DEP ROUTING AND TRANSMITTAL SLIP

TO: (NAME, OFFICE, LOCATION)

1. JEFF KOERNER - ARM
2. MAIL STATION #5505
3. ____
4. ____
5. ____

PLEASE PREPARE REPLY FOR:	COMMENTS:
____ SECRETARY'S SIGNATURE	
____ DIV/DIST DIR SIGNATURE	
____ MY SIGNATURE	
____ YOUR SIGNATURE	
____ DUE DATE ____	
ACTION/DISPOSITION	
____ DISCUSS WITH ME	
____ COMMENTS/ADVISE	
____ REVIEW AND RETURN	
____ SET UP MEETING	
____ FOR YOUR INFORMATION	
____ HANDLE APPROPRIATELY	
____ INITIAL AND FORWARD	
____ SHARE WITH STAFF	
____ FOR YOUR FILES	

FROM: Mara Nasca/SD DATE: 7/18/2000 PHONE: SC748-6975

DEP 15-026 (12/93)

Okeelanta 0990005 Air Application for The Florida Crystals Sugar Refinery, dated March 31, 2000

Table A-11, PSD Source Applicability Analysis for Okeelanta Sugar Refinery

The future Maximum Emissions (TPY) indicates PM at 44.18 TPY, PM10 at 19.51 TPY and VOC at 39.02 TPY.

Construction Permit 0990005-002-AC dated July 17, 1996, the permit application, and the TV Permit application indicate PM at 57.26 TPY, PM10 at 26.26 TPY - Net change PM at 33.71 over the threshold.

Best Available Copy

Department of Environmental Protection

RECEIVED
JUL 21 2000
BUREAU OF AIR REGULATION

Lawton Chiles
Governor

South District
2295 Victoria Avenue, Suite 364
Fort Myers, Florida 33901-3881

Virginia B. Wetherell
Secretary

PERMITTEE:
Okeelanta Corporation
Florida Crystals Refinery, Inc.
Post Office Box 86
South Bay, Florida 33493

Facility I.D.: 0990005
Permit Number: 0990005-002-AC
Date of Issue: July 17, 1996
Expiration Date: July 17, 2001
County: Palm Beach
Latitude: 26° 35' 00" N
Longitude: 80° 45' 00" W
Section/Town/Range: 16/45S/36E
Project: Okeelanta Sugar Mill
and Refinery

This permit is issued under the provisions of Chapter 403, Florida Statutes (F.S.), and Florida Administrative Code (F.A.C.) Rules 62-4, 62-296, and 62-297. The above named permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents, attached hereto or on file with the Department and made a part hereof and specifically described as follows:

I. Construct (after the fact) a sugar refinery process and refined sugar handling systems with a design capacity of 850 tons per day of refined sugar. This unit employs a rotary dryer and two rotary coolers. Particulate (sugar dust) emissions are controlled as follows: The rotary dryer vents through an American Air Filter (AAF) skimmer to remove large particles and then through an AAF Wet Rotoclone to remove PM and PM10. Particulate emissions from the two rotary coolers pass through a pair of parallel wet cyclones. Particulate emissions from bucket elevators and conveyors are controlled by venting through the two rotoclones.

II. Construct a new fluidized bed dryer/cooler unit with a design capacity of 870 tons per day of refined sugar which will be the primary processing unit. The rotary dryer and coolers will be used for specialty sugars and in the event that the fluid bed dryer/cooler is off line for repairs.

The facility is located 6 miles south of South Bay, Florida, on U.S. Highway 27.

<u>For Title V Permits</u>

SIC Number 2062
SCC Numbers 3-02-015-01 General
3-02-015-99 Not Classified

PERMITTEE:
Okeelanta Corporation
Florida Crystals Refinery, Inc.

I.D. No.: 0990005
Permit/Cert. No.: 0990005-002-AC
Date of Issue: July 17, 1996
Expiration Date: July 17, 2001

SPECIFIC CONDITIONS

FACILITY OPERATIONS:

1. The total hours of operation of the rotary dryer or the fluid bed dryer shall not exceed 7,200 hours per calendar year. The hours of operation of the Bulk Load-out Operation and the Transfer Bulk Load-out Operation are not restricted. [Reference Construction Permit Application Dated March 5, 1996)]

2. This facility shall be operated in such a fashion so as to preclude objectionable odors. [Reference Rule 62-296.320(2), F.A.C.]

3. There shall be no discharges of liquid effluents or contaminated runoff from the plant site.

4. Copies of all applications, reports, tests, and notifications shall also be submitted to the Air Pollution Control Section of the Palm Beach County Public Health Unit located at 901 Evernia Street (P.O. Box 29), West Palm Beach, Florida 33402-0029.

5. Any time this unit is found to be performing inadequately because of overloading, neglect, or other reasons, the owner shall discontinue its use until measures are provided to correct the cause of such performance.

6. Reasonable precautions shall be taken to prevent emissions of unconfined particulate matter. Reasonable precautions include the following:

A. Paving and maintenance of roads, parking areas, and yards.
B. Application of water when necessary to control emissions.
C. Removal of particulate matter from roads and other paved areas under control of the owner or operator to prevent reentrainment, and from buildings or work areas to prevent particulate.
D. Enclosure or covering of conveyor systems.
E. Posting of vehicle (or truck) speed limits.

[Reference Rule 62-296.320(4)(c), F.A.C.]

7. Circumvention. No person shall circumvent any air pollution control device, or allow the emission of air pollutants without the applicable air pollution control device operating properly. [Rule 62-210.650, F.A.C.]

CONDITIONS OF COMPLIANCE:

8. The applicant shall retain a registered professional engineer for the inspection of the construction of this project. Upon completion the engineer shall inspect for conformity to construction permit applications and associated documents. [Reference Rule 62-4.050(3), F.A.C.]

PERMITTEE:
Okeelanta Corporation
Florida Crystals Refinery, Inc.

I.D. No.: 0990005
Permit/Cert. No.: 0990005-002-AC
Date of Issue: July 17, 1996
Expiration Date: July 17, 2001

SPECIFIC CONDITIONS

CONDITIONS OF COMPLIANCE:

9. The Department shall be notified and prior approval shall be obtained of any changes or revisions made during construction.

10. It shall be assumed that all the Volatile Organic Compounds (VOC) which are used in the processing are emitted to the atmosphere as fugitive emissions and are to be reported as such. Any VOC that is included in the Hazardous Air Pollutant (HAP) list must be reported separately from the total VOCs.

11. This facility shall comply with the Process Weight Table Emission Rates shown in Table 296.320-1. Interpolation of the data in Table 296.320-1 for the process weight rates up to 30 tons per hour shall be accomplished by the use of the equation: $E = 3.59*P^{0.62}$, where P is less than or equal to 30 tons per hour; and interpolation and extrapolation of the data for process weight rates in excess of 30 tons per hour shall be accomplished by use of the equation: $E = 17.31*P^{0.16}$, where P is greater than 30 tons per hour. Where: E = Emissions in pounds per hour, P = Process weight rate in tons per hour. [Reference Rule 62-296.320(4)(a)2., F.A.C.]

12. Each of the emission units has the potential to emit less than 100 tons per year of particulate matter and is equipped with either a baghouse or a wet cyclone(s). Therefore the department waives any particulate matter compliance test requirements for such emissions unit specified in any otherwise applicable rule, and specifies an alternative standard of 5% opacity.

If the Department has reason to believe that the particulate weight emission standard applicable to such an emissions unit is not being met, it shall require that compliance be demonstrated by the test method specified in the applicable rule. [Reference Rule 62-297.620(4), F.A.C.]

13. Florida Crystals, Inc., the Permittee, has requested lower emissions limits than what is allowed in the Process Weight Tables. The computation and emission factors used are found in Table A-1 and A-2 in Appendix A of the Application For Air Permit submitted on March 6, 1996 and therefore are a part of this permit. Based on process equipment and control equipment manufacturer's guarantees, these emissions would be the basis for the Title V fees and are shown in the following tables (excerpted from the application):

PERMITTEE:
Okeelanta Corporation
Florida Crystals Refinery, Inc.

I.D. No.: 0990005
Permit/Cert. No.: 0990005-002-AC
Date of Issue: July 17, 1996
Expiration Date: July 17, 2001

SPECIFIC CONDITIONS

CONDITIONS OF COMPLIANCE:

ROTARY DRYING SYSTEM

Source Emission Point Description	Throughput (lb/hr)	PM (Tons/year)	PM10 (Tons/year)
Bulk Load-out Operation	25,000	2.86	1.35
Transfer Bulk Load-out Operation	53,333	1.22	0.58
Cooler No. 1 Wet Cyclone	70,840	17.13	9.48
Cooler No. 2 Wet Cyclone	70,840	17.13	9.48
AAF Skimmer/Wet Rotoclone No.1	70,840	5.788	2.32
AAF Wet Rotoclone No. 2	70,840	1.158	0.46
TOTAL		**45.29**	**23.66**

FLUIDIZED BED DRYING SYSTEM

Source Emission Point Description	Throughput (lb/hr)	PM (Tons/year)	PM10 (Tons/year)
Bulk Load-out Operation	25,000	2.86	1.35
Transfer Bulk Load-out Operation	53,333	1.22	0.58
Fluidized Bed Baghouse	72,500	6.91	0.28
AAF Skimmer/Wet Rotoclone No.1	72,500	0.59	0.23
AAF Wet Rotoclone No. 2	72,500	0.391	0.16
TOTAL		**11.97**	**2.60**

REQUIRED TESTING:

14. Visible emissions test are required to show continuing compliance with the standards of the Department. The test results must provide reasonable assurance that the unit is capable of compliance at the permitted maximum operating rate. Tests shall be conducted in accordance with EPA Method Nine as published in 40 CFR-60 Appendix A, or State approved equivalent method. Such test shall be conducted within 30 days of initial operation. The Department shall be notified at least 15 days prior to testing to allow witnessing. [Reference Rules 62-297.310(7)(a)9. and 62-297.310(7)(a)4.a,, F.A.C.]

PERMITTEE:
Okeelanta Corporation
Florida Crystals Refinery, Inc.

I.D. No.: 0990005
Permit/Cert. No.: 0990005-002-AC
Date of Issue: July 17, 1996
Expiration Date: July 17, 2001

SPECIFIC CONDITIONS

REQUIRED TESTING:

15. Testing of emissions should be conducted with the source operating within 10% of its rated capacity. Testing may be conducted at less than 90% of rated capacity; however, if so, subsequent source operation is limited to up to 110% of the test load. Once the unit is so limited, then operation at higher capacities is allowed for purposes of additional compliance testing to regain rated capacity in the permit with prior notification to the Department's South District. [Reference Rule 62-297.310(2), F.A.C.]

16. Notification of the Department prior to any required testing shall include as a minimum: the date and time of the test, the exact location of the test, and the name and telephone number of the contact person at the site. [Reference Rule 62-297.310(7)(a)9., F.A.C.]

REPORTS AND RECORD KEEPING:

17. An annual operation report (DEP Form 62-210.900(5)) shall be submitted by March 1st each year. [Rule 62-4.070(3), and Rule 62-210.370(3), F.A.C.]

GENERAL CONDITIONS:

18. An integral part of this permit is the attached 15 General Conditions. [Rule 62-4.160, F.A.C.]

Note: In the event of an emergency the permittee shall contact the Department by calling **(904) 413-9911**. During normal business hours, the permittee shall call (941) 332-6975.

Issued this 17th day of July, 1996.

STATE OF FLORIDA
DEPARTMENT OF
ENVIRONMENTAL PROTECTION

David M. Knowles

David M. Knowles, P.E.
District Air
Program Administrator

DMK/AEL/jw

_10_ Pages Attached

March 29, 2000

Mr. David Knowles, P.E.
Program Administrator/Air Resource Management
Florida Department of Environmental Protection
Fort Myers Regional Service Center
2295 Victoria Avenue, Suite 364W
Fort Myers, Florida 33901-3881

Attention: Mr. David Knowles, P.E.

Subject: Revised Air Construction Application
DEP Permit No. 0990005-002-AC
Okeelanta Corporation/Florida Crystals Refinery, Inc.

Dear Mr. Knowles:

Please find enclosed a complete revised air construction application for the sugar refinery at Okeelanta. The initial DEP construction permit was issued July 17, 1996. Florida Crystals Refinery plans to improve its refined sugar processing capabilities. The improvement project is designed to provide the flexibility to produce specialty sugars while simultaneously producing standard white sugar. At the time of our previous application the refinery did not operate in this manner. However, the existing construction permit does allow concurrent operation of the two separate sugar drying and cooling systems needed to produce two types of refined sugar simultaneously.

In addition, a small (40 ft. x 80 ft. footprint) building will be erected as part of this improvement project. This building will house a new vacuum pan and associated process equipment to supplement the three existing refinery vacuum pans. However, no additional point sources of emissions are proposed. The existing sugar drying and cooling systems and refined sugar dust emission control systems remain unchanged and will not be altered as part of this improvement. The new vacuum pan will shift some production processing from the existing systems and will result in a 4.6% increase in the rated capacity of the sugar refinery. Although the refined sugar output will increase a small amount, the potential air emissions will remain well below the limits in the existing permit.

The details of the improvement project are incorporated into this revised application. For completeness, the entire application is presented in updated form. Further descriptions of the new equipment and of the refinery processing methods are included in Attachment A. The revised emission calculations account for the proposed

Okeelanta Corporation
P.O. Box 86 • South Bay, FL 33493 • Phone (561) 993-1600 • Fax (561) 992-7326

concurrent operation of the drying/cooling systems and the projected daily and hourly peaks in refined sugar output. Net changes in PM, PM_{10} and VOCs from the proposed improvement are below the significant emission rate for each pollutant. The revisions to potential and actual emissions resulting from these improvements do not trigger PSD new source review. Maximum estimated annual emissions of 44.18 TPY PM and 19.51 TPY PM_{10} do not exceed the current emission limits of 57.26 TPY PM and 26.26 TPY PM_{10} in the existing permit.

Since the refinery is currently under an air construction permit, no new emission point sources will be created due to the refinery improvements and no increase in allowable emissions is being requested, it is believed that this revision can be processed as an amendment to the existing construction permit. Therefore, a processing fee is not applicable to this application pursuant to the provisions of Chapter 62-4.050(4) Florida Administrative Code. The revised Title V application submitted on March 15, 2000 included these refinery improvements.

If you have any questions or if additional information is required, please contact the undersigned at (561) 996-9072 extension 1658.

Sincerely,

Matthew Capone

Matthew Capone, P.E.
Director of Environmental Programs

MC/hll

Enclosures (4 copies)

c: Ricardo Lima
Golder Associates

Golder Associates

RECEIVED
JUL 21 2000
BUREAU OF AIR REGULATION

AIR PERMIT APPLICATION FOR THE FLORIDA CRYSTALS SUGAR REFINERY

Prepared For:
Okeelanta Corporation
21250 U.S. Highway 27
South Bay, FL 33493

Prepared By:
Golder Associates Inc.
6241 NW 23rd Street, Suite 500
Gainesville, Florida 32653-1500

March 2000
9937615Y/F1

DISTRIBUTION:
6 Copies – Okeelanta Corporation
2 Copies – Golder Associates Inc.

RECEIVED
MAR 31 2000
D.E.P. - South District

Department of Environmental Protection

Division of Air Resources Management

APPLICATION FOR AIR PERMIT - TITLE V SOURCE

See Instructions for Form No. 62-210.900(1)

I. APPLICATION INFORMATION

Identification of Facility

1. Facility Owner/Company Name: **Okeelanta Corporation**	
2. Site Name: **Florida Crystals Sugar Refinery**	
3. Facility Identification Number: **0990005** [ ] Unknown	
4. Facility Location: **6 miles south of South Bay on U.S. 27** Street Address or Other Locator: **21250 U.S. Highway 27** City: **South Bay** County: **Palm Beach** Zip Code: **33493**	
5. Relocatable Facility? [ ] Yes [X] No	6. Existing Permitted Facility? [X] Yes [ ] No

Application Contact

1. Name and Title of Application Contact: **Matthew Capone, Director of Environmental Programs**
2. Application Contact Mailing Address: Organization/Firm: **Okeelanta Corporation** Street Address: **21250 U.S. Highway 27** City: **South Bay** State: **FL** Zip Code: **33493**
3. Application Contact Telephone Numbers: Telephone: (**561**) **996 – 9072; x 1658** Fax: (**561**) **992 - 7326**

Application Processing Information (DEP Use)

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

Purpose of Application

Air Operation Permit Application

This Application for Air Permit is submitted to obtain: (Check one)

[ ] Initial Title V air operation permit for an existing facility which is classified as a Title V source.

[ ] Initial Title V air operation permit for a facility which, upon start up of one or more newly constructed or modified emissions units addressed in this application, would become classified as a Title V source.

Current construction permit number:____________________

[ ] Title V air operation permit revision to address one or more newly constructed or modified emissions units addressed in this application.

Current construction permit number:____________________

Operation permit number to be revised:____________________

[ ] Title V air operation permit revision or administrative correction to address one or more proposed new or modified emissions units and to be processed concurrently with the air construction permit application. (Also check Air Construction Permit Application below.)

Operation permit number to be revised/corrected:____________________

[ ] Title V air operation permit revision for reasons other than construction or modification of an emissions unit. Give reason for the revision; e.g., to comply with a new applicable requirement or to request approval of an "Early Reductions" proposal.

Operation permit number to be revised:____________________

Reason for revision:____________________

Air Construction Permit Application

This Application for Air Permit is submitted to obtain: (Check one)

[X] Air construction permit to construct or modify one or more emissions units.

[ ] Air construction permit to make federally enforceable an assumed restriction on the potential emissions of one or more existing, permitted emissions units.

[ ] Air construction permit for one or more existing, but unpermitted, emissions units.

Owner/Authorized Representative or Responsible Official

1.	Name and Title of Owner/Authorized Representative or Responsible Official: **Ricardo A. Lima, Vice President – General Manager**
2.	Owner/Authorized Representative or Responsible Official Mailing Address: Organization/Firm: **Okeelanta Corporation** Street Address: **21250 U.S. Highway 27** City: **South Bay** State: **FL** Zip Code: **33493**
3.	Owner/Authorized Representative or Responsible Official Telephone Numbers: Telephone: **(561) 996 - 9072** Fax: **(561) 992 - 7326**
4.	Owner/Authorized Representative or Responsible Official Statement: *I, the undersigned, am the owner or authorized representative*(check here [ ], if so) or the responsible official (check here [ ], if so) of the Title V source addressed in this application, whichever is applicable. 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. 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 any permitted emissions unit.* [signature] 3-29-00 Signature Date

* Attach letter of authorization if not currently on file.

Professional Engineer Certification

1.	Professional Engineer Name: **David A. Buff** Registration Number: **19011**
2.	Professional Engineer Mailing Address: Organization/Firm: **Golder Associates Inc.** Street Address: **6241 NW 23rd Street, Suite 500** City: **Gainesville** State: **FL** Zip Code: **32653-1500**
3.	Professional Engineer Telephone Numbers: Telephone: **(352) 336 - 5600** Fax: **(352) 336 - 6603**

4. 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.

