JONES EDMUNDS

July 16, 2013

Syed Arif, PE
Environmental Administrator
Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
2600 Blair Stone Road
MS 5500
Tallahassee, Florida 32399-2400

Re: New River Solid Waste Association
New River Regional Landfill
Air Operations Permit Renewal Application
Facility No. 1250008
Jones Edmunds Project No.: 14040-046-01-5000

Dear Mr. Arif:

On behalf of New River Solid Waste Association (NRSWA), Jones Edmunds & Associates, Inc. is providing the enclosed Air Operations Permit Renewal Application for the New River Regional Landfill (NRRL). This application is being provided electronically.

NRSWA owns and operates the NRRL in Union County, Florida. The NRRL is a municipal solid waste disposal facility, which consists of a Class I Landfill and a separate Class III Landfill.

The NRRL is regulated under 40 CFR 60 Subpart WWW (NSPS for Landfills) and 40 CFR 63 Subpart AAAA (NESHAP for Landfills). The current Air Operations Permit (1250008-005-AV) was issued May 20, 2011 and includes the following emissions units:

- **EU-001—**Class I Landfill (Cells 1 through 5)/Class III Landfill/gas collection system/non-assisted utility flare.

- **EU-002—**Fugitive Non-Methane Organic Compounds (NMOC) Emissions and Hazardous Air Pollutant (HAP) emissions from the natural decomposition

reactions associated with the landfill that are not collected by the landfill gas collection system.

This permit application is to 1) renew the existing air operations permit that expires on April 16, 2014 and 2) incorporate the terms and conditions of the Air Construction Permit (125008-006-AC) for the following emissions units:

- **EU-001**
    - NRSWA replaced the existing 2,400-standard-cubic-feet-per-minute (scfm) flare and blower station (EU-001) with a new 3,000-scfm flare and blower station (EU-004). Furthermore, the 2,400-scfm flare will be not used as a backup flare device, as proposed in the Air Construction Permit Application, and will be decommissioned. Therefore, EU-001 may be removed from the permit.
- **EU-002**
    - The additional fugitive emissions from the proposed Class I Cell 6 expansion have been incorporated.
- **EU-004**
    - The landfill recently was issued solid waste permit 13500-023-SC to construct and operate a new solid waste disposal area (Cell 6) located adjacent to existing Cells 1 through 5. Cell 6 will increase the Class I disposal capacity by approximately 1.3 million megagrams; the existing permitted disposal capacity of Cells 1 through 5 is 3.7 million megagrams.
    - In addition to constructing the landfill expansion, NRSWA replaced the existing 2,400-scfm flare and blower station (EU-001) with a new 3,000-scfm flare and blower station (EU-004). This proposed new flare and blower station will provide adequate flaring capacity for Cells 1 through 6 and for the next potential cell expansion.
    - As part of the expansion process, NRSWA conducted site-specific testing for NMOC concentrations in landfill gas from the Class I and Class III Landfills. Because the Class I Landfill has a greater design capacity as well as higher NMOC concentrations than the Class III Landfill, we have calculated that the Class III Landfill contributes less than 1% of the total

NMOC emissions from the site and may be considered a nonproductive area in accordance with 40 CFR 60.759(a)(3)(ii). This request was sent under separate cover on July 5, 2011, and the removal of the Class III Landfill from the GCCS has been shown on the Design Plan and permit application.

- Greenhouse gas emissions are evaluated in accordance with the Prevention of Significant Deterioration (PSD) Major Source permitting program subject to the thresholds in 40 CFR 52.21(b)(49)(v).

- **Insignificant Emissions Units**

  - Site internal combustion engines that fall under the conditional exemption for internal combustion engines in Rule 62-210.300(3)(a)(35), FAC, are identified.

Please contact me at (352) 377-5821 or greinhart@jonesedmunds.com if you have any questions regarding this application package.

Sincerely,

George Reinhart, PhD, PE
Project Engineer

\\Gnv-docp\docprod\14040\046015000\2013-07-16_LTR_AirPermit_SArif_FDEP.doc

Enclosures

xc: Darrell O'Neal, New River Solid Waste Association
Joel Woolsey, Jones Edmunds

AIR OPERATIONS PERMIT RENEWAL APPLICATION FOR THE NEW RIVER REGIONAL LANDFILL FACILITY NO. 1250008

Department of
Environmental Protection

Division of Air Resource Management

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit:

- For any required purpose at a facility operating under a federally enforceable state air operation permit (FESOP) or Title V air operation permit;
- For a proposed project subject to prevention of significant deterioration (PSD) review, nonattainment new source review, or maximum achievable control technology (MACT);
- To assume a restriction on the potential emissions of one or more pollutants to escape a requirement such as PSD review, nonattainment new source review, MACT, or Title V; or
- To establish, revise, or renew a plantwide applicability limit (PAL).

Air Operation Permit – Use this form to apply for:

- An initial federally enforceable state air operation permit (FESOP); or
- An initial, revised, or renewal Title V air operation permit.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: New River Solid Waste Association	
2. Site Name: New River Regional Landfill	
3. Facility Identification Number: 125008	
4. Facility Location... Street Address or Other Locator: 24276 NE 157th Street City: Raiford County: Union Zip Code: 32083	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: Joel Woolsey
2. Application Contact Mailing Address... Organization/Firm: Jones Edmunds & Associates, Inc. Street Address: 730 NE Waldo Road City: Gainesville State: Florida Zip Code: 32641
3. Application Contact Telephone Numbers... Telephone: (352) 377 - 5821 ext. 1358 Fax: (352) 377 - 3166
4. Application Contact E-mail Address: jwoolsey@jonesedmunds.com

Application Processing Information (DEP Use)

1. Date of Receipt of Application:	3. PSD Number (if applicable):
2. Project Number(s):	4. Siting Number (if applicable):

APPLICATION INFORMATION

Purpose of Application

This application for air permit is being submitted to obtain: (Check one)

Air Construction Permit

☐ Air construction permit.

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL).

☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL), and separate air construction permit to authorize construction or modification of one or more emissions units covered by the PAL.

Air Operation Permit

☐ Initial Title V air operation permit.

☒ Title V air operation permit revision.

☒ Title V air operation permit renewal.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.

☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

☐ Air construction permit and Title V permit revision, incorporating the proposed project.

☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

☐ I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

This permit is being submitted to renew the expiring Air Operations Permit (1250008-005-AV) and to incorporate the terms and conditions of the Air Construction Permit (1250008-006-AC).

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Processing Fee
002	Fugitive NMOC emissions and hazardous air pollutants (HAPs) emission from the natural decomposition reactions associated with the landfill which are not collected by the landfill	N/A	N/A
004	3,000 scfm open, non-assisted Flare and Blower Station.	N/A	N/A

Application Processing Fee

Check one: ☐ Attached - Amount: $_____ ☒ Not Applicable

APPLICATION INFORMATION

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1. Owner/Authorized Representative Name : Perry Kent

2. Owner/Authorized Representative Mailing Address...
   Organization/Firm: New River Solid Waste Association
   Street Address: PO Box 647
   City: Raiford State: Florida Zip Code: 32083

3. Owner/Authorized Representative Telephone Numbers...
   Telephone: (386) 431-1000 ext. Fax: (386) 431-1099

4. Owner/Authorized Representative E-mail Address: pkent@nrswa.org

5. Owner/Authorized Representative Statement:

   I, the undersigned, am the owner or authorized representative of the corporation, partnership, or other legal entity submitting this air permit application. To the best of my knowledge, the statements made in this application are true, accurate and complete, and any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department.

   Perry Kent
   Signature

   7-12-13
   Date

APPLICATION INFORMATION

Application Responsible Official Certification

Complete if applying for an initial, revised, or renewal Title V air operation permit or concurrent processing of an air construction permit and revised or renewal Title V air operation permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name: Darrell O'Neal

2. Application Responsible Official Qualification (Check one or more of the following options, as applicable):

- ☐ For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C.
- ☐ For a partnership or sole proprietorship, a general partner or the proprietor, respectively.
- ☒ For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official.
- ☐ The designated representative at an Acid Rain source or CAIR source.

3. Application Responsible Official Mailing Address...
Organization/Firm: New River Solid Waste Association
Street Address: PO Box 647
City: Raiford State: Florida Zip Code: 32083-0647

4. Application Responsible Official Telephone Numbers...
Telephone: ( ) - ext. Fax: ( ) -

5. Application Responsible Official E-mail Address: doneal@nrswa.org

APPLICATION INFORMATION

6. Application Responsible Official Certification:

I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

Signature

7-12-13
Date

APPLICATION INFORMATION

Professional Engineer Certification

1. Professional Engineer Name: George Reinhart, PE
   Registration Number: 66516
2. Professional Engineer Mailing Address...
   Organization/Firm: Jones Edmunds & Associates, Inc.
   Street Address: 730 NE Waldo Road
   City: Gainesville State: Florida Zip Code: 32641
3. Professional Engineer Telephone Numbers...
   Telephone: (352) 377 - 5821 ext. 1346 Fax: (352) 377 - 3166
4. Professional Engineer E-mail Address:
5. Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☒ *, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.*

(4) If the purpose of this application is to obtain an air construction permit (check here ☐ *, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here* ☐ *, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.*

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here , if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

GEORGE REINHART LICENSE NO. 66516 STATE OF FLORIDA PROFESSIONAL ENGINEER

Signature (seal) Date: 7/11/13

* Attach any exception to certification statement.

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone 17 East (km) 382.8 North (km) 3330.3		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) 30/06/00 Longitude (DD/MM/SS) 82/13/00	
3. Governmental Facility Code: 3	4. Facility Status Code: A	5. Facility Major Group SIC Code: 49	6. Facility SIC(s): 4953
7. Facility Comment : Facility is a Municipal Solid Waste disposal facility that uses an open (candlestick) flare to destroy collected landfill gas per 40 CFR 60 Subpart WWW.			

Facility Contact

1. Facility Contact Name: Perry Kent
2. Facility Contact Mailing Address... Organization/Firm: New River Solid Waste Association Street Address: PO Box 647. City: Raiford State: Florida Zip Code: 32083
3. Owner/Authorized Representative Telephone Numbers... Telephone: (386) 431-1000 ext. Fax: (386) 431-1099
4. Owner/Authorized Representative E-mail Address: doneal@nrswa.org

Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name: Darrell O'Neal
2. Owner/Authorized Representative Mailing Address... Organization/Firm: New River Solid Waste Association Street Address: PO Box 647. City: Raiford State: Florida Zip Code: 32083
3. Owner/Authorized Representative Telephone Numbers... Telephone: (386) 431-1000 ext. Fax: (386) 431-1099
4. Owner/Authorized Representative E-mail Address: doneal@nrswa.org

FACILITY INFORMATION

Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a "major source" and a "synthetic minor source."

1. ☐ Small Business Stationary Source	☐ Unknown
2. ☐ Synthetic Non-Title V Source	
3. ☒ Title V Source	
4. ☒ Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. ☐ Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. ☐ Major Source of Hazardous Air Pollutants (HAPs)	
7. ☐ Synthetic Minor Source of HAPs	
8. ☒ One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. ☐ One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. ☒ One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. ☒ Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	
12. Facility Regulatory Classifications Comment: This facility is a Title V source subject to NSPS for MSW Landfills, 62-204.800 FAC and 40 CFR 60, Subpart WWW. The facility is also subject to 40 CFR 63 Subpart AAAA, Subpart M, and Subpart ZZZZ	

FACILITY INFORMATION

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
NMOC	B	N
PM	B	N
CO	B	N
NO_X	B	N
SO_2	B	N
VOC	B	N
HAPs	B	N
Greenhouse Gasses (GHG)	B	N

B. EMISSIONS CAPS

Facility-Wide or Multi-Unit Emissions Caps

1. Pollutant Subject to Emissions Cap	2. Facility-Wide Cap [Y or N]? (all units)	3. Emissions Unit ID's Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap

7. Facility-Wide or Multi-Unit Emissions Cap Comment:

C. FACILITY ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1.	Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: C.1 ☐ Previously Submitted, Date:
2.	Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: C.2 ☐ Previously Submitted, Date:
3.	Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☒ Attached, Document ID: C.3 ☐ Previously Submitted, Date:

Additional Requirements for Air Construction Permit Applications (N/A)

1.	Area Map Showing Facility Location: ☐ Attached, Document ID: ☒ Not Applicable (existing permitted facility)
2.	Description of Proposed Construction, Modification, or Plantwide Applicability Limit (PAL): ☐ Attached, Document ID:
3.	Rule Applicability Analysis: ☐ Attached, Document ID:
4.	List of Exempt Emissions Units: ☐ Attached, Document ID: ☒ Not Applicable (no exempt units at facility)
5.	Fugitive Emissions Identification: ☐ Attached, Document ID: ☒ Not Applicable
6.	Air Quality Analysis (Rule 62-212.400(7), F.A.C.): ☐ Attached, Document ID: ☒ Not Applicable
7.	Source Impact Analysis (Rule 62-212.400(5), F.A.C.): ☐ Attached, Document ID: ☒ Not Applicable
8.	Air Quality Impact since 1977 (Rule 62-212.400(4)(e), F.A.C.): ☐ Attached, Document ID: ☒ Not Applicable
9.	Additional Impact Analyses (Rules 62-212.400(8) and 62-212.500(4)(e), F.A.C.): ☐ Attached, Document ID: ☒ Not Applicable
10.	Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☐ Attached, Document ID: ☒ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for FESOP Applications (N/A)

1. List of Exempt Emissions Units:
   ☐ Attached, Document ID:_____ ☒ Not Applicable (no exempt units at facility)

Additional Requirements for Title V Air Operation Permit Applications

1. List of Insignificant Activities: (Required for initial/renewal applications only)
   ☒ Attached, Document ID: C.4 ☐ Not Applicable

2. Identification of Applicable Requirements: (Required for initial/renewal applications, and for revision applications if this information would be changed as a result of the revision being sought)
   ☒ Attached, Document ID: C.5
   ☐ Not Applicable

3. Compliance Report and Plan: (Required for all initial/revision/renewal applications)
   ☒ Attached, Document ID: C.6
   Note: A compliance plan must be submitted for each emissions unit that is not in compliance with all applicable requirements at the time of application and/or at any time during application processing. The department must be notified of any changes in compliance status during application processing.

4. List of Equipment/Activities Regulated under Title VI: (If applicable, required for initial/renewal applications only)
   ☐ Attached, Document ID:_____
   ☐ Equipment/Activities Onsite but Not Required to be Individually Listed
   ☒ Not Applicable

5. Verification of Risk Management Plan Submission to EPA: (If applicable, required for initial/renewal applications only)
   ☐ Attached, Document ID:_____ ☒ Not Applicable

6. Requested Changes to Current Title V Air Operation Permit:
   ☒ Attached, Document ID: C.7 ☐ Not Applicable

C. FACILITY ADDITIONAL INFORMATION (CONTINUED) (N/A)

Additional Requirements for Facilities Subject to Acid Rain, CAIR, or Hg Budget Program

1. Acid Rain Program Forms:

   Acid Rain Part Application (DEP Form No. 62-210.900(1)(a)):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable (not an Acid Rain source)

   Phase II NO_X Averaging Plan (DEP Form No. 62-210.900(1)(a)1.):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable

   New Unit Exemption (DEP Form No. 62-210.900(1)(a)2.):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable

2. CAIR Part (DEP Form No. 62-210.900(1)(b)):
   ☐ Attached, Document ID:_____ ☐ Previously Submitted, Date:_____
   ☒ Not Applicable (not a CAIR source)

Additional Requirements Comment

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for an initial, revised or renewal Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for an air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised or renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes, and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit addressed in this application that is subject to air construction permitting and for each such emissions unit that is a regulated or unregulated unit for purposes of Title V permitting. (An emissions unit may be exempt from air construction permitting but still be classified as an unregulated unit for Title V purposes.) Emissions units classified as insignificant for Title V purposes are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   [X] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   [ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   [ ] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   [ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   [X] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
   Fugitive NMOC emissions and hazardous air pollutants (HAPs) emission from the natural decomposition reactions associated with the landfill which are not collected by the landfill gas collection system

3. Emissions Unit Identification Number: EU 002

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:
A	07/1992	07/1992	49

8. Federal Program Applicability: (Check all that apply)

   [ ] Acid Rain Unit

   [ ] CAIR Unit

9. Package Unit: N/A
   Manufacturer: N/A Model Number: N/A

10. Generator Nameplate Rating: N/A

11. Emissions Unit Comment:
    Landfill gas that cannot be reasonably collected by the gas collection system vents to the atmosphere as fugitive emissions. The collection efficiency of the NRRL Class I Landfill GCCS has been estimated as 75%, in accordance with AP-4, Section 2.4.4.2.

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

B. EMISSIONS UNIT CAPACITY INFORMATION
(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate:	
2. Maximum Production Rate: 495 scfm fugitive landfill gas (2011 Design Plan)	
3. Maximum Heat Input Rate: million Btu/hr	
4. Maximum Incineration Rate: pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	
24 hours/day	7 days/week
52 weeks/year	8,760 hours/year
6. Operating Capacity/Schedule Comment: Landfill gas generation is a biological process that operates continuously. The landfill gas production rate changes over time. Refer to 2011 Design Plan for details on the modeled landfill gas generation rate.	

C. EMISSION POINT (STACK/VENT) INFORMATION

(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: Class I Landfill	2. Emission Point Type Code: 4	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking: Fugitive emissions from the Class I. Uncontrolled emissions from the Class III landfill are included under EU-004.		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: 002		
5. Discharge Type Code: F	6. Stack Height:	7. Exit Diameter:
8. Exit Temperature: 100°F ±	9. Actual Volumetric Flow Rate:	10. Water Vapor:
11. Maximum Dry Standard Flow Rate:	12. Nonstack Emission Point Height: 0 (Landfill)	
13. Emission Point UTM Coordinates... Zone: East (km): North (km):	14. Emission Point Latitude/Longitude… Latitude (DD/MM/SS) Longitude (DD/MM/SS)	
15. Emission Point Comment: Fugitive emissions from the Class I Landfill.		

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 1

1. Segment Description (Process/Fuel Type): Fugitive landfill gas **not** collected by the facility gas collection and control system, consisting of approximately 50% Methane (CH_4) and 50% Carbon Dioxide ($C0_2$).		
2. Source Classification Code (SCC): 50100402	3. SCC Units: Million Cubic Feet Waste Gas Generated	
4. Maximum Hourly Rate: 0.0297	5. Maximum Annual Rate: 260	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: 0.01	8. Maximum % Ash: N/A	9. Million Btu per SCC Unit: 5 x 10^8 MMBtu/MMSCF
10. Segment Comment: Maximum annual rate is based on the highest annual rate of landfill gas production using a 75% collection efficiency per AP-42, Section 2.4.4.2. 25% of the landfill gas produced cannot be reasonably collected by the gas collection system and vents to the atmosphere as fugitive emissions. 495 ft^3/min x 60 min/hr ÷ 10^6 ft^3/million ft^3 = 0.0297 million ft^3/hr 0.0297 million ft^3/hr x 8,760 hr/yr = 260 million ft^3/yr 500 BTU/ft^3 x 1x10^6 ft^3/million ft^3 = 5.00 x 10^8 million BTU/million ft^3		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
NMOC	N/A	N/A	NS
VOC	N/A	N/A	NS
HAPs	N/A	N/A	NS
GHG	N/A	N/A	NS

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: NMOC	2. Total Percent Efficiency of Control:
3. Potential Emissions: 4.1 lb/hour 17.8 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: C_{NMOC} = 621 ppmv (as hexane) Reference: Landfill Test Report, Cubix Corp, May 2011	7. Emissions Method Code: 1
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for NMOC fugitive emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: VOC	2. Total Percent Efficiency of Control:
3. Potential Emissions: 1.6 lb/hour 6.9 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: C_{NMOC} = 621 ppmv (as hexane) Reference: Landfill Test Report, Cubix Corp, May 2011 VOCs taken as 39% of NMOC per AP-42 Section 2.4	7. Emissions Method Code: 3
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for VOC fugitive emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: HAPs	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.5 lb/hour 2.2 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Varies (see Attachment C.8) Reference:	7. Emissions Method Code: 1 / 3
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for HAPs fugitive emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: GHG	2. Total Percent Efficiency of Control:
3. Potential Emissions: 47,814 lb/hour 209,425 tons/year (CO_2e)	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Varies (see Attachment C.8) Reference:	7. Emissions Method Code: 1 / 3
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for GHG fugitive emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation __ of ____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

Visible Emissions Limitation: Visible Emissions Limitation __ of ____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: ☐ Rule ☐ Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor _ of _

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement: ☐ Rule ☐ Other	
4. Monitor Information... Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

Continuous Monitoring System: Continuous Monitor _ of _

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement: ☐ Rule ☐ Other	
4. Monitor Information... Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: C.2 [ ] Previously Submitted, Date _____

2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: I.2 [ ] Previously Submitted, Date _____

3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: I.3 [ ] Previously Submitted, Date _____

4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: I.4 [ ] Previously Submitted, Date _____
   [ ] Not Applicable (construction application)

5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   [X] Attached, Document ID: I.5 [ ] Previously Submitted, Date _____
   [ ] Not Applicable

6. Compliance Demonstration Reports/Records:
   [X] Attached, Document ID: I.6
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   [ ] Previously Submitted, Date: _____
   Test Date(s)/Pollutant(s) Tested: _____
   [ ] To be Submitted, Date (if known): _____
   Test Date(s)/Pollutant(s) Tested: _____
   _____
   [ ] Not Applicable

   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute:
   [ ] Attached, Document ID: _____ [X] Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications (N/A)

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: _____ ☒ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications (N/A)

1. Identification of Applicable Requirements: ☐ Attached, Document ID: _____
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: _____ ☒ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements Comment

EMISSIONS UNIT INFORMATION
Section [2] of [2]

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   [X] The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   [ ] The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   [X] This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   [ ] This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   [ ] This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:
   The Class III Landfill has been removed from the GCCS as a non-productive area. All emissions from the Class III Landfill have been included as uncontrolled emissions.

3. Emissions Unit Identification Number: EU 004

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:
A	07/1992 Landfill 01/2012 Flare	07/1992 Landfill 01/2013 Flare	49

8. Federal Program Applicability: (Check all that apply)

   [ ] Acid Rain Unit

   [ ] CAIR Unit

9. Package Unit: N/A
   Manufacturer: N/A Model Number: N/A

10. Generator Nameplate Rating: N/A

11. Emissions Unit Comment:
    A new 3,000 scfm open flare and Class I Landfill. The Class I landfill has approximately 5.0 Million Megagrams of solid waste disposal capacity.

EMISSIONS UNIT INFORMATION
Section [2] of [2]

Emissions Unit Control Equipment/Method: Control 1 of 1

1. Control Equipment/Method Description: Active (vacuum) Landfill Gas Collection System with a candle-stick flare destruction device designed and operated in accordance with 40 CFR 60.18.
2. Control Device or Method Code: 23 - Flaring

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

Emissions Unit Control Equipment/Method: Control ___ of ___

1. Control Equipment/Method Description:
2. Control Device or Method Code:

B. EMISSIONS UNIT CAPACITY INFORMATION
(Optional for unregulated emissions units.)

Emissions Unit Operating Capacity and Schedule

1. Maximum Process or Throughput Rate: 3,000 cfm of LFG	
2. Maximum Production Rate:	
3. Maximum Heat Input Rate: million Btu/hr	
4. Maximum Incineration Rate: pounds/hr tons/day	
5. Requested Maximum Operating Schedule:	
24 hours/day	7 days/week
52 weeks/year	8,760 hours/year
6. Operating Capacity/Schedule Comment: The Class I and Class III landfills are a biological process that operate continuously. The maximum rate shown is the maximum capacity of the control device, and does not indicate the maximum landfill gas production rate of the landfill. The landfill gas production rate changes over time. Refer to Attachment C.8 for details on the modeled landfill gas generation rate.	

C. EMISSION POINT (STACK/VENT) INFORMATION

(Optional for unregulated emissions units.)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram: 3,000 scfm Flare and Blower Station	2. Emission Point Type Code: 1	
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking: Candle-stick flare unit		
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common: 004		
5. Discharge Type Code: V	6. Stack Height: 36 feet	7. Exit Diameter: 1 foot
8. Exit Temperature: 1200-1400°F ±	9. Actual Volumetric Flow Rate: 3000 acfm	10. Water Vapor: N/A
11. Maximum Dry Standard Flow Rate: N/A	12. Nonstack Emission Point Height: N/A feet	
13. Emission Point UTM Coordinates... Zone: East (km): North (km):	14. Emission Point Latitude/Longitude… Latitude (DD/MM/SS) 30/05/31 Longitude (DD/MM/SS) 82/12/05	
15. Emission Point Comment: Technical Specifications for the non-assisted utility flare are provided in Attachment I.3.		

D. SEGMENT (PROCESS/FUEL) INFORMATION

Segment Description and Rate: Segment 1 of 2

1. Segment Description (Process/Fuel Type): Class I landfill gas collected by the facility gas collection and control system, consisting of approximately 50% Methane (CH4) and 50% Carbon Dioxide (C02) at a maximum flow rate of 3,000 cfm.		
2. Source Classification Code (SCC): 50100410	3. SCC Units: Million Cubic Feet Waste Gas Burned	
4. Maximum Hourly Rate: 0.18	5. Maximum Annual Rate: 1,577	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: 0.01	8. Maximum % Ash: N/A	9. Million Btu per SCC Unit: 5 x 10^8 MMBtu/MMSCF
10. Segment Comment: 3,000 ft^3/min x 60 min/hr ÷ 10^6 ft^3/million ft^3 = 0.18 million ft^3/hr 0.18 million ft^3/hr x 8,760 hr/yr = 1,577 million ft^3/yr 500 BTU/ft^3 x 1x10^6 ft^3/million ft^3 = 5.00 x 10^8 million BTU/million ft^3		

Segment Description and Rate: Segment 2 of 2

1. Segment Description (Process/Fuel Type): Uncontrolled emissions from the Class III landfill.		
2. Source Classification Code (SCC): 50100403	3. SCC Units: Million Cubic Feet Waste Gas Generated	
4. Maximum Hourly Rate: 0.0021	5. Maximum Annual Rate: 18.4	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur: 0.01	8. Maximum % Ash: N/A	9. Million Btu per SCC Unit:
10. Segment Comment: Refer to 2011 Design Plan for details on landfill gas generation rates. (35 ft^3/min) x (60 min/hr) / (10^6 ft^3/million ft^3) = 0.0021 million ft^3/hr (0.0021 million ft^3/hr) x (8,760 hr/yr) = 18.4 million ft^3/yr		

D. SEGMENT (PROCESS/FUEL) INFORMATION (CONTINUED)

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

Segment Description and Rate: Segment __ of __

1. Segment Description (Process/Fuel Type):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment:		

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
NMOC	023	N/A	NS
PM	023	N/A	NS
CO	023	N/A	NS
NO_X	023	N/A	NS
SO_2	023	N/A	NS
HAPs	N/A	N/A	NS
GHG	N/A	N/A	NS

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: NMOC	2. Total Percent Efficiency of Control: 98.0% (Flare)
3. Potential Emissions: 0.5 lb/hour 2.1 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: C_{NMOC} = 621 ppmv (as hexane) Reference: Landfill Test Report, Cubix Corp, May 2011	7. Emissions Method Code: 1
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for NMOC potential emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

<u>Allowable Emissions</u> Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: PM	2. Total Percent Efficiency of Control:
3. Potential Emissions: 1.4 lb/hour 5.9 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 1.5 x 10^{1} lb PM/million dry standard ft^3 CH_4 Reference: AP-42, Draft Section 2.4	7. Emissions Method Code: 3
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for PM potential emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

<u>Allowable Emissions</u> Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: CO	2. Total Percent Efficiency of Control:
3. Potential Emissions: 4.1 lb/hour 18.1 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 4.6 x 10^{1} lb CO/million dry standard ft^3 CH_4 Reference: AP-42, Draft Section 2.4	7. Emissions Method Code: 3
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for CO potential emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: NOX	2. Total Percent Efficiency of Control:
3. Potential Emissions: 3.5 lb/hour 15.4 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: 3.9 x 10^{1} lb NO_X/million dry standard ft^3 CH_4 Reference: AP-42, Draft Section 2.4	7. Emissions Method Code: 3
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for NOX potential emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: SO2	2. Total Percent Efficiency of Control:
3. Potential Emissions: 1.0 lb/hour 4.3 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: C_S = 33 ppmv Reference: AP-42, Draft Section 2.4	7. Emissions Method Code: 1
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for SO2 potential emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: HAPs	2. Total Percent Efficiency of Control:
3. Potential Emissions: 0.05 lb/hour 0.2 tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Varies (see Attachment C.8) Reference:	7. Emissions Method Code: 1 / 3
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for Class III Landfill uncontrolled HAPs potential emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

<u>Allowable Emissions</u> Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

<u>Allowable Emissions</u> Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL, FUGITIVE, AND ACTUAL EMISSIONS

(Optional for unregulated emissions units.)

Complete a Subsection F1 for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V operation permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

Potential, Estimated Fugitive, and Baseline & Projected Actual Emissions

1. Pollutant Emitted: GHG	2. Total Percent Efficiency of Control: 98.0% (Flare)
3. Potential Emissions: 3,657 lb/hour 16,019 tons/year (CO_2e)	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: Varies (see Attachment C.8) Reference:	7. Emissions Method Code: 3
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: See Attachment C.8 for GHG potential emissions calculations.	
11. Potential, Fugitive, and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete Subsection F2 if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

Allowable Emissions Allowable Emissions __ of ___

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

G. VISIBLE EMISSIONS INFORMATION

Complete Subsection G if this emissions unit is or would be subject to a unit-specific visible emissions limitation.

Visible Emissions Limitation: Visible Emissions Limitation 1 of 1

1. Visible Emissions Subtype: VE 20	2. Basis for Allowable Opacity: [X] Rule [ ] Other
3. Allowable Opacity: Normal Conditions: 20 % Exceptional Conditions: 0 % Maximum Period of Excess Opacity Allowed: 5 min / 2 hr period min/hour	
4. Method of Compliance: Flare to be tested annually in accordance with EPA Method 22 (Rule 40 CFR 60.18(f)(1)). EPA Method 22 test shall last 2 hours (Rule 40 CFR 60.18(f)(1)).	
5. Visible Emissions Comment: The visible emissions limit for the flare must comply with 40 CFR 60.18 (no visible emissions, except for periods not to exceed a total of five minutes during any two consecutive hours).	

Visible Emissions Limitation: Visible Emissions Limitation __ of ____

1. Visible Emissions Subtype:	2. Basis for Allowable Opacity: [ ] Rule [ ] Other
3. Allowable Opacity: Normal Conditions: % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance:	
5. Visible Emissions Comment:	

H. CONTINUOUS MONITOR INFORMATION

Complete Subsection H if this emissions unit is or would be subject to continuous monitoring.

Continuous Monitoring System: Continuous Monitor 1 of 1

1. Parameter Code: FO – Flame Outage	2. Pollutant(s):
3. CMS Requirement: Rule: 40 CFR 60.756 (c)(1) ☒ Rule ☐ Other	
4. Monitor Information... Manufacturer: LFG Specialties Model Number: Thermocouple Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment: Thermocouple meeting the requirements of 60.756(c)(1).	

Continuous Monitoring System: Continuous Monitor _ of _

1. Parameter Code:	2. Pollutant(s):
3. CMS Requirement: ☐ Rule ☐ Other	
4. Monitor Information... Manufacturer: Model Number: Serial Number:	
5. Installation Date:	6. Performance Specification Test Date:
7. Continuous Monitor Comment:	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: C.2 [ ] Previously Submitted, Date _____

2. Fuel Analysis or Specification: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: I.2 [ ] Previously Submitted, Date _____

3. Detailed Description of Control Equipment: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: I.3 [ ] Previously Submitted, Date _____

4. Procedures for Startup and Shutdown: (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: I.4 [ ] Previously Submitted, Date _____
[ ] Not Applicable (construction application)

5. Operation and Maintenance Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
[X] Attached, Document ID: I.5 [ ] Previously Submitted, Date _____
[ ] Not Applicable

6. Compliance Demonstration Reports/Records:
[X] Attached, Document ID: I.6
Test Date(s)/Pollutant(s) Tested: _____
[ ] Previously Submitted, Date: _____
Test Date(s)/Pollutant(s) Tested: _____
[ ] To be Submitted, Date (if known): _____
Test Date(s)/Pollutant(s) Tested: _____
[ ] Not Applicable

Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.

7. Other Information Required by Rule or Statute:
[ ] Attached, Document ID: _____ [X] Not Applicable

I. EMISSIONS UNIT ADDITIONAL INFORMATION (CONTINUED)

Additional Requirements for Air Construction Permit Applications (N/A)

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)): ☐ Attached, Document ID: _____ ☒ Not Applicable
2. Good Engineering Practice Stack Height Analysis (Rules 62-212.400(4)(d) and 62-212.500(4)(f), F.A.C.): ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Description of Stack Sampling Facilities: (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements for Title V Air Operation Permit Applications (N/A)

1. Identification of Applicable Requirements: ☐ Attached, Document ID: _____
2. Compliance Assurance Monitoring: ☐ Attached, Document ID: _____ ☒ Not Applicable
3. Alternative Methods of Operation: ☐ Attached, Document ID: _____ ☒ Not Applicable
4. Alternative Modes of Operation (Emissions Trading): ☐ Attached, Document ID: _____ ☒ Not Applicable

Additional Requirements Comment

ATTACHMENT C.1

FACILITY PLOT PLAN

LEGEND

- PROPERTY LINE
- LIMITS OF WASTE
- LIMITS OF CELLS

STATE ROAD 121

ENTRANCE GATE

RECYCLING CENTER

STORMWATER POND

SCALE HOUSE /OFFICE

STORMWATER POND

CITIZEN'S DROP-OFF AREA

MAINTENANCE AND EQUIPMENT BUILDING

STORMWATER POND

OPERATORS BUILDING

STORMWATER POND

CLASS III LANDFILL
(EU 004)

CELL 6

CELL 5

CELL 4

CELL 1

CLASS I LANDFILL
(EU 002/EU 004)

CELL 2

CELL 3

LEACHATE AERATION/ STORAGE BASINS

WASTE TIRE STORAGE AREA

YARD WASTE PROCESSING FACILITY AND EQUIPMENT AREA

FUTURE LANDFILL GAS TO ENERGY FACILITY

NEW 3,000 SCFM FLARE AND BLOWER STATION (EU 004)

GRAPHIC SCALE

0 125 250 500

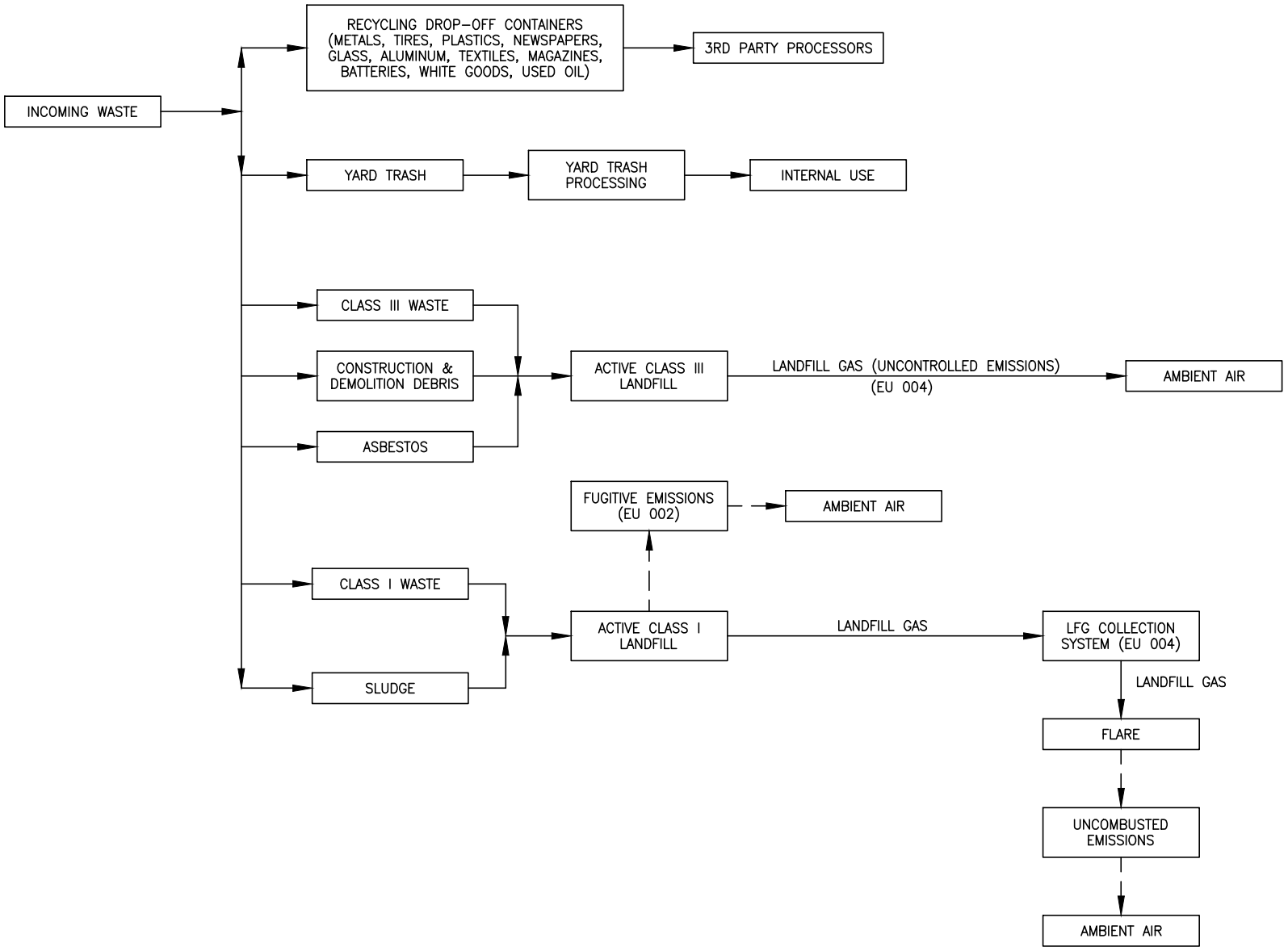
SCALE IN FEET

ATTACHMENT C.1
FACILITY PLOT PLAN
NEW RIVER REGIONAL LANDFILL
UNION COUNTY, FLORIDA

JONES EDMUNDS

ATTACHMENT C.2

PROCESS FLOW DIAGRAM



ATTACHMENT C.2/I.1
PROCESS FLOW DIAGRAM
NEW RIVER REGIONAL LANDFILL
UNION COUNTY, FLORIDA

JONES EDMUNDS

ATTACHMENT C.3

PRECAUTIONS TO PREVENT EMISSIONS OF UNCONFINED PARTICULATE MATTER

ATTACHMENT C.3
PRECAUTIONS TO PREVENT EMISSIONS OF UNCONFINED PARTICULATE MATTER

Unconfined particulate matter emissions at the landfill are caused by wind erosion and vehicular traffic on unpaved roads around the active phases of the landfill. Emissions of unconfined particulate matter will be prevented in several ways:

- The entrance road is paved from the connection at SR 121 to a point approximately 5,000 feet beyond the scalehouse, which should prevent dust and particulate matter emissions at the landfill entrance.

- Dust and particulate matter emissions will be controlled in landfilling areas by covering landfill intermediate or final cover slopes with vegetation and/or permitted cover material as soon as practical. Areas not active may be planted with grass cover to control dust and particulate matter.

- Additional dust and particulate matter problems internal to the landfill are to be addressed as such problems arise. Remedial methods such as watering, treating unpaved roadways with a dust control spray or mixture, etc. may be performed as required.

ATTACHMENT C.4

LIST OF INSIGNIFICANT ACTIVITIES

ATTACHMENT C.4
LIST OF EXEMPT EMISSIONS UNITS

As part of this application, the New River Solid Waste Association (NRSWA) requests that the New River Regional Landfill (NRRL) emissions units or pollutant-emitting activities that are listed in Rule 62-210.300(3)(a),FAC, Categorical Exemptions, or that meet the criteria specified in Rule 62-210.300(3)(b)(1), FAC, Generic Emissions Unit Exemption, be designated as insignificant. As such, such emissions units or activities are exempt from the permitting requirements of Chapters 62-210, 62-212, and 62-4, FAC, as long as the exempt emissions units or activities shall be subject to any applicable emissions limiting standard and the emissions from exempt emissions units or activities shall be considered in determining the potential emissions of the NRRL containing the exempt emissions units.

Emissions units and pollutant-emitting activities are exempt from permitting under Rules 62-210.300(3)(a) and (b)1, FAC if they are contained within a Title V source; however, such emissions units and activities shall be considered insignificant for Title V purposes if they also meet the criteria of Rule 62-213.430(6)(b), FAC.

The emissions units and/or activities listed below are considered insignificant in accordance with Rule 62-210.300(3)(a) or 62-213.430(6), FAC:

1. Stationary Internal Combustion Engines

Description – Emergency Generators	Year Acquired	HP
Cummins Fermont Diesel Generator (Shop)	2/17/06	Unknown (<500)
Mitsubishi/Generac Diesel Generator (Office)	9/25/06	60
Olympian Diesel Generator (Flare)	2002	85

Description - Miscellaneous ICE	Year Acquired	HP
Honda Gas Generator	8/2/99	11
Honda Gas Generator	8/2/99	11
Perkins/Wacker Portable Gas Generator	5/10/00	71
Perkins Diesel Pump with Trailer	1/14/04	84
Onan Diesel Floodlight Generator Set	2/17/05	20
John Deere 6-Inch Diesel Pump Set	9/19/05	80
Peterson Diesel Grinder	12/01/05	450
Morbark Diesel Grinder	11/08/06	325
Honda/Husqvarna Gas Generator	7/13/07	13

2. Vehicle Refueling Operations and Associated Fuel Storage

Tank Description	Volume (Gallons)
Unleaded Gasoline	500
Off-Road Diesel	4,000
Off-Road Diesel	1,000

The landfill also has various small storage tanks (<500 gallons) containing new and used motor oil, hydraulic fluid, antifreeze and other maintenance supplies.

ATTACHMENT C.5

IDENTIFICATION OF APPLICABLE REQUIREMENTS

ATTACHMENT C.5
IDENTIFICATION OF APPLICABLE REQUIREMENTS

FEDERAL

40 CFR Part 60, Subpart A	General Provisions
40 CFR Part 60, Subpart Cc	Emission Guidelines and Compliance Times for Municipal Solid Waste Landfills
40 CFR Part 60, Subpart WWW	Standards of Performance for Municipal Solid Waste (MSW) Landfills
40 CFR Part 60, Subpart IIII	Standards of Performance for Stationary Compression Ignition Internal Combustion Engines
40 CFR Part 60, Subpart JJJJ	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines
40 CFR Part 61, Subpart A	General Provisions
40 CFR Part 61, Subpart M	National Emission Standard for Asbestos
40 CFR Part 63, Subpart A	General Provisions
40 CFR Part 63, Subpart AAAA	National Emissions Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills
40 CFR Part 63, Subpart ZZZZ	National Emissions Standards for Hazardous Air Pollutants: Stationary Reciprocating Internal Combustion Engines
40 CFR 70	State Operating Permit Program Consistent with Title V of the Clean Air Act

STATE

62-4, FAC	Permits
62-204, FAC	Air Pollution Control – Municipal Solid Waste Landfills
62-210, FAC	Stationary Sources – General Requirements
62-213, FAC	Operation Permits for Major Sources of Air Pollution
62-296, FAC	Stationary Sources – Emissions Standards
62-297, FAC	Stationary Sources – Emissions Monitoring

PREVENTION OF SIGNIFICANT DETERIORATION (PSD) EVALUATION (62-212.400, FAC)

The PSD requirements of 62-212.400, FAC do not apply to the Facility.

ATTACHMENT C.6

COMPLIANCE REPORT AND PLAN

ATTACHMENT C.6
COMPLIANCE REPORT AND PLAN

EU002

EU002 is currently in compliance with all applicable requirements and therefore does not require a compliance plan.

EU004

EU004 is currently in compliance with all applicable requirements and therefore does not require a compliance plan.

ATTACHMENT C.7

REQUESTED CHANGES TO CURRENT TITLE V AIR OPERATION PERMIT

ATTACHMENT C.7
REQUESTED CHANGES TO THE TITLE V OPERATION PERMIT

The proposed changes to the Title V Operation Permit are mainly to incorporate the terms and conditions of the Air Construction Permit (125008-006-AC) for the following emissions units:

EU-001

- NRSWA replaced the existing 2,400-standard-cubic-feet-per-minute (scfm) flare and blower station (EU-001) with a new 3,000-scfm flare and blower station (EU-004). Furthermore, the 2,400-scfm flare will be not used as a backup flare device, as proposed in the Air Construction Permit Application, and will be decommissioned. Therefore, EU-001 may be removed from the permit.

EU-002

- The additional fugitive emissions from the proposed Class I Cell 6 expansion have been incorporated.

EU-004

- The landfill recently was issued solid waste permit 13500-023-SC to construct and operate a new solid waste disposal area (Cell 6) located adjacent to existing Cells 1 through 5. Cell 6 will increase the Class I disposal capacity by approximately 1.3 million megagrams; the existing permitted disposal capacity of Cells 1 through 5 is 3.7 million megagrams.

- In addition to constructing the landfill expansion, NRSWA replaced the existing 2,400-scfm flare and blower station (EU-001) with a new 3,000-scfm flare and blower station (EU-004). This proposed new flare and blower station will provide adequate flaring capacity for Cells 1-6 and for the next potential cell expansion.

- As part of the expansion process, NRSWA conducted site-specific testing for NMOC concentrations in landfill gas from the Class I and Class III Landfills. Because the Class I Landfill has a greater design capacity as well as higher NMOC concentrations than the Class III Landfill, we have calculated that the Class III Landfill contributes less than 1% of the total NMOC emissions from the site and may be considered a nonproductive area in accordance with 40 CFR 60.759(a)(3)(ii). This request was sent under separate cover on July 5, 2011, and the removal of the Class III Landfill from the GCCS has been shown on the Design Plan and permit application.

- Greenhouse gas emissions are evaluated in accordance with the Prevention of Significant Deterioration (PSD) Major Source permitting program subject to the thresholds in 40 CFR 52.21(b)(49)(v).

Insignificant Emissions Units

- Site internal combustion engines that fall under the conditional exemption for internal combustion engines in Rule 62-210.300(3)(a)(35), FAC, are identified.

ATTACHMENT C.8

EMISSIONS CALCULATIONS

PROJECT NUMBER: 14040-046-01
PROJECT NAME: New River Regional Landfill, Facility 1250008
SUBJECT: Air Emissions Calculations - EU-002 PTE
BY: HBoudreau Date: 7/9/13
CHECKED BY: GReinhart Date: 7/12/13

OBJECTIVE: 1. Calculate the Facility potential to emit fugitive NMOC, HAPs and GHG

APPROACH: 1. Use site-specific emissions factors where available, and published emissions factors where site-specific data is not available
2. Use modeled Class I landfill gas generation rate to determine fugitive emissions

CALCULATIONS:

Class I Landfill Specifications		Units	Source
Maximum LFG Generation rate	1,980	scfm landfill gas	NRRL Design Plan, 2011
Maximum LFG Collection rate	1,485	scfm landfill gas	NRRL Design Plan, 2011
Fugitive LFG rate	495	scfm landfill gas	calculated
Methane / CO2 Concentration	50%	%	Assumed
Temperature LFG	25	C	AP-42, Section 2.4.4.1

Landfill Emissions Factors:

Emissions	Emission Factor	Units	Source
NMOC	6.21E+02	ppmv	May 5, 2011 site-specific testing
HAPS	See HAPs calculations	lb/MMCF CH4	AP-42, Table 2.4-1 and April 6, 2010 site-specific testing

GHG Global Warming Potential

Emissions	Emission Factor	Units	Source
CH_4 CO2e	21	CO2e	40 CFR 98, Table A-1
CO_2 CO2e	1	CO2e	40 CFR 98, Table A-1

CLASS I LANDFILL FUGITIVE EMISSIONS:

Fugitive CH_4 Emissions

CH_4 emissions factor	N/A	
Flow rate (LFG)	495	scfm
Flow rate (CH_4)	248	scfm
	7.01E+00	m^3/min
	3.68E+06	m^3/yr

$$UM_{CH4} = Q_{CH4}\left[\frac{MW \cdot 1atm}{8.205 \cdot 10^{-5} m^3 \cdot atm / gmol^{\circ}K \cdot 1000kg \cdot (273+^{\circ}C)}\right]$$

UM_{CH4}= 2.42E+06 kg/yr
2,664 ton/yr
55,940 ton/yr CO2e

Fugitive NMOC Emissions

NMOC emissions factor	6.21E+02	ppmv (as hexane)
Flow rate (LFG)	495	scfm
Flow rate (CH_4)	248	scfm
	7.01E+00	m^3/min

$$Q_{NMOC} = 2.0 \cdot Q_{CH_4} \cdot 525{,}600 \frac{\min}{yr} \cdot \frac{C_{NMOC}}{1 \cdot 10^6}$$

Q_{NMOC}= 4.57E+03 m^3/yr

$$UM_{NMOC} = Q_{NMOC}\left[\frac{MW \cdot 1atm}{8.205 \cdot 10^{-5} m^3 \cdot atm / gmol^{\circ}K \cdot 1000kg \cdot (273+^{\circ}C)}\right]$$

UM_{NMOC}= 1.61E+04 kg/yr
17.78 ton/yr

CLASS I LANDFILL FUGITIVE EMISSIONS (Continued):

Fugitive CO2 Emissions

CO2 emissions factor	N/A	
Flow rate (LFG)	495	scfm
Flow rate (CO2)	248	scfm
	7.01E+00	m^3/min
	3.68E+06	m^3/yr

$$UM_{CO2} = Q_{CO2}\left[\frac{MW \cdot 1atm}{8.205 \cdot 10^{-5} m^3 \cdot atm / gmol^{\circ}K \cdot 1000kg \cdot (273+^{\circ}C)}\right]$$

UM_{CO2}=	6.63E+06	kg/yr
	7,309	ton/yr
	153,485	**ton/yr CO2e**

Fugitive HAP Emissions

See attached HAP calculations

Total HAPs	**2.2 TPY**
Maximum HAP (Toluene)	**0.6 TPY**

SUMMARY

Emissions Rates (EU-002), Post-Modification Potential To Emit:

Pollutant	Emissions (TPY)	Emissions (lb/hr)
CH4 (CO2e)	55,940	12,772
CO2 (CO2e)	153,485	35,042
Total GHG	209,425	47,814
NMOC	17.8	4.1
VOC[1]	6.9	1.6
HAPS (total)	2.2	0.5
HAP (individual)	0.6	0.1

1 - VOCs taken as 39% of NMOC per AP-42 Section 2.4

PROJECT NUMBER: 14040-033-01 SHEET: 1 OF 5
PROJECT NAME: New River Regional Landfill, Facility 1250008
SUBJECT: Air Emissions Calculations - EU-004 PTE
BY: HBoudreau Date: 7/9/13
CHECKED BY: GReinhart Date: 7/12/13

OBJECTIVE: 1. Calculate the emissions at 100% operating capacity for the new non-assisted utility flare
2. Calculate the uncontrolled NMOC, HAPs and GHG emissions from the Class III Landfill

APPROACH: 1. Use site-specific emissions factors where available, and published emissions factors where site-specific data is not available
2. Use modeled Class III landfill gas generation rate to determine uncontrolled emissions

CALCULATIONS:

Flare Specifications at 100% load		**Units**	**Source**
Flare Capacity	3,000	scfm landfill gas	Flare manufacturer
Methane /CO2%	50%	%	Assumed
Btu value of LFG	500	Btu/scf LFG	Calculated
Temperature LFG	25	C	AP-42, Section 2.4.4.1
Class III Landfill Specifications			
Maximum LFG generation rate	35	scfm	NRRL Design Plan, 2011

Standard Btu value of methane gas 1000 Btu / ft^3

Flare Emissions Factors:

Emissions	**Emission Factor**	**Units**	**Source**
NO_x	3.90E+01	lb/MMCF CH4	AP-42 (Draft Section 2.4)
CO	4.60E+01	lb/MMCF CH4	AP-42 (Draft Section 2.4)
PM_{10}	15	lb/10^6 scf CH_4	AP-42 (Draft Section 2.4)
NMOC	6.21E+02	ppmv	May 5, 2011 site-specific testing
Total Sulfur	33	ppmv	AP-42 (Draft Section 2.4)

Class III Landfill Emissions Factors:

Emissions	**Emission Factor**	**Units**	**Source**
NMOC	3.66E+01	ppmv	May 5, 2011 site-specific testing
HAPS	See HAPs calculations	lb/MMCF CH4	AP-42, Table 2.4-1 and April 6, 2010 site-specific testing

GHG Global Warming Potential

Emissions	**Emission Factor**	**Units**	**Source**
CH_4 CO2e	21	CO2e	40 CFR 98, Table A-1
CO_2 CO2e	1	CO2e	40 CFR 98, Table A-1
NO_X CO2e	310	CO2e	40 CFR 98, Table A-1

FLARE EMISSIONS:

NO_x Emissions

NO_X emissions factor	3.90E+01	lb/10^6 scf CH_4
Flow rate (LFG)	3,000	scfm

$$CM_{NOx} = Q_{LFG} \cdot C_{NO_x} \cdot 60 \frac{\min}{hr}$$

CM_{NOx}=	3.5	lb/hr
	84.2	lb/day
	15.4	**ton/yr**
	4,766	**ton/yr CO2e**

Uncombusted CH_4 Emissions

CH_4 emissions factor	N/A	
Flow rate (LFG)	3,000	scfm
Flow rate (CH_4)	1,500	scfm
	4.25E+01	m^3/min
	2.23E+07	m^3/yr

$$UM_{CH4} = Q_{CH4}\left[\frac{MW \cdot 1atm}{8.205 \cdot 10^{-5} m^3 \cdot atm / gmol^{\circ}K \cdot 1000kg \cdot (273 + {}^{\circ}C)}\right]$$

UM_{CH4}=	1.46E+07	kg/yr
	16,144	ton/yr

$$CM_{CH4} = \left[UM_{CH4} \cdot \left(1 - \frac{\eta_{cnt}}{100}\right)\right]$$

CM_{CH4}=	1769.23	lb/day
	73.72	lb/hr
	322.88	ton/yr
	6,781	**ton/yr CO2e**

CO Emissions

CO emissions factor	4.60E+01	lb/scf
Flow rate (LFG)	3,000	scfm

$$CM_{CO} = Q_{LFG} \cdot C_{CO} \cdot 60 \frac{\min}{hr}$$

CM_{CO}=	4.14	lb/hr
	99.4	lb/day
	18.13	**ton/yr**

PM_{10} Emissions

All particulate emissions assumed to be under 10 microns

PM emissions factor	15	lb/10^6 scf CH_4
Flow rate (LFG)	3,000	scfm
Flow rate (CH_4)	1,500	scfm

$$CM_{PM_{10}} = Q_{CH_4} \cdot C_{PM_{10}} \cdot 60 \frac{\min}{hr} \cdot \frac{1}{1 \cdot 10^6}$$

CM_{PM10}=	1.35	lb/hr
	32.4	lb/day
	5.9	**ton/yr**

FLARE EMISSIONS (Continued):

SO_x Emissions

Total sulfur oxidized to SOx

Total sulfur emissions factor	33	ppmv
Flow rate (LFG)	3,000	scfm
	4.46E+07	m^3/yr
Flow rate (CH_4)	2.23E+07	m^3/yr

$$Q_S = 2.0 \cdot Q_{CH4} \cdot \frac{C_S}{1 \cdot 10^6}$$

Q_S= 1473.23 m^3/yr

$$UM_S = Q_S \cdot \left[\frac{MW_S \cdot 1atm}{(8.205 \cdot 10^{-5} m^3 \cdot atm / gmol \cdot {}^\circ K) \cdot (1000 g / gmol) \cdot (273 + T{}^\circ C)} \right]$$

UM_S= 1931.7 kg/yr
2.1 ton/yr

$$CM_{SO_2} = \left[UM_S \cdot \frac{\eta_{coll}}{100} \cdot \frac{2.0 lb SO_2}{lbS} \right]$$

η_{coll}= 100 since calc is based on actual flow rate
CM_{SO2}= **4.3 ton/yr**
23.3 lb/day
1.0 lb/hr

NMOC Emissions

NMOC emissions factor	6.21E+02	ppmv (as hexane)
Flow rate (LFG)	3,000	scfm
Flow rate (CH_4)	1,500	scfm
	4.25E+01	m^3/min

$$Q_{NMOC} = 1.82 \cdot Q_{CH_4} \cdot 525{,}600 \frac{\min}{yr} \cdot \frac{C_{NMOC}}{1 \cdot 10^6}$$

Q_{NMOC}= 2.52E+04 m^3/yr

$$UM_{NMOC} = Q_{NMOC} \left[\frac{MW \cdot 1atm}{8.205 \cdot 10^{-5} m^3 \cdot atm / gmol {}^\circ K \cdot 1000 kg \cdot (273 + {}^\circ C)} \right]$$

UM_{NMOC}= 8.89E+04 kg/yr
98.03 ton/yr

$$CM_{NMOC} = \left[UM_{NMOC} \cdot \left(1 - \frac{\eta_{cnt}}{100} \right) \right]$$

CM_{NMOC}= **2.0 ton/yr**
10.74 lb/day
0.45 lb/hr

CLASS III LANDFILL EMISSIONS:

Uncontrolled CH_4 Emissions

CH_4 emissions factor	N/A	
Flow rate (LFG)	35	scfm
Flow rate (CH_4)	18	scfm
	4.95E-01	m^3/min
	2.60E+05	m^3/yr

$$UM_{CH4} = Q_{CH4}\left[\frac{MW \cdot 1atm}{8.205 \cdot 10^{-5} m^3 \cdot atm / gmol^{\circ}K \cdot 1000kg \cdot (273 + {}^{\circ}C)}\right]$$

UM_{CH4}=	1.71E+05	kg/yr
	188	ton/yr
	3,955	**ton/yr CO2e**

Uncontrolled NMOC Emissions

NMOC emissions factor	3.66E+01	ppmv (as hexane)
Flow rate (LFG)	35	scfm
Flow rate (CH_4)	18	scfm
	4.95E-01	m^3/min

$$Q_{NMOC} = 2.0 \cdot Q_{CH_4} \cdot 525{,}600 \frac{\min}{yr} \cdot \frac{C_{NMOC}}{1 \cdot 10^6}$$

Q_{NMOC}=	1.91E+01	m^3/yr

$$UM_{NMOC} = Q_{NMOC}\left[\frac{MW \cdot 1atm}{8.205 \cdot 10^{-5} m^3 \cdot atm / gmol^{\circ}K \cdot 1000kg \cdot (273 + {}^{\circ}C)}\right]$$

UM_{NMOC}=	6.72E+01	kg/yr
	0.07	**ton/yr**

Uncontrolled CO_2 Emissions

CO_2 emissions factor	N/A	
Flow rate (LFG)	35	scfm
Flow rate (CO_2)	18	scfm
	4.95E-01	m^3/min
	2.60E+05	m^3/yr

$$UM_{CO2} = Q_{CO2}\left[\frac{MW \cdot 1atm}{8.205 \cdot 10^{-5} m^3 \cdot atm / gmol^{\circ}K \cdot 1000kg \cdot (273 + {}^{\circ}C)}\right]$$

UM_{CO2}=	4.69E+05	kg/yr
	517	**ton/yr**

Class III Fugitive HAP Emissions

See attached HAP calculations

Total HAPs	**0.2 TPY**
Maximum HAP (Toluene)	**0.04 TPY**

SUMMARY:

Emissions Rates (EU-001), Post-Modification Potential To Emit

Pollutant	Flare (TPY)	Class III Landfill (TPY)	Total (TPY)	Total (lb/hr)
NO_x	15.4	-	15.4	3.5
CO	18.1	-	18.1	4.1
PM_{10}	5.9	-	5.9	1.4
NMOC	2.0	0.07	2.1	0.5
SOx	4.3	-	4.3	1.0
HAPS (total)	-	0.2	0.2	0.05
HAP (individual)	-	0.04	0.0	0.0
CH4 (CO2e)	6,781	3,955	10,736	2,451
NOx (CO2e)	4,766	-	4,766	1,088
CO2 (CO2e)	-	517	517	118
Total GHG (CO2e)			16,019	3,657

JONES EDMUNDS

PROJECT NUMBER: 14040-033-01 SHEET: 1 OF 1
PROJECT NAME: New River Regional Landfill, Facility 1250008
SUBJECT: Air Emissions Calculations - EU-004 HAPs
BY: HBoudreau Date: 7/9/13
CHECKED BY: GReinhart Date: 7/12/13

Enter year of emissions inventory: 2019
Collection system efficiency (Class III) [E]: N/A

Pollutant Parameters

Gas / Pollutant	Concentration[D] (*ppmv*)	Molecular Weight	Notes	Mass Generation Rate TPY *Class III*
Hazardous Air Pollutants				
1,1,1-Trichloroethane (methyl chloroform)	**1**	133.41	A	3.113E-03
1,1,2,2-Tetrachloroethane	1.1	167.85	A, B	4.308E-03
1,1-Dichloroethane (ethylidene dichloride)	2.4	98.97	A, B	5.542E-03
1,1-Dichloroethene (vinylidene chloride)	0.20	96.94	A, B	4.524E-04
1,2-Dichloroethane (ethylene dichloride)	**0.39**	98.96	A, B	9.005E-04
1,2-Dichloropropane (propylene dichloride)	0.18	112.99	A, B	4.746E-04
Acrylonitrile	6.3	53.06	A, B	7.800E-03
Benzene - No or Unknown Co-disposal	**1.55**	78.11	A, B	2.825E-03
Carbon disulfide	0.58	76.13	A, B	1.030E-03
Carbon tetrachloride	4.0E-03	153.84	A, B	1.436E-05
Carbonyl sulfide	0.49	60.07	A, B	6.868E-04
Chlorobenzene	0.25	112.56	A, B	6.566E-04
Chloroethane (ethyl chloride)	1.3	64.52	A, B	1.957E-03
Chloroform	0.03	119.39	A, B	8.357E-05
Dichlorobenzene	**0.44**	147	B, C	1.509E-03
Dichloromethane (methylene chloride)	**0.435**	84.94	A	8.621E-04
Ethylbenzene	**6.3**	106.16	A, B	1.561E-02
Ethylene dibromide	1.0E-03	187.88	A, B	4.384E-06
Hexane	**0.715**	86.18	A, B	1.438E-03
Mercury (total)	2.9E-04	200.61	A	1.357E-06
Methyl ethyl ketone	7.1	72.11	A, B	1.195E-02
Methyl isobutyl ketone	1.9	100.16	A, B	4.440E-03
Perchloroethylene (tetrachloroethylene)	3.7	165.83	A	1.432E-02
Toluene - No or Unknown Co-disposal	**19.5**	92.13	A, B	4.192E-02
Trichloroethylene (trichloroethene)	2.8	131.40	A, B	8.585E-03
Vinyl chloride	**0.46**	62.50	A, B	6.708E-04
Xylenes	**13.1**	106.16	A, B	3.245E-02
Total HAPs			0	1.636E-01
Max HAP				4.192E-02

A. Hazardous air pollutants (HAP) listed in Title III of the 1990 Clean Air Act Amendments.
B. Considered volatile organic compounds (VOC), as defined by U.S. EPA in 40 CFR 51.100(s).
C. Source tests did not indicate whether this compound was the para- or ortho- isomer. The para- isomer is a Title III-listed HAP.
D. **Indicates site-specific value taken from April 6, 2010 gas composition testing**
E. Uncontrolled emissions from the Class III Landfill are included in EU-001
F. VOCs taken as 39% of NMOC in accordance with AP-42

Source: Tables 2.4-1 and 2.4-2 of *Compilation of Air Pollutant Emission Factors, AP-42, Volume 1: Stationary Point and Area Sources*, 5th ed., Chapter 2.4 Municipal Solid Waste Landfills. U.S. EPA, Office of Air Quality Planning and Standards. Research Triangle Park, NC. November 1998. http://www.epa.gov/ttn/chief/ap42/ch02/final/c02s04.pdf

Sample Calculations:

$$UM_P = Q_P * \left[\frac{MW_P * 1 \text{ atm}}{(8.205 \times 10^{-5} \text{ m}^3\text{-atm/gmol-}^\circ\text{K})(1000 \text{g/kg})(273 + T\ ^\circ\text{K})} \right] \quad (4)$$

where:

UMp = Uncontrolled mass emissions of pollutant P (i.e., NMOC), kg/yr;
MWp = Molecular weight of P, g/gmol (i.e., 86.18 for NMOC as hexane);
Qp = NMOC emission rate of P, m^3/yr; and
T = Temperature of landfill gas, °C.

$$Q_P = 1.82\ Q_{CH_4} * \frac{C_P}{(1 \times 10^6)} \quad (3)$$

where:

Qp = Emission rate of pollutant P (i.e. NMOC), m^3/yr;
Q_{CH_4} = CH_4 generation rate, m^3/yr (from the Landfill Air Emissions Estimation model);
C_P = Concentration of P in landfill gas, ppmv; and
1.82 = Multiplication factor (assumes that approximately 55 percent of landfill gas is CH_4 and 45 percent is CO_2, N_2, and other constituents).

ATTACHMENT I.2

FUEL SPECIFICATION

ATTACHMENT I.2
FUEL SPECIFICATION

EU002

EU002 represents the fugitive Non-Methane Organic Compounds (NMOC) emissions and Hazardous Air Pollutants (HAPs) emissions from the natural decomposition reactions associated with the landfill that are not collected by the landfill gas collection system.

EU004

The flare is fueled by waste landfill gas. The estimated fuel heat content is 500 MMBtu/MMscf gas, assuming a methane content of 50%. This represents an industry average for landfill gas.

ATTACHMENT I.3

DESCRIPTION OF CONTROL EQUIPMENT

ATTACHMENT I.3
DESCRIPTION OF CONTROL EQUIPMENT

EU002

EU002 represents the fugitive Non-Methane Organic Compounds (NMOC) emissions and Hazardous Air Pollutants (HAPs) emissions from the natural decomposition reactions associated with the landfill that are not collected by the landfill gas collection system. Therefore, by definition EU002 does not have any control equipment.

EU004

The flare station has a 3,000-scfm capacity. Specifications for the project are as follows, and an example proposal is attached:

FLARE STATION DESIGN SPECIFICATIONS

Landfill gas flow rate (max)	3,000 scfm
Landfill gas flow rate (min)	300 scfm
Minimum destruction efficiency within specified flows and composition	98% destruction of total hydrocarbons

FLARE STATION MANUFACTURER

Perennial Energy
1375 County Road 8690
West Plains, Missouri 65775
Phone: (417) 256-2002
Fax: (417) 256-2801

ATTACHMENT I.4

PROCEDURES FOR STARTUP AND SHUTDOWN

ATTACHMENT I.4
PROCEDURES FOR STARTUP AND SHUTDOWN

EU002

EU002 represents the fugitive Non-Methane Organic Compounds (NMOC) emissions and Hazardous Air Pollutants (HAPs) emission from the natural decomposition reactions associated with the landfill that are not collected by the landfill gas collection system and therefore by definition cannot be start up or shut down because it is a natural biological process.

EU004

The landfill gas (LFG) flare (EU004) will be operated in accordance with the manufacturer's recommendations, including periods of startup and shutdown. These procedures are documented in the Operations and Maintenance (O&M) Manual that is maintained on site and is included in the Startup, Shutdown, and Malfunction (SS&M) Plan, provided as Exhibit A.

In addition, because the facility is subject to the National Emission Standard for Hazardous Air Pollutants (NESHAP), the New River Solid Waste Association has a SSM Plan for the LFG collection and control system.

EXHIBIT A

STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

NEW RIVER REGIONAL LANDFILL
GAS COLLECTION AND
CONTROL SYSTEM
STARTUP, SHUTDOWN, AND
MALFUNCTION PLAN

Facility ID #1250008

Prepared for:

NEW RIVER SOLID WASTE ASSOCIATION
24276 NE 157th Street
Raiford, Florida 32083

Prepared by:

JONES EDMUNDS & ASSOCIATES, INC.
730 NE Waldo Road
Gainesville, Florida 32641

Certificate of Authorization #1841

Version 3
July 2013

Revision: 0
Revision Date:
Issuance Date: June 27, 2013
Revised By: Jones Edmunds

NEW RIVER SOLID WASTE ASSOCIATION
NEW RIVER REGIONAL LANDFILL
GAS COLLECTION AND CONTROL SYSTEM
STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

The New River Solid Waste Association owns and operates the New River Regional Landfill in Raiford, Florida. Jones Edmunds & Associates, Inc. prepared the following Startup, Shutdown, and Malfunction (SS&M) Plan to comply with the requirements of 40 CFR 63.6(e)(3), because this facility is subject to 40 CFR Part 63, Subpart AAAA, the National Emission Standard for Hazardous Air Pollutants for municipal solid waste landfills.

A copy of the original Plan and each revision/addendum will be kept on file at the facility for at least 5 years. The Site Manager is responsible for ensuring that the most recent copy of this Plan is made available to all personnel involved with the landfill gas collection and control system at the New River Regional Landfill as well as to appropriate regulatory agency personnel upon request.

TABLE OF CONTENTS

LIST OF TABLES

ATTACHMENTS

1.0 INTRODUCTION

1.1 OVERVIEW

The New River Regional Landfill (NRRL) is an affected source subject to the Municipal Solid Waste (MSW) Landfill New Source Performance Standards (NSPS). Because it is NSPS-applicable, the NRRL is also subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for MSW Landfills (40 CFR 63, Subpart AAAA). As such, a written Startup, Shutdown, and Malfunction (SS&M) Plan is required to be used by the NRRL.

Jones Edmunds & Associates, Inc. developed this Plan for the NRRL on behalf of the New River Solid Waste Association (NRSWA).

1.2 PURPOSE

As specified in 40 CFR 63.6 (e)(3), the purpose of this Plan is to provide site personnel with a flexible plan to reduce air emissions during startups, shutdowns, and malfunctions and to correct malfunctions as soon as practical after they occur. Specifically, the purpose of this Plan is to help the NRRL:

- Operate and maintain the gas collection and control system in a manner consistent with safety and good air-pollution-control practices for reducing emissions to the levels required by the relevant standards.

- Correct malfunctions as soon as practical after their occurrence.

- Reduce the reporting burden associated with periods of startup, shutdown, and malfunction.

In addition, the Plan describes the specific required record-keeping and reporting procedures.

1.3 DEFINITIONS

The terms defined below are used throughout this document. Where applicable, these definitions are based on 40 CFR 63, Subpart A.

Administrator means the Administrator of the US Environmental Protection Agency or his or her authorized representative (e.g., a State that has been delegated the authority to implement the provisions of this part). For this Plan, the Administrator is the Florida Department of Environmental Protection (FDEP) Northeast District Air Program Administrator.

Affected source means the collection of equipment, activities, or both within a single contiguous area and under common control. In this Plan, the affected source is the NRRL.

Event is any occurrence of a startup, shutdown, or malfunction.

Gas Collection and Control System (GCCS) means the series of wells, conveyance pipe, condensate collection system, flare station and blower system (the control system), and associated instrumentation and controls.

Monitoring means the collection and use of measurement data or other information to control the operation of a process or pollution-control device or to verify a work practice standard relative to ensuring compliance with applicable requirements. Monitoring is composed of four elements:

- Indicator(s) of performance.
- Measurement techniques.
- Monitoring frequency.
- Averaging time.

Malfunction means any sudden, infrequent, and not reasonably preventable failure of air-pollution-control-and-monitoring equipment, process equipment, or a process to operate in a normal or usual manner **that causes or has the potential to cause emissions of an applicable standard to be exceeded**. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

Owner or operator means any person who owns, leases, operates, controls, or supervises a stationary source. For this Plan, the Owner is the NRSWA.

Responsible official means, for a municipality, State, Federal, or other public agency, either a principal executive officer or ranking elected official. For this Plan, the Responsible Official is the NRSWA Executive Director or the Assistant Director.

Shutdown means the cessation of operation of an affected source or portion of an affected source for any purpose.

Site Manager – For this Plan, the Site Manager is the Owner's on-site representative, responsible for ensuring that recordkeeping and action items are executed in accordance with this Plan.

Startup means the setting in operation of an affected source or portion of an affected source for any purpose. Startup encompasses actions to bring the GCCS online, regardless of whether the system has been historically on line, or after a shutdown for maintenance.

Working day means any day on which Federal offices (or State offices for a State that has obtained delegation under Section 112(1)) are open for normal business. Saturdays, Sundays, and official Federal (or where delegated, State) holidays are not working days.

1.4 PLAN APPLICABILITY AND EXCLUSIONS

The purpose of Plan reporting is to document events that may result in or have the potential to result in an exceedance of applicable standards. Therefore, for any SS&M Event to be considered

an Event that must be addressed by this Plan, it must result in or have the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements. The following list constitutes the possible deviations of the NSPS operational and compliance requirements that could occur due to an Event, thereby necessitating implementation of this Plan:

- GCCS downtime of greater than 5 days (if an alternative timeframe has not been established).

- Free venting of collected landfill gas (LFG) without control for greater than 1 hour.

- Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes (if an alternative timeframe has not been established).

- Downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).

If the occurrence would not result in or have the potential to result in an exceedance of one of these emission limitations, it is not required to be corrected or documented in accordance with this Plan, although use of the Plan may still be advisable. Events should be considered actionable under this Plan whether they are discovered by the Owner during normal operations or by a regulatory agency during compliance inspections.

In addition, the following items are addressed by other regulations and are excluded from documentation under this Plan:

- Exceedance at individual wells for pressure, oxygen, and temperature.

- Surface emissions monitoring exceedance (reading at 500 ppm or greater).

- Shutdowns of the flare that are followed immediately by successful re-start sequences and do not vent emissions to the atmosphere. This is done automatically or manually and is part of the control device's normal operating procedures.

2.0 PLAN PROCEDURES

This section addresses each type of Event separately. Startup and shutdown Events are generally planned Events associated with repairing, maintaining, testing, and/or upgrading the GCCS and associated monitoring equipment; therefore, they do not typically trigger Plan reporting. A landfill is not a typical affected source that can be started up or shut down because landfill emissions are produced by a continuous biological process. Therefore, the primary focus of this Plan will be on malfunctions of the NRRL GCCS.

Recordkeeping and reporting procedures for all Events are described in Section 3.0.

2.1 STARTUP AND SHUTDOWN EVENTS

2.1.1 Startup Events

Startup Events typically refer to startup of the control system and associated monitoring system. Startups are considered consistent with the Plan provided they are conducted in accordance with the manufacturer's guidance and included in on-site operations and maintenance manuals. The manufacturer's guidance documents for the primary Perennial flare system are included in Attachment A.

2.1.2 Shutdown Events

Shutdown Events typically refer to shutdown of the control system and associated monitoring system. Shutdowns are considered consistent with the Plan provided they are conducted in accordance with the manufacturer's guidance and included in on-site operations and maintenance manuals. The manufacturer's guidance documents for the primary Perennial flare system are included in Attachment A.

2.1.3 Ancillary Activities

This Plan provides additional guidance for ancillary activities related to startups and shutdowns of the GCCS associated with maintenance, construction, and/or repair. These activities may cause air emissions in excess of the NSPS operational standards and therefore require implementation of this Plan. Table 1 lists practices that may be used to mitigate air emissions related to ancillary startup or shutdown activities and preclude implementation of this Plan. These are not corresponding action items but general practices that may be used to limit air emissions to the greatest extent practical.

Table 1 Ancillary Activities and Mitigation Practices	
Ancillary Activity	Mitigation Practices
• Repairing system leaks. • Purging gases trapped within the piping system. • Venting uncombusted landfill gas during startup of flare. • Conducting all other activities associated with construction of the GCCS system before fulltime operation, such as trial operations.	• Temporarily cap pipes venting gas to the extent that capping does not impact safety or the effective construction of the system. • Reduce the surface area of earthwork to maintain cover integrity and reduce gas emissions to the atmosphere to the extent that this does not impact safety or the effective construction of the system. • Limit pipe purging to as short a time as practical.

2.2 MALFUNCTION EVENTS

System malfunctions are a normal part of GCCS operation and may include sudden, infrequent, and not reasonably preventable failures of the GCCS. This Plan intends to include as many of the possible causes as practical for specific malfunction Events. The following list includes occurrences that may constitute a malfunction of the GCCS at the NRRL. Each occurrence (or any malfunction not addressed here) could have multiple causes that need to be investigated and evaluated immediately to determine the best course of action to correct the malfunction. Attachment B provides a detailed table of diagnosis and correction procedures for each of these malfunction Events.

- Loss of LFG flow/gas mover malfunction.
- Collection well and pipe failures.
- Loss of electrical power (other than the loss of power followed by a normal restart sequence).
- Failure to operate in automatic mode.
- Loss of flame.
- Malfunction of flow measuring/recording device.
- Malfunction of temperature measuring/recording device.
- Other control device malfunctions.
- Blockage of landfill gas flow.

The following steps shall be taken, even if they are not included in the correction procedures of the preceding list, for all malfunction Events that must be corrected in accordance with this Plan:

- Identify whether the malfunction is causing or has caused excess emissions to the atmosphere. If excess emissions are occurring, take necessary steps to reduce

emissions to the maximum extent practical using good air-pollution-control practices and safety procedures.

- Contact the Site Manager immediately and proceed with the malfunction diagnosis and correction procedures provided in Attachment B. Notify the Site Manager of all subsequent steps in the malfunction diagnosis and correction procedures.

- If the procedures in Attachment B do not address or do not adequately address the malfunction that has occurred, attempt to correct the malfunction with the best resources available. Notify the Site Manager, complete the Startup, Shutdown and Malfunction Event Form (SS&M Event Form) (included as Attachment C), and revise the Plan within 45 days after the Event. If the deviations cause an exceedance of any NSPS operational and compliance requirements, notify the Administrator by telephone, fax, or e-mail within 2 working days of beginning action not covered in this Plan and by letter within 7 working days after the end of the Event. Further guidance for reporting deviations from this Plan is provided in Section 3.0.

- If the GCCS malfunction cannot be corrected within the time required to prevent a deviation from the NSPS operational standards (as listed in Section 1.4), shut down the control device for up to 5 days to prevent air emissions and notify the Site Manager. Define an appropriate alternative timeframe for corrective action that is reasonable for the type of repair and/or maintenance that is required to correct the malfunction.

- If the malfunction cannot be corrected within the alternative timeframe specified above, conduct the appropriate notification, recordkeeping, and reporting required for deviations of the Title V permit (refer to the Title V permit).

- For malfunction Events conducted in accordance with this Plan and do not require deviation reporting, initiate recordkeeping and reporting procedures in accordance with Section 3.0 after diagnosis and correction are completed.

- If the flare fails to operate in automatic mode, shut it down or operate it in manual mode. An operator shall be at the flare at all times when the flare is operating in manual mode.