If the purpose of this application is to obtain a Title V source 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 schedule is submitted with this application.

If the purpose of this application is to obtain an air construction permit for one or more proposed new or modified emissions units (check here [X], 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.

If the purpose of this application is to obtain an initial air operation permit or operation permit revision 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.

David A. Buff — Signature | 3/28/00 — Date

(seal) REGISTERED ENGINEER — STATE OF FLORIDA — DAVID A. BUFF — No. 19011

* Attach any exception to certification statement.

Scope of Application

Emissions Unit ID	Description of Emissions Unit	Permit Type	Processing Fee
--	Sugar Refinery		

Application Processing Fee

Check one: [ ] Attached - Amount: $: ____________ [X] Not Applicable

Construction/Modification Information

1. Description of Proposed Project or Alterations: **Update of construction application for sugar refinery processes and refined sugar handling systems (single emission unit). These processes and handling systems for refined sugar emit particulate matter, PM_{10}, and fugitive VOCs. This update includes revised descriptions of the normal production operations, process equipment improvements associated with a planned building addition, and revised emission calculations.**	
2. Projected or Actual Date of Commencement of Construction: **Apr 12 2000**	
3. Projected Date of Completion of Construction: **Nov 30 2000**	

Application Comment

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates: Zone: **17** East (km): **524.9** North (km): **2940.1**			
2. Facility Latitude/Longitude: Latitude (DD/MM/SS): **26 / 35 /** Longitude (DD/MM/SS): **80 / 45 /**			
3. Governmental Facility Code: **0**	4. Facility Status Code: **A**	5. Facility Major Group SIC Code: **20**	6. Facility SIC(s):
7. Facility Comment (limit to 500 characters):			

Facility Contact

1. Name and Title of Facility Contact: **Matthew Capone, Director of Environmental Programs**
2. Facility Contact Mailing Address: Organization/Firm: **Okeelanta Corporation** Street Address: **21250 U.S. Highway 27** City: **South Bay** State: **FL** Zip Code: **33493**
3. Facility Contact Telephone Numbers: Telephone: (**561**) **996 – 9072; x 1658** Fax: (**561**) **992 - 7326**

Facility Regulatory Classifications

Check all that apply:

1. [ ] Small Business Stationary Source?	[ ] Unknown
2. [X] Major Source of Pollutants Other than Hazardous Air Pollutants (HAPs)?	
3. [ ] Synthetic Minor Source of Pollutants Other than HAPs?	
4. [X] Major Source of Hazardous Air Pollutants (HAPs)?	
5. [ ] Synthetic Minor Source of HAPs?	
6. [X] One or More Emissions Units Subject to NSPS?	
7. [ ] One or More Emission Units Subject to NESHAP?	
8. [ ] Title V Source by EPA Designation?	
9. Facility Regulatory Classifications Comment (limit to 200 characters): **See Attachment OC-AI-AD**	

List of Applicable Regulations

B. FACILITY POLLUTANTS

List of Pollutants Emitted

1. Pollutant Emitted	2. Pollutant Classif.	3. Requested Emissions Cap lb/hour	tons/year	4. Basis for Emissions Cap	5. Pollutant Comment
PM	A				Particulate Matter - Total
PM_{10}	A				Particulate Matter - PM_{10}
SO_2	A				Sulfur Dioxide
NO_X	A				Nitrogen Oxides
CO	A				Carbon Monoxide
VOC	A				Volatile Organic Compounds
PB	B				Lead
H114	B				Mercury Compounds
H021	B				Beryllium Compounds
FL	B				Fluorides
SAM	B				Sulfuric Acid Mist
HAPs	A				Hazardous Air Pollutants

ATTACHMENT OC-AI-AD

FACILITY POLLUTANTS COMMENT

ATTACHMENT OC-AI-AD
FACILITY POLLUTANTS COMMENT

At this time, it is unclear whether Okeelanta Corporation or Okeelanta Power L.P. should be classified as major for HAPs. Okeelanta Power L.P. has no emissions test data indicating significant HAP emissions from its boilers. Emissions test data from the Pulp and Paper Industry indicates HAPs emissions from wood-fired boilers. However, these emissions data may not be representative of Okeelanta Power HAP emissions. In addition, recent sugar industry test data indicate HAPs emissions from sugar industry bagasse fired boilers. However, Okeelanta Power believes the HAPs emissions from its boilers are much lower than the emissions from the older boilers at the sugar mill. Okeelanta is currently not operating its sugar mill boilers, as steam is being supplied by Okeelanta Power.

C. FACILITY SUPPLEMENTAL INFORMATION

Supplemental Requirements

1. Area Map Showing Facility Location: [X] Attached, Document ID: **Attachment A-1** [ ] Not Applicable [ ] Waiver Requested	
2. Facility Plot Plan: [X] Attached, Document ID: **Attachment A-2** [ ] Not Applicable [ ] Waiver Requested	
3. Process Flow Diagram(s): [X] Attached, Document ID: **Attachment OC-FE-3a** [ ] Not Applicable [ ] Waiver Requested	
4. Precautions to Prevent Emissions of Unconfined Particulate Matter: [ ] Attached, Document ID: ______ [X] Not Applicable [ ] Waiver Requested	
5. Fugitive Emissions Identification: [ ] Attached, Document ID: ______ [X] Not Applicable [ ] Waiver Requested	
6. Supplemental Information for Construction Permit Application: [X] Attached, Document ID: **Att. A, B, and C** [ ] Not Applicable	
7. Supplemental Requirements Comment:	

Additional Supplemental Requirements for Title V Air Operation Permit Applications

8. List of Proposed Insignificant Activities: [ ] Attached, Document ID:________ [X] Not Applicable
9. List of Equipment/Activities Regulated under Title VI: [ ] Attached, Document ID:________ [ ] Equipment/Activities On site but Not Required to be Individually Listed [X] Not Applicable
10. Alternative Methods of Operation: [ ] Attached, Document ID:________ [X] Not Applicable
11. Alternative Modes of Operation (Emissions Trading): [ ] Attached, Document ID:________ [X] Not Applicable
12. Identification of Additional Applicable Requirements: [ ] Attached, Document ID:________ [X] Not Applicable
13. Risk Management Plan Verification: [ ] Plan previously submitted to Chemical Emergency Preparedness and Prevention Office (CEPPO). Verification of submittal attached (Document ID:________) or previously submitted to DEP (Date and DEP Office:________________________) [ ] Plan to be submitted to CEPPO (Date required:________________________) [X] Not Applicable
14. Compliance Report and Plan: [ ] Attached, Document ID:________ [X] Not Applicable
15. Compliance Certification (Hard-copy Required): [ ] Attached, Document ID:________ [X] Not Applicable

III. EMISSIONS UNIT INFORMATION

A separate Emissions Unit Information Section (including subsections A through J as required) must be completed for each emissions unit addressed in this Application for Air Permit. If submitting the application form in hard copy, indicate, in the space provided at the top of each page, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application.

A. GENERAL EMISSIONS UNIT INFORMATION
(All Emissions Units)

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).

[X] 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. Regulated or Unregulated Emissions Unit? (Check one)

[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.

3. Description of Emissions Unit Addressed in This Section (limit to 60 characters):

Sugar Refinery

4. Emissions Unit Identification Number:
ID: **021-025**

[ ] No ID
[ ] ID Unknown

5. Emissions Unit Status Code:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A		**20**	[ ]

9. Emissions Unit Comment: (Limit to 500 Characters)

This emission unit produces refined bulk and bagged sugar from raw sugar supplied by the sugar mill.

Emissions Unit Control Equipment

1. Control Equipment/Method Description (Limit to 200 characters per device or method): **Baghouse** **Dynamic Separator (wet) (2)** **Wet Cyclonic Separators (4)** **Process Enclosed**	
2. Control Device or Method Code(s):	**18, 57, 85, 54**

Emissions Unit Details

1. Package Unit: Manufacturer:	Model Number:	
2. Generator Nameplate Rating:	MW	
3. Incinerator Information: Dwell Temperature: Dwell Time: Incinerator Afterburner Temperature:		 °F seconds °F

B. EMISSIONS UNIT CAPACITY INFORMATION
(Regulated Emissions Units Only)

Emissions Unit Operating Capacity and Schedule

1. Maximum Heat Input Rate:			mmBtu/hr	
2. Maximum Incineration Rate:	lb/hr		tons/day	
3. Maximum Process or Throughput Rate:				
4. Maximum Production Rate:		327,000	TPY	
5. Requested Maximum Operating Schedule:				
	24	hours/day	7	days/week
	52	weeks/year	8,760	hours/year
6. Operating Capacity/Schedule Comment (limit to 200 characters):				

Maximum production rate refers to the amount of refined sugar produced by the refinery based on the fluidized bed drying system and rotary drying system operating rates. See Attachment A for further details.

C. EMISSIONS UNIT REGULATIONS
(Regulated Emissions Units Only)

List of Applicable Regulations

62-297.310(1)	
62-297.310(2)	
62-296.320(4)(a)	
62-296.320(4)(b)	
62-297.310(4)(a)2	
62-297.310(5)	
62-297.310(7)(a)4	
62-297.310(7)(a)9	
62-297.310(7)(b)	
62-297.310(7)(c)	
62-297.310(8)	
62-297.620	

D. EMISSION POINT (STACK/VENT) INFORMATION
(Regulated Emissions Units Only)

Emission Point Description and Type

1. Identification of Point on Plot Plan or Flow Diagram? **See Comment**	2. Emission Point Type Code: **3**
3. Descriptions of Emission Points Comprising this Emissions Unit for VE Tracking (limit to 100 characters per point): **C1 and C2: wet cyclones Nos. 1 and 2 stacks, respectively. Fluidized Bed Baghouse stack. Wet Rotoclone Nos. 1 and 2 stacks. Bulk Load-out Area (building). Trans-shipment Load-out Area (building).**	
4. ID Numbers or Descriptions of Emission Units with this Emission Point in Common:	

5. Discharge Type Code: **V**	6. Stack Height: **41** feet	7. Exit Diameter: **2.2** feet
8. Exit Temperature: **100** °F	9. Actual Volumetric Flow Rate: **14,100** acfm	10. Water Vapor: %

11. Maximum Dry Standard Flow Rate: dscfm	12. Nonstack Emission Point Height: feet
13. Emission Point UTM Coordinates: Zone: East (km): North (km):	
14. Emission Point Comment (limit to 200 characters): **See Attachment OC-EU1-D14**	

E. SEGMENT (PROCESS/FUEL) INFORMATION
(All Emissions Units)

Segment Description and Rate: Segment 1 of 3

1. Segment Description (Process/Fuel Type) (limit to 500 characters):

Food and Agriculture – Sugar cane processing, general

2. Source Classification Code (SCC): **3-02-015-01**	3. SCC Units: **Tons Sugar Produced**	
4. Maximum Hourly Rate: **62.5**	5. Maximum Annual Rate: **327,000**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:

10. Segment Comment (limit to 200 characters):

Max hourly and max annual rates refer to the amount of refined sugar produced by the refinery from the fluidized bed drying system and rotary drying system methods operating simultaneously (1,500 TPD). Maximum process rates for either system is 1,200 TPD.

Segment Description and Rate: Segment 2 of 3

1. Segment Description (Process/Fuel Type) (limit to 500 characters):

Food and Agriculture – Sugar Cane Processing, Other Not Classified.

2. Source Classification Code (SCC): **3-02-015-99**	3. SCC Units: **Tons Processed**	
4. Maximum Hourly Rate: **44**	5. Maximum Annual Rate: **97,000**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:

10. Segment Comment (limit to 200 characters):

Max hourly and max annual rates refer to the maximum amount of refined sugar that could be loaded at the bulk load-out area. Annual operating hours are 8,760 hours.

E. SEGMENT (PROCESS/FUEL) INFORMATION
(All Emissions Units)

Segment Description and Rate: Segment 3 of 3

1. Segment Description (Process/Fuel Type) (limit to 500 characters): **Food and Agriculture – Sugar Cane Processing, Other Not Classified**		
2. Source Classification Code (SCC): **3-02-015-99**	3. SCC Units: **Tons Processed**	
4. Maximum Hourly Rate: **72**	5. Maximum Annual Rate: **230,600**	6. Estimated Annual Activity Factor:
7. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment (limit to 200 characters): **Max hourly and annual rates refer to the maximum amount of refined sugar that could be loaded at the trans-shipment bulk load-out area. Annual operating hours are 8,760 hours.**		

Segment Description and Rate: Segment ____ of ____

1. Segment Description (Process/Fuel Type) (limit to 500 characters):		
2. Source Classification Code (SCC):	3. SCC Units:	
4. Maximum Hourly Rate:	5. Maximum Annual Rate:	6. Estimated Annual Activity Factor:
8. Maximum % Sulfur:	8. Maximum % Ash:	9. Million Btu per SCC Unit:
10. Segment Comment (limit to 200 characters):		

F. EMISSIONS UNIT POLLUTANTS
(All Emissions Units)

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
PM	057		EL
PM_{10}	057		EL
VOC			NS

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: **PM**	2. Total Percent Efficiency of Control: **99.4 %**
3. Potential Emissions: **21.66** lb/hour **44.25** tons/year	4. Synthetically Limited? [X]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference: **Attachment A, Tables A-1 to A-4**	7. Emissions Method Code: **2**
8. Calculation of Emissions (limit to 600 characters): **Total emissions from sugar drying, handling, and loadout operations. See Attachment A, Tables A-1 to A-4.**	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **See Attachments for complete calculations and description of control equipment.**	

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **57.26 TPY**	4. Equivalent Allowable Emissions: **21.66** lb/hour **57.26** tons/year
5. Method of Compliance (limit to 60 characters): **Annual VE test using EPA Method 9.**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **The refinery is subject to the process weight table, but Okeelanta requests that allowable emissions be based on the ann. limit in the existing permit and if hourly limits are required on calc. for potential hourly emissions shown in Tbls A1-A4.**	

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: **PM_{10}**	2. Total Percent Efficiency of Control: **99.0 %**
3. Potential Emissions: **10.00** lb/hour **19.54** tons/year	4. Synthetically Limited? [X]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference: **Att. A, Tables A-1 to A-4**	7. Emissions Method Code: **2**
8. Calculation of Emissions (limit to 600 characters): **Total emissions from sugar drying, handling, and loadout operations. See Attachment A, Tables A-1 to A-4.**	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **See Attachments for complete calculations and descriptions of control equipment.**	

Allowable Emissions Allowable Emissions 1 of 1

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units: **26.26 TPY**	4. Equivalent Allowable Emissions: **10.00** lb/hour **26.26** tons/year
5. Method of Compliance (limit to 60 characters): **Annual VE Test using EPA Method 9**	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters): **The refinery is subject to the process weight table, but Okeelanta requests that allowable emissions be based on the ann. limit in the existing permit and if hourly limits are required on calc. for potential hourly emissions shown in Tbls A1-A4.**	

G. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION
(Regulated Emissions Units - Emissions-Limited and Preconstruction Review Pollutants Only)

Potential/Fugitive Emissions

1. Pollutant Emitted: **VOC**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **15.56** lb/hour **39.02** tons/year	4. Synthetically Limited? [**X**]
5. Range of Estimated Fugitive Emissions: [ ] 1 [ ] 2 [ ] 3 ______ to ______ tons/year	
6. Emission Factor: Reference: **See Attachment A, Table A-5**	7. Emissions Method Code: **2**
8. Calculation of Emissions (limit to 600 characters): **See Attachment A, Table A-5**	
9. Pollutant Potential/Fugitive Emissions Comment (limit to 200 characters): **Pollutant emissions are based on maximum estimated VOC chemical usages.**	

Allowable Emissions Allowable Emissions ______ of ______

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Requested Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance (limit to 60 characters):	
6. Allowable Emissions Comment (Desc. of Operating Method) (limit to 200 characters):	

H. VISIBLE EMISSIONS INFORMATION
(Only Regulated Emissions Units Subject to a VE Limitation)

Visible Emissions Limitation: Visible Emissions Limitation 1 of 2

1. Visible Emissions Subtype: **VE**	2. Basis for Allowable Opacity: [X] Rule [ ] Other
3. Requested Allowable Opacity: Normal Conditions: **5** % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: **EPA Method 9 annually**	
5. Visible Emissions Comment (limit to 200 characters): **Rule 62-297.620(4), F.A.C. This limit applies to each point source e-xhaust stack, and is requested in lieu of a PM stack test.**	

I. CONTINUOUS MONITOR INFORMATION
(Only Regulated Emissions Units 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 (limit to 200 characters):	

H. VISIBLE EMISSIONS INFORMATION
(Only Regulated Emissions Units Subject to a VE Limitation)

Visible Emissions Limitation: Visible Emissions Limitation 2 of 2

1. Visible Emissions Subtype: **VE**	2. Basis for Allowable Opacity: [X] Rule [ ] Other
3. Requested Allowable Opacity: Normal Conditions: **20** % Exceptional Conditions: % Maximum Period of Excess Opacity Allowed: min/hour	
4. Method of Compliance: **EPA Method 9 annually**	
5. Visible Emissions Comment (limit to 200 characters): **Rule 62-296.310(2), F.A.C. This limit applies to all fugitive emission points in this application.**	

I. CONTINUOUS MONITOR INFORMATION
(Only Regulated Emissions Units 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 (limit to 200 characters):	

J. EMISSIONS UNIT SUPPLEMENTAL INFORMATION
(Regulated Emissions Units Only)

Supplemental Requirements

1. Process Flow Diagram [X] Attached, Document ID: Att. A-3,4 & 5 [ ] Not Applicable [ ] Waiver Requested
2. Fuel Analysis or Specification [ ] Attached, Document ID:________ [X] Not Applicable [ ] Waiver Requested
3. Detailed Description of Control Equipment [X] Attached, Document ID: Att. A, B, and C [ ] Not Applicable [ ] Waiver Requested
4. Description of Stack Sampling Facilities [ ] Attached, Document ID:_______ [X] Not Applicable [ ] Waiver Requested
5. Compliance Test Report [ ] Attached, Document ID:________ [ ] Previously submitted, Date:______________ [X] Not Applicable
6. Procedures for Startup and Shutdown [ ] Attached, Document ID:________ [X] Not Applicable [ ] Waiver Requested
7. Operation and Maintenance Plan [ ] Attached, Document ID:________ [X] Not Applicable [ ] Waiver Requested
8. Supplemental Information for Construction Permit Application [X] Attached, Document ID: Att. A, B, and C [ ] Not Applicable
9. Other Information Required by Rule or Statute [ ] Attached, Document ID:_______ [X] Not Applicable
10. Supplemental Requirements Comment:

Additional Supplemental Requirements for Title V Air Operation Permit Applications