3.0 RECORDKEEPING AND REPORTING

Section 3.1 describes the specific reporting and recordkeeping requirements for Events that must be corrected in accordance with this Plan. Section 3.2 describes instances that may trigger revisions to this Plan and the steps required to revise the Plan. Section 3.3 outlines the requirements for the Semi-Annual SS&M Report.

3.1 EVENT RECORDKEEPING AND REPORTING

Each Event that requires correction in accordance with this Plan must be recorded using the SS&M Event Form. Additional Event reporting is determined based on whether the corrective action was or was not consistent with the Facility's current Plan and if the Event caused an exceedance of any applicable emission limitations. Example SS&M Event Forms are included in Attachment D.

3.1.1 Corrective Action Consistent with Plan

If the actions taken during an Event are consistent with this Plan, the following steps must be taken:

- Complete and file the SS&M Event Form (Attachment C).

The following information must be filed and submitted with the Report:

- Copy of the completed SS&M Event Form.

3.1.2 Corrective Actions Inconsistent with Plan without Exceedances

If the actions taken during an Event were not consistent with this Plan and they did not cause an exceedance of any NSPS operational and compliance requirements, the following steps must be taken:

- Notify the Site Manager.
- Complete and file the SS&M Event Form (Attachment C).
- Revise the Plan in accordance with Section 3.2 within 45 days of a Deviation Event.

The following information must be filed and submitted with the Report:

- Copy of the completed SS&M Event Form.
- Revised Plan.

3.1.3 Corrective Actions Inconsistent with Plan with Exceedances

If the actions taken during an Event were not consistent with this Plan and caused an exceedance of any NSPS operational and compliance requirements, the following steps must be taken:

- Notify the Site Manager.
- Notify the Administrator by telephone, fax, or email within 2 working days after beginning the actions that were inconsistent with the Plan.
- Complete and file the SS&M Event Form (Attachment C).
- Notify the Administrator by letter within 7 working days after the end of the Event to provide the following:
    - Copy of the SS&M Event Form.
    - Description of what excess emissions and/or parameter monitoring exceedances are believed to have occurred during the Event.
    - Name, title, and contact information of Site Manager.
- Provide certifying signature of the owner/operator or other responsible official.
- Revise the Plan in accordance with Section 3.2 within 45 days of a Deviation Event.

The following information must be filed and submitted with the Report:

- Copy of the completed SS&M Event Form.
- Copy of Administrator Notification Correspondence.
- Revised Plan.

3.2 PLAN MAINTENANCE

3.2.1 When to Revise the Plan

This Plan will be revised:

- To reflect changes to Facility equipment, operations, or procedures.

- If the Plan fails to provide for the operation of the air-pollution-control-and-monitoring equipment during an Event in a manner consistent with safety and good air-pollution practices to reduce emissions.

- If the Plan does not provide adequate procedures for correcting an Event as quickly as practicable.

- If the Plan includes an Event that does not meet the definition of an Event.

- If the Plan fails to address or does not adequately address an Event that has occurred (see Section 3.1.2). In this case the Site Manager must:

    - Revise the Plan within 45 days after the Event to include detailed procedures for operating and maintaining the source during similar Events and a program of corrective action for similar Events.

    - Include the revised Plan in the Report.

Revisions to the Plan are not effective until written notice has been provided to the Administrator describing the Plan revisions. Although the Plan is a required part of the Title V permit, revisions to the Plan shall not be deemed to constitute or require a permit revision.

3.2.2 Plan Filing

Facilities must maintain a current Plan in the Facility files and must make the Plan available upon request. If a Plan is subsequently revised, the facility must maintain each previous version of the Plan for 5 years after revision of the Plan. Each such revision must be reported in the Report. Facilities must retain a copy of the most recent Plan for 5 years from the date a source ceases operation or is no longer subject to the NESHAP requirements. A copy of the previous Plan is provided as Attachment E.

3.3 REPORT PREPARATION

The Report must be addressed to the Administrator and postmarked by the 30th day following the end of each semi-annual reporting period—specifically, by July 30 and January 30. Reports may be combined with the semi-annual report required by NESHAP 40 CFR 63.1980(a) and 40 CFR 60.757(f) of the NSPS. Reports are only required if an Event occurred during the reporting period. The Report must include the following:

- Cover letter (as provided in Attachment F) with the name, title and certifying signature of the owner or operator or other responsible official. Identify any Events that caused or may have caused an applicable emission limit to be exceeded in the cover letter.

- Statement that the Plan was revised during the reporting period, if necessary. Include the revised Plan in the Report attachments.

- Completed SS&M Event Forms for each Event that occurred during the reporting period

- Discussion including the number, duration, and brief description for each type of startup, shutdown, and malfunction Event that occurred during the reporting period.

4.0 REFERENCES

Florida Administrative Code, Chapter 62-213 Operation Permits for Major Sources of Air Pollution.

US EPA, Federal Regulations, 40 CFR 63 Subpart AAAA.

US EPA, Federal Regulations, 40 CFR 63.6, Compliance with standards and maintenance requirements.

US EPA, Federal Regulations, 40 CFR 63.10, Recordkeeping and reporting requirements.

US EPA, Office of Air Quality Planning and Standards. (December 2003) *How to Prepare a Startup, Shutdown, Malfunction Plan for Collection and Control Systems at Municipal Solid Waste Landfills*. EPA-456/R-03-006.

ATTACHMENT A

PERENNIAL ENERGY
STARTUP AND MAINTENANCE PROCEDURES

New River Landfill Gas
Flare Station

Operation and Maintenance Procedures

Flare Start

Flare start is initiated when:

1. no alarms are present;
2. LFG valve is closed;
3. Flare Temp (T) is <700° F;
4. Start Switch is turned to ON;
5. Blower(s) are selected in AUTO on Operator Interface
6. Pilot sequence starts.

Pilot Sequence

1. Propane valve opens;
2. Igniter turns on;
3. LFG Valve opens after 10 sec;
4. Igniter and propane remain ON for 120 sec;
5. Blower(s) selected Start when valve is Open;
6. Blower(s)ramp up to match flow or vacuum selected;
7. Blower (s) speed varies from 0-60 Hz depending on flow or vacuum setpoint;
8. LFG valve failure if valve does not open after 30 sec;
9. Pilot failure when T is <250° F for 90 sec and pilot is on.

Flare High Temp SD - T is >1800° F for 30 sec
Flare Low Temp SD - T is <500° F for 2 minutes

Flare Alarms

Channel	Alarm	Setting	Condition
1	Blower 1 Fault	Fault from VFD	Flare SD, Dial-out
2	Blower 2 Fault	Fault from VFD	Flare SD, Dial-out
3	Blower 3 Fault	Fault from VFD	Flare SD, Dial-out
4	Flame Fail	N/A	
5	Flare High Temp	T is >1800° F for 30 sec	Flare SD, Dial-out
6	Flare Low Temp	T is <500° F for 2 minutes	Flare SD, Dial-out
7	Flashback High Temp	Temp > 250° F	Flare SD, Dial-out
8	Blower 1 High Temp	Bearing Temp >180° F	Dial-out
9	Blower 2 High Temp	Bearing Temp >180° F	Dial-out
10	Blower 3 High Temp	Bearing Temp >180° F	Dial-out
11	Valve Failure	Valve not open after 30 sec	Flare SD, Dial-out
12	Liquid Level High	Level High	Flare SD, Dial-out
13	Low CH4 Content	N/A	
14	Pilot Failure	T is <250° F for 90 sec and pilot is on	Flare SD, Dial-out

Auto Re-Start

Flare has been programmed to allow for an Auto Re-Start under most conditions in the event of a loss of Power. Due to the fact that flame confirmation is conducted using the same thermocouple as the temperature monitoring it is somewhat problematic to allow for a successful Auto Re-Start. The following conditions will allow for an Auto Re-Start:

Long Shutdown in which flare is allowed to cool down. If the flare power loss is long enough for flare to cool down to less than 700 Deg F the flare will start ignition sequence upon resumption of power.

Blower fault occurs on one of the operating blowers, fault clears after time delay. This will occur on many power loss faults. Communication faults (Code 76) cannot be set to reset after time delay. Communication Fault would need to be cleared onsite or remotely.

A cool-down period has been added to the control logic to provide a condition for flare ignition in the event of a loss of power. In the event that the flare temperature is not less than 700 Deg F the flare startup will be delayed. The delay can be cleared by turning the flare switch to OFF and then ON again or by clearing a VFD fault onsite or remotely.

A condition where an instantaneous fault occurs may result in resumption of operation without a new ignition sequence. This will occur when the loss of power does not clear the ignition complete setting in the control logic. In this event the flare will operate without flame until the temperature drops below the low temperature alarm setpoint.

Flare Shutdown Procedures

Normal Shutdown

Normal flare shutdown procedures shall be conducted according to the following steps:

1. Ramp down blowers by setting FLOW CONTROL to 500 cfm;
2. Allow flow to reach setpoint;
3. Turn Flare Start Switch on front of control panel to OFF;
4. NOTE: ramp down is not required but reduces wear on LFG blowers;
5. Verify all operating blowers have ramped to 0 Hz and stopped;
6. Visually inspect and verify Shut Off valve is closed;
7. If maintenance will be performed on the flare or blowers it is recommended that proper lockout/tagout procedures be followed at the Motor Control Center.

Emergency Shutdown

An Emergency Stop button is located on the front of the Control Panel. Pressing this button will immediately stop power to all rotating equipment and electrical equipment. Shutoff Valve has been designed to spring closed upon loss of power under emergency shutdown. The Emergency Shutdown should be utilized in the event of possible damage to equipment or danger to operating personnel.

Maintenance Schedule

Blowers

1. Drain valves weekly;
2. Grease bearings quarterly per Hoffman manual;
3. Record bearing temps weekly and trend.

Flare

1. Inspect and clean igniter assembly annually;
2. Inspect thermocouple annually.

System

1. Check Pressure Transmitter measurement annually;
2. Clean and inspect Liquid level switch annually;
3. Clean and inspect Motor Control Center semi-annually;
4. Calibrate LFG Meter annually;
5. Remove and inspect condensate pumps annually.

ATTACHMENT B

COMMON CAUSES AND RESPONSE ACTIONS FOR GCCS MALFUNCTIONS

COMMON CAUSES AND RESPONSE ACTIONS FOR GCCS MALFUNCTIONS

This list summarizes possible causes and response actions for GCCS malfunctions and is not considered to be all-inclusive. The list of response actions is not intended to be a sequence of events that must be implemented in order. Certain malfunctions may or may not be associated with the listed "common causes," nor will the "typical response actions" be appropriate in all instances. Site-specific evaluation of the malfunction and development of specific response actions is recommended in all cases.

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Blower or Other Gas Mover Equipment	Applies vacuum to wellfield to extract LFG and transport to control device	Loss of LFG Flow/Blower Malfunction	• Flame arrestor fouling/deterioration • Automatic valve problems • Blower failure (e.g., belt, motor, impeller, coupling, seizing) • Loss of power • Extraction piping failure • Condensate knock-out problems • Extraction piping blockages	• Repair breakages in extraction piping • Clean flame arrestor • Repair blockages in extraction piping • Verify automatic valve operation, compressed air/nitrogen supply • Notify power utility, if appropriate • Provide/use auxiliary power source, if necessary • Repair settlement in collection piping • Repair blower • Activate back-up blower, if available • Clean knock-out pot/demister • Drain knock-out pot

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Blower or Other Gas Mover Equipment and Control Device	Collection and control of LFG	Loss of electrical power	• Force majeure/Act of God (e.g., lightning, flood, earthquake) • Area-wide or local blackout or brown-out • Interruption in service (e.g., blown service fuse) • Electrical line failure • Breaker trip • Transformer failure • Motor starter failure/trip • Overdraw of power • Problems in electrical panel • Damage to electrical equipment from on-site operations	• Check/reset breaker • Check/repair electrical panel components • Check/repair transformer • Check/repair motor starter • Check/repair electrical line • Test amperage to various equipment • Contact electricity supplier • Contact/contract electrician • Provide auxiliary power (if necessary)
Extraction Wells and Collection Piping	Conduits for extractions and movement of LFG flow	Collection well and pipe failures	• Break/crack in header or lateral piping • Leaks at wellheads, valves, flanges, test ports, seals, couplings, etc. • Collection piping blockages • Problems due to settlement (e.g., pipe separation, deformation, development of low points)	• Repair leaks or breaks in lines or wellheads • Follow procedures for loss of LFG flow/blower malfunction • Repair blockages in collection piping • Repair settlement in collection piping • Re-install, repair, or replace piping • Review waste types, age of waste, etc.

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
LFG Control Device	Combusts LFG	Loss of Flame	• Problems/failure of thermocouple • Loss/change of LFG flow • Loss/change of LFG quality • Problems with air/fuel controls • Problems/failure of flame sensor • Problems with temperature monitoring equipment	• Check/repair temperature monitoring equipment • Check/repair thermocouple • Follow procedures for loss of flow/blower malfunction • Check/adjust air/fuel controls • Check/adjust/repair flame sensor • Check/adjust LFG collectors
		Failure to Operate in Automatic Mode	• Problems/failure of automatic operation • Problems with power outages • Problems with electrical controls	• Switch to manual mode – operator shall remain at the control device at all times flare is operating in manual mode • Check alarm history • Reset alarms at touch screen • Restart flare in automatic mode • If flare cannot be restarted in automatic mode shutdown flare and request assistance
		Other Control Device Malfunctions	• Control device smoking (i.e., visible emissions) • Problems with flare insulation • Problems with pilot light system • Problems with air louvers • Problems with air/fuel controllers • Problems with thermocouple • Problems with burners • Problems with flame arrester • Alarmed malfunction conditions not covered above • Unalarmed conditions not covered above	• Site-specific diagnosis procedures • Site-specific responses actions based on diagnosis • Open manual louvers • Clean pitot orifice • Clean/drain flame arrestor • Refill propane supply • Check/repair pilot sparking system

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Flow Monitoring/ Recording Device	Measures and records gas flow from collection system to control	Malfunctions of Flow Monitoring/Recording Device	• Problems with orifice plate, pitot tube, or other in-line flow measuring device • Problems with device controls and/or wiring • Problems with chart recorder	• Check/adjust/repair flow measuring device and/or wiring • Check/repair chart recorder • Replace paper in chart recorder
Temperature Monitoring/ Recording Device	Monitors and records combustion temperature of enclosed combustion device	Malfunctions of Temperature Monitoring/Recording Device	• Problems with thermocouple • Problems with device controls and/or wiring • Problems with chart recorder	• Check/adjust/repair thermocouple • Check/adjust/repair controller and/or wiring • Check/adjust/repair electrical panel components • Check/repair chart recorder • Replace paper in chart recorder
Collection Piping	Conduit movement of LFG flow	Blockage of LFG Flow	• Collection piping blockages due to build-up of liquid • Problems due to settlement (e.g., pipe separation, deformation, development of low points)	• Follow procedures for loss of LFG flow/blower malfunction • Repair blockages in collection piping • Repair settlement in collection piping • Re-install, repair, or replace piping

ATTACHMENT C

SS&M EVENT FORM

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Event: *This resulted in or had the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements:*

- *GCCS downtime of greater than 5 days.*
- *Free venting of collected LFG without control for greater than 1 hour.*
- *Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes.*
- *Any downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).*

Section 1 – All Events

List of all affected piece(s) of equipment:

Type of Event	Military Time		Duration (hrs:min)	Event Code *(see Section 4)*	SSM Plan Deviation? (Y[1]/N)	Deviation Caused Exceedance? (Y[2]/N)
	Date/Time Start	Date/Time End				
☐ Startup						
☐ Shutdown						
☐ Malfunction *(Complete Section 2)*						

[1]If there are any deviations from the SSM Plan:

- ☐ Notify the Site Manager.
- ☐ *Complete Section 3.*
- ☐ Revise the Plan within 45 days after the event.

[2]If there was any deviations from the SSM Plan that caused an exceedance of any NSPS operational and compliance requirements:

- ☐ Notify the Administrator by telephone, fax, or e-mail within 2 working days after beginning actions inconsistent with the Plan.
- ☐ Notify the Administrator by letter within 7 working days after the end of the event.

Section 2 – Malfunction Events Only

☐ *Check if Section is N/A*

☒ **Check one of the following for each step**

Step	Corrective Action Procedures for All Malfunctions	Yes/ Completed	No/ Not Applicable
1.	Is landfill gas being released to the air? *(smell landfill gas, or detect gas flow?)* **If Yes:** Notify the Site Manager and stop (if possible) landfill gas flow.	☐	☐
2.	Is the malfunction causing an unsafe operating condition that may harm people, the environment, or the landfill gas control equipment? **If Yes:** Notify the Site Manager and stop (if possible) the unsafe condition.	☐	☐
3.	Does the control device or other system component need to be shutdown? **If Yes: F**ollow Shutdown SOP.	☐	☐
4.	Are other personnel/resource (qualified technician, electrician, consultant or other) needed for malfunction diagnosis? **If Yes:** Notify qualified personnel. *Contact Name and Time:*	☐	☐
5.	Start malfunction diagnosis in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
6.	Are other resources needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other)? **If Yes:** Contact qualified resource. *Contact Name and Time:*	☐	☐
7.	Fix the malfunction in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
8.	Once the malfunction has been fixed: Has a control device or other system component been shutdown? **If Yes:** Follow Startup SOP and restart the system.	☐	☐
9.	Record date that malfunction started, date that malfunction ended (fixed), and total time that system was out of service in Section 1 – "Malfunction".	☐	
10.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☐	

Date Form Filled Out: _____ **Signature of Preparer:** _____

Name and Title of Site Manager: _____

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Section 3 – Events with a deviation from the SSM Plan procedures Only ☐ *Check if Section is N/A*

Provide explanation of the circumstances of the startup, shutdown, malfunction:

Provide description of the corrective action:

Describe the reasons the SSM Plan was not adequate:

Describe proposed revisions to the SSM Plan:

Section 4 - Event Codes

For Start-ups and Shutdowns

Startup: *The setting in operation of an affected source or portion of an affected source for any purpose.*
Shutdown: *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
S1	Maintenance
S2	Suspected Collection System Malfunction
S3	Suspected Control Device Malfunction
S4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
S5	Training
S6	Gas System Construction/Expansion
S7	Normal Backup Operation
S99	Other (Describe) _____

For Malfunctions

Malfunction*: Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

Code	Event
M1	Loss of LFG Flow/Blower Malfunction
M2	Collection Well and Pipe Failures
M3	Loss of Electrical Power
M4	Loss of Flame
M5	Malfunctions of Flow Monitoring/Recording Device
M6	Malfunctions of Temperature Monitoring/Recording Device
M7	Other Control Device Malfunctions
M8	Blockage of LFG Flow
M9	Treatment Skid Malfunction
M99	Other (Describe) _____

Date Form Filled Out: _____ **Signature of Preparer:** _____

Name and Title of Site Manager: _____

ATTACHMENT D

EXAMPLE SS&M EVENT FORMS

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Event: *This resulted in or had the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements:*

- *GCCS downtime of greater than 5 days.*
- *Free venting of collected LFG without control for greater than 1 hour.*
- *Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes.*
- *Any downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).*

Section 1 – All Events

List of all affected piece(s) of equipment:

Type of Event		Military Time		Duration (hrs:min)	Event Code *(see Section 4)*	SSM Plan Deviation? (Y[1]/N)	Deviation Caused Exceedance? (Y[2]/N)
		Date/Time Start	Date/Time End				
☒	Startup	8/13/12 9:30	8/13/12 13:45	4:15	S3	Y	Y
☐	Shutdown						
☐	Malfunction *(Complete Section 2)*						

[1]If there are any deviations from the SSM Plan:

☒ Notify the Site Manager.
☒ *Complete Section 3.*
☒ Revise the Plan within 45 days after the event.

[2]If there was any deviations from the SSM Plan that caused an exceedance of any NSPS operational and compliance requirements:

☒ Notify the Administrator by telephone, fax, or e-mail within 2 working days after beginning actions inconsistent with the Plan.
☒ Notify the Administrator by letter within 7 working days after the end of the event.

Section 2 – Malfunction Events Only

☒ *Check if Section is N/A*

		☒**Check one of the following for each step**	
Step	**Corrective Action Procedures for All Malfunctions**	**Yes/ Completed**	**No/ Not Applicable**
1.	Is landfill gas being released to the air? *(smell landfill gas, or detect gas flow?)* **If Yes:** Notify the Site Manager and stop (if possible) landfill gas flow.	☐	☐
2.	Is the malfunction causing an unsafe operating condition that may harm people, the environment, or the landfill gas control equipment? **If Yes:** Notify the Site Manager and stop (if possible) the unsafe condition.	☐	☐
3.	Does the control device or other system component need to be shutdown? **If Yes: F**ollow Shutdown SOP.	☐	☐
4.	Are other personnel/resource (qualified technician, electrician, consultant or other) needed for malfunction diagnosis? **If Yes:** Notify qualified personnel. *Contact Name and Time:*	☐	☐
5.	Start malfunction diagnosis in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
6.	Are other resources needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other)? **If Yes:** Contact qualified resource. *Contact Name and Time:*	☐	☐
7.	Fix the malfunction in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
8.	Once the malfunction has been fixed: Has a control device or other system component been shutdown? **If Yes:** Follow Startup SOP and restart the system.	☐	☐
9.	Record date that malfunction started, date that malfunction ended (fixed), and total time that system was out of service in Section 1 – "Malfunction".	☐	
10.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☐	

Date Form Filled Out: August 13, 2012 **Signature of Preparer:** John Doe

Name and Title of Site Manager: Jane Doe, Solid Waste Director

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Section 3 – Events with a deviation from the SSM Plan procedures Only ☐ *Check if Section is N/A*

Provide explanation of the circumstances of the startup, shutdown, malfunction:
System would not start in Automatic Mode, so started system in Manual Mode and left flare unattended.

Provide description of the corrective action:
Called Mr. Upholtz to fix flare controls and update SSM Plan.

Describe the reasons the SSM Plan was not adequate:
The SSM Plan did not clearly state that the flare could not be operated in manual mode and left unattended.

Describe proposed revisions to the SSM Plan:
Add bold statement in SSM Plan that flare cannot be operated in manual mode.

Section 4 - Event Codes

For Start-ups and Shutdowns

Startup: *The setting in operation of an affected source or portion of an affected source for any purpose.*
Shutdown: *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
S1	Maintenance
S2	Suspected Collection System Malfunction
S3	Suspected Control Device Malfunction
S4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
S5	Training
S6	Gas System Construction/Expansion
S7	Normal Backup Operation
S99	Other (Describe) _____

For Malfunctions

Malfunction*: Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

Code	Event
M1	Loss of LFG Flow/Blower Malfunction
M2	Collection Well and Pipe Failures
M3	Loss of Electrical Power
M4	Loss of Flame
M5	Malfunctions of Flow Monitoring/Recording Device
M6	Malfunctions of Temperature Monitoring/Recording Device
M7	Other Control Device Malfunctions
M8	Blockage of LFG Flow
M9	Treatment Skid Malfunction
M99	Other (Describe) _____

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Event: *This resulted in or had the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements:*

- *GCCS downtime of greater than 5 days.*
- *Free venting of collected LFG without control for greater than 1 hour.*
- *Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes.*
- *Any downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).*

Section 1 – All Events

List of all affected piece(s) of equipment:

Type of Event		Military Time		Duration (hrs:min)	Event Code *(see Section 4)*	SSM Plan Deviation? (Y[1]/N)	Deviation Caused Exceedance? (Y[2]/N)
		Date/Time Start	Date/Time End				
☐	Startup						
☒	Shutdown	8/13/12 14:45	8/13/12 15:15	0:30	S4	N	N
☐	Malfunction *(Complete Section 2)*						

[1]If there are any deviations from the SSM Plan:

- ☐ Notify the Site Manager.
- ☐ *Complete Section 3.*
- ☐ Revise the Plan within 45 days after the event.

[2]If there was any deviations from the SSM Plan that caused an exceedance of any NSPS operational and compliance requirements:

- ☐ Notify the Administrator by telephone, fax, or e-mail within 2 working days after beginning actions inconsistent with the Plan.
- ☐ Notify the Administrator by letter within 7 working days after the end of the event.

Section 2 – Malfunction Events Only

☒ *Check if Section is N/A*

		☒**Check one of the following for each step**	
Step	**Corrective Action Procedures for All Malfunctions**	**Yes/ Completed**	**No/ Not Applicable**
1.	Is landfill gas being released to the air? *(smell landfill gas, or detect gas flow?)* **If Yes:** Notify the Site Manager and stop (if possible) landfill gas flow.	☐	☐
2.	Is the malfunction causing an unsafe operating condition that may harm people, the environment, or the landfill gas control equipment? **If Yes:** Notify the Site Manager and stop (if possible) the unsafe condition.	☐	☐
3.	Does the control device or other system component need to be shutdown? **If Yes: F**ollow Shutdown SOP.	☐	☐
4.	Are other personnel/resource (qualified technician, electrician, consultant or other) needed for malfunction diagnosis? **If Yes:** Notify qualified personnel. *Contact Name and Time:*	☐	☐
5.	Start malfunction diagnosis in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
6.	Are other resources needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other)? **If Yes:** Contact qualified resource. *Contact Name and Time:*	☐	☐
7.	Fix the malfunction in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
8.	Once the malfunction has been fixed: Has a control device or other system component been shutdown? **If Yes:** Follow Startup SOP and restart the system.	☐	☐
9.	Record date that malfunction started, date that malfunction ended (fixed), and total time that system was out of service in Section 1 – "Malfunction".	☐	
10.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☐	

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Section 3 – Events with a deviation from the SSM Plan procedures Only ☒ *Check if Section is N/A*
Provide explanation of the circumstances of the startup, shutdown, malfunction:

Provide description of the corrective action:

Describe the reasons the SSM Plan was not adequate:

Describe proposed revisions to the SSM Plan:

Section 4 - Event Codes

For Start-ups and Shutdowns

Startup: *The setting in operation of an affected source or portion of an affected source for any purpose.*
Shutdown: *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
S1	Maintenance
S2	Suspected Collection System Malfunction
S3	Suspected Control Device Malfunction
S4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
S5	Training
S6	Gas System Construction/Expansion
S7	Normal Backup Operation
S99	Other (Describe) _____

For Malfunctions

Malfunction*: Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

Code	Event
M1	Loss of LFG Flow/Blower Malfunction
M2	Collection Well and Pipe Failures
M3	Loss of Electrical Power
M4	Loss of Flame
M5	Malfunctions of Flow Monitoring/Recording Device
M6	Malfunctions of Temperature Monitoring/Recording Device
M7	Other Control Device Malfunctions
M8	Blockage of LFG Flow
M9	Treatment Skid Malfunction
M99	Other (Describe) _____

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Event: *This resulted in or had the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements:*

- *GCCS downtime of greater than 5 days.*
- *Free venting of collected LFG without control for greater than 1 hour.*
- *Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes.*
- *Any downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).*

Section 1 – All Events

List of all affected piece(s) of equipment:

Type of Event		Military Time		Duration (hrs:min)	Event Code *(see Section 4)*	SSM Plan Deviation? (Y[1]/N)	Deviation Caused Exceedance? (Y[2]/N)
		Date/Time Start	Date/Time End				
☐	Startup						
☐	Shutdown						
☒	Malfunction *(Complete Section 2)*	8/13/12 5:30	8/13/12 7:30	2:00	M99	N	N

[1]If there are any deviations from the SSM Plan:

- ☐ Notify the Site Manager.
- ☐ *Complete Section 3.*
- ☐ Revise the Plan within 45 days after the event.

[2]If there was any deviations from the SSM Plan that caused an exceedance of any NSPS operational and compliance requirements:

- ☐ Notify the Administrator by telephone, fax, or e-mail within 2 working days after beginning actions inconsistent with the Plan.
- ☐ Notify the Administrator by letter within 7 working days after the end of the event.

Section 2 – Malfunction Events Only

☐ *Check if Section is N/A*

☒**Check one of the following for each step**

Step	Corrective Action Procedures for All Malfunctions	Yes/ Completed	No/ Not Applicable
1.	Is landfill gas being released to the air? *(smell landfill gas, or detect gas flow?)* **If Yes:** Notify the Site Manager and stop (if possible) landfill gas flow.	☒	☐
2.	Is the malfunction causing an unsafe operating condition that may harm people, the environment, or the landfill gas control equipment? **If Yes:** Notify the Site Manager and stop (if possible) the unsafe condition.	☒	☐
3.	Does the control device or other system component need to be shutdown? **If Yes: F**ollow Shutdown SOP.	☒	☐
4.	Are other personnel/resource (qualified technician, electrician, consultant or other) needed for malfunction diagnosis? **If Yes:** Notify qualified personnel. *Contact Name and Time:*	☐	☒
5.	Start malfunction diagnosis in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☒	
6.	Are other resources needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other)? **If Yes:** Contact qualified resource. *Contact Name and Time:*	☐	☒
7.	Fix the malfunction in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☒	
8.	Once the malfunction has been fixed: Has a control device or other system component been shutdown? **If Yes:** Follow Startup SOP and restart the system.	☒	☐
9.	Record date that malfunction started, date that malfunction ended (fixed), and total time that system was out of service in Section 1 – "Malfunction".	☒	
10.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☒	

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Section 3 – Events with a deviation from the SSM Plan procedures Only ☒ *Check if Section is N/A*
Provide explanation of the circumstances of the startup, shutdown, malfunction:

Provide description of the corrective action:

Describe the reasons the SSM Plan was not adequate:

Describe proposed revisions to the SSM Plan:

Section 4 - Event Codes

For Start-ups and Shutdowns

Startup: *The setting in operation of an affected source or portion of an affected source for any purpose.*
Shutdown: *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
S1	Maintenance
S2	Suspected Collection System Malfunction
S3	Suspected Control Device Malfunction
S4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
S5	Training
S6	Gas System Construction/Expansion
S7	Normal Backup Operation
S99	Other (Describe) _____

For Malfunctions

Malfunction*: Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

Code	Event
M1	Loss of LFG Flow/Blower Malfunction
M2	Collection Well and Pipe Failures
M3	Loss of Electrical Power
M4	Loss of Flame
M5	Malfunctions of Flow Monitoring/Recording Device
M6	Malfunctions of Temperature Monitoring/Recording Device
M7	Other Control Device Malfunctions
M8	Blockage of LFG Flow
M9	Treatment Skid Malfunction
M99	Other (Describe) Block Valve failed in open position

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

ATTACHMENT E

PREVIOUS PLAN

NEW RIVER REGIONAL LANDFILL
GAS COLLECTION AND
CONTROL SYSTEM
STARTUP, SHUTDOWN, AND
MALFUNCTION PLAN

Facility ID #1250008

Prepared for:

NEW RIVER SOLID WASTE ASSOCIATION
24276 NE 157th Street
Raiford, Florida 32083

Prepared by:

JONES EDMUNDS & ASSOCIATES, INC.
730 NE Waldo Road
Gainesville, Florida 32641

Certificate of Authorization #1841

Version 2
Dated July 2012

Revision: 0
Revision Date:
Issuance Date: July 10, 2012
Revised By: Jones Edmunds

NEW RIVER REGIONAL LANDFILL (NRRL)
GAS COLLECTION AND CONTROL SYSTEM

STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

Jones Edmunds prepared this startup, shutdown, and malfunction (SS&M) plan to comply with the requirements of 40 CFR 63.6(e)(3), as this facility is subject to 40 CFR Part 63, Subpart AAAA, the National Emission Standard for Hazardous Air Pollutants for municipal solid waste landfills.

A copy of the original plan and each revision/addendum will be kept on file at the facility for at least 5 years. The Site Manager is responsible for ensuring that the most recent copy of this Plan is made available to all personnel involved with the landfill gas collection and control system at the NRRL as well as to appropriate regulatory agency personnel on request.

TABLE OF CONTENTS

LIST OF TABLES

ATTACHMENTS

1.0 INTRODUCTION

1.1 OVERVIEW

The New River Regional Landfill (NRRL) is an affected source subject to the Municipal Solid Waste (MSW) Landfill New Source Performance Standards (NSPS). Because it is NSPS applicable, it is also subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for MSW Landfills (40 CFR 63, Subpart AAAA). As such, a written Startup, Shutdown, and Malfunction (SS&M) Plan (Plan) is required to be used by the Facility. Jones Edmunds has developed this Plan for the NRRL on behalf of the New River Solid Waste Association.

1.2 PURPOSE

As specified in 40 CFR 63.6 (e)(3), the purpose of this Plan is to provide site personnel with a flexible plan to reduce air emissions during startups, shutdowns, and malfunctions and to correct malfunctions as soon as practical after they occur. Specifically, the purpose of this Plan is to help the Facility:

- Operate and maintain the gas collection and control system in a manner consistent with safety and good air-pollution-control practices for reducing emissions to the levels required by the relevant standards.
- Correct malfunctions as soon as practical after their occurrence.
- Reduce the reporting burden associated with periods of startup, shutdown, and malfunction.

In addition, the Plan describes the required specific record-keeping and reporting procedures.

1.3 DEFINITIONS

The terms defined below are used throughout this document. Where applicable, these definitions are based on 40 CFR 63, Subpart A.

Administrator means the Administrator of the United States Environmental Protection Agency or his or her authorized representative (e.g., a State that has been delegated the authority to implement the provisions of this part). For this Plan the Administrator is the Florida Department of Environmental Protection (FDEP) Northeast District Air Program Administrator.

Affected source means the collection of equipment, activities, or both within a single contiguous area and under common control. In this Plan the affected source is the NRRL.

Event is any occurrence of a Startup, Shutdown, or Malfunction.

Gas Collection and Control System (GCCS) means the series of wells, conveyance pipe, condensate collection system, flare station, blower system, and associated instrumentation and controls. The control system refers to the flare.

Monitoring means the collection and use of measurement data or other information to control the operation of a process or pollution-control device or to verify a work practice standard relative to ensuring compliance with applicable requirements. Monitoring is composed of four elements:

- Indicator(s) of performance.
- Measurement techniques.
- Monitoring frequency.
- Averaging time.

Malfunction means any sudden, infrequent, and not reasonably preventable failure of air-pollution-control-and-monitoring equipment, process equipment, or a process to operate in a normal or usual manner **that causes or has the potential to cause emissions of an applicable standard to be exceeded**. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

Owner or operator means any person who owns, leases, operates, controls, or supervises a stationary source. For this Plan the Owner is the New River Solid Waste Association.

Responsible official means, for a municipality, State, Federal, or other public agency, either a principal executive officer or ranking elected official. For this Plan a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the Association.

Shutdown means the cessation of operation of an affected source or portion of an affected source for any purpose.

Site Manager – For this Plan the Site Manager is the Owner's on-site representative, responsible for ensuring that recordkeeping and action items are executed in accordance with this Plan.

Startup means the setting in operation of an affected source or portion of an affected source for any purpose. Startup encompasses actions to bring the GCCS on line, regardless of whether the system has been historically on line, or after a shutdown for maintenance.

Working day means any day on which Federal Government offices (or State government offices for a State that has obtained delegation under Section 112(1) are open for normal business. Saturdays, Sundays, and official Federal (or where delegated, State) holidays are not working days.

1.4 PLAN APPLICABILITY AND EXCLUSIONS

The purpose of Plan reporting is to document events that may result in or have the potential to result in an exceedance of applicable standards. Therefore, for any SS&M Event (Event) to be considered an Event that must be addressed by this Plan, it must result in or have the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements. The following list constitutes the possible deviations of the NSPS operational and compliance requirements that could occur due to an Event, thereby necessitating implementation of this Plan:

- GCCS downtime of greater than 5 days (if an alternative timeframe has not been established).
- Free venting of collected landfill gas (LFG) without control for greater than 1 hour.
- Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes (if an alternative timeframe has not been established).
- Downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).

If the occurrence would not result in or have the potential to result in an exceedance of one of these emission limitations, it is not required to be corrected or documented in accordance with this Plan, although use of the Plan may still be advisable. Events should be considered actionable under this Plan whether they are discovered by the landfill Owner during normal operations or by a Regulatory Agency during compliance inspections.

In addition, the following items are addressed by other regulations and are excluded from documentation under this Plan:

- Exceedance at individual wells for pressure, oxygen, and temperature.
- Surface emissions monitoring exceedance (reading at 500 ppm or greater).
- Shutdowns of the flare which are followed immediately by successful re-start sequences and do not vent emissions to the atmosphere. This is done either automatically or manually and is part of the control device's normal operating procedures.

2.0 PLAN PROCEDURES

This section addresses each type of Event separately. Startup and shutdown Events are generally planned Events associated with repairing, maintaining, testing, and/or upgrading the GCCS and associated monitoring equipment do not typically trigger Plan reporting. A landfill is not a typical affected source that can be started up or shutdown because landfill emissions are produced by a continuous biological process. Therefore, the primary focus of this Plan will be on malfunctions of the Facility GCCS.

Recordkeeping and reporting procedures for all Events are described in Section 3.0

2.1 STARTUP AND SHUTDOWN EVENTS

2.1.1 Startup Events

Startup Events typically refer to startup of the control system and associated monitoring system. Startups are considered consistent with the Plan provided they are conducted in accordance with the manufacturer's guidance, which is provided in Attachment A, and included in on-site operations and maintenance manuals.

2.1.2 Shutdown Events

Shutdown Events typically refer to shutdown of the control system and associated monitoring system. Shutdowns are considered consistent with the Plan provided they are conducted in accordance with the manufacturer's guidance, which is provided in Attachment A, and included in on-site operations and maintenance manuals.

2.1.3 Ancillary Activities

This Plan provides additional guidance for ancillary activities related to startups and shutdowns of the GCCS associated with maintenance, construction, and/or repair. These activities may cause air emissions in excess of the NSPS operational standards and therefore require implementation of this Plan. Table 1 lists practices that may be used to mitigate air emissions related to ancillary startup or shutdown activities and preclude implementation of this Plan. Note that these are not corresponding action items but general practices that may be used to limit air emissions to the greatest extent practical.

Table 1 Ancillary Activities and Mitigation Practices	
Ancillary Activity	Mitigation Practices
• Repairing system leaks. • Purging gases trapped within the piping system. • Venting of uncombusted landfill gas during startup of flare. • All other activities associated with construction of the GCCS system before fulltime operation, such as trial operations.	• Temporarily cap pipes venting gas to the extent that capping does not impact safety or the effective construction of the system. • Reduce the surface area of earthworks to maintain cover integrity and reduce gas emissions to the atmosphere to the extent that this does not impact safety or the effective construction of the system. • Limit pipe purging to as short a time as practical.

2.2 MALFUNCTION EVENTS

System malfunctions are a normal part of GCCS operation and may include sudden, infrequent, and not reasonably preventable failures of the GCCS. It is the intent of this Plan to include as many of the possible causes as practical for specific malfunction Events. The following list includes occurrences that may constitute a malfunction of the GCCS at the Facility. Each of these occurrences (or any malfunction not addressed here) could have multiple causes that need to be investigated and evaluated immediately to determine the best course of action to correct the malfunction. Attachment B provides a detailed table of diagnosis and correction procedures for each of these malfunction Events.

- Loss of LFG Flow/Gas mover malfunction.
- Collection well and pipe failures.
- Loss of electrical power (other than the loss of power followed by a normal restart sequence).
- Failure to operate in automatic mode.
- Loss of flame.
- Malfunction of flow measuring/recording device.
- Malfunction of temperature measuring/recording device.
- Other control device malfunctions.
- Blockage of landfill gas flow.

The following steps shall be taken, even if they are not included in the correction procedures of the preceding list, for all malfunction Events that must be corrected in accordance with this Plan:

- Identify whether the malfunction is causing or has caused excess emissions to the atmosphere. If excess emissions are occurring, take necessary steps to reduce emissions to the maximum extent practical using good air-pollution-control practices and safety procedures.

- Contact the Site Manager immediately and proceed with the malfunction diagnosis and correction procedures provided in Attachment B. The Site Manager should be notified of all subsequent steps in the malfunction diagnosis and correction procedures.

- If the procedures in Attachment B of this Plan do not address or do not adequately address the malfunction that has occurred, the operator should attempt to correct the malfunction with the best resources available. Notify the Site Manager, complete the SSM Event Form, and revise the SSMP within 45 days after the event. If the deviations cause an exceedance of any NSPS operational and compliance requirements notify the Administrator by telephone, fax, or e-mail within 2 working days of beginning action not covered in this Plan and by letter within 7 working days after the end of the event. Further guidance for reporting deviations from this Plan is provided in Section 3.0.

- If the GCCS malfunction cannot be corrected within the time required to prevent a deviation from the NSPS operational standards (as listed in Section 1.4), shut down the control device for up to five days to prevent air emissions and notify the Site Manager. Define an appropriate alternative timeframe for corrective action that is reasonable for the type of repair and/or maintenance that is required to correct the malfunction.

- If the malfunction cannot be corrected within the alternative timeframe specified above, conduct the appropriate notification, recordkeeping, and reporting required for deviations of the Title V permit (refer to the Title V permit).

- For malfunction Events that are conducted in accordance with this Plan and do not require deviation reporting, initiate recordkeeping and reporting procedures in accordance with Section 3.0 after diagnosis and correction are completed.

- If the flare fails to operate in automatic mode, it should be shutdown or operated in manual mode. There shall be an operator at the flare at all times when the flare is operating in manual mode.

3.0 REPORTING AND RECORDKEEPING

Section 3.1 describes the specific reporting and recordkeeping requirements for Events that must be corrected in accordance with this Plan. Section 3.2 describes instances that may trigger revisions to this Plan and the steps required to revise the Plan. Section 3.3 outlines the requirements for the Semi-Annual SS&M Report (Report).

3.1 EVENT RECORDING AND REPORTING

Each Event that requires correction in accordance with this Plan must be recorded using the Startup, Shutdown and Malfunction Event Form (SS&M Event Form) provided in Attachment C. Additional Event reporting is determined based on whether the corrective action was or was not consistent with the Facility's current Plan and if the Event caused an exceedance of any applicable emission limitations. Example SS&M Event Forms are included in Attachment D.

3.1.1 Corrective Action Consistent with Plan

If the actions taken during an Event are consistent with this Plan, the following steps must be taken:

- Complete and file the SS&M Event Form (Attachment C).

The following information must be filed and submitted with the Report:

- Copy of the completed SS&M Event Form.

3.1.2 Corrective Actions Inconsistent with Plan without Exceedances

If the actions taken during an Event were not consistent with this Plan and they did not cause an exceedance of any NSPS operational and compliance requirements, the following steps must be taken:

- Notify the Site Manager.
- Complete and file the SS&M Event Form (Attachment C).
- Revise the Plan in accordance with Section 3.2 within 45 days of a Deviation Event.

The following information must be filed and submitted with the Report:

- Copy of the completed SS&M Event Form.
- Revised Plan.

3.1.3 Corrective Actions Inconsistent with Plan with Exceedances

If the actions taken during an Event were not consistent with this Plan and they caused an exceedance of any NSPS operational and compliance requirements, the following steps must be taken:

- Notify the Site Manager.
- Notify the Administrator by telephone, fax, or email within 2 working days after beginning the actions that were inconsistent with the Plan.
- Complete and file the SS&M Event Form (Attachment C).
- Notify the Administrator by letter within 7 working days after the end of the Event to provide the following:
    - Copy of the SS&M Event Form.
    - Describe what excess emissions and/or parameter monitoring exceedances are believed to have occurred during the Event.
    - Name and title of Site Manager.
- Provide certifying signature of the owner/operator or other responsible official.
- Revise the Plan in accordance with Section 3.2 within 45 days of a Deviation Event.

The following information must be filed and submitted with the Report:

- Copy of the completed SS&M Event Form.
- Copy of Administrator Notification Correspondence.
- Revised Plan.

3.2 PLAN MAINTENANCE

3.2.1 When to Revise the Plan

This Plan will be revised:

- To reflect changes to Facility equipment, operations, or procedures.

- If the Plan fails to provide for the operation of the air-pollution-control-and-monitoring equipment during an Event in a manner consistent with safety and good air-pollution practices to reduce emissions.

- If the Plan does not provide adequate procedures for correcting an Event as quickly as practicable.

- If the Plan includes an Event that does not meet the definition of an Event.

- If the Plan fails to address or does not adequately address an Event that has occurred (see Section 3.1.2). In this case the Site Manager must:

    - Revise the Plan within 45 days after the Event to include detailed procedures for operating and maintaining the source during similar Events and a program of corrective action for similar Events.

    - Include the revised Plan in the Report.

Revisions to the Plan are not effective until written notice has been provided to the Administrator describing the Plan revisions. Although the Plan is a required part of the Title V permit, revisions to the Plan shall not be deemed to constitute or require a permit revision.

3.2.2 Plan Filing

Facilities must maintain a current Plan in the Facility files and must make the Plan available upon request. If a Plan is subsequently revised, the facility must maintain each previous version of the Plan for 5 years after revision of the Plan. Each such revision must be reported in the Report. Facilities must retain a copy of the most recent Plan for 5 years from the date a source ceases operation or is no longer subject to the NESHAP requirements. A copy of the previous Plan is provided as Attachment F.

3.3 REPORT PREPARATION

The Report must be addressed to the Administrator and postmarked by the 30th day following the end of each semi-annual reporting period; specifically by July 30 and January 30. Reports may be combined with the semi-annual report required by NESHAP 40 CFR 63.1980(a) and 40 CFR 60.757(f) of the NSPS. Reports are only required if an Event occurred during the reporting period. The Report must include the following:

- Cover letter (as provided in Attachment E) with the name, title and certifying signature of the owner or operator or other responsible official. Identify any Events that caused or may have caused an applicable emission limit to be exceeded in the cover letter.

- Statement that the Plan was revised during the reporting period, if necessary. Include the revised Plan in the Report attachments.

- Completed SS&M Event Forms for each Event that occurred during the reporting period

- Discussion including the number, duration, and brief description for each type of startup, shutdown, and malfunction Event that occurred during the reporting period.

4.0 REFERENCES

Florida Administrative Code, Chapter 62-213 Operation Permits for Major Sources of Air Pollution.

US EPA, Federal Regulations, 40 CFR 63 Subpart AAAA.

US EPA, Federal Regulations, 40 CFR 63.6, Compliance with standards and maintenance requirements.

US EPA, Federal Regulations, 40 CFR 63.10, Recordkeeping and reporting requirements.

US EPA, Office of Air Quality Planning and Standards. (December 2003) *How to Prepare a Startup, Shutdown, Malfunction Plan for Collection and Control Systems at Municipal Solid Waste Landfills*. EPA-456/R-03-006.

ATTACHMENT A

PARNEL FLARE STARTUP AND MAINTENANCE PROCEDURES

Checklist – Startup

1. Ensure that the flow control valves of selected gas wells in the LFG wellfield are appropriately set. Set each wells flow rate immediately after starting up the blower for the first time.

2. Open the main block valve at the inlet of the blower-flare facility. (It should normally be throttled to about a 10 to 25% open position (range of travel) depending upon flow setting needed.)

3. Open the inlet and outlet valves to the inlet separator. Close the bypass valve if present.

4. Open the inlet and discharge block valves for each blower to be operated and close the block valves for non-operating blowers.

5. Verify the propane or natural gas system is ready to start.

6. Walk through the flare station to verify that there are no gas leaks or unusual odors.

7. Turn the power switch to the "On" position.

8. Set any "Hand-Off-Auto" switch for each blower to be run in an "Auto" position. Leave each blower which is not to be run in the "Off" or "Standby" position.

9. Verify that all alarms have been reset by pressing the main control panel "Alarm Reset" button.

10. Turn the automatic block valve switch to "Auto" position.

11. Press or turn the "Start" button to initiate the automatic start up sequence.

12. The blower should come on, the automatic block valve should open, and the flare should light. Watch for the flowmeter indicator to indicate flow and then verify that the flare main burner is lit. If flame fails to prove on an automatic system, the flare should time out and lock out. If manually controlled if the flare fails to light, shut the system down and allow sufficient time for a convection purge, before attempting a re-light.

13. Once the flare is lit and proven, check to be sure that combustion is satisfactory and that the main fuel pressure (burner back pressure) and LFG flow to the flare is satisfactory.

Once online verify the following:

1. Automatic block valve is fully opened.

2. LFG flow is adequate to satisfy minimum flow requirements of blower and flare.

3. Listen for abnormal blower and motor sound

4. Check for unusual odors that could indicate a gas leak.

5. Once the flare operation has stabilized, verify performance, temperature, and flow.

6. Visually observe combustion inside the flare

Checklist – Routine

1. The landfill gas collection system should be operated according to the specifications of the manufacturer and the engineer.

2. Only individuals undergoing the proper training should operate any aspect of the landfill gas collection system. Those parties responsible for any aspect of operating the landfill gas collection system must be identified in the bioreactor operations planning meeting.

3. The landfill gas collection system should be inspected for leaks, broken pipes, and damaged hoses. Any sounds indicating possible air entrance into the system should be inspected further even if the leak is not visible.

Checklist – Shutdown

Hit the "Stop" button or turn the "Start" switch to "Off" on the control panel. Turning off all control panel power is to be avoided.

Checklist – Emergency Shutdown

1. Hit the "Stop" button or turn the "Start" switch to "Off" on the control panel. Turning off all control panel power is to be avoided.

2. Ensure that the source of gas from the wellfield is blocked outside the facility plot.

3. Verify closure of the automatic block valve. Do not rely solely on it.

4. Close manual block valve. This valve should be located at the facility plot limit or outside the facility.

ATTACHMENT B

COMMON CAUSES AND RESPONSE ACTIONS FOR GCCS MALFUNCTIONS

COMMON CAUSES AND RESPONSE ACTIONS FOR GCCS MALFUNCTIONS

This list represents a summary of possible causes and response actions for GCCS malfunctions and is not considered to be all inclusive. The list of response actions is not intended to be a sequence of events that must be implemented in order. Certain malfunctions may or may not be associated with the listed "common causes," nor will the "typical response actions" be appropriate in all instances. Site-specific evaluation of the malfunction and development of specific response actions is recommended in all cases.

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Blower or Other Gas Mover Equipment	Applies vacuum to wellfield to extract LFG and transport to control device	Loss of LFG Flow/Blower Malfunction	• Flame arrestor fouling/deterioration • Automatic valve problems • Blower failure (e.g., belt, motor, impeller, coupling, seizing) • Loss of power • Extraction piping failure • Condensate knock-out problems • Extraction piping blockages	• Repair breakages in extraction piping • Clean flame arrestor • Repair blockages in extraction piping • Verify automatic valve operation, compressed air/nitrogen supply • Notify power utility, if appropriate • Provide/utilize auxiliary power source, if necessary • Repair settlement in collection piping • Repair blower • Activate back-up blower, if available • Clean knock-out pot/demister • Drain knock-out pot

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Blower or Other Gas Mover Equipment and Control Device	Collection and control of LFG	Loss of electrical power	• Force majeure/Act of God (e.g., lightning, flood, earthquake) • Area-wide or local blackout or brown-out • Interruption in service (e.g., blown service fuse) • Electrical line failure • Breaker trip • Transformer failure • Motor starter failure/trip • Overdraw of power • Problems in electrical panel • Damage to electrical equipment from on-site operations	• Check/reset breaker • Check/repair electrical panel components • Check/repair transformer • Check/repair motor starter • Check/repair electrical line • Test amperage to various equipment • Contact electricity supplier • Contact/contract electrician • Provide auxiliary power (if necessary)
Extraction Wells and Collection Piping	Conduits for extractions and movement of LFG flow	Collection well and pipe failures	• Break/crack in header or lateral piping • Leaks at wellheads, valves, flanges, test ports, seals, couplings, etc. • Collection piping blockages • Problems due to settlement (e.g., pipe separation, deformation, development of low points)	• Repair leaks or breaks in lines or wellheads • Follow procedures for loss of LFG flow/blower malfunction • Repair blockages in collection piping • Repair settlement in collection piping • Re-install, repair, or replace piping • Review waste types, age of waste, etc.

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
LFG Control Device	Combusts LFG	Loss of Flame	• Problems/failure of thermocouple • Loss/change of LFG flow • Loss/change of LFG quality • Problems with air/fuel controls • Problems/failure of flame sensor • Problems with temperature monitoring equipment	• Check/repair temperature monitoring equipment • Check/repair thermocouple • Follow procedures for loss of flow/blower malfunction • Check/adjust air/fuel controls • Check/adjust/repair flame sensor • Check/adjust LFG collectors
		Failure to Operate in Automatic Mode	• Problems/failure of automatic operation • Problems with Power outages • Problems with Electrical Controls	• Switch to manual mode - operator shall remain at the control device at all times flare is operating in manual mode • Check alarm history • Reset alarms at touch screen • Restart flare in automatic mode • If flare cannot be restarted in automatic mode shutdown flare and request assistance
		Other Control Device Malfunctions	• Control device smoking (i.e., visible emissions) • Problems with flare insulation • Problems with pilot light system • Problems with air louvers • Problems with air/fuel controllers • Problems with thermocouple • Problems with burners • Problems with flame arrester • Alarmed malfunction conditions not covered above • Unalarmed conditions not covered above	• Site-specific diagnosis procedures • Site-specific responses actions based on diagnosis • Open manual louvers • Clean pitot orifice • Clean/drain flame arrestor • Refill propane supply • Check/repair pilot sparking system

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Flow Monitoring/ Recording Device	Measures and records gas flow from collection system to control	Malfunctions of Flow Monitoring/Recording Device	• Problems with orifice plate, pitot tube, or other in-line flow measuring device • Problems with device controls and/or wiring • Problems with chart recorder	• Check/adjust/repair flow measuring device and/or wiring • Check/repair chart recorder • Replace paper in chart recorder
Temperature Monitoring/ Recording Device	Monitors and records combustion temperature of enclosed combustion device	Malfunctions of Temperature Monitoring/Recording Device	• Problems with thermocouple • Problems with device controls and/or wiring • Problems with chart recorder	• Check/adjust/repair thermocouple • Check/adjust/repair controller and/or wiring • Check/adjust/repair electrical panel components • Check/repair chart recorder • Replace paper in chart recorder
Collection Piping	Conduit movement of LFG flow	Blockage of LFG Flow	• Collection piping blockages due to build-up of liquid • Problems due to settlement (e.g., pipe separation, deformation, development of low points)	• Follow procedures for loss of LFG flow/blower malfunction • Repair blockages in collection piping • Repair settlement in collection piping • Re-install, repair, or replace piping

ATTACHMENT C

SS&M EVENT FORM

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Event: *This resulted in or had the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements:*

- *GCCS downtime of greater than 5 days.*
- *Free venting of collected LFG without control for greater than 1 hour.*
- *Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes.*
- *Any downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).*

Section 1 – All Events

List of all affected piece(s) of equipment:

Type of Event	Military Time		Duration (hrs:min)	Event Code *(see Section 4)*	SSM Plan Deviation? (Y[1]/N)	Deviation Caused Exceedance? (Y[2]/N)
	Date/Time Start	Date/Time End				
☐ Startup						
☐ Shutdown						
☐ Malfunction *(Complete Section 2)*						

[1]If there are any deviations from the SSM Plan:

- ☐ Notify the Site Manager.
- ☐ *Complete Section 3.*
- ☐ Revise the Plan within 45 days after the event.

[2]If there was any deviations from the SSM Plan that caused an exceedance of any NSPS operational and compliance requirements:

- ☐ Notify the Administrator by telephone, fax, or e-mail within 2 working days after beginning actions inconsistent with the Plan.
- ☐ Notify the Administrator by letter within 7 working days after the end of the event.

Section 2 – Malfunction Events Only

☐ *Check if Section is N/A*

☒ **Check one of the following for each step**

Step	Corrective Action Procedures for All Malfunctions	Yes/ Completed	No/ Not Applicable
1.	Is landfill gas being released to the air? *(smell landfill gas, or detect gas flow?)* **If Yes:** Notify the Site Manager and stop (if possible) landfill gas flow.	☐	☐
2.	Is the malfunction causing an unsafe operating condition that may harm people, the environment, or the landfill gas control equipment? **If Yes:** Notify the Site Manager and stop (if possible) the unsafe condition.	☐	☐
3.	Does the control device or other system component need to be shutdown? **If Yes: F**ollow Shutdown SOP.	☐	☐
4.	Are other personnel/resource (qualified technician, electrician, consultant or other) needed for malfunction diagnosis? **If Yes:** Notify qualified personnel. *Contact Name and Time:*	☐	☐
5.	Start malfunction diagnosis in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
6.	Are other resources needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other)? **If Yes:** Contact qualified resource. *Contact Name and Time:*	☐	☐
7.	Fix the malfunction in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
8.	Once the malfunction has been fixed: Has a control device or other system component been shutdown? **If Yes:** Follow Startup SOP and restart the system.	☐	☐
9.	Record date that malfunction started, date that malfunction ended (fixed), and total time that system was out of service in Section 1 – "Malfunction".	☐	
10.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☐	

Date Form Filled Out: _____ **Signature of Preparer:** _____

Name and Title of Site Manager: _____

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Section 3 – Events with a deviation from the SSM Plan procedures Only ☐ *Check if Section is N/A*

Provide explanation of the circumstances of the startup, shutdown, malfunction:

Provide description of the corrective action:

Describe the reasons the SSM Plan was not adequate:

Describe proposed revisions to the SSM Plan:

Section 4 - Event Codes

For Start-ups and Shutdowns

Startup: *The setting in operation of an affected source or portion of an affected source for any purpose.*
Shutdown: *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
S1	Maintenance
S2	Suspected Collection System Malfunction
S3	Suspected Control Device Malfunction
S4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
S5	Training
S6	Gas System Construction/Expansion
S7	Normal Backup Operation
S99	Other (Describe) _____

For Malfunctions

Malfunction*: Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

Code	Event
M1	Loss of LFG Flow/Blower Malfunction
M2	Collection Well and Pipe Failures
M3	Loss of Electrical Power
M4	Loss of Flame
M5	Malfunctions of Flow Monitoring/Recording Device
M6	Malfunctions of Temperature Monitoring/Recording Device
M7	Other Control Device Malfunctions
M8	Blockage of LFG Flow
M9	Treatment Skid Malfunction
M99	Other (Describe) _____

Date Form Filled Out: _____ **Signature of Preparer:** _____

Name and Title of Site Manager: _____

ATTACHMENT D

EXAMPLE SS&M EVENT FORMS

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Event: *This resulted in or had the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements:*

- *GCCS downtime of greater than 5 days.*
- *Free venting of collected LFG without control for greater than 1 hour.*
- *Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes.*
- *Any downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).*

Section 1 – All Events

List of all affected piece(s) of equipment:

Type of Event		Military Time		Duration (hrs:min)	Event Code *(see Section 4)*	SSM Plan Deviation? (Y[1]/N)	Deviation Caused Exceedance? (Y[2]/N)
		Date/Time Start	Date/Time End				
☒	Startup	8/13/12 9:30	8/13/12 13:45	4:15	S3	Y	Y
☐	Shutdown						
☐	Malfunction *(Complete Section 2)*						

[1]If there are any deviations from the SSM Plan:

☒ Notify the Site Manager.
☒ *Complete Section 3.*
☒ Revise the Plan within 45 days after the event.

[2]If there was any deviations from the SSM Plan that caused an exceedance of any NSPS operational and compliance requirements:

☒ Notify the Administrator by telephone, fax, or e-mail within 2 working days after beginning actions inconsistent with the Plan.
☒ Notify the Administrator by letter within 7 working days after the end of the event.

Section 2 – Malfunction Events Only

☒ *Check if Section is N/A*

		☒**Check one of the following for each step**	
Step	**Corrective Action Procedures for All Malfunctions**	**Yes/ Completed**	**No/ Not Applicable**
1.	Is landfill gas being released to the air? *(smell landfill gas, or detect gas flow?)* **If Yes:** Notify the Site Manager and stop (if possible) landfill gas flow.	☐	☐
2.	Is the malfunction causing an unsafe operating condition that may harm people, the environment, or the landfill gas control equipment? **If Yes:** Notify the Site Manager and stop (if possible) the unsafe condition.	☐	☐
3.	Does the control device or other system component need to be shutdown? **If Yes: F**ollow Shutdown SOP.	☐	☐
4.	Are other personnel/resource (qualified technician, electrician, consultant or other) needed for malfunction diagnosis? **If Yes:** Notify qualified personnel. *Contact Name and Time:*	☐	☐
5.	Start malfunction diagnosis in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
6.	Are other resources needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other)? **If Yes:** Contact qualified resource. *Contact Name and Time:*	☐	☐
7.	Fix the malfunction in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
8.	Once the malfunction has been fixed: Has a control device or other system component been shutdown? **If Yes:** Follow Startup SOP and restart the system.	☐	☐
9.	Record date that malfunction started, date that malfunction ended (fixed), and total time that system was out of service in Section 1 – "Malfunction".	☐	
10.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☐	

Date Form Filled Out: August 13, 2012 **Signature of Preparer:** John Doe

Name and Title of Site Manager: Jane Doe, Solid Waste Director

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Section 3 – Events with a deviation from the SSM Plan procedures Only ☐ *Check if Section is N/A*

Provide explanation of the circumstances of the startup, shutdown, malfunction:
System would not start in Automatic Mode, so started system in Manual Mode and left flare unattended.

Provide description of the corrective action:
Called Mr. Upholtz to fix flare controls and update SSM Plan.

Describe the reasons the SSM Plan was not adequate:
The SSM Plan did not clearly state that the flare could not be operated in manual mode and left unattended.

Describe proposed revisions to the SSM Plan:
Add bold statement in SSM Plan that flare cannot be operated in manual mode.

Section 4 - Event Codes

For Start-ups and Shutdowns

Startup: *The setting in operation of an affected source or portion of an affected source for any purpose.*
Shutdown: *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
S1	Maintenance
S2	Suspected Collection System Malfunction
S3	Suspected Control Device Malfunction
S4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
S5	Training
S6	Gas System Construction/Expansion
S7	Normal Backup Operation
S99	Other (Describe) _____

For Malfunctions

Malfunction*: Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

Code	Event
M1	Loss of LFG Flow/Blower Malfunction
M2	Collection Well and Pipe Failures
M3	Loss of Electrical Power
M4	Loss of Flame
M5	Malfunctions of Flow Monitoring/Recording Device
M6	Malfunctions of Temperature Monitoring/Recording Device
M7	Other Control Device Malfunctions
M8	Blockage of LFG Flow
M9	Treatment Skid Malfunction
M99	Other (Describe) _____

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Event: *This resulted in or had the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements:*

- *GCCS downtime of greater than 5 days.*
- *Free venting of collected LFG without control for greater than 1 hour.*
- *Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes.*
- *Any downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).*

Section 1 – All Events

List of all affected piece(s) of equipment:

Type of Event		Military Time		Duration (hrs:min)	Event Code *(see Section 4)*	SSM Plan Deviation? (Y[1]/N)	Deviation Caused Exceedance? (Y[2]/N)
		Date/Time Start	Date/Time End				
☐	Startup						
☒	Shutdown	8/13/12 14:45	8/13/12 15:15	0:30	S4	N	N
☐	Malfunction *(Complete Section 2)*						

[1]If there are any deviations from the SSM Plan:

- ☐ Notify the Site Manager.
- ☐ *Complete Section 3.*
- ☐ Revise the Plan within 45 days after the event.

[2]If there was any deviations from the SSM Plan that caused an exceedance of any NSPS operational and compliance requirements:

- ☐ Notify the Administrator by telephone, fax, or e-mail within 2 working days after beginning actions inconsistent with the Plan.
- ☐ Notify the Administrator by letter within 7 working days after the end of the event.

Section 2 – Malfunction Events Only

☒ *Check if Section is N/A*

		☒**Check one of the following for each step**	
Step	**Corrective Action Procedures for All Malfunctions**	**Yes/ Completed**	**No/ Not Applicable**
1.	Is landfill gas being released to the air? *(smell landfill gas, or detect gas flow?)* **If Yes:** Notify the Site Manager and stop (if possible) landfill gas flow.	☐	☐
2.	Is the malfunction causing an unsafe operating condition that may harm people, the environment, or the landfill gas control equipment? **If Yes:** Notify the Site Manager and stop (if possible) the unsafe condition.	☐	☐
3.	Does the control device or other system component need to be shutdown? **If Yes: F**ollow Shutdown SOP.	☐	☐
4.	Are other personnel/resource (qualified technician, electrician, consultant or other) needed for malfunction diagnosis? **If Yes:** Notify qualified personnel. *Contact Name and Time:*	☐	☐
5.	Start malfunction diagnosis in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
6.	Are other resources needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other)? **If Yes:** Contact qualified resource. *Contact Name and Time:*	☐	☐
7.	Fix the malfunction in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
8.	Once the malfunction has been fixed: Has a control device or other system component been shutdown? **If Yes:** Follow Startup SOP and restart the system.	☐	☐
9.	Record date that malfunction started, date that malfunction ended (fixed), and total time that system was out of service in Section 1 – "Malfunction".	☐	
10.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☐	

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Section 3 – Events with a deviation from the SSM Plan procedures Only ☒ *Check if Section is N/A*
Provide explanation of the circumstances of the startup, shutdown, malfunction:

Provide description of the corrective action:

Describe the reasons the SSM Plan was not adequate:

Describe proposed revisions to the SSM Plan:

Section 4 - Event Codes

For Start-ups and Shutdowns

Startup: *The setting in operation of an affected source or portion of an affected source for any purpose.*
Shutdown: *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
S1	Maintenance
S2	Suspected Collection System Malfunction
S3	Suspected Control Device Malfunction
S4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
S5	Training
S6	Gas System Construction/Expansion
S7	Normal Backup Operation
S99	Other (Describe) _____

For Malfunctions

Malfunction*: Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

Code	Event
M1	Loss of LFG Flow/Blower Malfunction
M2	Collection Well and Pipe Failures
M3	Loss of Electrical Power
M4	Loss of Flame
M5	Malfunctions of Flow Monitoring/Recording Device
M6	Malfunctions of Temperature Monitoring/Recording Device
M7	Other Control Device Malfunctions
M8	Blockage of LFG Flow
M9	Treatment Skid Malfunction
M99	Other (Describe) _____

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Event: *This resulted in or had the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements:*

- *GCCS downtime of greater than 5 days.*
- *Free venting of collected LFG without control for greater than 1 hour.*
- *Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes.*
- *Any downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).*

Section 1 – All Events

List of all affected piece(s) of equipment:

Type of Event		Military Time		Duration (hrs:min)	Event Code *(see Section 4)*	SSM Plan Deviation? (Y[1]/N)	Deviation Caused Exceedance? (Y[2]/N)
		Date/Time Start	Date/Time End				
☐	Startup						
☐	Shutdown						
☒	Malfunction *(Complete Section 2)*	8/13/12 5:30	8/13/12 7:30	2:00	M99	N	N

[1]If there are any deviations from the SSM Plan:

- ☐ Notify the Site Manager.
- ☐ *Complete Section 3.*
- ☐ Revise the Plan within 45 days after the event.

[2]If there was any deviations from the SSM Plan that caused an exceedance of any NSPS operational and compliance requirements:

- ☐ Notify the Administrator by telephone, fax, or e-mail within 2 working days after beginning actions inconsistent with the Plan.
- ☐ Notify the Administrator by letter within 7 working days after the end of the event.

Section 2 – Malfunction Events Only

☐ *Check if Section is N/A*

☒**Check one of the following for each step**

Step	Corrective Action Procedures for All Malfunctions	Yes/ Completed	No/ Not Applicable
1.	Is landfill gas being released to the air? *(smell landfill gas, or detect gas flow?)* **If Yes:** Notify the Site Manager and stop (if possible) landfill gas flow.	☒	☐
2.	Is the malfunction causing an unsafe operating condition that may harm people, the environment, or the landfill gas control equipment? **If Yes:** Notify the Site Manager and stop (if possible) the unsafe condition.	☒	☐
3.	Does the control device or other system component need to be shutdown? **If Yes: F**ollow Shutdown SOP.	☒	☐
4.	Are other personnel/resource (qualified technician, electrician, consultant or other) needed for malfunction diagnosis? **If Yes:** Notify qualified personnel. *Contact Name and Time:*	☐	☒
5.	Start malfunction diagnosis in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☒	
6.	Are other resources needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other)? **If Yes:** Contact qualified resource. *Contact Name and Time:*	☐	☒
7.	Fix the malfunction in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☒	
8.	Once the malfunction has been fixed: Has a control device or other system component been shutdown? **If Yes:** Follow Startup SOP and restart the system.	☒	☐
9.	Record date that malfunction started, date that malfunction ended (fixed), and total time that system was out of service in Section 1 – "Malfunction".	☒	
10.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☒	

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

STARTUP, SHUTDOWN, AND MALFUCTION EVENT FORM

Section 3 – Events with a deviation from the SSM Plan procedures Only ☒ *Check if Section is N/A*
Provide explanation of the circumstances of the startup, shutdown, malfunction:

Provide description of the corrective action:

Describe the reasons the SSM Plan was not adequate:

Describe proposed revisions to the SSM Plan:

Section 4 - Event Codes

For Start-ups and Shutdowns

Startup: *The setting in operation of an affected source or portion of an affected source for any purpose.*
Shutdown: *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
S1	Maintenance
S2	Suspected Collection System Malfunction
S3	Suspected Control Device Malfunction
S4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
S5	Training
S6	Gas System Construction/Expansion
S7	Normal Backup Operation
S99	Other (Describe) _____

For Malfunctions

Malfunction*: Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

Code	Event
M1	Loss of LFG Flow/Blower Malfunction
M2	Collection Well and Pipe Failures
M3	Loss of Electrical Power
M4	Loss of Flame
M5	Malfunctions of Flow Monitoring/Recording Device
M6	Malfunctions of Temperature Monitoring/Recording Device
M7	Other Control Device Malfunctions
M8	Blockage of LFG Flow
M9	Treatment Skid Malfunction
M99	Other (Describe) Block Valve failed in open position

Date Form Filled Out: *August 13, 2012* **Signature of Preparer:** *John Doe*

Name and Title of Site Manager: *Jane Doe, Solid Waste Director*

ATTACHMENT E

EXAMPLE ADMINISTRATOR NOTIFICATION LETTER

[Date]

[Name and Title]
District Air Program Administrator
FDEP Northeast District
7825 Baymeadows Way
Suite B200
Jacksonville, FL 32256-7890

RE: Semiannual Startup, Shutdown, Malfunction (SS&M) Plan Report
New River Regional Landfill
Facility ID No. 1250008
Reporting Period: _____ to _____

Dear [Name],

The New River Regional Landfill is subject to the National Emissions Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills (Landfill NESHAP – 40 CFR 63 Subpart AAAA), The NESHAP requires that a report be submitted on a semiannual basis to the Administrator discussing the facility's compliance with the procedures in their SSM Plan during SSM events (40 CFR 63.l0(d)(5)).

The actions taken at the facility during all SSM events, for the reporting period listed above, (were/were not) consistent with the procedures listed in the SSM Plan at the facility. [List any events that were not consistent with the Plan and the dates the Administrator was notified of such event.]

During the reporting period listed above, there (were/were not any) revisions made to the SSM Plan at the facility. (If changes were made, state why - revised to reflect new equipment, new contact numbers, etc.).

If you have any questions regarding this Semiannual SSM Plan Report, please contact me at 352-671-8465.

Sincerely,

xxxxxxxxxxxxxx
[Name and title of responsible official]

Attachments: SS&M Report Forms
Deviation Reports
Revised Plans

ATTACHMENT F

PREVIOUS PLAN

NEW RIVER REGIONAL LANDFILL (NRRL)
GAS COLLECTION AND CONTROL SYSTEM STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

Facility ID #1250008

Prepared for:

NEW RIVER SOLID WASTE ASSOCIATION
P.O. Box 647
Raiford, Florida 32083

Prepared by:

JONES EDMUNDS & ASSOCIATES, INC.
730 NE Waldo Road
Gainesville, Florida 32641

Certificate of Authorization #1841

Version 1
Dated February 2010

Revision: 0
Revision Date: Feb 8, 2010
Issuance Date: Feb 8, 2010
Revised By: Jones Edmunds

NEW RIVER REGIONAL LANDFILL (NRRL)
GAS COLLECTION AND CONTROL SYSTEM

STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

Jones Edmunds prepared this startup, shutdown, and malfunction (SS&M) plan to comply with the requirements of 40 CFR 63.6(e)(3), as this facility is subject to 40 CFR Part 63, Subpart AAAA, the National Emission Standard for Hazardous Air Pollutants for municipal solid waste landfills.

A copy of the original plan and each revision/addendum will be kept on file at the facility for at least 5 years. The Site Manager is responsible for ensuring that the most recent copy of this Plan is made available to all personnel involved with the landfill gas collection and control system at the NRRL as well as to appropriate regulatory agency personnel on request.

TABLE OF CONTENTS

LIST OF TABLES

ATTACHMENTS

1.0 INTRODUCTION

1.1 OVERVIEW

The New River Regional Landfill (NRRL) is an affected source subject to the Municipal Solid Waste (MSW) Landfill New Source Performance Standards (NSPS). Because it is NSPS applicable, it is also subject to the National Emissions Standards for Hazardous Air Pollutants (NESHAP) for MSW Landfills (40 CFR 63, Subpart AAAA). As such, a written Startup, Shutdown, and Malfunction (SS&M) Plan (Plan) is required to be used by the Facility. Jones Edmunds has developed this Plan for the NRRL on behalf of the New River Solid Waste Association.

1.2 PURPOSE

As specified in 40 CFR 63.6 (e)(3), the purpose of this plan is to provide site personnel with a flexible plan to reduce air emissions during startups, shutdowns and malfunctions and to correct malfunctions as soon as practical after they occur. Specifically, the purpose of this plan is to help the Facility:

- Operate and maintain the gas collection and control system in a manner consistent with safety and good air-pollution-control practices for reducing emissions to the levels required by the relevant standards.
- Correct malfunctions as soon as practical after their occurrence.
- Reduce the reporting burden associated with periods of startup, shutdown, and malfunction.

In addition, specific record-keeping and reporting procedures are described.

1.3 DEFINITIONS

The terms defined below are used throughout this document. Where applicable, these definitions are based on 40 CFR 63, Subpart A.

Administrator means the Administrator of the United States Environmental Protection Agency or his or her authorized representative (e.g., a State that has been delegated the authority to implement the provisions of this part). For this Plan the Administrator is the Florida Department of Environmental Protection (FDEP) Central District Air Program Administrator.

Affected source means the collection of equipment, activities, or both within a single contiguous area and under common control. In this Plan the affected source is the NRRL.

Event is any occurrence of a Startup, Shutdown, or Malfunction.

Gas Collection and Control System (GCCS) means the series of wells, conveyance pipe, condensate collection system, flare station, blower system, and associated instrumentation and controls. The control system refers to the flare.

Monitoring means the collection and use of measurement data or other information to control the operation of a process or pollution-control device or to verify a work practice standard relative to ensuring compliance with applicable requirements. Monitoring is composed of four elements:

- Indicator(s) of performance.
- Measurement techniques.
- Monitoring frequency.
- Averaging time.

Malfunction means any sudden, infrequent, and not reasonably preventable failure of air-pollution-control-and-monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes or has the potential to cause emissions of an applicable standard to be exceeded. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.

Owner or operator means any person who owns, leases, operates, controls, or supervises a stationary source. For this Plan the Owner is the New River Solid Waste Association.

Responsible official means, for a municipality, State, Federal, or other public agency, either a principal executive officer or ranking elected official. For this Plan a principal executive officer of a Federal agency includes the chief executive officer having responsibility for the overall operations of a principal geographic unit of the Association.

Shutdown means the cessation of operation of an affected source or portion of an affected source for any purpose.

Site Manager – For this Plan the Site Manager is the Owner's on-site representative, responsible for ensuring that recordkeeping and action items are executed in accordance with this Plan.

Startup means the setting in operation of an affected source or portion of an affected source for any purpose. Startup encompasses actions to bring the GCCS on line, regardless of whether the system has been historically on line, or after a shutdown for maintenance.

Working day means any day on which Federal Government offices (or State government offices for a State that has obtained delegation under Section 112(1) are open for normal business. Saturdays, Sundays, and official Federal (or where delegated, State) holidays are not working days.

1.4 PLAN APPLICABILITY AND EXCLUSIONS

The purpose of Plan reporting is to document events that may result in or have the potential to result in an exceedance of applicable standards. Therefore, for any SS&M Event (Event) to be considered an Event that must be addressed by this Plan, it must result in or have the potential to result in an exceedance of one or more of the NSPS operational and compliance requirements. The following list constitutes the possible deviations of the NSPS operational and compliance requirements that could occur due to an Event, thereby necessitating implementation of this Plan:

- GCCS downtime of greater than 5 days (if an alternative timeframe has not been established).
- Free venting of collected LFG without control for greater than 1 hour.
- Downtime for temperature monitoring and/or recording equipment of greater than 15 minutes (if an alternative timeframe has not been established).
- Any downtime for LFG flow monitoring and/or recording equipment (flow meter monitoring is not required).

If the occurrence would not result in or have the potential to result in an exceedance of one of these emission limitations, **it is not required to be corrected or documented in accordance with this Plan,** although use of the Plan may still be advisable. Events should be considered actionable under this Plan whether they are discovered by the landfill Owner during normal operations or by a Regulatory Agency during compliance inspections.

In addition, the following items are addressed by other regulations and are excluded from documentation under this Plan:

- Exceedance at individual wells for pressure, oxygen, and temperature.
- Surface emissions monitoring exceedance (reading at 500 ppm or greater).
- Shutdowns of the flare which are followed immediately by successful re-start sequences and do not vent emissions to the atmosphere. This is done either automatically or manually and is part of the control device's normal operating procedures.

2.0 PLAN PROCEDURES

This section addresses each type of event separately. Startup and shutdown Events are generally planned Events associated with repairing, maintaining, testing, and/or upgrading the GCCS system and associated monitoring equipment do not typically trigger Plan reporting. A landfill is not a typical affected source that can be started up or shutdown because landfill emissions are produced by a continuous biological process. Therefore, the primary focus of this Plan will be on malfunctions of the Facility GCCS.

Recordkeeping and reporting procedures for all Events are described in Section 3.0

2.1 STARTUP AND SHUTDOWN EVENTS

2.1.1 Startup Events

Startup Events typically refer to startup of the control system and associated monitoring system. Startups are considered consistent with the Plan provided they are conducted in accordance with the manufacturer's guidance, which is provided in Attachment A.

2.1.2 Shutdown Events

Shutdown Events typically refer to shutdown of the control system and associated monitoring system. Shutdowns are considered consistent with the Plan provided they are conducted in accordance with the manufacturer's guidance, which is provided in Attachment A.

2.1.3 Ancillary Activities

This Plan provides additional guidance for ancillary activities related to startups and shutdowns of the GCCS associated with maintenance, construction, and/or repair. These activities may cause air emissions in excess of the NSPS operational standards and therefore require implementation of this Plan. Table 1 lists practices that may be used to mitigate air emissions related to ancillary startup or shutdown activities and preclude implementation of this Plan. Note that these are not corresponding action items but general practices that may be used to limit air emissions to the greatest extent practical.

Table 1 Ancillary Activities	
Ancillary Activity	Mitigation Practices
• Repairing system leaks. • Purging gases trapped within the piping system. • Venting of uncombusted landfill gas during startup of flare. • All other activities associated with construction of the GCCS system prior to fulltime operation, such as trial operations.	• Temporarily cap pipes venting gas to the extent that capping does not impact safety or the effective construction of the system. • Reduce the surface area of earthworks to maintain cover integrity and reduce gas emissions to the atmosphere to the extent that this does not impact safety or the effective construction of the system. • Limit pipe purging to as short a time as practical.

2.2 MALFUNCTION EVENTS

System malfunctions are a normal part of GCCS operation and may include sudden, infrequent, and not reasonably preventable failures of the GCCS. It is the intent of this Plan to include as many of the possible causes as practical for specific malfunction Events. The following list includes occurrences that may constitute a malfunction of the GCCS at the Facility. Each of these occurrences (or any malfunction not addressed here) could have multiple causes that need to be investigated and evaluated immediately to determine the best course of action to correct the malfunction. Attachment B provides a detailed table of diagnosis and correction procedures for each of these malfunction Events.

- Loss of LFG Flow/Gas mover malfunction.
- Collection well and pipe failures.
- Loss of electrical power (other than a loss of power followed by a normal restart sequence).
- Loss of flame.
- Malfunction of flow measuring/recording device.
- Malfunction of temperature measuring/recording device.
- Other control device malfunctions.
- Blockage of landfill gas flow.

The following steps shall be taken, even if they are not included in the correction procedures of the preceding list, for all malfunction Events that must be corrected in accordance with this Plan:

- Identify whether the malfunction is causing or has caused excess emissions to the atmosphere. If excess emissions are occurring, take necessary steps to reduce

emissions to the maximum extent practical using good air-pollution-control practices and safety procedures.

- Contact the Site Manager immediately and proceed with the malfunction diagnosis and correction procedures provided in Attachment B. The Site Manager should be notified of all subsequent steps in the malfunction diagnosis and correction procedures.

- If the procedures in Attachment B of this Plan do not address or do not adequately address the malfunction that has occurred, the operator should attempt to correct the malfunction with the best resources available. Reporting is required within 2 working days of beginning action not covered in this Plan; further guidance for reporting deviations from this Plan is provided in Section 3.0.

- If the GCCS malfunction cannot be corrected within the time required to prevent a deviation from the NSPS operational standards, shut down the control device if appropriate to prevent air emissions and if this has not automatically occurred. Define an appropriate alternative timeframe for corrective action that is reasonable for the type of repair and/or maintenance that is required to correct the malfunction.

- If the malfunction cannot be corrected within the alternative timeframe specified above, conduct the appropriate recordkeeping and reporting required for deviations of the Title V permit (refer to the Title V permit).

- For malfunction Events that are conducted in accordance with this Plan and do not require deviation reporting, initiate recordkeeping and Reporting procedures in accordance with Section 3.0 after diagnosis and correction are completed.

3.0 REPORTING AND RECORDKEEPING

Section 3.1 describes the specific reporting and recordkeeping requirements for Events that must be corrected in accordance with this Plan. Section 3.2 describes instances that may trigger revisions to this Plan and the steps required to revise the Plan. Section 3.3 outlines the requirements for the Semi-Annual SS & M Report (Report).

3.1 EVENT RECORDING AND REPORTING

Each Event that requires correction in accordance with this Plan must be recorded using the Startup, Shutdown and Malfunction Form (SS&M Form) provided in Attachment C. Additional Event reporting is determined based on whether the corrective action was or was not consistent with the Facility's current Plan.

3.1.1 Corrective Action Consistent with Plan

If the actions taken during an Event are consistent with this Plan, the following information must be filed with the Report:

- Copy of the SS&M Form.

3.1.2 Corrective Actions Inconsistent with Plan

If the actions taken during a malfunction were not consistent with this Plan, the following steps must be taken:

- Notify the Administrator by telephone, fax, or email within 2 working days after beginning the actions that were inconsistent with the Plan.
- Prepare the Plan Deviation Report Form (Deviation Form) (Attachment D).
- Prepare the SS&M Form.
- Notify the Administrator by letter within 7 working days after the end of the Event to provide the following:
    - Copy of the Deviation Form.
    - Copy of the SS&M Form.
    - Whether any excess emissions and/or parameter monitoring exceedances are believed to have occurred during the Event.
    - Name and title of Site Manager.

- Certifying signature of the owner/operator or other responsible official.

- Revise the Plan in accordance with Section 3.2 within 45 days of a Deviation Event.

- File the above information in the Report.

3.2 PLAN MAINTENANCE

3.2.1 When to Revise the Plan

This Plan will be revised:

- To reflect changes to Facility equipment, operations, or procedures.

- If the Plan fails to provide for the operation of the air-pollution-control-and-monitoring equipment during an Event in a manner consistent with safety and good air-pollution practices to reduce emissions.

- If the Plan does not provide adequate procedures for correcting an Event as quickly as practicable.

- If the Plan includes an Event that does not meet the definition of an Event.

- If the Plan fails to address or does not adequately address an Event that has occurred (see Section 3.1.2). In this case the site Manager must:

    - Revise the Plan within 45 days after the Event to include detailed procedures for operating and maintaining the source during similar Events and a program of corrective action for similar Events.

    - Include the revised Plan in the Report.

Revisions to the Plan are not effective until written notice has been provided to the Administrator describing the Plan revisions. Although the Plan is a required part of the Title V permit, revisions to the Plan shall not be deemed to constitute or require a permit revision.

3.2.2 Plan Filing

Facilities must maintain a current Plan in the Facility files and must make the Plan available upon request. If a Plan is subsequently revised, the facility must maintain each previous version of the Plan for 5 years after revision of the Plan. Each such revision must be reported in the

Report. Facilities must retain a copy of the most recent Plan for 5 years from the date a source ceases operation or is no longer subject to the NESHAP requirements.

3.3 REPORT PREPARATION

The Report must be addressed to the Administrator and postmarked by the 30th day following the end of each semi-annual reporting period; specifically by July 30 and January 30. Reports may be combined with the semi-annual report required by NESHAP 40 CFR 63.1980(a) and 40 CFR 60.757(f) of the NSPS. Reports are only required if an Event occurred during the reporting period. The Report must include the following:

- Cover letter (as provided in Attachment E) with the name, title and certifying signature of the owner or operator or other responsible official. Identify any Events that caused or may have caused an applicable emission limit to be exceeded in the cover letter

- Statement that the Plan was revised during the reporting period, if necessary. Include the revised Plan in the Report attachments.

- SS&M Forms for each Event that occurred during the reporting period

- Deviation Forms and reporting documentation for each Event that occurred during the reporting period for which the procedures in the Plan were not followed

4.0 REFERENCES

Florida Administrative Code, Chapter 62-213 Operation Permits for Major Sources of Air Pollution.

US EPA, Federal Regulations, 40 CFR 63 Subpart AAA.

US EPA, Federal Regulations, 40 CFR 63.6, Compliance with standards and maintenance requirements.

US EPA, Federal Regulations, 40 CFR 63.10, Recordkeeping and reporting requirements.

US EPA, Office of Air Quality Planning and Standards. *How to Prepare a Startup, Shutdown, Malfunction Plan for Collection and Control Systems at Municipal Solid Waste Landfills*. EPA-456/R-03-006. December 2003.

ATTACHMENT A

PARNEL FLARE STARTUP AND MAINTENANCE PROCEDURES

Checklist – Startup

1. Ensure that the flow control valves of selected gas wells in the LFG wellfield are appropriately set. Set each wells flow rate immediately after starting up the blower for the first time.

2. Open the main block valve at the inlet of the blower-flare facility. (It should normally be throttled to about a 10 to 25% open position (range of travel) depending upon flow setting needed.)

3. Open the inlet and outlet valves to the inlet separator. Close the bypass valve if present.

4. Open the inlet and discharge block valves for each blower to be operated and close the block valves for non-operating blowers.

5. Verify the propane or natural gas system is ready to start.

6. Walk through the flare station to verify that there are no gas leaks or unusual odors.

7. Turn the power switch to the "On" position.

8. Set any "Hand-Off-Auto" switch for each blower to be run in an "Auto" position. Leave each blower which is not to be run in the "Off" or "Standby" position.

9. Verify that all alarms have been reset by pressing the main control panel "Alarm Reset" button.

10. Turn the automatic block valve switch to "Auto" position.

11. Press or turn the "Start" button to initiate the automatic start up sequence.

12. The blower should come on, the automatic block valve should open, and the flare should light. Watch for the flowmeter indicator to indicate flow and then verify that the flare main burner is lit. If flame fails to prove on an automatic system, the flare should time out and lock out. If manually controlled if the flare fails to light, shut the system down and allow sufficient time for a convection purge, before attempting a re-light.

13. Once the flare is lit and proven, check to be sure that combustion is satisfactory and that the main fuel pressure (burner back pressure) and LFG flow to the flare is satisfactory.

Once online verify the following:

1. Automatic block valve is fully opened.

2. LFG flow is adequate to satisfy minimum flow requirements of blower and flare.

3. Listen for abnormal blower and motor sound

4. Check for unusual odors that could indicate a gas leak.

5. Once the flare operation has stabilized, verify performance, temperature, and flow.

6. Visually observe combustion inside the flare

Checklist – Routine

1. The landfill gas collection system should be operated according to the specifications of the manufacturer and the engineer.

2. Only individuals undergoing the proper training should operate any aspect of the landfill gas collection system. Those parties responsible for any aspect of operating the landfill gas collection system must be identified in the bioreactor operations planning meeting.

3. The landfill gas collection system should be inspected for leaks, broken pipes, and damaged hoses. Any sounds indicating possible air entrance into the system should be inspected further even if the leak is not visible.

Checklist – Shutdown

Hit the "Stop" button or turn the "Start" switch to "Off" on the control panel. Turning off all control panel power is to be avoided.

Checklist – Emergency Shutdown

1. Hit the "Stop" button or turn the "Start" switch to "Off" on the control panel. Turning off all control panel power is to be avoided.

2. Ensure that the source of gas from the wellfield is blocked outside the facility plot.

3. Verify closure of the automatic block valve. Do not rely solely on it.

4. Close manual block valve. This valve should be located at the facility plot limit or outside the facility.

ATTACHMENT B

COMMON CAUSES AND RESPONSE ACTIONS FOR GCCS MALFUNCTIONS

COMMON CAUSES AND RESPONSE ACTIONS FOR GCCS MALFUNCTIONS

This list represents a summary of possible causes and response actions for GCCS malfunctions and is not considered to be all inclusive. The list of response actions is not intended to be a sequence of events that must be implemented in order. Certain malfunctions may or may not be associated with the listed "common causes," nor will the "typical response actions" be appropriate in all instances. Site-specific evaluation of the malfunction and development of specific response actions is recommended in all cases.

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Blower or Other Gas Mover Equipment	Applies vacuum to wellfield to extract LFG and transport to control device	Loss of LFG Flow/Blower Malfunction	• Flame arrestor fouling/deterioration • Automatic valve problems • Blower failure (e.g., belt, motor, impeller, coupling, seizing) • Loss of power • Extraction piping failure • Condensate knock-out problems • Extraction piping blockages	• Repair breakages in extraction piping • Clean flame arrestor • Repair blockages in extraction piping • Verify automatic valve operation, compressed air/nitrogen supply • Notify power utility, if appropriate • Provide/utilize auxiliary power source, if necessary • Repair settlement in collection piping • Repair blower • Activate back-up blower, if available • Clean knock-out pot/demister • Drain knock-out pot

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Extraction Wells and Collection Piping	Conduits for extractions and movement of LFG flow	Collection well and pipe failures	• Break/crack in header or lateral piping • Leaks at wellheads, valves, flanges, test ports, seals, couplings, etc. • Collection piping blockages • Problems due to settlement (e.g., pipe separation, deformation, development of low points) • Water in wells	• Repair leaks or breaks in lines or wellheads • Follow procedures for loss of LFG flow/blower malfunction • Repair blockages in collection piping • Repair settlement in collection piping • Re-install, repair, or replace piping • Review waste types, age of waste, etc. • Dewater wells
Blower or Other Gas Mover Equipment and Control Device	Collection and control of LFG	Loss of electrical power	• Force majeure/Act of God (e.g., lightning, flood, earthquake) • Area-wide or local blackout or brown-out • Interruption in service (e.g., blown service fuse) • Electrical line failure • Breaker trip • Transformer failure • Motor starter failure/trip • Overdraw of power • Problems in electrical panel • Damage to electrical equipment from on-site operations	• Check/reset breaker • Check/repair electrical panel components • Check/repair transformer • Check/repair motor starter • Check/repair electrical line • Test amperage to various equipment • Contact electricity supplier • Contact/contract electrician • Provide auxiliary power (if necessary)

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
LFG Control Device	Combusts LFG	Loss of Flame	• Problems/failure of thermocouple • Loss/change of LFG flow • Loss/change of LFG quality • Problems with air/fuel controls • Problems/failure of flame sensor • Problems with temperature monitoring equipment	• Check/repair temperature monitoring equipment • Check/repair thermocouple • Follow procedures for loss of flow/blower malfunction • Check/adjust air/fuel controls • Check/adjust/repair flame sensor • Check/adjust LFG collectors
Flow Monitoring/ Recording Device	Measures and records gas flow from collection system to control	Malfunctions of Flow Monitoring/Recording Device	• Problems with in-line flow measuring device • Problems with device controls and/or wiring • Problems with data recorder	• Check/adjust/repair flow measuring device and/or wiring • Check/repair data recorder • Contact service technician
Temperature Monitoring/ Recording Device	Monitors and records combustion temperature of enclosed combustion device	Malfunctions of Temperature Monitoring/Recording Device	• Problems with thermocouple • Problems with device controls and/or wiring • Problems with data recorder	• Check/adjust/repair thermocouple • Check/adjust/repair controller and/or wiring • Check/adjust/repair electrical panel components • Check/repair data recorder

EQUIPMENT	PURPOSE	MALFUNCTION EVENT	COMMON CAUSES	TYPICAL RESPONSE ACTIONS
LFG Collection and Control System				
Control Device	Combusts LFG	Other Control Device Malfunctions	• Control device smoking (i.e., visible emissions) • Problems with flare insulation • Problems with pilot light system • Problems with air louvers • Problems with air/fuel controllers • Problems with thermocouple • Problems with burners • Problems with flame arrester • Alarmed malfunction conditions not covered above • Unalarmed conditions discovered during inspection not covered above	• Site-specific diagnosis procedures • Site-specific response actions based on diagnosis • Open manual louvers • Clean/drain flame arrestor • Check/refill propane supply • Check/repair pilot sparking system
Collection Piping	Conduit movement of LFG flow	Blockage of LFG Flow	• Collection piping blockages due to build-up of liquid • Problems due to settlement (e.g., pipe separation, deformation, development of low points)	• Follow procedures for loss of LFG flow/blower malfunction • Repair blockages in collection piping • Repair settlement in collection piping • Re-install, repair, or replace piping

ATTACHMENT C

SS&M REPORT FORMS

FORM A
SSM PLAN REPORT FORMS

Section 1 – All Events

List of all affected piece(s) of equipment:							
Type of Event		Military Time		Duration (hours)	Event Code (see back of form)	Exceedance of NSPS Operation Standard? (Y/N)	SSM Plan Followed? (Y/N*)
		Date/Time Start	Date/Time End				
☐	Startup						
☐	Shutdown						
☐	Malfunction					**Complete Section 2 Below**	

*If SSM Plan was not followed, notify the Administrator within two working days.

Section 2 – Malfunction Events Only

		☒**Check one of the following for each step**	
Step	**Corrective Action Procedures for All Malfunctions**	**Procedure completed**	**Procedure Not Applicable**
1.	Determine if landfill gas is being released to the air (can you smell landfill gas, or measure/detect gas flow?).	☐	
2.	If landfill gas is being released to the air, notify the Site Manager.	☐	☐
3.	Determine if the malfunction is causing an unsafe operating condition that may harm people, the environment, or the landfill gas control equipment.	☐	
4.	If unsafe operating condition exists, or landfill gas is being released to the air, stop (if practical and safe) landfill gas flow.	☐	☐
5.	If Control device or other system component is shutdown due to Step 4, follow Shutdown SOP and Complete Section 1 – "Shutdown".	☐	☐
6.	Determine if other personnel/resource (qualified technician, electrician, consultant or other) are needed for malfunction diagnosis.	☐	☐
7.	If additional personnel needed, notify qualified personnel: *Record Contact Name and Time:*	☐	☐
8.	Start malfunction diagnosis in accordance with the "Common Causes and Response Actions for GCCS Malfunctions" guidance document.	☐	
9.	Determine if other resources are needed to fix the malfunction (qualified technician, electrician, contractor, on-site resources, manufacturer's representative, or other).	☐	
10.	If additional resources needed, contact qualified resource: *Record Contact Name and Time:*	☐	☐
11.	Fix the malfunction.	☐	
12.	Once the malfunction is fixed, re-start the system if it had been shut down, and record start-up times and dates in Section 1 of this form.	☐	☐
13.	Record date that malfunction occurred, date that malfunction was repaired, and total time that system was out of service in Section 1 of this form.	☐	
14.	Sign this form and place it in the Start-up, Shutdown, Malfunction file.	☐	
15.	If Plan procedures were not followed, notify the Administrator within two working days of initiating actions not consistent with the Plan.	☐	☐

Date Form Filled Out: _____ **Signature of Preparer:** _____

Name and Title of Site Manager: _____

FORM A

Event Codes

For Start-ups and Shutdowns

Startup: *The setting in operation of an affected source or portion of an affected source for any purpose.*
Shutdown: *The cessation of operation of an affected source or portion of any source for any purpose.*

Code	Event
1	Maintenance
2	Suspected Collection System Malfunction
3	Suspected Control Device Malfunction
4	Suspected Continuous Monitoring System Malfunction (Temperature/Flow/Other)
5	Training
6	Gas System Construction/Expansion
7	Normal Backup Operation
99	Other (Describe) _____

For Malfunctions

Malfunction*: Any sudden, infrequent and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner. Failures that are caused in part by poor maintenance or careless operation are not malfunctions.*

Code	Event
10	Automatic shutdown of control device by designed protective systems
11	Autodialer Callout
12	Shutdown alarms that result in the device not shutting down
13	Unalarmed shutdown
14	Control Device Smoking
15	Inspection identified malfunction
16	Loss of power – utility down
17	Loss of power – unknown
18	Damaged Well, Header or Lateral Piping
19	Leaks at wellheads, valves, flanges, test ports, seals, couplings, etc.
20	Condensate Knock-out Problems
21	Collection Piping Blockages
22	Problems due to Settlement
23	Loss of phase
24	Blower overload condition
25	Blower bearing failure
26	Broken belts (if belt-drive) or broken coupling (if direct-drive) in blower
27	Continuous Monitoring System Malfunction – Thermocouple
28	Continuous Monitoring System Malfunction – UV Scanner
29	Continuous Monitoring System Malfunction – Flow Monitor
30	Continuous Monitoring System Malfunction – Flow Recorder
31	Continuous Monitoring System Malfunction – Temperature Recorder
32	Act of God (i.e., lightening, wind, etc.)
99	Other (Describe) _____

ATTACHMENT D

STARTUP/SHUTDOWN/MALFUNCTION PLAN DEVIATION REPORT

FORM B
SSM PLAN DEVIATION REPORT

Facility ID No.: 1250008 Date Form Completed: _____

Unit ID: 001 – Municipal Solid Waste Landfill with a Candlestick Flare

Event: ☒check the appropriate box

☐ Startup ☐ Shutdown ☐ Malfunction

Date: _____ Time: _____

Duration: _____

Provide explanation of the circumstances of the startup, shutdown, malfunction:

_____

_____

Provide description of the corrective action:

_____

_____

Describe the reasons the SSM Plan was not adequate:

_____

_____

Describe proposed revisions to the SSM Plan:

_____

_____

Were any excess emissions and/or parameter monitoring exceedances believed to have occurred during the event?

☐ check the appropriate box.

☐ Yes ☐ No

Name: _____

Title: _____

Signature: _____

ATTACHMENT E

EXAMPLE ADMINISTRATOR NOTIFICATION LETTER

[Date]

Rita Felton-Smith
FDEP Northeast District
3319 Maguire Blvd.
Suite 232
Orlando, Florida 32803-3767

RE: Semiannual Startup, Shutdown, Malfunction (SS&M) Plan Report
New River Regional Landfill
Facility ID No. 1250008
Reporting Period: _____ to _____

Dear Ms. Felton-Smith,

The New River Regional Landfill is subject to the National Emissions Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills (Landfill NESHAP – 40 CFR 63 Subpart AAAA), The NESHAP requires that a report be submitted on a semiannual basis to the Administrator discussing the facility's compliance with the procedures in their SSM Plan during SSM events (40 CFR 63.l0(d)(5)).

The actions taken at the facility during all SSM events, for the reporting period listed above, (were/were not) consistent with the procedures listed in the SSM Plan at the facility. [List any events that were not consistent with the Plan and the dates the Administrator was notified of such event.]

During the reporting period listed above, there (were/were not any) revisions made to the SSM Plan at the facility. (If changes were made, state why - revised to reflect new equipment, new contact numbers, etc.).

If you have any questions regarding this Semiannual SSM Plan Report, please contact me at 352-671-8465.

Sincerely,

xxxxxxxxxxxxxx
[Name and title of responsible official]

Attachments: SS&M Report Forms
Deviation Reports
Revised Plans

ATTACHMENT F

EXAMPLE ADMINISTRATOR NOTIFICATION LETTER

[Date]

[Name and Title]
District Air Program Administrator
Florida Department of Environmental Protection Northeast District
8800 Baymeadows Way West, Suite 100
Jacksonville, FL 32256

RE: New River Solid Waste Association
New River Regional Landfill
Facility ID No.:1250008
Semi-Annual Startup, Shutdown, and Malfunction Plan Report
Reporting Period: ___ to ___

Dear [Name],

The New River Regional Landfill is subject to the National Emissions Standards for Hazardous Air Pollutants: Municipal Solid Waste Landfills (Landfill NESHAP – 40 CFR 63 Subpart AAAA), The NESHAP requires that a report be submitted semiannually to the Administrator discussing the facility's compliance with the procedures in their SS&M Plan during SS&M events (40 CFR 63.l0(d)(5)).

The actions taken at the facility during all SS&M events, for the reporting period listed above, (were/were not) consistent with the procedures listed in the SS&M Plan at the facility. [List any events that were not consistent with the Plan and the dates the Administrator was notified of such event.]

During this reporting period, revisions there (were/were not) made to the SS&M Plan at the facility. (If changes were made, state why - revised to reflect new equipment, new contact numbers, etc.).

If you have any questions regarding this Semiannual SS&M Plan Report, please contact me at 352-671-8465.

Sincerely,

xxxxxxxxxxxxxx
[Name and title of responsible official]

Attachments: SS&M Report Forms
Deviation Reports
Revised Plans

ATTACHMENT I.5

OPERATIONS AND MAINTENANCE PLAN

OPERATION & MAINTENANCE

MANUAL

for a

3000 SCFM CANDLESTICK FLARE

for the

NEW RIVER LANDFILL RAIFORD, FLORIDA

P.O. # 744

ENGINEER

JANECHEK & ASSOCIATES
248 Hill Place
Costa Mesa, CA 92627
Phone: 949-887-5422

CLIENT

NEW RIVER SOLID WASTE ASSOCIATION
PO Box 647
Raiford, FL 32083
Phone: 386-431-1000

MANUFACTURER

PERENNIAL ENERGY, LLC.
1375 County Road 8690
West Plains, MO 65775
Phone: 417-256-2002
Fax: 417-256-2801

PEI # 2012

JULY 2012

TABLE OF CONTENTS

INTRODUCTION

We at PEI feel that you have purchased the finest Candlestick Flare possible. Given proper care and maintenance, this system will provide you with many years of service and will be instrumental in helping you to reach your energy goals.

Only the finest components were used in the construction of your equipment. In order to maintain its quality, we recommend that you use only those parts approved by the PEI Service Staff when replacing components on your system. Remember, you own the best system available in today's market - it is our goal to keep it that way.

Before you operate your equipment read this manual thoroughly. If you have any questions please call our service engineers at (417) 256-2002. A thorough understanding of the operation and maintenance of your equipment is imperative to insure its successful operation.

This manual is for the sole use of the purchaser and/or his employees and servicemen. This manual or any part of it cannot be copied or distributed to persons not directly responsible for the maintenance and operation of this Equipment.

WARRANTY

PEI warrants its System to be free from defects in materials and labor for a period of one year after being placed in service or eighteen months from date of shipment whichever occurs first.

All of the components not manufactured by PEI carry their own manufacturer's warranty. In no way does PEI warranty override, supersede, or limit those warranties. With respect to products, parts and work not manufactured or performed by PEI, PEI's only obligation shall be to assign to Purchaser, to the extent possible, whatever warranty PEI receives from the original Manufacturer. PEI will attempt to aid the Purchaser in obtaining replacement parts or repair of the component as outlined in our Service Policy. The liability of PEI shall not, in any case, exceed the cost of correcting the defect in the component and PEI shall not be liable for indirect or consequential damages as a result of any component failure.

PEI warrants only the cost of parts and labor for repair of design and/or workmanship defects, and is not responsible for any damage and/or loss caused by the system to any personal or real property. PEI is not responsible for premature wear or failure of gas train components caused by hydrogen sulfide in excess of 1500 ppm, or chlorinated hydrocarbons in excess of 35 ppm. PEI is not responsible for any special, direct, indirect, or consequential damage or loss of income or saving due to down time on other components, which rely on the System.

PEI's warranty shall not apply if damage results from mis-adjustment, abuse, inadequate maintenance, accident, or improper service or installation.

This warranty does not include reimbursement of any costs for shipping the product or parts to PEI facility or local designated service establishment, or for labor and/or material required for removal or reinstallation of a product in connection with a warranty repair. In no event shall PEI be liable for cost of labor for replacement or repair of defective parts when the unit has been in the possession of the Purchaser for a period longer than one year.

This warranty is in lieu of all other warranties, expressed or implied, including warranties of merchantability or fitness for a particular purpose, any legal implied warranty of fitness, merchantability or otherwise applicable to this product shall be limited in duration to the minimum period already set forth. This warranty gives the Purchaser specific legal rights; you may also have other rights, which vary from state to state. Any claim by the Purchaser shall be submitted to PEI in writing during the warranty period.

Product(s) Description	**Shipment Date**	**Start-Up Date**
Candlestick Flare	05 Sep 12	
Other Related Components	05 Sep 12	
O&M Manuals (3ea Vol 1/1)	27 Aug 12	

SERVICE POLICY

If repair service is required during the Warranty period, the Purchaser should first call PEI's Service Department and explain the nature of the problem. If the problem is minor, and the Purchaser is willing and able to correct it, then PEI will supply instructions. If this process is unable to correct the problem, then a service technician should be contacted by the Purchaser to do the repair work. PEI will supply maintenance instruction as needed, by phone. If the problem is determined by PEI to be related to the design or workmanship of the system, then PEI will pay reasonable, pre-approved, charges for material and labor for repair. The Purchaser shall pay the technician directly, and submit a warranty claim to PEI for reimbursement of materials and labor. In all other cases, the Purchaser is responsible for labor costs.

In the case of component failure, PEI will aid the Purchaser by providing the required part the same day (if in stock). An invoice for the part and shipping will be sent with the part. The Purchaser returns the defective part either to the original manufacturer or to PEI (depending on the circumstances) for determination of the cause of failure. An RGA (Returned Goods Authorization) number will be issued, which must appear on the return shipping label. If the part proves defective and is covered by the original manufacturers warranty, then the Purchaser will be credited for the invoice that was sent with the new part, but shall be responsible for the shipping costs.

If the repair service and/or service call is considered by PEI to be normal operation and maintenance/troubleshooting and occurs during the warranty period, PEI billing rates are applicable. The attached Fee Schedule details our service department billing rates.

If repair service is required after the warranty period has expired, the Purchaser is responsible for parts, labor, and shipping costs. PEI Service Department is available during normal business hours at 417-256-2002 to provide assistance with service and maintenance to allow maximum equipment efficiency and service life. See attached Fee Schedule for labor rates.

FEE SCHEDULE

Effective 5/9/12

Labor			**Rate**
Site Service -	Service Tech -	Reg. Rate	$130.00 per hour
		Overtime Rate	$195.00 per hour
	Engineer -	Reg. Rate	$159.00 per hour
		Overtime Rate	$238.50 per hour
Consulting/Troubleshooting Service via phone			$159.00 per hour
Programming Service			$159.00 per hour
Consulting/Engineering			$159.00 per hour
Travel Time			$ 97.50 per hour
Drafting			$ 78.50 per hour

Other Expenses

Mileage Rate	$ .96 per mile
Per diem (meals)	$ 57.00 per day

Other out-of-pocket expenses such as airfare, car rental, lodging, etc. at actual cost + 10%.

HYDROGEN SULFIDE SAFETY

Hydrogen sulfide is a toxic gas that affects the respiratory system. Hydrogen sulfide poisoning is characterized by respiratory failure that can lead to unconsciousness, brain damage, and death.

Should hydrogen sulfide poisoning occur, prompt mouth-to-mouth resuscitation is required to prevent brain damage.

Before attempting to rescue victims of hydrogen sulfide poisoning, take adequate precautions to ensure that you will not also become a victim. Do not assume that you will be able to hold your breath long enough to complete a rescue operation. At higher concentrations a single breath can cause unconsciousness.

Persons entering an environment where hydrogen sulfide may be encountered should be tethered to ensure prompt retrieval in the event of unconsciousness.

If it becomes necessary to work in an atmosphere where the hydrogen sulfide concentration is known to exceed 10 ppm, a breathing device such a Scott Air Pack (Scott Aviation, Lancaster, N.Y.) should be used.

Do not rely on your sense of smell for detecting hydrogen sulfide. The human nose is an unreliable detector as it becomes deadened to smell at concentrations over 10 ppm. Use a reliable device such as a DelMar Scientific's spot check to monitor concentrations.

HYDROGEN SULFIDE TOXICITY TABLE

CONCENTRATION	SYMPTOM
1 ppm	Characteristic Odor
10 ppm	Maximum allowable concentration for 8 hours continuous exposure.
100 ppm	Kills sense of smell in 3 to 15 minutes, may burn eyes and throat.
200 ppm	Kills sense smell instantly, burns eyes and throat.
500 ppm	Lose sense of reason and balance, respiratory failure in 2-15 minutes. Demands prompt resuscitation.
700 ppm	Will become unconscious quickly, breathing stops.
1000 ppm	Instant unconsciousness.
1500 ppm	Equipment Warranty Void

SYSTEM SPECIFICATIONS

Project Number	***1696***
FLR Model Number	*FLR-12-C*

Candlestick Flare Specifications

Flow Rate	300 SCFM – 3000 SCFM
Methane Quality	50%
Flare Tip Diameter	12.39 Inches
Height	36 Feet

UNLOADING AND ASSEMBLY INSTRUCTIONS

The Gas Handling System and Flare are shipped separately along with other small components. Upon arrival at the jobsite, a crane or other lifting device will be required to unload and place the units.

Approximate weights for major equipment:

Candlestick Flare: 4000 - 5000 lbs

Candlestick Flare

The Flare is shipped in a horizontal position. The two lifting points on the top of the flare and two of the flare feet are used when lifting the flare off the shipping trailer. REMOVE THE PLYWOOD COVER FROM THE TOP OF THE FLARE BEFORE LIFTING TO THE VERTICAL POSITION. Lift the flare to a vertical position using appropriate lifting equipment connected to the same two lifting points on the top of the flare. The flare should be slowly lifted and set on the prepared concrete foundation pad. The flare mounting feet should be anchored with appropriate, site designed anchor bolts and leveled using shims or grouting. The flare should be level to within 1/8" from foot to foot.

Smaller components that ship loose from the flare can now be installed. These include, but are not limited to:

Flame arrester, flex, valves

The landfill gas piping connections and electrical connections can now be made. In addition, the condensate drain must be connected to a proper condensate collection system. The Flare should also be properly grounded.

This is a simple overview of the installation requirements of our equipment and does not include other requirements of the installer to provide a complete installation as required in the specifications.

SYSTEM OPERATION INFORMATION

PROJECT #1696 New River

SYSTEM DESCRIPTION

The Candlestick Flare combusts gas extracted from a landfill by a Gas Handling System (GHS). The GHS is supplied by others and should include a Control Panel with a Programmable Logic Controller (PLC), which manually or automatically controls all functions of the system with various safety alarms and shutdowns.

RECOMMENDED SEQUENCE OF OPERATION

1. All hand-operated butterfly valves should be in the position described by the P&ID
2. Start sequence
    a. The pilot sequence is started.
    b. Once the respective delay timers time out, the blower will start.
    c. Once the delay blower start has timed out and a slight pressure has been achieved (this is to ensure a quiet and smooth flare startup), the shutdown valve will open.
    d. Once the LFG starts burning, the flare thermocouple will recognize the flame.
    e. Once the flare exceeds the low flare temperature setpoint, usually 200 °F, the flare will be running in automatic mode.
        i. Should the flare ever drop below the low flare temperature setpoint, the flare will shut down and the restart sequence will begin.
        ii. The flare will restart until the relight counter reaches its setpoint.
        iii. If the setpoint is reached, the flare will shut down on flame flame fail.
        iv. If the flare temperature reaches its low temperature setpoint in the relight sequence, the relight counter is reset to zero.

Main Air Dampers, (Figure 1)

The main air dampers should be opened to the fullest extent by removing the set collar and allowing the damper to open almost all the way and putting the set collar back in place. These dampers are for improving flame stability by limiting the air movement up through the wind shield in windy conditions. Sometimes it is advantageous to have one fully open and one slightly closed on the side facing high prevailing winds. **Operating the flare with these dampers closed will result in overheating the wind shield, distorting it and causing damage**. It is best to operate them fully open if conditions allow.

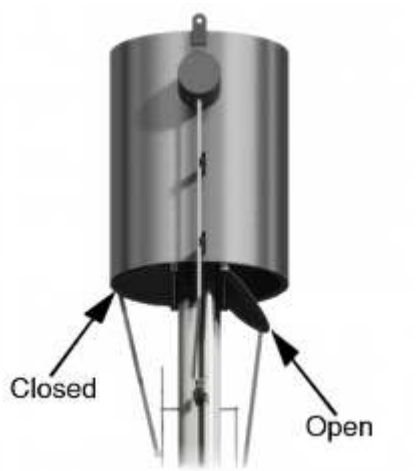


Figure 1. Main Air Dampers

Spirolator, (Figure 2)

The Spirolator needs to be adjusted to control the back pressure of the gas. The Spirolator is the adjustable fuel orifice in the tip of the flare. It needs to be adjusted so that the back pressure, measured at the base of the flare, at all expected flows ranges between 2 and 7 in WC.

The Spirolator is **closed** by moving the adjustment rod **up**. This would be the position for the lowest flow condition. Using an allen wrench, loosen the set collars on the rod, adjust rod position and re-tighten the set collars.

The Spirolator is **opened** by moving the adjustment rod **down.** This would be the position for the highest flow condition. Using an allen wrench, loosen the set collars on the rod, adjust rod position and re-tighten the set collars.

There should be a set collar above and below the linkage guide locking the rod in place at the desired adjustment. A set collar above the linkage guide only, will allow the gas flow to change the position of the Spirolator

Again, check the back pressure at system flow rates and adjust accordingly. Back pressures below 2 in WC (Spirolator too far open) can result in the flame burning inside the tip, damaging the burner tip. Back pressures appreciably above 7 in WC (Spirolator too far closed) may result in unstable flame and/or flame failures.

Figure 2. Spirolator

MAINTENANCE SCHEDULE

FREQUENCY	CHECK
Daily	A. Visually inspect unit - repair any breaks, leaks, and loose wires.
	B. Follow all Manufacturers' Recommendations in Section 7.
Three Months	Turn flare off and perform the following procedures:
	A. Check ignitor gap - Verify that the ignitor gap is 0.10". Regap as necessary. Verify that the spark is at the tip of the ignitor.
	B. Inspect Ignitor Wiring - Examine the wire which runs between the ignition transformer on the flare and the ignitor in the pilot for frayed, heat damaged, or worn insulation.
	C. Check Pilot - Turn the PILOT switch to the "TEST" position. Verify that the pilot lights and does not blow out. Return the PILOT switch to the "AUTO" position.
	D. Check Thermocouple Voltage - Measure the voltage between the red and yellow wires of FLR-TE-501 and convert that voltage to temperature using the Type K Thermocouple Chart in Section 6. The readings should be within 25 °F of ambient temperature. Call PEI if a greater discrepancy exists.
	E. Check Flare Shutdown Valve FV-301 - Turn the SHUTDOWN VALVE switch to the "TEST" position. As the valve opens, verify the indicator shows "OPEN". After the valve has reached the full open position, turn the SHUTDOWN VALVE switch to the "CLOSED" or "AUTO" position and verify that the valve closes in less than 2 seconds. Return the valve switch to the "AUTO" position.
	F. Zero out the pressure gauges by closing off the valves in the gas lines to the gauges and opening the valves in the tees to atmosphere. Adjust the zeroing screw until the needle points to zero.
	G. Test any pilot fail alarms and shutdowns according to the system O&M Manual.
	H. Test any flame fail alarms and shutdowns according to the system O&M Manual.
Annually	Shut the Flare down and perform the following checks:
	A. Check for loose bolts on the structure and at the flanges.

RECOMMENDED SPARE PARTS LIST FOR CANDLESTICK FLARE

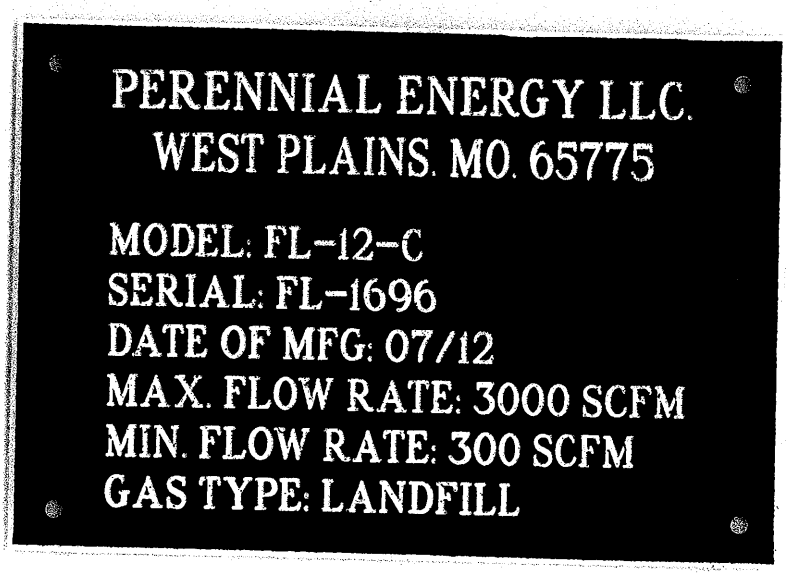
JOB #1696 New River

Device	Part Number	Reference Designator
Ignitor	739	FLR-IGN-1
Thermocouple	5745	FLR-TE-501

SERIAL NUMBER DATA SHEET

Proj. # 1696 **Proj. Name: New River**

Device	Ref. Des.	Manufacturer	Model No.	Serial No.
Actuator	FV-301	ABZ	ESA950-4	277531002
Flame Arrester	TSE-301	Varec	5010-1-1	


PERENNIAL ENERGY LLC.
WEST PLAINS. MO. 65775
MODEL: FL-12-C
SERIAL: FL-1696
DATE OF MFG: 07/12
MAX. FLOW RATE: 3000 SCFM
MIN. FLOW RATE: 300 SCFM
GAS TYPE: LANDFILL

THERMOCOUPLE MILLIVOLTS TO DEG F CONVERSION CHART, TYPE K

MAXIMUM TEMPERATURE RANGE

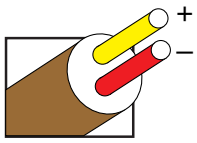
Thermocouple Grade
– 328 to 2282°F
– 200 to 1250°C

Extension Grade
32 to 392°F
0 to 200°C

LIMITS OF ERROR
(whichever is greater)
Standard: 2.2°C or 0.75% Above 0°C
2.2°C or 2.0% Below 0°C
Special: 1.1°C or 0.4%

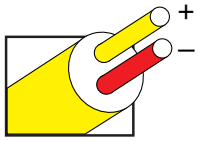
COMMENTS, BARE WIRE ENVIRONMENT:
Clean Oxidizing and Inert; Limited Use in Vacuum or Reducing; Wide Temperature Range; Most Popular Calibration

TEMPERATURE IN DEGREES °F
REFERENCE JUNCTION AT 32°F



Thermocouple Grade

Nickel-Chromium vs. Nickel-Aluminum



Extension Grade

Revised Thermocouple Reference Tables

TYPE K

Reference Tables
N.I.S.T. Monograph 175
Revised to ITS-90

Z

Thermoelectric Voltage in Millivolts

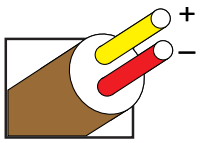
°F	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	°F
-450							-6.458	-6.457	-6.457	-6.456	-6.456	-450
-440	-6.456	-6.455	-6.454	-6.454	-6.453	-6.452	-6.451	-6.450	-6.449	-6.448	-6.446	-440
-430	-6.446	-6.445	-6.444	-6.443	-6.441	-6.440	-6.438	-6.436	-6.435	-6.433	-6.431	-430
-420	-6.431	-6.429	-6.427	-6.425	-6.423	-6.421	-6.419	-6.416	-6.414	-6.411	-6.409	-420
-410	-6.409	-6.406	-6.404	-6.401	-6.398	-6.395	-6.392	-6.389	-6.386	-6.383	-6.380	-410
-400	-6.380	-6.377	-6.373	-6.370	-6.366	-6.363	-6.359	-6.355	-6.352	-6.348	-6.344	-400
-390	-6.344	-6.340	-6.336	-6.332	-6.328	-6.323	-6.319	-6.315	-6.310	-6.306	-6.301	-390
-380	-6.301	-6.296	-6.292	-6.287	-6.282	-6.277	-6.272	-6.267	-6.262	-6.257	-6.251	-380
-370	-6.251	-6.246	-6.241	-6.235	-6.230	-6.224	-6.218	-6.213	-6.207	-6.201	-6.195	-370
-360	-6.195	-6.189	-6.183	-6.177	-6.171	-6.165	-6.158	-6.152	-6.146	-6.139	-6.133	-360
-350	-6.133	-6.126	-6.119	-6.113	-6.106	-6.099	-6.092	-6.085	-6.078	-6.071	-6.064	-350
-340	-6.064	-6.057	-6.049	-6.042	-6.035	-6.027	-6.020	-6.012	-6.004	-5.997	-5.989	-340
-330	-5.989	-5.981	-5.973	-5.965	-5.957	-5.949	-5.941	-5.933	-5.925	-5.917	-5.908	-330
-320	-5.908	-5.900	-5.891	-5.883	-5.874	-5.866	-5.857	-5.848	-5.840	-5.831	-5.822	-320
-310	-5.822	-5.813	-5.804	-5.795	-5.786	-5.776	-5.767	-5.758	-5.749	-5.739	-5.730	-310
-300	-5.730	-5.720	-5.711	-5.701	-5.691	-5.682	-5.672	-5.662	-5.652	-5.642	-5.632	-300
-290	-5.632	-5.622	-5.612	-5.602	-5.592	-5.581	-5.571	-5.561	-5.550	-5.540	-5.529	-290
-280	-5.529	-5.519	-5.508	-5.497	-5.487	-5.476	-5.465	-5.454	-5.443	-5.432	-5.421	-280
-270	-5.421	-5.410	-5.399	-5.388	-5.377	-5.365	-5.354	-5.343	-5.331	-5.320	-5.308	-270
-260	-5.308	-5.296	-5.285	-5.273	-5.261	-5.250	-5.238	-5.226	-5.214	-5.202	-5.190	-260
-250	-5.190	-5.178	-5.166	-5.153	-5.141	-5.129	-5.117	-5.104	-5.092	-5.079	-5.067	-250
-240	-5.067	-5.054	-5.042	-5.029	-5.016	-5.003	-4.991	-4.978	-4.965	-4.952	-4.939	-240
-230	-4.939	-4.926	-4.913	-4.900	-4.886	-4.873	-4.860	-4.847	-4.833	-4.820	-4.806	-230
-220	-4.806	-4.793	-4.779	-4.766	-4.752	-4.738	-4.724	-4.711	-4.697	-4.683	-4.669	-220
-210	-4.669	-4.655	-4.641	-4.627	-4.613	-4.599	-4.584	-4.570	-4.556	-4.542	-4.527	-210
-200	-4.527	-4.513	-4.498	-4.484	-4.469	-4.455	-4.440	-4.425	-4.411	-4.396	-4.381	-200
-190	-4.381	-4.366	-4.351	-4.336	-4.321	-4.306	-4.291	-4.276	-4.261	-4.246	-4.231	-190
-180	-4.231	-4.215	-4.200	-4.185	-4.169	-4.154	-4.138	-4.123	-4.107	-4.091	-4.076	-180
-170	-4.076	-4.060	-4.044	-4.029	-4.013	-3.997	-3.981	-3.965	-3.949	-3.933	-3.917	-170
-160	-3.917	-3.901	-3.885	-3.869	-3.852	-3.836	-3.820	-3.803	-3.787	-3.771	-3.754	-160
-150	-3.754	-3.738	-3.721	-3.705	-3.688	-3.671	-3.655	-3.638	-3.621	-3.604	-3.587	-150
-140	-3.587	-3.571	-3.554	-3.537	-3.520	-3.503	-3.486	-3.468	-3.451	-3.434	-3.417	-140
-130	-3.417	-3.400	-3.382	-3.365	-3.348	-3.330	-3.313	-3.295	-3.278	-3.260	-3.243	-130
-120	-3.243	-3.225	-3.207	-3.190	-3.172	-3.154	-3.136	-3.119	-3.101	-3.083	-3.065	-120
-110	-3.065	-3.047	-3.029	-3.011	-2.993	-2.975	-2.957	-2.938	-2.920	-2.902	-2.884	-110
-100	-2.884	-2.865	-2.847	-2.829	-2.810	-2.792	-2.773	-2.755	-2.736	-2.718	-2.699	-100
-90	-2.699	-2.680	-2.662	-2.643	-2.624	-2.605	-2.587	-2.568	-2.549	-2.530	-2.511	-90
-80	-2.511	-2.492	-2.473	-2.454	-2.435	-2.416	-2.397	-2.378	-2.359	-2.339	-2.320	-80
-70	-2.320	-2.301	-2.282	-2.262	-2.243	-2.223	-2.204	-2.185	-2.165	-2.146	-2.126	-70
-60	-2.126	-2.106	-2.087	-2.067	-2.048	-2.028	-2.008	-1.988	-1.969	-1.949	-1.929	-60
-50	-1.929	-1.909	-1.889	-1.869	-1.850	-1.830	-1.810	-1.790	-1.770	-1.749	-1.729	-50
-40	-1.729	-1.709	-1.689	-1.669	-1.649	-1.628	-1.608	-1.588	-1.568	-1.547	-1.527	-40
-30	-1.527	-1.507	-1.486	-1.466	-1.445	-1.425	-1.404	-1.384	-1.363	-1.343	-1.322	-30
-20	-1.322	-1.301	-1.281	-1.260	-1.239	-1.218	-1.198	-1.177	-1.156	-1.135	-1.114	-20
-10	-1.114	-1.094	-1.073	-1.052	-1.031	-1.010	-0.989	-0.968	-0.947	-0.926	-0.905	-10
0	-0.905	-0.883	-0.862	-0.841	-0.820	-0.799	-0.778	-0.756	-0.735	-0.714	-0.692	0
0	-0.692	-0.671	-0.650	-0.628	-0.607	-0.586	-0.564	-0.543	-0.521	-0.500	-0.478	0
10	-0.478	-0.457	-0.435	-0.413	-0.392	-0.370	-0.349	-0.327	-0.305	-0.284	-0.262	10
20	-0.262	-0.240	-0.218	-0.197	-0.175	-0.153	-0.131	-0.109	-0.088	-0.066	-0.044	20
30	-0.044	-0.022	0.000	0.022	0.044	0.066	0.088	0.110	0.132	0.154	0.176	30
40	0.176	0.198	0.220	0.242	0.264	0.286	0.308	0.330	0.353	0.375	0.397	40
50	0.397	0.419	0.441	0.463	0.486	0.508	0.530	0.552	0.575	0.597	0.619	50
60	0.619	0.642	0.664	0.686	0.709	0.731	0.753	0.776	0.798	0.821	0.843	60
70	0.843	0.865	0.888	0.910	0.933	0.955	0.978	1.000	1.023	1.045	1.068	70
80	1.068	1.090	1.113	1.136	1.158	1.181	1.203	1.226	1.249	1.271	1.294	80
90	1.294	1.316	1.339	1.362	1.384	1.407	1.430	1.453	1.475	1.498	1.521	90

°F	0	1	2	3	4	5	6	7	8	9	10	°F
100	1.521	1.543	1.566	1.589	1.612	1.635	1.657	1.680	1.703	1.726	1.749	100
110	1.749	1.771	1.794	1.817	1.840	1.863	1.886	1.909	1.931	1.954	1.977	110
120	1.977	2.000	2.023	2.046	2.069	2.092	2.115	2.138	2.161	2.184	2.207	120
130	2.207	2.230	2.253	2.276	2.298	2.321	2.344	2.367	2.390	2.413	2.436	130
140	2.436	2.459	2.483	2.506	2.529	2.552	2.575	2.598	2.621	2.644	2.667	140
150	2.667	2.690	2.713	2.736	2.759	2.782	2.805	2.828	2.851	2.874	2.897	150
160	2.897	2.920	2.944	2.967	2.990	3.013	3.036	3.059	3.082	3.105	3.128	160
170	3.128	3.151	3.174	3.197	3.220	3.244	3.267	3.290	3.313	3.336	3.359	170
180	3.359	3.382	3.405	3.428	3.451	3.474	3.497	3.520	3.544	3.567	3.590	180
190	3.590	3.613	3.636	3.659	3.682	3.705	3.728	3.751	3.774	3.797	3.820	190
200	3.820	3.843	3.866	3.889	3.912	3.935	3.958	3.981	4.004	4.027	4.050	200
210	4.050	4.073	4.096	4.119	4.142	4.165	4.188	4.211	4.234	4.257	4.280	210
220	4.280	4.303	4.326	4.349	4.372	4.395	4.417	4.440	4.463	4.486	4.509	220
230	4.509	4.532	4.555	4.578	4.601	4.623	4.646	4.669	4.692	4.715	4.738	230
240	4.738	4.760	4.783	4.806	4.829	4.852	4.874	4.897	4.920	4.943	4.965	240
250	4.965	4.988	5.011	5.034	5.056	5.079	5.102	5.124	5.147	5.170	5.192	250
260	5.192	5.215	5.238	5.260	5.283	5.306	5.328	5.351	5.374	5.396	5.419	260
270	5.419	5.441	5.464	5.487	5.509	5.532	5.554	5.577	5.599	5.622	5.644	270
280	5.644	5.667	5.690	5.712	5.735	5.757	5.779	5.802	5.824	5.847	5.869	280
290	5.869	5.892	5.914	5.937	5.959	5.982	6.004	6.026	6.049	6.071	6.094	290
300	6.094	6.116	6.138	6.161	6.183	6.205	6.228	6.250	6.272	6.295	6.317	300
310	6.317	6.339	6.362	6.384	6.406	6.429	6.451	6.473	6.496	6.518	6.540	310
320	6.540	6.562	6.585	6.607	6.629	6.652	6.674	6.696	6.718	6.741	6.763	320
330	6.763	6.785	6.807	6.829	6.852	6.874	6.896	6.918	6.941	6.963	6.985	330
340	6.985	7.007	7.029	7.052	7.074	7.096	7.118	7.140	7.163	7.185	7.207	340
350	7.207	7.229	7.251	7.273	7.296	7.318	7.340	7.362	7.384	7.407	7.429	350
360	7.429	7.451	7.473	7.495	7.517	7.540	7.562	7.584	7.606	7.628	7.650	360
370	7.650	7.673	7.695	7.717	7.739	7.761	7.783	7.806	7.828	7.850	7.872	370
380	7.872	7.894	7.917	7.939	7.961	7.983	8.005	8.027	8.050	8.072	8.094	380
390	8.094	8.116	8.138	8.161	8.183	8.205	8.227	8.250	8.272	8.294	8.316	390
400	8.316	8.338	8.361	8.383	8.405	8.427	8.450	8.472	8.494	8.516	8.539	400
410	8.539	8.561	8.583	8.605	8.628	8.650	8.672	8.694	8.717	8.739	8.761	410
420	8.761	8.784	8.806	8.828	8.851	8.873	8.895	8.918	8.940	8.962	8.985	420
430	8.985	9.007	9.029	9.052	9.074	9.096	9.119	9.141	9.163	9.186	9.208	430
440	9.208	9.231	9.253	9.275	9.298	9.320	9.343	9.365	9.388	9.410	9.432	440
450	9.432	9.455	9.477	9.500	9.522	9.545	9.567	9.590	9.612	9.635	9.657	450
460	9.657	9.680	9.702	9.725	9.747	9.770	9.792	9.815	9.837	9.860	9.882	460
470	9.882	9.905	9.927	9.950	9.973	9.995	10.018	10.040	10.063	10.086	10.108	470
480	10.108	10.131	10.153	10.176	10.199	10.221	10.244	10.267	10.289	10.312	10.334	480
490	10.334	10.357	10.380	10.402	10.425	10.448	10.471	10.493	10.516	10.539	10.561	490
500	10.561	10.584	10.607	10.629	10.652	10.675	10.698	10.720	10.743	10.766	10.789	500
510	10.789	10.811	10.834	10.857	10.880	10.903	10.925	10.948	10.971	10.994	11.017	510
520	11.017	11.039	11.062	11.085	11.108	11.131	11.154	11.176	11.199	11.222	11.245	520
530	11.245	11.268	11.291	11.313	11.336	11.359	11.382	11.405	11.428	11.451	11.474	530
540	11.474	11.497	11.519	11.542	11.565	11.588	11.611	11.634	11.657	11.680	11.703	540
550	11.703	11.726	11.749	11.772	11.795	11.818	11.841	11.864	11.887	11.910	11.933	550
560	11.933	11.956	11.978	12.001	12.024	12.047	12.070	12.093	12.116	12.140	12.163	560
570	12.163	12.186	12.209	12.232	12.255	12.278	12.301	12.324	12.347	12.370	12.393	570
580	12.393	12.416	12.439	12.462	12.485	12.508	12.531	12.554	12.577	12.600	12.624	580
590	12.624	12.647	12.670	12.693	12.716	12.739	12.762	12.785	12.808	12.831	12.855	590
600	12.855	12.878	12.901	12.924	12.947	12.970	12.993	13.016	13.040	13.063	13.086	600
610	13.086	13.109	13.132	13.155	13.179	13.202	13.225	13.248	13.271	13.294	13.318	610
620	13.318	13.341	13.364	13.387	13.410	13.433	13.457	13.480	13.503	13.526	13.549	620
630	13.549	13.573	13.596	13.619	13.642	13.665	13.689	13.712	13.735	13.758	13.782	630
640	13.782	13.805	13.828	13.851	13.874	13.898	13.921	13.944	13.967	13.991	14.014	640
650	14.014	14.037	14.060	14.084	14.107	14.130	14.154	14.177	14.200	14.223	14.247	650
660	14.247	14.270	14.293	14.316	14.340	14.363	14.386	14.410	14.433	14.456	14.479	660
670	14.479	14.503	14.526	14.549	14.573	14.596	14.619	14.643	14.666	14.689	14.713	670
680	14.713	14.736	14.759	14.783	14.806	14.829	14.853	14.876	14.899	14.923	14.946	680
690	14.946	14.969	14.993	15.016	15.039	15.063	15.086	15.109	15.133	15.156	15.179	690

Revised Thermocouple Reference Tables

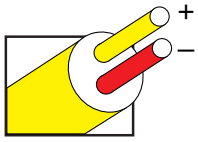
TYPE K

Reference Tables N.I.S.T. Monograph 175 Revised to ITS-90



Thermocouple Grade

Nickel-Chromium vs. Nickel-Aluminum



Extension Grade

MAXIMUM TEMPERATURE RANGE

Thermocouple Grade
– 328 to 2282°F
– 200 to 1250°C

Extension Grade
32 to 392°F
0 to 200°C

LIMITS OF ERROR
(whichever is greater)
Standard: 2.2°C or 0.75% Above 0°C
2.2°C or 2.0% Below 0°C
Special: 1.1°C or 0.4%

COMMENTS, BARE WIRE ENVIRONMENT:
Clean Oxidizing and Inert; Limited Use in Vacuum or Reducing; Wide Temperature Range; Most Popular Calibration

TEMPERATURE IN DEGREES °F
REFERENCE JUNCTION AT 32°F

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
700	15.179	15.203	15.226	15.250	15.273	15.296	15.320	15.343	15.366	15.390	15.413	700
710	15.413	15.437	15.460	15.483	15.507	15.530	15.554	15.577	15.600	15.624	15.647	710
720	15.647	15.671	15.694	15.717	15.741	15.764	15.788	15.811	15.834	15.858	15.881	720
730	15.881	15.905	15.928	15.952	15.975	15.998	16.022	16.045	16.069	16.092	16.116	730
740	16.116	16.139	16.163	16.186	16.209	16.233	16.256	16.280	16.303	16.327	16.350	740
750	16.350	16.374	16.397	16.421	16.444	16.468	16.491	16.514	16.538	16.561	16.585	750
760	16.585	16.608	16.632	16.655	16.679	16.702	16.726	16.749	16.773	16.796	16.820	760
770	16.820	16.843	16.867	16.890	16.914	16.937	16.961	16.984	17.008	17.031	17.055	770
780	17.055	17.078	17.102	17.125	17.149	17.173	17.196	17.220	17.243	17.267	17.290	780
790	17.290	17.314	17.337	17.361	17.384	17.408	17.431	17.455	17.478	17.502	17.526	790
800	17.526	17.549	17.573	17.596	17.620	17.643	17.667	17.690	17.714	17.738	17.761	800
810	17.761	17.785	17.808	17.832	17.855	17.879	17.902	17.926	17.950	17.973	17.997	810
820	17.997	18.020	18.044	18.068	18.091	18.115	18.138	18.162	18.185	18.209	18.233	820
830	18.233	18.256	18.280	18.303	18.327	18.351	18.374	18.398	18.421	18.445	18.469	830
840	18.469	18.492	18.516	18.539	18.563	18.587	18.610	18.634	18.657	18.681	18.705	840
850	18.705	18.728	18.752	18.776	18.799	18.823	18.846	18.870	18.894	18.917	18.941	850
860	18.941	18.965	18.988	19.012	19.035	19.059	19.083	19.106	19.130	19.154	19.177	860
870	19.177	19.201	19.224	19.248	19.272	19.295	19.319	19.343	19.366	19.390	19.414	870
880	19.414	19.437	19.461	19.485	19.508	19.532	19.556	19.579	19.603	19.626	19.650	880
890	19.650	19.674	19.697	19.721	19.745	19.768	19.792	19.816	19.839	19.863	19.887	890
900	19.887	19.910	19.934	19.958	19.981	20.005	20.029	20.052	20.076	20.100	20.123	900
910	20.123	20.147	20.171	20.194	20.218	20.242	20.265	20.289	20.313	20.336	20.360	910
920	20.360	20.384	20.407	20.431	20.455	20.479	20.502	20.526	20.550	20.573	20.597	920
930	20.597	20.621	20.644	20.668	20.692	20.715	20.739	20.763	20.786	20.810	20.834	930
940	20.834	20.857	20.881	20.905	20.929	20.952	20.976	21.000	21.023	21.047	21.071	940
950	21.071	21.094	21.118	21.142	21.165	21.189	21.213	21.236	21.260	21.284	21.308	950
960	21.308	21.331	21.355	21.379	21.402	21.426	21.450	21.473	21.497	21.521	21.544	960
970	21.544	21.568	21.592	21.616	21.639	21.663	21.687	21.710	21.734	21.758	21.781	970
980	21.781	21.805	21.829	21.852	21.876	21.900	21.924	21.947	21.971	21.995	22.018	980
990	22.018	22.042	22.066	22.089	22.113	22.137	22.160	22.184	22.208	22.232	22.255	990
1000	22.255	22.279	22.303	22.326	22.350	22.374	22.397	22.421	22.445	22.468	22.492	1000
1010	22.492	22.516	22.540	22.563	22.587	22.611	22.634	22.658	22.682	22.705	22.729	1010
1020	22.729	22.753	22.776	22.800	22.824	22.847	22.871	22.895	22.919	22.942	22.966	1020
1030	22.966	22.990	23.013	23.037	23.061	23.084	23.108	23.132	23.155	23.179	23.203	1030
1040	23.203	23.226	23.250	23.274	23.297	23.321	23.345	23.368	23.392	23.416	23.439	1040
1050	23.439	23.463	23.487	23.510	23.534	23.558	23.581	23.605	23.629	23.652	23.676	1050
1060	23.676	23.700	23.723	23.747	23.771	23.794	23.818	23.842	23.865	23.889	23.913	1060
1070	23.913	23.936	23.960	23.984	24.007	24.031	24.055	24.078	24.102	24.126	24.149	1070
1080	24.149	24.173	24.197	24.220	24.244	24.267	24.291	24.315	24.338	24.362	24.386	1080
1090	24.386	24.409	24.433	24.457	24.480	24.504	24.527	24.551	24.575	24.598	24.622	1090
1100	24.622	24.646	24.669	24.693	24.717	24.740	24.764	24.787	24.811	24.835	24.858	1100
1110	24.858	24.882	24.905	24.929	24.953	24.976	25.000	25.024	25.047	25.071	25.094	1110
1120	25.094	25.118	25.142	25.165	25.189	25.212	25.236	25.260	25.283	25.307	25.330	1120
1130	25.330	25.354	25.377	25.401	25.425	25.448	25.472	25.495	25.519	25.543	25.566	1130
1140	25.566	25.590	25.613	25.637	25.660	25.684	25.708	25.731	25.755	25.778	25.802	1140
1150	25.802	25.825	25.849	25.873	25.896	25.920	25.943	25.967	25.990	26.014	26.037	1150
1160	26.037	26.061	26.084	26.108	26.132	26.155	26.179	26.202	26.226	26.249	26.273	1160
1170	26.273	26.296	26.320	26.343	26.367	26.390	26.414	26.437	26.461	26.484	26.508	1170
1180	26.508	26.532	26.555	26.579	26.602	26.626	26.649	26.673	26.696	26.720	26.743	1180
1190	26.743	26.767	26.790	26.814	26.837	26.861	26.884	26.907	26.931	26.954	26.978	1190
1200	26.978	27.001	27.025	27.048	27.072	27.095	27.119	27.142	27.166	27.189	27.213	1200
1210	27.213	27.236	27.259	27.283	27.306	27.330	27.353	27.377	27.400	27.424	27.447	1210
1220	27.447	27.471	27.494	27.517	27.541	27.564	27.588	27.611	27.635	27.658	27.681	1220
1230	27.681	27.705	27.728	27.752	27.775	27.798	27.822	27.845	27.869	27.892	27.915	1230
1240	27.915	27.939	27.962	27.986	28.009	28.032	28.056	28.079	28.103	28.126	28.149	1240
1250	28.149	28.173	28.196	28.219	28.243	28.266	28.289	28.313	28.336	28.360	28.383	1250
1260	28.383	28.406	28.430	28.453	28.476	28.500	28.523	28.546	28.570	28.593	28.616	1260
1270	28.616	28.640	28.663	28.686	28.710	28.733	28.756	28.780	28.803	28.826	28.849	1270
1280	28.849	28.873	28.896	28.919	28.943	28.966	28.989	29.013	29.036	29.059	29.082	1280
1290	29.082	29.106	29.129	29.152	29.176	29.199	29.222	29.245	29.269	29.292	29.315	1290
°F	0	1	2	3	4	5	6	7	8	9	10	°F

°F	0	1	2	3	4	5	6	7	8	9	10	°F
1300	29.315	29.338	29.362	29.385	29.408	29.431	29.455	29.478	29.501	29.524	29.548	1300
1310	29.548	29.571	29.594	29.617	29.640	29.664	29.687	29.710	29.733	29.757	29.780	1310
1320	29.780	29.803	29.826	29.849	29.873	29.896	29.919	29.942	29.965	29.989	30.012	1320
1330	30.012	30.035	30.058	30.081	30.104	30.128	30.151	30.174	30.197	30.220	30.243	1330
1340	30.243	30.267	30.290	30.313	30.336	30.359	30.382	30.405	30.429	30.452	30.475	1340
1350	30.475	30.498	30.521	30.544	30.567	30.590	30.613	30.637	30.660	30.683	30.706	1350
1360	30.706	30.729	30.752	30.775	30.798	30.821	30.844	30.868	30.891	30.914	30.937	1360
1370	30.937	30.960	30.983	31.006	31.029	31.052	31.075	31.098	31.121	31.144	31.167	1370
1380	31.167	31.190	31.213	31.236	31.260	31.283	31.306	31.329	31.352	31.375	31.398	1380
1390	31.398	31.421	31.444	31.467	31.490	31.513	31.536	31.559	31.582	31.605	31.628	1390
1400	31.628	31.651	31.674	31.697	31.720	31.743	31.766	31.789	31.812	31.834	31.857	1400
1410	31.857	31.880	31.903	31.926	31.949	31.972	31.995	32.018	32.041	32.064	32.087	1410
1420	32.087	32.110	32.133	32.156	32.179	32.202	32.224	32.247	32.270	32.293	32.316	1420
1430	32.316	32.339	32.362	32.385	32.408	32.431	32.453	32.476	32.499	32.522	32.545	1430
1440	32.545	32.568	32.591	32.614	32.636	32.659	32.682	32.705	32.728	32.751	32.774	1440
1450	32.774	32.796	32.819	32.842	32.865	32.888	32.911	32.933	32.956	32.979	33.002	1450
1460	33.002	33.025	33.047	33.070	33.093	33.116	33.139	33.161	33.184	33.207	33.230	1460
1470	33.230	33.253	33.275	33.298	33.321	33.344	33.366	33.389	33.412	33.435	33.458	1470
1480	33.458	33.480	33.503	33.526	33.548	33.571	33.594	33.617	33.639	33.662	33.685	1480
1490	33.685	33.708	33.730	33.753	33.776	33.798	33.821	33.844	33.867	33.889	33.912	1490
1500	33.912	33.935	33.957	33.980	34.003	34.025	34.048	34.071	34.093	34.116	34.139	1500
1510	34.139	34.161	34.184	34.207	34.229	34.252	34.275	34.297	34.320	34.343	34.365	1510
1520	34.365	34.388	34.410	34.433	34.456	34.478	34.501	34.524	34.546	34.569	34.591	1520
1530	34.591	34.614	34.637	34.659	34.682	34.704	34.727	34.750	34.772	34.795	34.817	1530
1540	34.817	34.840	34.862	34.885	34.908	34.930	34.953	34.975	34.998	35.020	35.043	1540
1550	35.043	35.065	35.088	35.110	35.133	35.156	35.178	35.201	35.223	35.246	35.268	1550
1560	35.268	35.291	35.313	35.336	35.358	35.381	35.403	35.426	35.448	35.471	35.493	1560
1570	35.493	35.516	35.538	35.560	35.583	35.605	35.628	35.650	35.673	35.695	35.718	1570
1580	35.718	35.740	35.763	35.785	35.807	35.830	35.852	35.875	35.897	35.920	35.942	1580
1590	35.942	35.964	35.987	36.009	36.032	36.054	36.076	36.099	36.121	36.144	36.166	1590
1600	36.166	36.188	36.211	36.233	36.256	36.278	36.300	36.323	36.345	36.367	36.390	1600
1610	36.390	36.412	36.434	36.457	36.479	36.501	36.524	36.546	36.568	36.591	36.613	1610
1620	36.613	36.635	36.658	36.680	36.702	36.725	36.747	36.769	36.792	36.814	36.836	1620
1630	36.836	36.859	36.881	36.903	36.925	36.948	36.970	36.992	37.014	37.037	37.059	1630
1640	37.059	37.081	37.104	37.126	37.148	37.170	37.193	37.215	37.237	37.259	37.281	1640
1650	37.281	37.304	37.326	37.348	37.370	37.393	37.415	37.437	37.459	37.481	37.504	1650
1660	37.504	37.526	37.548	37.570	37.592	37.615	37.637	37.659	37.681	37.703	37.725	1660
1670	37.725	37.748	37.770	37.792	37.814	37.836	37.858	37.881	37.903	37.925	37.947	1670
1680	37.947	37.969	37.991	38.013	38.036	38.058	38.080	38.102	38.124	38.146	38.168	1680
1690	38.168	38.190	38.212	38.235	38.257	38.279	38.301	38.323	38.345	38.367	38.389	1690
1700	38.389	38.411	38.433	38.455	38.477	38.499	38.522	38.544	38.566	38.588	38.610	1700
1710	38.610	38.632	38.654	38.676	38.698	38.720	38.742	38.764	38.786	38.808	38.830	1710
1720	38.830	38.852	38.874	38.896	38.918	38.940	38.962	38.984	39.006	39.028	39.050	1720
1730	39.050	39.072	39.094	39.116	39.138	39.160	39.182	39.204	39.226	39.248	39.270	1730
1740	39.270	39.292	39.314	39.335	39.357	39.379	39.401	39.423	39.445	39.467	39.489	1740
1750	39.489	39.511	39.533	39.555	39.577	39.599	39.620	39.642	39.664	39.686	39.708	1750
1760	39.708	39.730	39.752	39.774	39.796	39.817	39.839	39.861	39.883	39.905	39.927	1760
1770	39.927	39.949	39.970	39.992	40.014	40.036	40.058	40.080	40.101	40.123	40.145	1770
1780	40.145	40.167	40.189	40.211	40.232	40.254	40.276	40.298	40.320	40.341	40.363	1780
1790	40.363	40.385	40.407	40.429	40.450	40.472	40.494	40.516	40.537	40.559	40.581	1790
1800	40.581	40.603	40.624	40.646	40.668	40.690	40.711	40.733	40.755	40.777	40.798	1800
1810	40.798	40.820	40.842	40.864	40.885	40.907	40.929	40.950	40.972	40.994	41.015	1810
1820	41.015	41.037	41.059	41.081	41.102	41.124	41.146	41.167	41.189	41.211	41.232	1820
1830	41.232	41.254	41.276	41.297	41.319	41.341	41.362	41.384	41.405	41.427	41.449	1830
1840	41.449	41.470	41.492	41.514	41.535	41.557	41.578	41.600	41.622	41.643	41.665	1840
1850	41.665	41.686	41.708	41.730	41.751	41.773	41.794	41.816	41.838	41.859	41.881	1850
1860	41.881	41.902	41.924	41.945	41.967	41.988	42.010	42.032	42.053	42.075	42.096	1860
1870	42.096	42.118	42.139	42.161	42.182	42.204	42.225	42.247	42.268	42.290	42.311	1870
1880	42.311	42.333	42.354	42.376	42.397	42.419	42.440	42.462	42.483	42.505	42.526	1880
1890	42.526	42.548	42.569	42.591	42.612	42.633	42.655	42.676	42.698	42.719	42.741	1890
°F	0	1	2	3	4	5	6	7	8	9	10	°F

MAXIMUM TEMPERATURE RANGE

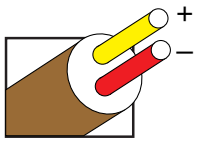
Thermocouple Grade
– 328 to 2282°F
– 200 to 1250°C

Extension Grade
32 to 392°F
0 to 200°C

LIMITS OF ERROR
(whichever is greater)
Standard: 2.2°C or 0.75% Above 0°C
2.2°C or 2.0% Below 0°C
Special: 1.1°C or 0.4%

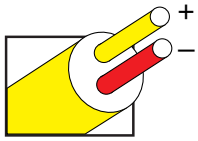
COMMENTS, BARE WIRE ENVIRONMENT:
Clean Oxidizing and Inert; Limited Use in Vacuum or Reducing; Wide Temperature Range; Most Popular Calibration

TEMPERATURE IN DEGREES °F
REFERENCE JUNCTION AT 32°F



Thermocouple Grade

Nickel-Chromium vs. Nickel-Aluminum



Extension Grade

Revised Thermocouple Reference Tables

TYPE K

Reference Tables
N.I.S.T. Monograph 175
Revised to ITS-90

Thermoelectric Voltage in Millivolts

°F	0	1	2	3	4	5	6	7	8	9	10	°F
1900	42.741	42.762	42.783	42.805	42.826	42.848	42.869	42.891	42.912	42.933	42.955	1900
1910	42.955	42.976	42.998	43.019	43.040	43.062	43.083	43.104	43.126	43.147	43.169	1910
1920	43.169	43.190	43.211	43.233	43.254	43.275	43.297	43.318	43.339	43.361	43.382	1920
1930	43.382	43.403	43.425	43.446	43.467	43.489	43.510	43.531	43.552	43.574	43.595	1930
1940	43.595	43.616	43.638	43.659	43.680	43.701	43.723	43.744	43.765	43.787	43.808	1940
1950	43.808	43.829	43.850	43.872	43.893	43.914	43.935	43.957	43.978	43.999	44.020	1950
1960	44.020	44.041	44.063	44.084	44.105	44.126	44.147	44.169	44.190	44.211	44.232	1960
1970	44.232	44.253	44.275	44.296	44.317	44.338	44.359	44.380	44.402	44.423	44.444	1970
1980	44.444	44.465	44.486	44.507	44.528	44.550	44.571	44.592	44.613	44.634	44.655	1980
1990	44.655	44.676	44.697	44.719	44.740	44.761	44.782	44.803	44.824	44.845	44.866	1990
2000	44.866	44.887	44.908	44.929	44.950	44.971	44.992	45.014	45.035	45.056	45.077	2000
2010	45.077	45.098	45.119	45.140	45.161	45.182	45.203	45.224	45.245	45.266	45.287	2010
2020	45.287	45.308	45.329	45.350	45.371	45.392	45.413	45.434	45.455	45.476	45.497	2020
2030	45.497	45.518	45.539	45.560	45.580	45.601	45.622	45.643	45.664	45.685	45.706	2030
2040	45.706	45.727	45.748	45.769	45.790	45.811	45.832	45.852	45.873	45.894	45.915	2040
2050	45.915	45.936	45.957	45.978	45.999	46.019	46.040	46.061	46.082	46.103	46.124	2050
2060	46.124	46.145	46.165	46.186	46.207	46.228	46.249	46.269	46.290	46.311	46.332	2060
2070	46.332	46.353	46.373	46.394	46.415	46.436	46.457	46.477	46.498	46.519	46.540	2070
2080	46.540	46.560	46.581	46.602	46.623	46.643	46.664	46.685	46.706	46.726	46.747	2080
2090	46.747	46.768	46.789	46.809	46.830	46.851	46.871	46.892	46.913	46.933	46.954	2090
2100	46.954	46.975	46.995	47.016	47.037	47.057	47.078	47.099	47.119	47.140	47.161	2100
2110	47.161	47.181	47.202	47.223	47.243	47.264	47.284	47.305	47.326	47.346	47.367	2110
2120	47.367	47.387	47.408	47.429	47.449	47.470	47.490	47.511	47.531	47.552	47.573	2120
2130	47.573	47.593	47.614	47.634	47.655	47.675	47.696	47.716	47.737	47.757	47.778	2130
2140	47.778	47.798	47.819	47.839	47.860	47.880	47.901	47.921	47.942	47.962	47.983	2140
2150	47.983	48.003	48.024	48.044	48.065	48.085	48.105	48.126	48.146	48.167	48.187	2150
2160	48.187	48.208	48.228	48.248	48.269	48.289	48.310	48.330	48.350	48.371	48.391	2160
2170	48.391	48.411	48.432	48.452	48.473	48.493	48.513	48.534	48.554	48.574	48.595	2170
2180	48.595	48.615	48.635	48.656	48.676	48.696	48.717	48.737	48.757	48.777	48.798	2180
2190	48.798	48.818	48.838	48.859	48.879	48.899	48.919	48.940	48.960	48.980	49.000	2190
2200	49.000	49.021	49.041	49.061	49.081	49.101	49.122	49.142	49.162	49.182	49.202	2200
2210	49.202	49.223	49.243	49.263	49.283	49.303	49.323	49.344	49.364	49.384	49.404	2210
2220	49.404	49.424	49.444	49.465	49.485	49.505	49.525	49.545	49.565	49.585	49.605	2220
2230	49.605	49.625	49.645	49.666	49.686	49.706	49.726	49.746	49.766	49.786	49.806	2230
2240	49.806	49.826	49.846	49.866	49.886	49.906	49.926	49.946	49.966	49.986	50.006	2240
°F	0	1	2	3	4	5	6	7	8	9	10	°F

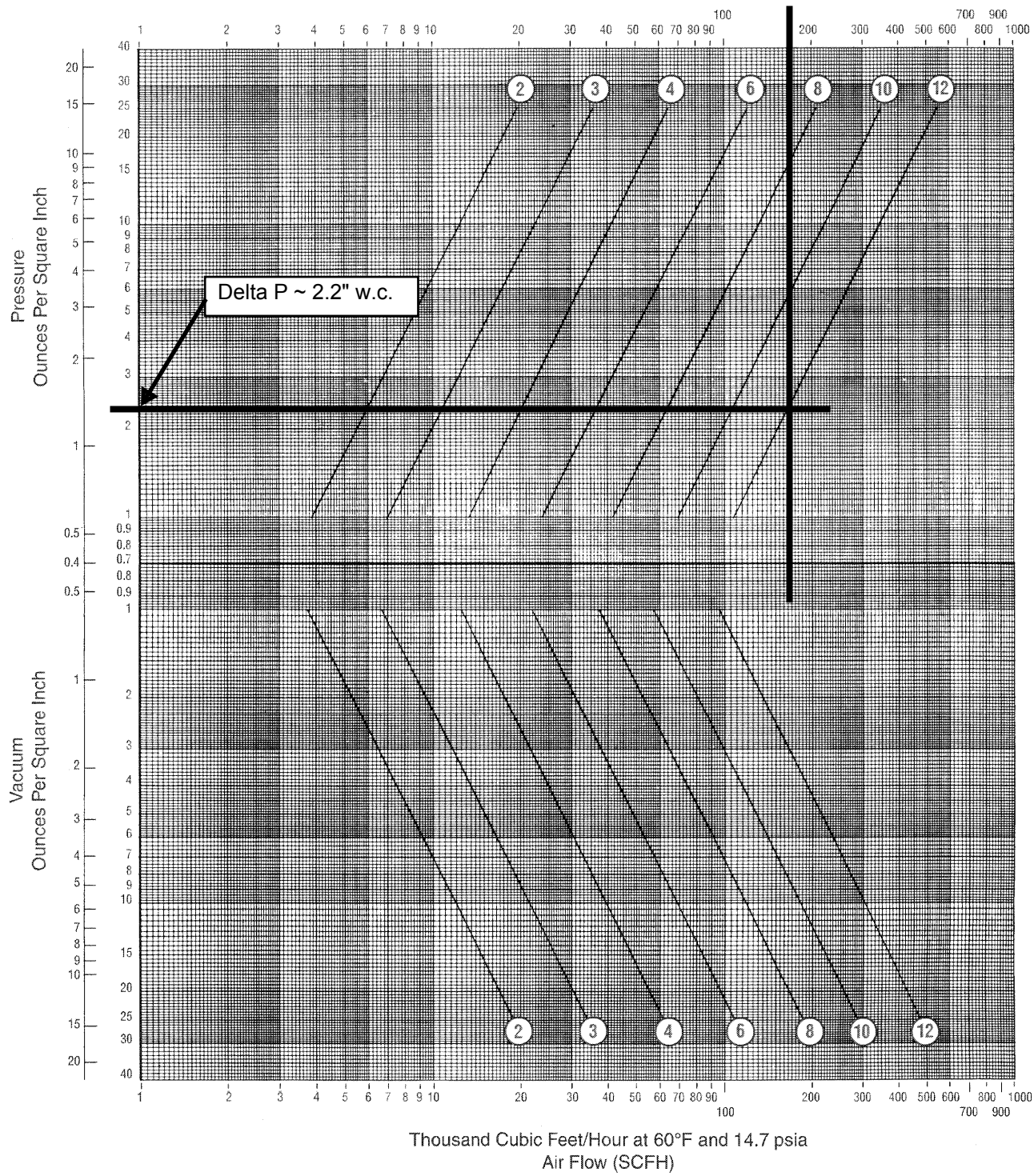
°F	0	1	2	3	4	5	6	7	8	9	10	°F
2250	50.006	50.026	50.046	50.066	50.086	50.106	50.126	50.146	50.166	50.186	50.206	2250
2260	50.206	50.226	50.246	50.266	50.286	50.306	50.326	50.346	50.366	50.385	50.405	2260
2270	50.405	50.425	50.445	50.465	50.485	50.505	50.525	50.545	50.564	50.584	50.604	2270
2280	50.604	50.624	50.644	50.664	50.684	50.703	50.723	50.743	50.763	50.783	50.802	2280
2290	50.802	50.822	50.842	50.862	50.882	50.901	50.921	50.941	50.961	50.981	51.000	2290
2300	51.000	51.020	51.040	51.060	51.079	51.099	51.119	51.139	51.158	51.178	51.198	2300
2310	51.198	51.217	51.237	51.257	51.276	51.296	51.316	51.336	51.355	51.375	51.395	2310
2320	51.395	51.414	51.434	51.453	51.473	51.493	51.512	51.532	51.552	51.571	51.591	2320
2330	51.591	51.611	51.630	51.650	51.669	51.689	51.708	51.728	51.748	51.767	51.787	2330
2340	51.787	51.806	51.826	51.845	51.865	51.885	51.904	51.924	51.943	51.963	51.982	2340
2350	51.982	52.002	52.021	52.041	52.060	52.080	52.099	52.119	52.138	52.158	52.177	2350
2360	52.177	52.197	52.216	52.235	52.255	52.274	52.294	52.313	52.333	52.352	52.371	2360
2370	52.371	52.391	52.410	52.430	52.449	52.468	52.488	52.507	52.527	52.546	52.565	2370
2380	52.565	52.585	52.604	52.623	52.643	52.662	52.681	52.701	52.720	52.739	52.759	2380
23905	2.759	52.778	52.797	52.817	52.836	52.855	52.875	52.894	52.913	52.932	52.952	2390
2400	52.952	52.971	52.990	53.010	53.029	53.048	53.067	53.087	53.106	53.125	53.144	2400
2410	53.144	53.163	53.183	53.202	53.221	53.240	53.260	53.279	53.298	53.317	53.336	2410
2420	53.336	53.355	53.375	53.394	53.413	53.432	53.451	53.470	53.490	53.509	53.528	2420
2430	53.528	53.547	53.566	53.585	53.604	53.623	53.643	53.662	53.681	53.700	53.719	2430
2440	53.719	53.738	53.757	53.776	53.795	53.814	53.833	53.852	53.871	53.890	53.910	2440
2450	53.910	53.929	53.948	53.967	53.986	54.005	54.024	54.043	54.062	54.081	54.100	2450
2460	54.100	54.119	54.138	54.157	54.176	54.195	54.214	54.233	54.252	54.271	54.289	2460
2470	54.289	54.308	54.327	54.346	54.365	54.384	54.403	54.422	54.441	54.460	54.479	2470
2480	54.479	54.498	54.517	54.536	54.554	54.573	54.592	54.611	54.630	54.649	54.668	2480
2490	54.668	54.687	54.705	54.724	54.743	54.762	54.781	54.800	54.819	54.837	54.856	2490
2500	54.856	54.875	54.894									2500
°F	0	1	2	3	4	5	6	7	8	9	10	°F

FLAME ARRESTER DELTA P

Flow Curves

3000 SCFM x 60 min/hr = 180,000 SCFH

5000 and 5010 Flame Arresters



McMASTER-CARR®

CHICAGO, ILLINOIS

CATALOG

112

Serving industry since 1901

TELEPHONE
(630) 833-0300
(630) 600-3600

INTERNET
www.mcmaster.com

FAX
(630) 834-9427

E-MAIL
chi.sales@mcmaster.com

MAIL
P.O. Box 4355
Chicago, IL 60680-4355

STREET ADDRESS
600 County Line Road
Elmhurst, IL 60126-2081

Steel Ejector Exhaust Muffler/Filters

- Maximum Pressure: 125 psi
- Maximum Temperature: 150° F
- Filtration: 800 microns

Air is concentrated in a narrow stream over a long distance to deliver maximum force exactly where you need it. Mufflers have low pressure requirements, yet provide efficient air thrust to eject parts. They reduce exhaust noise by 17-22 decibels. Made of zinc-plated steel with a nylon insert. **Connections:** NPT male.