11. Alternative Methods of Operation
    [ ] Attached, Document ID:________ [ ] Not Applicable

12. Alternative Modes of Operation (Emissions Trading)
    [ ] Attached, Document ID:________ [ ] Not Applicable

13. Identification of Additional Applicable Requirements
    [ ] Attached, Document ID:________ [ ] Not Applicable

14. Compliance Assurance Monitoring Plan
    [ ] Attached, Document ID:________ [ ] Not Applicable

15. Acid Rain Part Application (Hard-copy Required)

    [ ] Acid Rain Part - Phase II (Form No. 62-210.900(1)(a))
    Attached, Document ID:________

    [ ] Repowering Extension Plan (Form No. 62-210.900(1)(a)1.)
    Attached, Document ID:________

    [ ] New Unit Exemption (Form No. 62-210.900(1)(a)2.)
    Attached, Document ID:________

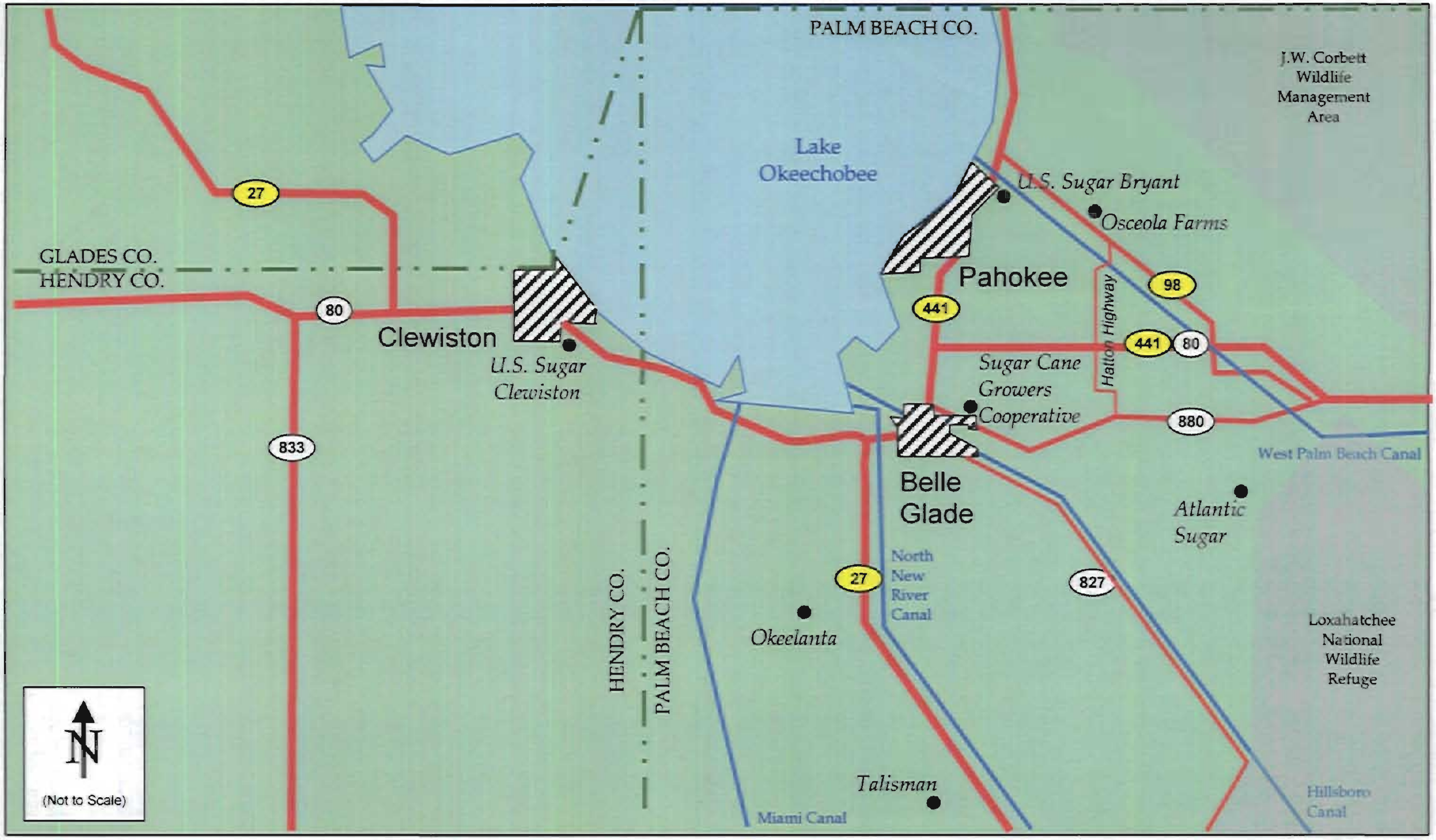
    [ ] Retired Unit Exemption (Form No. 62-210.900(1)(a)3.)
    Attached, Document ID:________

    [ ] Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.)
    Attached, Document ID:________

    [ ] Phase NOx Averaging Plan (Form No. 62-210.900(1)(a)5.)
    Attached, Document ID:________

    [ ] Not Applicable

ATTACHMENT A-1

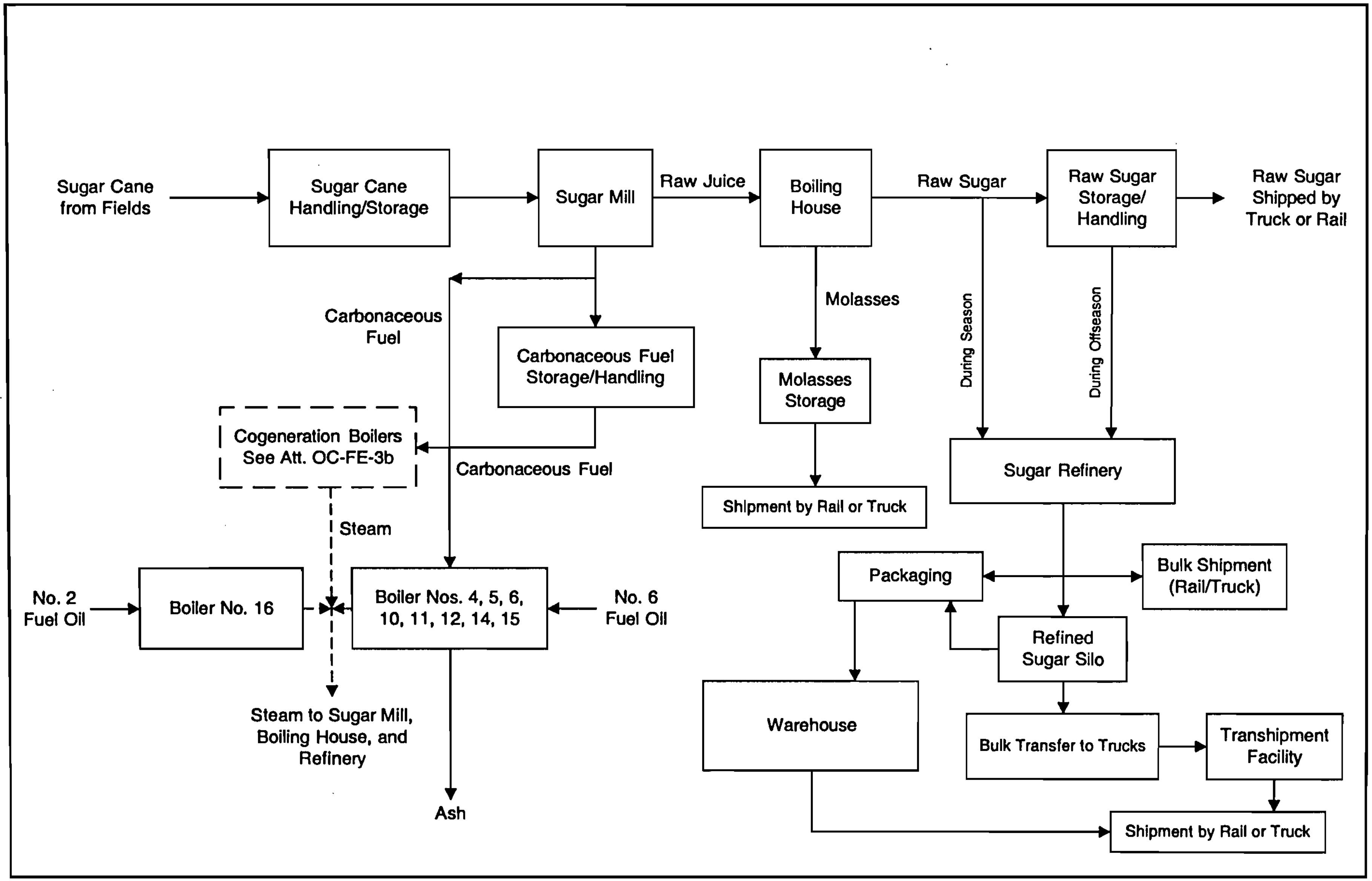


Attachment A-1
Location of Okeelanta Corporation Sugar Mill and Refinery

Source: Golder Associates Inc., 2000

Golder Associates

ATTACHMENT OC-FE-3a
PROCESS FLOW DIAGRAM



Attachment OC-FE-3a
Sugar Manufacturing
Process Flow Diagram
Okeelanta Corporation
South Bay, FL

Process Flow Legend
Solid/Liquid →
Steam ---→

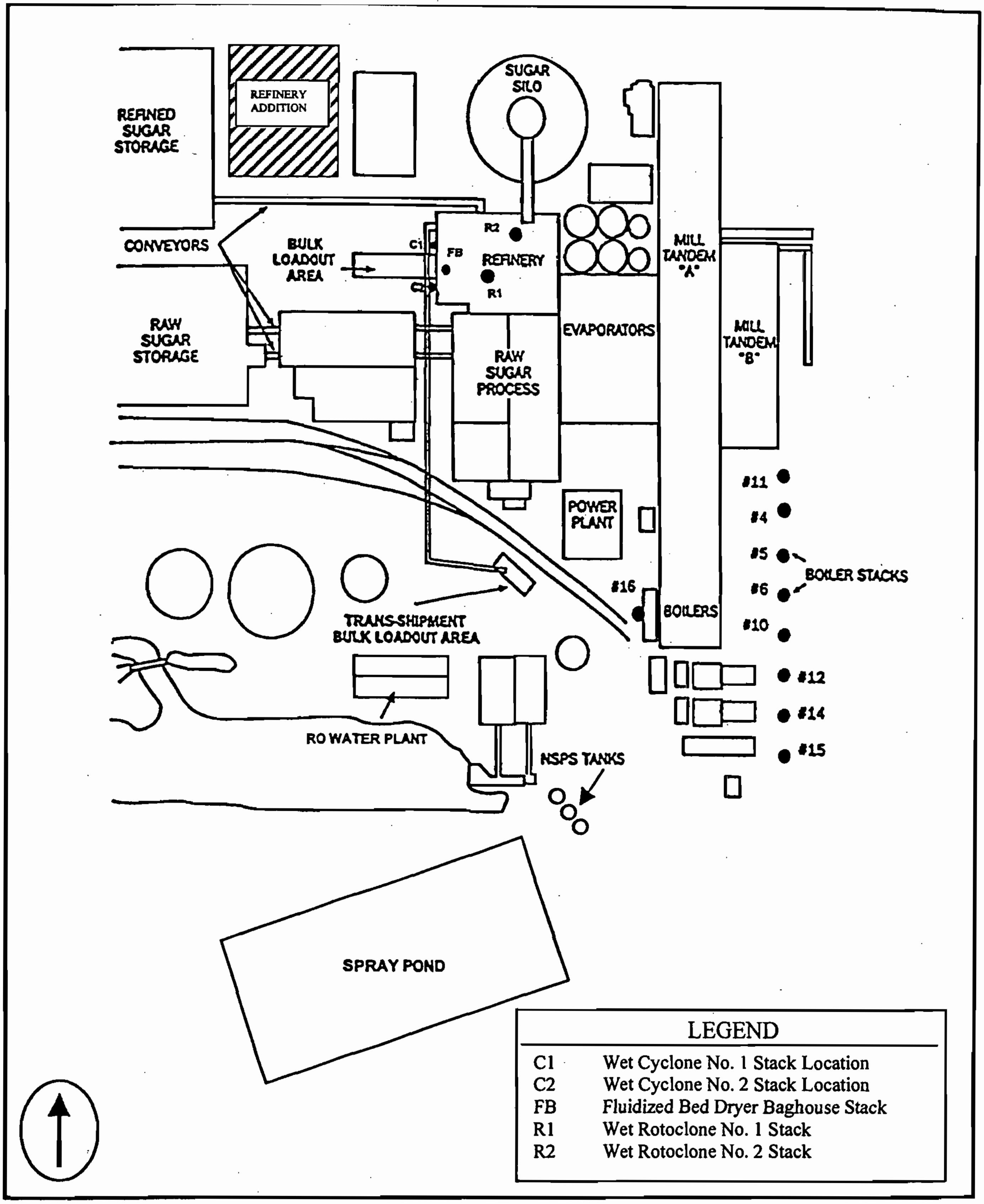
Overall Sugar Mill - Facility Flow Diagram

Filename: 9937534Y/F1/WP/OCFE03.VSD (Page 1)

Date: 02/11/00

Golder Associates

ATTACHMENT A-2



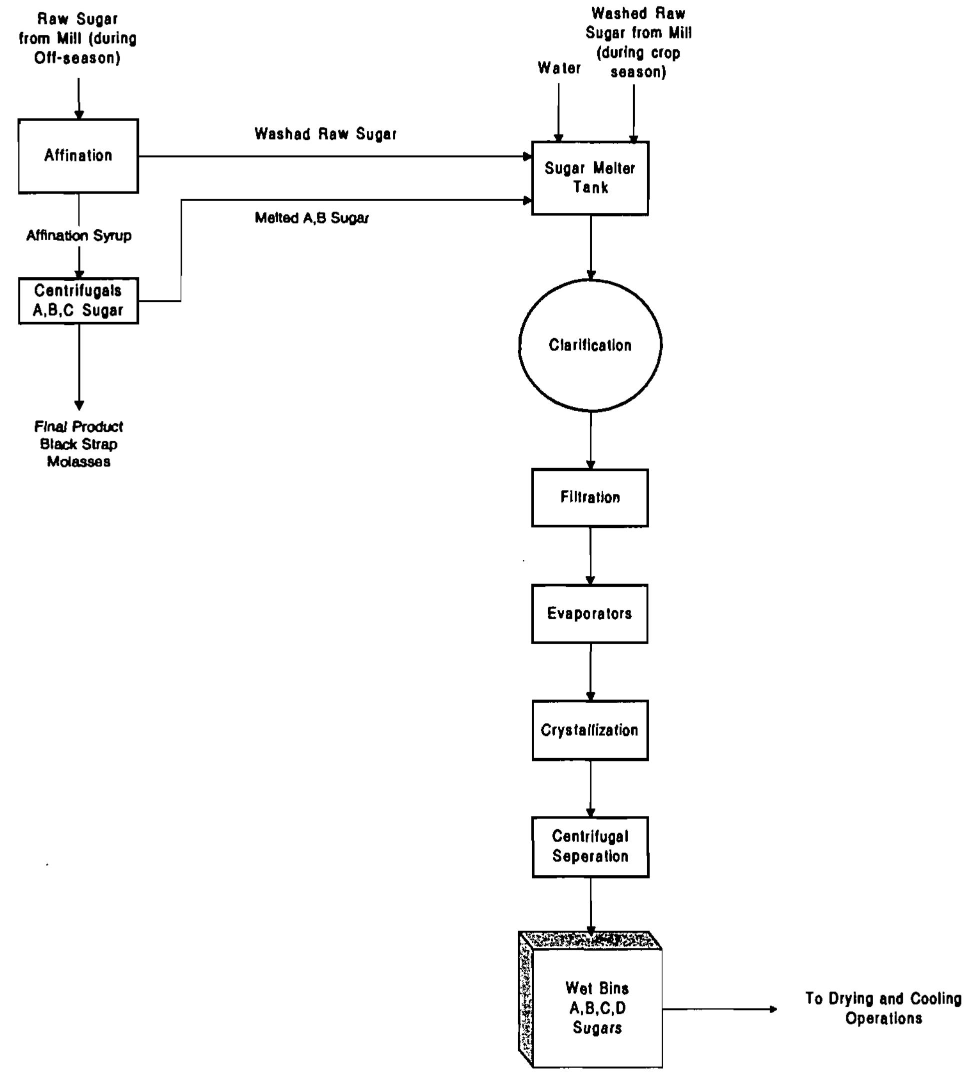
Attachment A-2

Facility Plot Plan of Okeelanta Sugar Mill and Refinery

Note: Plot Plan is a general arrangement for informational purposes only. Plot plan is not to scale