Pipe Size	Max. cfm @ 90 psi	Height	Dia.		Each
1/8"	22	1 3/8"	7/16"	9837K41	$4.52
1/4"	34	1 3/4"	9/16"	9837K42	5.07
3/8"	45	2 1/4"	11/16"	9837K43	5.14
1/2"	68	2 23/32"	7/8"	9837K44	6.17
3/4"	75	3 5/32"	1 1/16"	9837K45	8.61
1"	101	3 7/8"	1 5/16"	9837K46	11.00

Aluminum Exhaust Muffler/Filters

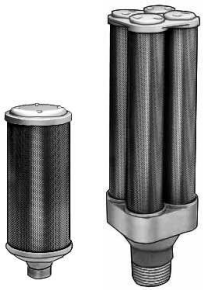
- Maximum Pressure: 150 psi
- Maximum Temperature: 325° F
- Filtration: 10 microns

Mufflers have rugged construction: top and bottom covers are cast aluminum; perforated housing, tie rods, and nuts are zinc-plated steel. These mufflers reduce noise level by 17-22 decibels with little impairment of operating efficiency.

Air Exhaust Mufflers— Control the exhaust noise from air cylinders, valves, and other air-operated devices.

Vacuum Exhaust Mufflers— Reduce the noise of vacuum pump exhaust. Applications include suction devices, vacuum frames, chucks, simulation chambers, and transfer and control devices.

Connections: NPT.



Single Chamber *Four Chamber*

Pipe Size	Height	Dia.	Air Exhaust Max. cfm @ 90 psi		Each	Vacuum Exhaust Max. cfm @ 15 psi		Each
NPT Male—Single Chamber								
1/8"	3 1/8"	1 27/32"	44	4440K121	$4.63	8	9850K51	$6.06
1/4"	4 3/8"	1 27/32"	84	4440K122	5.55	26	9850K52	7.14
3/8"	5 1/8"	2 19/32"	192	4440K123	8.30	50	9850K53	10.07
1/2"	6"	3 5/32"	256	4440K124	9.24	75	9850K54	11.15
3/4"	7 3/16"	3 13/32"	544	4440K125	11.67	150	9850K55	14.25
1"	8 3/4"	3 29/32"	800	4440K126	13.58	230	9850K56	16.56
1 1/4"	8 3/4"	3 29/32"	1,360	4440K127	15.42	315	9850K57	18.21
1 1/2"	13 9/16"	5 1/4"	2,080	4440K128	23.43	510	9850K58	27.68
2"	18 7/8"	5 1/4"	3,200	4440K129	27.72	870	9850K59	33.73
NPT Male—Four Chamber								
3"	22 1/8"	8 1/4"	7,200	4440K131	136.38	1,975	9850K61	158.90
4"	23 1/2"	9 3/8"	14,000	4440K132	149.26	3,700	9850K62	177.92
6"	30 7/8"	13 1/8"	36,000	4440K133	205.36	5,900	9850K63	244.54
NPT Female—Single Chamber								
1/8"	2 13/16"	1 27/32"	44	4440K141	4.63	8	9850K71	6.06
1/4"	4"	1 27/32"	84	4440K142	5.55	26	9850K72	7.14
3/8"	4 9/16"	2 19/32"	192	4440K143	8.30	50	9850K73	10.07
1/2"	5 1/2"	3 5/32"	256	4440K144	9.24	75	9850K74	11.15
3/4"	6 11/16"	3 13/32"	544	4440K145	11.67	150	9850K75	14.25
1"	8"	3 29/32"	800	4440K146	13.58	230	9850K76	16.56
1 1/4"	8"	3 29/32"	1,360	4440K147	15.42	315	9850K77	18.21
1 1/2"	12 1/2"	5 1/4"	2,080	4440K148	23.43	510	9850K78	27.68
2"	17 3/4"	5 1/4"	3,200	4440K149	27.72	870	9850K79	33.73

High Pressure Aluminum Exhaust Muffler/Filters

- Maximum Pressure: 300 psi
- Maximum Temperature: 160° F
- Filtration: 250 microns

Female

Delivering high pressure, these units have an aluminum housing for corrosion resistance and durability as well as self-cleaning screens made of 50-mesh Type 304 stainless steel (unless noted). Units reduce noise by 17-20 decibels. **Connections:** NPT.

Pipe Size	Max. cfm @ 100 psi	Ht.	Dia.	NPT Male	Each	NPT Female	Each
1/8"	20	1 7/8"	13/16"	9993K31	$6.89	9993K41	$6.89
1/4"	33	1 7/8"	13/16"	9993K32	6.89	9993K42	6.89
3/8"	82	3 1/4"	1 1/4"	9993K33	10.46	9993K43	10.46
1/2"	110	3 1/4"	1 1/4"	9993K34	10.46	9993K44	10.46
3/4"	175	4 5/8"	2"	9993K35	21.77	9993K45	21.77
1"	215	4 5/8"	2"	9993K36	21.77	9993K46	21.77
1 1/4"	520	5 1/2"	2 1/2"	_____	_____	9993K47★	64.77
1 1/2"	550	5 1/2"	2 1/2"	_____	_____	9993K48★	67.40
2"	570	6 7/16"	3"	_____	_____	9993K49★	123.06

★ Has a brass screen.

Polyethylene Exhaust Muffler/Filters

- Maximum Pressure: 150 psi
- Maximum Temperature: 150° F
- Filtration: See table

Standard Flow

The one-piece molded body is made of tough, resilient, high-density polyethylene welded to a polyethylene adapter. The units are easy to clean with mineral spirits and are not affected by oil or water in the air lines. They reduce noise level by 20-30 decibels. Color is gray.

Connections: NPT male.

Pipe Size	Max. cfm @ 14.7 psi	Height	Dia.		Each
Standard Flow *(50 to 60 microns)*					
10-32	0.7	15/16"	19/64"	4427K69	$1.52
1/8"	13	1 3/16"	1/2"	4427K71	1.78
1/4"	24	1 1/2"	21/32"	4427K72	2.07
3/8"	51	2 5/8"	15/16"	4427K73	3.00
1/2"	60	2 5/8"	15/16"	4427K74	3.11
3/4"	78	5 25/32"	1 1/2"	4427K75	5.85
1"	88	6 5/8"	1 7/8"	4427K76	7.41
High Flow *(80 to 100 microns)*					
1/8"	33	1 3/16"	1/2"	4427K81	1.78
1/4"	60	1 1/2"	21/32"	4427K82	2.07
3/8"	128	2 5/8"	15/16"	4427K83	3.00
1/2"	150	2 5/8"	15/16"	4427K84	3.11
3/4"	195	5 25/32"	1 1/2"	4427K85	5.85
1"	220	6 5/8"	1 7/8"	4427K86	7.41

Nylon Exhaust Muffler/Filters

- Maximum Pressure: 150 psi
- Maximum Temperature: 120° F
- Filtration: 250 microns

Housing is made of glass-filled nylon and ultrasonically welded to create a lightweight yet durable corrosion resistant muffler/filter. Screens made from self-cleaning 50-mesh Type 304 stainless steel. Muffler/filters reduce exhaust noise by 17-20 decibels.

Connections: NPT male.

Pipe Size	Max. cfm @ 100 psi	Height	Dia.		Each
1/8"	20	2 7/64"	13/16"	9992K21	$4.63
1/4"	33	2 15/64"	13/16"	9992K22	4.63
3/8"	82	3 27/64"	1 1/4"	9992K23	6.83
1/2"	110	3 35/64"	1 1/4"	9992K24	6.83

Polypropylene Exhaust Mufflers

- Maximum Pressure: 150 psi
- Maximum Temperature: 175° F

Short and Wide *Long and Narrow*

Exceptionally lightweight mufflers have a fail-safe feature that guards against excessive back-pressure build-up and clogging. They reduce noise level by 10-20 decibels. Made of glass-filled polypropylene. Housing is black.

Mufflers with a polyethylene inner mesh element reduce noise about 10% better than those with metal elements.

Connections: NPT male.

To Order: Please specify inner mesh element material: brass, stainless steel, or polyethylene.

Pipe Size	Height	Dia.		Each
Short and Wide				
1/8"	1 13/16"	1 5/8"	4869K71	$5.70
1/4"	1 13/16"	1 5/8"	4869K72	5.70
27/32"	2 27/32"	2"	4869K73	8.10
1/2"	2 31/32"	2"	4869K74	8.10
3/4"	4 1/4"	2 29/32"	4869K75	16.20
1"	4 13/32"	2 29/32"	4869K76	16.20
Long and Narrow				
1/8"	2 1/3"	15/16"	4869K81	5.70
1/4"	2 15/32"	15/16"	4869K82	5.70
3/8"	3 1/2"	1 11/32"	4869K83	8.10
1/2"	3 21/32"	1 11/32"	4869K84	8.10
3/4"	5 19/32"	1 29/32"	4869K85	16.20
1"	5 27/32"	1 29/32"	4869K86	16.20

McMASTER-CARR®

CHICAGO, ILLINOIS

open
24 hours 7 days a week

TELEPHONE	(630) 833-0300 (630) 600-3600
TELÉFONO (ESPAÑOL)	(630) 833-7100
INTERNET	www.mcmaster.com
FAX	(630) 834-9427
TTY FOR THE HEARING IMPAIRED	(630) 834-8844
E-MAIL	chi.sales@mcmaster.com
MAIL	P.O. Box 4355 Chicago, IL 60680-4355
STREET ADDRESS	600 County Line Rd. Elmhurst, IL 60126-2081

Additional Locations

Atlanta

Mail	Street Address		
P.O. Box 740100	6100 Fulton Industrial Blvd.	Telephone	(404) 346-7000
Atlanta, GA 30374-0100	Atlanta, GA 30336-2852	Fax	(404) 349-9091
		E-Mail	atl.sales@mcmaster.com

Cleveland

Mail	Street Address		
P.O. Box 94930	200 Aurora Industrial Pkwy.	Telephone	(330) 995-5500
Cleveland, OH 44101-4930	Aurora, OH 44202	Fax	(330) 995-9600
		E-Mail	cle.sales@mcmaster.com

Los Angeles

Mail	Street Address		
P.O. Box 54960	9630 Norwalk Blvd.	Telephone	(562) 692-5911
Los Angeles, CA 90054-0960	Santa Fe Springs, CA 90670-2932	Fax	(562) 695-2323
		E-Mail	la.sales@mcmaster.com

New York City — Philadelphia

Mail	Street Address		
P.O. Box 440	473 Ridge Rd.	Telephone	(732) 329-3200
New Brunswick, NJ 08903-0440	Dayton, NJ 08810-0317	Fax	(732) 329-3772
		E-Mail	nj.sales@mcmaster.com

Terms and Conditions

TERMS. BY PURCHASING FROM US, YOU AGREE TO THESE TERMS AND CONDITIONS. No other terms shall apply except as agreed in writing signed by us. We reserve the right to correct typographic errors and reject orders.

PRICES; PAYMENT. Prices, title and risk of loss are F.O.B. our warehouse. Prices don't include taxes or shipment and may be changed without notice. Payment due within 30 days of shipment, net on open account less 2% for payment within 10 days of shipment. Visa, MasterCard, and American Express accepted for net invoice amount. Credit card arrangements subject to change. Open accounts available on approval.

RETURNS. If shipment appears damaged, don't pay freight unless damage is marked on bill by carrier. No return authorization required.

LIMITED WARRANTY. Our only warranty obligation is to replace any item proved defective in material or workmanship. ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PURPOSE, ARE DISCLAIMED.

LIABILITY. WE SHALL NOT BE LIABLE IN CONTRACT, WARRANTY, TORT OR OTHERWISE FOR CONSEQUENTIAL, SPECIAL, EXEMPLARY OR INCIDENTAL DAMAGES. IN NO EVENT SHALL OUR LIABILITY EXCEED THE PURCHASE PRICE. ENFORCING THE LIMITED REPLACEMENT RIGHTS IS YOUR EXCLUSIVE REMEDY.

INFORMATION. Information about products is as provided by our supplier. We make no warranty or representation concerning such information. SOME PRODUCTS SOLD BY US CONTAIN INGREDIENTS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM. UPON REQUEST, WE WILL FURNISH YOU WITH MATERIAL SAFETY DATA SHEETS FOR HAZARDOUS SUBSTANCES AS DEFINED BY OSHA AND A LIST OF PRODUCTS OR SUBSTANCES KNOWN BY THE STATE OF CALIFORNIA TO CAUSE CANCER OR REPRODUCTIVE HARM.

OBLIGATIONS. You warrant, represent and agree: (1) to comply with all laws; (2) that our sale and shipment of the product will not, by export thereof, your legal status or otherwise, cause us to violate any law; and (3) to indemnify us against any losses from a failure by you or a third party to comply with law or these terms and conditions, or from use of the product.

tyco

Flow Control

VAREC ISO 9001 Certified Firm

VAREC®

Vapor Control Inc.

5000/5010 Series
Flame Arrester

INSTRUCTION, OPERATION AND MAINTENANCE MANUAL

TABLE OF CONTENTS

LIST OF TABLES

Disclaimer of Warranties

The contract between the Seller and the Buyer states the entire obligation of the Seller. The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship between the Seller and Buyer. There are no express or implied warranties set out in this instruction manual. The only warranties that apply are those in the existing contract between the Seller and Buyer.

The Varec 5000/5010 Series Flame Arresters have not been tested by Varec under all possible operational conditions, and Varec does not have all the data relative to your application. The information in this instruction manual is not all inclusive and does not and cannot take into account all unique situations Consequently, you should review this product literature in view of your application. If you have any further questions, please contact Varec for assistance.

Limitations of Seller's Liability

If it is determined that this instruction manual created some new warranties, Varec's liability shall be limited to repair or replacement under the standard warranty clause. In no case shall Varec's liability exceed that stated as Limitations of Remedy in the contract between Varec and our customer.

Safety Precautions

READ AND UNDERSTAND THIS INSTRUCTION MANUAL BEFORE INSTALLING, OPERATING OR PERFORMING MAINTENANCE ON VAREC 5000/5010 SERIES FLAME ARRESTERS. FOLLOW ALL PRECAUTIONS AND WARNINGS NOTED HEREIN WHEN INSTALLING, OPERATING OR PERFORMING MAINTENANCE ON THIS EQUIPMENT.

WARNING

Flame arrester should be installed upstream and not more than 15 feet from the ignition source for use in accordance with UL approval.

Flame Arrester must be isolated from the gas piping before performing maintenance. All gas must be blocked and pressure safely vented.

Flame arresters are not capable of stopping a flame front in mixtures of air with hydrogen, acetylene, ethylene oxide, or carbon disulfide.

Safety Precaution Definitions

CAUTION

Damage to equipment may result if this precaution is disregarded.

WARNING

Direct injury to personnel or damage to equipment which can cause injury to personnel may result if this precaution is not followed.

General

The VAREC Model 5000/5010 Series Flame Arresters are designed to stop the propagation of flame from external sources. They are used on storage tank roofs, digester covers, and in waste gas piping systems. These units are installed where fire protection is required in combination with pressure relief or shut-off valves in vapor balancing, recovery, or open vent piping systems.

WARNING

Flame Arresters are not capable of stopping a flame front in mixtures of air with hydrogen, acetylene, ethylene oxide, or carbon disulfide.

Flame Arrester should be installed upstream of and not more than 15 feet from the ignition source for use in accordance with UL aproval.

✎NOTE

Varec Flame Arresters bearing UL approval are tested for use on oil storage tanks, installed not more than 15 feet from the open end of the vent pipe. (Reference UL 525.) These test conditions may not represent the actual service conditions or piping system design. API Publication 2028 states that the Arresters should be independently tested under actual service conditions before installation.

Construction

The standard unit is constructed of a heavy cast housing containing a removable multiplate bank assembly with aluminum extensible frame. A fixed 316 S.S. frame is also available. Working pressure rating is 10 PSIG (69.0 kPa). For material selection see Tables 2 & 3.

Practical Limitations

While Flame Arresters decrease the possibility of flame propagation in a system, certain variables must be evaluated to ensure safety. The relative fire hazard of flammable mixtures can be judged by the upper and lower explosive limits. These limits are expressed as percent by volume of the gas or vapor in air. The explosive range is that span of concentrations lying between the lower and upper limits. The upper limit is the point at which the mixture is too rich to burn, i.e., contains too little oxygen to support combustion. The broader the explosive range, the easier it is to create an air-gas explosive mixture. Conversely, when the explosive range is narrow, the chance of developing a hazardous air-gas mixture decreases.

Table 1 gives the approximate limits of flammability of some single gases, vapors, and industrial mixtures in air at common temperatures and at atmospheric pressure.

WARNING

In all cases where the ratio of upper limit/lower limit exceeds 10, the use of Flame Arresters is not recommended. Also, the presence of any O_2 is dangerous because of the lack of homogeneity which is possible in gas mixtures. Any surplus of oxygen provides the potential for rapid explosion.

Operation

Flame Arresters do not prevent ignition of flammable mixtures, but do prevent the propagation of a flame. The Varec 5000/5010 Series Flame Arresters stop flame propagation by absorbing and dissipating heat through the surface area of the bank sheets. Heat is absorbed as ignited gas attempts to pass through the small passages within the bank assembly. This action lowers the temperature of the gas below its ignition point and quenches the flame.

Product	Limits in Air Pressure		Product	Limits in Air Pressure		Product	Limits in Air Percent	
	Lower	Higher		Lower	Higher		Lower	Higher
Acetyldehyde	4.1	55.0	Ethy-Alcohol	4.3	19.0	Methyl-Alcohol	7.3	36.0
Acetone	3.0	11.0	Ethyl-Bromide	6.7	11.3	Methyl-Chloride	10.7	17.4
Acetylene	2.5	81.0	Ehtyl-Chloride	3.8	15.4	Methyl-Ethyl-Ketone	1.8	10.0
Ammonia	15.0	28.0	Ethyl-Ether	1.9	48.0	Methyl-formate	5.9	20.0
Benzene	1.4	7.1	Ethyl-Formate	2.7	13.5	Methyl-Proply-Ketone	1.5	8.0
Benzine	1.1		Ethylene	3.1	32.0	Natural Gas	3.8	17.0
Blast Furnace Gas	35.0	74.0	Furfural	2.1		Noriane	0.8	
Butadiene	2.0	11.5	Gasoline	1.4	7.6	Octane	1.0	
Butane	1.9	8.5	Hexane	1.2	7.5	Pentane	1.5	7.8
Butylene	2.0	9.6	Heptane	1.2	6.7	Propane	2.1	9.5
Carbon Disulphide	1.25	44.0	Hydrocyanic Acid	6.0	41.0	Propyl-Alcohol	2.1	13.5
Carbon Monoxide	12.5	74.0	Hydrogen	4.0	75.0	Propylene	2.4	10.3
Cyclohexane	1.3	8.0	Hydrogen-Sulhide	4.3	5.0	Pyridine	1.8	12.4
Cyclopropane	2.4	10.4	Isobutane	1.8	8.4	Styrene	1.1	6.1
Decane	0.8	5.4	Isopentane	1.4	7.6	Toluene	1.4	6.7
Ethane	3.0	12.5	Isopropyl-Alcohol	2.0	12.0	Water Gas	7.0	72.0
Ethyl-Acentate	2.5	9.0	Methane	5.3	14.0	Xylene	1.0	6.0

Reference: Bureau of Mines Bulletin 503, Limits of Flammability of Gases and Vapors, 1952

Table 1 – Flammability Limit of Gases and Vapor

Installation

The 5000 Series Flame Arrester (ref. Figure 1) is designed for vertical application in pipe lines and on tank or digester roofs. The 5010 Series Flame Arrester (ref. Figure 2) is designed for horizontal positioning in pipelines, however, it may be in either direction.

The cover, roof or piping system must have the appropriate flange(s) installed for mating with the Flame Arrester. Flame Arrester with aluminum housings should be mated with an ANSI Class 125 F.F. flange. The 316 stainless steel housing should be mated with an ANSI Class 150 R.F. flange. The Arrester must be located with clearance allowed for removal of the bank assembly.

The flange of vertical mounting must be plumb and level to ensure proper operation of the pressure relief valve (when used in combination with the Flame Arrester).

The flange for horizontal mounting must be oriented to ensure that Arrester drain hole will be at the extreme bottom (6 o'clock) position.
Remove the Flame Arrester from the shipping container or pallet. Remove flange protectors. Inspect for and remove any packing or other loose material in the inlet/outlet chambers of the housing.
Remove cover and extract bank assembly. Inspect for shipping debris or damage, and correct as required. Insert bank and replace cover. Tighten cap screws uniformly.

WARNING

The aluminum bank assembly weighs from 10 to 80 pounds and the 316 S.S. assembly is substantially heavier. Use the appropriate tools and equipment when handling these units to avoid injury.

4. Place the appropriate full face flange gasket (by others) on the flange.

CAUTION

If it is necessary to mate an ANSI Class 125 F.F. flange with an ANSI Class 150 R.F. flange, use the proper spacer to convert the raised face to a flat face.

5. Place the Arrester on the flange, and position the unit so that the bank assembly can be readily extracted for inspection and maintenance.

NOTE

When installing the Model 5010 in a horizontal position, check the drain hole to see that it is functional. Install the appropriate drain piping along with a Varec Drip Trap or an isolation valve.

Install mounting hardware and tighten uniformly.

The Flame Arrester is now installed and ready for use.

Maintenance

Maintenance is the most important factor in the operation of the Flame Arrester. The bank sheets must be kept clean to prevent a decrease in gas flow through the system and loss of heat absorbing efficiency.

WARNING

Failure to properly maintain the unit could result in reduction of safety and impairment of system operation.

A regular inspection program is important. The frequency of inspection is determined by the application. Consideration should be given to the amount and nature of water or solids in the gas, and the corrosivity of the process stream. Generally, the first inspection should be made 30 days after commissioning. Inspections should continue on a 30 day schedule unless excessive deposits or accumulation of foreign matter are found. If so, the frequency of inspections should be increased. Adjust inspection frequency to maintain free and unrestricted flow through the Arrester.

WARNING

Flame Arrester must be isolated from the gas piping before removing cover plate. All gas must be blocked and pressure safely vented. Ensure that Arrester is cool after a fire, or wear appropriate protective clothing.

1. Remove cover cap screws and cover plate. Pull out bank assembly by pulling on bank handle. If desired, the bank assembly may be removed from the housing.

WARNING

The aluminum bank assembly weighs from 10 to 80 pounds and the 316 S.S. assembly is substantially heavier. Use the appropriate tools and equipment when handling these units to avoid injury.

   a. Extend the aluminum frame to its full open position. Both sides of each grid sheet may be inspected and cleaned without removal from the frame.
   b. The 316 S.S. frame is non-extensible and must be disassembled to access the bank sheets.

2. Check for corrosion, bent, warped or otherwise damaged sheets that could cause an opening for a direct flame path. Replace with a full bank sheet set if necessary.

3. Bank assembly cleaning procedure is based on the type of residue to be removed. Determine if residue type is Group I, II, or III. Follow the cleaning procedures for the selected group.

WARNING

Use all volatile and flammable solvents carefully to avoid ignition or prolonged breathing. Use protective clothing and gloves when using acid to avoid burns from contact with skin.

Group I
Residue Type: Soil, sand, pollen, and metallic salts.

Cleaning Procedure:

   a. Wash bank sheets with a mild solvent such as petroleum naphtha or commercial petroleum derived cleaning fluids.
   b. Rinse sheets with a solvent that does not leave an oily film. This is necessary to avoid collecting foreign matter.
   c. Blow out dry particles with compressed air.
   d. Wash bank sheets with hot water.
   e. Steam bank assembly clean.

Group II
Residue Type: Metallic oxides and metallic carbonates.

Cleaning Procedure:

a. Wash bank sheets as described in Group I, Step 1.
b. Soak entire bank assembly in cold 35% nitric acid.

CAUTION

Use acid only on aluminum or stainless steel bank assemblies. Do not use on carbon steel or monel.

NOTE

If residue still remains, place bank assembly in boiling 35% nitric acid. Once all residue is removed, soak bank assembly in a solution of baking soda and water (8 ounce baking soda to 3 gallons water) to neutralize any remaining acid. Blow dry using compressed air.

Group III
Residue Type: Organic tars, organic gums and sulfur organic residues.

Cleaning procedure:

a. Wash bank sheets as described in Group I, Step 1.
b. Blowout with compressed air.
c. Wash bank sheets with a strong solvent such as benzol, xyol, carbon tetrachloride, acetone, carbon disulfide, paint thinner (not lacquer), or a mixture of 1/3 each of benzol, alcohol and acetone.

4. If residue cannot be removed by the above procedures, replace with a new bank sheet set.

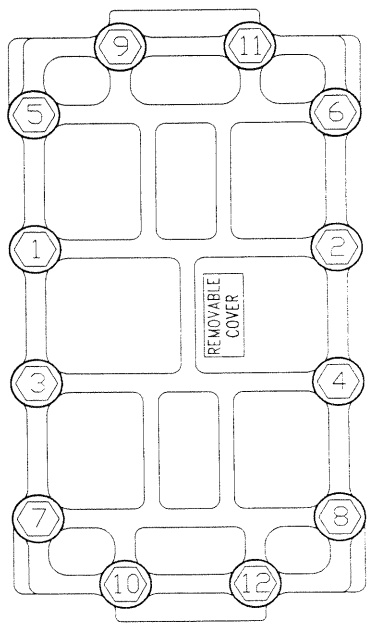
WARNING

Clogged bank assembly can restrict flow and reduce ability to stop flame propagation.

5. Place the bank assembly into the Arrester housing. Install new gasket, cover plate, and cap screws.
   a. The aluminum extensible frame bank assembly may not go entirely back into place. The force needed to compress bank into place is supplied by tightening cover plate cap screws.
   b. The 316 S.S. fixed frame bank assembly should allow cover to close readily.

6. Install all cap screws hand tight. Cross tighten all cap screws evenly around cover per below drawing. Torque to 40-50 ft/lbs.

7. The Flame Arrester is ready to be placed back into service. Perform soap test. If any leakage is detected, further tighten cap screws (maximum torque not to exceed 60 ft.-lb.)

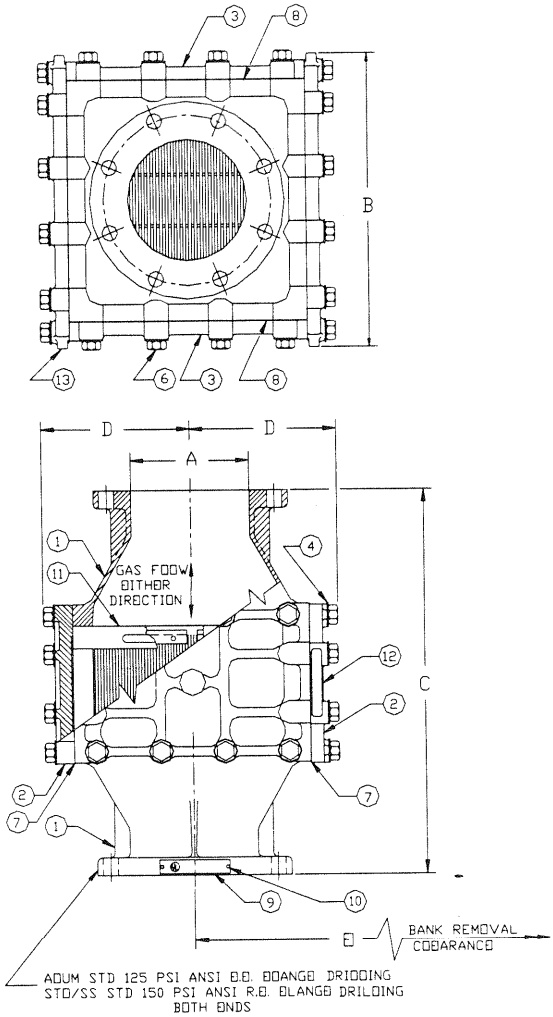


Replacement Parts

When ordering replacement parts specify Flame Arresters by Model number, series number, and pipe size. Identify replacement parts by item number, description, and material as shown on reference drawings. Include part number where possible.

Size	2	3	4	6	8	0	1
Nominal	2 In.	3 In.	4 In.	6 In.	8 In.	10 In.	12 In.
Pipe Size	50 MM	75 MM	100 MM	150 MM	200 MM	250 MM	300 MM
Bank Assembly Alum Ext. Frame w/Alum Sheets	BM 6027	BM6055	BM6090	BM6126	BM6245	BM6269	BM6716
Bank Assembly Alum Ext. Flame w/316 S.S. Sheets	BM18996-000	BM18998-000	BM19000-000	BM18956-000	BM18958-000	BM19002-000	BM19004-000
Bank Assembly 316 S.S. Fixed Frame w/316 S.S. Sheets	BM19882-600	BM19883-600	BM19884-600	BM19885-600	BM19886-600	BM19887-600	BM19888-600
Bank Sheet Set Aluminum	BA17040	BA17046	BA17052	BA17058	BA17064	BA17070	BA17076
Bank Sheet Set 316 S.S.	BA17044	BA17050	BA17056	BA17062	BA17068	BA17074	BA17080
Gasket Kit Compressed Non-Asbestos	13-09101-02	13-09101-03	13-09101-04	13-0910106	13-09101-08	13-09101-10	13-09101-12

Figure 1 – 5000 Flame Arrester

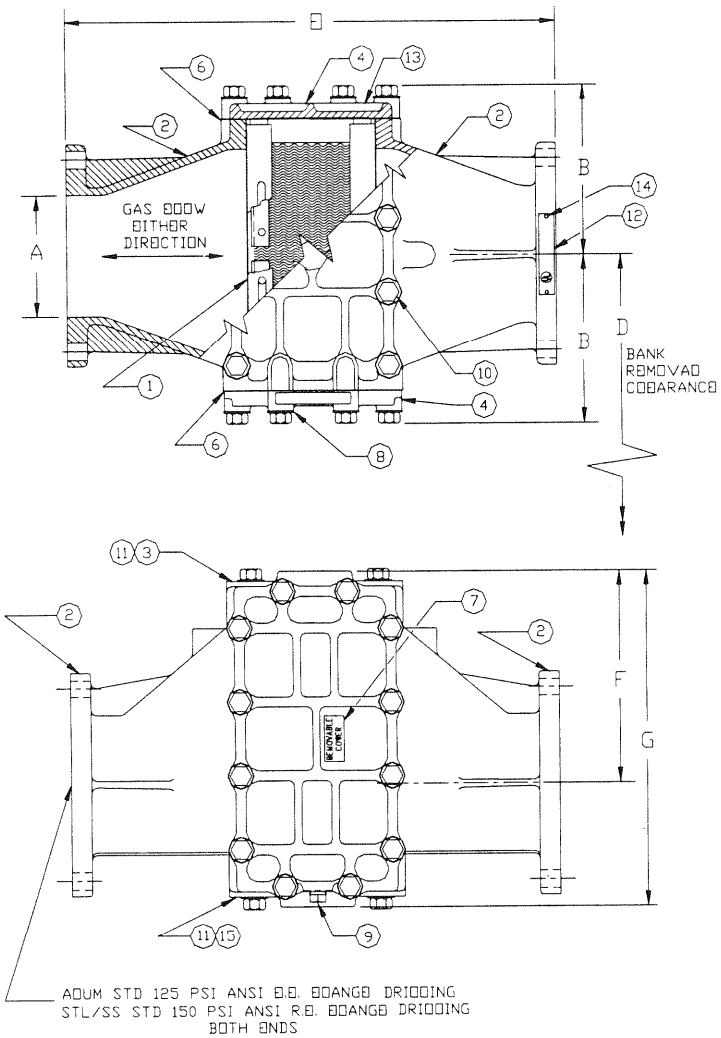


Dimensions					
Size (A)		**B**	**C**	**D**	**F**
2"	In.	9	12-5/8	4-5/16	19
	MM	229	321	109	483
3"	In.	11-3/4	13-7/8	5-3/4	23-1/4
	MM	298	353	146	591
4"	In.	14-1/2	16-5/8	7-3/8	28-1/8
	MM	368	422	187	715
6"	In.	16-1/2	21-1/2	8-3/8	31-1/8
	MM	419	546	213	791
8"	In.	21-5/8	27-1/4	10-7/8	38-5/8
	MM	549	692	276	981
10"	In.	24	28-3/8	11-7/8	41-5/8
	MM	610	721	302	1057
12"	In.	31	34-3/8	14-5/8	50
	MM	787	873	372	1270

Material Table					
Item	**Description**	**Material**			
		Model	**Model**	**Model**	**Model**
		5000X1	**5000X2**	**5000X3**	**5000X6**
1	End Housing	Aluminum	Aluminum	Steel	316 S.S.
2	Cover Plate	Aluminum	Aluminum	Steel	316 S.S.
3	Side Plate	Aluminum	Aluminum	Steel	316 S.S.
4	Washer	Zn Pl Stl	An Pl Stl	Zn Pl Stl	304 S.S.
6	Cap Screw	Zn Pl Stl	An Pl Stl	Zn Pl Stl	304 S.S.
7	Gasket, Cover Plate	Compressed Non-Asbestos	Compressed Non-Asbestos	Compressed Non-Asbestos	Compressed Non-Asbestos
8	Gasket, Side Plate	Compressed Non-Asbestos	Compressed Non-Asbestos	Compressed Non-Asbestos	Compressed Non-Asbestos
9	U.L. Listing Tag	Aluminum	-	-	-
10	Drive Screw	18-8 SST	18-8 SST	18-8 SST	18-8 SST
11	Bank Assembly	Alum. Ext. Frame/Alum Sheets	Alum. Ext. Frame/316 S.S. Sheets	Fixed 316 S.S. Frame/316 S.S. Sheets	Fixed 316 S.S. Frame/316 S.S. Sheets
12	Cover Tag	Aluminum	Aluminum	Aluminum	Aluminum
13	Rear Plate	Aluminum	Aluminum	Steel	316 SST

Table 1- 5000 Series, Materials of Construction

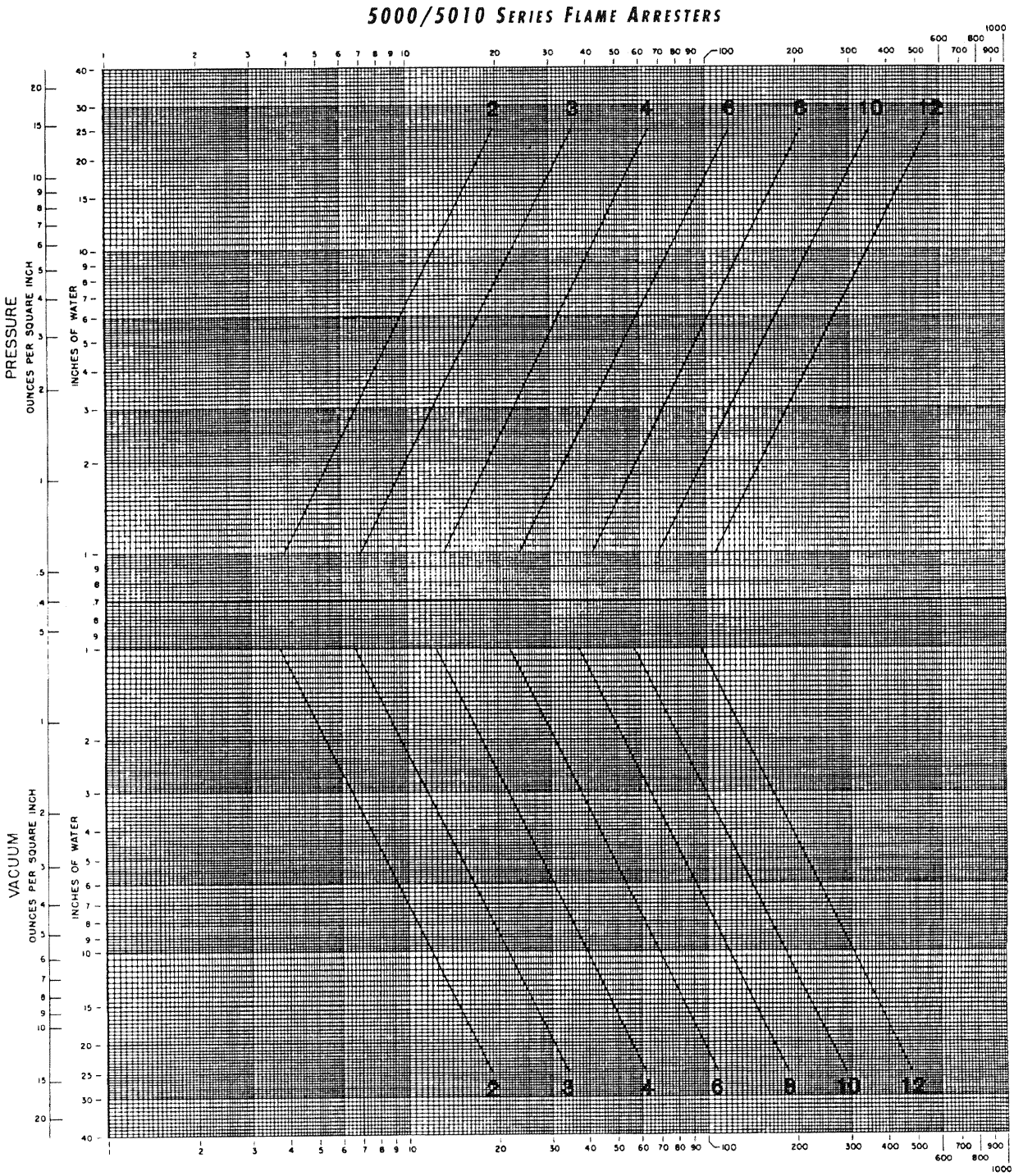
Figure 2 - 5010 Series Flame Arrester



Dimensions						
Size (A)		B	C	D	F	G
2"	In.	4-5/16	18-3/4	14-1/2	5-3/8	9
	MM	110	476	368	137	229
3"	In.	5-5/8	2-7/8	16	7-1/4	11-3/4
	MM	143	581	406	184	298
4"	In.	7	27	20	9	14
	MM	178	686	508	229	356
6"	In.	8-1/4	30-3/4	24-3/8	10-3/4	16-3/8
	MM	210	781	619	273	416
8"	In.	10-3/4	38-1/4	32-1/8	14-3/8	21-5/8
	MM	273	972	816	365	549
10"	In.	11-7/8	41-5/8	35-1/2	16	24
	MM	302	1057	902	406	610
12"	In.	14-1/2	49-1/2	34-3/8	20	31
	MM	368	1257	873	508	787

Material Table					
Item	Description	Material			
		Model	Model	Model	Model
		5010X1	5010X2	5010X3	5010X6
1	Bank Assembly	Alum. Ext. Frame/Alum Sheets	Alum. Ext. Frame/Alum Sheets	316 S.S. Fixed Frame/316 S.S. Sheets	316 S.S. Fixed Frame/316 S.S. Sheets
2	End Housing	Aluminum	Aluminum	Steel	316 S.S.
3/15	Side Plate	Aluminum	Aluminum	Steel	316 S.S.
4	Cover Plate	Aluminum	Aluminum	Steel	316 S.S.
6	Gasket, Cover Plate	Compressed Non-Asbestos	Compressed Non-Asbestos	Compressed Non-Asbestos	Compressed Non-Asbestos
7	Cover Tag	Aluminum	Aluminum	Aluminum	Aluminum
8	Washer	Zn Pl Stl	Zn Pl Stl	Zn Pl Stl	304 S.S.
9	1/2" NPT Plug	Zn Pl Stl	Zn Pl Stl	Zn Pl Stl	316 S.S.
10	Cap Screw	Zn Pl Stl	Zn Pl Stl	Zn Pl Stl	304 S.S.
11	Gasket, Side Plate	Alum. Ext. Frame/Alum Sheets	Compressed Non-Asbestos	Compressed Non-Asbestos	Compressed Non-Asbestos
12	U.L. Listing Tag	Aluminum	-	-	-
13	Rear Plate	Aluminum	Aluminum	Steel	316 SST
14	Drive Screw	18-8 SST	18-8 SST	18-8 SST	18-8 SST

Table 2 – 5010 Series, Materials of Construction



Air Flow (CFH) at 22°C and 14.7 PSIA may be determined as follows.

Multiply Air Flow from chart (SCFH) times the factor 1.0223.

VAREC

REVISIONS		
REV.	DESCRIPTION	APPROVAL/DATE
C	ECN #01-1229	S.WILLIS 8-17-01 G.SETZER 9-24-01 D.WYANT 9-24-01

THIS PAGE IS FOR APPROVALS AND REVISION RECORDS OF THE DOCUMENT IN THIS FOLDER. COPIES OF THIS PAGE ARE NOT TO BE DISTRIBUTED WITH THE ASSOCIATED DOCUMENT.

EXCLUDING THIS PAGE, THIS DOCUMENT CONTAINS 15

DWN			INSTALLATION, OPERATION & MAINTENANCE MANUAL FOR 5000/5010 SERIES FLAME ARRESTER
CHK			
APPR			
APPR			
APPR			
APPR			

SIZE		REV.
A	33-07765	C

FORM NO. 1500 REV. A 5/93

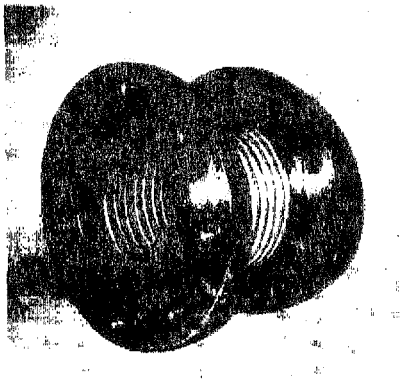
FLEX-JOINTS

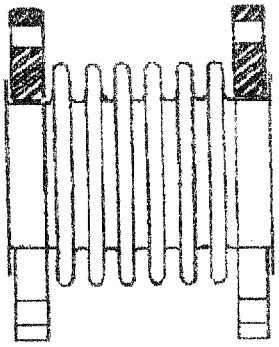
The Flex-Joint is a versatile expansion joint that is designed to handle a wide range of applications involving vibration or thermal movement. The bellows element is made from T-321 stainless steel with 150 lb. carbon steel plate flanges floating on both ends. Floating flanges eliminate the problems of bolt-hole alignment which is often encountered when installing joints with welded flanges. The floating flanges can be rotated for quick and easy bolt-hole alignment. Proper alignment eliminates the possibility of imposing torque on the unit during installation thereby increasing the service life and performance of the joint.

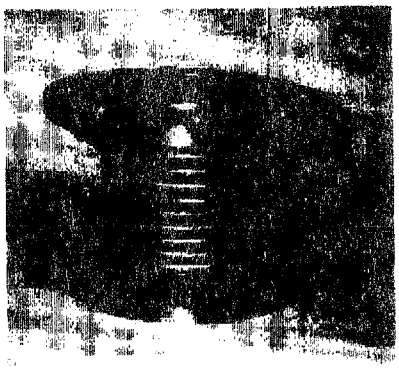
Maximum pressure is 150 psig; maximum temperature is 850 degrees F.

All wetted surface are stainless steel.

Flex-Joints are available with the following options: Control Rods, Liner, Forged Steel Flanges and Stainless Steel Flanges. Hot Dipped, Galvanized Flanges



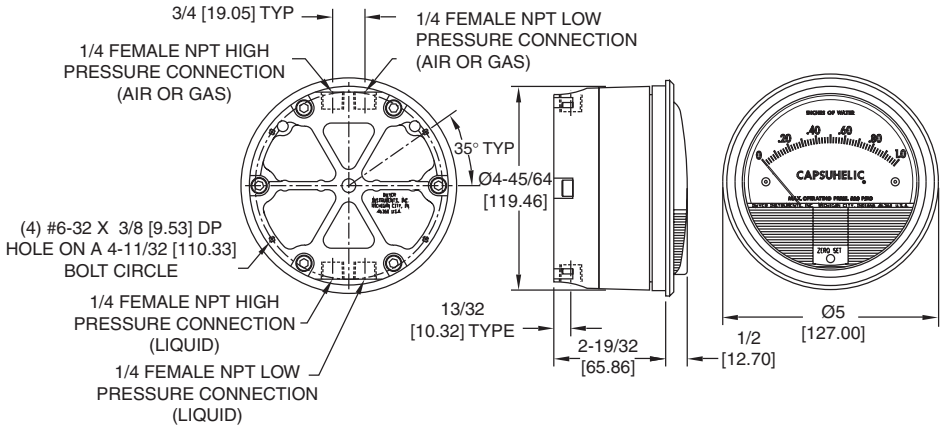




Stock Number	Pipe Size (in.)	Length (in.)	Comp. (in.)	Ext. (in.)	Lat. (in.)	Weight (lbs.)
FJ-200	2	6	1	1/2	1/2	9
FJ-250	2 1/2	6	1	1/2	1/2	10
FJ-300	3	6	1	1/2	1/4	11
FJ-400S	4	7	1	1/2	1/4	14
FJ-500S	5	8	1 1/4	1/2	1/4	21
FJ-600S	6	8	1 1/4	1/2	1/4	24
FJ-800S	8	8	1 1/4	1/2	1/4	47
FJ-1000S	10	8	1 1/2	3/4	1/4	61
FJ-1200S	12	9	1 1/2	3/4	1/4	87
FJ-1400S	14	9	1 1/2	3/4	1/4	101

Series 4000 Capsuhelic® Differential Pressure Gage

Specifications - Installation and Operating Instructions



CAUTION: Use of a line filter (Dwyer model A-391 or equivalent) is recommended to prevent entry of liquid borne particles into gage. Dwyer Instruments cannot assume responsibility for failure of gages due to clogging of internal passages.

NOTE: DO NOT use with hydrogen gas. Toxic and/or explosive gas may form due to reaction with rare earth magnet.

CAPSUHELIC® INSTALLATION

1. Select a location free from excessive vibration and where the ambient temperature will not exceed 200°F. Sensing lines may be run any necessary distance. For example, 250 foot lines will not affect accuracy but will damp the reading slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult factory for means of providing additional damping.

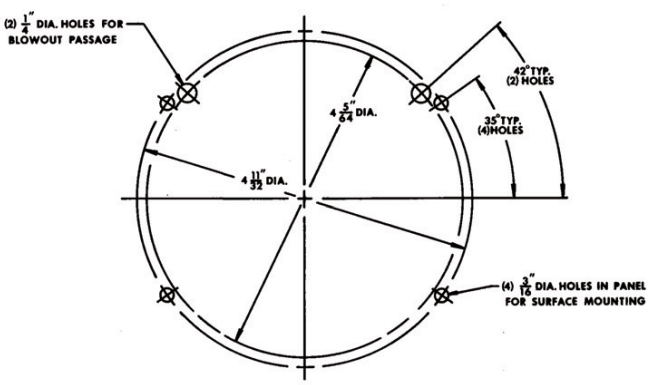
2. All standard models are calibrated for use with the diaphragm and scale in a vertical position. Special factory calibration is necessary for operation in an inclined or horizontal position. The exceptions are ranges under 5 in. w.c., (or metric equivalents) which can only be calibrated for vertical operation.

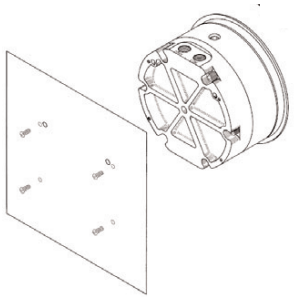
SPECIFICATIONS

Service: Aluminum Case: Air and compatible gases and oil based liquids. Brass Case: Air and compatible gases and water based liquids.
Wetted Materials: Consult factory.
Housing: Die cast aluminum with impregnated hard coating, standard. Optional forged brass housing is required for water or water based fluids. Special material diaphragms available, contact factory.
Accuracy: ±3% of full scale at 70°F (21.1°C). (±2% on 4000S models, ±4% on 4200, 4210, 4215, 4220, 4300, 4400, and 4500).
Pressure Limits: -20˝ Hg to 500 psig. (-0.677 bar to 34.4 bar).
Temperature Limits: 20 to 200°F. (-6.67 to 93.3°C).
Size: 4˝ (101.6 mm) diameter dial face.
Mounting Orientation: Diaphragm in vertical position. Consult factory for other position orientations.
Process Connections: 1/4˝ female NPT high and low pressure taps, duplicated -one pair top for air and gas, and one pair bottom for liquids.
Weight: 3 lb, 3 oz (1.45 kg) aluminum case; 7 lb, 13 oz (3.54 kg) brass case.
Standard Accessories: Two 1/4˝ NPT plugs for duplicate pressure taps, four flush mounting adapters with screws and four surface mounting screws.

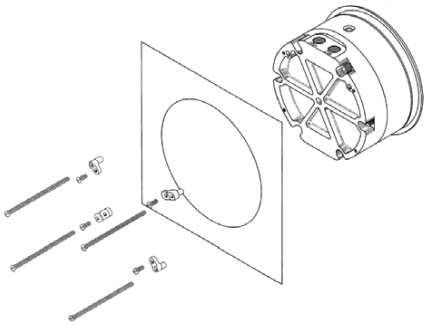
DWYER INSTRUMENTS, INC.
P.O. Box 373 • Michigan City, IN 46361, U.S.A.
Phone: 219/879-8000
Fax: 219/872-9057
www.dwyer-inst.com
e-mail: info@dwyer-inst.com

3. Surface Mounting





Locate 4 mounting holes, 35˚ from horizontal centerline on a 4-11/32˝ dia. circle. Use No. 6-32 machine screws of appropriate length. Be sure to drill 1/4˝ holes for blowout protection as shown in the diagram.



4. Flush Mounting

Provide a 4-13/16˝ dia. opening in panel. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with mounting lugs firmly secured in place.

5. To zero the gage after Installation

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

CAUTION

Note location of blowout or vent holes in the surface mounting diagram. Do not block these holes as their function is to vent overpressure failure out the back of the gage rather than blowing off the front cover.

Important Notes:

Two pairs of high and low pressure taps are provided, one pair on the top and a duplicate pair on the bottom. These fittings may be utilized according to the type of service for which the gage will be used. For gas or vapor service the gage should be connected from the pressure source to the top pressure fittings so that any accumulation of condensate may be drained or bled out the bottom fittings. For liquid service the pressure source should bee connected to the bottom taps so that any trapped gas may be vented out the top fittings. Optional bleed fittings may be obtained to replace the standard 1/4 NPT plugs for installations requiring frequent draining or venting of the gage. Note that the unused pair of pressure taps must be plugged in order for the gage to operate. For straight pressure or vacuum applications where only one of a pair of high and low pressure taps are being utilized, the other tap must be open to atmosphere.

For portable use or temporary installation use 1/4 male NPT to male flare fitting and connect to pressure source with high pressure hose or tubing will flare nut connectors.
For permanent installation 1/4˝ OD copper or stainless steel tubing is recommended.

Proper installation of fittings and plugs is important. Sparingly apply pipe thread sealant to threads. Excessive amounts can fall into pressure passages and cause blockage. we recommend Loctite® 69-31 Hydraulic Sealant. Install using torque wrench. Tighten only to 20 ft/lbs. Overtightening can damage case.

CAPSUHELIC® MAINTENANCE

Note: Capsuhelic® differential pressure gages are high precision instruments assembled and calibrated in a modern factory. If trained instrument mechanics are not available, we recommend that any instruments requiring repair be returned to the factory.

1. No lubrication or periodic servicing is required. If the interior is protected from dust, dirt, corrosive gases and fluids, years of trouble free service may be expected.

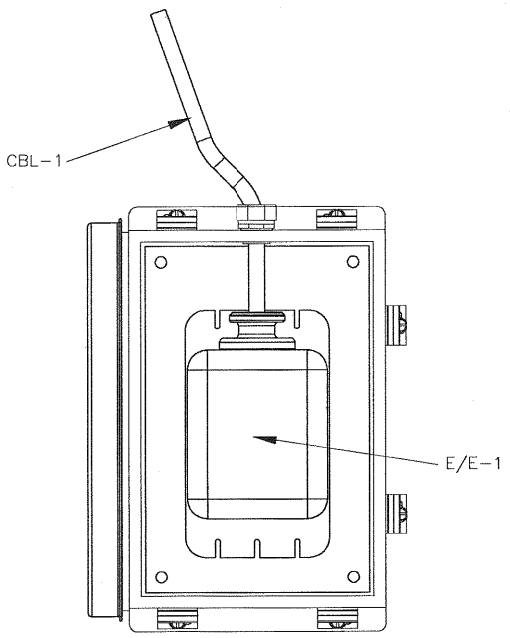
2. For service requiring a high degree of continued accuracy, periodic calibration checks are recommended. Send back to the factory for re-calibration.

Printed in U.S.A. 10/03 FR# 440306-00 Rev. 10

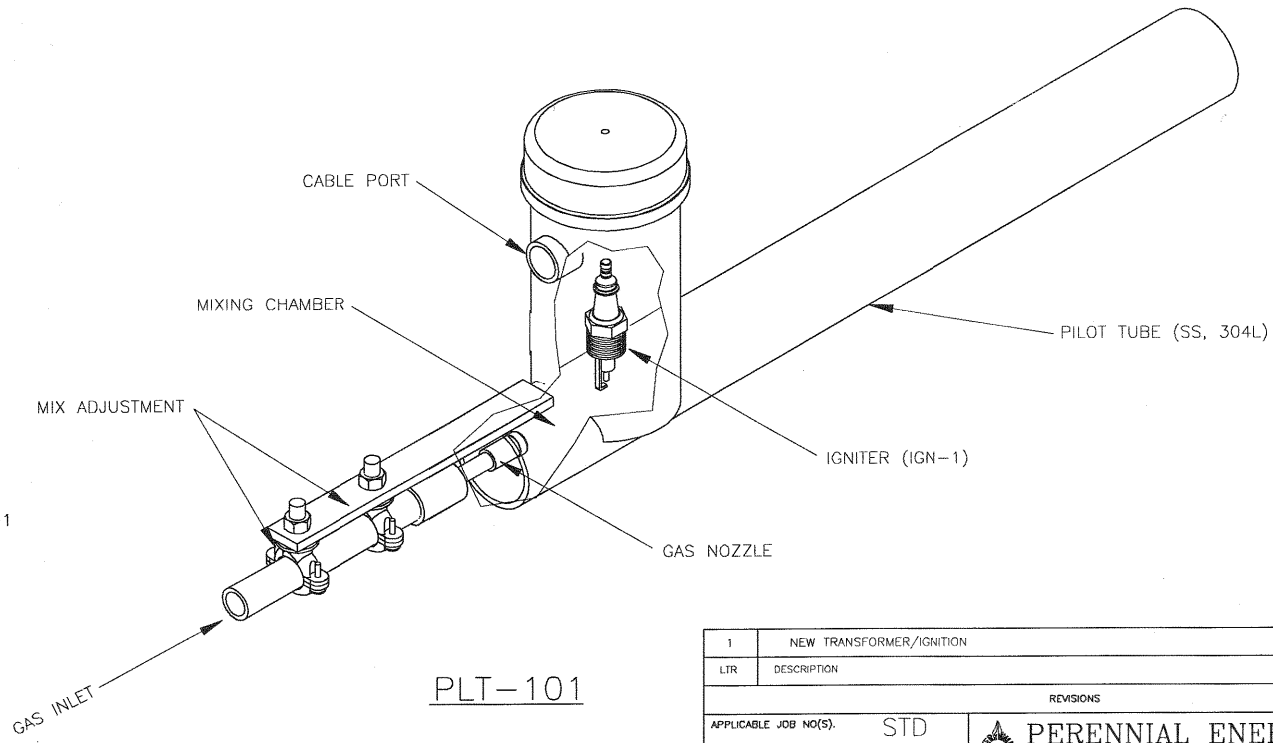
DWYER INSTRUMENTS, INC.
P.O. Box 373 • Michigan City, IN 46361, U.S.A.
Phone: 219/879-8000 **www.dwyer-inst.com**
Fax: 219/872-9057 **e-mail: info@dwyer-inst.com**

(XX) REFERENCED PARTS

PartID	Section	Drawing	RefDes	RD Qty	Unit Qty	Total Qty	Component	Mfg / Material / Type	Manufacturers Part # / Description
49	FLR-I	PP-032-0006	FLR-CBL-1	1 ea	20 ft	20 ft	Cable-Ignition	Mallory	8 mm
2029	FLR-I	PP-032-0006	FLR-E/E-1	1 ea	1 ea	1 ea	Transformer-Ignition	Dongan	A10-LA22, 120V 60HZ primary, 10,000V, 22 ma secondary, 250 VA
739	FLR-I	PP-032-0006	FLR-IGN-1	1 ea	1 ea	1 ea	Ignitor	Auburn	I-64-4



ITC-1



PLT-101

LTR	DESCRIPTION	DATE	APPROVED
1	NEW TRANSFORMER/IGNITION	11/19/01	

REVISIONS

APPLICABLE JOB NO(S). STD
STANDARD

PERENNIAL ENERGY, INC.
1280 CO RD 8690, WEST PLAINS, MO 65775 USA

ENGINEERING SIGNATURES

DESIGNED BY: T.LANDERS	DATE 5/31/00
DRAWN BY: T.CREECH/TPH	DATE 5/31/00

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
FRACT ±1/16 .XX ±.03 ANGLES ±0°30

MATERIAL: AS NOTED

TITLE: CSF PILOT & IGNITION ASSEMBLY-DONGAN

SIZE B 17x11 | DWG. NO. PP-032-0006

SCALE AS NOTED | FILE NO. PP-032-0006 R0 BW.DWG | SHEET 1 OF 1

TAYLOR CABLE PRODUCTS
301 HIGH GROVE ROAD
GRANDVIEW, MO 64030
816-765-5011
FAX 816-761-4023

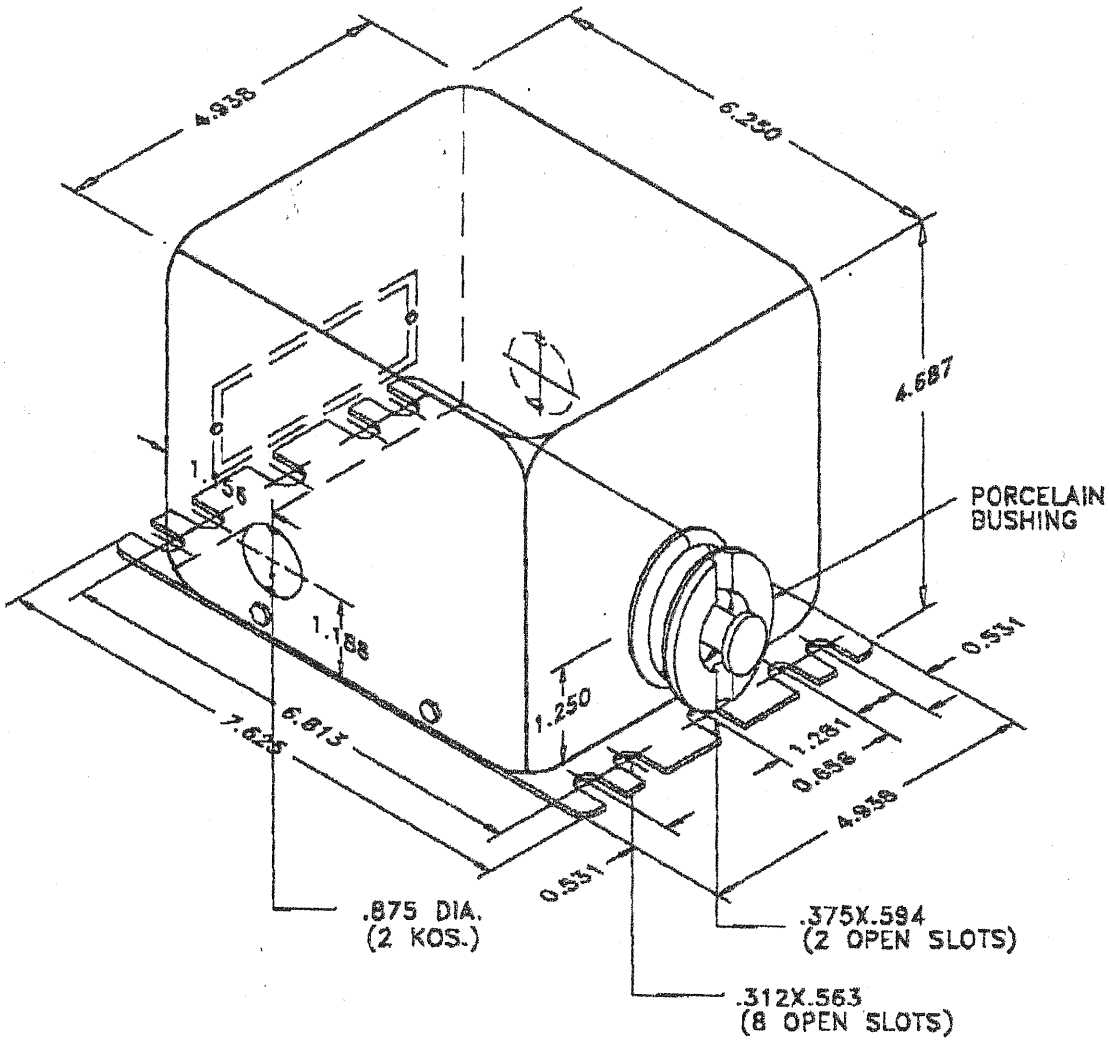
WIRE AND CABLE SPECIFICATION

PART NUMBER: 357 SERIES 8MM SILICONE IGNITION CABLE
DESCRIPTION:

CONDUCTOR: METALLIC CONDUCTOR CONSISTING OF 41 X 33 TCW 18AWG OHMS OF RESISTANCE, 0/25 OHMS PER FOOT.

JACKET: FIRST PASS IS A SILICONE DESIGNED TO MEET ELECTRICAL AND HEAT SPECIFICATIONS FOR IGNITION CABLE, WITH AN OUTSIDE DIAMETER OF .205 +/- .05. SECOND PASS ALSO DESIGNED TO MEET AUTOMOTIVE SPECIFICATIONS FOR ELECTRICAL AND HEAT RESISTANCE WITH AN OUTSIDE DIAMETER OF .315 +/- .05. SILICONE 350 VOLTS PER MILL.

BRAID: FIBERGLASS BRAIDING 8 PICKS PER INCH (APPROXIMATE).



ELECTRICAL SPECIFICATIONS

PRIMARY VOLTAGE: -- VOLTS
FREQUENCY: 60HZ.
SECONDARY: 10000V. AT 22MA. ONE END OF SECONDARY GROUND TO CORE AND CASE.
RATING: 250VA.
MAXIMUM AMBIENT TEMPERATURE: 120° F

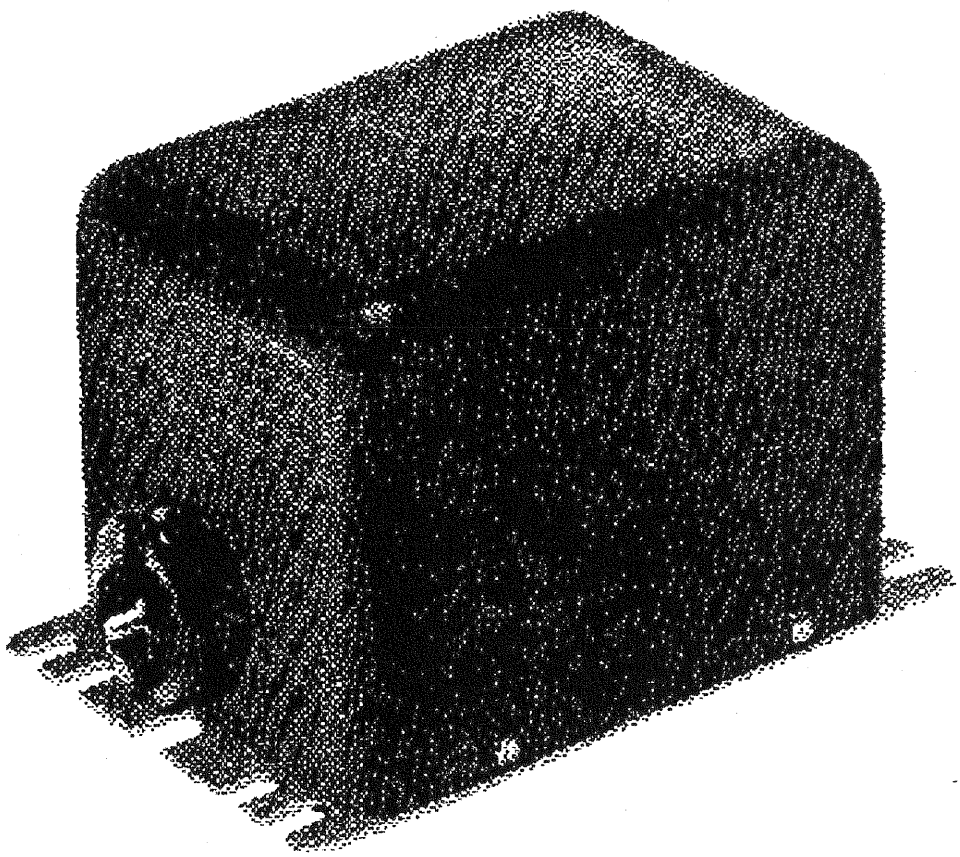
TABLE FOR PRIM. VOLTAGE

CAT. NOS	VOLTS
A10-LA22	120
C10-LA22	240

REV: C		TITLE: OUTLINE FOR 250VA. 1PH. 60HZ.
REV: B	SEC. WAS 2X5000V & ADD. CHART MJ 1-19-01	IGNITION TRANSFORMER
REV: A	DRAWN ON AUTO CAD MJ. 4-7-97	
DONGAN ELECTRIC MFG. CO. PIONEER TRANSFORMER CO.	TOLERANCES DECIMAL DIMENSIONS ±.030 FRACTIONAL DIMENSIONS ±1/32 SCALE: 3D	MADE BY: M.JAFRI; DATE: 6-7-95; CHECKED & APPROVED: PART NUMBER: A10-LA22 C10-LA22; DRAWING NUMBER: 10-623

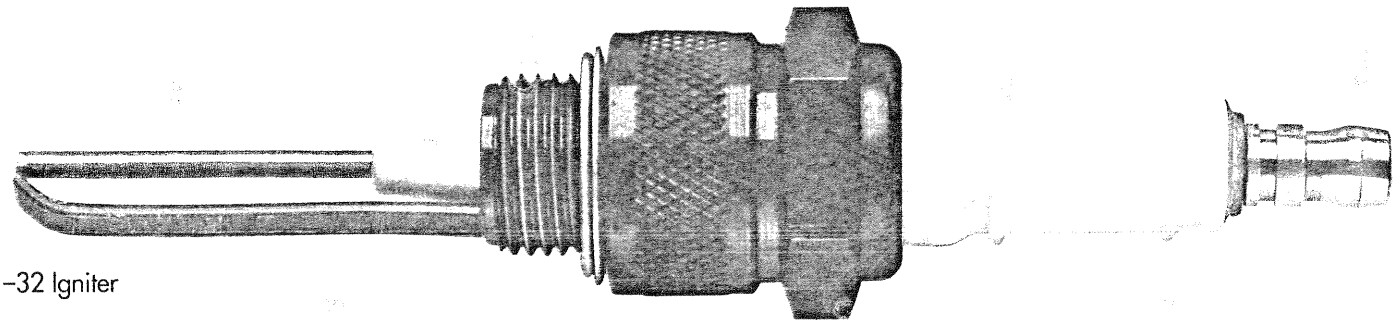
A10-LA22 *120 V Pri 60 Hz*

Sec. 10,000 22 ma 250 va

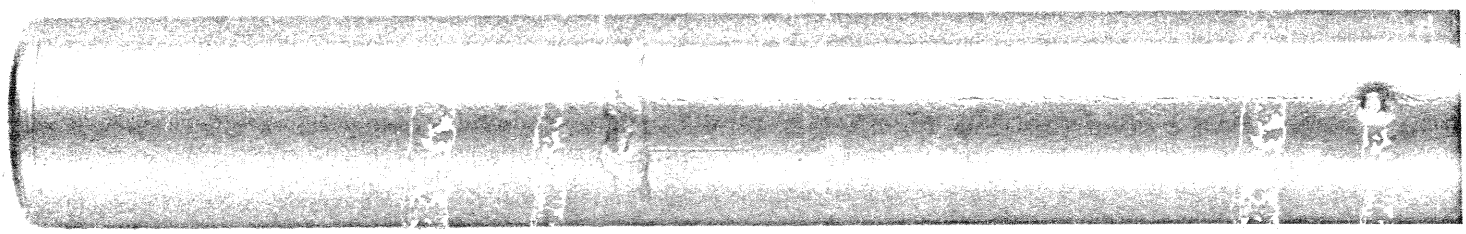


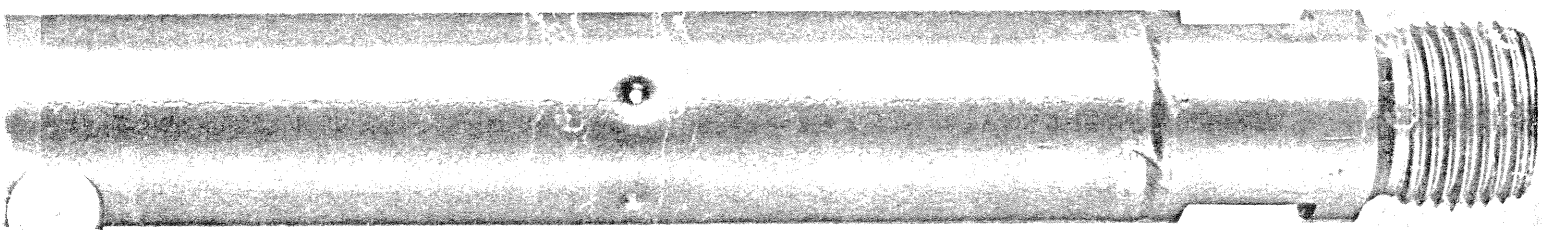
89 York Street, Auburn, New York 13021
(315) 252-9501
(315) 252-8172 FAX

Igniters and Flame Rods



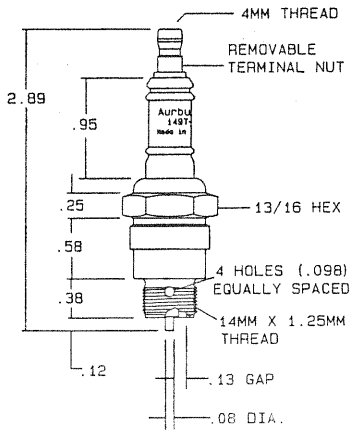
I-32 Igniter



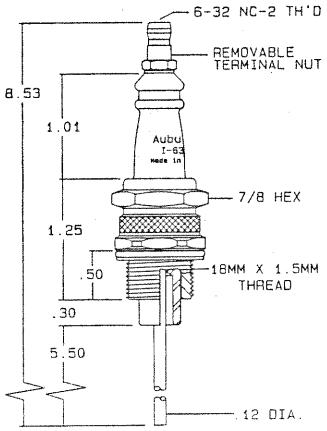


HE-65 Rod Type High Energy Igniter

Igniters

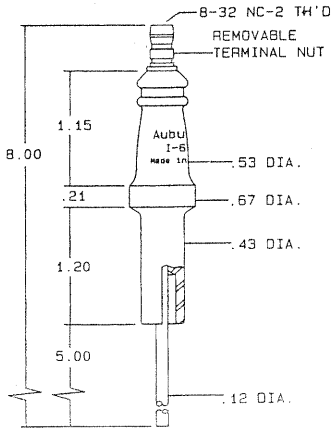


149T-1/(.090)



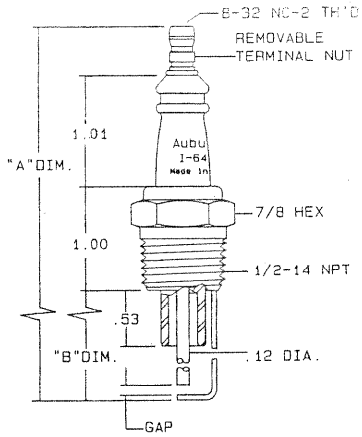
I-63

*Standard–Other Lengths Available Upon Request



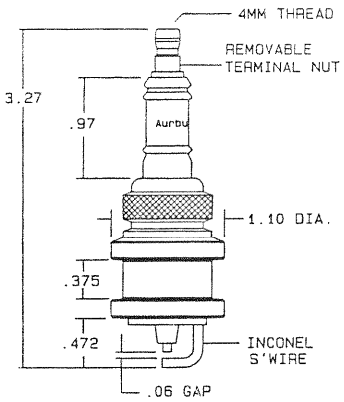
I-6 Insulator Assembly

*Standard–Other Lengths Available Upon Request

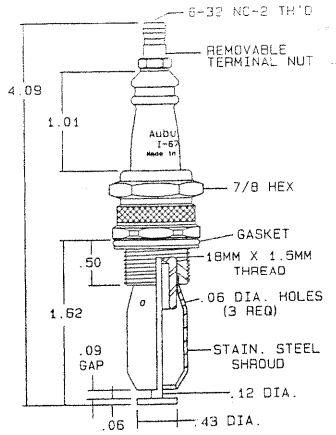


CAT. NO.	"A" DIM.	"B" DIM.	ELEC. MAT.	GAP
I-64-1	4.20	1.72	NI	.090
I-64-3	6.24	3.75	NI	.090

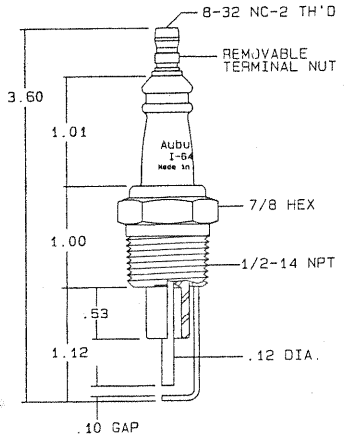
I-64 Series



I-82

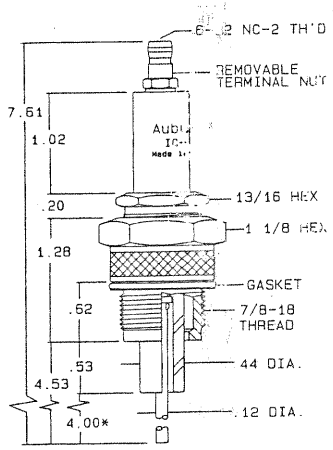


I-67



I-64-4

UL Recognized



IC-9

*Standard–Other Lengths Available Upon Request

Instruction Manual
Form 5782

Type R622

March 2004

Type R622 Pressure Reducing Regulator

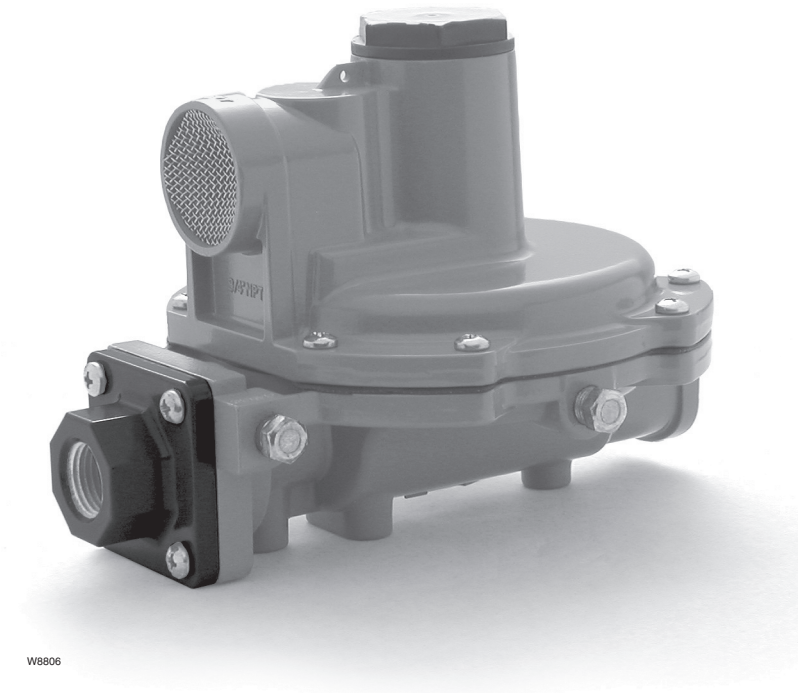


Figure 1. *Type R622 Regulator*

Introduction

Scope of Manual

This installation manual covers the installation, startup, adjustment, and maintenance procedures for the Type R622 pressure reducing regulator.

Product Description

Type R622 direct-operated, spring-loaded regulators provide economical pressure reducing control in a variety of residential, commercial, and industrial applications. These regulators can be used with natural, manufactured, or liquefied petroleum gases and have the same inlet and outlet pressure capabilities.

In addition, Type R622 regulators have internal relief across the diaphragm to help minimize overpressure. Any outlet pressure above the start-to-discharge point of the nonadjustable relief valve spring moves the diaphragm off the relief valve seat, allowing excess pressure to bleed out through the screened spring case vent.

Specifications

The Specifications section lists operating conditions and other specifications of the Type R622 regulator. Information specific to a regulator's construction is stamped on the nameplate.

D103093X012

Specifications

Body Size and End Connection Style(1)
1/2-inch (DN 15) inlet and outlet NPT

Maximum Allowable Inlet Pressure(1)
Operating: 125 psig (8,62 bar)
Emergency: 125 psig (8,62 bar)
Except 1.8 to 2.2-inches w.c. (4 to 5 mbar) spring range which has operating and emergency pressures of 60 psig (4,14 bar)

Maximum Allowable Outlet (Casing) Pressure(1)
Operating to Avoid Internal Part Damage:
3 psid (0,21 bar d) above outlet pressure setting
Emergency: 20 psi (1,38 bar)

Outlet Pressure Ranges
See table 1

Pressure Registration
Internal

Orifice Sizes and Flow Coefficients
1/8-inch (3,18 mm) orifice
Wide-Open C_g for relief sizing = 12.5

Internal Relief Performance
Start to Discharge is 8 to 22-inches w.c. (20 to 55 mbar) for setpoints from 1.8 to 20-inches w.c. (4 to 48 mbar)
Start to Discharge is 140 to 200% over setpoint from 20-inches w.c. to 2.2 psig (48 to 152 mbar)

Spring Case Vent Connections
3/4-inch NPT with removable screen

Maximum Temperature Capabilities(1)
–20° to 160°F (–29° to 71°C)

Approximate Weight
2.35 pounds (1,1 kg)

1. The pressure/temperature limits in this instruction manual or any applicable standard limitation should not be exceeded.

Table 1. Outlet Pressure Ranges

REGULATOR TYPE NUMBER	OUTLET PRESSURE RANGE	CONTROL SPRING PART NUMBER	CONTROL SPRING COLOR CODE
R622	1.8 to 2.2-inches w.c. (4 to 5 mbar)	T14453T0012	Purple
	5 to 7-inches w.c. (12 to 17 mbar)	T14398T0012	Orange
	6.5 to 9-inches w.c. (16 to 22 mbar)	T14399T0012	Yellow
	9 to 13-inches w.c. (22 to 32 mbar)	T14400T0012	Silver
	13 to 20-inches w.c. (32 to 48 mbar)	T14401T0012	Gray
	16 to 35-inches w.c. (40 to 87 mbar)	T14402T0012	Pink
	1 to 2.2 psig (69 to 152 mbar)	T14403T0012	Light Blue

WARNING

Fisher regulators must be installed, operated, and maintained in accordance with federal, state, and local codes, rules and regulations, and Fisher instructions.

If the regulator vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Call a gas serviceman to service the unit. Only a qualified person must install or service the regulator.

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

Principle of Operation

Refer to figure 2. When downstream demand decreases, the pressure under the diaphragm increases. This pressure ovrecomes the regulator setting (which is set by a spring). Through the action of the pusher post assembly, the valve disk moves closer to the orifice and reduces gas flow. If demand downstream increases, pressure under the diaphragm decreases. Spring force pushes the pusher post assembly downward and the valve disk moves away from the orifice. Type R622 regulators include an internal relief valve for overpressure protection.

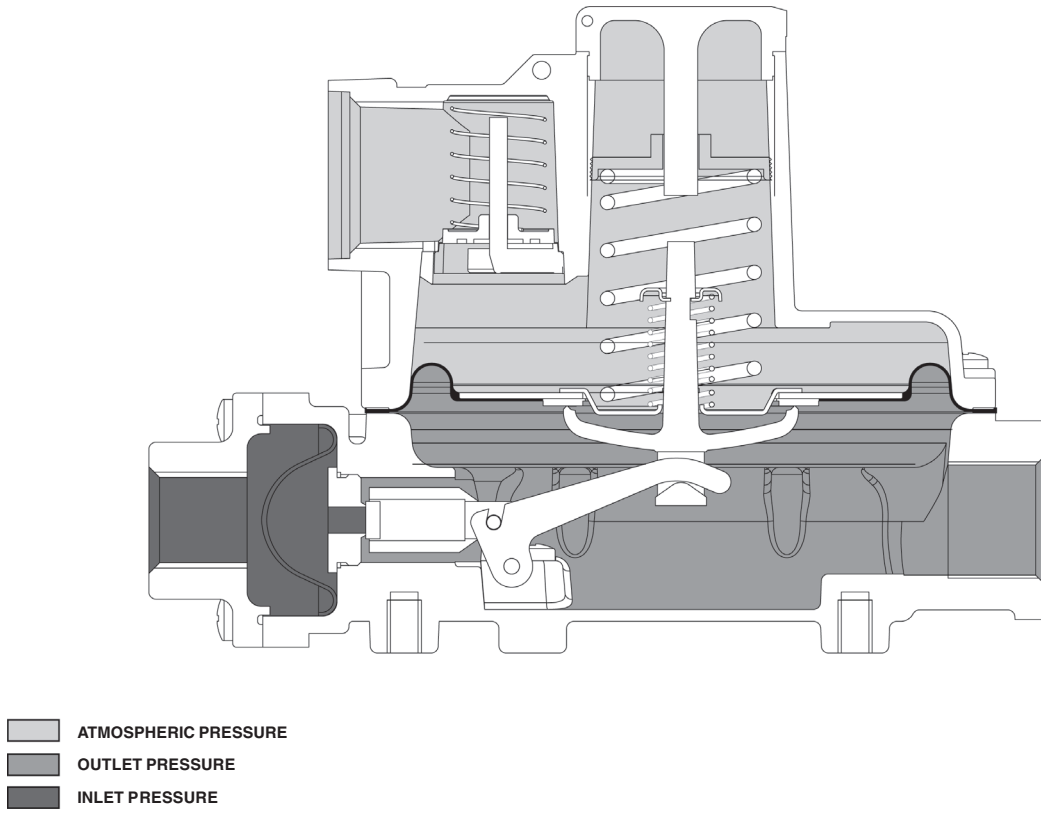


Figure 2. *Type R622 Regulator Construction Features*

Installation

WARNING

Personal injury, equipment damage, or leakage due to escaping gas or bursting of pressure-containing parts might result if these regulators are overpressured or installed where service conditions could exceed the limits for which the regulators were designed, or where conditions exceed any ratings of the adjacent piping or piping connections. To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by the appropriate code, regulation or standard) to prevent service conditions from exceeding those limits.

Additionally, physical damage to a regulator could cause personal injury and property damage due to escaping gas. To avoid such injury and damage, install the regulator in a safe location.

A regulator may vent some gas to the atmosphere in hazardous or flammable gas service, vented gas might accumulate and cause personal injury, death or property damage due to fire or explosion. Vent a regulator in hazardous gas service to a remote, safe location away from air intakes or any hazardous location. The vent line must be protected against condensation or clogging.

Before installing the regulator, check for damage which might have occurred in shipment. Also check for dirt or foreign matter which may have accumulated in the regulator body or in the pipeline. Apply pipe compound to the male threads of the pipeline and install the regulator so that the flow is in the direction of the arrow cast on the side of the body. The diaphragm actuator assembly can be rotated to any position relative to the body, in 90° increments. ***Remove the two machine screws (key 3) that hold the body to the actuator in order to rotate the diaphragm actuator assembly.***

Do not install the regulator in a location where there can be excessive water accumulation, such as directly beneath a downspout or in an undrained pit.

To obtain the maximum flow capacities or other performance characteristics, the length of pipe from the regulator outlet to the meter—or for the first 18-inches (457 mm), whichever is closer—should have no bends and should be the same size as the regulator outlet. Replace the regulator if water gets into the spring case or the lower casing of the regulator.

Type R622 regulators have a spring case vent (3/4-inch NPT female) which is screened to prevent insects or foreign material from entering.

CAUTION

You are advised to use new vent piping because defective threads on the relief vent piping may interfere with the venting assembly if the piping obstructs the movement of the vent flapper.

On indoor installations, the vent should be piped outside the building, see figure 3. Remove the screen from the regulator vent connection and connect vent piping from that connection to the outdoors. Vent piping should be as large in diameter as practical, be as short as possible, and have a minimum number of bends and elbows. Install a weather and insect resistant vent assembly on the outside end of the pipe, such as a Fisher Type Y602. The same installation precautions apply to vent assemblies as the integral regulator vents described previously.

A program of regular inspection of the vent opening should be established to see that it has not become plugged by foreign material. On some installations, such as in areas of heavy snowfall, it may be necessary to install the regulator beneath a protective hood. If other protection is provided from the elements, the vent should be pointing or sloping down sufficiently to allow any condensate to drain. Also check the regulator periodically for external or internal corrosion.

Overpressure Protection

WARNING

Some type of overpressure protection is needed if actual inlet pressure can exceed the outlet pressure rating. Overpressuring any portion of this equipment above the limits given in the Specification section and table 1 may cause damage to regulator parts, leaks in the regulator, or personal injury due to bursting of pressure-containing parts or explosion of accumulated gas.

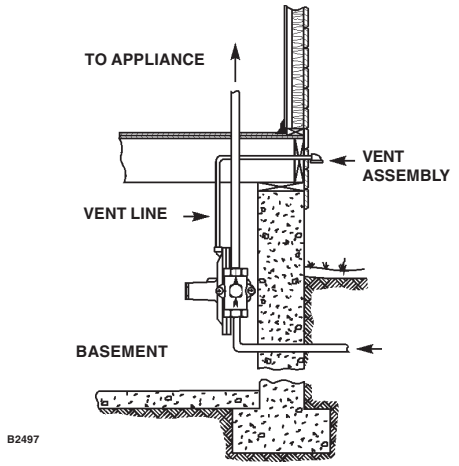


Figure 3. Typical Vent Line Installation

Type R622 regulators provide internal relief that limits the total outlet pressure buildup over setpoint. This internal relief may be adequate for the application, if not, provide additional pressure relief or a pressure-limiting device downstream. Regulators should be inspected for damage after any overpressure condition.

WARNING

To avoid personal injury or property damage due to explosion or damage to regulator or downstream components during startup, release downstream pressure to prevent an overpressure condition on the diaphragm of the regulator.

In order to avoid an overpressure condition and possible equipment damage, pressure gauges should always be used to monitor pressures during startup.

Startup

1. Check to see that all appliances are turned off.
2. Slowly open the upstream shutoff valve.
3. Slowly open the downstream shutoff valve
4. Check all connections for leaks.
5. Make final control spring adjustments according to the adjustment procedures.
6. Light the appliance pilots.

Adjustment

To increase the outlet pressure setting of the regulator, the adjusting screw (key 23, figure 5) must be turned clockwise. This requires removal of the closing cap (key 31, figure 5). To reduce the outlet pressure setting, turn the adjusting screw counterclockwise. A pressure gauge should always be used to monitor downstream pressure while adjustments are being made. Do not adjust the spring to produce an outlet pressure setting above the limit identified on the information label. If the required pressure setting is not within the range of the spring being used, substitute with the correct spring, see table 1. When changing the spring, also change the range identified on the information label to indicate the actual pressure range of the spring in use. After the spring adjustment has been completed, replace the closing cap.

Shutdown

WARNING

To avoid personal injury or property damage due to explosion or damage to regulator or downstream components during shutdown, release downstream pressure to prevent an overpressure condition on the regulator diaphragm.

Installation arrangements may vary, but in any installation it is important that the valves be opened or closed slowly. These steps apply to the typical installation.

1. Slowly close the downstream shutoff valve.
2. Slowly close the upstream shutoff valve.
3. Open vent valves downstream of the regulator.
4. Open vent valves upstream of the regulator.

Maintenance

WARNING

Avoid personal injury or damage to property from sudden release of pressure or uncontrolled gas or other process fluid. Before starting to disassemble, isolate the regulator from all pressure and cautiously release trapped pressure from the regulator. Use gauges to monitor inlet, loading and outlet pressures while releasing these pressures.

These procedures are for gaining access to the diaphragm, valve disk and orifice. All pressure must be released from the diaphragm actuator assembly before the following steps can be performed.

While using the following procedures, refer to figure 5 for key number locations.

Diaphragm and Disk Replacement

1. Remove the closing cap (key 31) and adjusting screw (key 23).
2. Remove the spring case machine screws (key 4) out of the spring case (key 25), and remove the spring case and control spring (key 22).
3. Lift the diaphragm assembly slightly, and slide it away from the lever (key 27), so that the pusher post (key 18) releases the lever.
4. Remove the diaphragm assembly (key 17). Examine the diaphragm assembly, replace if necessary.
5. Reassemble in the reverse order of the above procedures. Place the diaphragm assembly into position in the body (key 1), being sure the pusher post is properly hooked on the lever (key 27). Rotate the diaphragm so that the diaphragm and lower casing holes align. Check the diaphragm for proper orientation. Tighten the spring case machine screws (key 4) to 15 to 30 inch-pounds (1,7 to 3,9 N•m).
6. To remove the disk follow steps 1 through 4.
7. Remove screws (key 4).
8. Remove lever (key 27)
9. Remove stem assembly (key 28)
10. Remove disk (key 33) from stem assembly (key 28). Examine the disk. If it is nicked, cut, or otherwise damaged, the disk should be replaced.
11. Put together in reverse order.

Inlet Screen and Orifice Replacement

1. Remove the regulator from line.
2. Remove macnine screws (key 4).
3. Remove inlet O-ring (key 5). Lubricate a new inlet O-ring and place on inlet fitting (key 3).

4. Remove inlet screen (key 13). Clean and/or replace the inlet screen, if necessary.

5. Install the inlet screen (key 13) and inlet fitting (key 3). Then install and tighten the machine screws (key 4) to 15 to 30 inch-pounds-force (1.95 to 3.98 N•m).

6. To replace the orifice, follow steps 1 through 4, and then remove orifice (key 24) from body. Examine the seating edge of the orifice. If it is nicked or rough, it should be replaced. Treat the male threads of the new orifice with lubricant before reassembling, tightening to 15 to 20 inch-pounds (1.95 to 2.6 N•m) of torque.

7. Install the inlet screen (key 13) and inlet fitting (key 3). Then install and tighten the machine screws (key 14) to 15 to 30 inch-pounds-force (1.95 to 3.98 N•m).

Parts Ordering

The type number, orifice size, spring range, and date of manufacture are located on the spring case. Always provide this information in any correspondence with your Fisher Sales Representative regarding replacement parts or technical assistance. If construction changes are made in the field, be sure that the information label is also changed to reflect the most recent construction.

Parts List

Key	Description	Part Number
1	Body	T80567T0GY2
2	Pipe Plug (2 required)	1D8293T0022
3	Inlet Fitting	T21176T0BK2
4	Machine Screw (12 required)	T13526T0012
5	O-Ring	T14431T0012
13	Inlet Screen	T14436T0012
16	Relief Spring	T13612T0012
17	Diaphragm	T21163T0012
18	Pusher Post	T40653T0012
19	Lower Spring Seat	T14396T0012
20	Relief Spring Retainer	T13613T0012
22	Spring	
	1.8 to 2.2-inches w.c.	T14453T0012
	5 to 7-inches w.c.	T14398T0012
	6.5 to 9-inches w.c.	T14399T0012
	9 to 13-inches w.c.	T14400T0012
	13 to 20-inches w.c.	T14401T0012
	16 to 35-inches w.c.	T14402T0012
	1 to 2.2 psig	T14403T0012
23	Adjusting Screw	
	For use with inches w.c. springs	T21186T0012
	For use with psig spring	T21202T0012
24	Orifice	T21126T0012
25	Spring Case Assembly	T40655T0022
26	Vent Screen	T1121338982
27	Lever	T21197T0012
28	Stem Assembly	T14452T0012
29	Pin Lever	T14397T0012
30	Machine Screw (2 required)	1E175828982
31	Closing Cap	T21187T0012
33	Disk	T14437T0012
38	O-Ring	T14422T0012
41	Information Label	GE00563T012

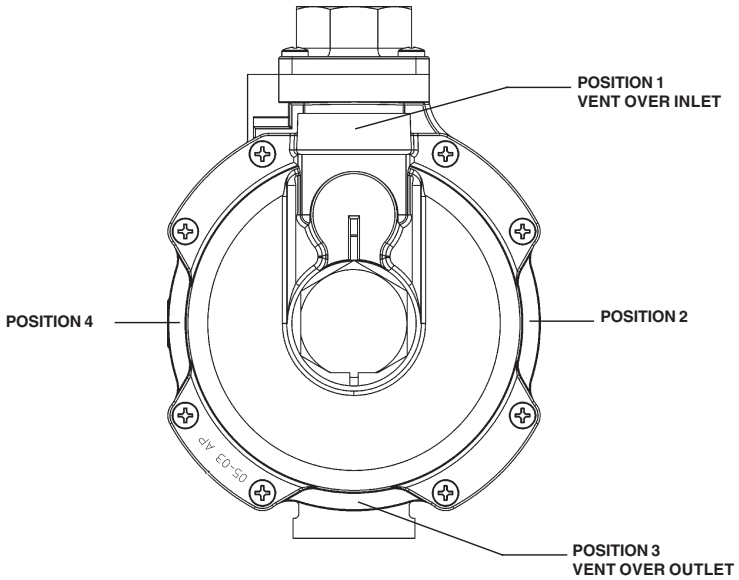


Figure 4. Vent Location

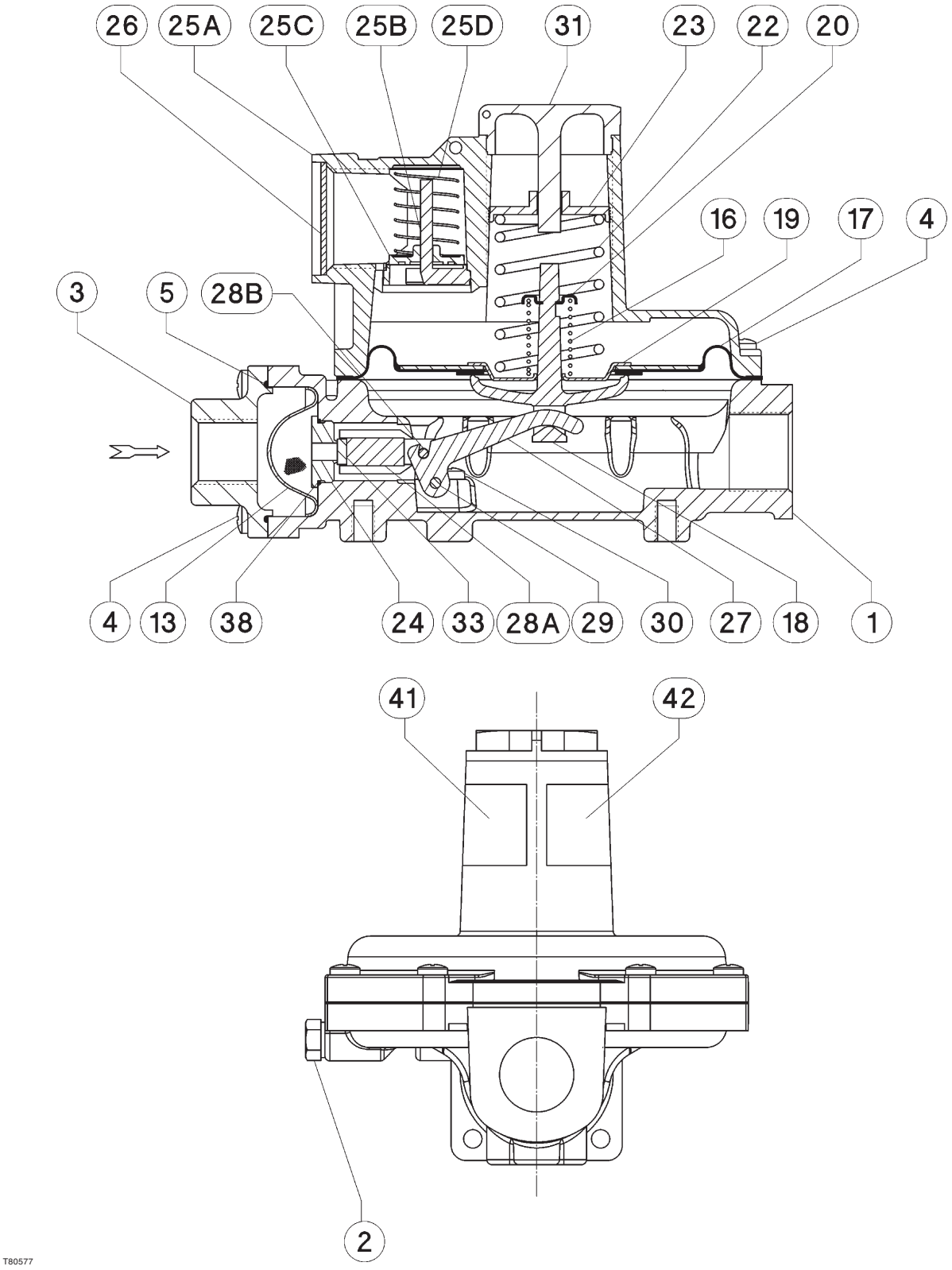


Figure 5. Type R622 Regulator Assembly

For information, contact Fisher:
Marshalltown, Iowa 50158 USA
McKinney, Texas 75070 USA
28320 Gallardon, France
40013 Castel Maggiore (BO), Italy
Sao Paulo 05424 Brazil
Singapore 128461

FISHER®

Quality in Every Degree®

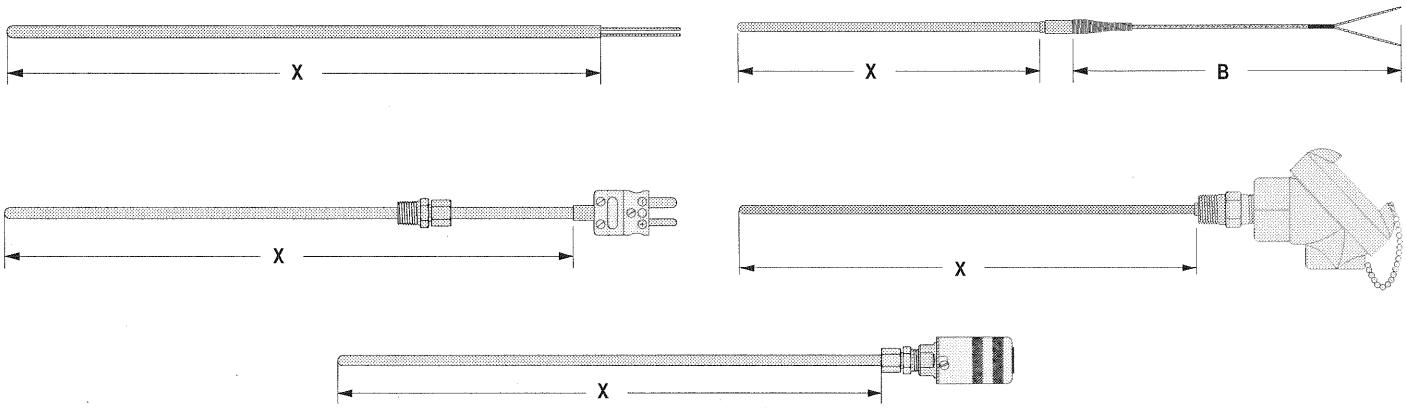
TEMPERATURE SENSORS

5211 Industrial Road, Fort Wayne, IN 46825-5152 USA
Tel: (260) 484-2580 Fax: (800) 837-6805 or (260) 482-6805
www.pyromation.com

NVLAP®
NVLAP LAB CODE 200502-0

ISO 9001 REGISTERED FIRM

A Pyromation MgO thermocouple assembly consists of a thermocouple element swaged in hard-packed standard purity (96%) Magnesium Oxide mineral insulation and encased in a metal sheath. Thermocouple sheaths have been fully annealed; they can be formed into many configurations, and can be bent into a radius of twice the size of its outer sheath. The tables found on this page and the following pages allow customer selection of standard ANSI thermocouple types, sheath diameters, mounting fittings and terminations. Custom built specials are available upon request.



EXAMPLE ORDER NUMBER:

1-1	1-2	1-3	1-4	1-4A		1-5	
K	4	8	G	M	-	006	-

For Optional Sheath Mounting Fittings See Page MgO - 2

1-1

THERMOCOUPLE TYPES	
ORDER CODE	
SINGLE	DUPLEX
E	E E
J	J J
K	K K
T	T T
N	N N

1-2

SHEATH DIAMETERS	
ORDER CODE	DESCRIPTION
1	1/16" (.063)
2	1/8" (.125)
3	3/16" (.188)
4	1/4" (.250)
6	3/8" (.375)

1-3

SHEATH MATERIALS		
ORDER CODE	MATERIAL	STANDARD AVAILABLE TYPES
3	Inconel 600	J, K, N
4	310 Stainless steel	K
5	446 Stainless steel	K *
8	316 Stainless steel	E, J, K, T
9	304 Stainless steel	E, J, K, T

** All sensors with 446SS sheaths must have an ungrounded measuring junction*

1-5

'X' DIMENSION
Insert three digit sheath length **(X Dimension)** in inches
Sheath lengths over 98" will be shipped in a coiled configuration unless otherwise specified

1-4A

SPECIAL OPTIONS	
ORDER CODE	DESCRIPTION
M	Special limits of error
H	High purity MgO insulation (99.6% pure)
Use this table only if options are desired	

1-4

MEASURING JUNCTIONS	
ORDER CODE	DESCRIPTION
G	Grounded junction
U	Ungrounded junction
E	Exposed junction

1-2A REDUCED TIP MgO THERMOCOUPLES

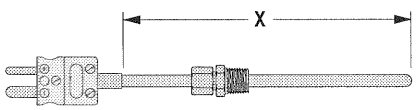
ORDER CODE	Nominal Sheath Dia.	Tip Dia.	Tip Length	Material
68R48	3/8" OD	1/4" OD	1 1/4"	316 SS
68R38	3/8" OD	3/16" OD	1 1/4"	316 SS
68R28	3/8" OD	1/8" OD	1 1/4"	316 SS
48R38	1/4" OD	3/16" OD	1 1/4"	316 SS
48R28	1/4" OD	1/8" OD	1 1/4"	316 SS

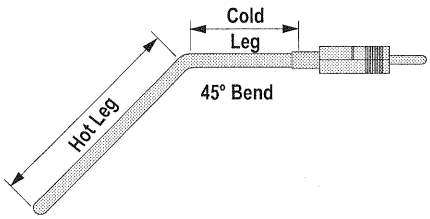
Table 1-2A lists thermocouple elements with reduced tip sheaths. To order, use order code numbers from Tbl. 1-2A in place of straight sheath order code numbers from Tbl. 1-2 and 1-3. Other reduced tips available upon request. Example: J48R38G

Pyromation® INC.
Phone (260) 484-2580 • FAX (800) 837-6805

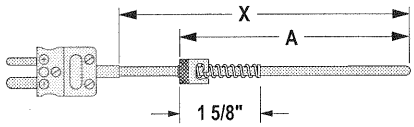
Select Sheath Mounting or Bend Options as desired from tables below.

COMPRESSION FITTING

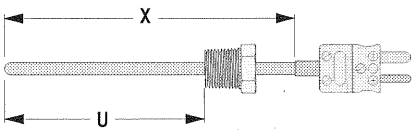




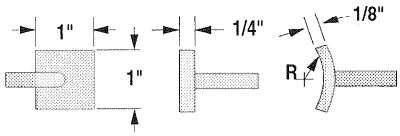
BAYONET CAP and SPRING (OPTION 13A)



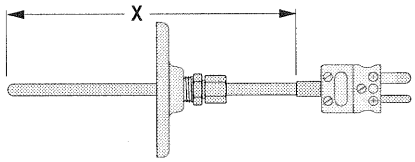
FIXED BUSHING



WELD PADS



ADJUSTABLE FLANGE (OPTION 14)



EXAMPLE ORDER NUMBER: J48GM - 012 - **01A, 306**[2] - PAGE MgO 3 - PAGE MgO 4 - PAGE MgO 5

2-1

NO FITTING or BEND OPTIONS	
ORDER CODE	00

2-2

RE-ADJUSTABLE COMPRESSION FITTINGS			
ORDER CODE	TYPE	NPT SIZE	AVAILABLE SHEATH DIAMETERS (In Inches)
10A	Stainless steel	1/8"	1/16, 1/8, 3/16, 1/4
10B	Stainless steel	1/4"	1/4, 3/8
10C	Stainless steel	1/2"	3/16, 1/4
11A	Brass	1/8"	1/16, 1/8, 3/16, 1/4
11B	Brass	1/4"	1/8, 3/16, 1/4, 3/8
11C	Brass	1/2"	1/4, 3/8
19C	Spring loaded SS well fitting	1/2"	3/16, 1/4

*Teflon gland standard (400° max.) For lava gland (1200° max) opt. **10A** and **10B** only use letter suffix **"L"** after compression fitting order code. **EX: 10AL for lava gland***

2-3

ONE-TIME ADJUSTABLE COMPRESSION FITTINGS			
ORDER CODE	TYPE	NPT SIZE	AVAILABLE SHEATH DIAMETERS (In Inches)
01A	Stainless steel	1/8"	1/16, 1/8, 3/16, 1/4
01B	Stainless steel	1/4"	1/8, 3/16, 1/4, 3/8
01C	Stainless steel	1/2"	1/8, 1/4, 3/8
15A	Brass	1/8"	1/8, 3/16, 1/4
15B	Brass	1/4"	3/16, 1/4, 3/8
15C	Brass	1/2"	1/4, 3/8

2-4

SHEATH BENDS	
ORDER CODE	DESCRIPTION
2 _ _	Sheath bent 45 degrees
3 _ _	Sheath bent 90 degrees

*When ordering bend options, specify hot leg dim. **"U". Ex :order code 206 is a 45° bend with 6" hot leg.** Total sheath length is Table 1 **"X"** length = hot leg **plus** cold leg*

2-7

MISCELLANEOUS OPTIONS		
ORDER CODE	DESCRIPTION	AVAILABLE SHEATH DIAMETERS (In Inches)
13A_ _*	Spring loaded bayonet fitting	1/8, 3/16
14	Adjustable flange with brass compression fitting	1/8, 3/16, 1/4, 3/8
16A	Compression fitting with bayonet cap and spring	1/8 (2 5/8" min. 'A' dim.)

** When ordering fixed bayonet fitting specify hot leg dimension **"A". EX: order code 13A06 is for a fixed bayonet adapter with 6" hot leg.** Total sheath length is Table 1 **"X"** length = hot leg **plus** cold leg.*

2-6

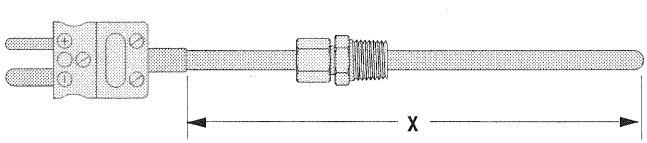
FIXED BUSHINGS		
ORDER CODE 316 SS	MOUNTING THREAD	AVAILABLE SHEATH DIAMETERS (In Inches)
8A _ _*	1/8" NPT	1/16, 1/8, 3/16, 1/4
8B _ _	1/4" NPT	1/16, 1/8, 3/16, 1/4, 3/8
8C _ _	1/2" NPT	1/8, 3/16, 1/4, 3/8
8D _ _	3/4" NPT	1/8, 3/16, 1/4, 3/8

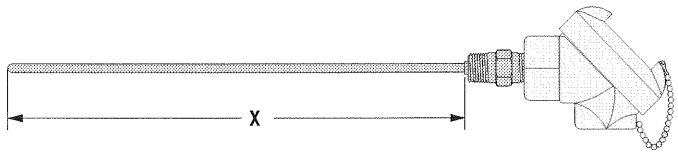
** When ordering fixed bushings, specify order code above plus insertion length **"U"**, as measured from hot tip to bottom of threaded bushing. **EX: order code 8A06 is 1/8" NPT, 316 SS bushing located 6" from hot tip.***

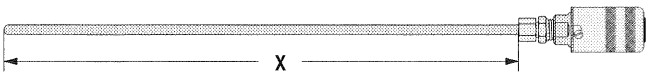
2-5

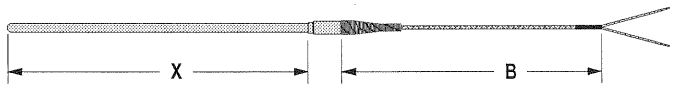
WELD PADS	
ORDER CODE	DESCRIPTION
17	304 SS weld pad 1" x 1" x 1/4" thick perpendicular mount
18	304 SS weld pad 1" x 1" x 1/4" thick horizontal mount
17R	304 SS weld pad 1" x 1" x 1/8" thick perpendicular mount with radius bend (specify radius)
18R	304 SS weld pad 1" x 1" x 1/8" thick horizontal mount with radius bend (specify radius)

Pyromation® INC.
Phone (260) 484-2580 • FAX (800) 837-6805









EXAMPLE ORDER NUMBERS: K48GM - 012 - 01A - **6HN** (3-1) **31** (3-2) OR K48GM - 012 - 15C - **16** (3-1)

3-1 HEAD MOUNTING FITTINGS FOR STANDARD HEADS

For head terminations, a head mounting fitting must be selected

ORDER CODE	DESCRIPTION
6HN	1/2" x 1/2" NPT steel hex nipple
8HN	1/2" x 1/2" NPT stainless steel hex nipple
8HP	1/2" NPT stainless steel bushing (no process threads)
8RNDC	3/4" x 1/2" NPT stainless steel hex nipple
22CF	Brass compression fitting (not available with head termination order codes 52, 71 or 81)

HEAD MOUNTING FITTINGS FOR MINIATURE HEADS OPTIONS 17 & 25

ORDER CODE	DESCRIPTION
8HPB	1/4" NPT stainless steel bushing (no process threads)
9HNB	1/4" x 1/4"stainless steel bushing (no process threads)
22CFB	Brass compression fitting

3-2 STANDARD HEAD TERMINATIONS

ORDER CODE	DESCRIPTION
10	No head .2" stripped leads (insert two digit strip length for other lengths - ex. 10(03")
22	No head - 3" individual leads with terminal pins
23	Extension leadwire (requires Table 4 and 5 selections)
31	Cast aluminum screw cover head
34	Cast iron screw cover head
49	Flip top aluminum head
52	Class B explosion proof head
53	Delrin screw cover head
63	Polypropylene screw cover head
71	Cast iron/aluminum explosion proof head
81	316L stainless steel explosion proof head
91	316L stainless steel head
	OPTIONS
GS	Ground screw (standard with options 52, 71, 81)
I	Stainless steel tag (supply tag information)
W	White epoxy coating
SB	1/2" NPT conduit reducer bushing
T	Transmitter (See INS-1)
CT	Ceramic Terminal Block (opt. 53 and 63 only)

MINIATURE HEAD TERMINATIONS

ORDER CODE	DESCRIPTION
14	Ceramic wafer head
17	Miniature plastic head
25	Miniature nickel plated head

3-1 SHEATH TERMINATIONS

ORDER CODE	DESCRIPTION
10	2" stripped leads (insert two digit strip length for other lengths - ex. 10(03")

LEADWIRE TRANSITIONS (Requires Tbl. 4 and 5 selections)

ORDER CODE	DESCRIPTION
15	Extension leadwire transition with relief spring (400°F)
16	Extension leadwire transition with heat shrink tubing (220°F)
13	Same size transition with heat shrink tubing (220°F)
18	Same size transition without heat shrink tubing (400°F)
19	Extension leadwire transition without spring or heat shrink (400°F)
	OPTIONS
HT	High temperature potting (1000°F) not available with opt. 13 or 16

PLUG AND JACK TERMINATIONS

ORDER CODE	DESCRIPTION
4	Standard male plug (350°F)
5	Standard female jack (350°F)
6	Miniature male plug (350°F)
7	Miniature female jack (350°F)
	OPTIONS
MC	Mating connector
MT	Medium temp connector (500°F)
HT	High temp connector (800°F)
SP	Solid pin plug
CL	Compression L bracket to hold plug to sheath

I845300

APOLLO®

Installation, Operation, and Maintenance Guide

For Apollo Series Valves:

2 Piece Threaded
and Solder End
Ball Valves

CONBRACO
Ball Valve Division

P.O. BOX 125 PAGELAND, S.C. 29728 803-672-6161

INSTALLATION, OPERATION AND MAINTENANCE OF THREADED AND SOLDER END APOLLO BALL VALVES

Valves must be installed in piping systems that comply to the applicable A.N.S.I. B31 Standard. Special considerations must be taken with respect to pipe line expansions and contractions and the media expansions and contractions within the piping system.

THREADED END INSTALLATION

1. Pipe connections to be threaded into these valves should be accurately threaded, clean and free of dirt and metal shavings.
2. Teflon tape is recommended for use as the pipe joint sealant.
3. Use two wrenches when making the pipe joint. Apply one wrench on the hex pads nearest the joint being tightened to prevent breaking the retainer-to-body seal.
4. UNION END VALVES: Remove the union nut from valve and place onto pipe. Thread the tailpiece onto the pipe using a smooth jaw wrench. Thread the union nut onto the valve body and *lightly* torque.

SOLDER END INSTALLATION

1. Piping connections to be soldered into these valves should be cut square and then cleaned with an appropriate cleaner or flux.
2. These valves are designed to be soft soldered. Apply heat with the flame directed *away* from the center of the valve body. Excessive heat can harm the Teflon seats. Solder valves only in the fully open position.
3. UNION END VALVES: Remove the union nut from valve and place onto pipe. Solder the tailpiece onto pipe, thread union nut onto valve body and *lightly* torque.

OPERATION

The valve is marked showing proper rotation direction for “ON” and “OFF” positions. Rotation is clockwise for “OFF” and counterclockwise for “ON”.

MAINTENANCE

Normal stem packing wear can be compensated for by tightening the packing gland screw clockwise. If all of the adjustment to the packing gland screw has been made, remove the lever and packing gland nut and add one or two replacement bearings on top of the old packing. Reassemble the lever and packing gland nut.
CAUTION: Do not disassemble Valve while under pressure nor with entrapped hazardous fluids therein.

General repair of the valve can be made by:

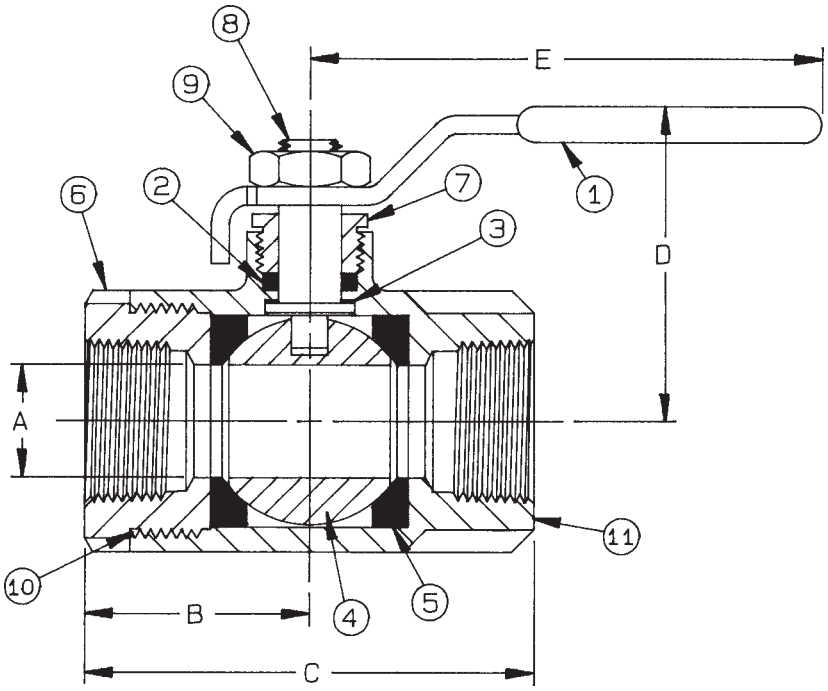
1. Close valve.
2. Remove retainer from body center section by turning counterclockwise
3. 1/4" thru 1" valves only; pry out the top seat being careful not to damage the ball. 1-1/4" thru 3" valves; the top seat will come out with the retainer.
4. Push ball out of body with finger.
5. Remove packing gland nut by turning counterclockwise and push stem down into body to remove.
6. Remove all seats and seals. To facilitate removal of the stem packing, cut with knife.
7. Replace all seats and seals as furnished in the Service Kit. Inspect the ball and stem for excessive wear or damage and replace if necessary.
8. Reverse the above procedure to reassemble using a sealant on the retainer threads equivalent to Loctite Hydraulic Sealant. **NOTE: VALVES IN OXYGEN SERVICE CAN ONLY BE SEALED WITH AN OXYGEN COMPATIBLE THREAD SEALANT.**

Union End Valves cannot be easily field repaired, therefore it is recommended that the main valve section be replaced.

NOTE: ALWAYS TEST VALVE AND SYSTEM BEFORE PUTTING THE SYSTEM INTO SERVICE.

Bronze Valves: **WARNING**: This product is made from Bronze Alloys which contain lead; a chemical known to the State of California to cause cancer and birth defects and other reproductive harm.

General 2-PC. BALL VALVE
Identification



1. Lever and grip
2. Stem packing
3. Stem bearing
4. Ball
5. Seat (2)
6. Retainer
8. Stem
9. Lever nut
10. Body seal
11. Body

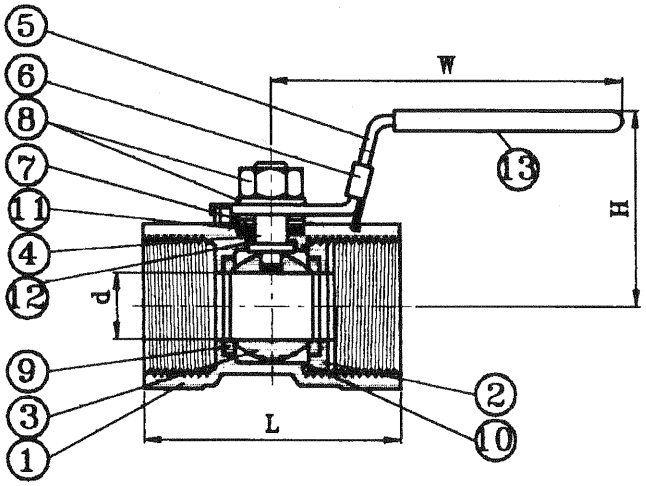
warren®

VALVES

STAINLESS STEEL ONE PIECE BALL VALVE

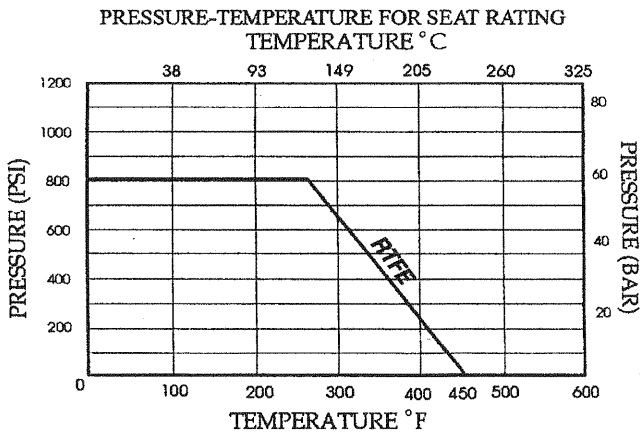
800 PSI W.O.G.
THREADED ENDS

BLOW - OUT PROOF STEM
LOCKING DEVICE



ITEM	PART NAME	MATERIAL
1	Body	ASTM A351-CF8M
2	Retainer	ASTM A351-CF8M
3	Ball	ASTM A351-CF8M
4	Stem	AISI 316
5	Handle	AISI 304
6	Locking Device	AISI 304
7	Disc	AISI 304
8	Nut & Washer	AISI 304
9	Ball Seat	RTFE
10	Body Seal	PTFE
11	Stem Packing	PTFE
12	Thrust Washer	PTFE
13	Handle Sleeve	VINYL

FIGURE NUMBER 1010



Size	L	W	H	d	CV Factor Approx.	Wt. (Lbs.) Approx.
1/4"	1.535	2.362	1.299	0.197	2.5	0.163
3/8"	1.732	2.952	1.377	0.276	4.5	0.251
1/2"	2.204	3.503	1.653	0.354	7	0.427
3/4"	2.283	3.503	1.811	0.492	9	0.599
1"	2.755	4.173	1.968	0.629	16	0.992
1-1/4"	3.031	4.173	2.204	0.787	24	1.433
1-1/2"	3.228	5.039	2.598	0.964	37	1.895
2"	3.897	5.039	2.834	1.269	68	3.174

Resilient Seated Butterfly Valves

ABZ VALVE | A GFT COMPANY

Figures 101/108/102

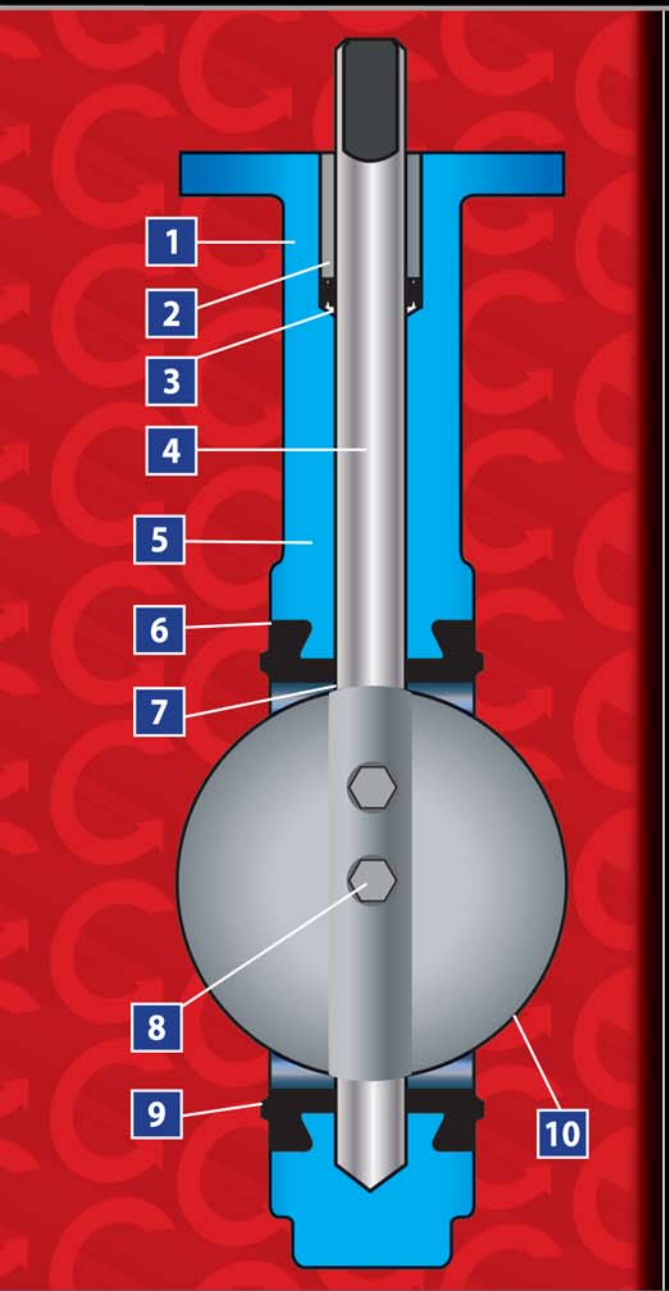
Sizes
2” - 12”
Rated Up To 175 PSI

ABZ VALVES & CONTROLS
PO Box 157 • 113 W. Main • Madison, KS 66860
620-437-2440 • FAX 620-437-2435
www.abzvalve.com • info@abzvalve.com

ABZ Precision Built Butterfly Valves

Resil-O-Seat™ Seated Valves for Chemical and Abrasion Resistance Applications.

The figures 101/102/108 provide excellent flexibility with a variety of trim materials. These are available for a wide selection of applications.



1 Body machined to high tolerances. Guaranteed standard dimensions for interchangeability of parts and actuators.

2 Top bushings protect the stem from side thrust of operators. They are made of impact and corrosion resistant materials.

3 Special double-V-shape of stem seal self-adjusts to protect the stem area for either vacuum or pressure use.

4 Stem extends through disc and aligns with socket in body. Stem end has standard dimensions for operator interchangeability.

5 Long neck allows for insulation requirements.

6 The special snap-in Resil-O-Seat™ design fixes seat in place without bonding. The Resil-O-Seat™ is 100% field replaceable - no special tools required.

7 Stem and body are isolated from the line media by the interference fit of the primary seal created between the disc and seat.

8 Stainless steel cap screws securely hold disc to stem. O-ring seal prevents leakage into the stem area and creates a positive connection.

9 Resil-O-SeatTM forms a seal against all standard ANSI 125/150 flanges. Gasketing requirements are eliminated.

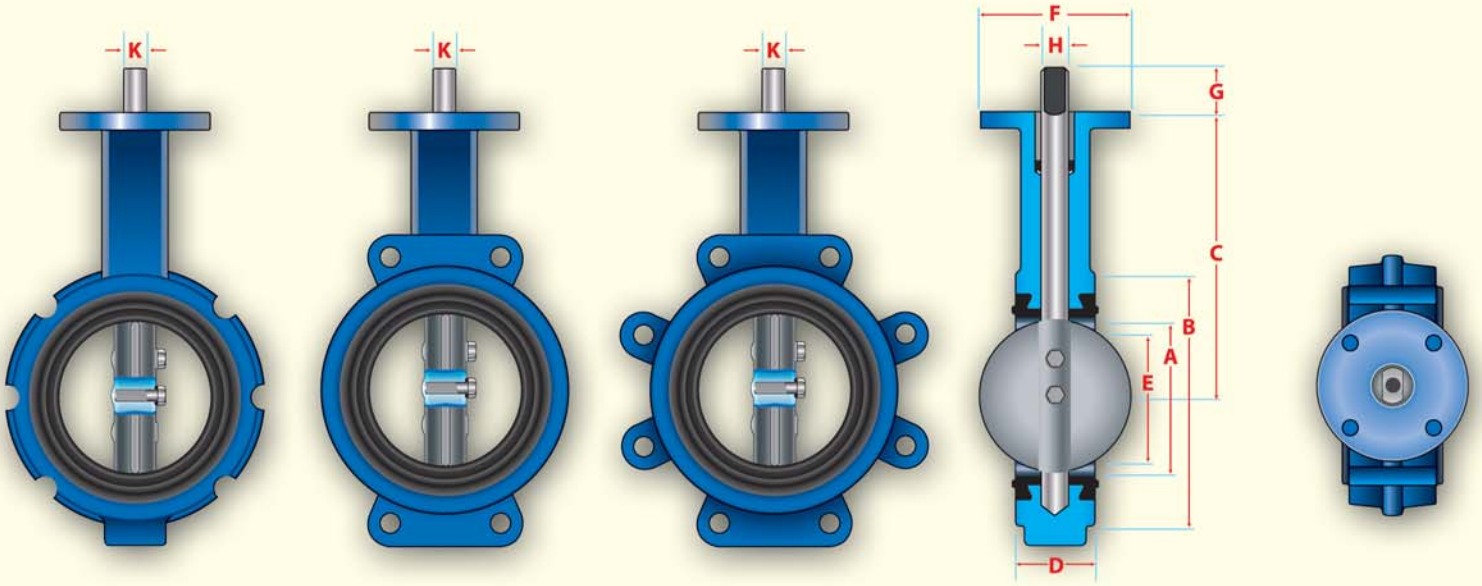
10 Disc edge is individually processed through machining and hand buffing for a smooth edge, providing a bubble tight shutoff and maximum seat life.

101 is a wafer style body
108 is semi-lug style body
102 is a full lug style body

ABZ VALVE
A GPT COMPANY

FIGURES 101/108/102

Valve Dimensions



All standard seats are Food Grade with the exception of Viton

Valve Size	DIMENSIONS									TOP PLATE DRILLING			TAPPED LUG DATA				WEIGHT (POUNDS)		
	A	B	C	D	E	F	G	H	K	Bolt Circle	No. Holes	Hole Dia.	Bolt Circle	No. Holes 102	No. Holes 108	Tap	101	108	102
2	2 1/8	4 1/8	5 1/2	1 5/8	1 11/16	4	1 1/4	9/16	3/8	3 1/4	4	7/16	4 3/4	4	4	5/8-11 UNC	7	8	8
2 1/2	2 9/16	4 7/8	6	1 3/4	2 3/16	4	1 1/4	9/16	3/8	3 1/4	4	7/16	5 1/2	4	4	5/8-11 UNC	8	9	9
3	3 1/8	5 3/8	6 1/4	1 3/4	2 7/8	4	1 1/4	9/16	3/8	3 1/4	4	7/16	6	4	4	5/8-11 UNC	9	10	10
4	4 1/8	6 7/8	7	2	3 7/8	4	1 1/4	5/8	7/16	3 1/4	4	7/16	7 1/2	8	4	5/8-11 UNC	13	17	20
5	5 3/16	7 5/8	7 1/2	2 1/8	5	4	1 1/4	5/8	7/16	3 1/4	4	7/16	8 1/2	8	4	3/4-10 UNC	19	20	23
6	6 1/8	8 3/4	8	2 1/8	6	4	1 1/4	5/8	7/16	3 1/4	4	7/16	9 1/2	8	4	3/4-10 UNC	20	24	27
8	8 1/8	11	9 1/2	2 1/2	8	6	1 1/4	3/4	1/2	5	4	9/16	11 3/4	8	4	3/4-10 UNC	36	38	43
10	10 1/8	13 3/8	10 3/4	2 1/2	10 1/16	6	1 1/4	7/8	5/8	5	4	9/16	14 1/4	12	4	7/8-9 UNC	49	55	63
12	12 1/8	16 1/8	12 1/4	3	11 15/16	6	2	1 1/8	1/4	5	4	9/16	17	12	4	7/8-9 UNC	70	82	90

STANDARD CONSTRUCTION SPECIFICATIONS:

Body: Cast Iron, Ductile Iron (Lug) and Aluminum (Wafer)

Disc: 316 Stainless Steel, Aluminum Bronze, Ductile Iron, Epoxy Coated Ductile Iron

Stem: 316 Stainless Steel, 416 Stainless Steel, Carbon Steel

Resilient Seat: EPDM, Buna-N, Viton, Natural Rubber, White Buna, White Neoprene.

Stem Bushing: Teflon® – Graphite Impregnated

Stem Packing: Buna-N and Viton

Additional materials are available for a wide selection of applications.

NOTES:

1. Dimension "K" not applicable to 12" size. The 12" stem is round with ¼" Key.
2. The figures 101, 102 and 108 cannot be used on pipe or flange with an inside diameter less than the "E" dimension.
3. Valves are rated up to 175 PSI bi-directional service and 85 PSI end of line rating. Undercut disc is rated up to 50 PSI bi-directional service and 25 PSI end of line rating. Preferred direction is with disc bolts on downstream side of disc.
4. Designed in accordance with sections of API 609 Catagory A, ASME 16.1/16.5, ASME 16.34 and MSS SP67. Design tested in accordance with API 598.
5. Compatible with ANSI Class 125/150 flange standards.

Rated Flow Coefficient (Cv) - Figure 101/108/102

Valve Size	ANGLE OF DISC OPENING								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
2	1.67	7.7	17	29	48	74	115	145	195
2 1/2	2.50	11.0	25	44	69	109	174	237	307
3	3.33	15.7	37	64	105	165	276	377	487
4	5.00	27.7	63	110	177	278	472	671	827
5	8.33	43.7	99	177	276	443	752	1,083	1,325
6	13.33	58.7	136	242	385	616	1,075	1,521	1,883
8	20.00	107.3	247	434	687	1,094	1,821	2,671	3,239
10	31.67	174.0	394	696	1,092	1,770	2,983	4,288	5,210
12	47.0	251.7	578	1,002	1,665	2,654	4,398	6,466	8,026

Cv is defined as the volume of water in U.S.G.P.M. that will flow through a given restriction or valve opening with a pressure drop of one (1) p.s.i. at room temperature. Recommended control angles are between 25°-70° open.

Torque Chart - Figure 101/108/102

Valve Size	NORMAL CONDITIONS					SEVERE CONDITIONS				
	Δ P=0	Δ P=50	Δ P=100	Δ P=150	Δ P=175	Δ P=0	Δ P=50	Δ P=100	Δ P=150	Δ P=175
2	221	230	240	250	254	373	384	400	406	410
2 1/2	269	283	288	302	311	454	464	475	486	497
3	322	341	365	379	392	540	568	589	611	634
4	480	514	542	576	590	816	848	886	918	936
5	653	706	754	806	854	1,102	1,162	1,220	1,274	1,301
6	907	1,008	1,109	1,210	1,260	1,529	1,642	1,756	1,868	1,926
8	1,512	1,714	1,915	2,112	2,215	2,549	2,776	3,002	3,229	3,343
10	2,318	2,621	2,900	3,224	3,372	3,910	4,250	4,590	4,931	5,101
12	3,125	3,629	4,138	4,637	6,112	5,270	5,838	6,404	6,971	7,258

Undercut disc available.

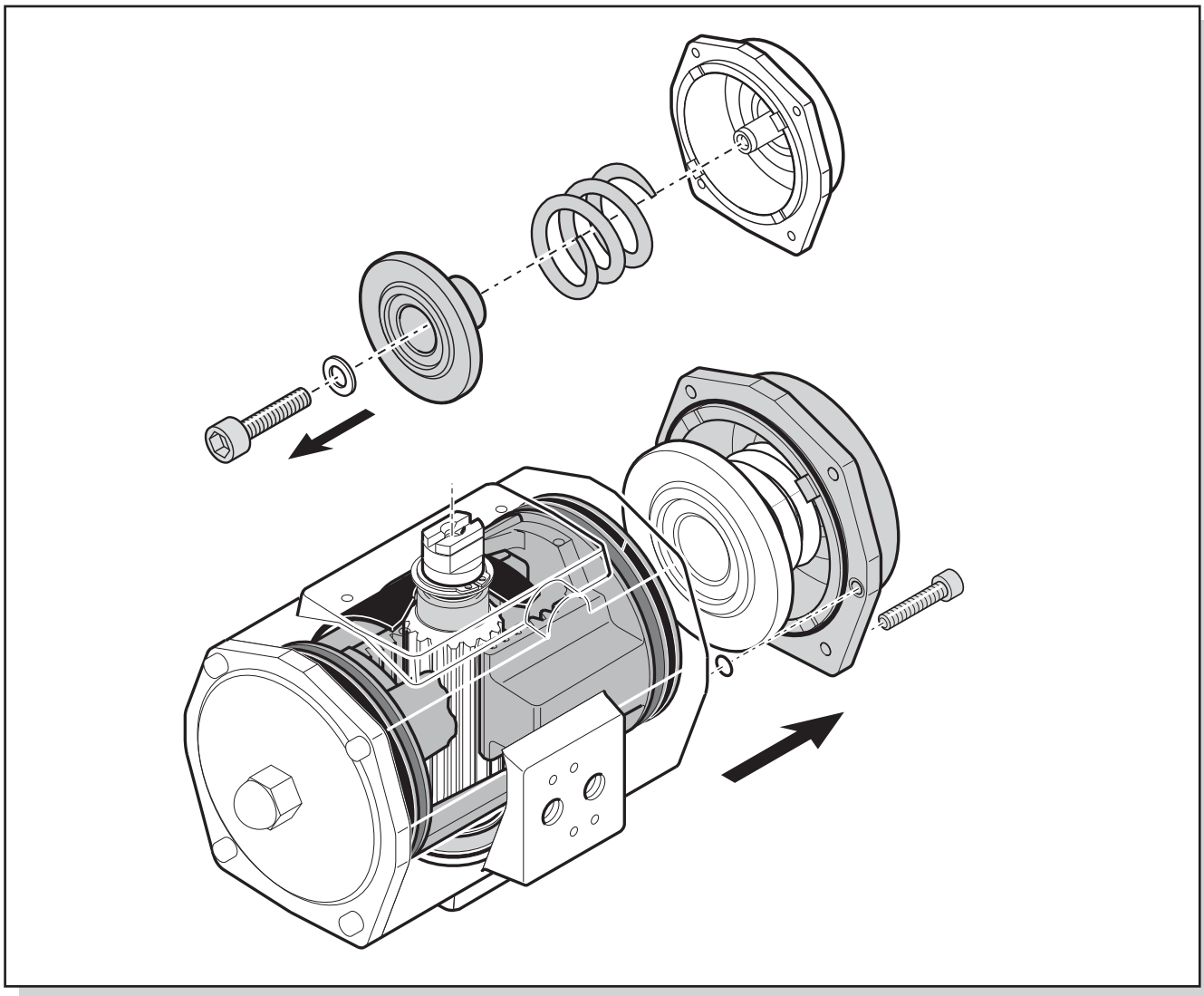
All torques shown in inch lbs. 20% Safety factor already included.

ABZ VALVES & CONTROLS, INC.
A Global Flow Technologies Company
P.O. Box 157 • 113 West Main • Madison, KS 66860
PHONE: 620-437-2440 • FAX: 620-437-2435
www.abzvalve.com • www.globalflowtech.com
info@abzvalve.com

Certified System ISO 9001-2008

Installation Operation & Maintenance Manual
DOC.41.EDN Rev: E
March 2012

Pneumatic Actuators "E" and "P" series



EL-O-MATIC™

www.El-O-Matic.com

EMERSON™
Process Management

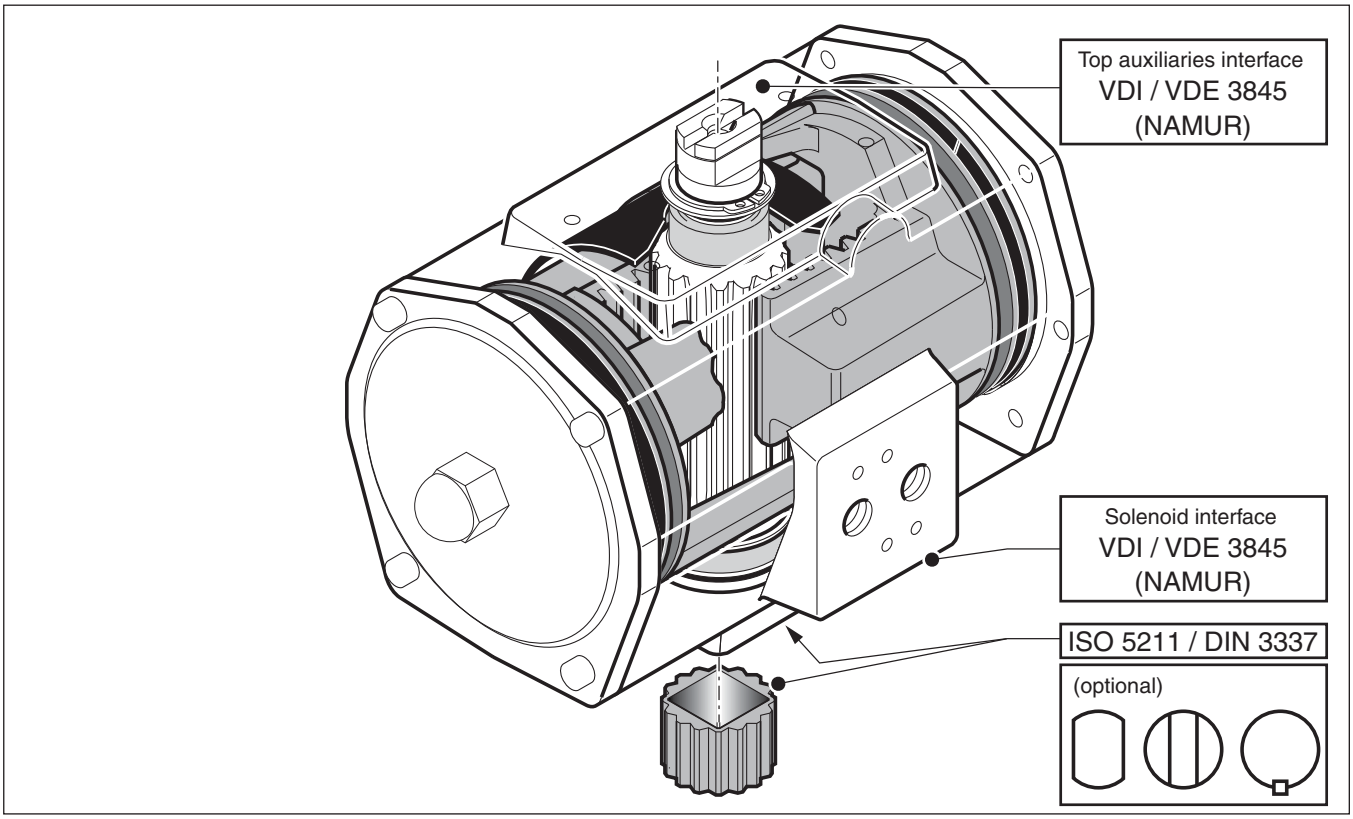
CONTENTS

INHALT

INHOUD

1 INTRODUCTION / EINLEITUNG / *INLEIDING*

1.1 Identification / Unterscheidung / *Identificatie*

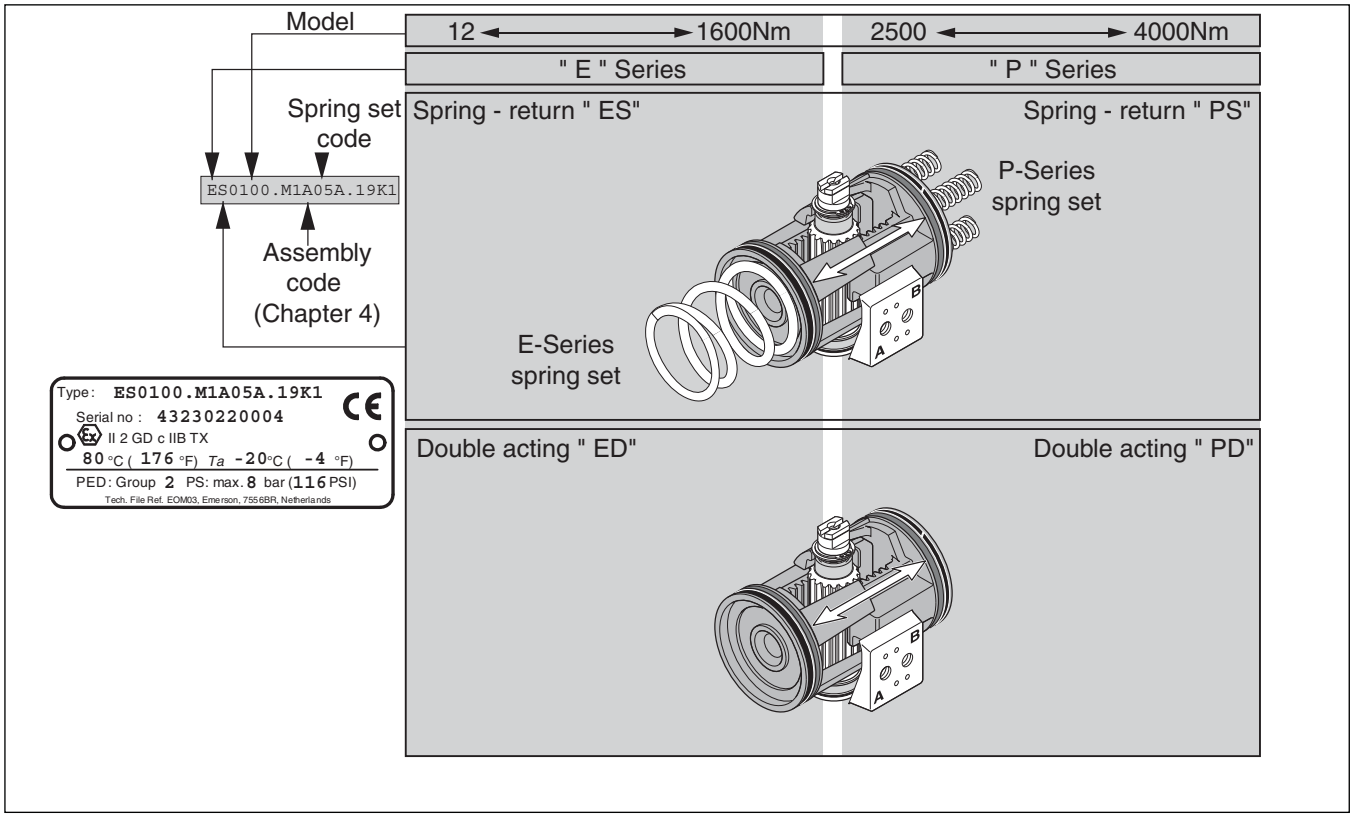


1.1

Warning! Actuator must be isolated both pneumatically and electrically before any (dis)assembly is begun. Before mounting or (dis)assembling the actuator consult the relevant sections of this manual.

Achtung! Der Antrieb muß vor jedem Ausbau sowohl pneumatisch, als auch elektrisch von allen Anschlüssen abgekoppelt werden. Lesen Sie vor dem Einbau oder Ausbau des Antriebes die entsprechenden Kapitel dieses Handbuchs aufmerksam durch!

Waarschuwing! *Aandrijving moet zowel pneumatisch als elektrisch afgekoppeld worden, voordat met (de) monteren begonnen kan worden. Raadpleeg de desbetreffende paragrafen van deze handleiding alvorens te (de)monteren of toebehoren te bevestigen.*



1.2

Model	-	Typ -		*model*
Spring set code	-	Federsatzcodenummer	-	*code verenset*
Assembly code (page 13)	-	Bezeichnung der Drehrichtung (s.13)	-	*montagecode (pag. 13)*
“E”- Series	-	“E”-Serie	-	*“E”-serie*
“P”- Series	-	“P”-Serie	-	*“P”-serie*
Spring return	-	Federrückstellend	-	*veerretour*
P-Series spring set	-	Federsatz der P-Serie	-	*verenset P-serie*
E-Series spring set	-	Federsatz der E-Serie	-	*verenset E-serie*
Double acting ED	-	doppeltwirkend ED	-	*dubbelwerkend ED*
Double acting PD	-	doppeltwirkend PD	-	*dubbelwerkend PD*

1.2 Product code

Action
ED or PD = Double acting **ES or PS** = Single acting (Spring return)

Actuator type
E-series
0012 = E12 **0025** = E25 **0040** = E40 **0065** = E65 **0100** = E100 **0150** = E150
0200 = E200 **0350** = E 350 **0600** = E600 **0950** = E950 **1600** = E1600

P-series
2500 = P2500 **4000** = P4000

Valve flange			**Finish**
Metric ISO 5211	Metric DIN 3337	UNC/NPT ISO 5211	
M =	**D =**	**U =**	Standard
N =	**E =**	**V =**	CSR coating + Aluminum pinion
O =	**F =**	**W =**	CSR coating + Stainless Steel pinion

Limit stops
0 = No limit stops — Standard on P-series
1 = L1 limit stops — Standard on E-Series
2 = Double Stroke Adjustment — Standard on DSA-Series

Assembly codes	**Rotation**	**Mounting**
A = Spring to close	clock wise	in line with pipeline
B = Spring to close	clock wise	across pipeline
C = Spring to open	counter clock wise	across pipeline
D = Spring to open	counter clock wise	in line with pipeline

Spring set E-Serie	**Spring set P-serie**
00 = Double acting actuator	**00** = Double acting actuator
01 = Springset 1	**04** = Springset 4
02 = Springset 2	**06** = Springset 6
03 = Springset 3	**08** = Springset 8
04 = Springset 4	**10** = Springset 10
05 = Springset 5	**12** = Springset 12
06 = Springset 6	**14** = Springset 14

Future expansion
A = Standard

Insert size (in mm.) [1]	**E12**	**E25**	**E40**	**E65**	**E100**	**E150**	**E200**
- ISO or UNC	00	11	14	14	19	19	22
- DIN	00	11	14	14	17	17	22
	E 350	**E600**	**E950**	**E1600**	**P2500**	**P4000**	
- ISO or UNC	27	27	36	46	00	00	
- DIN	22	27	36	46	00	00	

Visual Indication Code
D = Disk **K** = Knob **N** = No visual indication

Temperature range
0 = Standard TS: 80°C (176°F) / -20°C (-4°F)
1 = High temp TS: 120°C (248°F) / -20°C (-4°F)
2 = Low temp TS: 80°C (176°F) / -40°C (-40°F)

ES 0040.M 1 A 05 A.14 N 1

[1]Actuators E12, P2500 and P4000 have no inserts. They have have a inner square directly in the pinion
180° actuators are not covered by this configuration matrix.

1.2 Produktcode

Wirkrichtung
ED or PD = Doppeltwirkend **ES or PS** = Einfachwirkend (Federrückstellend)

Antriebstyp
E-series
0012 = E12 **0025** = E25 **0040** = E40 **0065** = E65 **0100** = E100 **0150** = E150
0200 = E200 **0350** = E 350 **0600** = E600 **0950** = E950 **1600** = E1600

P-series
2500 = P2500 **4000** = P4000

Armaturenflansch			**Oberflächenbeschichtung**
Metrisch ISO 5211	Metrisch DIN 3337	UNC/NPT ISO 5211	
M =	**D =**	**U =**	Standard
N =	**E =**	**V =**	CSR Beschichtung + Aluminium Welle
O =	**F =**	**W =**	CSR Beschichtung + Edelstahl Welle

Hubbegrenzung
0 = Keine Hubbegrenzung Standard bei P-series
1 = L1 Hubbegrenzung Standard bei E-Series
2 = Doppelter Hubbegrenzung Standard bei DSA-Series

Aufbaucode	**Drehrichtung**	**Montage**
A = Federschließend	im Uhrzeigersinn	parallel zur Leitung
B = Federschließend	im Uhrzeigersinn	quer zur Leitung
C = Federöffnend	gegen den Uhrzeigersinn	quer zur Leitung
D = Federöffnend	gegen den Uhrzeigersinn	parallel zur Leitung

Federsätze E-Serie	**Federsätze P-serie**
00 = Doppeltwirkender Antrieb	**00 =** Doppeltwirkender Antrieb
01 = Federsatz 1	**04 =** Federsatz 4
02 = Federsatz 2	**06 =** Federsatz 6
03 = Federsatz 3	**08 =** Federsatz 8
04 = Federsatz 4	**10 =** Federsatz 10
05 = Federsatz 5	**12 =** Federsatz 12
06 = Federsatz 6	**14 =** Federsatz 14

Zukünftige Erweiterung
A = Standard

Insert size (in mm.) [1]	**E12**	**E25**	**E40**	**E65**	**E100**	**E150**	**E200**
- ISO or UNC	00	11	14	14	19	19	22
- DIN	00	11	14	14	17	17	22
	E 350	**E600**	**E950**	**E1600**	**P2500**	**P4000**	
- ISO or UNC	27	27	36	46	00	00	
- DIN	22	27	36	46	00	00	

Sichtanzeige
D = Scheibe **K** = Knopf **N** = Keine Sichtanzeige

Temperaturbereich
0 = Standard Temperatur TS: 80°C (176°F) / -20°C (-4°F)
1 = Hohe Temperatur TS: 120°C (248°F) / -20°C (-4°F)
2 = Niederig Temperatur TS: 80°C (176°F) / -40°C (-40°F)

ES 0040.M 1 A 05 A.14 N 1

[1] Antriebe E12, P2500 und P4000 haben keine Inserts.
Sie haben eine viereckige Wellenaufnahme, direkt in der Welle. 180° Antriebe werden nicht durch diese Konfigurationsmatrix abgedeckt.