Golder Associates

ATTACHMENT A-3



Attachment A-3
Florida Crystals Refinery
Process Flow Diagram
South Bay, Florida

Process Flow Legend:
Solid / Liquid →
Gas — — →

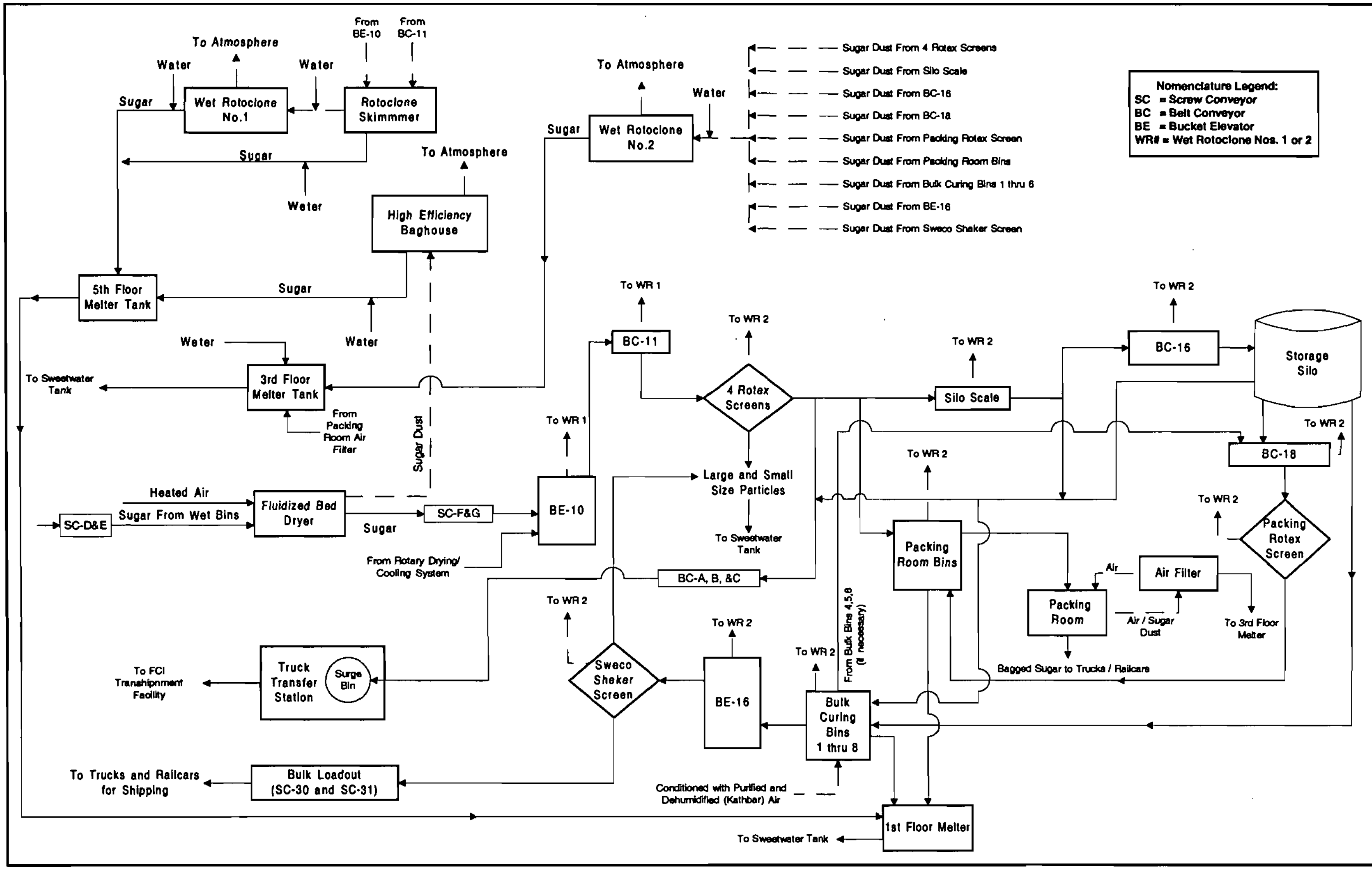
Emission Unit: Sugar Mill Refinery

Filename: 9937615Y/F1/WP/FIGA3-4.VSD:Page 1

Latest Revision Date: 2/22/00

Golder Associates

ATTACHMENT A-4



Attachment A-4
Florida Crystals Refinery
Process Flow Diagram
South Bay, Florida

Process Flow Legend:
Solid / Liquid ———→
Gas — — —→

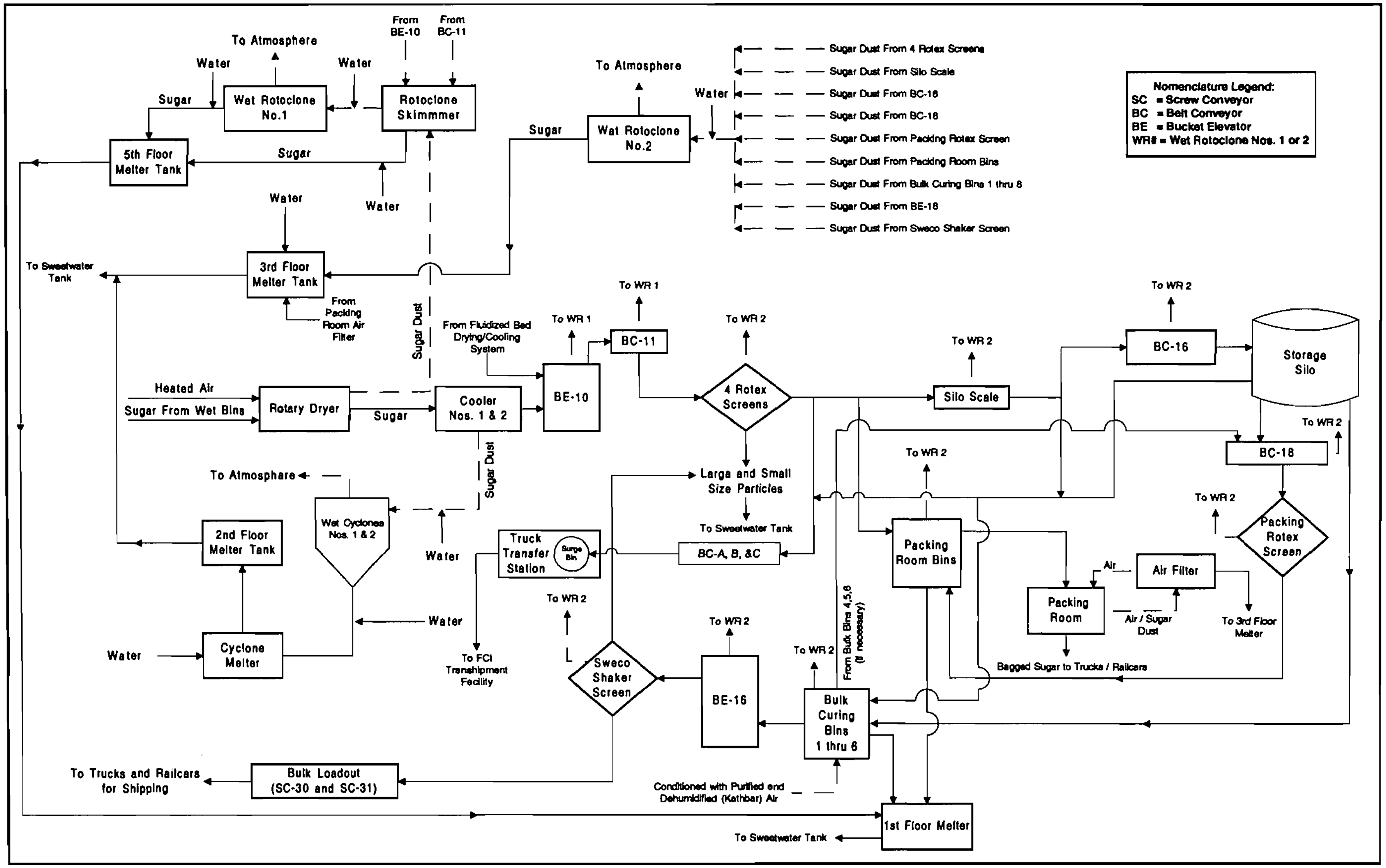
Emission Unit: Refinery Operations with Fluidized Bed Dryer/Cooler

Filename: 9937615Y/F1/WP/FIGA3-4.VSD:Page 2

Latest Revision Date: 2/22/00

Golder Associates

ATTACHMENT A-5



Attachment A-5 Florida Crystals Refinery Process Flow Diagram South Bay, Florida	Process Flow Legend: Solid / Liquid ——→ Gas — — →	*Emission Unit:* Refinery Operations with Rotary Dryer/Coolers *Filename:* 9937615Y/F1/WP/FIGA-5.VSD *Latest Revision Date:* 2/22/00	Golder Associates

ATTACHMENT OC-EU1-D14
EMISSION POINT INFORMATION

ATTACHMENT OC-EU1-D14

EMISSION POINT INFORMATION

Descriptions of Emissions Points Comprising this Emissions Unit:

ID 021 Rotary Dryer/Rotoclone No. 1

022 Cooler No. 1/Cyclone No. 1

023 Cooler No. 2/Cyclone No. 2

024 Conveying/Rotoclone No. 2

025 Fluidized Bed Dryer/Cooler

Emission Point Comment:

1. Identification of Point on Plot Plan or Flow Diagram:
   - Bulk Load-Out Area
   - Trans-Shipment Bulk Load-Out Area
   - C1
   - C2
   - Fluidized Bed Dryer Baghouse
   - Wet Rotoclone No. 1
   - Wet Rotoclone No. 2

14. Emission Point Comment: Stack parameters above represent average for Cooler No. 1 and No. 2 wet cyclones. Exit diameter = 2.16 ft. This emission unit has five vertical stacks serving individual control equipment and two fugitive emissions sources.

See Table B-1, Attachment B, for stack/vent information on each emission point.

ATTACHMENT A

1.0 SUGAR REFINERY BACKGROUND

Okeelanta Corporation operates a raw sugar refinery located south of South Bay, Florida (see Attachment A-1). Sugar cane from the fields is processed in the on-site sugar mill to produce raw sugar. The raw sugar can either be sold in bulk or sent to the refinery to produce standard white sugar or a specialty sugar. Some of the refined sugar is sold in bulk and shipped by truck or rail car. The majority of the refined sugar produced is transferred by truck to the Florida Sugar Distributors, Inc. packaging and distribution warehouse on site. This document presents an update to the original application for the sugar refinery submitted in 1996. For completeness, the entire application is presented in updated form.

The Okeelanta sugar refinery is currently operating under construction permit No.0990005-002-AC, issued on July 17, 1996. A package boiler (Boiler No. 16, Permit No. AO50-257065; PSD-FL-169) is permitted to provide process steam to the sugar refinery. The current raw sugar refining process utilizes both fluidized bed drying/cooling equipment, as well as conventional rotary drying/cooling equipment. The rated capacity of the facility under the construction permit was 870 tons per day (TPD) of refined sugar output with fluidized bed operations and 850 TPD with rotary dryer/cooler operations. These rated capacities represent long-term consistent operations. Actual daily peak capacity for standard operation using either the fluidized bed drying/cooling system or the rotary drying/cooling system is roughly 1,000 TPD refined sugar output. Several weeks per year, a specialty sugar is produced using the rotary drying/cooling system in addition to the white sugar produced with the normal fluidized bed process. In this case the total daily peak capacity has been approximately 1,300 TPD.

Okeelanta Corporation is currently planning to implement improvements to the existing refinery. The proposed project will include construction of a new building housing the following equipment:

1,700 ft^3 Vacuum pan	1,200 ft^3 seeder cutover tanks (2)
Vacuum pan condenser	Motor control center room
Centrifugals (2)	MCC and Centrifugal controller room
Syrup and Molasses feed tanks	Refined sugar conveying system
Final liquor syrup storage tanks	2,000 ft^3 Receiver
5,000 gallon Condensate collection tank	Various Pumps
1,000 gallon Centrifugal wash water	Lunch and Locker room

Some of the existing production will be shifted to the new process equipment. The new vacuum pan will reduce the number of batches per day made in the three existing vacuum pans. These additions will allow the rated capacity of the refinery to increase approximately 40 TPD.

Changes to existing conveying system will also be implemented to allow flexibility in operations, i.e., concurrent production of specialty sugars and standard white sugar. Two additional storage and curing bins and new Rotex screens will be added in the existing refinery building. This equipment will improve conveying refined sugar from the existing silo to the bulk transfer station during periods when the refinery is shutdown.

After implementing these improvements, the annual refined sugar production capacity and PM emission limit will remain below the existing limits of the construction permit issued by DEP July 17, 1996.

This attachment is divided into several sections. A description of refinery operations is presented in Section 2.0. Emissions estimates are calculated and presented in Section 3.0. Applicable regulations are discussed in Section 4.0. A facility plot plan for the Okeelanta Corporation sugar mill and refinery is contained in Attachment A-2.

2.0 REFINERY OPERATIONS

The existing refinery receives washed raw sugar from the mill and begins the process of refinement and removal of impurities through affination, clarification, decolorization, and crystallization. The refined wet sugar can be stored in the wet sugar bins or conveyed directly to the drying and cooling operations.

Drying and cooling of the wet sugar is performed with a fluidized bed dryer/cooler, and with rotary dryer and coolers. Both drying methods can be operated at the same time. After drying/cooling, the sugar is screened for the required size, cured in bulk curing bins, and then sent via a network of conveyors, bucket elevators, and scales to either the storage silo, the bulk load-out area for shipping by truck or rail car, or the packing room, where it is packaged in various size bags or containers.

A simplified flow diagram of the existing sugar refining operations, up to the point of drying, is presented in Attachment A-3. Flow diagrams of the cooling/drying operations are shown in Attachment A-4 (fluidized bed method) and Attachment A-5 (rotary method). The maximum production capacity is 1,500 TPD of refined sugar when both the fluidized bed and rotary methods of cooling/drying are operating simultaneously.

As described above, the refinery is currently planning an improvement with new equipment for the existing refinery. The proposed project will include construction of a new building housing an additional vacuum pan, condenser and related equipment, additional tanks, storage/curing bins, and refined sugar conveying systems. These additions will allow the rated capacity of refined sugar production to increase approximately 40 TPD. The existing drying/cooling equipment capacity will not change, and the peak daily production capacity of the refinery will not exceed 1,200 TPD (1,500 TPD for simultaneous operation). The maximum annual refined sugar production capacity will be 327,000 tons per year (TPY). Changes to the existing conveying system will also be implemented to allow flexibility in operations, i.e., types of sugar products produced and stored. The flow diagrams incorporate changes due to the proposed changes to the refinery. The location of the new building for the expansion is shown in Attachment A-2.

It is noted that no air emission sources will be associated with the new building, except for a very small amount of volatile organic compound (VOC) emissions from seeding the vacuum pan.

The fluidized bed drying/cooling operation is described in Section 2.1; the rotary drying/cooling operation is described in Section 2.2; conveying/transfer operations in Section 2.3; packaging operations in Section 2.4; and bulk load-out operations are described in Sections 2.5 and 2.6.

2.1 FLUIDIZED BED DRYER/COOLER OPERATIONS (OPERATING METHOD ONE)

The first operating method involves using a fluidized bed dryer/cooler to dry the refined sugar. In the fluidized bed drying process, wet refined sugar is passed over jets of steam-heated air that suspend the particles and evaporate the moisture (see fluidized bed dryer/cooler diagram in Attachment A-4). The fluidized bed system is the primary method of operation. The system performs all drying and cooling operations in a single integral unit. Typically, the rotary dryer/cooler system is brought on-line only for special batches of sugar or when the fluidized bed system is down for repairs. This process potentially creates sugar dust emissions. This sugar dust can be emitted to the atmosphere in the form of particulate matter (PM), and PM with an aerodynamic particle size diameter equal to or less than 10 microns (PM_{10}).

The fluidized bed system will operate up to 8,520 hours per year (355 days per year). The rotary dryer system will normally be brought on-line only when the production of specialty sugar is required or when the fluidized bed dryer is shutdown. The total maximum annual refined sugar production capacity is 327,000 TPY, using both the fluidized bed drying system and the rotary drying process.

For the fluidized bed drying operations, the refinery uses product recovery/control equipment consisting of two wet dynamic precipitators (rotoclones), a dry skimmer used as a pre-cleaner, enclosures for conveying systems and transfer points, building enclosures to minimize fugitive PM emissions from bulk load-out operations, and a highly efficient baghouse to recover/control sugar dust emissions (refer to flow diagram in Attachment A-4).

The fluidized bed system emissions are controlled by a BETH GmbH pulse jet baghouse that can achieve efficiencies of 99.8 percent for PM (see control efficiency derivation in Table B-3). The baghouse vents to the atmosphere through a single 7-ft-diameter, 80-ft-high stack. The baghouse is dedicated to the fluidized bed dryer/cooler.

Sugar dust emissions from a conveyor and bucket elevator are controlled by a dry skimmer and AAF Wet Rotoclone No. 1 (see detailed description in Section 2.2).

2.2 ROTARY DRYER/COOLER OPERATIONS (OPERATING METHOD TWO)

The second operating method employs a rotary dryer and two rotary coolers to dry the refined sugar before it is screened and stored, bagged, or shipped. The rotary drying process involves conveying the sugar through an inclined rotating cylinder while passing steam-heated air over the sugar in order to evaporate the moisture (refer to flow diagram in Attachment A-5). Whether using the rotary system or the fluidized bed dryer/cooler alone, the daily maximum refined sugar output will not exceed 1,200 TPD. The daily maximum production when simultaneously operating the fluidized bed system for standard white sugar and rotary system for specialty sugar is 1,500 TPD refined sugar output. The maximum annual refined sugar production is 327,000 TPY using any combination of the fluidized bed and the rotary drying/cooling methods of operation.

As a consequence of the rotary drying process and screening, conveying, and loading operations, some of the sugar can break apart into smaller particles to form sugar dust. This sugar dust can be emitted to the atmosphere in the form of PM and PM_{10}.

For the rotary drying operations, FCR uses product recovery/control equipment consisting of two pairs of wet cyclones (Lapple design), two wet dynamic precipitators (rotoclones), a dry skimmer used as a pre-cleaner, enclosures for conveying systems and transfer points, and building enclosures to minimize fugitive PM emissions from bulk load-out operations (refer to flow diagram in Attachment A-5). Conveying/transferring and bulk load-out fugitive emissions controls are discussed in Sections 2.3 and 2.5, respectively.

The rotary dryer vents sugar dust to an American Air Filter (AAF) skimmer, which acts as a pre-cleaner to remove large sugar particles, and then to AAF Wet Rotoclone No. 1. Water spray nozzles located on the inlet of AAF Wet Rotoclone No. 1 allows the equipment to achieve control efficiencies of 99.9 percent for PM and 99.0 percent for PM_{10} (see manufacturers' guarantee in Attachment C). In addition to a main exhaust stack, Wet Rotoclone No. 1 has a secondary stack that vents to the atmosphere but does not act as an emission stack. This stack is 1.0 foot (ft) in diameter and acts as backpressure relief for the control equipment. In addition to controlling emissions from the rotary dryer, AAF Skimmer/Wet Rotoclone No. 1 controls dust pickup points tied into Bucket Elevator 10 and Belt Conveyor 11, which capture fugitive dust emissions from the conveyor transfer points.

Control equipment on each rotary Cooler No. 1 and No. 2 consists of a pair of wet cyclones in parallel that vent to the atmosphere through a rectangular duct at the top of each pair of cyclones. Based on dry cyclone design equations by Lapple and Shepherd, the wet cyclones can achieve a minimum estimated control efficiencies of 94.0 percent for PM and 38.6 percent for PM_{10} (see efficiency derivation in Table B-4). Although operating the cyclones with internal water spray nozzles may increase PM collection efficiency, the main purpose of the water spray is to prevent sugar buildup inside the cyclones.

2.3 REFINED SUGAR CONVEYING SYSTEM CONTROL EQUIPMENT

To control dust in the conveying system and to reclaim product, multiple sugar dust pickup points are located on conveyors, bucket elevators, scales, screens, and bins (see Attachments A-4 and A-5 flow diagrams for detailed representations of the pickup points). These fugitive dust pickup points feed into AAF Wet Rotoclone No. 2, which is similar in design and control efficiency to AAF Wet Rotoclone No. 1, but without the skimmer. AAF Wet Rotoclone No. 2 also has a secondary pressure relief stack, which is 1.0 ft in diameter, but is vented inside the refinery operations building. This second stack does not act as an emission source.

2.4 PACKAGING OPERATIONS

Packaging of granulated sugar takes place in the packing room. Any air-borne sugar dust created from packing operations is conveyed along with room air through a high efficiency air filter that recovers the product and returns the clean air to the packing room. The packing room dust control system is a sealed operation that does not emit sugar dust from the building to the atmosphere. The packing rotex screens and the packing room bins vent to Wet Rotoclone No. 2 for PM control.

2.5 BULK LOAD-OUT OPERATIONS

The existing refined sugar bulk load-out area is a potential source of fugitive PM emissions. Assuming that enough sugar is stored in the sugar silo, the bulk load-out operations can occur 365 days a year. Trucks and rail cars are loaded for shipment inside a building enclosed on three sides. Bulk loading of refined sugar can emit fugitive sugar dust but is, for the most part, confined to the load-out building, where dust settles and is washed from the floor. Fugitive emissions were calculated using the material drop operations equation as presented in AP-42 Section 13.2.4 [Environmental Protection Agency (EPA), 1995]. A control efficiency of 50 percent was assumed due to the building enclosure.

2.6 TRANSFER BULK LOAD-OUT STATION

The transfer bulk load-out station is utilized for bulk loading refined sugar into trucks to supply the Florida Sugar Distributors, Inc. (formerly Florida Crystals, Inc.) packaging and trans-shipment facility. The trans-shipment facility is located approximately 2,500 ft southeast of the Okeelanta refinery. The transfer bulk load-out station is located directly south of the refinery and raw sugar processing building.

Four enclosed conveyors in series feed refined sugar from the silo to the transfer load-out building that is enclosed on all four sides. High-pressure air curtains are mounted at the entrance and exit, at opposite the ends of the drive through building. DCL, Inc.'s "contained flow" loading spouts are used to transfer product from the screw conveyors to the trucks (see construction drawings in Attachment C). The transfer bulk load-out operations can operate up to 365 days a year.

3.0 POLLUTANT EMISSIONS CALCULATIONS

Short-term and annual PM and PM_{10} emission calculations for both the fluidized bed and the rotary operating methods are presented in Tables A-1 and A2. Short-term PM/PM_{10} emissions for the simultaneous operation of both the fluidized bed and the rotary drying methods are presented in Table A-3. Emissions from bulk loadout operations are shown in Table A-4. The estimates presented represent potential emissions from refinery operations after implementation of the improvements discussed in section 1.0 and 2.0.

Based on the fluidized bed dryer/cooler manufacturer's data, sugar dust generated from fluidized bed drying operations is conservatively estimated at 1.5 percent of the refined sugar output. Also based on sugar industry data, sugar dust generated from rotary drying operations is conservatively estimated at 3.5 percent of the refined sugar output. For the rotary drying system, specific percentages of the total dust that is lost from the various equipment were assumed as follows: and 90 percent from the dryer to Wet Rotoclone No. 1, and 5 percent from each cooler to Wet Rotoclone Nos. 1 and 2.

Sources of emission factors and control efficiencies for Tables A-1, A-2, and A-3 include AP-42, standard cyclone design calculations based on the work of Shepherd and Lapple, manufacturers' design information, and Okeelanta's engineering department. Control equipment diagrams, design-based calculations and manufacturers' guaranteed efficiency derivations are provided in the attachments.

Uncontrolled emissions from conveyor transfer points, bucket elevators, truck loading, and other similar operations, were calculated using the material drop operations equation as presented in AP-42 Section 13.2.4 [Environmental Protection Agency (EPA), 1995]. A control efficiency of 50 percent was assumed for the bulk loadout operation due to the building enclosure. A control efficiency of 90 percent was assumed for the transfer bulk loadout operation due to the building enclosure and the use of DCL, Inc.'s "contained flow" loading spouts to transfer product from the screw conveyor to the truck (see construction drawings in Attachment C).

As shown in Tables A-1 through A-3, worst-case short-term emissions occur under the rotary drying system method of operation (18.61 lb/hr PM and 9.88 lb/hr PM_{10}). The rotary drying/cooling system is intended for production of specialty sugars and for a back-up system for standard white sugar, normally produced with the fluidized bed system.

On an annual basis, the fluidized bed system could potentially process the entire amount of refined sugar output (327,000 TPY). The utilization of the rotary system is not expected to exceed 20% of this annual maximum refined sugar output. However, to provide increased redundancy and maximum flexibility in the event of fluidized bed system failures, the potential emissions produced with the rotary system were calculated assuming 194,000 TPY. The worst-case annual emissions with full production (327,000 TPY) and simultaneous drying operations with maximum use of the rotary drying systems are estimated at 40.44 TPY of PM and 19.36 TPY of PM_{10} (see Table A-3).

Maximum emissions from bulk loadout operations are estimated at 3.05 lb/hr and 3.74 TPY PM, and 0.122 lb/hr and 0.15 TPY PM_{10}. Total maximum annual emissions from all refinery operations are therefore 44.18 TPY PM and 19.51 TPY PM_{10} (from Tables A-3 and A-4 combined).

FCR also uses some chemicals in refining to seed the crystallization process and clean equipment. Some of These chemicals contain VOCs. The maximum estimated emissions of VOCs are based on maximum chemical usage for the operating capacity anticipated after the improvements. VOC emissions from chemicals used in the refining process are presented in Table A-5. The maximum estimated VOC emissions are 39.02 TPY.

4.0 REGULATORY APPLICABILITY

4.1 PREVENTION OF SIGNIFICANT DETERIORATION (PSD) REVIEW

Florida's preconstruction review requirements for air pollution sources are contained in Florida Administrative Code (F.A.C.) Rule 62-212. These rules require air construction permits for modifications to existing sources. "Modification" is defined in Rule 62-212.200 as:

> *Any physical change in, change in the method of operation of, or addition to a stationary source or facility which increases the actual emission of any air pollutant regulated under Rule...., including any not previously emitted from the source or facility.*

However, a change in the method of operation shall not include an increase in the hours of operation or in the production rate, unless such change would be prohibited under any federally enforceable permit condition, which was established after January 6, 1975.

The Okeelanta refinery is located in a PM attainment and an ozone maintenance area. Any modification resulting in a significant net emission increase of greater than 25 TPY of PM, 15 TPY of PM_{10}, or 40 TPY of VOC would be subject to PSD new source review. The PSD baseline emissions for the refinery, as presented in the original application, are shown in Table A-6 (for PM/PM_{10}) and Table A-7 (for VOC), using the same emissions estimating methodology as for the future maximum emissions. Net changes in PM, PM_{10} and VOCs from the proposed refinery modification, based on the original construction permit application for the refinery, are shown in the following table. As shown, the net increases in emissions are below the significant emission rate for each pollutant. As such, the modification to the refinery (1996 modification and currently proposed modification) does not trigger PSD new source review. Maximum estimated annual emissions of 44.18 TPY PM/19.51 TPY PM_{10} do not exceed the currently permitted annual emissions of 57.26 TPY PM and 26.26 TPY PM_{10}.

PSD Source Applicability Analysis for Okeelanta Sugar Refinery

Regulated Pollutant	Baseline Actual Emissions (TPY)[a]	Future Maximum Emissions (TPY)	Net Change (TPY)	Significant Emission Rate (TPY)	PSD Applies?
PM	23.55	44.18	20.63	25	No
PM_{10}	12.41	19.51	7.10	15	No
VOC	25.36	39.02	13.66	40	No

[a] Based on the 1996 air construction permit application.

4.2 APPLICABLE STATE REGULATIONS

The refinery will be subject to Rule 62-296.320, F.A.C., for general particulate emissions limiting standards. Because the refinery processes raw materials to produce a finished product through a chemical or physical change, the refinery is subject to the process weight table emissions limits. However, the calculated maximum emissions produce lower emissions than using the process weight table to establish allowable PM limits. Okeelanta requests that the allowable limits reflect the worst-case potential emissions documented in this application, but not lower than the annual limits in the current construction permit.

In addition, the fluidized bed dryer/cooler is controlled by a baghouse, and maximum emissions from this source are estimated to be much less than 100 TPY. In accordance with Rule 62-297.620 (4), F.A.C., Okeelanta requests that the PM compliance test be waived in favor of the alternate 5 percent opacity limit set forth in the rule. According to Rule 62-296.320 (4), all other sources at the refinery will be subject to the general visible emission limit of 20 percent.

TABLES

Table A-3. Short Term Particulate Matter Emissions from Okeelanta Sugar Refinery Using the a Combination of the Fluidized Bed Drying System and the Rotary Drying System

Source Emission Point Description	Refined Sugar Throughput (a) (lb/hr)	Refined Sugar Throughput (a) (TPD)	Refined Sugar Throughput (a) (TPY)	PM Uncontrolled Emission Factor		Loading to Control Equipment (lb/hr)	Control Efficiency (%)	Maximum Emission Rate (lb/hr)	Maximum Emission Rate (TPY)
						Particulate Matter (PM)			
Fluidized Bed Drying System									
Fluidized Bed Baghouse	91,667	1,100	133,000	1.5	%	1375.0	99.8	2.75	3.99
Rotary Drying System									
Cooler No. 1 / Wet Cyclone No. 1	33,333	400	194,000	0.175	%	58.33	95.6	2.59	15.07
Cooler No. 2 / Wet Cyclone No. 2	33,333	400	194,000	0.175	%	58.33	95.6	2.59	15.07
AAF Skimmer/Wet Rotoclone No.1 (from dryer)	33,333	400	194,000	3.150	%	1,050.0	99.9	1.05	6.11
Material Handling									
AAF Skimmer/Wet Rotoclone No.1 (from transfer points)	125,000	1,500	327,000	0.2090	lb/ton	13.06	99.9	0.0131	0.0342
AAF/Wet Rotoclone No.2	125,000	1,500	327,000	0.9407	lb/ton	58.79	99.9	0.0588	0.1538
							Total	9.05	40.44
						Particulate Matter (PM10)			
Fluidized Bed Drying System									
Fluidized Bed Baghouse	91,667	1,100	133,000	0.060	%	55.00	99.8	0.110	0.16
Rotary Drying System									
Cooler No. 1 / Wet Cyclone No. 1	33,333	400	194,000	0.007	%	2.33	38.6	1.43	8.34
Cooler No. 2 / Wet Cyclone No. 2	33,333	400	194,000	0.007	%	2.33	38.6	1.43	8.34
AAF Skimmer/Wet Rotoclone No.1 (from dryer)	33,333	400	194,000	0.126	%	42.00	99.0	0.42	2.44
Material Handling									
AAF Skimmer/Wet Rotoclone No.1 (from transfer points)	125,000	1,500	327,000	0.00836	lb/ton	0.523	99.0	0.0052	0.0137
AAF/Wet Rotoclone No.2	125,000	1,500	327,000	0.03763	lb/ton	2.352	99.0	0.0235	0.0615
							Total	1.99	19.36

Note: See Tables A-1 and A-2 for footnotes concerning emission factors and control efficiencies.
(a) Based on maximum of 1,500 tons/day (TPD) throughput as a combined operation potential maximum for the refinery.

Table A-2. Annual and Short Term Particulate Matter Emissions from Okeelanta Sugar Refinery Using the Rotary Drying System

Source Emission Point Description	Maximum Refined Sugar Throughput (lb/hr)	(TPD)	(TPY)	PM Uncontrolled Emission Factor		Loading to Control Equipment (lb/hr)	Control Efficiency (%)	Maximum Emission Rate (lb/hr)	Maximum Annual Emissions (TPY)
						Particulate Matter (PM)			
Cooler No. 1 /Wet Cyclone No. 1	100,000	1,200	194,000	0.175	% (a)	175	95.6 (c)	7.70	14.94
Cooler No. 2/Wet Cyclone No. 2.	100,000	1,200	194,000	0.175	% (a)	175	95.6 (c)	7.70	14.94
AAF Skimmer/Wet Rotoclone No.1 (from dryer)	100,000	1,200	194,000	3.150	% (a)	3,150	99.9 (d)	3.15	6.11
AAF Skimmer/Wet Rotoclone No.1 (from transfer points)	100,000	1,200	194,000	0.2090	lb/ton (b)	10.45	99.9 (d)	0.0105	0.020
AAF/Wet Rotoclone No.2	100,000	1,200	194,000	0.9407	lb/ton (b)	47.03	99.9 (d)	0.0470	0.091
							Total	18.61	36.10
						Particulate Matter (PM10)			
Cooler No. 1 /Wet Cyclone No. 1	100,000	1,200	194,000	0.007	% (e)	7.0	38.6 (c)	4.30	8.34
Cooler No. 2/Wet Cyclone No. 2.	100,000	1,200	194,000	0.007	% (e)	7.0	38.6 (c)	4.30	8.34
AAF Skimmer/Wet Rotoclone No.1 (from dryer)	100,000	1,200	194,000	0.126	% (e)	126.0	99.0 (d)	1.26	2.44
AAF Skimmer/Wet Rotoclone No.1 (from transfer points)	100,000	1,200	194,000	0.00836	lb/ton (e)	0.418	99.0 (d)	0.0042	0.008
AAF/Wet Rotoclone No.2	100,000	1,200	194,000	0.03763	lb/ton (e)	1.881	99.0 (d)	0.0188	0.036
							Total	9.88	19.17

Footnotes:

(a) Based on sugar industry data, uncontrolled sugar dust loading (PM and PM10) is a max of 3.5% of the total refined sugar throughput when rotary dryers/coolers are used. Factor assumes that 5% of the uncontrolled sugar dust is vented to each Cooler No. 1 and No. 2 Wet Cyclone and 90% is vented to Wet Rotoclone No. 1.

(b) Wet Rotoclone No. 1 controls 2 transfer points/operations; wet Rotoclone No. 2 controls 9 transfer points/operations. Continuos/batch drop equation from AP-42 (USEPA, 1995) Section 13.2.4. Formula used with multiple for drop points, Rotoclone No. 1 having 2 drop points and Rotoclone No. 2 with 9 drop points.
E (lb/ton) = k x 0.0032 x (U/5)^1.3 / (M/2)^1.4 ; where U is assumed to be a max of 1 mph due to the building enclosure.
M = Moisture Content = 0.03% for refined sugar.
k = 0.74 for PM
E = 0.104 lb/ton per transfer point/opertion, or 0.941 lb/ton for 9 points.

(c) Control efficiency based on standard cyclone efficiency equations by Lapple and Shepherd (see Table B4).

(d) Guaranteed manufacturers control equipment efficiency for total PM = 99.9% and PM10 = 99.0%.

(e) Based on sugar dust analysis, uncontrolled PM10 is less than 4% of total sugar dust loading to the control equipment.

Table A-1. Annual and Short Term Particulate Matter Emissions from Okeelanta Sugar Refinery Using the Fluidized Bed Drying System

Source Emission Point Description	Maximum Refined Sugar Throughput (lb/hr)	Maximum Refined Sugar Throughput (TPD)	Maximum Refined Sugar Throughput (TPY)	PM Uncontrolled Emission Factor	Loading to Control Equipment (lb/hr)	Control Efficiency (%)	Maximum Emission Rate (lb/hr)	Maximum Annual Emissions (TPY)
					Particulate Matter (PM)			
Fluidized Bed Baghouse	100,000	1,200	327,000	1.5 % (a)	1,500.0	99.8 (b)	3.00	9.81
AAF Skimmer/Wet Rotoclone No.1	100,000	1,200	327,000	0.2090 lb/ton (c)	10.45	99.9 (d)	0.0105	0.034
AAF/ Wet Rotoclone No.2	100,000	1,200	327,000	0.9407 lb/ton (c)	47.03	99.9 (d)	0.0470	0.154
						Total	3.01	9.84
					Particulate Matter (PM10)			
Fluidized Bed Baghouse	100,000	1,200	327,000	0.060 % (e)	60.0	99.8 (b)	0.120	0.3924
AAF Skimmer/Wet Rotoclone No.1	100,000	1,200	327,000	0.00836 lb/ton (e)	0.418	99.0 (d)	0.00418	0.0137
AAF/ Wet Rotoclone No.2	100,000	1,200	327,000	0.03763 lb/ton (e)	1.881	99.0 (d)	0.01881	0.0615
						Total	0.124	0.41

Footnotes:

(a) Based on manufacturers maximum estimated PM inlet loading rate of 1.5 % of throughput rate for fluidized bed dryer/cooler.
Factor assumes that all of the fluidized bed dryer/cooler sugar dust is vented to this control device.

(b) Baghouse manufacturers efficiency.

(c) Based on continuous drop emission factors computed from AP-42 (USEPA, 1995) Section 13.2.4.
Formula used with multiple for drop points, Rotoclone No. 1 having 2 drop points and Rotoclone No. 2 with 9 drop points.
E (lb/ton) = k x 0.0032 x (U/5)^1.3 / (M/2)^1.4 ; where U is assumed to be a max of 1 mph due to the building enclosure.
M = Moisture Content = 0.03% for refined sugar.
k = 0.74 for PM
E = 0.104 lb/ton per transfer point/opertion, or 0.941 lb/ton for 9 points.

(d) Guaranteed manufacturers control equipment efficiency for total PM = 99.9% and PM10 = 99.0%.

(e) Based on sugar dust analysis, uncontrolled PM10 is less than 4% of total sugar dust loading to the control equipment.

Table A-4. Annual and Short Term Particulate Matter Emissions from Okeelanta Sugar Refinery Bulk and Transfer Load-out Operations.

Source Emission Point Description	Maximum Refined Sugar Throughput (a) (lb/hr)	(TPD)	(TPY)	PM Uncontrolled Emission Factor	Uncontrolled PM Emissions (lb/hr)	Control Efficiency (%)	Maximum Emission Rate (lb/hr)	Annual Emissions (Tons/yr)
					Particulate Matter (PM)			
Bulk load-out Operations	88,000	600	97,000	0.105 lb/ton (b)	4.60	50 (d)	2.30	2.53
Transfer Bulk Load-out Operations	144,000	1,200	230,000	0.105 lb/ton (b)	7.53	90 (d)	0.75	1.20
						Total	3.05	3.74
					Particulate Matter (PM10) (i)			
Bulk load-out Operations	88,000	600	97,000	0.00418 lb/ton (c)	0.184	50 (d)	0.092	0.10
Transfer Bulk Load-out Operations	144,000	1,200	230,000	0.00418 lb/ton (c)	0.301	90 (d)	0.030	0.05
						Total	0.122	0.15

(a) Throughput based on 1,800 tons/day (TPD) and 327,000 tons/yr (TPY), with 30/70% split between the Bulk and Transfer Bulk load-out operations.
(b) Bulk load-out operations continuous drop emission factors are computed from AP-42 (USEPA, 1995) Section 13.2.4.
E (lb/ton) = k x 0.0032 x (U/5)^1.3 / (M/2)^1.4 ; where U is assumed to be a max of 1 mph due to the building enclosure.
M = Moisture Content = 0.03% for refined sugar.
k = 0.74 for PM
(c) PM10, based on sugar dust analysis, is less than 4% of total sugar dust loading.
(d) Represents assumed control efficiency achieved from the building load-out enclosure. Transfer bulk load-out control efficiency is higher than bulk load-out building due to improved design and operating procedures.