1.2 Product code

Werking
ED of PD *= Dubbelwerkend* ***ES of PS*** *= Enkelwerkend (Veerretour)*

Aandrijvings type
E-series
0012 *= E12* ***0025*** *= E25* ***0040*** *= E40* ***0065*** *= E65* ***0100*** *= E100* ***0150*** *= E150*
0200 *= E200* ***0350*** *= E 350* ***0600*** *= E600* ***0950*** *= E950* ***1600*** *= E1600*

P-series
2500 *= P2500* ***4000*** *= P4000*

Afsluiterflens			***Coating***
Metrisch	*Metrisch*	*UNC/NPT*	
ISO 5211	*DIN 3337*	*ISO 5211*	
M =	***D =***	***U =***	*Standaard*
N =	***E =***	***V =***	*CSR coating + Aluminum as*
O =	***F =***	***W =***	*CSR coating + RVS as*

Slagbegrenzing

0 = *Geen slagbegrenzing*	*Standaard bij P-series*
1 = *L1 slagbegrenzing*	*Standaard bij E-Series*
2 = *Dubbelzijdige slagbegrenzing*	*Standaard bij DSA-Series*

Montage codes	***Verdraaing***	***Montage***
A *= Veersluitend*	*met de klok mee*	*in lijn met de leiding*
B *= Veersluitend*	*met de klok mee*	*dwars op de leiding*
C *= Veeropenend*	*tegen de klok in*	*dwars op de leiding*
D *= Veeropenend*	*tegen de klok in*	*in lijn met de leiding*

Verenset E-serie	***Verenset P-serie***
00 *= Dubbelwerkende aandrijving*	***00*** *= Dubbelwerkende aandrijving*
01 *= Verenset 1*	***04*** *= Verenset 4*
02 *= Verenset 2*	***06 =*** *Verenset 6*
03 *= Verenset 3*	***08 =*** *Verenset 8*
04 *= Verenset 4*	***10 =*** *Verenset 10*
05 *= Verenset 5*	***12 =*** *Verenset 12*
06 *= Verenset 6*	***14 =*** *Verenset 14*

Toekomstige uitbreiding
A *= Standaard*

Insert size (in mm.) [1]	***E12***	***E25***	***E40***	***E65***	***E100***	***E150***	***E200***
- ISO or UNC	*00*	*11*	*14*	*14*	*19*	*19*	*22*
- DIN	*00*	*11*	*14*	*14*	*17*	*17*	*22*
	E 350	***E600***	***E950***	***E1600***	***P2500***	***P4000***	
- ISO or UNC	*27*	*27*	*36*	*46*	*00*	*00*	
- DIN	*22*	*27*	*36*	*46*	*00*	*00*	

Visuele positie aanduiding
D *= Schijf* ***K*** *= Knop* ***N*** *= Geen positie aanduiding*

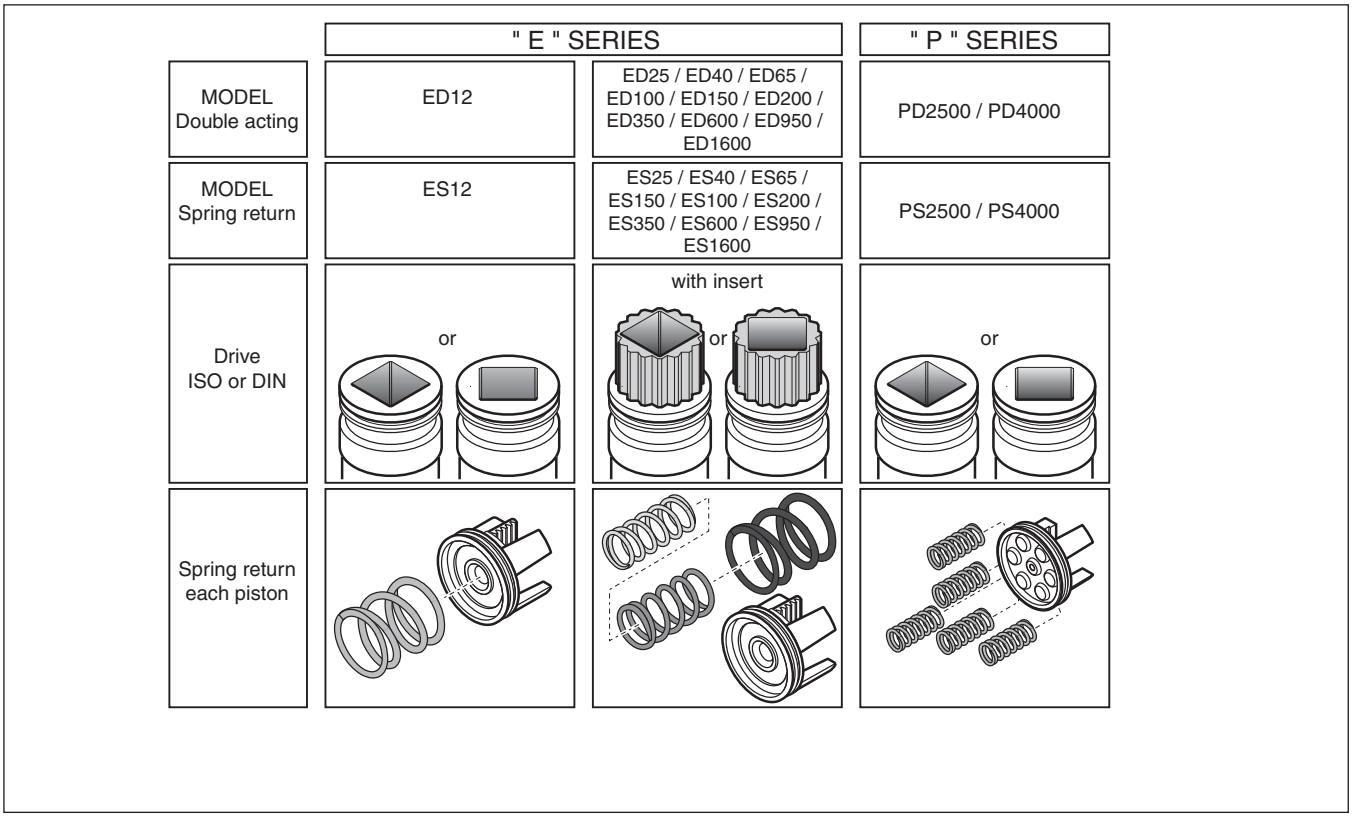
Temperatuursbereik

0 *= Standaard temperatuur*	*TS: 80°C (176°F)*	*/*	*-20°C (-4°F)*
1 *= Hoge temperatuur*	*TS: 120°C (248°F)*	*/*	*-20°C (-4°F)*
2 *= Lage temperatuur*	*TS: 80°C (176°F)*	*/*	*-40°C (-40°F)*

ES 0040.M 1 A 05 A.14 N 1

[1] *Aandrijvingen E12, P2500 en P4000 hebben geen inserts. Deze hebben een binnenvierkant direct in de as 180° aandrijvingen worden niet door deze configuratie matrix afgedekt.*

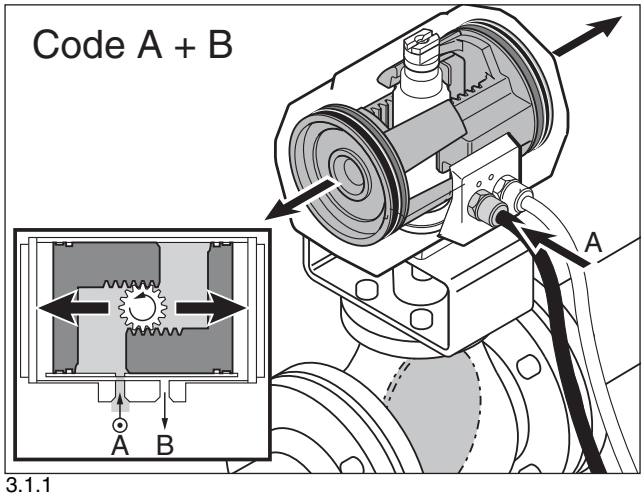
2 CONSTRUCTION DETAILS / KONSTRUKTIVE EINZELHEITEN / *CONSTRUCTIEDETAILS*



2.1

"E" Series	-	"E"-SERIE	-	*"E"-serie*
"P" Series	-	"P"-SERIE	-	*"P"-serie*
MODEL double acting	-	doppeltwirkender TYP	-	*MODEL dubbelwerkend*
MODEL spring return	-	TYP mit Federrückstellung	-	*MODEL veerretour*
Drive ISO or DIN	-	Antrieb gemäß ISO oder DIN	-	*Aandrijving ISO of DIN*
Spring return each piston	-	beiderseits Federrückstellung	-	*Veerset per zuiger*
or	-	oder	-	*of*
with insert	-	mit Insert		*met insert*

3 PRINCIPLES OF OPERATION / FUNKTIONSPRINZIP / *BEDIENING*



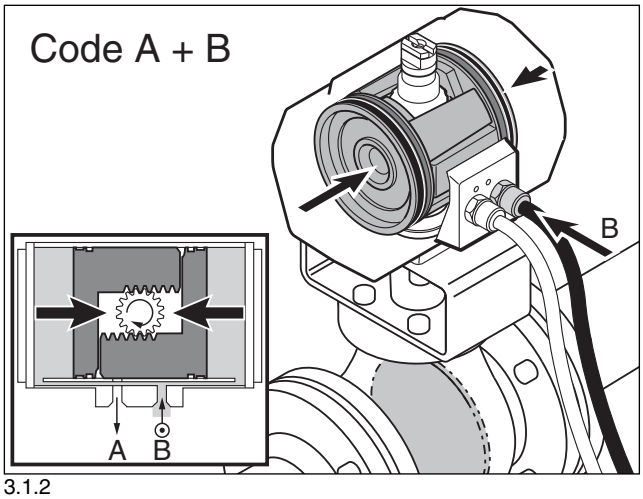
3.1.1

3.1 Air connections double acting

Check the assembly code before connecting air supply (see page 5). Reverse air supply in case of assembly codes C and D (see page 13).

3.1.1
Air to port A: counterclockwise / open.

3.1.2
Air to port B: clockwise / close.



3.1.2

3.1 Luftanschlüsse, doppeltwirkend

Vor dem anschließen der Zuluft den Aufbaucode kontrollieren (siehe Seite 5).
Bei Aufbaucode C und D ist die Luftzufuhr zu tauschen (siehe Seite 13).

3.1.1
Luftzufuhr an Anschluß A: gegen den Uhrzeigersinn / offen.

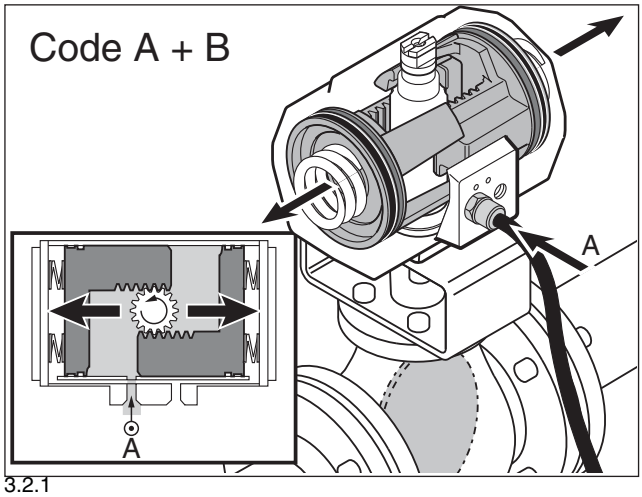
3.1.2
Luftzufuhr an Anschluß B: im Uhrzeigersinn / geschlossen.

3.1 Luchtaansluitingen, dubbelwerkend

Controleer de montagecode voor het aansluiten van de luchttoevoer (zie pagina 5). Verwissel de luchttoevoer in geval van montagecodes C en D (zie pagina 13).

3.1.1
Lucht naar poort A: tegen de wijzers van de klok in / open

3.1.2
Lucht naar poort B: met de wijzers van de klok mee / dicht.



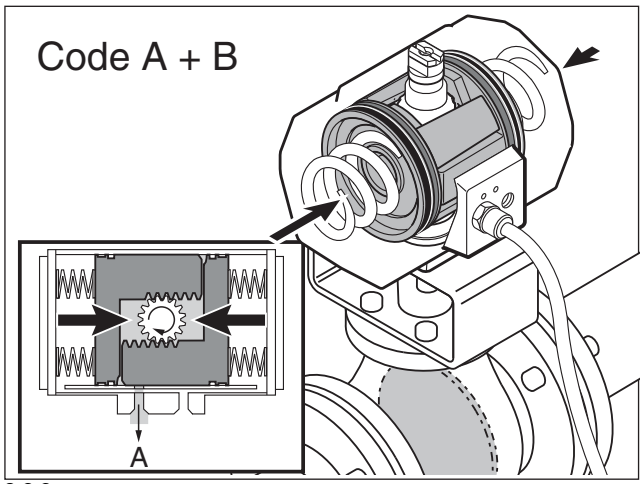
3.2.1

3.2 Air connections spring return

Check the assembly code before connecting air supply (see page 5). Reverse air supply in case of assembly codes C and D (see page 13).

3.2.1
Air to port A: counterclockwise / open.

3.2.2
Spring return: clockwise / close.



3.2.2

3.2 Luftanschlüsse mit Federrückstellung

Vor dem anschließen des Zuluft den Aufbaucode kontrolieren (siehe Seite 5). Bei Aufbaucode C und D ist die Luftzufuhr zu tauschen (siehe Seite 13).

3.2.1
Luftzufuhr an Anschluß A: gegen den Uhrzeigersinn / offen.

3.2.2
Federrückstellung: im Uhrzeigersinn / geschlossen.

3.2 Luchtaansluitingen, veerretour

Controleer de montagecode voor het aansluiten van de luchttoevoer (zie pagina 5). Verwissel de luchttoevoer in geval van montagecodes C en D (zie pagina 13).

3.2.1
Lucht naar poort A: tegen de wijzers van de klok in / open

3.2.2
Veerretour: met de wijzers van de klok mee / dicht.

3.3 Recommended tubing sizes / Empfohlene Rohrabmessungen / *Aanbevolen buisafmetingen*

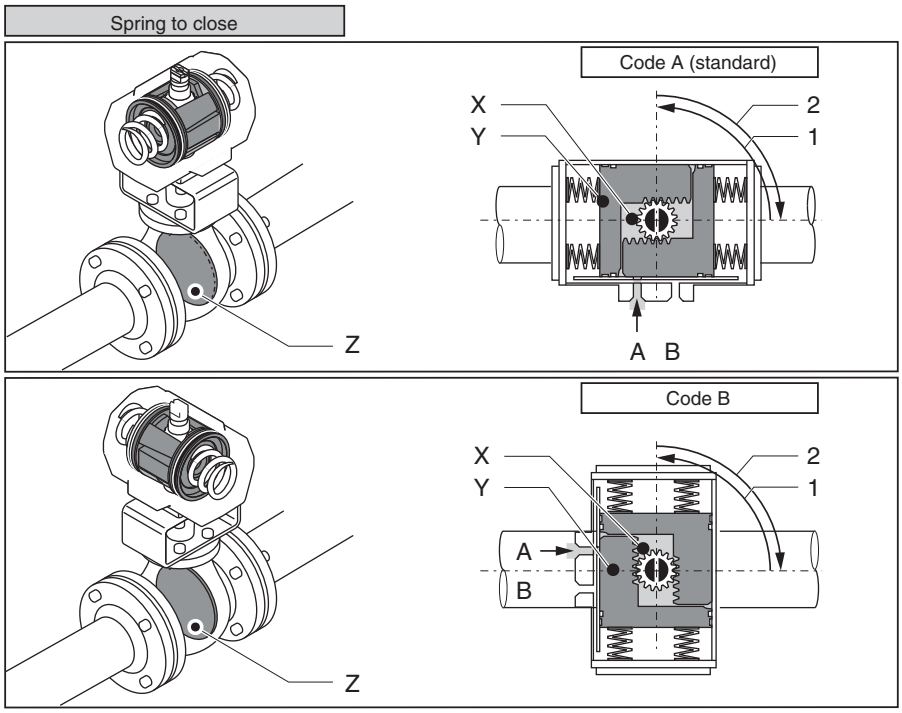
Actuator Model no.	Runs up to 1.2 mtr / 4ft	Runs over 1.2 mtr. / 4ft
Antriebstyp	**Bis 1,20 m**	**über 1,20 m**
Aandrijving modelnr.	**Tot 1,2 m**	**meer dan 1,2 m**
E-12, 25, 40, 65	6 mm / 1/4"	6 mm / 1/4"
E-100, 150, 200, 350, 600, 950	6 mm / 1/4"	8 mm / 5/16"
E1600 / P-2500, 4000	6 mm / 1/4"	10 mm / 3/8"

3.4 Air consumption at atmospheric pressure / Luftverbrauch bei Atmosphärendruck / *Luchtverbruik bij atmosferische druk*

	Actuator type / Modell / Model												
	E12	**E25**	**E40**	**E65**	**E100**	**E150**	**E200**	**E350**	**E600**	**E950**	**E1600**	**P2500**	**P4000**
Air chamber	litre/stroke - (Ltr./Hub) - liter/slag												
A	0.05	0.10	0.16	0.22	0.35	0.73	0.8	1.2	2.9	4.7	7.3	8.0	13.5
B	0.06	0.11	0.22	0.36	0.49	0.65	1.0	1.8	3.1	4.9	8.0	9.3	17.5
Air chamber	cu.in./stroke												
A	3.1	6.1	9.8	13	21	45	49	73	177	287	445	488	824
B	3.7	6.7	13.4	22	30	40	61	110	189	299	488	568	1068

- Model - Modell - *Model*
- Air chamber - Luftkammer - *Luchtkamer*

4 ASSEMBLY CODES / AUFBAUCODE / *MONTAGECODES*

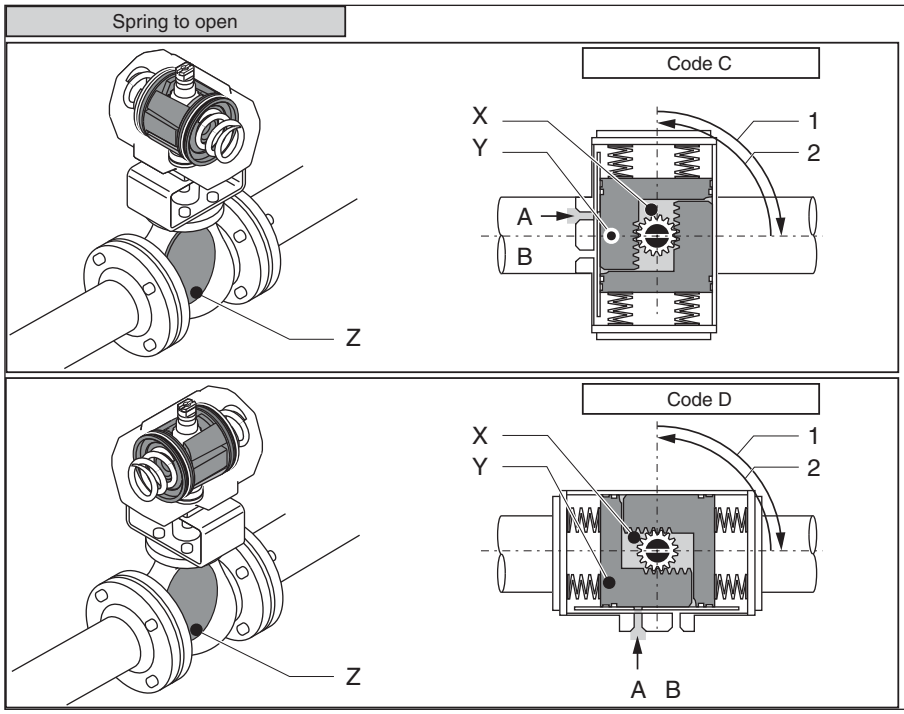


X= Shaft Welle As	Y= Piston Kolben Zuiger	Z= Valve Armatur Afsluiter
Standard	Standard	Closed
+90	Standard	Closed

4.1 Spring to close (rotation CW, topview) /

Schließfeder (Drehung im Uhrzeigersinn, Draufsicht) /

Veersluitend (rotatie met de wijzers van de klok mee, bovenaanzicht)

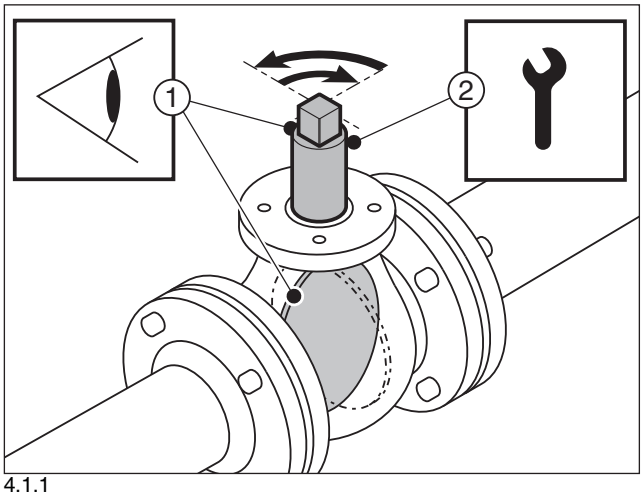


X=	Y=	Z=
Standard	+180	Open
+90	+180	Open
Shaft rotation	Wellen drehung	As verdraaing
1 = Pressure on A-port 2 = Pressure on B-port / Springstroke	1 = A-Kammer belüftet 2 = B-Kammer belüftet / Federhub	1 = Druk op A-poort 2 = Druk op B-poort / Veerslag

4.2 Spring to open (rotation CCW) /

Federkraftöffnend (Drehung gegen den Uhrzeigersinn) /

Veeropenend (rotatie tegen de wijzers van de klok in)



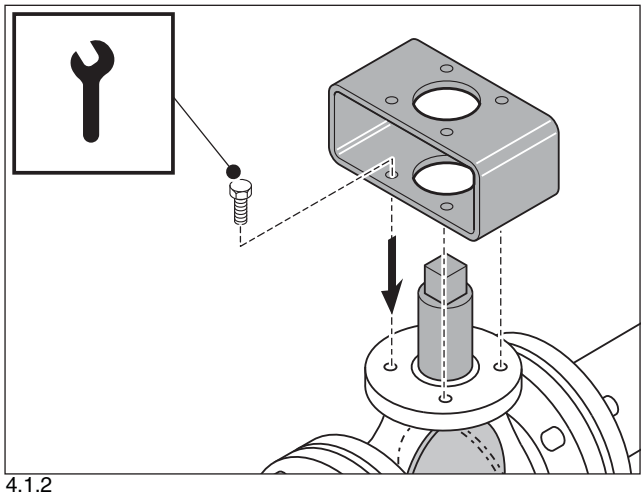
4.1.1

4.1 Installation

4.1.1 / 4.1.2 / 4.1.3

Remove handle nut, handle, lockwasher, etc. from valve if required.

Caution! When mounting do not hit with hammer on shaft top.

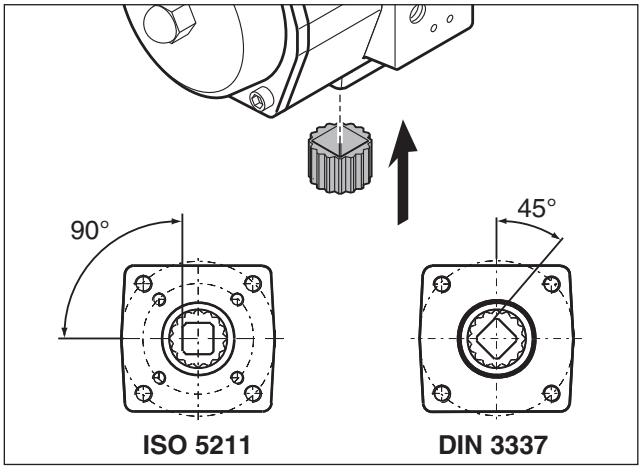

4.1.2

4.1 Aufbau

4.1.1 / 4.1.2 / 4.1.3

Mutter der Handbetätigung, Handbetätigung, Sicherungsscheibe usw., falls erforderlich, von der Armatur entfernen.

Achtung! Bei Montage nicht mit Hammer auf das Wellenende schlagen!



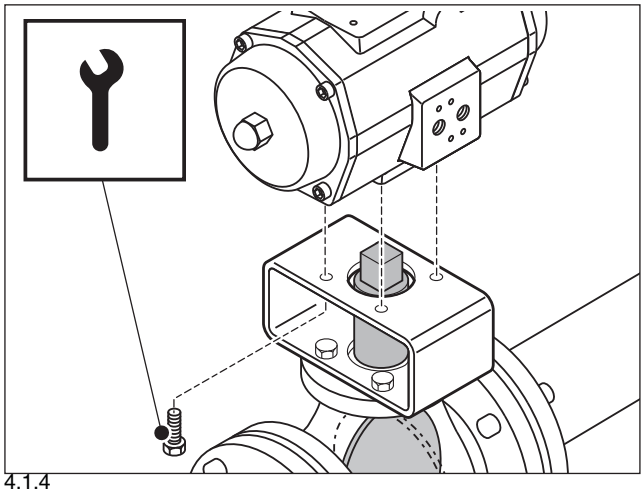
4.1.3

4.1 Installatie

4.1.1 / 4.1.2 / 4.1.3

Verwijder indien nodig hendelmoer, hendel, veerring etc. van de afsluiter.

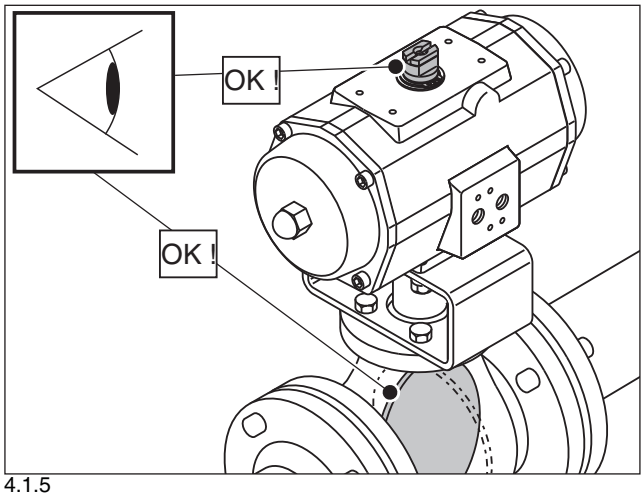
***Voorzichtig!** Bij montage niet met hammer op de astop slaan.*



4.1.4

4.1.4 / 4.1.5.

Valves are manufactured so that they operate in only one 90 degree segment. The actuator should be mounted for counterclock-wise rotation to open and clockwise to close the valve.



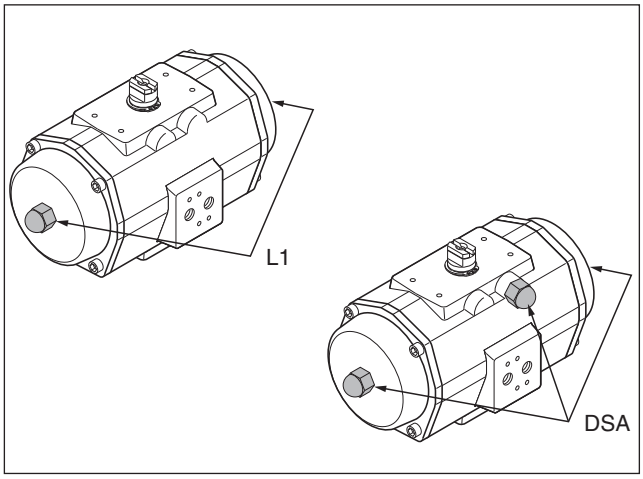
4.1.5

4.1.4 / 4.1.5.

Die Armaturen sind so konstruiert, daß sie nur innerhalb eines 90°-Winkels wirksam sind.
Der Antrieb sollte so montiert werden, daß eine Drehung gegen den Uhrzeigersinn die Armatur öffnet und daß eine Drehung im Uhrzeigersinn die Armatur schließt.

4.1.4 / 4.1.5.

Afsluiters zijn zodanig geconstrueerd dat deze alleen in een segment van 90 graden werken. Bevestig de aandrijving zo dat bij rotatie tegen de wijzers van de klok in de afsluiter wordt geopend en bij rotatie met de wijzers van de klok mee de afsluiter wordt gesloten.



4.2.1

4.2 Stroke adjustment

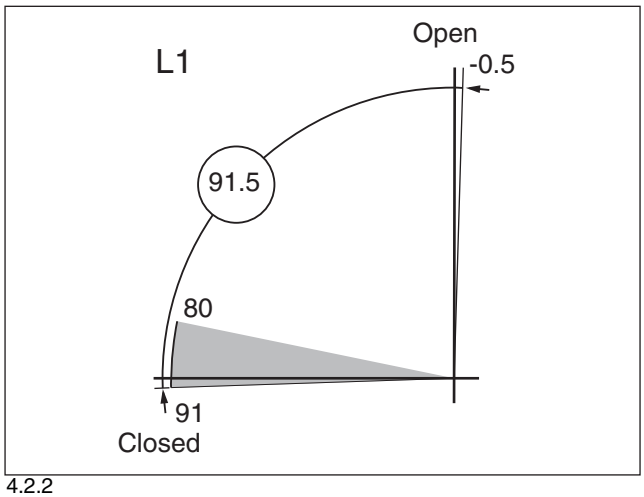
4.2.1

To achieve stroke adjustment, there are two actuator executions:

1- L1 One way limit stops
2- DSA Two way limit stops

4.2.2/4.2.3

Maximum stroke and adjustable stroke range of the L1 or DSA execution.



4.2.2

4.2 Hubbegrenzung

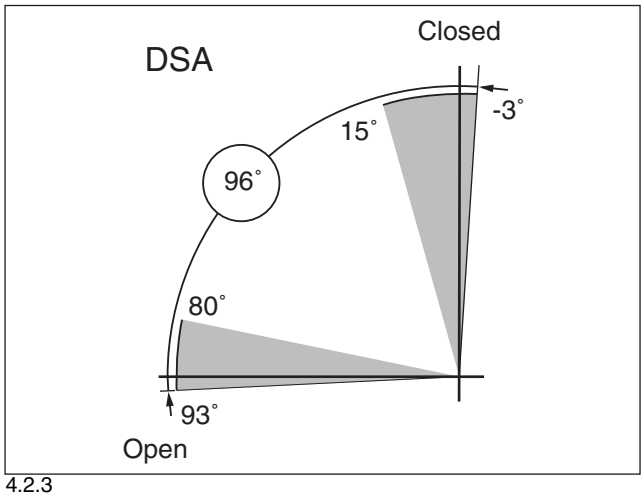
4.2.1

Für die Hubbegrenzung gibt es zwei Antriebsausführungen:

1- L1 einfache Hubbegrenzung
2- DSA doppelte Hubbegrenzung

4.2.2/4.2.3

Der Bereich des maximalen Hubs und des verstellbaren Hubs für die L1- oder DSA Ausführung.



4.2.3

Slagbegrenzing

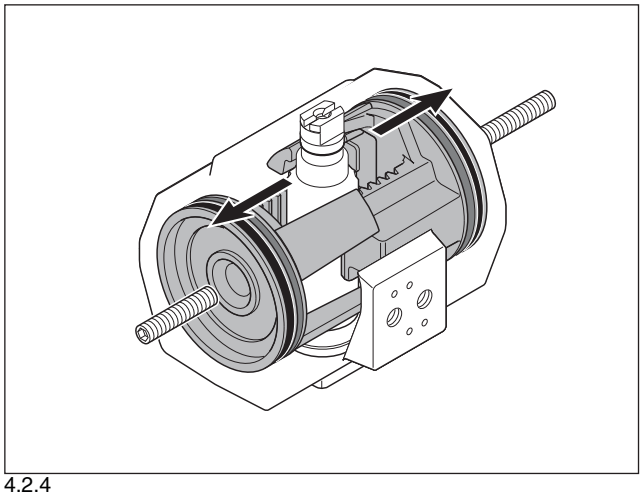
4.2.1

Ten behoeve van de slaginstelling bestaan er twee uitvoeringen van de aandrijvingen:

1- L1 enkelzijdige slagbegrenzing
2- DSA dubbelzijdige slagbegrenzing

4.2.2/4.2.3

Maximale slag en het bereik van de in te stellen slag van de L1- en de DSA uitvoering



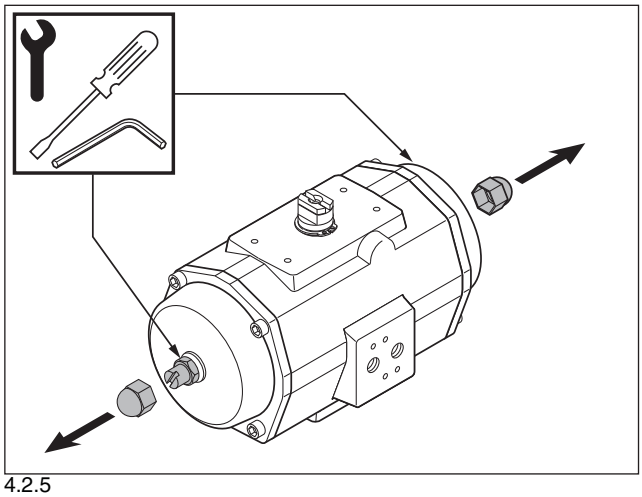
4.2.4

4.2.1 L1 one way stroke adjustment

The L1 one way stroke adjustment limits the outward movement of the pistons (see fig. 4.2.4). The double acting and the single acting actuators both have limit stop bolts in the end caps.

Procedure:

1. Mount the actuator on the valve (see chapter 4).
2. Remove nut covers, loosen the lock nuts and turn out the limit stop bolts 4 turns (see fig. 4.2.5). Select tool from table (see page 23).



4.2.5

4.2.1 Einstellen der einfacher Hubbegrenzung L1

Die Einstellung der einfacher Hubbegrenzung L1 begrenzt die Bewegung der Kolben beim Ausfahren (siehe Abb. 4.2.4). Die Begrenzungsschrauben für den doppeltwirkenden und den einfachwirkenden Antrieb befinden sich jeweils in den Endkappen.

Verfahren:

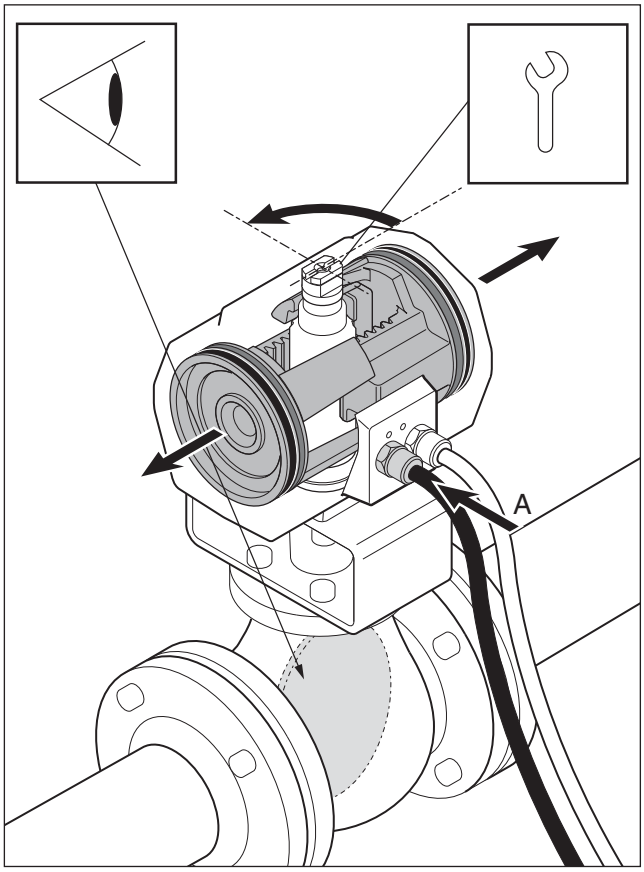
1. Montieren Sie den Antrieb auf das Ventil (siehe Kapitel 4).
2. Entfernen Sie die Schutzkappen, lockern Sie die Sicherungsmuttern und drehen Sie die Begrenzungsschrauben 4 Umdrehungen heraus (siehe Abb. 4.2.5). Wählen Sie das geeignete Werkzeug aus der Tabelle (siehe Seite 23).

4.2.1 Instellen van enkelzijdige slagbegrenzing L1

De L1-enkelzijdige slagbegrenzing begrenst de buitenwaartse beweging van de zuigers (zie afb. 4.2.4). De dubbel werkende en de enkel werkende aandrijvingen hebben beiden slagbegrenzingsbouten in de deksels.

Handelwijze:

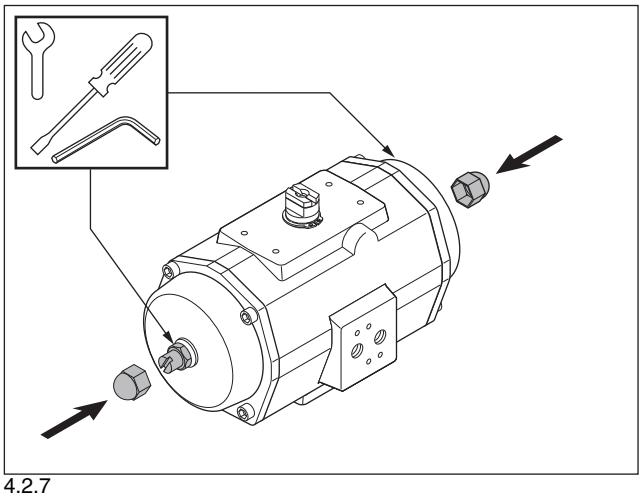
1. *Bevestig de aandrijving op de afsluiter (zie hoofdstuk 4).*
2. *Verwijder de moerbeschermkappen, draai de borgmoeren los en draai de slagbegrenzingsbouten 4 omwentelingen naar buiten (zie afb. 4.2.5). Kies het gereedschap uit de tabel (zie pagina 23).*



4.2.6

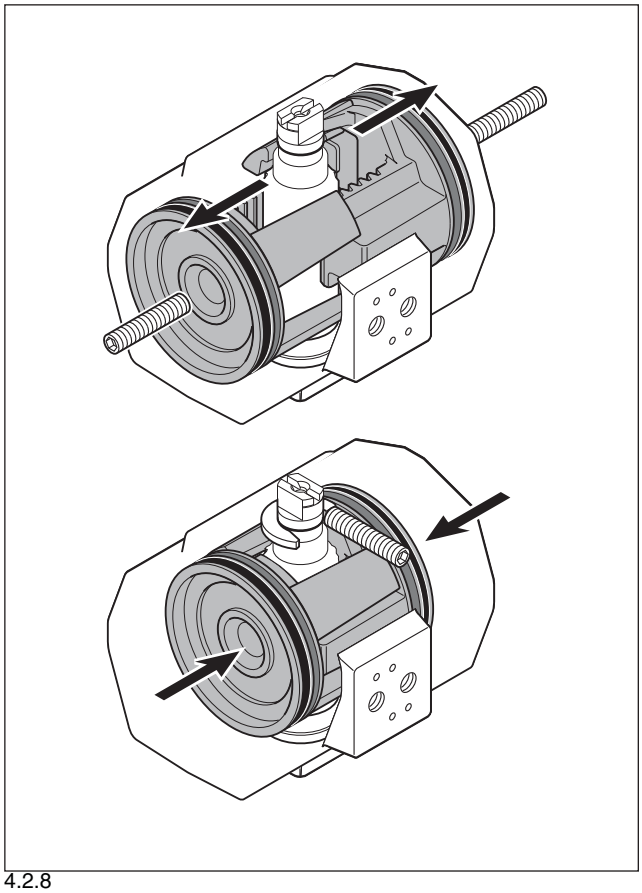
3. Turn actuator shaft until the valve is in the desired position (see fig. 4.2.6)
   Use some pressure on the “A” port.
   Use a wrench for accurate positioning.
4. Turn in both the limit stop bolts until an obstruction is felt (do not force) and lock the lock nut and place the nut covers
   (see fig. 4.2.7). Select tool from table (see page 23).

3. Drehen Sie die Antriebswelle, bis sich das Ventil in der gewünschten Position befindet (siehe Abb. 4.2.6). Geben Sie einen geringen Druck auf Anschluß "A" auf. Verwenden Sie zur genauen Positionierung einen Maulschlüssel.
4. Drehen Sie die beiden Begrenzungsschrauben hinein, bis Sie einen Widerstand verspüren (keine übermäßige Kraft aufwenden), verriegeln Sie die Sicherungsmutter und setzen Sie die Schutzkappen wieder auf (siehe Abb. 4.2.7). Wählen Sie das geeignete Werkzeug aus der Tabelle (siehe Seite 23).



4.2.7

3. Draai de aandrijvingsas, totdat de afsluiter op de gewenste positie staat (zie afb. 4.2.6). Zet een beetje druk op de “A”-poort.
   Gebruik een steeksleutel voor nauwkeurige positionering.
4. Draai de beide slagbegrenzingsbouten naar binnen, totdat u weerstand voelt (gebruik geen kracht), zet de borgmoer vast en plaats de moerbeschermkappen (zie afb. 4.2.7). Kies het gereedschap uit de tabel (zie pagina 23).



4.2.8

4.2.2 DSA two way stroke adjustment

The DSA two way stroke adjustment limits the outward and the inward movement of the pistons (see fig. 4.2.8). The double acting and the single acting actuators both have limit stop bolts in the end caps to limit the outward stroke. The bolt above the air connection interface limits the inward stroke.

Procedure:

1. Mount the actuator on the valve (see chapter 4).

4.2.2 Einstellen der doppelter Hubbegrenzung DSA /

Die Einstellung der doppelter Hubbegrenzung DSA begrenzt die Bewegung der Kolben beim Aus- und Einfahren (siehe Abb. 4.2.8). Die Begrenzungsschrauben für den doppeltwirkenden und den einfachwirkenden Antrieb, die den Ausfahrhub begrenzen, befinden sich jeweils in den Endkappen. Die Schraube über dem Luftanschluß begrenzt den Einfahrhub.

Verfahren:

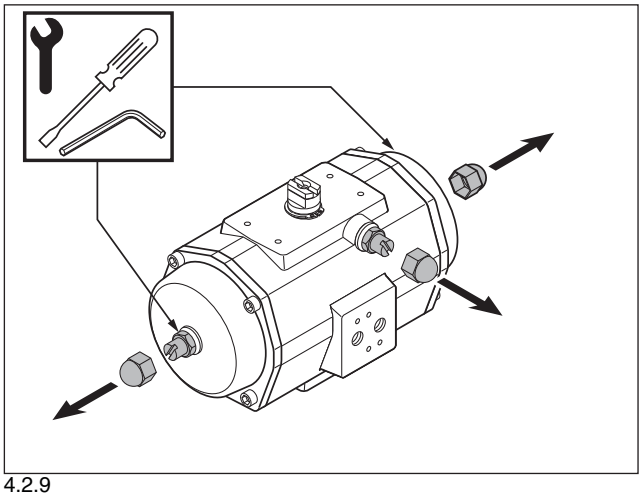
1. Montieren Sie den Antrieb auf das Ventil (siehe Kapitel 4).

4.2.2 *Instellen van dubbelzijdige slagbegrenzing DSA*

De DSA-dubbelzijdige slagbegrenzing begrenst de buitenwaartse en de binnenwaartse beweging van de zuigers (zie afb. 4.2.8). De dubbel werkende en de enkel werkende aandrijvingen hebben beiden slagbegrenzingsbouten in de deksels ter begrenzing van de buitenwaartse slag. De bout boven het luchtaansluitvlak begrenst de binnenwaartse slag.

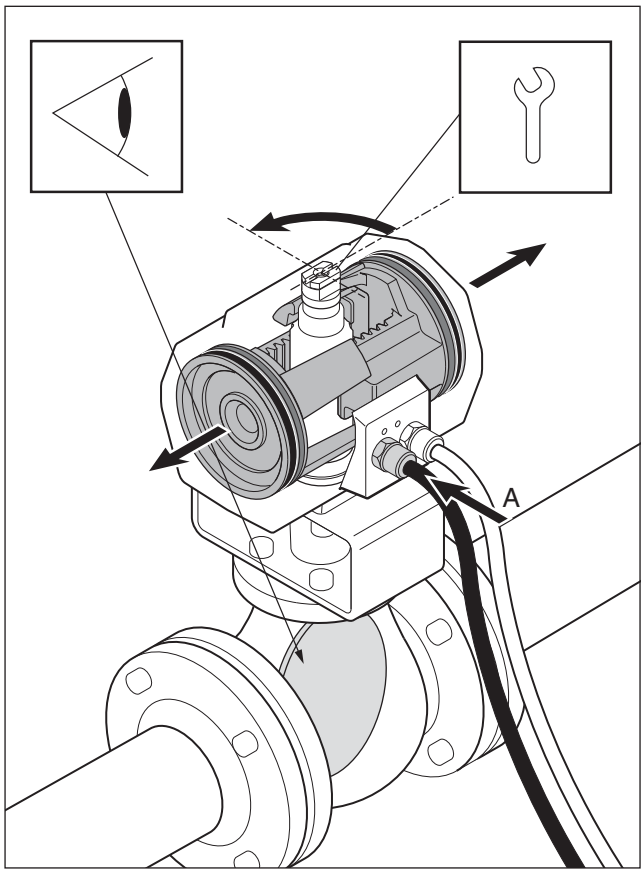
***Handelwijze**:*

1. *Bevestig de aandrijving op de afsluiter (zie hoofdstuk 4).*



4.2.9

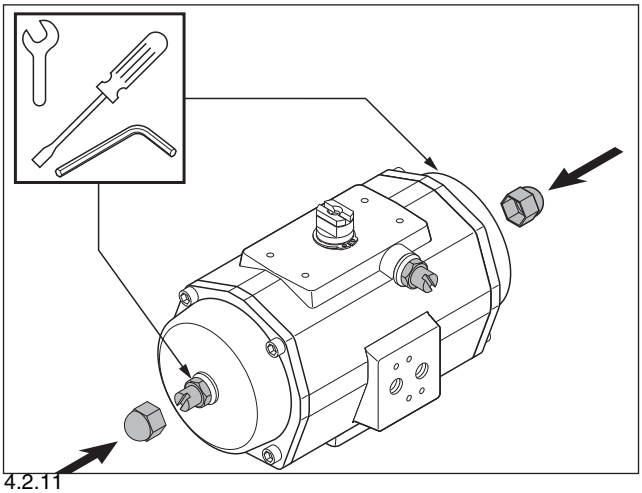
2. Remove nut covers, loosen the lock nuts and turn out the limit stop bolts 4 turns (see fig. 4.2.9).
3. Turn actuator shaft until the valve is in the desired position (see fig. 4.2.10).
   Use some pressure on the “A” port.
   Use a wrench for accurate positioning.



4.2.10

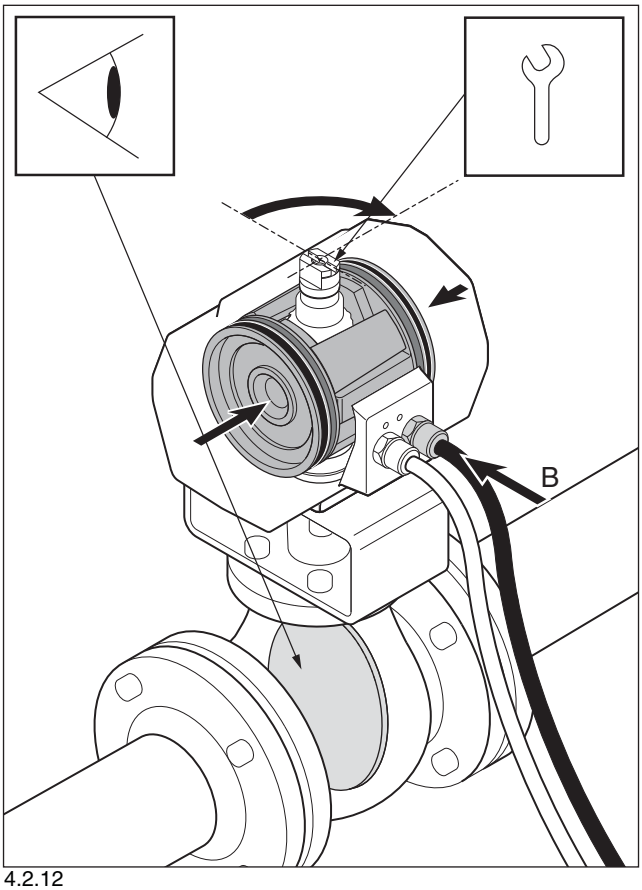
2. Entfernen Sie die Schutzkappen, lockern Sie die Sicherungsschrauben und drehen Sie die Begrenzungsschrauben 4 Umdrehungen heraus (siehe Abb. 4.2.9).
3. Drehen Sie die Antriebswelle, bis sich das Ventil in der gewünschten Position befindet (siehe Abb. 4.2.10). Geben Sie einen geringen Druck auf Anschluß "A" auf. Verwenden Sie zur genauen Positionierung einen Maulschlüssel.

2. Verwijder de moerbeschermkappen, draai de borgmoeren los en draai de slagbegrenzingsbouten 4 omwentelingen naar buiten (zie afb. 4.2.9).
3. Draai de aandrijvingsas, totdat de afsluiter op de gewenste positie staat (zie afb. 4.2.10). Zet een beetje druk op de “A”-poort. Gebruik een steeksleutel voor nauwkeurige positionering.



4.2.11

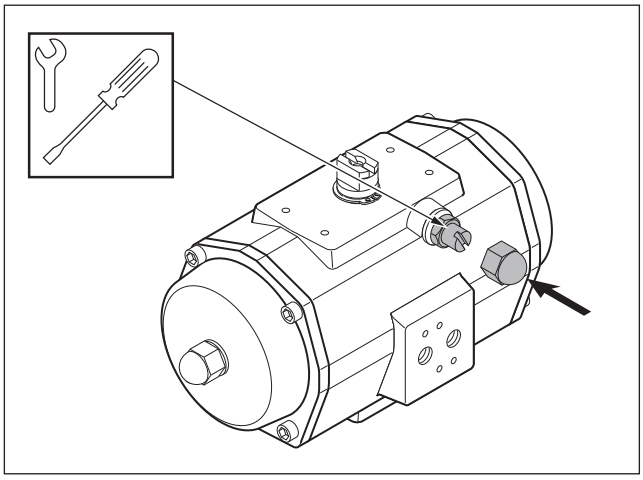
4. Turn in both the limit stop bolts until an obstruction is felt (do not force) and lock the lock nut and place the nut covers (see fig 4.2.11). The outward stroke is now set.
5. Turn actuator shaft until the valve is in the desired position (see fig. 4.2.12).
   Use some pressure on the “B” port.
   Use a wrench for accurate positioning.



4.2.12

4. Drehen Sie die beiden Begrenzungsschrauben hinein, bis Sie einen Widerstand verspüren (keine übermäßige Kraft aufwenden), verriegeln Sie die Sicherungsmutter und setzen Sie die Schutzkappen wieder auf (siehe Abb. 4.2.11).
   Jetzt ist der Ausfahrhub eingestellt.
5. Drehen Sie die Antriebswelle, bis sich das Ventil in der gewünschten Position befindet (siehe Abb. 4.2.12). Geben Sie einen geringen Druck auf Anschluß "B" auf. Verwenden Sie zur genauen Positionierung einen Maulschlüssel.

4. *Draai de beide slagbegrenzingsbouten naar binnen, totdat u weerstand voelt (gebruik geen kracht), zet de borgmoer vast en plaats de moerbeschermkappen (zie afb. 4.2.11). De buitenwaartse slag is nu ingesteld.*
5. *Draai de aandrijvingsas, totdat de afsluiter op de gewenste positie staat (zie afb. 4.2.12). Zet een beetje druk op de “B”-poort. Gebruik een steeksleutel voor nauwkeurige positionering.*



4.2.13

6. Turn in the limit stop bolt until an obstruction is felt (do not force), lock the lock nut and place the nut covers (see fig 4.2.13). The inward stroke is now set.

6. Drehen Sie die Begrenzungsschraube hinein, bis Sie einen Widerstand verspüren (keine übermäßige Kraft aufwenden), verriegeln Sie die Sicherungsmutter und setzen Sie die Schutzkappe wieder auf (siehe Abb. 4.2.13). Jetzt ist der Einfahrhub eingestellt.

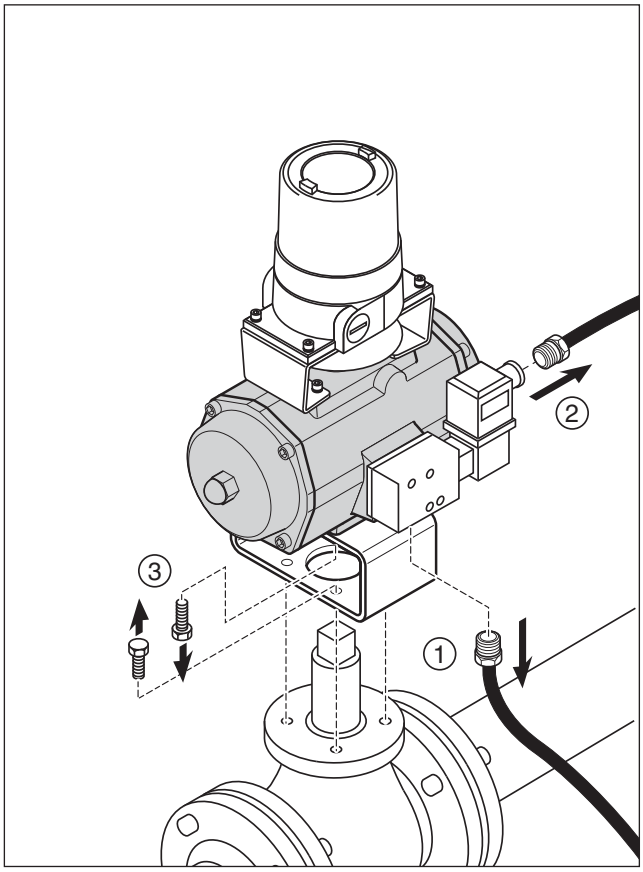
6. *Draai de slagbegrenzingsbout naar binnen, totdat u weerstand voelt (gebruik geen kracht), zet de borgmoer vast en plaats de moerbeschermkap (zie afb. 4.2.13).*
De binnenwaartse slag is nu ingesteld.

4.3 Tool table / Werkzeugtabelle / Gereedschapstabel

L1 limit stop bolts (in endcaps)					
Actuator type	**Nut**	**Bolt**	**Actuator type**	**Nut**	**Bolt**
ED25	W 10 mm	AK 3 mm	ED600 / 950	W 24 mm	W 11 mm
ED40 / 65	W 13 mm	AK 4 mm	ED1600	W 30 mm	W 11 mm
ED100 / 150 / 200	W 17 mm	AK 5 mm	PD2500	W 46 mm	W 17 mm
ED350	W 19 mm	AK 6 mm	PD4000	W 46 mm	W 17 mm
ES25 / 40	W 10 mm	SD 1.0x5.5 mm	ES600 / 950	W 24 mm	W 11 mm
ES65 / 100	W 13 mm	SD 1.0x5.5 mm	ES1600	W 30 mm	W 11 mm
ES 150 / 200	W 17 mm	SD 1.2x8.0 mm	PS2500	W 46 mm	W 17 mm
ES350	W 19 mm	SD 1.2x8.0 mm	PS4000	W 46 mm	W 17 mm
DSA Limit stop bolt (above air connection interface)					
Actuator type	**Nut**	**Bolt**	**Actuator type**	**Nut**	**Bolt**
E25	W 10 mm	SD 1.0x5.5 mm	E200 / 350	W 19 mm	SD 1.2x8.0 mm
E40 / 65	W 13 mm	SD 1.0x5.5 mm	E600 / 950	W 24 mm	W 11 mm
E100 / 150	W 17 mm	SD 1.2x8.0 mm	E1600	W 30 mm	W 11 mm

Limit stop bolt	: Hubbegrenzungsschraube	: Slagbegrenzingbout
Endcap	: Endkappe	: Deksel
Actuator type	: Antriebstyp	: Type aandrijving
Nut	: Mutter	: Moer
Bolt	: Schraube	: Schroef
AK = Allen key	: AK = Innensechskantschraube	: AK = Imbus sleutel
SD = Screwdriver	: SD = Schraubendreher	: SD = Schroevendraaier
W = Wrench	: W = Maulschlüssel	: W = Sleutel

5 DISASSEMBLY / DEMONTAGE / *DEMONTEREN*



5.1.1

5.1 Before starting

5.1.1

Caution! Never disassemble a valve that is under pressure!

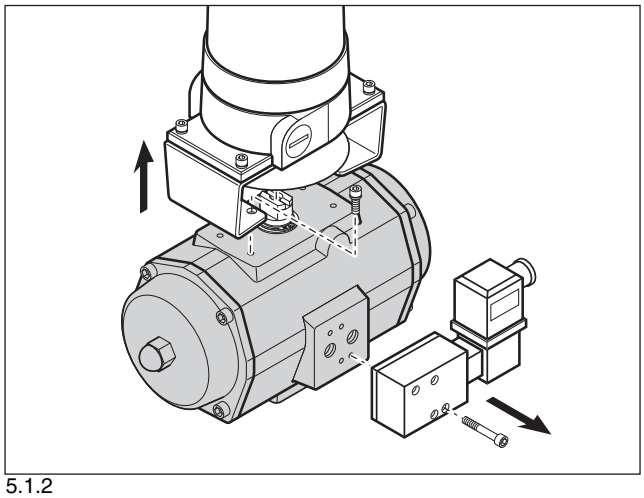
Caution! Ball valves and plug valves can trap pressurized media in the cavity. Isolate the piping system in which the actuator valve assembly is mounted and relieve any pressure on the valve.

5.1 Vor der Demontage

5.1.1

Achtung! Niemals eine unter Druck stehende Armatur demontieren!

Achtung! Kugel- und Kükenhähne können das Druckmedium in der Kammer einschließen. Das Rohr system, in das das Stellglied eingebaut ist, ist drucklos zu machen, um den an der Armatur anliegenden Restdruck zu entspannen.

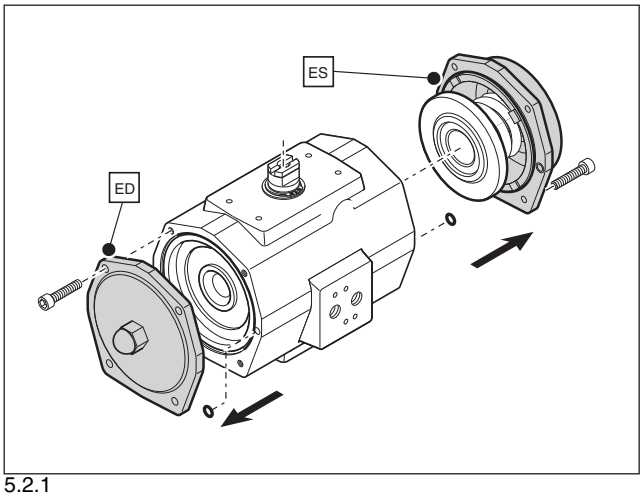

5.1.2

4.1 Alvorens te beginnen

5.1.1

Voorzichtig! Demonteer nooit een afsluiter die onder druk staat!

Voorzichtig! Kogelafsluiters en plugafsluiters kunnen drukmedia in de kamer vasthouden. Isoleer het buizenstelsel, waarin de aandrijving en afsluiter zijn gemonteerd, en haal de druk van de afsluiter.



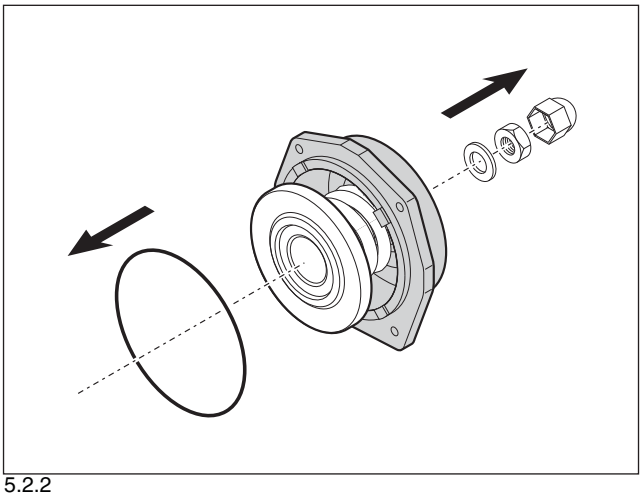
5.2.1

5.2 Removing endcaps type ES/ED 25 to ES/ED 350

5.2.1 / 5.2.2 / 5.2.3

Be careful not to damage the endcap O-rings.

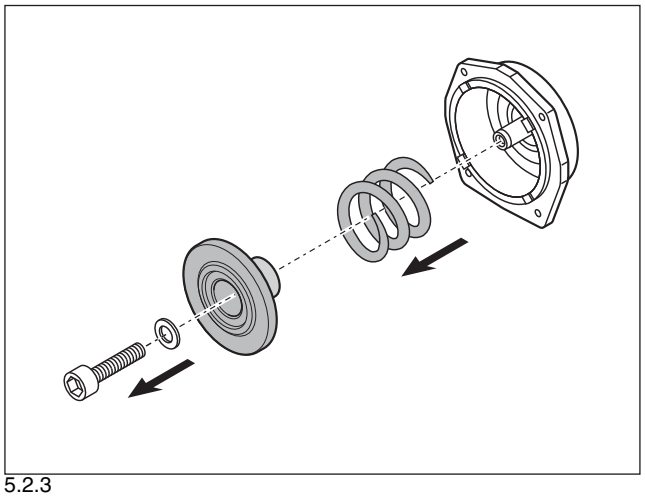
Caution! If the actuator is a "spring return" model, uniformly loosen all endcaps screws, two to three turns at a time, in sequence, to relieve pre-load of the springs. On all actuators with springs use caution when removing endcaps.


5.2.2

5.2 Endkappen Typ ES/ED 25 bis ES/ED 350 ausbauen

Beim Ausbauen darauf achten, daß die O-Ringe der Endkappen nicht beschädigt werden.

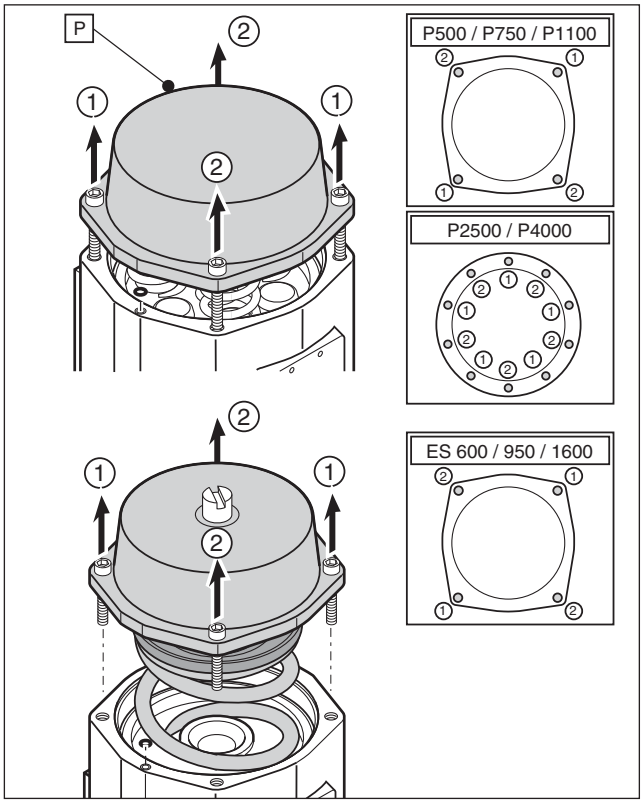
Achtung! Wenn es sich beim Antrieb um ein Typ mit Federrückstellung handelt, alle Endkappenschrauben gleichmäßig lösen. Jeweils immer nurzwei bis drei Schraubendrehungen gleichzeitig und nacheinander, um die Vorspannung der Federn zu senken. Seien Sie bei federrückstellenden Antrieben während der Demontage der Endkappen besonders vorsichtig.


5.2.3

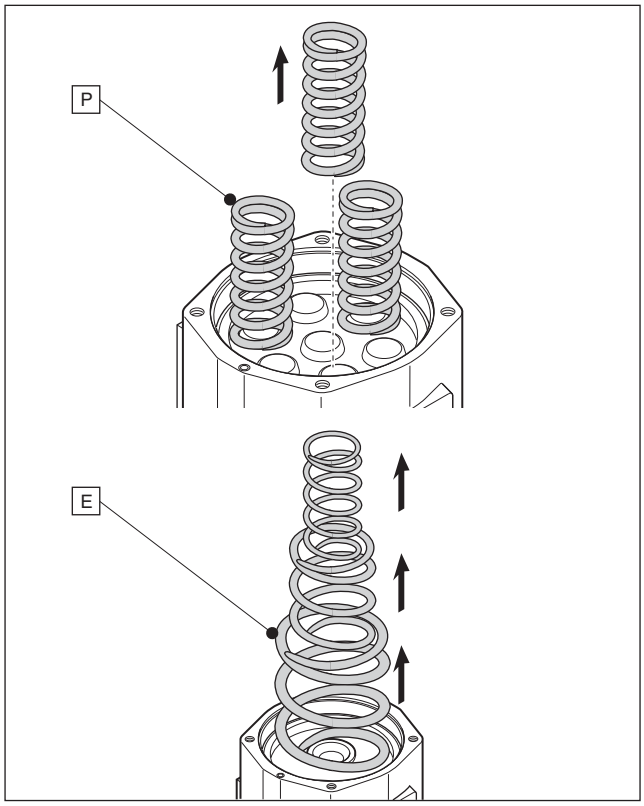
5.2 Deksels verwijderen type ES/ED 25 tot ES/ED 350

Let erop dat u de O-ringen van de sluitkap niet beschadigt.

Voorzichtig! Als de aandrijving een “veerretour”-model is: draai alle schroeven van de deksels gelijkmatig los, twee tot drie slagen per keer en kruislings, om de voorspanning van de veren af te halen.
Wees bij alle aandrijvingen met veren voorzichtig bij het verwijderen van deksels.



5.3.1



5.3.2

5.3 Removing endcaps type PE/PS and ES 600 to 1600

5.3.1 / 5.3.2

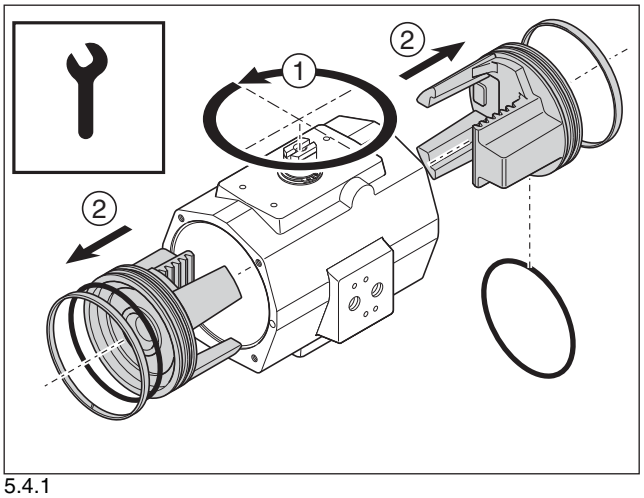
Caution! If the actuator is a "spring return" model, first loosen screws 1, then uniformly loosen all endcap screws 2, two to three turns at a time, in sequence, to relieve pre-load of the springs.
On all actuators with springs use caution when removing endcaps.

5.3 Endkappen Typ PE/PS und ES 600 bis 1600 ausbauen

Achtung! Wenn es sich beim Antrieb um ein Typ mit Federrückstellung handelt, zuerst die Schrauben mit der Nummer 1 lösen, danach gleichmäßig alle Endkappenschrauben mit der Nummer 2 lösen. Dabei jeweils immer nur zwei bis drei Schraubendrehungen gleichzeitig und nacheinander, um die Vorspannung der Federn zu senken.
Seien Sie bei federrückstellenden Antrieben während der Demontage der Endkappen besonders vorsichtig.

5.3 Deksels verwijderen type PE/PS en ES 600 tot 1600

***Voorzichtig**! Als de aandrijving een "veerretour"-model is: draai eerst schroeven 1 los, draai vervolgens alle schroeven 2 van de deksels gelijkmatig los, twee tot drie slagen per keer en kruislings, om de voorspanning van de veren af te halen.*
Wees bij alle aandrijvingen met veren voorzichtig bij het verwijderen van deksels.



5.4.1

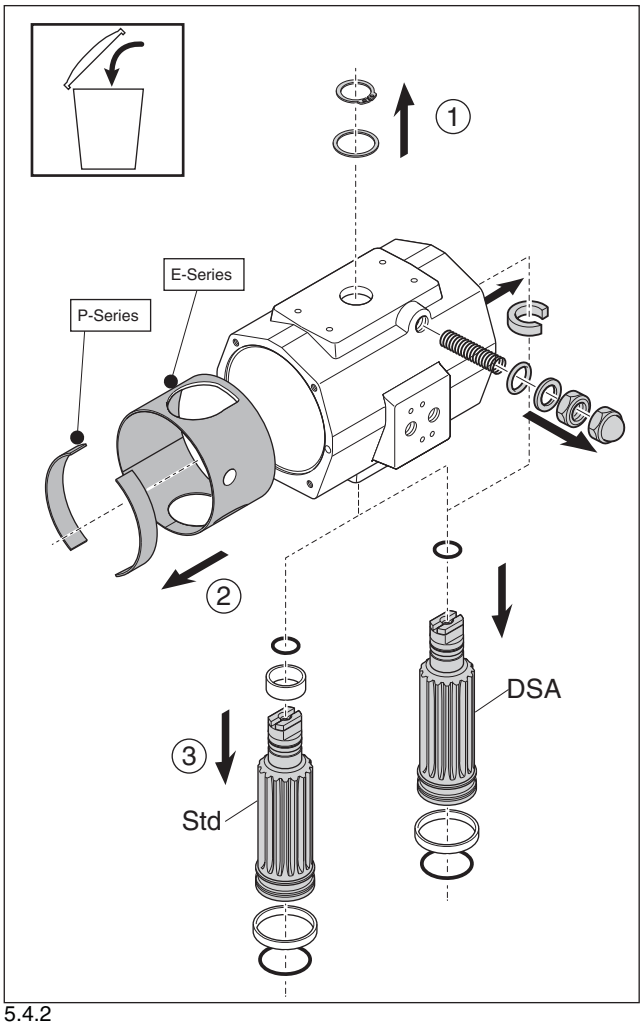
5.4 Removing Pistons/Spindle, E- and P-series

5.4.1

The two pistons can now be removed by rotating the actuator shaft.

5.4.2

In case of a DSA actuator first remove the DSA-cam through the bore of the housing.
Then take out the shaft.



5.4.2

5.4 Kolben/Wellen, E- und P-Serie, ausbauen

5.4.1

Die beiden Kolben werden nun durch Drehen der Antriebswelle ausgebaut.

5.4.2

Bei einem DSA Antrieb zuerst den DSA-Nocken durch die Bohrung des Gehäuses entfernen. Dann die Welle herausnehmen.

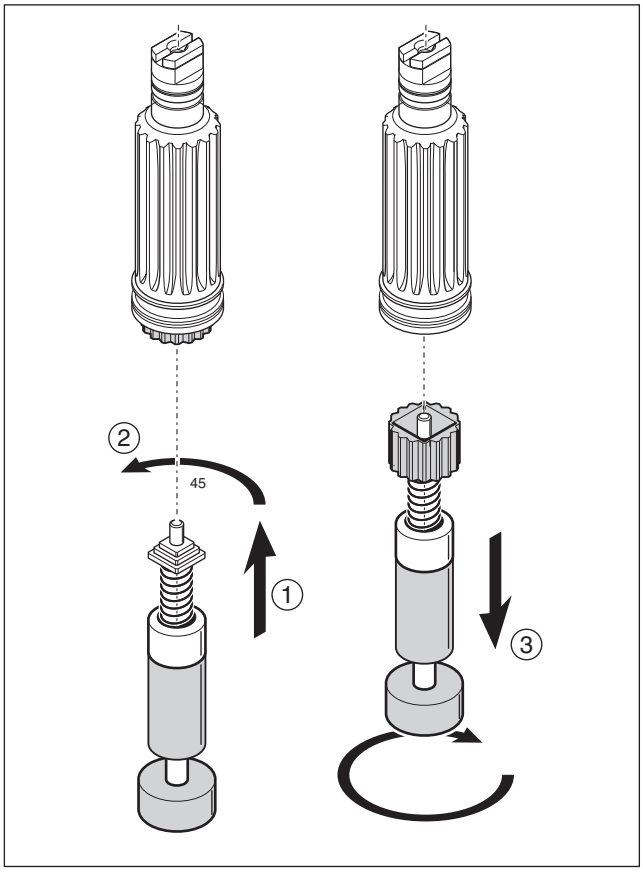
5.4 Zuigers/spindel verwijderen, E- en P-serie

5.4.1

De twee zuigers kunnen nu verwijderd worden door de as van de stelaandrijving te draaien.

5.4.2

In geval van een DSA aandrijving eerst de DSA-nok verwijderen door de boring van het huis.
Dan de as verwijderen.



5.5.1

5.5 Removing insert

5.5.1

Insert removal requires the use of the extractor part No. 590.00.001 for square sizes 11, 14 and 17.
Part No 590.00.002 is used for square sizes 19, 22 and 27.

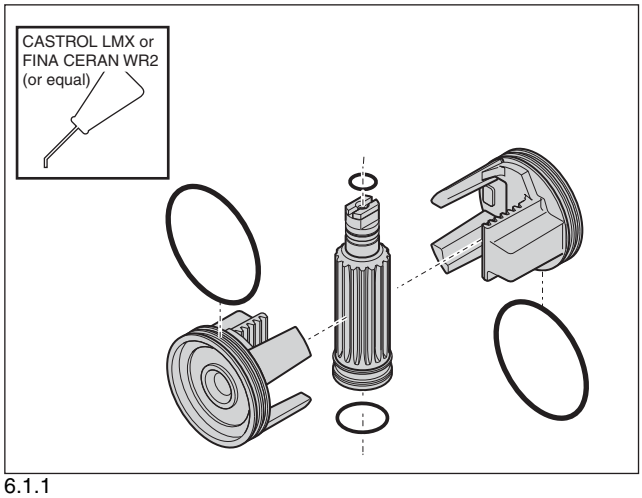
5.5 Insert ausbauen

Für den Ausbau der Inserts benötigen Sie das Werkzeug Artikelnr. 590.00.001 für die Vierkantgrößen 11, 14 und 17.
Werkzeug Artikelnr. 590.00.002 wird für die Vierkantgrößen 19, 22 und 27 benötigt.

5.5 Insert verwijderen

Om de insert te verwijderen moet u gebruik maken van de extractor art.nr. 590.00.001 voor vierkantafmetingen 11, 14 en 17.
Art.nr. 590.00.002 wordt gebruikt voor vierkantafmetingen 19, 22 en 27.

6 REASSEMBLY / ZUSAMMENBAU / *OPNIEUW MONTEREN*



6.1.1

6.1 Reassembly guide band and shaft

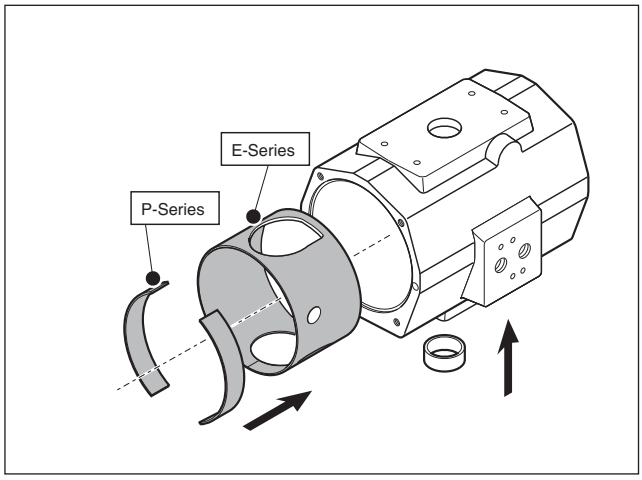
Before reassembly check the requested assembly code (see chapter 4).

6.1.1

Apply a light film of grease to all O-Rings and on the gear teeth.

6.1.3

In case of a DSA actuator mount the DSA-cam through the bore of the housing on top of the shaft.



6.1.2

6.1 Zusammenbau von Führungsband und Antriebswelle

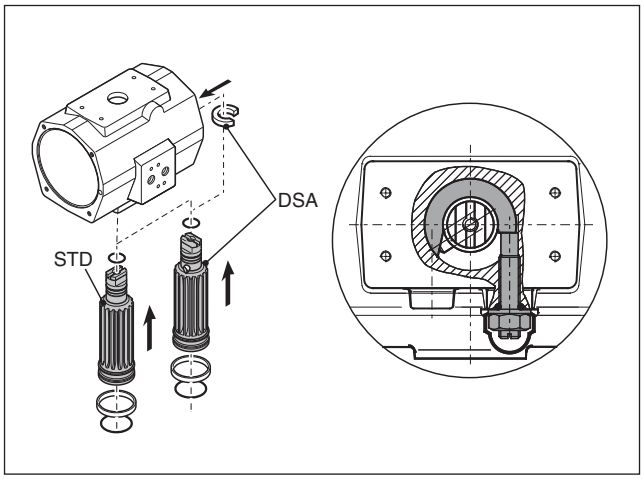
Kontrollieren Sie vor dem Zusammenbau den gewünschten Aufbaucode (siehe Kapitel 4)!

6.1.1

Alle O-Ringe und Verzahnungen einfetten.

6.1.3

Bei einem DSA Antrieb den DSA-Nocken durch die Bohrung des Gehäuses auf der Welle montieren.



6.1.3

6.1 Opnieuw monteren van geleideband en as

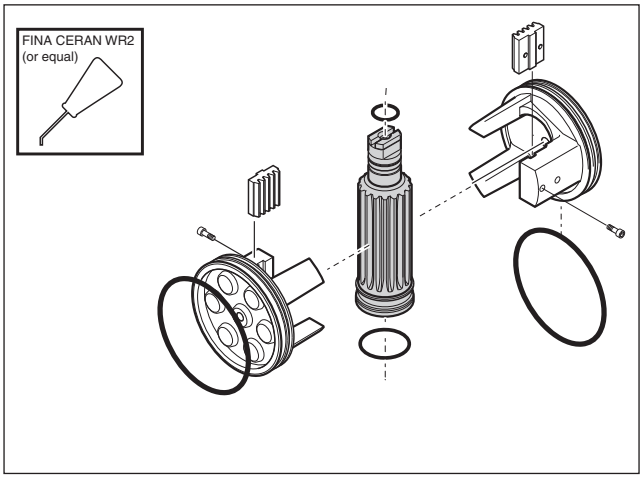
Kontroleer voor het opnieuw monteren de gewenste montagecode (zie hoofdstuk 4).

6.1.1

Breng op alle O-ringen en de tanden van de overbrenging een dunne laag smeervet aan

6.1.3

In geval van een DSA aandrijving de DSA-nok door de boring van het huis op de as monteren.