Table A-5. Annual and Short Term Emissions of VOC's from Refinery Chemical Usage

Material	Chemical	VOC Content	Potential Chemical Usage (lb/yr) (a)	Potential VOC Emissions (TPY)	
Pure Isopropyl Alcohol	Isopropyl Alcohol	100%	77,500	38.75	
Rodine 213	Isopropyl Alcohol	15%	3,000	0.225	
	Propargyl Alcohol	3%	3,000	0.045	
		Total VOCs =	15.56 lb/hr (b)	39.02	TPY

(a) Based on mill estimates for maximum usage rates.
(b) Based on the average of 5,365 hour per year for the 93/94 and 94/95 operating season assuming that 100% of compound is emitted to the atmosphere.

Table A-6 . PSD Baseline Particulate Matter Emissions Calculations for Okeelanta Sugar Refinery Using the Existing Sugar Drying System
(Rotary Drying System Without Transfer Bulk Load-out operations)

Source Emission Point Description	Actual Refined Sugar Throughput (a) (TPD)	(lb/hr)	(TPY)	PM Uncontrolled Emission Factor			Loading to Control Equipment (lb/hr)	Control Efficiency (%)		Emission Rate (lb/hr)	Annual Emissions (Tons/yr)
							Particulate Matter (PM)				
Bulk load-out Operations	164.2	161.0	55,830	0.1045	lb/ton	(b)	0.0084	50.000	(c)	0.0042	0.0043
Cooler No. 1 / Wet Cyclone No. 1	564	47,031	125,574	0.175	%	(d)	82.30	95.6	(e)	3.65	9.76
Cooler No. 2 / Wet Cyclone No. 2	564	47,031	125,574	0.175	%	(d)	82.30	95.6	(e)	3.65	9.76
AAF Skimmer/Wet Rotoclone No.1 (from dryer)	564	47,031	125,574	3.150	%	(d)	1481.49	99.9	(f)	1.48	3.96
AAF Skimmer/Wet Rotoclone No.1 (from transfer points)	564	47,031	125,574	0.209	lb/ton	(b)	4.92	99.9	(f)	0.0049	0.013
AAF Wet Rotoclone No.2	564	47,031	125,574	0.941	lb/ton	(b)	22.12	99.9	(f)	0.0221	0.059
								Total		8.82 lb/hr	23.55 TPY
							Particulate Matter (PM10)				
Bulk load-out Operations	164.2	161.0	55,830	0.0494	lb/ton	(g)	0.0040	50	(c)	0.0020	0.0020
Cooler No. 1 / Wet Cyclone No. 1	564	47,031	125,574	0.007	%	(g)	3.29	38.6	(e)	2.02	5.40
Cooler No. 2 / Wet Cyclone No. 2	564	47,031	125,574	0.007	%	(g)	3.29	38.6	(e)	2.02	5.40
AAF Skimmer/Wet Rotoclone No.1 (from dryer)	564	47,031	125,574	0.126	%	(g)	59.26	99.0	(f)	0.59	1.58
AAF Skimmer/Wet Rotoclone No.1 (from transfer points)	564	47,031	125,574	0.00836	lb/ton	(g)	0.20	99.0	(f)	0.0020	0.005
AAF Wet Rotoclone No.2	564	47,031	125,574	0.03763	lb/ton	(g)	0.88	99.0	(f)	0.0088	0.024
								Total		4.65 lb/hr	12.41 TPY

Footnotes:

(a) Actual sugar shipping throughput based on the average of 60,026 TPY for 1994 and 51,634 TPY for 1995 operating seasons. Actual refined sugar throughput based on the average of 131,343 TPY for 1994 and 119,804 TPY for 1995 operating seasons.

(b) Wet Rotoclone No. 1 controls 2 transfer points/operations; wet Rotoclone No. 2 controls 9 transfer points/operations. Continuos/batch drop equation from AP-42 (USEPA, 1995) Section 13.2.4. Formula used with multiple for drop points, Rotoclone No. 1 having 2 drop points and Rotoclone No. 2 with 9 drop points. E (lb/ton) = k x 0.0032 x (U/5)^1.3 / (M/2)^1.4 ; where U is assumed to be a max of 1 mph due to the building enclosure.
M = Moisture Content = 0.03% for refined sugar.
k = 0.74 for PM
E = 0.1045 lb/ton per transfer point/opertion, or 0.941 lb/ton for 9 points.

(c) Represents assumed control efficiency achieved from the building load-out enclosure. Transfer bulk load-out control efficiency is higher than bulk load-out building due to improved design and operating procedures.

(d) Based on sugar industry data, uncontrolled sugar dust loading (PM and PM10) is a max of 3.5% of the total refined sugar throughput when rotary dryers/coolers are used. Factor assumes that 5% of the uncontrolled sugar dust is vented to Cooler Nos. 1 and 2 Wet Cyclones, 90% is vented to Wet Rotoclone No. 1.

(e) Control efficiency based on standard cyclone efficiency equations by Lapple and Shepherd (see Table B-4).

(f) Guaranteed manufacturers control equipment efficiency for total PM = 99.9% and PM10 = 99.0%.

(g) Based on sugar dust analysis, uncontrolled PM10 is less than 4% of total sugar dust loading to the control equipment.

Table A-7. PSD Baseline VOC Emissions Calculations for Okeelanta Sugar Refinery

Material	Chemical	VOC Content	Average Actual Chemical Usage (a) (lb/yr)	Actual Emissions (TPY)
Talofloc	Isopropyl Alcohol	18%	218,481	19.66
	Methyl Chloride	0.06%	218,481	0.066
Pure Isopropyl Alcohol	Isopropyl Alcohol	100%	11,220	5.61
Rodine 213	Isopropyl Alcohol	15%	273	0.020
	Propargyl Alcohol	3%	273	0.0041
			Total VOCs =	25.36 TPY

(a) Based on the average of 93/94 and 94/95 operating season usage data assuming that 100% of compound is emitted to the atmosphere.

ATTACHMENT B

Table B-1. Stack Parameters for the Okeelanta Sugar Refinery

EU ID	Stack Description	Stack Height (ft)	Exit Diameter (ft)	Stack Temp (°F)	Actual Volumetric Flow Rate (acfm)	Percent Water Vapor (%)	Maximum Dry Standard Flow Rate (dscfm)
022	Cooler No. 1 Wet Cyclone	47	2.16 (a)	100	14,100	NA	NA
023	Cooler No. 2 Wet Cyclone	35	2.16 (a)	100	14,100	NA	NA
021	Wet Rotoclone No. 1	93 (b)	2.5	100	19,000	NA	NA
024	Wet Rotoclone No. 2	93 (b)	2.5	90	19,000	NA	NA
025	Fluidized Bed Baghouse	80	7	115	70,620	0.7	64,390

Footnote:

(a) Equivalent exit diameter based on a rectangular exhaust duct (2 ft by 1.83 ft) cross sectional area of 3.67 ft^2.

(b) Estimated height based on best available information.

Table B-2. Control Equipment Parameters and Particulate Removal Efficiencies for Sugar Dust Wet Collection Systems at Okeelanta Sugar Refinery

Name/ ID Designation	Cooler No. 1 Wet Cyclone	Cooler No. 2 Wet Cyclone	Wet Rotoclone No. 1	Wet Rotoclone No. 2
Manufacturer	Unknown	Unknown	American Air Filter (AAF)	American Air Filter (AAF)
Type/Design	Lapple (a) Wet Cyclone	Lapple (a) Wet Cyclone	Wet Rotoclone (b) Type W, Size 27	Wet Rotoclone (b) Type W, Size 27
Outlet Gas Temp (F) (c)	100	100	100	90
Outlet Gas Flow Rate (ACFM) (c)	14,100	14,100	19,000	19,000
Water Injection Rate (Gal/Min)	7.5	7.5	7.5	7.5
Pressure Drop Across Device (Inches of H2O)	8.0	8.0	9.0	9.0
Total PM Control Efficiency (%)	95.6	95.6	99.9	99.9
Total PM10 Control Efficiency (%)	38.6	38.6	99.0	99.0

Sample calculations:

Control efficiency (%) = [(inlet loading rate - outlet loading rate) / inlet loading rate] X 100

Footnote:
(a) Pressure drop and control efficiency based on standard cyclone design calculations by Lapple and Shepherd.
Outlet gas flow rate based on Phelps Fan Manufacturing fan curve at 1,600 RPM and 3"static pressure.
Flow rate represents combined flow of each cyclone pair.
(b) Pressure drop and outlet gas flow rate based on AAF fan operating curves at 1,000 RPM.
Control efficiency is manufacturers guarantee for PM10 .
(c) Typical outlet temperatures and estimated flow rates are shown.

Table B-3. Control Equipment Parameters and Particulate Removal Efficiency Derivation for Fluidized Bed Dryer Cooler Pulse Jet Baghouse at Okeelanta Sugar Refinery

Manufacturer		BETH GmbH, 23556 L0beck		
Type		BETHPULS 6.60 x 7.5.10		
Outlet Gas Temp (F)			115	
Outlet Gas Flow Rate (ACFM)			70,620	
Exhaust Gas Moisture Content (%)			0.7	
Cleaning Method		Pulse Jet Compressed Air		
Compressed Air Consumption (CFM)			51.8	
Number of Bags			420	
Total Filter Media Surface Area (sq. ft)			9,041	
Air to Cloth Ratio (CFM per sq ft.)			7.81	
Outlet Loading (grains/dscf)			0.00348	(a)

Pollutants	Inlet (b) Loading lb/hr	Control (c) Efficiency (%)	Outlet Loading lb/hr
Particulate Matter	960	99.80	1.92

Note: All parameters are based on manufacturers design information.

Footnotes:
(a) Calculated based on expected outlet loading rate (lb/hr) and outlet gas flow rate (scfm) at operational conditions.
(b) Inlet loading to the filter specified by the fluidized bed dryer manufacturer while operating at Okeelanta's estimated max refined sugar production (includes a 20 % design safety factor).
(c) Control efficiency based on baghouse manufacturers design information for dust content in raw gas (10g/m³ at standard conditions) and for dust content in clean gas (20mg/m³ at standard conditions).

Sample calculations:

Outlet loading rate = inlet loading rate X (1-(control efficiency/100))

Table B-4. Calculation of Cooler Nos. 1 and 2 Standard Cyclone Efficiency and Pressure Drop

(Referance - "Air Pollution Control A Design Approach" Cooper and Alley)

Step 1. Calculate Number of Effective Turns (Ne)

Ne = 1/H x [Lb + Lc/2]

H, Lb, and Lc are as shown in diagram

Values as follows:

H=	2.083	ft
Lb=	4.46	ft
Lc=	5	ft
Ne=	3.34	

Step 2. Calculate 50% Cut diameter (dpc)

```
          (9 x μ x W) ^ 0.5
dpc=  ----------------------------------------------
          (2 x pi x Ne x Vi x (pp - pg) ^ 0.5
```

W is as shown in the diagram

Ne is as derived above

pp = density of particulate

pg = density of gas

Vi = gas velocity

μ = gas viscosity = 1.31E-05 lb mass/ft-sec

Q = air flow based on ID fan curve for both cyclones in parallel

Q= Vi x Inlet Area = Vi x H x W

Q=	7,050	cfm per cyclone
W=	1	ft
Ne=	3.34	
Vi=	56.40	ft/sec
pp=	58	lb/ft^3
pg=	0.0708	lb/ft^3 for Air @ 100 degrees F
dpc=	4.14E-05	ft
=	12.62	μm

(Table B-4 Continued)

Step 3. Based on Particle Size Distribution, determine efficiency for each particle size range and sum for total.

Table 1. Particle Size Distribution for Refined Sugar Dust at Okeelanta Sugar Refinery

Smallest Size in Range (micrometers)	Largest Size in Range (micrometers)	Dust Analysis (%)
0	20	4
20	34	2
34	51	3
51	71	5
71	125	50
125	--	36
	Total	100

dpj = midpoint of distribution range

eff j= $1 / (1 + (dpc/dpj)^2)$ for range

mj= effj x dpj

effj*mj= effj x mj

Cummulative Percent collected = sum of effj*mj for all ranges up to the size range

Table 2 Cyclone Efficiency dpc= 12.617 micrometers

j	Size Range Micrometers	dpj	dpc/dpj	effj	mj %	Percent Collected effj*mj, %	Cummulative Percent Collected
1	0-20	10	0.79	38.6%	4.0	1.54	1.54
2	20-34	27	2.14	82.1%	2.0	1.64	3.18
3	34-51	42.5	3.37	91.9%	3.0	2.76	5.94
4	51-71	61	4.83	95.9%	5.0	4.79	10.74
5	71-125	98	7.77	98.4%	50.0	49.18	59.92
6	>125	125	9.91	99.0%	36.0	35.64	95.56
						Total	95.56

Calculated "Dry" Cyclone Efficiency

CALCULATED TOTAL PM EFFICIENCY IS 95.6%

CALCULATED PM10 EFFICIENCY IS 38.6%

(Table B-4 Continued)

Step 4. Calculate Pressure Drop

$Hv = K \times [H \times W / De^2]$

Hv = pressure drop, expressed in number of inlet velocity heads
K = a constant that depends on cyclone configuration and operating conditions

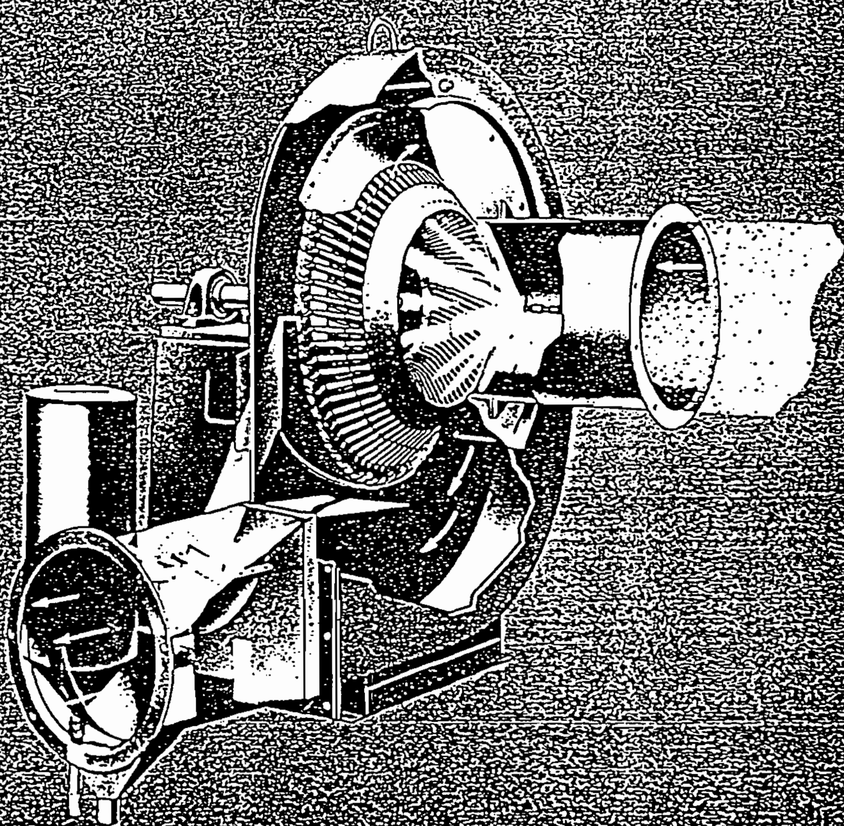
K =	16	; recommended default value
De =	1.67	ft
Hv =	12	

Delta P = $0.5 \times pg \times Vi^2 \times Hv$

Delta P =	pressure drop in N/m^2 or Pa	
pg =	1.13	kg/m^3
Vi =	17.19	m/s
Delta P =	2,011	N/m^2
Pressure Drop =	8.06	inches of water

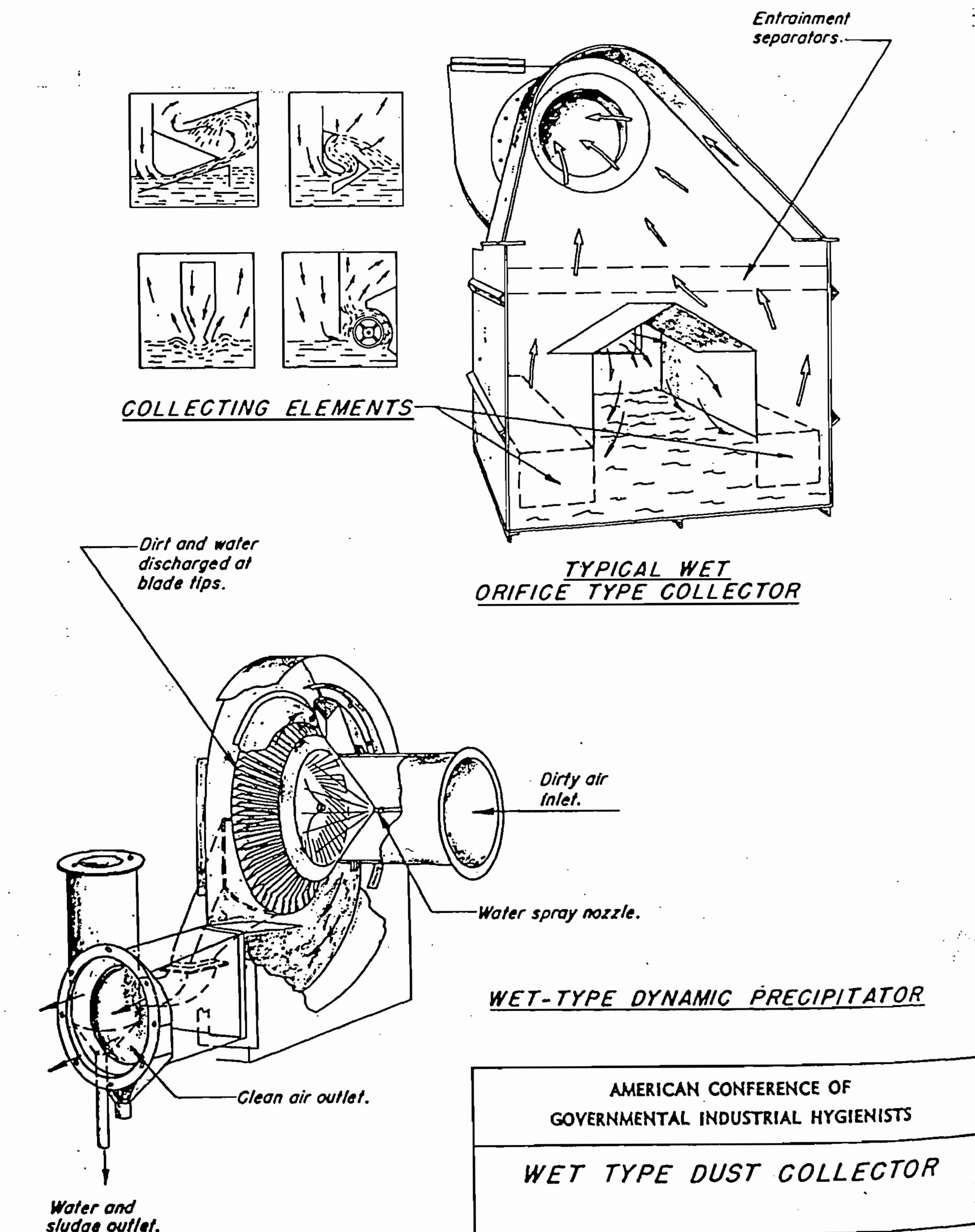
ATTACHMENT C

SMCP-3-512K
(Formerly CAD-3-512K)