6.2.1

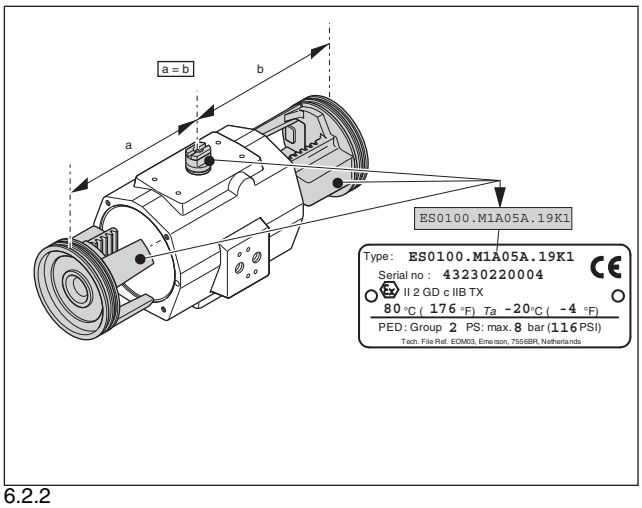
6.2 Reassembly pistons

6.2.1

Align the pinion gear so that the teeth on the center gear will “pick-up” the pistons assembly’s rack teeth when turning the top extension of the center gear clockwise (CW) or counter clockwise (CCW) according assembly code (see page 9).

6.2.3

Ensure that smooth movement and 90 degree operation can occur without moving the pistons out of the actuator body.



6.2.2

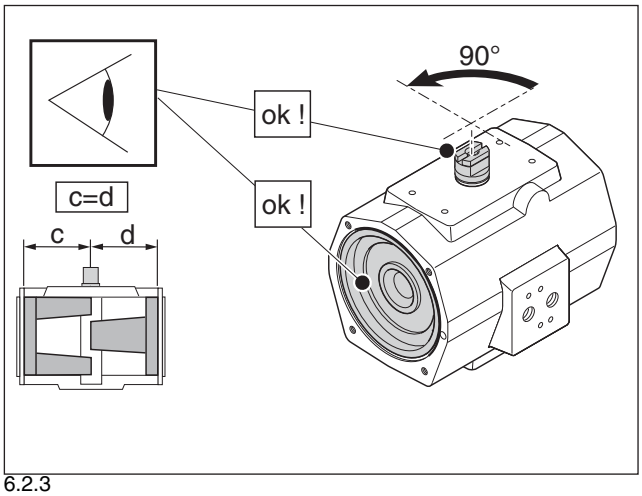
6.2 Zusammenbau von Kolben

6.2.1

Die verzahnte Welle so ausrichten, daß die Zähne die Innenverzahnung die beiden Kolben erfaßt, wobei das obere Wellenende entweder im Uhrzeigersinn oder gegen den Uhrzeigersinn (je nach Aufbaucode, siehe Seite 9) gedreht wird. Beachten Sie bitte, daß die Schlüsselfläche bzw. Nut am oberen Wellenende entweder parallel oder um 90° versetzt um Antrieb steht.

6.2.3

Beachten Sie, daß eine reibungslose Bewegung im 90°-Winkel möglich ist, ohne daß dabei die Kolben aus dem Antriebsgehäuse herausragen.



6.2.3

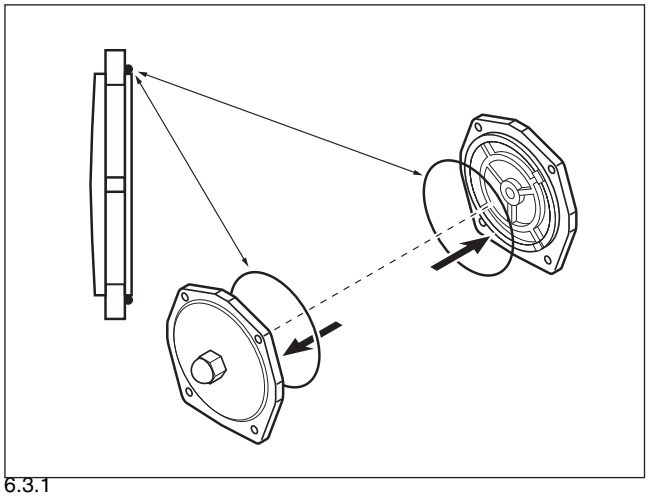
6.2 Opnieuw monteren van zuigers

6.2.1

Richt de tandoverbrenging zodanig uit dat de tanden op de as de heugeltanden van de zuiger zullen “oppakken”, als het bovenstuk van de as met de wijzers van de klok mee of tegen de klok in wordt gedraaid naar gelang de montage code (zie pagina 9).

6.2.3

Controleer op een soepele beweging en een verdraaiing van 90 graden, zonder dat de zuigers uit de behuizing van de aandrijving naar buiten komen.

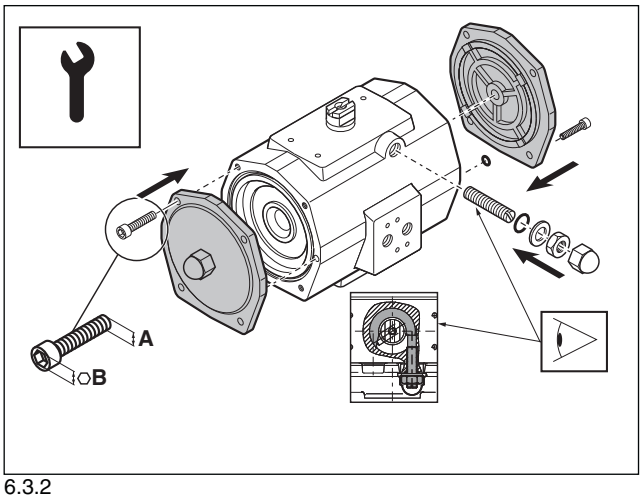


6.3.1

6.3 Reassembly endcaps double acting actuators

6.3.2

Ensure that endcap O-rings (A) and airport O-rings (B) are in place on both sides.



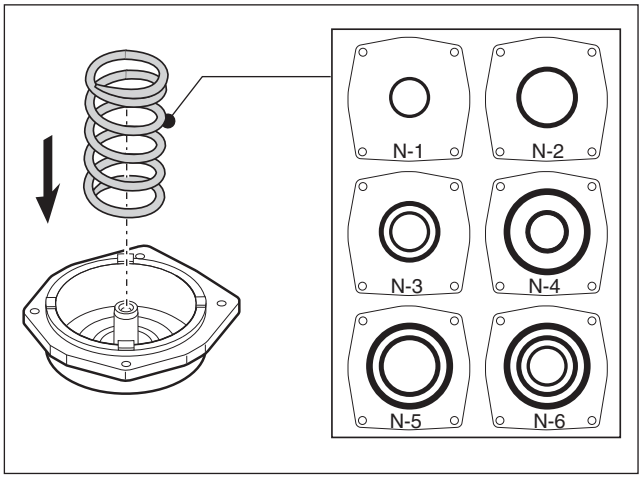
6.3.2

6.3 Zusammenbau Endkappen doppeltwirkende Antriebe

Beachten Sie, daß die O-Ringe der Endkappen (A) und Luftzufuhröffnungen (B) auf beiden Seiten eingesetzt werden.

6.3 Opnieuw monteren deksels van dubbelwerkende aandrijvingen

Plaats de O-ringen van de deksels (A) en de O-ringen van de luchtpoorten (B) aan beide zijden.

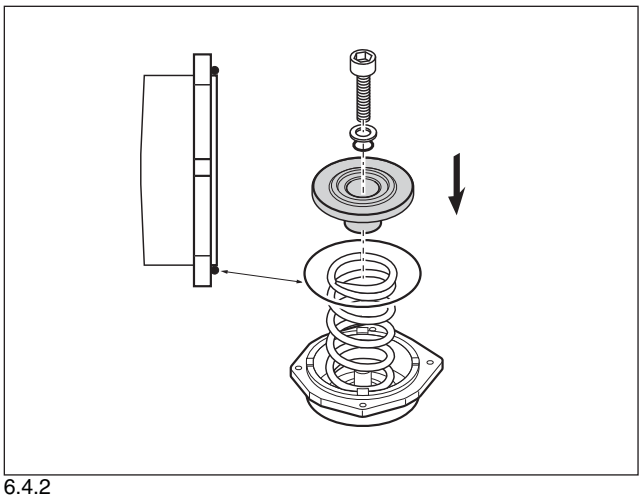


6.4.1

6.4 Reassembly endcaps single acting actuators ES25 - ES350

6.4.1
When replacing springs in a spring return actuator, ensure that the springs are replaced in their identical position in the spring pack from where they were removed.

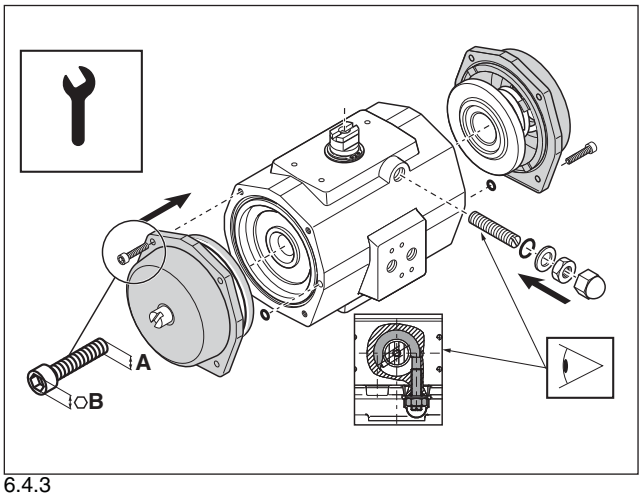
6.4.3
Ensure that endcap O-rings and airport O-rings are in place on both sides.


6.4.2

6.4 Zusammenbau Endkappen einfachwirkende Antriebe ES25 - ES350

6.4.1
Beachten Sie beim Wechseln der Federn im Antrieb mit Federrückstellung, daß die Fe-dern an ihrem ursprünglichen Platz eingebaut werden.

6.4.3
Beachten Sie, daß die O-Ringe der Endkappen und Luftzufuhröffnungen auf beiden Seiten eingesetzt werden.

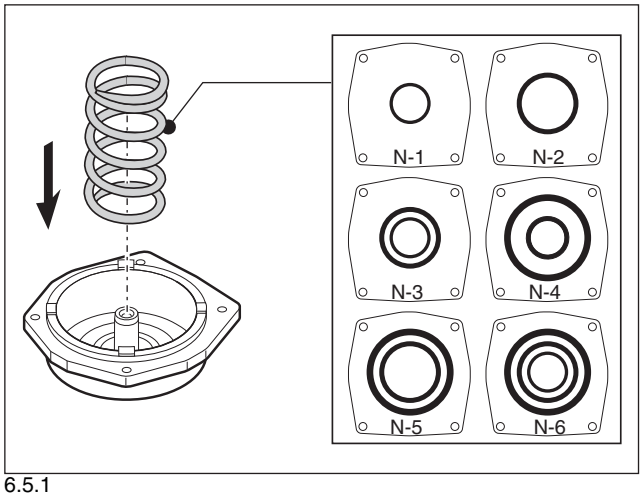


6.4.3

6.4 Opnieuw monteren deksels van enkelwerkende aandrijvingen ES25 - ES350

6.4.1
Zorg er bij het vervangen van veren in een veerretour-aandrijving voor dat de veren op exact dezelfde plaats in het verenpakket worden geplaatst, waar ze zijn verwijderd.

6.4.3
Plaats de O-ringen van de deksels en de O-ringen van de luchtpoorten aan beide zijden.

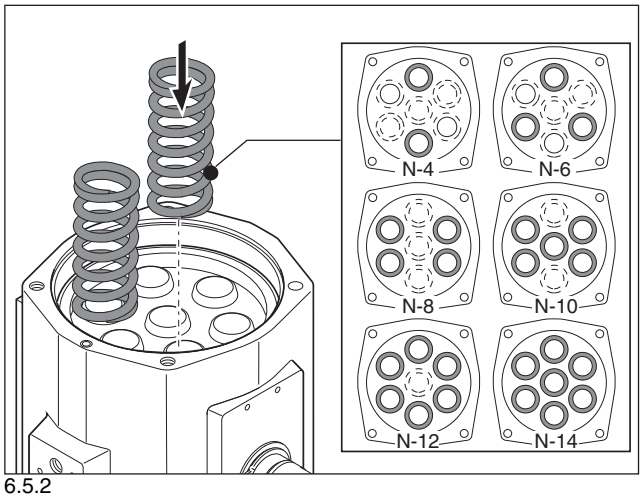


6.5.1

6.5 Reassembly endcaps single acting actuators ES600 - PS4000

6.5.1 / 6.5.2 / 6.5.3

When replacing springs in a spring return actuator, ensure that the springs are replaced in their identical position in the endcap from where they were removed. Before assembling the springs and endcaps, make sure that the pistons are pushed inside the body.

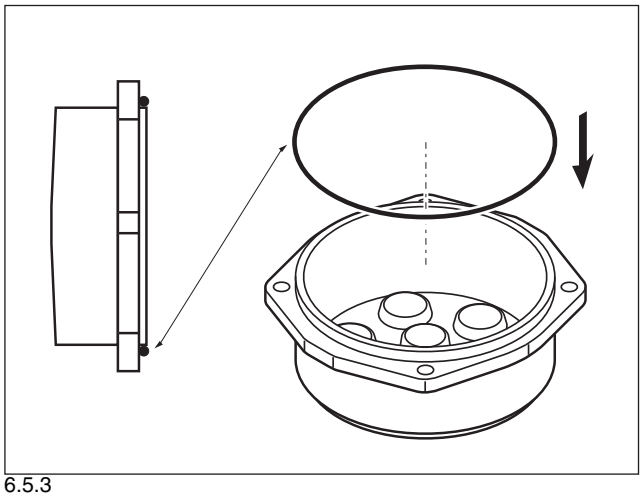


6.5.2

6.5 Zusammenbau Endkappen einfachwirkende Antriebe ES600 - PS4000

6.5.1 / 6.5.2 / 6.5.3

Beachten Sie, beim Wechsel der Federn im Antrieb mit Federrückstellung, daß die Federn an ihrem ursprünglichen Platz in der Endkappe eingebaut werden. Beachten Sie vor der Montage der Federn und Endkappen, daß die Kolben in den Antrieb hineingedrückt wurden.

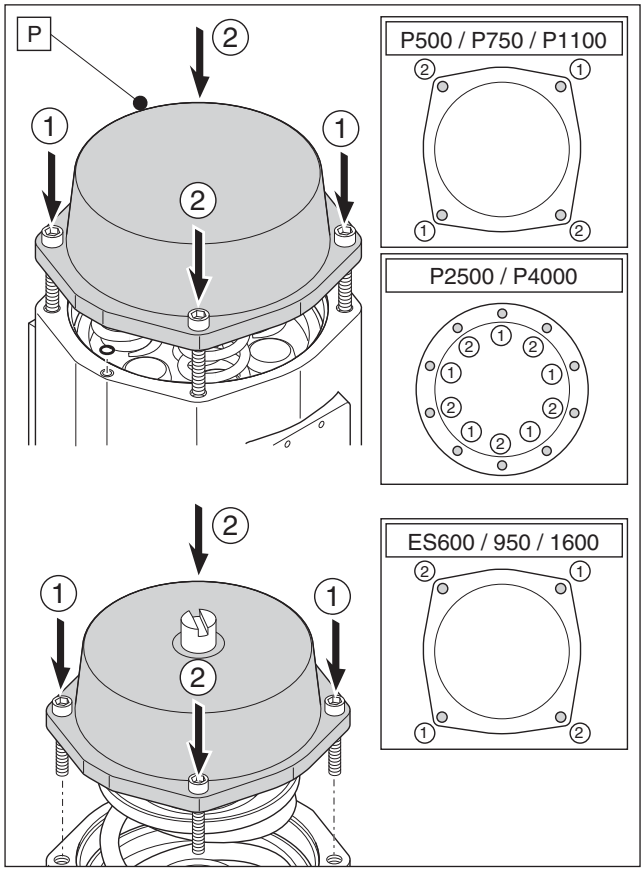


6.5.3

6.5 Opnieuw monteren deksels van enkelwerkende aandrijvingen ES600 - PS4000

6.5.1 / 6.5.2 / 6.5.3

Zorg er bij het vervangen van veren in een veerretour-aandrijving voor dat de veren op exact dezelfde plaats in de deksel worden geplaatst, waar ze zijn verwijderd. Zorg ervoor dat de zuigers naar binnen zijn, voordat u de veren en deksels monteert.



6.5.4

6.5.4

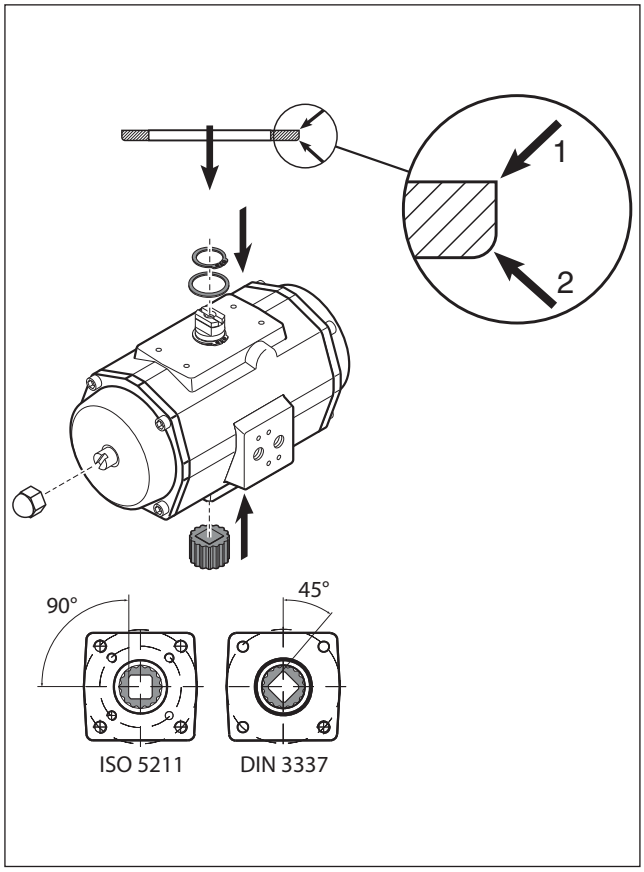
Engage the bolts with the tapped holes in the actuator body by forcing down slightly on the cap. Tighten each bolt in small and equal turns.

6.5.4

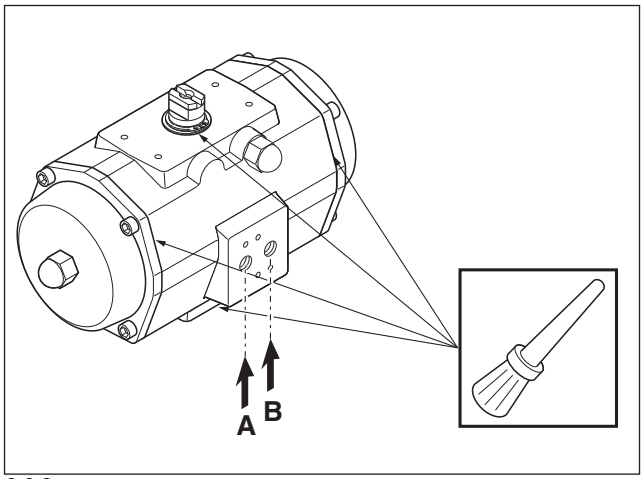
Die Schrauben mit leichtem Druck auf die Endkappe in die Gewindelöcher des Antriebsgehäuses einführen. Jede Schraube mit kurzen und gleichen Schraubendrehungen abwechselnd festschrauben.

6.5.4

Plaats de bouten in de schroefgaten in de behuizing van de aandrijving door de kap lichtjes naar beneden te drukken. Draai elke bout met kleine en gelijkmatige bewegingen vast.



6.6.1



6.6.2

6.6 Reassembly of springclip and insert

6.6.1

Install the new circlip onto its mating groove on the top shaft extension and with the non sharp edge (2) towards the housing and the sharp edge (1) towards the top of the shaft.

Check proper functioning by applying pressure to the A-port or B-port (see chapter 3).

6.6.2

Apply pressure to the A-port and use some soapsuds around shaft top and shaft bottom to check for air leakage. Apply pressure to the B-port and use some soapsuds around the endcaps to check for air leakage.

6.6 Zusammenbau von Seegerring und Insert

6.6.1

Den neuen Sicherungsring auf die dafür vorgesehene Rille am oberen Wellenende montieren und mit dem nicht scharfen Kante (2) in Richtung des Gehäuses und mit dem scharfen Kante (1) in Richtung oberen Wellenende.

Kontrollieren Sie die richtige Funktion des Antriebs durch anschliessen von Zuluft am Anschluß A und / oder B (siehe Kapitel 3).

6.6.2

Schließen Sie die Luftzufuhr am Anschluß A an und und verwenden Sie Seifenwasser an der Wellenoberseite und Wellenunterseite zur Kontrolle der Luftdichtigkeit. Schließen Sie am Anschluß B die Zuluft an und verwenden Sie Seifenwasser an den Endkappen zur Kontrolle der Luftdichtigkeit.

6.6 Opnieuw monteren van Seegerring en insert

6.6.1

Installeer de nieuwe veerring in de corresponderende groef op de astop en met de niet scherpe rand (2) richting de behuizing en de scherpe rand (1) richting de astop.

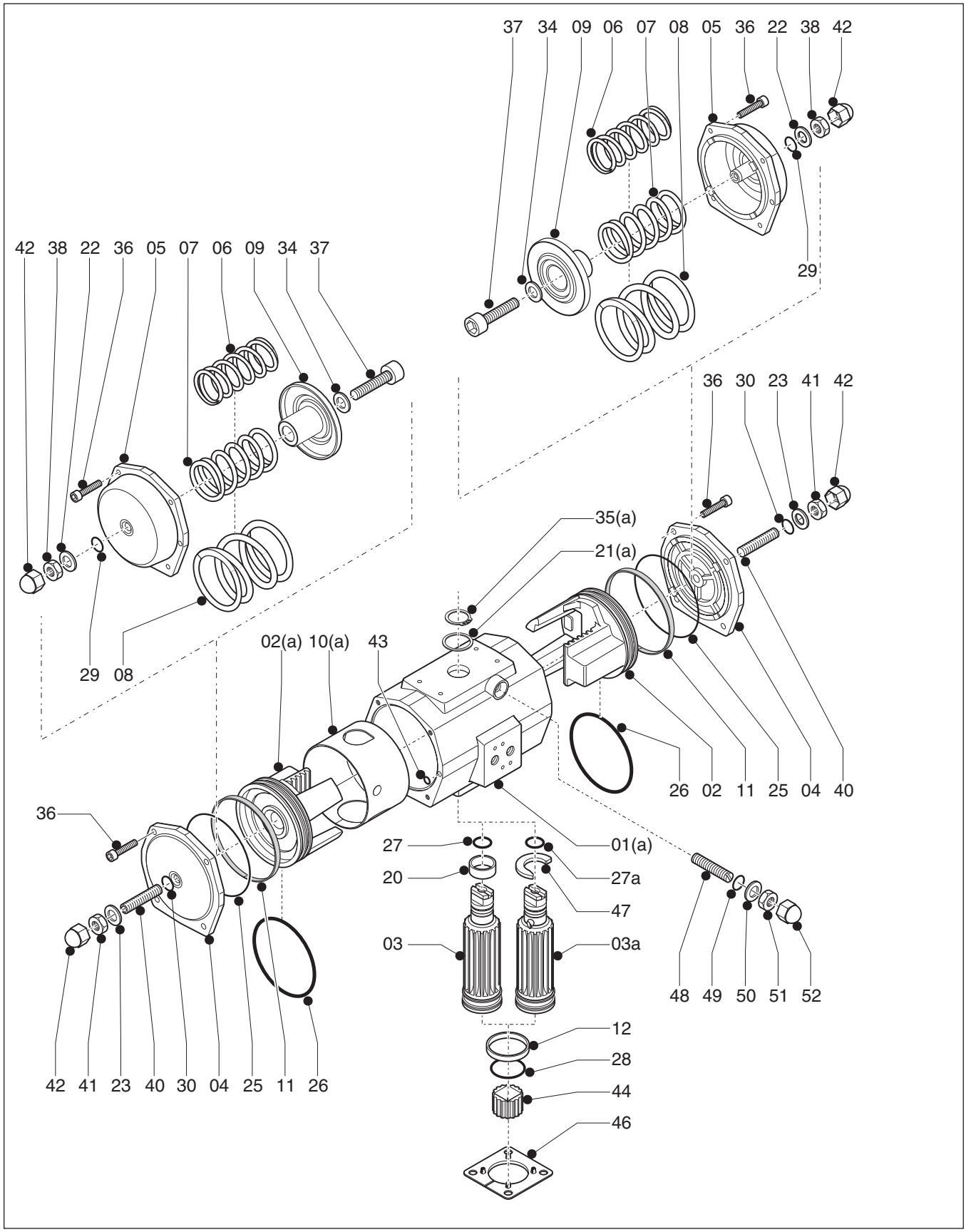
Kontroleer het juist functioneren door luchtdruk aan te sluiten op de A-poort of de B-poort (zie hoofdstuk 3).

6.6.2

Zet luchtdruk op de A-poort en gebruik zeepsop rond as-top en as-einde voor kontrole van de luchtdichtheid. Zet luchtdruk op de B-poort en gebruik zeepsop rond de deksels voor kontrole van de luchtdichtheid.

7 *PARTS LIST* / STÜCKLISTE / STUKLIJSTEN

7.1 E-serie



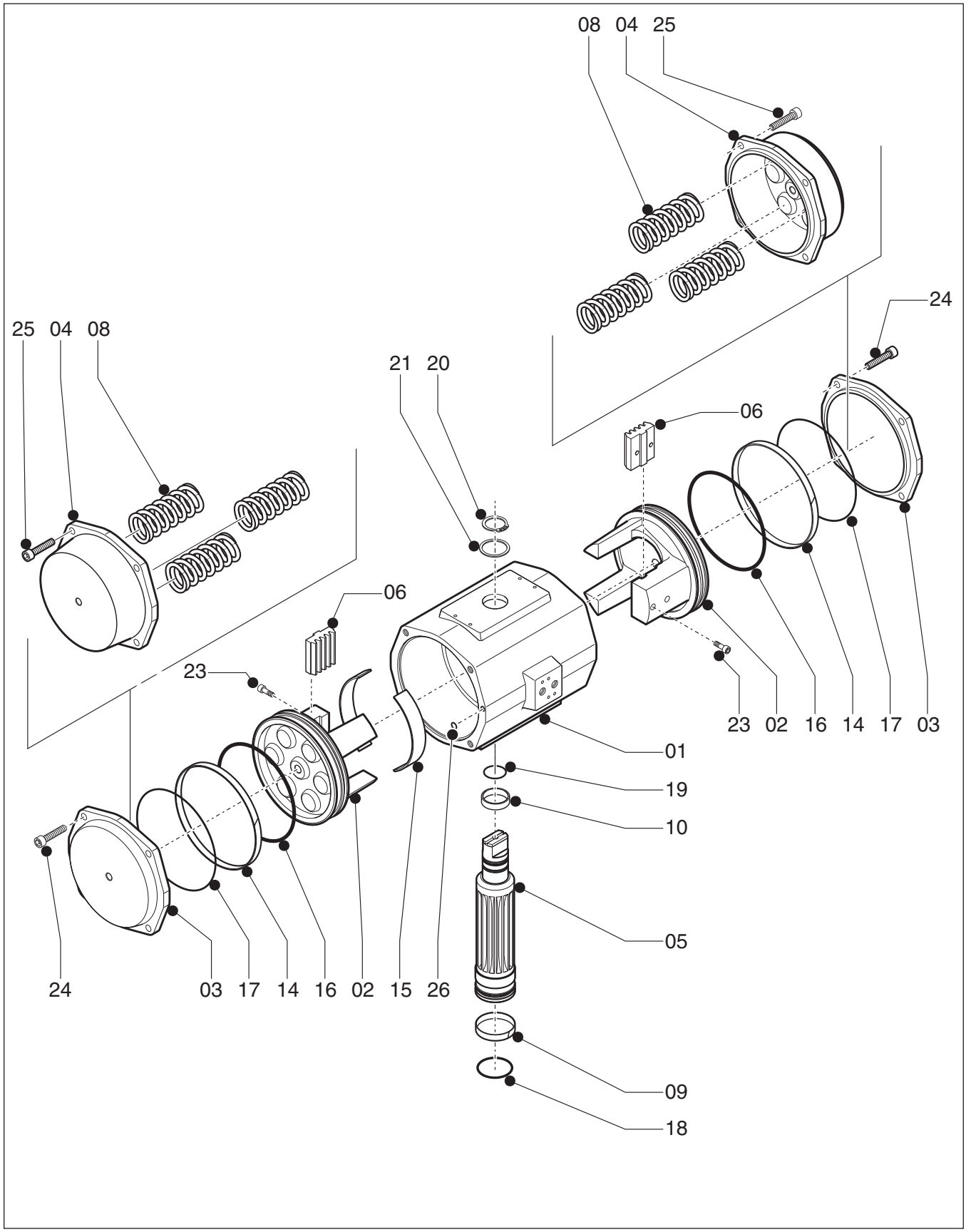
Pos.	Qty. St.Z. Aant.	Description	Bezeichnung	Benaming	Specification Spezifikation Specificatie
1	1	Body	Gehäuse	Behuizing	GAlSi10Mg, DIN 1725/2
1a	1	Body DSA	Gehäuse DSA	Behuizing DSA	GAlSi10Mg, DIN 1725/2
2	1	Piston	Kolben	Zuiger	GAlSi7Mg, DIN 1725/2
2a	1	Piston DSA	Kolben DSA	Zuiger DSA	GAlSi7Mg, DIN 1725/2
3	1	Drive Shaft	Antriebswelle	Aandrijfas	AlZnMGCu1.5, DIN 1725/1
3a	1	Drive Shaft DSA	Antriebswelle DSA	Aandrijfas DSA	AlZnMGCu1.5, DIN 1725/1
4	2	End Cap ED	Endkappe ED	Deksel ED	GDAlSi9Cu3, DIN1725/2
5	2	End Cap ES	Endkappe ES	Deksel ES	GDAlSi9Cu3, DIN 725/2
6	2	Spring-inner	Innenfeder	Veer binnen	Class C, DIN 17223
7	2	Spring-mid	Mittelfeder	Veer midden	Class C, DIN 17223
8	2	Spring-outer	Außenfeder	Veer buiten	Class C, DIN 17223
9	2	Spring Holder	Federhalter	Veerhouder	C45, DIN 17200
10*	1	Guide Band	Führungsband	Geleideband	PA66 + MoS2
10a*	1	Guide Band DSA	Führungsband DSA	Geleideband DSA	PA66 + MoS2
11*	2	Guide Band	Führungsband	Geleideband	PTFE + 2596 C
12*	1	Bearing Bush	Lagerbuchse	Lagerbus	PA66 + MoS2
20*	1	Bearing Bush	Lagerbuchse	Lagerbus	POM
21*	1	Washer	Unterlegscheibe	Afdichtring	POM
21a*	1	Washer DSA	Unterlegscheibe DSA	Afdichtring DSA	POM
22*	2	Washer ES	Unterlegscheibe ES	Sluitplaat ES	PA6
23*	2	Washer ED	Unterlegscheibe ED	Sluitplaat ED	PA6
25*	2	O-Ring	O-Ring	O-ring	Buna N
26*	2	O-Ring	O-Ring	O-ring	Buna N
27*	1	O-Ring	O-Ring	O-ring	Buna N
27a*	1	O-Ring DSA	O-Ring DSA	O-ring DSA	Buna N
28*	1	O-Ring	O-Ring	O-ring	Buna N
29*	4	O-Ring	O-Ring	O-ring	Buna N
30*	2	O-Ring	O-Ring	O-ring	Buna N
34	2	Washer ES	Unterlegscheibe ES	Afdichtring ES	C35
35*	1	Spring Clip	Seegerring	Seegerring	Ck75, DIN 17222
35a*	1	Spring Clip DSA	Seegerring DSA	Seegerring DSA	Ck75, DIN 17222
36	8	End Cap bolt ED/ES	Endkappenschraube ED/ES	Bout deksel ED/ES	AISI 304
37	2	Limit Stop Bolt ES	Begrenzungsschraube ES	Bout slagbegrenzing ES	AISI 304
38	2	Nut	Mutter	Moer	AISI 304
40	2	Limit Stop bolt ED	Begrenzungsschraube ED	Bout slagbegrenzing ED	AISI 304
41	2	Nut	Mutter	Moer	AISI 304
42	2	Nut cover	Schutzkappe	Moerbeschermkap	PE
43*	2	O-Ring	O-Ring	O-ring	Buna N
44	1	Insert	Insert	Inzetstuk	AlMgSi 1
46	1	Centre-plate (option for DIN3337 actuators)	Zentrierplatte (Option für DIN3337 Antriebe	Centreerplaat (optie voor DIN3337)	PA6 + 25% Glass
47	1	Cam for stroke adj. DSA	Hubbegrenzungsnocken DSA	Slagbegrenzingsnok DSA	AISI 304
48	1	Limit Stop bolt DSA	Begrenzungsschraube DSA	Bout slagbegrenzing DSA	AISI 304
49*	1	O-Ring DSA	O-Ring DSA	O-ring DSA	Buna N
50*	1	Washer DSA	Unterlegscheibe DSA	Sluitplaat DSA	PA6
51	1	Nut DSA	Mutter DSA	Moer DSA	AISI 304
52	1	Nut cover DSA	Schutzkappe DSA	Moerbeschermkap DSA	PE

* Recommended Spare Parts (contained in Repair Kit or Repair Kit DSA).
The extra or specific parts of a DSA actuator are marked “DSA”.

* Empfohlene Ersatzteile (Teil des Reparatursatzes oder Reparatursats für DSA)
Die zusätzlichen oder spezifischen Teile eines DSA-Antriebs sind mit der Kennzeichnung “DSA”angegeben.

* Aanbevolen reserve-onderdelen (opgenomen in reparatiepakket of reparatiepakket DSA).
De extra of specifieke delen van een DSA aandrijving zijn gemerkt met “DSA”.

7.2 P-serie


08 04 25
24
25 04 08
21 20
06
06
23
23 02 16 14 17 03
01
19
10
05
24 03 17 14 16 02 15 26
09
18

Pos.	Qty. St.Z. Aant.	Description	Bezeichnung	Benaming	Specification Spezifikation Specificatie
1	1	Body	Gehäuse	Behuizing	GAlSi10Mg, DIN 1725/2
2	2	Piston	Kolben	Zuiger	GAlSi7Mg, DIN 1725/2
3	2	End Cap PD	Endkappe PD	Deksel PD	GAlSi10Mg, DIN 1725/2
4	2	End Cap PE	Endkappe PE	Deksel PE	GAlSi10Mg, DIN 1725/2
5	1	Central drive shaft	Antriebswelle	Aandrijfas	AlZnMGCu1.5, DIN 1725/1
6	2	Gear Rack	Zahnstange	Tandheugel	C45, DIN 17200
8	14	Spring	Feder	Veer	Class C, DIN 17223
9*	1	Bearing bush	Lagerbuchse	Lagerbus	PA66 + MoS2
10*	1	Bearing bush	Lagerbuchse	Lagerbus	POM
14*	2	Guide band	Führungsband	Geleideband	PTFE + 25% C
15*	2	Guide band	Führungsband	Geleideband	PTFE + 25% C
16*	2	O-ring	O-Ring	O-ring	Buna N
17*	2	O-ring	O-Ring	O-ring	Buna N
18*	1	O-ring	O-Ring	O-ring	Buna N
19*	1	O-ring	O-Ring	O-ring	Buna N
20*	1	Spring Clip	Sprengring	Seegerring	Ck75, DIN17222
21*	1	Thrust Washer	Sicherungsscheibe	Drukschijf	POM
23	2/4	Bolt	Schraube	Bout	12.9 DIN912
24	8/20	Endcap Bolt PD	Endkappenschraube PD	Bout sluitkap PD	AISI 304
25	8/20	Endcap Bolt PE	Endkappenschraube PE	Bout sluitkap PE	AISI 304
26*	2	O-ring	O-Ring	O-ring	Buna N

* Recommended Spare Parts (contained in Repair Kit).
* Empfohlene Ersatzteile (Teil des Reparatursatzes).
* Aanbevolen reserve-onderdelen (opgenomen in reparatiepakket).

Contact Us: Emerson Process Management, Valve Automation facilities at your nearest location:

NORTH & SOUTH AMERICA

18703 GH Circle
PO Box 508
Waller, TX 77484
USA
T +1 281 727 5300
F +1 281 727 5353

2500 Park Avenue West
Mansfield, OH 44906
USA
T +1 419 529 4311
F +1 419 529 3688

9009 King Palm Drive
Tampa, FL 33619
USA
T +1 813 630 2255
F +1 813 630 9449

13840 Pike Road
Missouri City, Texas 77489
USA
T +1 281 499 1561
F +1 281 499 8445

Av. Hollingsworth,
325, Iporanga Sorocaba,
SP 18087-105
Brazil
T +55 15 3238 3788
F +55 15 3228 3300

MIDDLE EAST & AFRICA

P. O. Box 17033
Dubai
United Arab Emirates
T +971 4 811 8100
F +971 4 886 5465
P. O. Box 105958
Abu Dhabi
United Arab Emirates
T +971 2 697 2000
F +971 2 555 0364
P. O. Box 3911
Al Khobar 31952
Saudi Arabia
T +966 3 814 7560
F +966 3 814 7570

P. O. Box 10305
Jubail 31961
Saudi Arabia
T +966 3 340 8650
F +966 3 340 8790

P. O. Box 32281
Doha
Qatar
T +974 4 576777
F +974 4 315448

24 Angus Crescent
Longmeadow Business Estate
East P.O. Box 6908; Greenstone;
1616 Modderfontein, Extension 5
South Africa
T +27 11 451 3700
F +27 11 451 3800

EUROPE

Asveldweg 11
7556 BR Hengelo (O)
The Netherlands
T +31 74 256 1010
F +31 74 291 0938

Siemensring 112
47877 Willich
Germany
T +49 2154 499 660
F +49 2154 499 6613

25, Rue de Villeneuve
Silic – BP 40434
94583 Rungis
France
T +33 1 49 79 73 00
F +33 1 49 79 73 99
Via Montello 71/73
20038 Seregno (Milan)
Italy
T +39 0362 2285 207
F +39 0362 2436 55

6 Bracken Hill
South West Industrial Estate
Peterlee SR8 2LS
United Kingdom
T +44 191 518 0020
F +44 191 518 0032

2A Szturmowa Str
02-678 Warsaw
Poland
T +48 22 45 89 237
F +48 22 45 89 231

C/ Francisco Gervás, 1
28108 Alcobendas – Madrid
Spain
T +34 0913 586 000
F +34 0913 589 145

Letnikovskaya Str. 10-2
115114 Moscow
Russia and FSU
T +7 495 981 98 11
F +7 495 981 98 10

ASIA PACIFIC

No. 9 Gul Road
#01-02 Singapore 629361
T +65 6501 4600
F +65 6268 0028
9/F Gateway Building
No. 10 Ya Bao Road
Chaoyang District
Beijing 100020
P.R.China
T +86 10 5821 1188
F +86 10 5821 1100

No.15 Xing Wang Road
Wuqing Development Area
Tianjin 301700
P.R.China
T +86 22 8212 3300
F +86 22 8212 3308

Lot 13112, Mukim Labu
Kawasan Perindustrian Nilai
71807 Nilai, Negeri Sembilan
Malaysia
T +60 6 799 2323
F +60 6 799 9942

471 Mountain Highway
Bayswater, Victoria 3153
Australia
T +61 3 9721 0200
F +61 3 9720 0588

Delphi B Wing, 601 & 602
6th Floor, Central Avenue
Powai, Mumbai – 400 076
India
T +91 22 6662 0566
F +91 22 6662 0500

NOF, Shinagawa Konan Bldg
1-2-5, Higashi-shinagwa
Shinagwa-ku, Tokyo
140-0002 Japan
T +81 3 5769 6873
F +81 3 5769 6902

Installation & Maintenance Instructions

3–WAY OR 4–WAY, 2 POSITION SINGLE OR DUAL SOLENOID VALVES FOR NAMUR ACTUATORS – 1/4 NPT PRESSURE & 1/8 NPT EXHAUST CONNECTIONS AIR OR INERT GAS SERVICE – ANODIZED ALUMINUM CONSTRUCTION

SERIES 8551

Form No.V7418

Service Notice

Except for coil replacement, the Series 8551 are not repairable. When any performance problems are detected during routine inspection, replace valve immediately.

For catalog numbers prefixed WT or EF, see separate solenoid installation and maintenance instructions for information on: Wiring, Solenoid Temperature, Cause of Improper Operation and Coil Replacement.

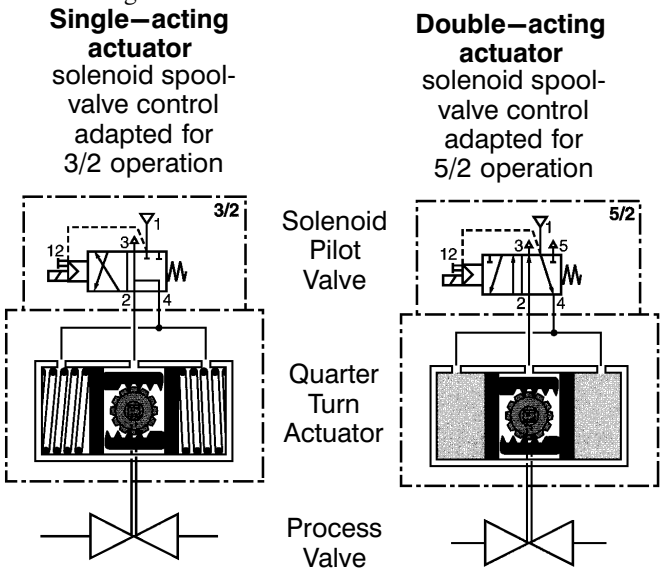
DESCRIPTION

Series 8551 valves are 3–way or 4–way, 5 ported 2 position piloted spool type single or dual solenoid valves designed for air or inert gas service. Valves are made of rugged anodized aluminum. A built–in manual operator allows manual operation when desired or during an electrical power outage. Each valve may be used for 3–way (normally closed) or 4–way operation by using the appropriate flow plate provided. Flow plates are marked (3/2) for 3 Ports, 2 Positions (3–way operation) or (5/2) for 5 Ports, 2 Positions (4–way operation). These valves are supplied with all necessary hardware for a NAMUR direct mount installation i.e. flow plates, gaskets, mounting screws and a locating set screw. *See **Flow Selection And Mounting** section.*

Valves catalog numbers prefixed SC are supplied with an open–frame spade plug connection coil (3x DIN 46244). A DIN Plug Connector Kit No. K226061–001, is available from ASCO.

APPLICATIONS

Typically, the 3–way (3/2) normally closed mode is used for a single acting (spring return) actuator; 4–way (5/2) mode for a double acting actuator.



Port Markings: 1 = Pressure, 2 & 4 = Cylinder 3 & 5 = Exhaust

OPERATION

IMPORTANT: Minimum operating pressure differential 30 psi; maximum 150 psi.

Breather Function 3–way (3/2) mode only: Allows for spring side of a spring return actuator to vent at all times through valve exhaust port 3.

Single Solenoid: This type of operation is used where automatic return of the valve on electrical power failure or loss of main line pressure is required.

3–Way NC Single Solenoid Operation

Solenoid De–energized: Flow is from port 2 to port 3. Port 4 is open to exhaust port 3 (breather function); pressure port 1 is closed Slight pilot exhaust is also apparent. Port 5 is not used.

Solenoid Energized: Flow is from pressure port 1 to port 2. Port 4 is open to exhaust port 3 (breather function); pilot exhaust is closed.

3–Way Single Solenoid (3/2)

Solenoid De–energized	Solenoid Energized
Pilot Exh. 2 4 / 3 1 5	Pilot Exh. 2 4 / 3 1 5

4–Way Single Solenoid Operation

Solenoid De–energized: Flow is from pressure port 1 to port 4 and from port 2 to port 3. Port 5 is closed. Slight pilot exhaust is also apparent.

Solenoid Energized: Flow is from pressure port 1 to port 2 and from port 4 to port 5. Port 3 and pilot exhaust are closed.

4–Way Single Solenoid (5/2)

Solenoid De–energized	Solenoid Energized
Pilot Exh. 2 4 / 3 1 5	Pilot Exh. 2 4 / 3 1 5

Dual Solenoids: Solenoid may be energized momentarily or continuously depending upon application. Dual solenoid valves are used where equipment must not change position when electrical power fails. Valve operates when one solenoid is energized and returns when the other solenoid is energized.

⚠ CAUTION: Do not energize solenoids A and B simultaneously, as this will cause valve to malfunction.

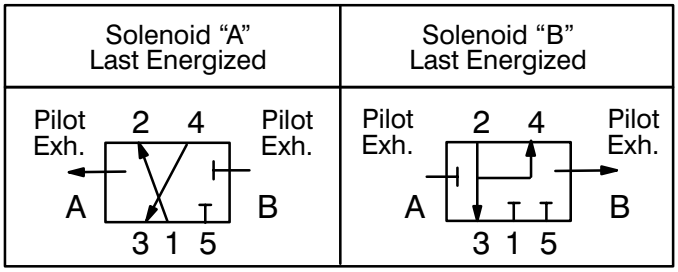
IMPORTANT: Minimum *on time* for each solenoid is 0.3 seconds.

3−Way NC Dual Solenoid Operation

Solenoid A Last Energized: Flow is from pressure port 1 to port 2. Port 4 is open to exhaust port 3 (breather function). Slight pilot exhaust is apparent when solenoid A is de−energized. Port 5 is not used.

Solenoid B Last Energized: Flow is from pressure 2 to port 3. Port 4 is open to exhaust 3 (breather function); pressure port 1 is closed. Slight pilot exhaust is apparent when solenoid B is de−energized.

3−Way Dual Solenoid (3/2)

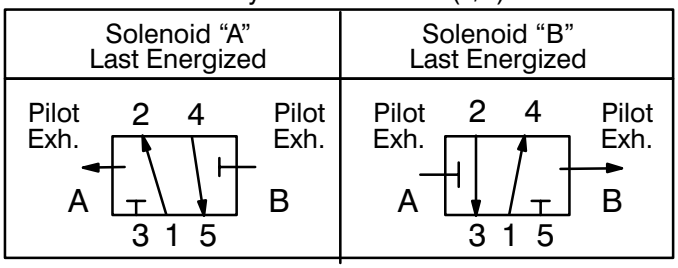


4−Way Dual Solenoid Operation

Solenoid A Last Energized: Flow is from pressure port 1 to port 2 and from port 4 to port 5. Port 3 is closed. Slight pilot exhaust apparent when solenoid A is de−energized.

Solenoid B Last Energized: Flow is from pressure port 1 to port 4 and from port 2 to port 3. Port 5 is closed. Slight pilot exhaust apparent when solenoid B is de−energized.

4−Way Dual Solenoid (5/2)



Manual Operator

Manual operator provides manual operation when desired or during an electrical power outage. To engage manual operator, rotate screw clockwise as far as possible to "1". Valve will now be in the same position as when the solenoid is energized. To disengage manual operator, rotate screw counterclockwise as far as possible to "0".

⚠ CAUTION: To prevent malfunction be sure to turn screw counterclockwise to "0" before operating valve electrically.

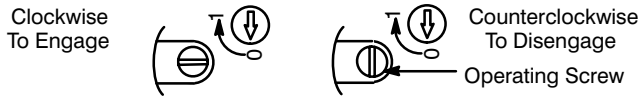


Figure 1. Manual Operator (partial view).

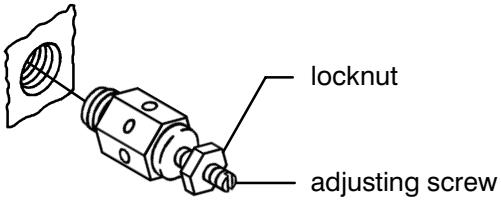
Metering Device with Filter for 1/8 NPT Connections (Optional Feature)

These metering devices can be used to vary the operating speed of the actuator/cylinder this valve is piloting. Install metering devices in 1/8 NPT exhaust connection and tighten securely. Install a metering device in port 3 and port 5 of 4−way (5/2) valves only. Because of the breather function, the use of a metering device is not recommended for the 3−way (3/2) mode.

Metering Device Adjustment:

A. Loosen Locknut on adjusting screw.
B. Turn adjusting screw clockwise (to reduce flow) as far as possible.
C. Turn adjusting screw counterclockwise (to increase flow) no more than two turns.
D. Tighten locknut using 13 mm wrench.

IMPORTANT: The steps above provide only a rough adjustment of the metering device. Final adjustments must be made with valve fully pressurized in the line of final application.



Turn clockwise to reduce flow and speed of actuatory/cylinder this valve is piloting; counterclockwise to increase flow and speed.

Figure 2. Metering Device (partial view).

INSTALLATION

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

⚠ WARNING: To prevent the possibility of electrical shock from the accessibility of live parts, install the open−frame solenoid in a suitable enclosure.

Future Service Considerations

Provision should be made for performing seat leakage, external leakage, and operational tests on the valve with a nonhazardous, noncombustible fluid.

Temperature Limitations

For valve ambient and fluid temperature ranges, refer to chart following. Check catalog number prefix and watt rating on nameplate.

ASCO Valves Automatic Switch Co. 50−60 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

Watt Rating AC/DC	Catalog Number Prefix	Ambient And Fluid Temperature Range
2.5 & 3 AC & DC	SC	5°F to 140°F (−15°C to 60°C)
6.3 AC	WT	5°F to 140°F (−15°C to 60°C)
	EF	5°F to 104°F (−15°C to 40°C)
6.9 DC	WT or EF	5°F to 77°F (−15°C to 25°C)

NOTE: For temperatures below 32°F (0°C) moisture−free air must be used.

Positioning

Valve may be mounted in any position.

Flow Selection and Mounting (Refer to Figure 3)

Two flow plates are provided with each valve. Flow plates are marked (3/2) for 3−way or (5/2) for 4−way. For proper orientation of the flow plate, the marking (3/2) or (5/2) must be opposite series number 8551 flow diagram label on valve body or facing solenoid "B" for dual solenoid construction. See Figure 3. for proper orientation of flow plate, gaskets, mounting screws and locating set screw. Then proceed as follows:

1. If required, install locating set screw using a 2 mm hex key wrench.
2. Install Port 2 and Port 4 gaskets and flow gasket on flow plate.
3. Position flow plate and solenoid valve on actuator. Then install two socket head cap screws in offset center holes on either side. Hand thread screws a few turns into actuator. Then tighten screws evenly using a 4 mm hex key wrench.

NOTE: Three sets of mounting screws are provided, sizes:M5, .190−24 UNC−2A and .190−32 UNF−2A.

Piping

There is pilot exhaust from the top of the solenoid when the solenoid is de−energized. The pilot exhaust may be connected to the main exhaust if the air or inert gas cannot be exhausted directly to the atmosphere. An exhaust protector is provided in the top of the plugnut/core tube assembly to prevent debris from entering pilot exhaust.

Connect piping or tubing to valve according to markings on valve body. Refer to flow diagrams in ***OPERATION*** section. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point.

⚠ CAUTION: To avoid damage to the valve body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. If TEFLON* tape, paste, spray or similar lubricant is used, use extra care when tightening due to reduced friction.

*DuPont's Registered Trademark

NOTE: The exhaust and/or pressure lines may be restricted to control cylinder speed on 4−way (5/2) mode only.

⚠ CAUTION: To protect the solenoid valve, install a strainer or filter, suitable for the service involved, in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601, and 8602 for strainers.

Wiring

Wiring must comply with local codes and the National Electrical Code. The open−frame solenoid may be rotated 360°. The open−frame solenoid is provided with 1/4″ spade terminals and a grounding spade terminal connection.

NOTE: Valves can be converted from alternating current (AC) to direct current (DC), or vice−versa, by changing the coil.

Solenoid Temperature

Series 8551 valves are supplied with coils designed for continuous duty service. When the solenoid is energized for a long period, the solenoid coil becomes hot and can be touched with the hand only for an instant. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

MAINTENANCE

⚠ WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize valve, and vent fluid to a safe area before inspecting or servicing the valve.

Preventive Maintenance

- Prepare and follow a routine inspection schedule based on the media, environment, and frequency of use.
- Keep the medium flowing through the valve as free from dirt and foreign material as possible. Depending on medium and service conditions, clean valve strainer or filter as required to keep the valve free of contamination. In the extreme case, contamination will cause faulty valve operation and the valve may fail to shift.
- While in service, the valve should be operated at least once a month to ensure proper operation.

Causes of Improper Operation

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Faulty Control Circuits:** Check the electrical system by energizing the solenoid. A metallic *click* signifies that the solenoid is operating. Absence of the *click* indicates loss of power supply. Check for loose or blown fuses, open−circuited or grounded coil, broken lead wires or splice connections.
- **Burned−Out Coil:** Check for open−circuited coil. Replace coil as necessary. Check supply voltage; it must be the same as specified on nameplate.
- **Low Voltage:** Check voltage across the coil terminals. Voltage must be at least 85% of nameplate rating

Coil Replacement

1. Disconnect grounding and supply wires from coil.
2. Remove retaining clip and slip coil off the plugnut/core tube assembly.
3. Install new coil and replace retaining clip.
4. Make electrical hookup to coil.

ASCO Valves Automatic Switch Co. 50−60 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

ORDERING INFORMATION FOR ASCO COILS OR REPLACEMENT VALVES

When ordering ASCO Coils or Replacement Valves, specify catalog number, voltage, frequency and coil number, if possible.

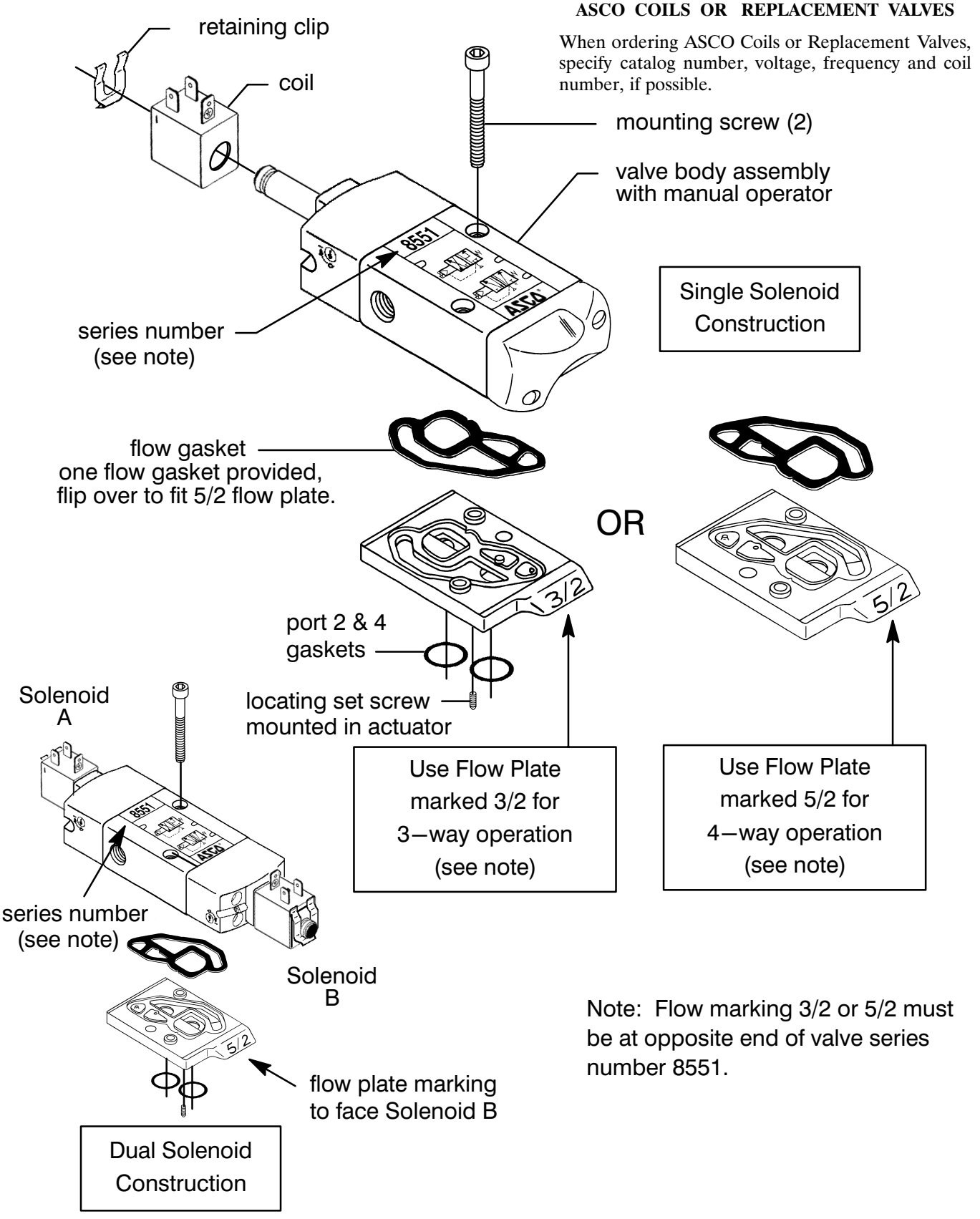


Figure 3. Series 8551 shown with prefix SC coil.

ASCO Valves Automatic Switch Co. 50–60 Hanover Road, Florham Park, New Jersey 07932 www.ascovalve.com

Valvetop® D-Series With Mechanical Switches M2, M4, M6, K2, K4, K6, T2, & T4 Options

Installation, Operation & Maintenance Manual

Table of Contents

TOPWORX®

EMERSON. Process Management

Installation on Actuator

Orientations, Normal and Reverse Acting

Normal acting is full CW when the process valve is closed and CCW when the process valve is open. *Reverse acting* is full CW when the process valve is open and CCW when the process valve is closed.

90° indicator dome assemblies are design to accommodate any mounting arrangement and can be adjusted up to 9° off axis if needed. 45° indicator dome assemblies can only accommodate *normal acting* applications that are *mounted parallel ±9°.* Consult your local distributor or factory representative for 45° *reverse acting* or *mounted perpendicular* applications.

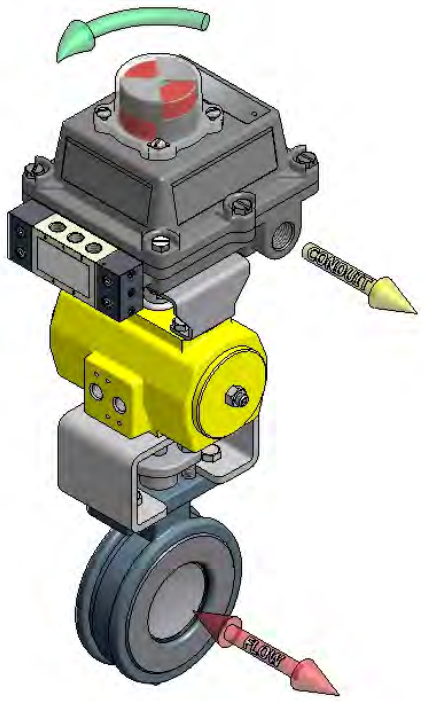
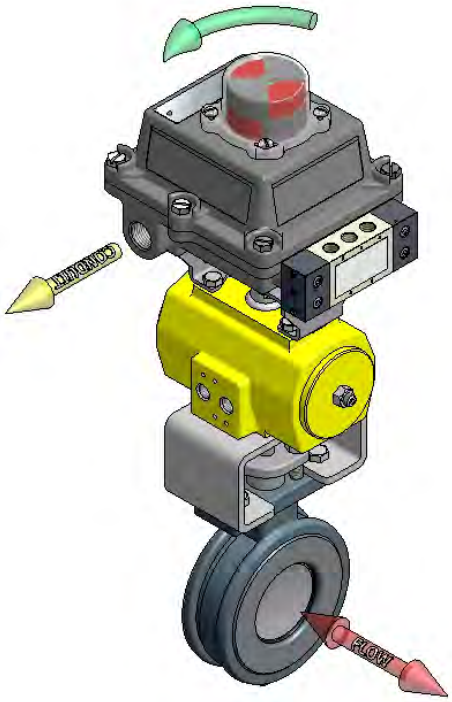


Illustration #1

The image to the left shows a Valvetop unit *mounted parallel* to the process valve in the closed position. The green arrow at the top shows the "*normal acting*" direction of travel to open the valve. This is the standard orientation and your unit unless otherwise specified will be factory set to operate in this fashion.

Illustration #2

The image to the right shows a Valvetop *mounted perpendicular* to the process valve in the closed position. The green arrow at the top shows the "*normal acting*" direction of travel to open the valve. Notice that the indicator dome has been rotated 90° compared to the unit above.

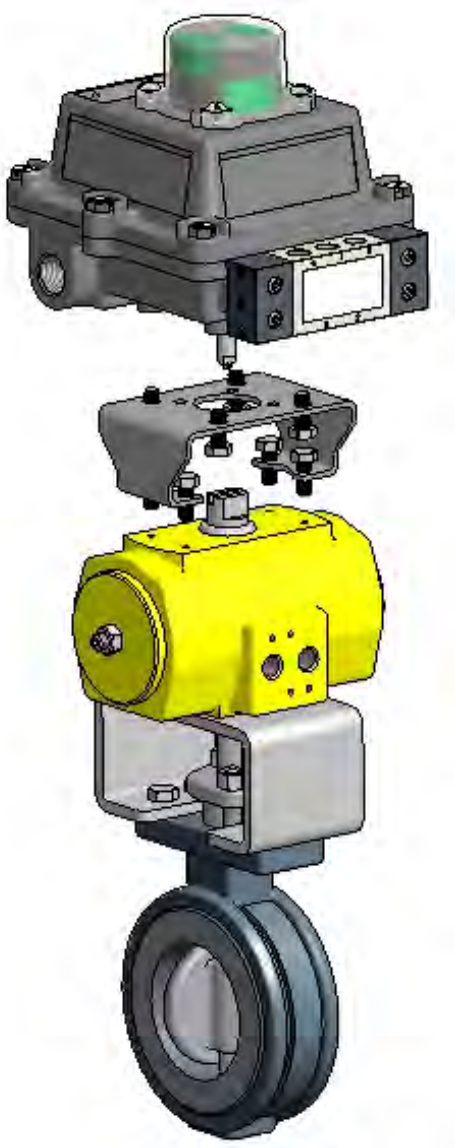


Installation on Actuator *(continued)*

Mounting

TopWorx has numerous mounting bracket kits available to meet your specific application, whether rotary or linear. Consult your local distributor or factory representative for ordering information. The illustration shows a direct Namur mount on a quarter turn valve. Refer to your mounting kit documentation for specific mounting instructions.

Illustration #3: Mounting Assembly

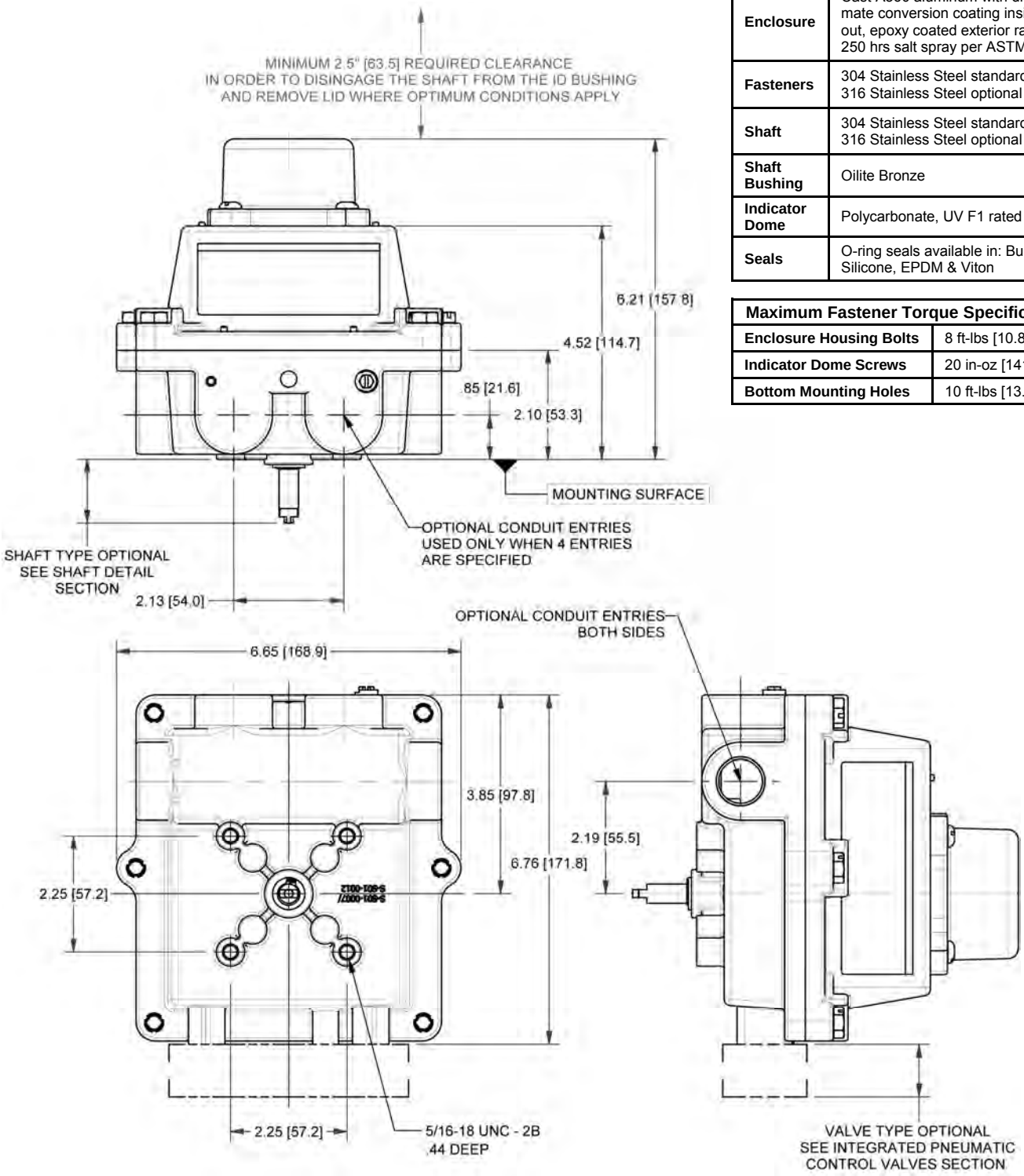


Installation Notes

1. Use caution not to allow undue axial (thrust) load on the shaft.
2. Cycle the valve a couple of times prior to final tightening of the mounting kit hardware. This allows the shaft to self-center in the pinion slot, or coupler. Refer to the *dimensions and materials section* of this document for appropriate tightening torque.
3. Always use sound mechanical practices when torquing down any hardware or making pneumatic connections. Refer to the Integrated Pneumatic Control Valves section for detailed information on pneumatic connections.
4. This product comes shipped with plastic plugs in the conduit entries in an effort to protect the internal components from debris during shipment and handling. **It is the responsibility of the receiving and/or installing personnel to provide appropriate permanent sealing devices to prevent the intrusion of debris, or moisture, when stored outdoors or when installed.**
5. **It is the responsibility of the installer, or end user, to install this product in accordance with the National Electrical Code (NFPA 70) or any other national or regional code defining proper practices.**

Dimensions and Materials: Valvetop DXP

Illustration #4

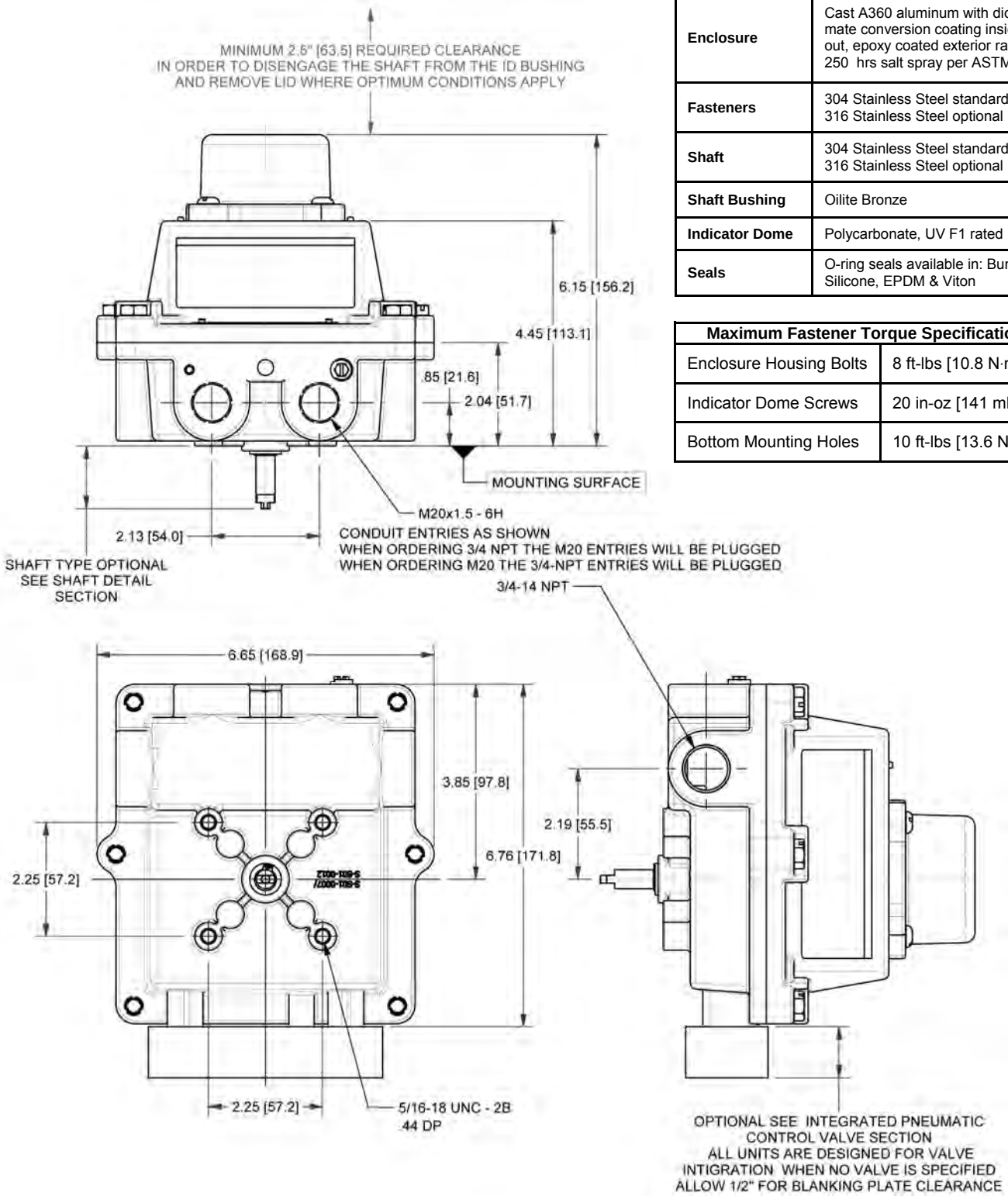


MATERIALS OF CONSTRUCTION	
Enclosure	Cast A360 aluminum with dichro-mate conversion coating inside & out, epoxy coated exterior rated for 250 hrs salt spray per ASTM B117
Fasteners	304 Stainless Steel standard 316 Stainless Steel optional
Shaft	304 Stainless Steel standard 316 Stainless Steel optional
Shaft Bushing	Oilite Bronze
Indicator Dome	Polycarbonate, UV F1 rated
Seals	O-ring seals available in: Buna, Silicone, EPDM & Viton

Maximum Fastener Torque Specifications	
Enclosure Housing Bolts	8 ft-lbs [10.8 N·m]
Indicator Dome Screws	20 in-oz [141 mN·m]
Bottom Mounting Holes	10 ft-lbs [13.6 N·m]

Dimensions and Materials: Valvetop DXP - IIC

Illustration #5

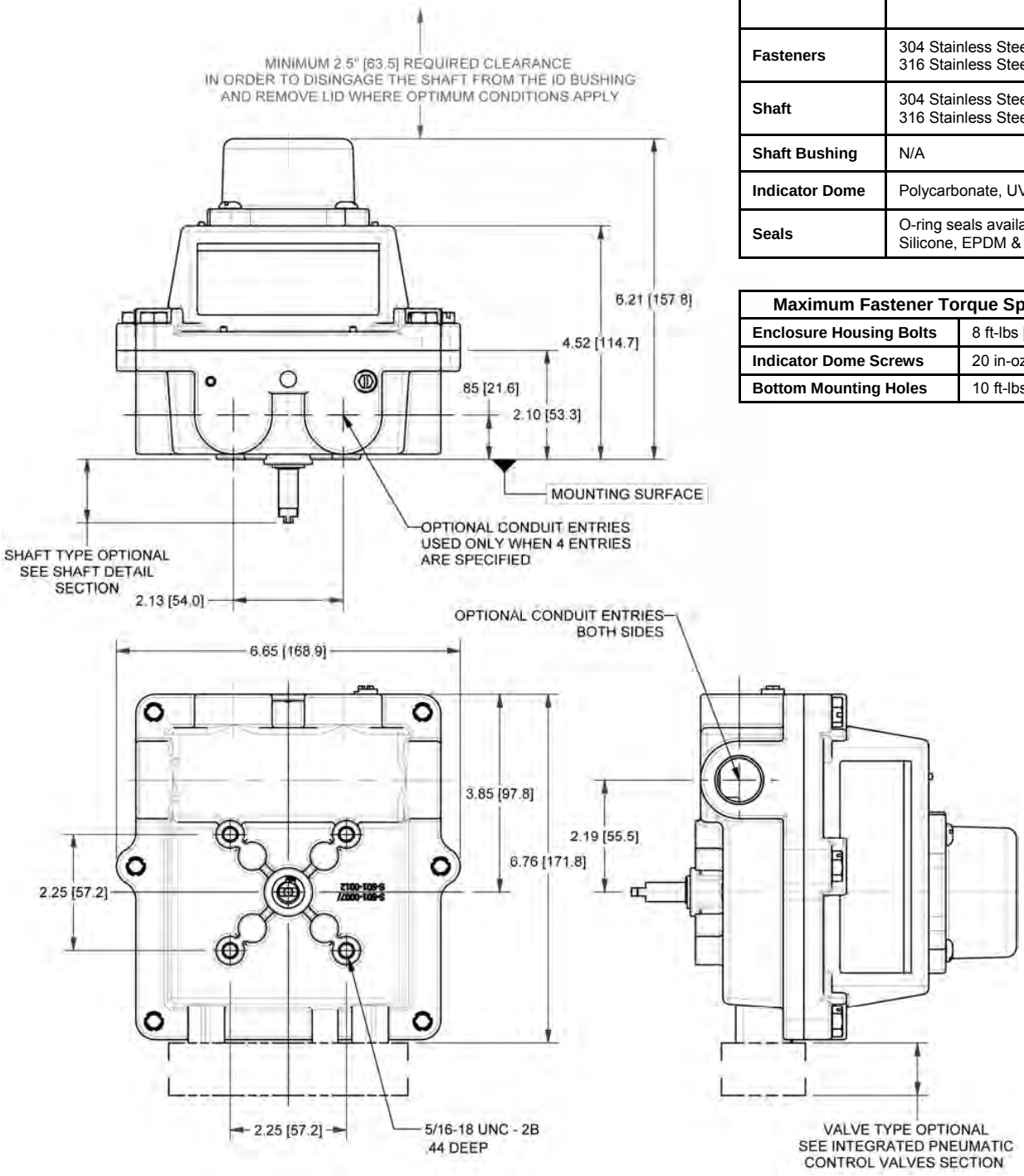


MATERIALS OF CONSTRUCTION	
Enclosure	Cast A360 aluminum with dichro-mate conversion coating inside & out, epoxy coated exterior rated for 250 hrs salt spray per ASTM B117
Fasteners	304 Stainless Steel standard 316 Stainless Steel optional
Shaft	304 Stainless Steel standard 316 Stainless Steel optional
Shaft Bushing	Oilite Bronze
Indicator Dome	Polycarbonate, UV F1 rated
Seals	O-ring seals available in: Buna, Silicone, EPDM & Viton

Maximum Fastener Torque Specifications	
Enclosure Housing Bolts	8 ft-lbs [10.8 N·m]
Indicator Dome Screws	20 in-oz [141 mN·m]
Bottom Mounting Holes	10 ft-lbs [13.6 N·m]

Dimensions and Materials: Valvetop DXS

Illustration #6

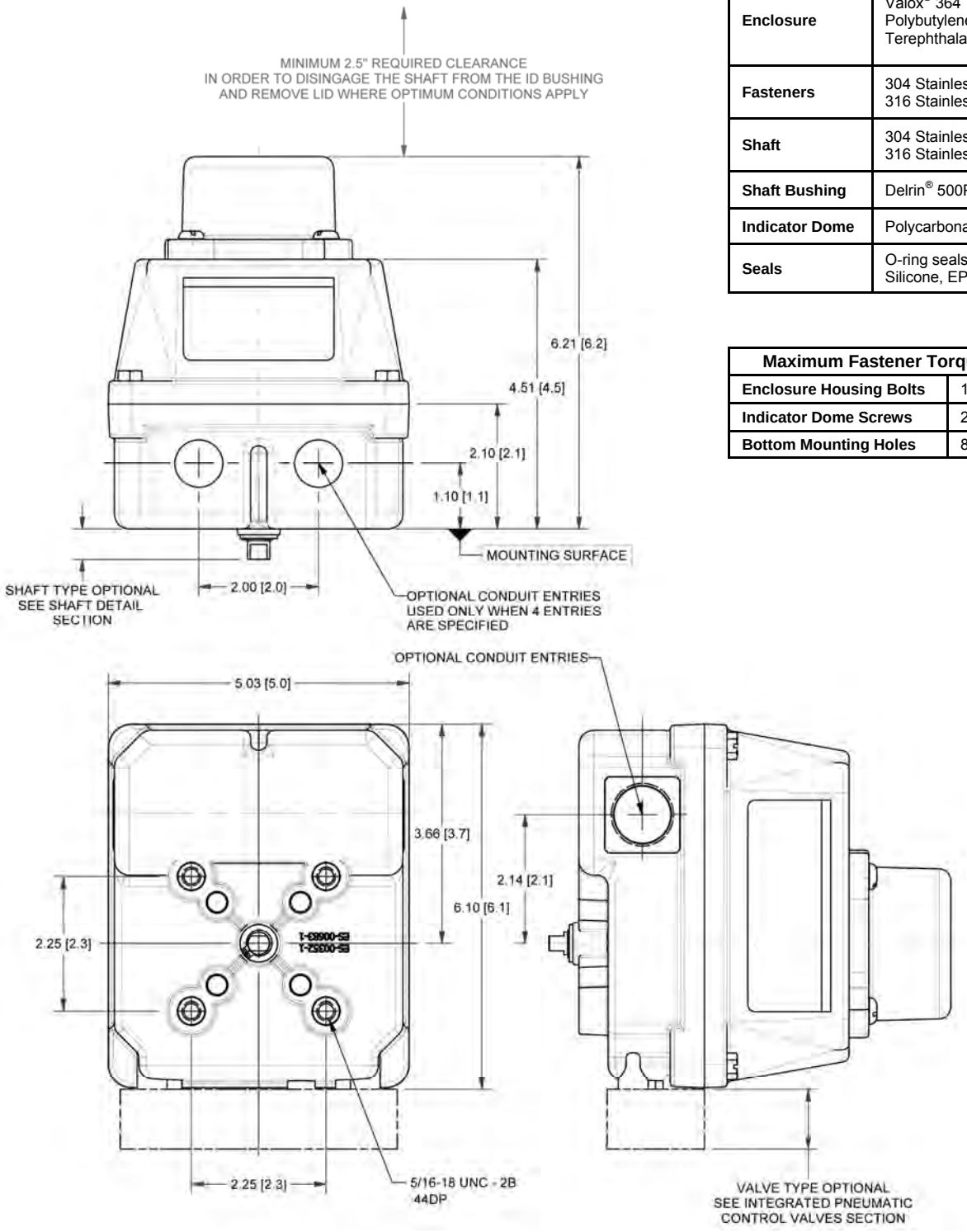


MATERIALS OF CONSTRUCTION	
Enclosure	Cast 316 Stainless Steel
Fasteners	304 Stainless Steel standard 316 Stainless Steel optional
Shaft	304 Stainless Steel standard 316 Stainless Steel optional
Shaft Bushing	N/A
Indicator Dome	Polycarbonate, UV F1 rated
Seals	O-ring seals available in: Buna, Silicone, EPDM & Viton

Maximum Fastener Torque Specifications	
Enclosure Housing Bolts	8 ft-lbs [10.8 N·m]
Indicator Dome Screws	20 in-oz [141 mN·m]
Bottom Mounting Holes	10 ft-lbs [13.6 N·m]

Dimensions and Materials: Valvetop DXR

Illustration #7



MATERIALS OF CONSTRUCTION	
Enclosure	Valox® 364 Polybutylene Terephthalate (PBT)
Fasteners	304 Stainless Steel standard 316 Stainless Steel optional
Shaft	304 Stainless Steel standard 316 Stainless Steel optional
Shaft Bushing	Delrin® 500P white
Indicator Dome	Polycarbonate, UV F1 rated
Seals	O-ring seals available in: Buna, Silicone, EPDM & Viton

Maximum Fastener Torque Specifications	
Enclosure Housing Bolts	10 in-lbs [903 mN·m]
Indicator Dome Screws	20 in-oz [141 mN·m]
Bottom Mounting Holes	8 ft-lbs [13.6 N·m]

Dimensions and Materials: Shafts

Illustration #8: Shaft Detail

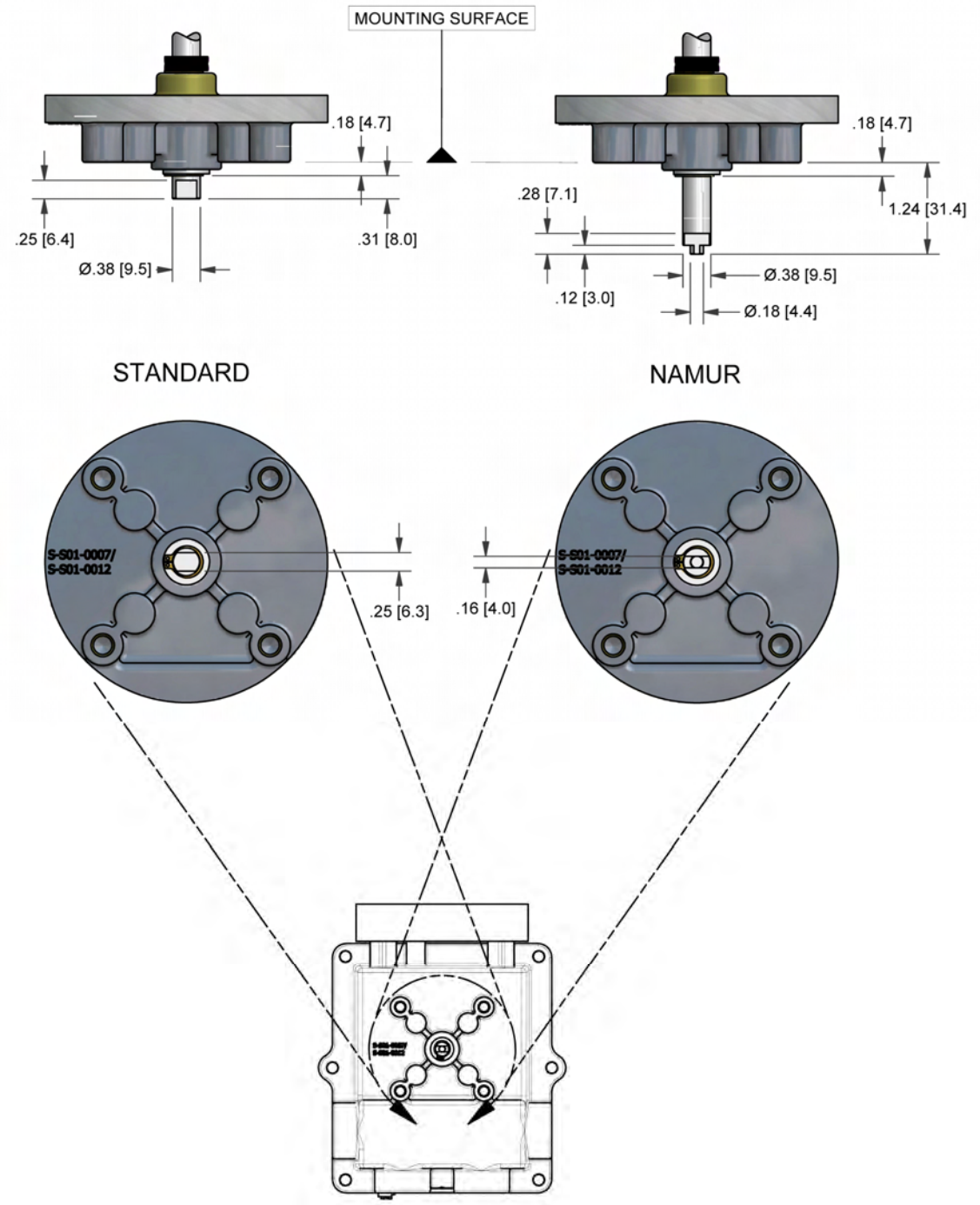


Illustration #9: Enclosure Assembly

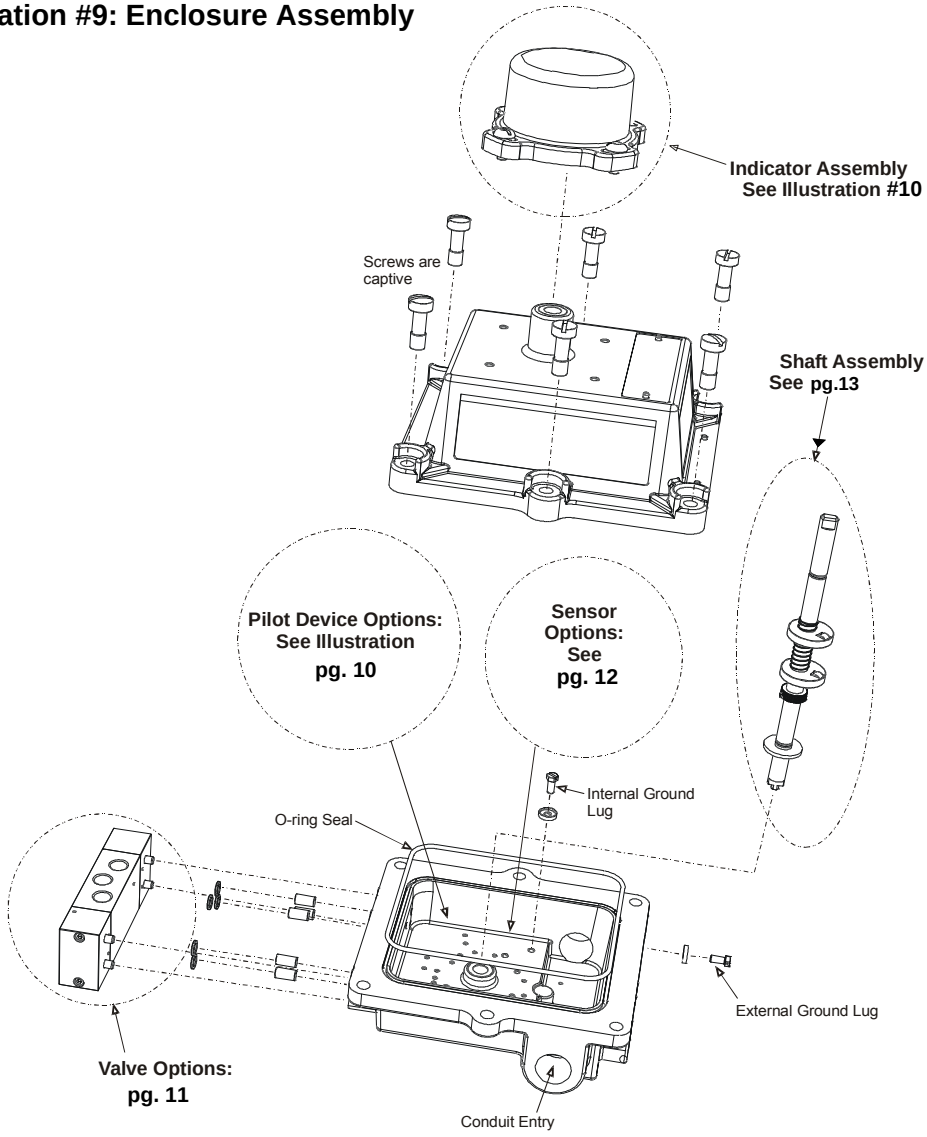
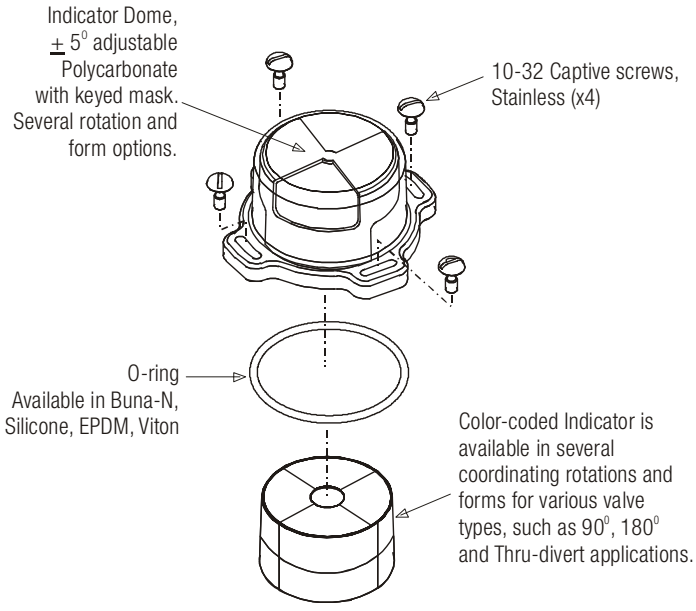


Illustration #10: Indicator Assembly



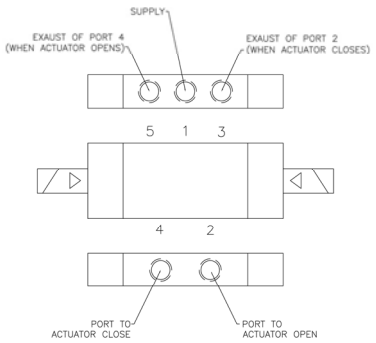
Indicator / Dome Replacement Kits	
AV-GB002	90º, Green/Open, Red/Closed, Buna O-Ring
AV-YB002	90º, Yellow/Open, Black/Closed, Buna O-Ring
AV-TB002	90º, Green/Thru, Red/Divert, Buna O-Ring
AV-4B002	90º, Green/Open, Red/Closed, Buna O-Ring

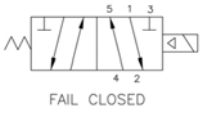
Pneumatic Hookup Procedures

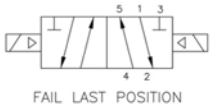
Prior to connecting the supply air to the spool valve, flush the system to remove any debris or contaminates. Galvanized pipe can easily flake and contaminate the system and therefore is not recommended. A 40 micron point of use filter at every device is recommended.

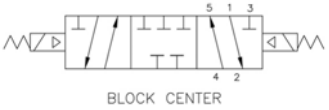
4-Way Spool Valves

The TopWorx spool valve is a 5 port, 4-way valve driven by an internally mounted pilot valve. The spool valve supply port and work ports are marked as follows:

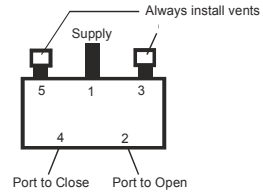


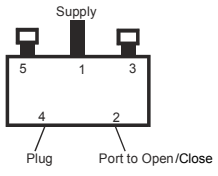






******Never Plug, Block or Restrict Port 5******





Spool Valve Specifications	
Medium	Dried, filtered air (40 micron)
Max Operating Pressure	100psi (0.7 MPa) (6.89Bar)
Min. Operating Pressure	30psi (0.28 MPa) (2.76Bar)
Ambient Temperature Range	Refer to Product Nameplate Marking
Flow Coefficient	1.2Cv or 3.0Cv (1.0 for ColdTemp™)
Environment Rating	Type 4, 4X, IP67
Port Size	1/2" NPT for 3.0Cv valve 1/4" NPT for 1.2Cv valve
Manual Override	Available in Latching/Non-Latching Push Type & Palm Actuator Type
Valve Body	Available in Hardcoat Anodized Aluminum, 304, or 316 Stainless Steel
Valve Seals	Spool Seals: Buna-N Valve Body Seals available in Buna-N, Silicone, EPDM & Viton. ColdTemp™ Spools are lap-joint technology containing no seals.

Don't forget!
TopWorx has a complete line of breathers, flow controls, regulators and filters.

Check out **www.topworx.com** or call us at **502.969.8000** for more details

Highly Recommended

TopWorx highly recommends Locktite 567 brand thread sealant. Do not use a hard setting pipe compound. If Teflon thread seal tape is used, start the wrap on the second thread from the leading thread of the fitting. This will prevent tape shreds from contaminating the spool valve seals.

Breathers (AL-M31) should be installed in the exhaust ports to keep debris from falling into the spool valve and damaging the seals. This must be addressed prior to installation, or storage.

A flow control may be used in Port 3, but should NEVER BE USED in Port 5. Any blockage or restriction may cause an internal pressure build-up inside the encloser and pose a safety issue.

DID YOU KNOW?
TopWorx manufactures the globally-known GO Switch Leverless Limit Switch, which comprises a full line of harsh environment sensors. If your application is very cold, very hot, under water or in a caustic atmosphere, then GO Switch has the answer.

Spool Valves and Pilots

Fail Closed Spool Valve Replacement Assemblies	
AV-BFCVA20	Std Alum Spool Valve Assy w/Buna seals
AV-BFCVS20	Std 304SS Spool Valve Assy w/Buna seals
AV-BFCV620	Std 316SS Spool Valve Assy w/Buna seals

Fail Last Position Spool Valve Replacement Assemblies	
AV-BFLPVA20	Std Alum Spool Valve Assy w/Buna seals
AV-BFLPVS20	Std 304SS Spool Valve Assy w/Buna seals
AV-BFLPV620	Std 316SS Spool Valve Assy w/Buna seals

Block-Center Spool Valve Replacement Assemblies	
AV-BBCVA20	Std Alum Spool Valve Assy w/Buna seals
AV-BBCVS20	Std 304SS Spool Valve Assy w/Buna seals
AV-BBCV620	Std 316SS Spool Valve Assy w/Buna seals

**Consult factory for more options.

Illustration #11: Spool Valve Assembly

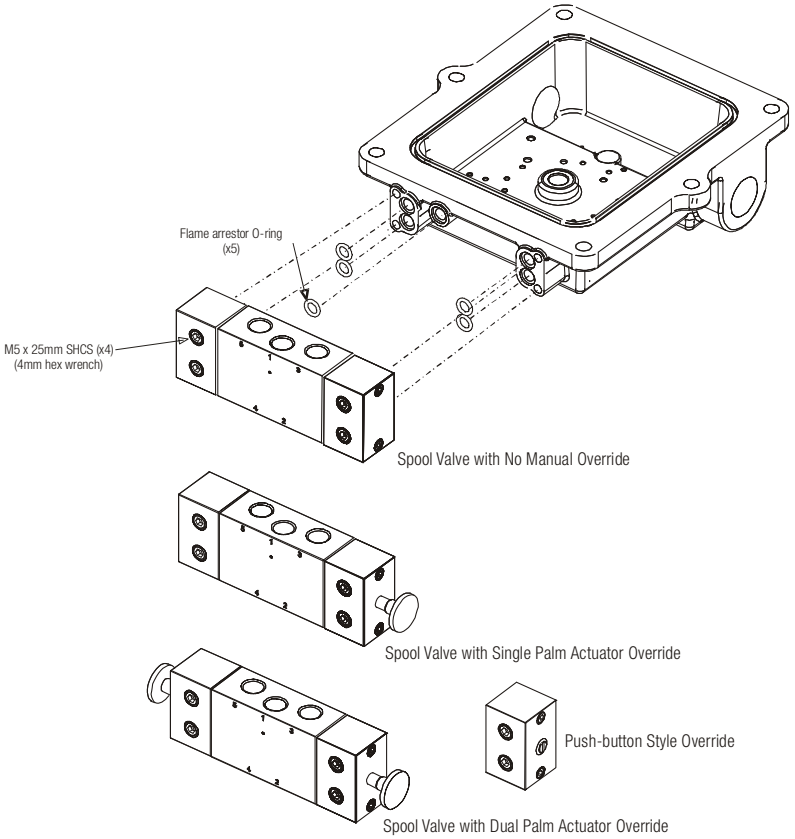
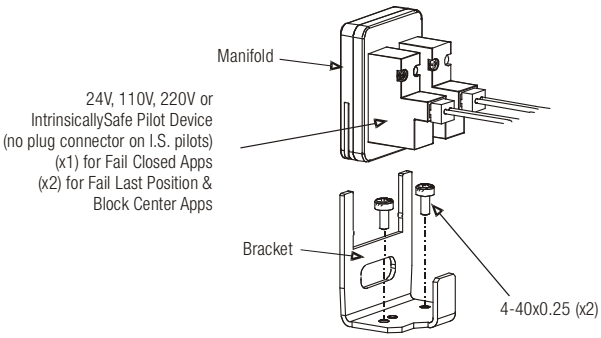
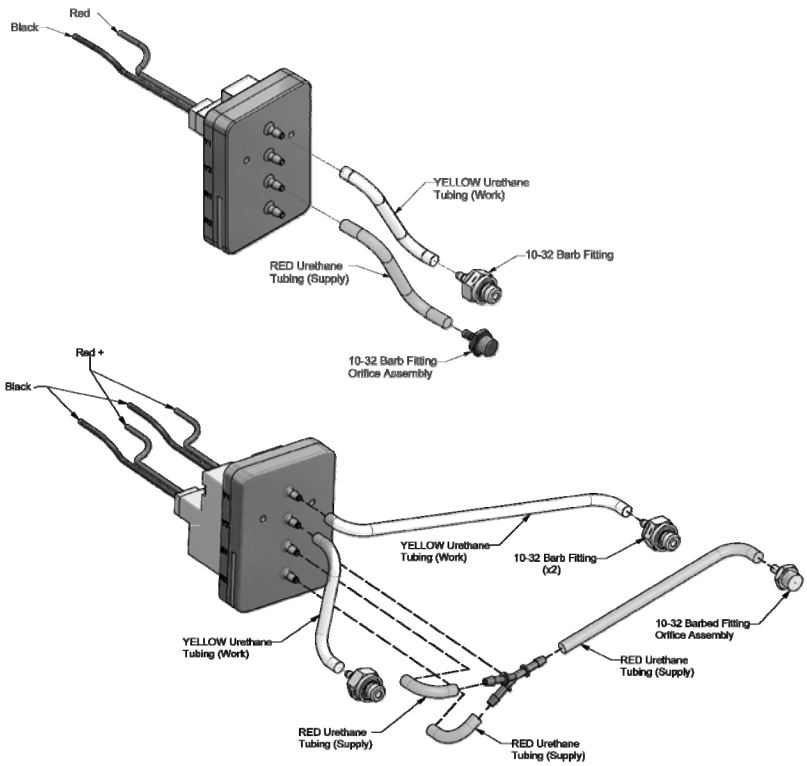


Illustration #12: Pilot Device Assembly





**Orifice only applicable to Explosion Proof units. All others use standard fitting.

Switch Assembly & Calibration

Switch#	Connection	Color Code	Terminal#
1	NC	Red	1
	COM	Black	2
	NO	Blue	3
2	NC	Red/Wht	4
	COM	Black/Wht	5
	NO	Blue/Wht	6
3	NC	Yellow	7
	COM	Brown	8
	NO	Orange	9
4	NC	White/Yel	10
	COM	White/Brn	11
	NO	White/Orn	12
5	NC	White	13
	COM	Gray	14
	NO	Violet	15
6	NC	Pink	16
	COM	White/Gry	17
	NO	White/Vio	18

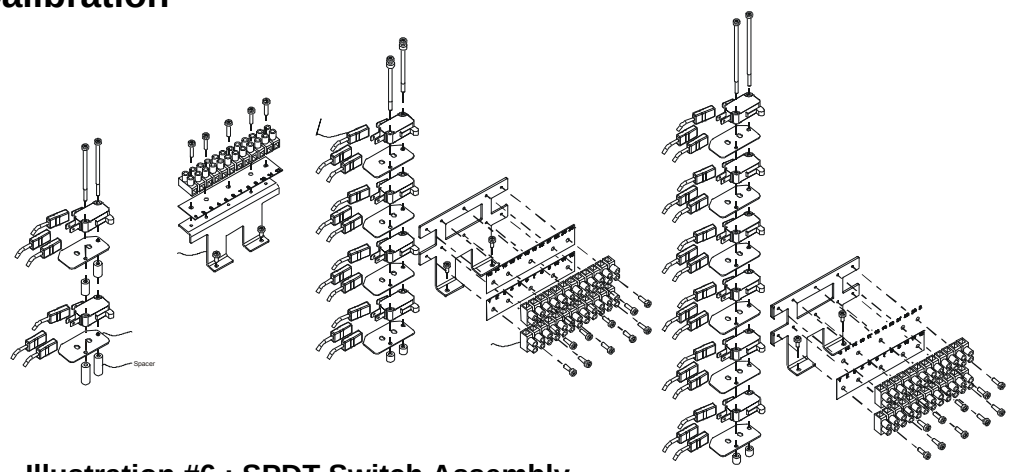
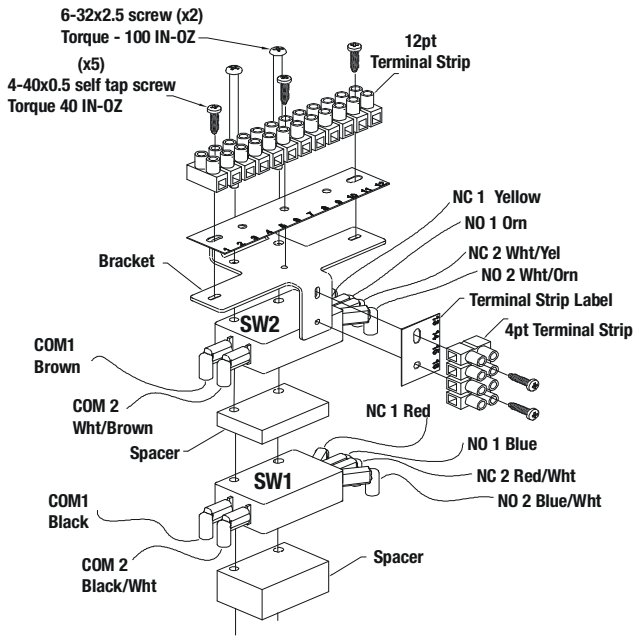


Illustration #6 : SPDT Switch Assembly



Switch Calibration Procedure

Never perform calibration while area is known to be hazardous.

Calibration may be performed using a Volt-Ohm meter by using the Ohm setting across COM and NO. When switch is active, the meter will read ≤0.5 Ohms, or the Diode setting may be used to indicate continuity.

If a 120Vac source is used, an appropriately sized resistor must be used in series to limit current to a maximum of 15 Amperes when circuit rating is unknown, or permanent damage may occur.

Step 1: With valve in the CLOSED position, disengage the BOTTOM Cam from the splined Hub and rotate Clockwise until SW1 activates. Release Cam to re-engage splined Hub.

Step 2: Rotate valve to the OPEN position. Disengage the TOP Cam from the splined Hub and rotate Counter-clockwise until SW2 activates. Release Cam to re-engage the splined Hub.

Step 3: Cycle valve CLOSED and OPEN several times to insure switches will maintain calibration.

For Reverse Acting actuators:
Step 1: With valve in the CLOSED position, disengage the TOP Cam from the splined Hub and rotate Counter-clockwise until SW2 activates. Release Cam to re-engage the splined Hub.

Step 2: Rotate valve to the OPEN position. Disengage the BOTTOM Cam from the splined Hub and rotate Clockwise until SW1 activates. Release Cam to re-engage the splined Hub.

Repeat Step 3 above.

When using the (4) and (6) switch options, use the same calibration steps as above for the switches you determine to indicate OPEN and which indicate CLOSED.

Switches may also be set at midpoint, or any point, of travel for Dribble Control, or any other logic necessary for the application.

Switch #	*Connection*	*Color Code*	*Terminal #*
SW#1	NC1	Red	1
	COM1	Black	2
	NO1	Blue	3
	NC2	Red/Wht	4
	COM2	Blk/Wht	5
	NO2	Blu/Wht	6
SW#2	NC1	Yellow	7
	COM1	Brown	8
	NO1	Orange	9
	NC2	Wht/Yel	10
	COM2	Wht/Brown	11
	NO2	Wht/Org	12

Switch Calibration

Never perform switch calibration while area is known to be hazardous.

Calibration procedure is the same for the DPDT switches as with the SPDT switches. Reference previous page.

Shaft Assembly & Safe Use

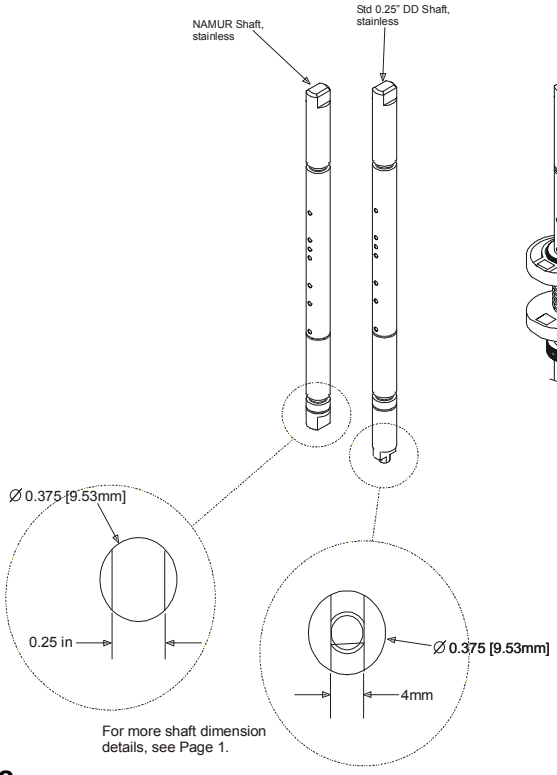


Illustration #8 :
Shaft / Cam Assembly

NAMUR Shaft Replacement Kits (2) Mechanical Switches	
AV-NSB201	NAMUR Shaft w/Buna-N o-rings & (2) cam assembly with installation hardware

Shaft Replacement Kits (2) Mechanical Switches	
AV-SSB201	Standard Shaft w/Buna-N o-rings & (2) cam assembly with installation hardware

Consult factory for more options

Special Conditions of Safe Use (All installations)

Clean only with a damp cloth to prevent possibility of electrostatic discharge.

For Explosion Proof installations, the internal ground connection shall be used and the external ground connection, if supplied in addition, is supplemental bonding allowed where local authorities permit, or is required.

When installing with a third party listed nipple-mount solenoid, it is the responsibility of the installer to provide fittings, and apparatus, suitable for the area classification in accordance with the National Electrical Code.

All cable entry devices or conduit stopping boxes shall be certified in type of explosion protection ‘d’, suitable for the conditions of use and correctly installed.

The IIC enclosures are excluded from use in carbon disulphide atmospheres.

The air pressure to the valve block, when fitted, shall not exceed 7bar.

Preventative Maintenance

The TopWorx Valvetop is designed to operate for one million cycles without servicing. Call TopWorx when you are approaching this milestone for a preventative maintenance kit and instructions.

Certifications & Approvals

	AREA	CERTIFICATION		c UL us LISTED	Ex	IECEx	CE 0518
DXP	0	Ex ia IIC T4 Ga, Ex t IIIC T70°C Db, IP67 –40°C ≤ Tamb ≤ 55°C (mech. and Go switches without spool valve option) Ex ia IIC T4 Gb, Ex t IIIC T70°C Db, IP67 –20°C ≤ Tamb ≤ 53°C (p+f switches without spool valve option) Ex ia IIC T4 Gb, Ex t IIIC T70°C Db, IP67 –10°C ≤ Tamb ≤ 50°C (with pilot/spool valve option) SIRA 07ATEX2214X Ui=28V, Ii=100mA, Pi=0.7W, Ci=14nF, Li=2.06mH			✓		✓
	1	Class I Div 1 Groups C,D Type 4, 4X Ex d IIB+H2 T6 –40°C ≤ Tamb ≤ 60°C, IP67 SIRA 07ATEX1273X IECEx SIR 07.0093X SPDT 15A/125, 250Vac SPDT with Gold Contacts 0.1A/125; 50mA/24Vdc DPDT 15A/125Vac		✓	✓	✓	✓
	C	Ex d IIC T6 –40°C ≤ Tamb ≤ 60°C, IP67 SIRA 07ATEX1273X SIRA IECEx SIR 06.0093X SPDT 15A/125, 250Vac SPDT with Gold Contacts 0.1A/125; 50mA/24Vdc DPDT 15A/125Vac			✓	✓	✓
	W	NEMA 4, 4X					
DXS	0	Ex ia IIC T4 Ga, Ex t IIIC T70°C Db, IP67 –40°C ≤ Tamb ≤ 55°C (mech. and Go switches without spool valve option) Ex ia IIC T4 Gb, Ex t IIIC T70°C Db, IP67 –20°C ≤ Tamb ≤ 53°C (p+f switches without spool valve option) Ex ia IIC T4 Gb, Ex t IIIC T70°C Db, IP67 –10°C ≤ Tamb ≤ 50°C (with pilot/spool valve option) SIRA 07ATEX2214X Ui=28V, Ii=100mA, Pi=0.7W, Ci=14nF, Li=2.06mH			✓		✓
	1	Class I Div 1 Groups C,D Type 4, 4X Ex d IIB+H2 T6 –40°C ≤ Tamb ≤ 60°C, IP67 SIRA 07ATEX1273X IECEx SIR 07.0093X SPDT 15A/125, 250Vac SPDT with Gold Contacts 0.1A/125; 50mA/24Vdc DPDT 15A/125Vac		✓	✓	✓	✓
	W	NEMA 4, 4X					
DXR	0	Ex ia IIC T4 Gb, Ex t IIIC T70°C Db, IP6X –20°C ≤ Tamb ≤ 53°C (without spool valve option) –10°C ≤ Tamb ≤ 50°C (with pilot/spool valve option) SIRA 07ATEX2214X 4-20mA Loop Entity Parameters: Ui=28V, Ii=100mA, Pi=0.7W, Ci=14nF, Li=2.06mH			✓		✓
	G	Type 4, 4X SPDT 15A/125, 250Vac SPDT with Gold Contacts 0.1A/125; 50mA/24Vdc DPDT 15A/125Vac	✓				✓
	W	Type 4, 4X SPDT 15A/125, 250Vac SPDT with Gold Contacts 0.1A/125; 50mA/24Vdc DPDT 15A/125Vac					

Warranty

TERMS AND CONDITIONS OF SALE

EXHIBIT C

These terms and conditions, the attendant quotation or acknowledgment, and all documents incorporated by reference therein, binds TopWorx, Inc. hereinafter the Seller, and the buyer, hereinafter Buyer, and constitutes the entire agreement (Agreement) between Buyer and Seller for the provision of services (Services) and/or the sale of goods (Goods) including (except as provided in Section 10) firmware incorporated therein.

1. PRICES: Unless otherwise specified by Seller, Seller's price for the Goods and/or Services shall remain in effect for thirty (30) days after the date of Seller's quotation or acceptance of the order for the Goods/Services, whichever is delivered first, provided an unconditional, complete authorization for the immediate manufacture and shipment of the Goods and/or provision of Services pursuant to Seller's standard order processing procedures is received and accepted by Seller within such time period. If such authorization is not received by Seller within such thirty (30) day period, Seller shall have the right to change the price for the Goods/Services to Seller's price in effect for the Goods/Services at the time the order is released to final manufacture. Prices for Goods do not cover storing, installing, starting up or maintaining Goods unless expressly stated in Seller's quotation. Notwithstanding the foregoing, the price for Goods/Services sold by Seller, but manufactured by others, shall be Seller's price in effect at the time of shipment to Buyer.

2. DELIVERY, ORDER ACCEPTANCE AND DOCUMENTATION: All shipping dates are approximate and are based upon Seller's prompt receipt of all necessary information from Buyer to properly process the order. Notwithstanding any provisions to the contrary in this or other documents related to this transaction, and regardless of how price was quoted, whether FOB, FAS, CIF or otherwise, legal title to the Goods and risk of loss thereto shall transfer to Buyer as follows: for sales in which the end destination of the Goods is within the United States, upon delivery to the freight carrier at the shipping point; for sales in which the end destination of the Goods is outside of the United States, immediately after the Goods have passed beyond the territorial limits of the United States. Seller shall provide Buyer with that data/documentation which is specifically identified in the quotation. If additional copies of data/documentation or non-standard data/documentation are to be provided by Seller, they shall be provided to Buyer at Seller's price then in effect. Data/documentation marked as confidential or proprietary may not be reproduced or used for any purpose other than the purpose for which it was provided and may not be disclosed to third parties without the prior written permission of Seller.

3. EXCUSE OF PERFORMANCE: Seller shall not be liable for delays in performance or for non-performance due to failure or interruption of computer or telecommunication systems, acts of God, war, riot, fire, terrorism, labor trouble, unavailability of materials or components, explosion, accident, compliance with governmental requests, laws, regulations, orders or actions, or other unforeseen circumstances or causes beyond Seller's reasonable control. In the event of such delay, the time for performance or delivery shall be extended by a period of time reasonably necessary to overcome the effect of the delay.

4. TERMINATION AND SUSPENSION BY BUYER: Buyer may terminate or suspend its order for any or all of the Goods/Services covered by the Agreement provided that Buyer gives Seller reasonable advance written notice of such termination or suspension and reimburses Seller for all losses, damages, costs and expenses arising from such termination or suspension.

5. LIMITED WARRANTY: Subject to the limitations contained in Section 6 herein, Seller warrants that the licensed firmware embodied in the Goods will execute the programming instructions provided by Seller, and that the Goods manufactured or Services provided by Seller will be free from defects in materials or workmanship under normal use and care. The foregoing warranties will apply until the expiration of the applicable warranty period. All other Goods are warranted for twelve (12) months from the date of shipment by Seller. Consumables and Services are warranted for a period of 90 days from the date of shipment or completion of the Services. Products purchased by Seller from a third party for resale to Buyer ("Resale Products") shall carry only the warranty extended by the original manufacturer. Buyer agrees that Seller has no liability for Resale Products beyond making a reasonable commercial effort to arrange for procurement and shipping of the Resale Products. If Buyer discovers any warranty defects and notifies Seller thereof in writing during the applicable warranty period, Seller shall, at its option, correct any errors that are found by Seller in the firmware or Services or repair or replace F.O.B. point of manufacture that portion of the Goods or firmware found by Seller to be defective, or refund the purchase price of the defective portion of the Goods/Services. All replacements or repairs necessitated by inadequate maintenance, normal wear and usage, unsuitable power sources or environmental conditions, accident, misuse, improper installation, modification, repair, use of unauthorized replacement parts, storage or handling, or any other cause not the fault of Seller are not covered by this limited warranty, and shall be at Buyer's expense. Seller shall not be obligated to pay any costs or charges incurred by Buyer or any other party except as may be agreed upon in writing in advance by Seller. All costs of dismantling, reinstallation and freight and the time and expenses of Seller's personnel and representatives for site travel and diagnosis under this warranty clause shall be borne by Buyer unless accepted in writing by Seller. Goods repaired and parts replaced by Seller during the warranty period shall be in warranty for the remainder of the original warranty period or ninety (90) days, whichever is longer. This limited warranty is the only warranty made by Seller and can be amended only in a writing signed by Seller. THE WARRANTIES AND REMEDIES SET FORTH ABOVE ARE EXCLUSIVE. THERE ARE NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AS TO MERCHANTABILITY, FITNESS FOR PARTICULAR PURPOSE OR ANY OTHER MATTER WITH RESPECT TO ANY OF THE GOODS OR SERVICES.

6. LIMITATION OF REMEDY AND LIABILITY: SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE REMEDIES OF BUYER SET FORTH IN THIS AGREEMENT ARE EXCLUSIVE. IN NO EVENT, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE), SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED OR SERVICES PROVIDED BY SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, REVENUE OR USE AND COSTS INCURRED INCLUDING WITHOUT LIMITATION FOR CAPITAL, FUEL AND POWER, AND CLAIMS OF BUYER'S CUSTOMERS.

7. PATENTS: Subject to the limitations contained in Section 6, Seller shall defend any suits brought against Buyer based on a claim that use of the Goods manufactured by Seller constitutes an infringement of a valid patent of the United States, and shall pay any damages awarded therein against Buyer, provided that Buyer: promptly notifies Seller in writing of the filing of such suit or the threat thereof; permits Seller to control completely the defense or compromise of such claim of infringement; and provides all reasonable assistance and cooperation requested by Seller for the defense of such suit. In the event that only the Goods manufactured by Seller are held to be infringing in such suit and their use is enjoined, Seller shall, at its sole option and expense, provide a commercially reasonable alternative, including, but not limited to, procuring for Buyer the right to continue using the Goods, replacing them with a non-infringing product or modifying them so they become non-infringing. Buyer agrees that Seller shall not be liable for infringement, and that Buyer shall fully indemnify Seller therefore, if infringement is based upon the use of Goods in connection with goods not manufactured by Seller or in a manner for which the Goods were not designed by the Seller or if the Goods were not designed by the Seller or if the Goods were designed by the Buyer or were modified by or for the Buyer in a manner to cause them to become infringing.

8. TAXES: Any tax or governmental charge payable by the Seller because of the manufacture, sale or delivery of the Goods, or provision of Services, may at Seller's option be added to the price herein specified. The foregoing shall not apply to taxes based upon Seller's net income.

9. TERMS OF PAYMENT: Subject to the approval of Seller's Credit Department, terms are F.O.B. shipping point, net 30 days from date of Seller's invoice in U.S. currency, except for applicable milestone payments covered below or export shipments for which Seller may require other arrangements. Freight charges may include shipping and handling charges, and Buyer shall pay all such charges. If any payment owed to Seller hereunder is not paid when due, it shall bear interest at a rate 1-1/2% per month interest from the date on which it is due until it is received and future shipments may be placed on hold. Seller shall have the right, among other remedies, either to terminate the Agreement or to suspend further deliveries under this and/or other agreements with Buyer in the event Buyer fails to make any payment hereunder when due. Buyer shall be liable for all expenses attendant to collection of past due amounts, including attorneys' fees. Unless otherwise provided in Seller's written quotation, periodic milestone payments shall be made by Buyer when the purchase price of this Agreement exceeds $100,000. In such cases, invoices shall be issued by Seller and paid by Buyer based on the following milestones: Milestone 1: 30% of price upon acceptance of order by Seller. Milestone 2: 30% of price upon release by Seller of approved bills of material to manufacturing for assembly. Milestone 3: 40% of price upon shipment of the Goods by Seller. Seller reserves the right to designate additional Milestones where the Agreement provides for Services in excess of $50,000.

10. SOFTWARE AND FIRMWARE: Notwithstanding any other provision herein to the contrary, Seller or applicable third party owner shall retain all rights of ownership and title in its respective firmware and software, including all copyrights relating to such firmware and software and all copies of such firmware and software. Except as otherwise provided herein, Buyer is hereby granted a nonexclusive, royalty free license to use firmware and software, and copies of firmware and software, incorporated into the Goods only in conjunction with such Goods and only at the Buyer's plant site where the Goods are first used. Buyer may negotiate with Seller separate licenses to use such copies and firmware and software at other plant sites. Buyer's use of certain firmware (as specified by Seller) and all other software shall be governed exclusively by Seller's and/or third party owner's applicable license terms.

11. BUYER SUPPLIED DATA: To the extent that Seller has relied upon any specifications, information, representation of operating conditions or other data or information supplied by Buyer to Seller ("Data") in the selection or design of the Goods and/or provision of the Services and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer and relied upon by Seller, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.

12. EXPORT/IMPORT: Buyer agrees that all applicable import and export control laws, regulations, orders and requirements, including without limitation those of the United States and the European Union, and the jurisdictions in which the Seller and Buyer are established or from which items may be supplied will apply to its receipt and use of Goods and Services. In no event shall Buyer use, transfer, release, import, export, or re-export Goods in violation of such applicable laws, regulations, orders, or requirements.

13. GENERAL PROVISIONS: (a) Buyer shall not assign its rights or obligations under the Agreement without Seller's prior written consent; (b) there are no understandings, agreements or representations, express or implied, not specified in the Agreement; (c) no action, regardless of form, arising out of transactions under the Agreement, may be brought by either party more than two years after the cause of action has accrued; (d) any modification of these terms and conditions must be set forth in a written instrument signed by a duly authorized representative of Seller; (e) the Agreement is formed and shall be construed, performed and enforced under the laws of the State of Missouri (however, Buyer and Seller agree that the proper venue for all actions arising under the Agreement shall be only in the State where the Goods involved in such actions were manufactured; (f) The 1980 United Nations Convention on Contracts for the International Sale of Goods does not apply to this Agreement; (g) If any provision of the Agreement is invalid under any statute or rule of law, such provision, to that extent only, shall be deemed to be omitted without affecting the validity of the remainder of the Agreement; (h) Seller specifically objects to the application of any Federal Acquisition Regulation ("FAR") or other governmental procurement provision or clause to the Agreement; (i) UNLESS OTHERWISE SPECIFICALLY PROVIDED IN SELLER'S QUOTATION, GOODS AND SERVICES HEREUNDER ARE NOT INTENDED FOR USE IN ANY NUCLEAR OR NUCLEAR RELATED APPLICATIONS. Buyer (i) accepts Goods and Services in accordance with the restriction set forth in the immediately preceding sentence, (ii) agrees to communicate such restriction in writing to any and all subsequent purchasers or users and (iii) agrees to defend, indemnify and hold harmless Seller from any and all claims, losses, liabilities, suits, judgments and damages, including incidental and consequential damages, arising from use of Goods and Services in any nuclear or nuclear related applications, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability; (j) The rights, remedies and protections afforded to Seller under this Agreement, including but not limited to indemnification of Seller, limitation of remedy and liability and limited warranty shall extend to Seller and to its affiliates, subsidiaries, or related companies performing or supplying work, services, or products under this Agreement or any agreement into which it is incorporated by reference; and (k) Seller does not agree to: (i) indemnify Buyer; or (ii) name Buyer as an additional insured.

Visit www.topworx.com for comprehensive information on our company, capabilities, and products – including model numbers, data sheets, specifications, dimensions, and certifications.

info.topworx@emerson.com

www.topworx.com

GLOBAL SUPPORT OFFICES

Americas
TopWorx, Inc
3300 Fern Valley Road
Louisville, Kentucky 40213 USA
+1 502 969 8000
info.topworx@emerson.com

Europe
TopWorx, Ltd
Suite 56, Stafford Business Village
Dyson Way
Staffordshire Technology Park
Stafford ST18 0TW, England
+44 1785 887 960
info.topworx@emerson.com

Asia-Pacific
TopWorx Pte, Ltd
TT International Tradepark
10 Toh Guan Road
#02-04 Singapore 608838
+65 6793 0980
info.topworx@emerson.com

Africa
TopWorx (Pty) Ltd.
10 Field Street
Wilbart, Evandale 1609
South Africa
+27 011 445 4475 tel
info.topworx@emerson.com

Middle East
TopWorx
P.O. Box 17033
Jebel Ali Free Zone
Dubai 17033
United Arab Emirates
971(4) 811 8100 tel
info.topworx@emerson.com

GRAINGER
FOR THE ONES WHO GET IT DONE

Print *printed* August 14, 2006

Valve,Flow Control

Flow Control Valve, Male Port 14 Inches, Female Port Size 1/4 Inch NPT, Coefficient of Volume 0.67, Maximum Operating Pressure 150 PSI, Maximum Temperature 0-180 Degrees Fahrenheit, Length 1 39/64 Inches, Height 1 19/64 Inches, Width 3/4 Inch

Grainger Item #	2F851
Price (ea.)	**$18.20**
Brand	INGERSOLL-RAND/ARO
Mfr. Model #	119307-250
Ship Qty.	1
Sell Qty. (Will-Call)	1
Ship Weight (lbs.)	0.1
Usually Ships	Today
Catalog Page No.	1522

Price shown may not reflect your price. Log in or register.

Additional Info

Flow Control Valves

Right angle flow control valves mount directly into cylinder port for precise control of cylinder speed.

Adjust with screwdriver to increase or decrease speed. Rugged, all metal design includes nickel-plated brass body, anodized aluminum swivel, and stainless steel spring for optimum corrosion resistance. Features dry thread sealant on male threads to eliminate need for piping tape. Full 360 Degree rotation for tubing alignment.

Tech Specs

Max. Operating PSI: 150
Body: Nickel-plated Brass
Length (In.): 1 39/64
Height (In.): 1 19/64
Width (In.): 3/4

Notes & Restrictions

There are currently no notes or restrictions for this item.

MSDS

This item does not require a **Material Safety Data Sheet (MSDS).**

Required Accessories

There are currently no required accessories for this item.

Optional Accessories

There are currently no optional accessories for this item.

Alternate Products

Valve,Flow Control

Item #: 4A789
Brand: PARTROL
Usually Ships: Today
Price (ea): $21.71

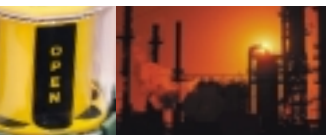
Valve,Flow Control

Item #: 6ZC08
Brand: INGERSOLL-RAND/ARO
Usually Ships: Today
Price (ea): $21.53

Repair Parts

There is currently no Repair Parts information

Fluid Control Products



ASCO® A Constant Flow Of Ideas

2 Way General Purpose Solenoid Valves

T A B L E O F C O N T E N T S

These solenoid valves have one inlet and one outlet, and are used to permit and shut off fluid flow.

Two Types of Operations Apply:

Normally Closed
Fluid is shut off when the coil is de-energized, flows through the valve when the coil is energized.

Normally Open
Fluid flows through the valve when the coil is de-energized, shuts off when the coil is energized.

Two Types of Constructions Apply:

Direct Acting
When the solenoid is energized, the core directly opens the orifice of a Normally Closed valve or closes the orifice in a Normally Open valve. The valve will operate at pressures from 0 psi to its rated maximum. The force needed to open the valve is proportional to the orifice size and fluid pressure. As orifice size increases, so does the required force. To open larger orifices without increasing solenoid size, internal pilots are used.

Internally Piloted
These valves use line pressure to assist operation.

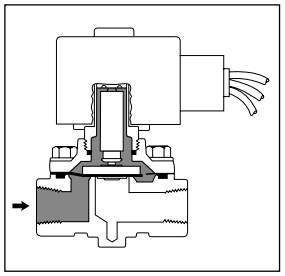
When the coil is de-energized (on a Normally Closed valve), the pilot orifice is closed and line pressure is applied to the top of the piston or diaphragm through the bleed orifice, closing the valve. When the coil is energized, the core opens the pilot orifice, relieving pressure from the diaphragm or piston. Line pressure, alone, opens the valve by lifting the diaphragm or piston off the main orifice.

See Engineering Section for further details.

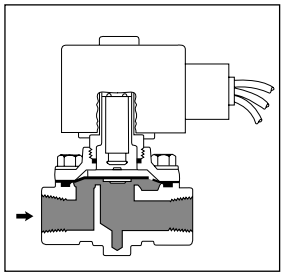
Standard and Optional Features:

Solenoid valves are supplied, as listed, with either Red-Hat II® molded epoxy solenoids or Red-Hat® solenoids with metal enclosures. Red-Hat II valves are identified by the letter "G" or "H" in their catalog numbers; e.g., 8030***G***16. Many optional features may be added to your valves; e.g., high-temperature Class H molded coils, manual operators, and metering devices.

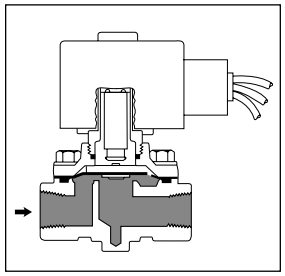
2 Way/2 Position Valves Flow Diagrams



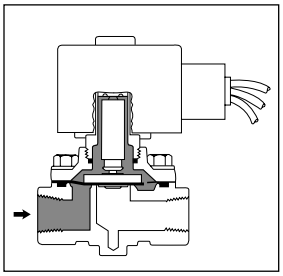
Normally Closed Valve
De-Energized



Normally Closed Valve
Energized



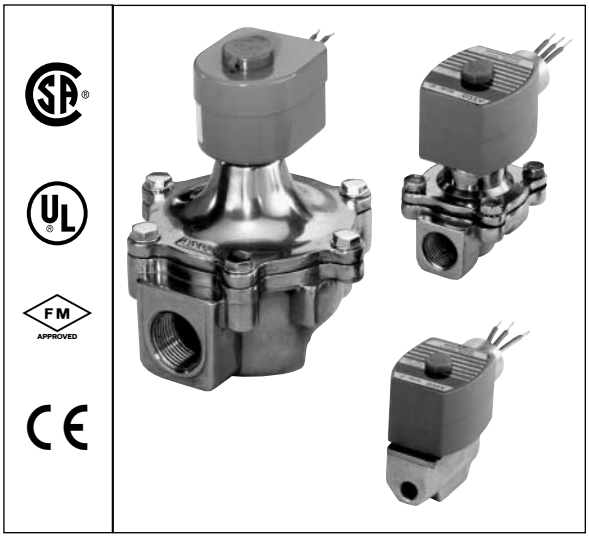
Normally Open Valve
De-Energized



Normally Open Valve
Energized

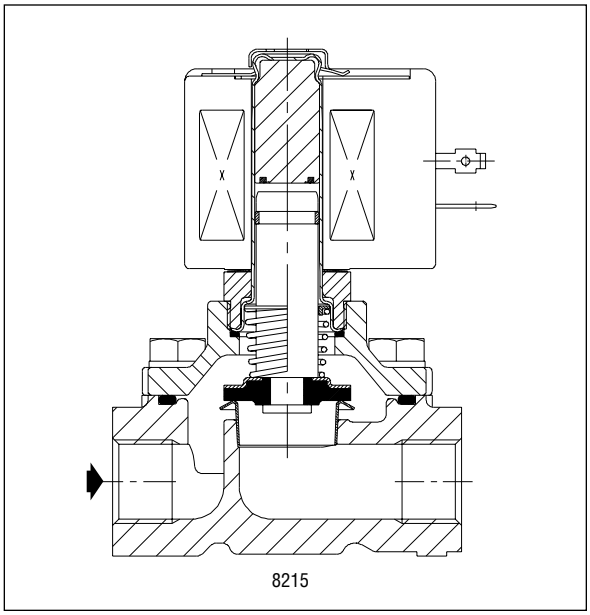
Features

- Lightweight, low-cost valves for air service.
- Ideal for low pressure applications.
- Provides high flow, Cv up to 138 (Kv 118).
- Air and vacuum service.



Construction

Valve Parts in Contact with Fluids	
Body	Aluminum
Seals, Diaphragms, Disc	NBR
Disc-Holder	PA (10.1 and 11.6 watt Normally Open only)
Core Guide	CA
Core Tube	305 Stainless Steel
Rider Rings	PTFE
Core and Plugnut	430F Stainless Steel
Springs	302 Stainless Steel
Shading Coil	Copper



Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.			
		AC			General Purpose		Explosionproof	
	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	-	6.1	16	40	238210	-	238214	-
F	11.6	10.1	25	70	238610	238710	238614	238714
B	14.9	-	-	-	-	62691	-	-
F	-	15.4	27	160	99257	-	99257	-
F	-	28.2	50	385	206409	-	206409	-

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz), 6, 12, 24, 120, 240 volts DC. Must be specified when ordering. Other voltages available when required.

Solenoid Enclosures

Standard: Red-Hat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; Red-Hat - Type I.

Optional: Red-Hat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; Red-Hat - Explosionproof and Raintight, Types 3, 7, and 9. (Except EF8215A40 and EF8215A90, which are suitable for Types 3 and 7 (C and D) only and have a T2B temperature rating code.) To order, add prefix "EF" to catalog number.

Nominal Ambient Temperature Ranges:

Red-Hat II/
Red-Hat AC: 32˚F to 125˚F (0˚C to 52˚C)
Red-Hat II DC: 32˚F to 104˚F (0˚C to 40˚C)
Red-Hat DC: 32˚F to 77˚F (0˚C to 25˚C)
(104˚F/40˚C occasionally)

Approvals:

CSA certified. UL listed, as indicated. FM approved (Normally Closed only, except Catalog Numbers 8215A90 and 8215A40). Red-Hat II meets applicable CE directives.

Specifications (English units)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi)			Max. Fluid Temp. ˚F		Aluminum Body			Watt Rating/ Class of Coil Insulation ②	
			Min.	Max. AC Air-Fuel Gas	Max. DC Air-Fuel Gas	AC	DC	Catalog Number	Constr. Ref. No	UL ⑤ Listing	AC	DC
NORMALLY CLOSED (Closed when de-energized)												
1/8	5/16	1.0	0	15	-	125	-	8040H6	11	❍	6.1/F	-
1/4	5/16	1.1	0	15	-	125	-	8040H7	11	❍	6.1/F	-
3/8	5/16	1.2	0	15	-	125	-	8040H8	11	❍	6.1/F	-
3/8	3/4	3.4	0	50	25	125	104	8215G10	2	❍	10.1/F	11.6/F
3/8	3/4	3.5	5	125	125	125	104	8215G1 ①	1	❍	6.1/F	11.6/F
1/2	3/4	5.4	0	2	-	125	-	8040G22	13A	❍	10.1/F	-
1/2	3/4	4.4	0	50	25	125	104	8215G20	2	❍	10.1/F	11.6/F
1/2	3/4	4.8	5	125	125	125	104	8215G2 ①	1	❍	6.1/F	11.6/F
3/4	3/4	9.5	0	2	-	125	-	8040G23	13B	❍	10.1/F	-
3/4	3/4	5.1	0	50	25	125	104	8215G30	4	❍	10.1/F	11.6/F
3/4	3/4	5.1	5	125	125	125	104	8215G3 ①	3	❍	6.1/F	11.6/F
1	1 5/8	21	0	25	25	125	77	8215B50 ③	6	❍	15.4/F	14.9/B
1 1/4	1 5/8	32	0	25	25	125	77	8215B60 ③	6	❍	15.4/F	14.9/B
1 1/2	1 5/8	35	0	25	25	125	77	8215B70 ③	6	❍	15.4/F	14.9/B
2	2 3/32	60	0	25	15	125	77	8215B80 ③	7	❍	15.4/F	14.9/B
2 1/2	3	117	0	5	-	125	-	8215A90	8	❍	28.2/F	-
3	3	138	0	5	-	125	-	8215A40	8	❍	28.2/F	-
NORMALLY OPEN (Open when de-energized)												
3/8	3/4	3.2	0	125	125	125	104	8215G13	9	●	10.1/F	11.6/F
1/2	3/4	4	0	125	125	125	104	8215G23	9	●	10.1/F	11.6/F
3/4	3/4	4.6	0	125	125	125	104	8215G33	10	●	10.1/F	11.6/F
1	1 5/8	22	0	25	15	125	77	8215C53	12	●	15.4/F	14.9/B
1 1/4	1 5/8	33	0	25	15	125	77	8215C63	12	●	15.4/F	14.9/B
1 1/2	1 5/8	37	0	25	15	125	77	8215C73	13	●	15.4/F	14.9/B
2	2 3/32	58	0	25	15	125	77	8215C83	14	●	15.4/F	14.9/B
2 1/2	3	117	0	5	-	125	-	8215B93 ④	15	●	28.2/F	-

Notes: ① Do not use for Fuel Gas.
② On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
③ FM Approved Process Control Valves. See Engineering Section (Approvals) for details.
④ Type 1 enclosure only.
⑤ ❍ = Safety Shutoff Valve; ● = General Purpose Valve. Refer to Engineering Section (Approvals) for details.

Specifications (Metric units)

Pipe Size (ins.)	Orifice Size (mm)	Kv Flow Factor (m3/h)	Operating Pressure Differential (bar) Min.	Max. AC Air-Fuel Gas	Max. DC Air-Fuel Gas	Max. Fluid Temp. ˚C AC	DC	Aluminum Body Catalog Number	Constr. Ref. No	UL ⑤ Listing	Watt Rating/ Class of Coil Insulation ② AC	DC
NORMALLY CLOSED (Closed when de-energized)												
1/8	7.9	.86	0	1.0	-	51	-	8040H6	11	❍	6.1/F	-
1/4	7.9	.94	0	1.0	-	51	-	8040H7	11	❍	6.1/F	-
3/8	7.9	1.03	0	1.0	-	51	-	8040H8	11	❍	6.1/F	-
3/8	19	2.91	0	3.4	1.7	51	40	8215G10	2	❍	10.1/F	11.6/F
3/8	19	3.00	0.3	8.6	8.6	51	40	8215G1 ①	1	❍	6.1/F	11.6/F
1/2	19	4.63	0	0.1	-	51	-	8040G22	13A	❍	10.1/F	-
1/2	19	3.77	0	3.4	1.7	51	40	8215G20	2	❍	10.1/F	11.6/F
1/2	19	4.11	0.3	8.6	8.6	51	40	8215G2 ①	1	❍	6.1/F	11.6/F
3/4	19	8.14	0	0.1	-	51	-	8040G23	13B	❍	10.1/F	-
3/4	19	4.37	0	3.4	1.7	51	40	8215G30	4	❍	10.1/F	11.6/F
3/4	19	4.37	0.3	8.6	8.6	51	40	8215G3 ①	3	❍	6.1/F	11.6/F
1	41	18.00	0	1.7	1.7	51	25	8215B50 ③	6	❍	15.4/F	14.9/B
1 1/4	41	27.43	0	1.7	1.7	51	25	8215B60 ③	6	❍	15.4/F	14.9/B
1 1/2	41	30.00	0	1.7	1.7	51	25	8215B70 ③	6	❍	15.4/F	14.9/B
2	53	51.43	0	1.7	1.0	51	25	8215B80 ③	7	❍	15.4/F	14.9/B
2 1/2	76	100.28	0	0.3	-	51	-	8215A90	8	❍	28.2/F	-
3	76	118.28	0	0.3	-	51	-	8215A40	8	❍	28.2/F	-
NORMALLY OPEN (Open when de-energized)												
3/8	19	2.74	0	8.6	8.6	51	40	8215G13	9	●	10.1/F	11.6/F
1/2	19	3.43	0	8.6	8.6	51	40	8215G23	9	●	10.1/F	11.6/F
3/4	19	3.94	0	8.6	8.6	51	40	8215G33	10	●	10.1/F	11.6/F
1	41	18.86	0	1.7	1.0	51	25	8215C53	12	●	15.4/F	14.9/B
1 1/4	41	28.28	0	1.7	1.0	51	25	8215C63	12	●	15.4/F	14.9/B
1 1/2	41	31.71	0	1.7	1.0	51	25	8215C73	13	●	15.4/F	14.9/B
2	53	49.71	0	1.7	1.0	51	25	8215C83	14	●	15.4/F	14.9/B
2 1/2	76	100.28	0	0.3	-	51	-	8215B93 ④	15	●	28.2/F	-

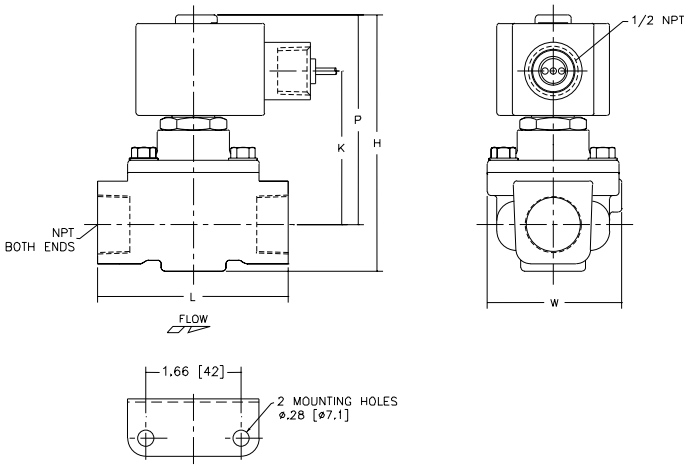
Notes:
① Do not use for Fuel Gas.
② On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
③ FM Approved Process Control Valves. See Engineering Section (Approvals) for details.
④ Type 1 enclosure only.
⑤ ❍ = Safety Shutoff Valve; ● = General Purpose Valve. Refer to Engineering Section (Approvals) for details.

Dimensions: inches (mm)

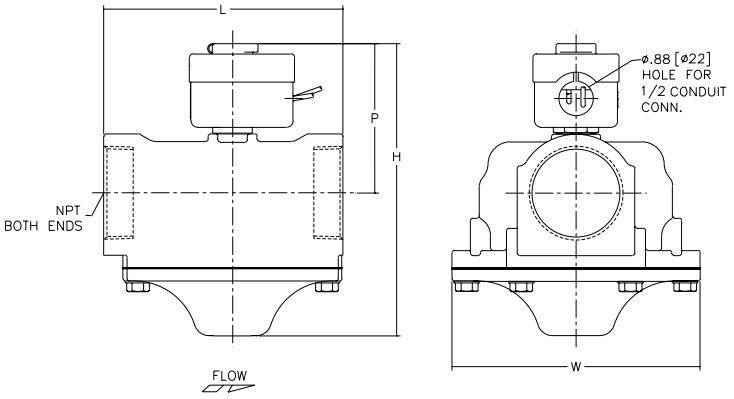
Constr. Ref. No.		H	K	L	P	W
1	ins.	3.42	2.00	2.75	2.87	2.46
	mm	87	51	70	73	63
2	ins	4.02	2.49	2.75	3.46	2.46
	mm	102	63	70	88	63
3	ins.	3.87	2.19	3.31	3.05	2.33
	mm	98	56	84	77	59
4	ins.	4.46	2.68	3.31	3.64	2.33
	mm	113	68	84	92	59
6 ①	ins.	6.84	x	5.00	5.59	5.38
	mm	174	x	127	142	137
7 ①	ins.	7.47	x	6.09	5.94	6.31
	mm	190	x	155	151	160
8 ①	ins.	10.25	x	7.79	7.91	7.94
	mm	260	x	198	201	202
9	ins.	4.42	2.72	2.75	3.86	2.36
	mm	112	69	70	98	60
10	ins.	4.86	2.72	3.31	4.04	2.36
	mm	123	69	84	103	60
11	ins.	2.74	1.44	2.00	2.30	1.69
	mm	69	36	51	58	43
12	ins.	6.84	x	5.00	3.63	5.38
	mm	174	x	127	92	137
13	ins.	6.84	x	5.00	3.56	5.38
	mm	174	x	127	90	137
13A	ins.	4.05	2.46	2.75	3.44	2.42
	mm	103	63	70	87	62
13B	ins.	4.49	2.65	3.31	3.63	2.39
	mm	114	67	84	92	61
14 ②	ins.	7.44	x	6.09	3.81	6.31
	mm	189	x	155	97	160
15 ②	ins.	10.25	x	7.80	5.22	7.94
	mm	260	x	198	133	202

IMPORTANT: Valves may be mounted in any position except all DC constructions and those marked ①, which must be mounted with the solenoid vertical and upright. Constructions marked ② must be mounted with the solenoid vertical and upright or horizontal only.

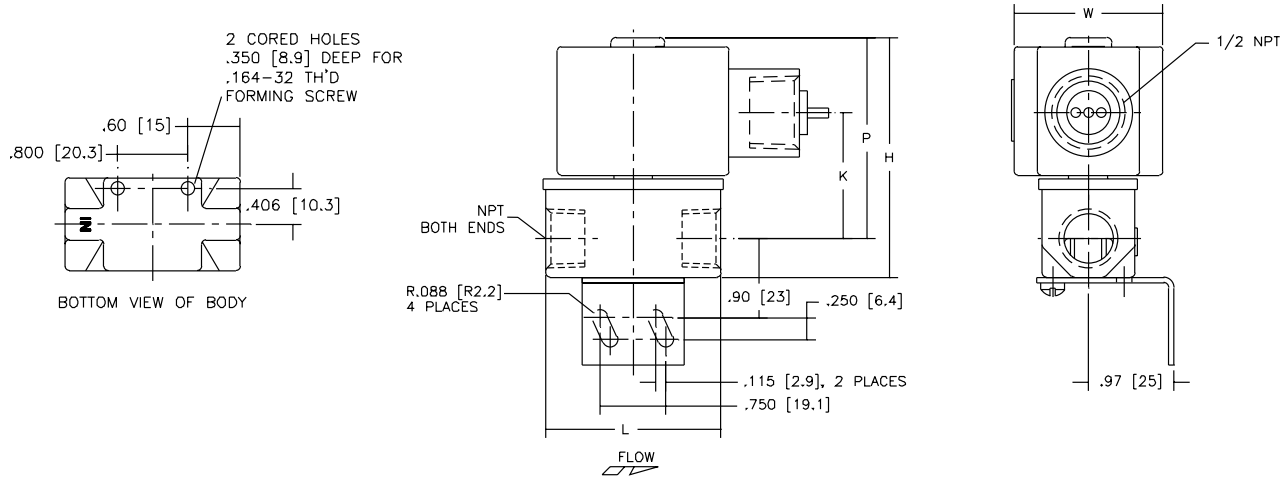
Constr. Refs. 1-4, 9, 10, 13a, 13b



Constr. Refs. 6, 7, 8, 12-15



Constr. Refs. 11



ASCO® Global Contacts

Americas

USA

Alabama
Birmingham, AL 35244
Tel (205) 988-8169
Fax (205) 988-9675

Alaska
Contact Southern CA office

Arizona
Contact Southern CA office

Arkansas
Contact Eastern OK office

California
Orange, CA 92868
Tel (714) 937-0811
Fax (714) 937-1390

Colorado
Littleton, CO 80122
Tel (303) 779-6990
Fax (303) 773-0859

Connecticut (Northern)
Contact Central/Northern NY office

Connecticut (Southern)
Contact NJ office

Delaware
Contact NJ office

Florida
Contact Alabama office,
toll-free (800) 531-2019

Georgia
Contact Alabama office

Hawaii
Contact Southern CA office

Idaho (Northern)
Contact Southern CA office

Idaho (Southern)
Contact Colorado office

Illinois
Westmont, IL 60559
Tel (630) 789-4810
Fax (630) 789-4820

Indiana
C. M. Buck & Associates, Inc.
Indianapolis, IN 46268
Tel (317) 293-5704
Fax (317) 293-0281

Iowa (Eastern)
Contact Illinois office,
toll-free (800) 437-1416

Iowa (Western)
Contact Colorado office

Kansas
Contact Colorado office

Kentucky
McNay Equipment Co.
Louisville, KY 40299
Tel (502) 491-0333
Fax (502) 499-7149

Louisiana
Contact Texas office

Maine
Contact Northern NY office

Maryland
Contact Southern NJ office

Massachusetts
Contact Northern NY office

Michigan
Southfield, MI 48076
Tel (248) 645-2620
Fax (248) 645-9696

Minnesota
Plymouth, MN 55447
Tel (612) 577-0427
Fax (612) 577-0524

Mississippi
Contact Alabama office

Missouri (Eastern)
Contact Illinois office,
toll-free (800) 437-1416

Missouri (Western)
Contact Colorado office

Montana
Contact Southern CA office

Nebraska
Contact Colorado office

Nevada (Northern)
Contact Southern CA office

Nevada (Southern)
Contact Southern CA office

New Hampshire
Contact Northern NY office

New Jersey
Marlton, NJ 08053
Tel (856) 985-8700
Fax (856) 985-5030
Headquarters:
Hanover Road, Florham Park
NJ,07932
Tel (973) 966-2000
Fax (973) 966-2628

New Mexico
Contact Southern CA office

New York (Central/Northern)
N. Syracuse, NY 13212
Tel (315) 453-3877
Fax (315) 453-3795

New York (Metropolitan)
Contact NJ office

North Carolina
PL&E Sales, Inc.
Charlotte, NC 28210
Tel (704) 366-9222
Fax (704) 366-9227

North Dakota
Contact Minnesota office

Ohio (Northern)
Contact Michigan office

Ohio (Southern)
McNay Equipment Co., Inc.
Cincinnati, OH 45242
Tel (513) 489-4770
Fax (513) 489-1470

Oklahoma
Automatic Engineering, Inc.
Tulsa, OK 74120
Tel (918) 585-5703
Fax (918) 585-5707

Oregon
Contact Northern CA office

Pennsylvania (Eastern)
Contact Southern NJ office

Pennsylvania (Western)
Continental Sales & Engrg. Co.
Pittsburgh, PA 15235
Tel (412) 241-5660
Fax (412) 243-1329

Rhode Island
Contact Northern NY office

South Carolina
Contact North Carolina office

South Dakota
Contact Minnesota office

Tennessee
Contact Alabama office

Texas
Dallas, TX 75243
Tel (972) 699-1781
Fax (972) 669-9852

Utah
Contact Colorado office

Vermont
Contact Northern NY office

Virginia (Northern)
Contact Southern NJ office

Virginia (Southern)
Richmond, VA 23288
Tel (804) 282-3523
Fax (804) 282-3522

Washington
Contact Northern CA office

West Virginia
Contact Western PA office

Wisconsin
Milwaukee, WI 53217
Tel (414) 351-8400
Fax (414) 351-8404

Wyoming
Contact Colorado office

Caribbean (Puerto Rico)
Mario R. Franceschini, Inc.
San Juan, PR 00907
Tel (787) 725-7080
Fax (787) 721-5762

ARGENTINA

ASCO Joucomatic
Tel (54) 11-4718-0322 x249
Fax (54)-11-4797-4164

BRAZIL

Main Office
ASCOVAL Ind. E. Com Ltda.
São Paulo
Tel (55) 11-7295-5333
Fax (55) 11-7295-3970

Grande Do Sul
Port Alegre 90550-004
Tel (011) 55-51-343-4699
Fax (011)55-51-343-4867

Sao Paulo
Campinas 13052-200
Tel (011) 55-192-227-7755
Fax (011)-55-192-227-2399

Minas Gerais
Belo Horizonte 30430-680
Tel (011) 55-31-295-2470
Fax (011)-55-31-295-3606

Rio De Janeiro
Bonsucesso 21032-600
Tel (011) 55-21-270-2290
Fax (011)-55-21-270-208

CANADA

Main Office
ASCOLECTRIC Limited
Brantford, Ontario N3T 5M8
Tel (519) 758-2700
Fax (519) 758-5540

British Columbia
Burnaby, V5G 4E1
Tel (604) 294-1767
Fax (604) 294-9935

Alberta, Saskatchewan, and Manitoba (incl. Thunder Bay)
Calgary T2E 7L4
Tel (403) 207-8571
Fax (403) 207-8581

Ontario (excl. Ottawa Valley & Thunder Bay)
Mississauga, L5N 1A6
Tel (905) 821-2711
Fax (905) 821-2780

Quebec & Ottawa Valley
Saint Laurent, H4S 1P9
Tel (514) 337-8520
Fax (514) 337-8771

Atlantic Provinces
Dartmouth, N.S. B3B 1W2
Tel (902) 468-2559
Fax (902) 468-1663

Manitoba
Winnipeg, R2J OB8
Tel (204) 233-0077
Fax (204) 233-0777

MEXICO

ASCOMATICA S.A. de C.V.
Mexico, D.F. CP11700
Tel (52) 5-596-77-41
Fax (52) 5-596-77-19

VENEZUELA

ASCOMATICA
Tel (58) 2-237-9036 ext.17
Fax (58)-2-238-9023

Europe

Belgium
ASCO Joucomatic
Benelux N.V.
Tel (32) 2-333-0250
Fax (32) 2-333-0251

Czech Republic
ASCO Joucomatic -S.R.O.
Tel (420) 2-61-31-54-11
Fax (420) 2-61-31-54-44

Egypt
ASCO Joucomatic
Tel (20) 2-594-0797
Fax (20) 2-355-0776

France
ASCO Joucomatic
Tel (33) 1-47-14-32-00
Fax (33) 1-47-14-30-64

Germany
ASCO Joucomatic GmbH
Tel (49)-7237-9960
Fax (49)-7237-9961

Hungary
ASCO Joucomatic
ASCO Magnesszelep Kft.
Tel (36) 1-3874811
Fax (36) 1-2502383

Italy
ASCO Joucomatic S.P. A.
Tel (39) 02-356931
Fax (39) 02-35693300

Middle East
ASCO Joucomatic Mideast
Tel (971) 4-834494
Fax (971) 4-834495

Poland
ASCO Joucomatic SP. Z0.0
Tel (48) 22-673-0601
Fax (48) 22-673-0134

Portugal
ASCO Joucomatic
Fluido Control, S.A.
Tel (351) 2-619-0857
Fax (351) 2-619-0858

South Africa
ASCO Joucomatic
ASCOREG (Pty.) LTD.
Tel (27) 11-444-2213
Fax (27) 11-444-2221

Spain
ASCO Joucomatic
Fluido Control, S.A.
Tel (34) 942-87-6100
Fax (34) 942-86-3323

Sweden
ASCO Joucomatic
ASCO AB
Tel (46) 33-108000
Fax (46) 33-108080

Switzerland
ASCO JOUCOMATIC A.G.
Tel (41) 32-374-4510
Fax (41) 32-374-4511

The Netherlands
ASCO Joucomatic
ASCO CONTROLS B.V.
Tel (31) 33-277-7911
Fax (31) 33-277-4561

Turkey
ASCO Joucomatic
Tel (90)-216-464-0770
Fax (90)-216-464-0771

United Kingdom
ASCO JOUCOMATIC LTD.
Tel (44) 1695-724270
Fax (44) 1695-729477

Asia/Pacific

Australia
ASCO Joucomatic
ASCOMATION PTY., LTD.
Tel (61) 2-9-451-7077
Fax (61) 2-9-451-9924

China
ASCO Asia – Hong Kong
Tel (852) 2-343-8580
Fax (852) 2-790-1771

India
ASCO (India) Ltd.
Tel (91) 44-496-0455
Fax (91) 44-496-2270

Indonesia
ASCO Asia – Indonesia
Tel (62-21) 575-0902
Fax (62-21) 575-0936

Japan
ASCO Japan Co. LTD.
Tel (81) 798-65-6361
Fax (81) 798-63-4443

Korea
ASCO Asia – Korea
Tel (82) 2-515-2485
Fax (82) 2-540-3250

Malaysia
ASCO Asia – Malaysia
Tel (60) 3-754-6811
Fax (60) 3-754-1664

Singapore
ASCO Asia -Singapore
Tel (65) 764-1218
Fax (65) 762-1305

Taiwan
ASCO Asia – Taiwan
Tel (886) 22-325-9555
Fax (886) 22-702-6009

For more detailed information order ASCO's complete Catalog 33 or Visit our Website: www.ascovalve.com E-mail: info-valve@asco.com

ATTACHMENT I.6

COMPLIANCE DEMONSTRATION

Programs
» Air Home
» Small Business Environmental Assistance
» Vehicles and Fuels
» Your Air Quality
» Public Notices

Information
» First Time Visitors
» Educators and Students
» Air Quality Professionals

Assistance
» Site Map
» Glossary
» Support Desk
» Contact Us

Emission Sources

Air Compliance and Enforcement Search (ACES)

Glossary

Facility Detail Report

Facility Characteristics

Glossary

Owner/Company: **NEW RIVER SOLID WASTE ASSOCIATION**
Site Name: **NEW RIVER REGIONAL LANDFILL**
Address: **24276 Ne 157th St Raiford FL 32083-0647**

Facility ID: **1250008**

Facility is currently **IN** Compliance

SIC Code: **4953 - Electric, Gas And Sanitary Services; Sanitary Services; Refuse Systems**
DEP Facility Type: **Municipal Solid Waste Landfill**
Regulatory Classifications: **Title V Source, Major of Non-HAP Pollutants**
Applicable Federal Rules Include: **NESHAP, NSPS**
Status: **Active**

Air Pollutant Information for Facility

Active Permits and Authorizations

Glossary

ID Number	Type	Sub Type Description	Project Name	Issued / Effective	Expiration Date
1250008-003-AV	Title V	Renewal	NEW RIVER SOLIID WASTE ASSOC.	04/16/2009	04/16/2014
1250008-005-AV	Title V	Revision	NEW RIVER REGIONAL LANDFILL	05/20/2011	04/16/2014
1250008-006-AC	Construction	Construction	NEW RIVER LANDFILL	10/14/2011	10/14/2013

5 Year Summary

Glossary

Number of Inspections	Date of Last Inspection	Formal Enforcement Actions	Penalties Assessed
7	6/12/2013	0	$0.00

Formal Enforcement Actions (and Penalties Assessed) may have been for violations discovered more than 5 years ago.

5 Year Inspection History

Glossary

Date	Compliance Office	Inspection Type	Inspection Description	Facility in Compliance at Time of Inspection?
07/31/2008	NED	INS3	Compliance Inspection	Yes
10/05/2009	NED	INS2	Compliance Inspection	Yes
10/08/2010	NED	INS2	Compliance Inspection	Yes
05/27/2011	NED	INS2	Compliance Inspection	Yes
06/02/2011	NED	INS3	Compliance Inspection	Yes

06/23/2011	NED	INS3	Compliance Inspection	Yes
06/12/2013	NED	INS2	Compliance Inspection	Yes

5 Year Compliance and Enforcement History Glossary

Date Violation Discovered	Discovery Method	Dollars Assessed	Environmental Project Dollars	Total Penalty Assessed
There were no violations discovered at this facility in the last 5 years.				

New Search

Report Date: 7/9/2013

Last updated: October 31, 2011

2600 Blair Stone Road, M.S. 5500 Tallahassee, Florida 32399-2400 850-717-9000 (phone) / 850-717-9001 (fax)