ROTO-CLONE TYPE "W"

Installation, Operation and Maintenance Instructions



AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS

WET TYPE DUST COLLECTOR

DATE 1-80 | Fig. 11-16

BEST AVAILABLE COPY

AAF INTERNATIONAL
215 CENTRAL AVENUE
LOUISVILLE KY 40208-1406
P.O. BOX 35690
LOUISVILLE KY 40232-5690

DataFax

To:	Paul Wesson	From:	Rick Stewart Answer Center Technical Support
Company:		Phone No.:	(800) 705-9290 (For Answer Center)
FAX No.:		Return FAX No.:	(502) 637-0299
Page 1 of:	2	Date:	January 12, 1996
Subject:	RotoClone Efficiency	cc:	

Paul:

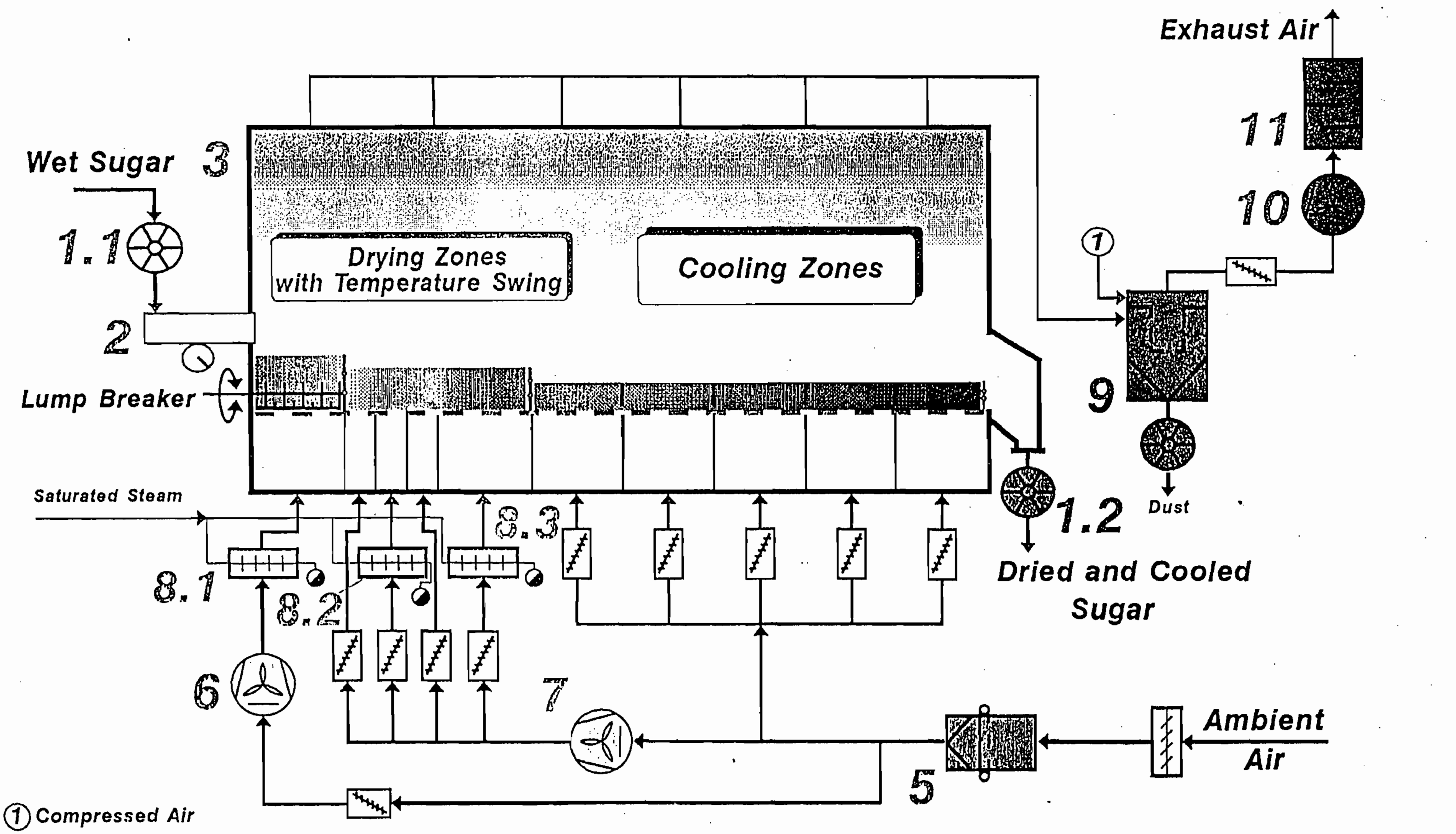
We do not have any efficiency ratings on skimmer. Here are some efficiency ratings on the W Rotoclone and much smaller micron than we discussed yesterday. Also, I'm sending a copy of the capacity table for the # 27.

Particle Size	Efficiency
2 µm	86.2 %
10 µm	99.0 %
16 µm	99.65 %
20 µm	99.8 %
26 µm	99.9 %

Hope this information is helpful.

Rick Stewart

Fluid Bed Drier Cooler for White Sugar
(Suction Operation)



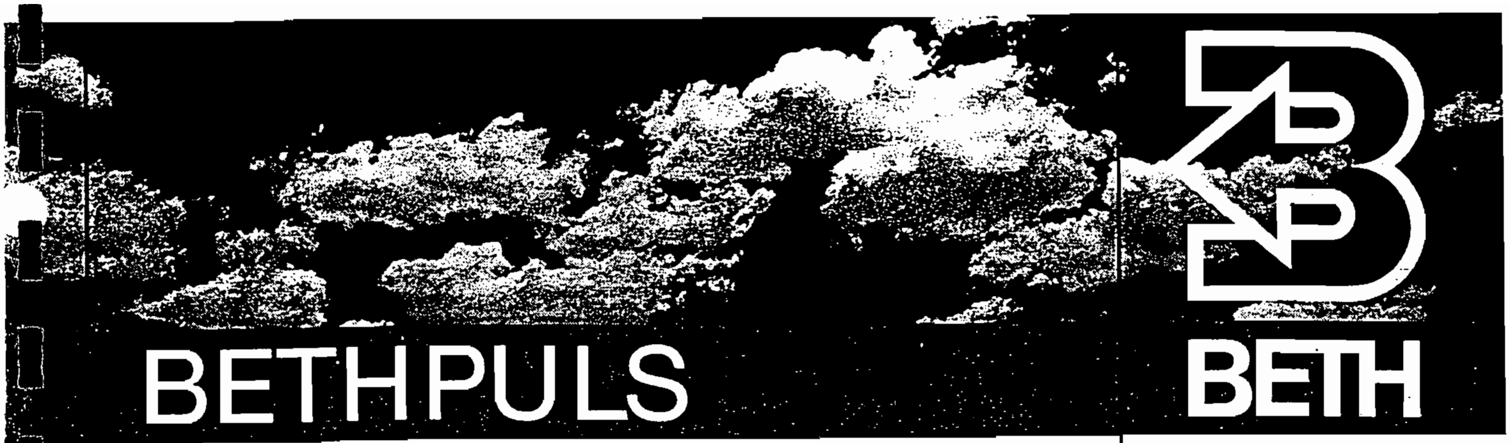
Technical data sheet BETHPULS

BETH

Customer	:	BMA Braunschweigische Maschinenbauanstalt AG 38112 Braunschweig
Customer's order-no.	:	005/00525249
Code	:	- - -
Plant	:	Fluidized-bed sugar drying - cooling
BETH-order-no.	:	069/0/74143
Clerck in charge	:	Mr. Novotny

Manufacturer	:	BETH GmbH, 23556 Lübeck
Type	:	BETHPULS 6.60 x 7.5.10
Fabrication-No.	:	7148
Year of construction	:	1995
Weight	:	17.585 kg
Type of dust	:	Sugar
Raw gas flow rate (operating condition)	:	120.000 m^3/h i.B.
Temperature filter inlet	:	45 °C
Dust content in raw gas	:	≈ 10 g/m^3 i.N.
Dust content in clean gas	:	≤ 20 mg/m^3 i.N.
Filter surface	:	840 m^2
Air-to-cloth ratio	:	2,38 m^3/m^2 x min
Number of section	:	7
Number of bags per section	:	60
Number of bags in filter	:	420
Diameter / length of the bag	:	160 mm/ 3.900 mm
Quality of the bag	:	PE 550
Surface of the bag retaining cage	:	galvanised
Division of bag retaining cage	:	2.600/1.300 mm
Energy equivalent continuous acoustic power level with 3 min. cycle	:	L_{WAFm} - - - dB (A)
Compressed air consumption for cleaning (at Pe 6 bar)	:	88 m^3/h i.N.
Permissible operating underpressure	:	5.000 Pa
Explosion pressure shock resistant up to	:	P_{red}: - - - bar
Control voltage	:	220 V, 60 Hz
Motor voltage	:	460 V, 60 Hz
Heating voltage	:	- - - V, - - Hz
Electr. control unit MVS 16/S	:	interval duration 15 s pulse duration 80 ms
Drive motor	:	G 42-20/D1A4-283
Speed	:	49 1/min
Power	:	3 kW
Model	:	B 5

Established on: 19.12.1995 Signature: ____________________



Operating Instructions

for the BETHPULS Bag Filter

Please read through these operating instructions carefully and make yourself acquainted with the function and design of your BETHPULS bag filter before you use it for the first time.
It is imperative that the operating instructions have not only been perused by all persons who have to do with the BETHPULS bag filter, but have also been understood by them.

By all means read the chapter "Safety" before the first start-up of the filter system!
In this instruction manual all passages which concern your safety and signalize important modes of behaviour are marked by the opposite warning triangle symbol.
Follow these instructions for the sake of your own safety!
By doing so you will avoid injury!

Always keep the instruction manual near the filter system. This is the only way to immediately solve problems that might arise.

The present operating instruction manual has been constructed in such a way that you will be able to reliably start up your filter system if you systematically follow the instructions.
They contain information about the function, design, operation, and maintenance of the system and give advice for solving arising problems.

By adequate operation and maintenance jobs carried out at regular intervals you will keep your filter system ready for service for a long time.

For changes which you wish to be carried out on the filter system, please always consult the local BETH customer service.

Important information:

The BETHPULS bag filter is intended for the dry separation of dust from waste air or waste gases.
Every other application is considered as a deviation from the intended purpose.
We do not assume any responsibility for damage caused by an application which does not comply with the intended purpose – nor for the resulting consequences. The risk associated with such an application is run by the operator himself.
At the time of delivery the BETHPULS bag filter is in keeping with the latest technological development and the accepted safety engineering rules of the effective device safety law.
The BETHPULS bag filter features reliable functioning when used in compliance with the intended purpose, and has left our works in perfect condition as far as the safety regulations are concerned.

Construction of the operating instruction manual:

This instruction manual is divided into chapters according to the following table of contents.
Where necessary, figures have been located on the left side to illustrate the text on the right. The foot-line of each page shows the respective page number.

Symbols used:

■ Listing of functions

● Request to the operator to take action

Attention!

This symbol additionally appears in all those places of the instruction manual where it is essential to follow the correct sequence of a process and to prevent damage or destruction of filter parts by paying special attention.

Contents

regulations

Safety instructions are to be found in all those places of the operating instruction manual where persons are exposed to danger of life and limb! Follow these instructions and behave extremely cautiously in these cases!

Apart from the safety instructions given in this manual, the statutory and other universally valid »Rules for the Prevention of Accidents and Industrial Safety as well as of Environmental Protection« have to be observed during operation of the filter system.

BETHPULS bag filters may only be installed, mounted, started, operated, maintained and repaired by instructed and specially trained technical personnel. The personnel must first be acquainted with the operation of the filter system and must have understood the explanations in order to be able to escape dangers which may occur during operation of the system!

The filter system is equipped with safety and protection devices based on the present level of technology.

The operator of the filter system has to take care that the filter system will only be used in a condition which ensures readiness for operation and is unobjectionable with regard to safety technology, in consideration of the safety regulations in the operating instruction manual, and in compliance with the intended purpose.

system which could affect its safety must immediately be eliminated.

Safety and protection devices must not be removed, made ineffective or inoperative!

Changes/extensions of the existing safety and protection devices indicated by BETH at a later time must additionally be carried out by the operator!

Arbitrary modifications and/or changes on the filter system are not permitted! **BETH do not answer for arbitrary modifications of safety and protection devices!**

Without our written consent no technical alterations may be carried out on the filter system. Any alteration of the original state may affect the safety of the filter system and/or lead to accidents!

For the sake of his own safety the operator is obliged to check the safety and protection devices of the filter system for externally perceptible defects and/or damage at regular intervals.
Perceptible safety defects are to be eliminated at once!

If the original state of the safety and protection devices is altered during operation, the filter system must immediately be properly stopped and precautions must be taken that it will not be started again in an improper way.

structions and controls the operator must ensure that the environment of the filter system is easy to survey.

Repair jobs may only be performed after shut-down of the total filter system. In addition the filter system has to be secured against unintentional reconnecting during such jobs (e. g. by danger signs)!

After repair work on the filter system it is to be checked whether all safety and protection devices are fully operative again.

The operator must assign all responsibilities for the activities associated with the operation of the filter system (e. g. maintenance) and must check whether the same are complied with.

The maintenance intervals prescribed by BETH are to be observed and the maintenance jobs carried out to be recorded.

1.2 Safety regulations specific to the system

In addition to the safety regulations specified hereinafter the special safety prescriptions integrated within the individual chapters are applicable.

Safety and danger indications on the filter system must be taken notice of and be kept in readable condition.

The BETHPULS bag filter may only be operated after orderly assembly in accordance with the mounting instructions by BETH.
All clean gas covers and covers for the cleaning units have to be closed before each start-up of the filter system. After maintenance and repair work it has to be checked whether all openings in the filter housing have correctly been closed again.

Running compressed air generators as well as extraction and ventilation equipment must not be disconnected during operation of the filter!

Important advice:
In case of suddenly arising dangers the BETHPULS bag filter can immediately be put out of operation by a separate EMERGENCY switch.

Jobs on the electrical equipment may only be carried out by technical personnel qualified for this purpose!
Before opening electrical devices the respective main switch has to be switched off and secured against unauthorized reconnecting. Moreover, it must first be stated that the electrical equipment is dead!
After repair work the electrical protection devices are to be checked for functioning before they are started up again!

Jobs on the compressed air system of the filter may only be performed by persons who have been specially trained for this purpose.

The permissible operating overpressure for the »cleaning« of the bags must not be exceeded!

The safety devices provided for the control of the air pressure (safety valves, pressure measuring instruments) must regularly be checked for their effectiveness. The adjustment of these safety devices must not be changed.
In case of failure of safety devices, the concerned compressed air supply piping must immediately be closed by means of the hand-operated shut-off valve provided for this purpose.

Before beginning maintenance work, the compressed air tanks to be maintained have to be rendered pressure free.

If the filter system is installed outdoors, make sure that handles, steps, railings, landings and ladders on the filter system are free from dirt, snow and ice.

Welding-, gas cutting- and/or grinding jobs on the filter housing may only be carried out with explicit permission. Call in the appropriate security officer of the firm on this matter!

Before beginning welding-, gas cutting- and grinding jobs, the vicinity of the filter system is to be freed from dust and combustible substances. Moreover, sufficient ventilation has to be provided for!

When filtering explosive dusts, smoking is strictly prohibited in the vicinity of the filter system during filter operation. Moreover, do not use open light or fire!

Explosion Hazard!

The screw conveyor installed for dust discharge operates on the principle of displacement.
Consequently, an obstruction in the discharge area may lead to dust accumulations in the dust collecting hopper.
For this reason, clogging in the discharge area must be avoided!
The separated dust must on no account be accumulated in the dust collecting hopper!

The safety instructions for the drives, bearings, screw conveyor, valve and fan in the separate instruction manuals of the manufacturers are to be followed!

Also follow the manufacturers instructions when using detergents and solvents!

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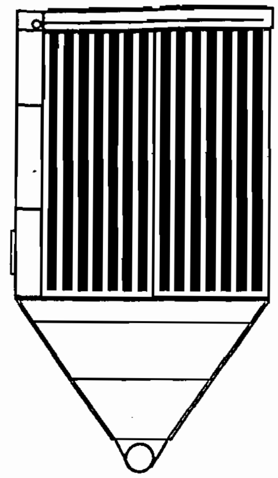

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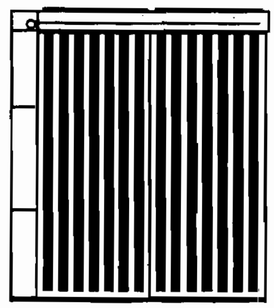

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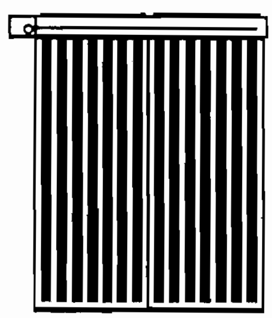

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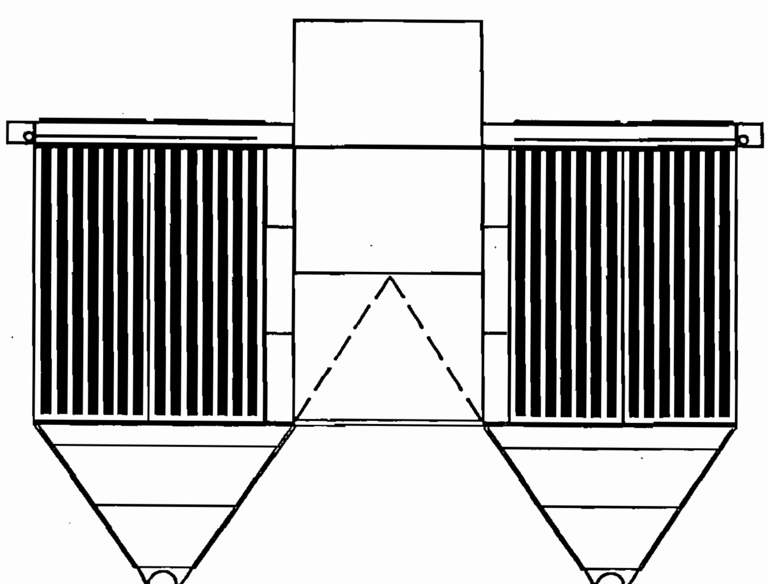


2 Technical Data

Note:
The opposite Technical Data are intended as initial information for the operator. Each BETHPULS bag filter is supplied with a data sheet specific to the system which contains all required indications.

2.1 List of types

Type key (example):

BP 6. 96 x 10. 6. 10

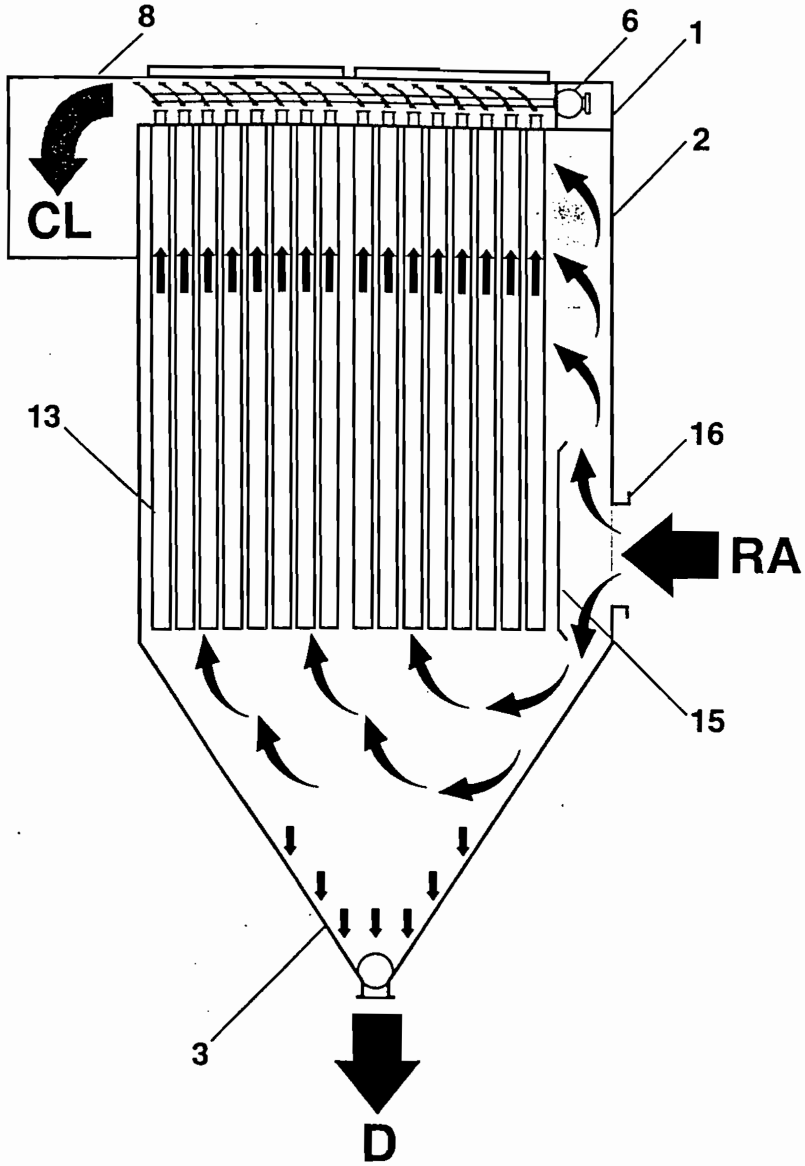
10	Type:	10 = Single-line filter 11 = Bin-mounted filter 12 = Filter head 20 = Double-line filter
6	Length of filter bags:	1 = 1300 mm 2 = 1950 mm 3 = 2600 mm 4 = 3250 mm 5 = 3900 mm 6 = 4500 mm 7 = 5200 mm
10	Number of sections	
96	Number of filter bags per section	
BP 6	Series:	BP 4 = 4 bag rows/section BP 6 = 6 bag rows/section

2.2 Filter system

Filtering surface:	Single-line filter:	approx. 11 to 2560 m²
	Bin-mounted filter:	approx. 11 to 448 m²
	Filter head:	approx. 11 to 2560 m²
	Double-line filter:	approx. 1344 to 5120 m²
Width of housing:	BP 4	1780 to 2620 mm
	BP 6	2200 to 3880 mm
Length of housing:	BP 4	1 to 2 sections
	BP 6	1 to 10 sections
Weight of housing:	BP 4 per section:	approx. 970 to 1603 kg
	BP 6 per section:	approx. 1910 to 3200 kg
Dia. of filter bag:	160 mm	
Dia. of bag retaining cage:	155 mm	
Operating overpressure (permitted):	- 5.000 Pa (standard)	
Operating overpressure (maximum):	- 12.000 Pa	
Explosion overpressure for explosive dusts:	explosion pressure shock resistant with pressure relief acc. to VDI 3673	
2/2-way diaphragm valve:	1 1/2"- single-diaphragm system 2 1/2"- double-diaphragm system	
Safety valve:	threaded connection: G 1/2" (test pressure: 6.4 bar)	
Maintenance unit:	threaded connection: G 1/2" air flow rate: maximally 60 l/second	
Compressed air voltage:	at least 6 bar (overpressure)	
Heating voltage:	220 V/50 Hz (Power: 80 W)	
Airborne sound level:	see data sheet specific to the system	
Type plate:	the type plate is fixed to the raw gas housing	

2.3 Control units (MVS8/MVS16)

Nominal voltage:	220 V/48 - 62 Hz 110 V/48 - 62 Hz 24 V/48 - 62 Hz or:	24 V/DC/V.d.c./V.c.c
Fuse protection for electrical devices:	2 A	
Pulse duration:	0.05 to 0.2 sec.	(adjustable)
Interval:	5 to 60 sec.	(adjustable)
Permissible ambient temperature:	- 5 °C to + 55 °C	
Applied position:	optional	
Protected to:	IP 65 acc. to DIN 40050	
Dimensions (width x height x depth):	240 x 160 x 90 mm (MVS8) 300 x 230 x 90 mm (MVS16)	
Weight:	approx. 2 kg	



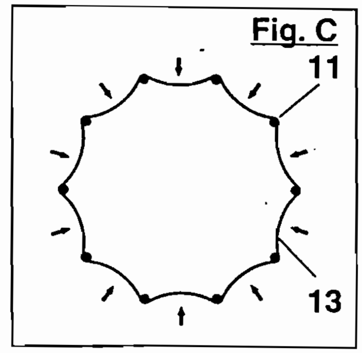


Fig. C

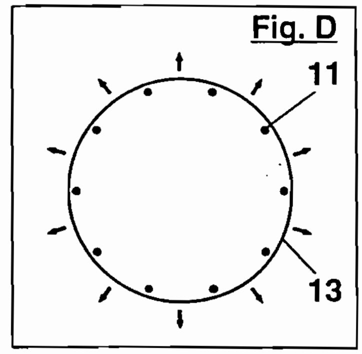


Fig. D

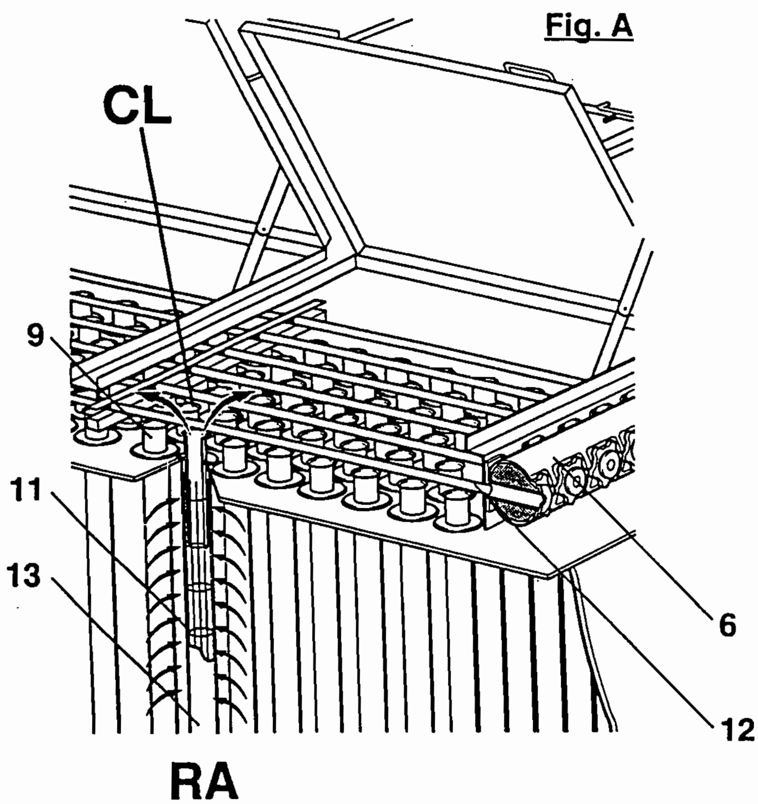


Fig. A

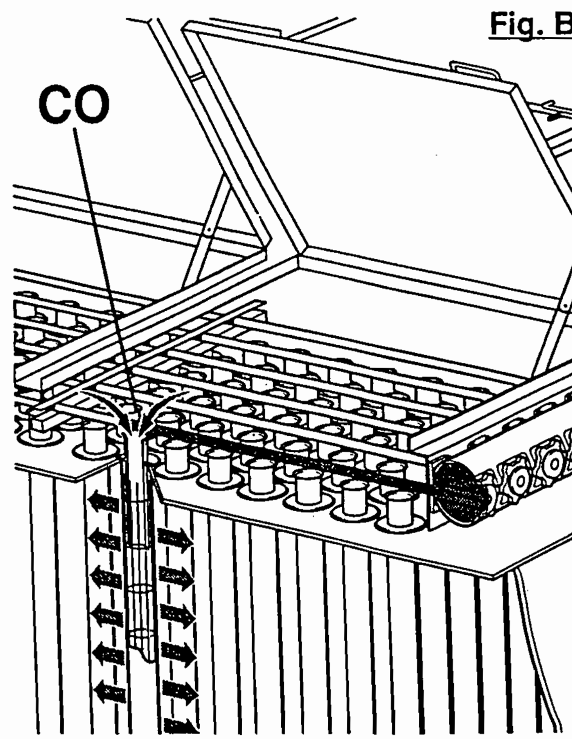


Fig. B

3 Function

3.1 Short description

The BETHPULS bag filter is a filtering separator with fully automatic bag cleaning by compressed air pulses. It is used for the dry separation of dust from waste air or waste gases.

3.2 Functional description

The raw gas to be filtered is fed into the raw gas housing (2) through the opening of the raw gas sockets (16), and therein is led to the individual filter bags.
By virtue of the inlet openings arranged in the lower part of the raw gas housing and the installation of a baffle plate (15) right behind the inlet openings there is a more uniform distribution of the raw gas over the whole filter surface.
Part of the dust is already separated when the raw gas impinges on the baffle plate.
The final separation of the raw gas (RA) into clean gas (CL) and dust (D) takes place on the filter bags (13).

Filtration phase:

During the filtration phase (see Fig. »A«) the separated dust is retained on the surface of the filter bags, while the developing clean gas passes through the bag fabric into the inside of the filter bags.
From inside the filter bags the clean gas flows upwards into the clean gas housing (1), from where it is discharged through the clean gas collecting duct (8).
The pressure drop as the gas penetrates the bag fabric exerts an inward force on the respective filter bag (13). This force is absorbed by the retaining cage (11) inside the filter bag . During the filtering process, the filter bag is therefore drawn inward around the retaining cage in a star-shaped form (see Fig. »C«)

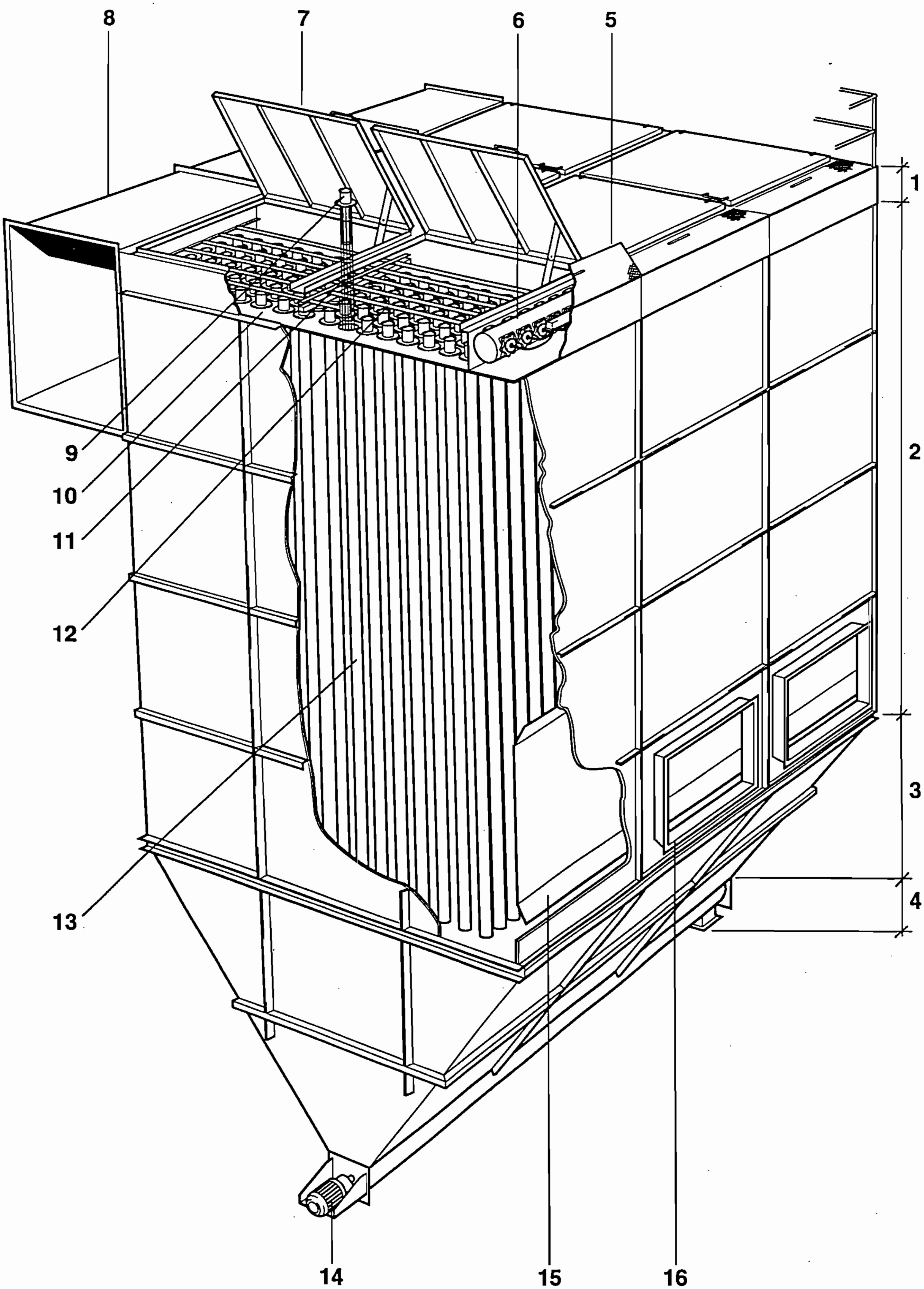
Bag cleaning phase:

During the bag cleaning phase (see Fig. »B«) each row of filter bags is cleaned independently of the others at predetermined intervals by compressed air (CO) and clean gas via a jet manifold (12).
Compressed air tanks (6) with integral diaphragm valves and separately mounted solenoid valves are provided at one end of the jet manifolds to release this process.
With closed solenoid valve the pressure in the compressed air tank is identical with the pressure in the space above the diaphragm of the diaphragm valve. The closing force then acting on the diaphragm results from the larger surface area of its upper side.
The individual solenoid valves are actuated one after the other in periodic sequence by an electronic control unit.
Upon actuation of a solenoid valve, its coil is excited and thus the magnet core is lifted. Now the vent hole of the activated solenoid valve is opened.
The control air escapes through this vent hole. Thus, the pressure exerted on the diaphragm from above is reduced.
The permanently existing air pressure inside the compressed air tank presses the diaphragm up.
The activated diaphragm valve is now open and enables the compressed air to be supplied into the associated jet manifold (12).

The air that is thus released from the compressed air tank is led via the jet manifold outlets to the individual filter bags, and the respective jet tubes (9), into the interior of the filter bags (13) of one row. The compressed air jet with its injector effect then forcibly carries with it clean gas from the clean gas chamber of the clean gas housing.
This mixture of compressed air and clean gas causes sudden inflation of the filter bags.
In this way the dust adhering to the outside of the filter bag is accelerated together with »its« bag, and as the cylindrical shape of the filter bag is reached it is repelled by the force of inertia developing during this process.
The efficiency of cleaning (»backflushing«) achievable in the foregoing way is mainly due to the rapid transition of the star-shaped drawn-in position of the respective filter bag (13) on the retaining cage (11) to the cylindrical shape (see also Fig. »C« and »D«).
As the electronic actuation is completed, the solenoid valve closes and the space above the diaphragm is filled with compressed air again.
During the bag cleaning phase the repelled dust falls down into the dust collecting hopper (3), from where it is continuously removed by means of conveying and discharge devices.

Attention!

Under normal conditions, the dust must not be accumulated in the dust collecting hopper.



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4 Design

The BETHPULS bag filter is designed as a compact welded and screwed construction. By a combination of standardised construction modules the dimensions and characteristic performance features of the filter system can be optimally adapted to any application purpose.

The size of the clean gas collecting duct (8) mounted with an opening to the clean gas housing depends on the given gas flow rate.

The transverse and angular joints in the housing sides formed by the assembly of the individual modules are sealed by the flanges of the tubular struts and fishplates. The housing flanges are sealed by means of sealing compound sprayed from cartridges. The filter system consists of four main construction modules:

Module 1
Clean gas housing with bag cleaning system

Module 2
Raw gas housing with filter bags

Module 3
Dust collecting hopper

Module 4
Screw conveyor with discharge devices

4.1 Clean gas housing

The clean gas housing (1) is divided into sections, each of which comprises four or six rows of filter bags (for nominal diameter and length of filter bags see chapter 2).

Clean gas housing sections are self-contained units with integral compressed air tanks (6).

The clean gas housing width depends on the required number of filter bags (13), the clean gas housing length on the required number of housing sections.

If required, each section can be equipped with a shut-off valve. By this means it is possible to separate the individual sections of the clean gas collecting duct (8) from one another. The bag suspension plate (10) at the underside of the clean gas housing forms the separating plane between raw gas and clean gas chamber. The bag suspension plate has holes for suspending the individual filter bags (13). Between these holes there are movable pressure plates which serve to secure the filter bags with their retaining cages (11) and the jet tubes (9).

By pressing the filter bags by means of the pressure plates onto the bag suspension plate, an optimal sealing between the raw and clean gas chamber is achieved. The upper closures of the clean gas housing are the clean gas covers (7) and the covers (5) of the cleaning units. Each of these covers close one section. All covers are hinged and can be fixed in the open position.

With filter systems which operate at low pressure, sealing of the clean gas chamber is achieved by a flexible seal set into the clean gas covers, and through low pressure.

During high pressure operation the sealing is achieved by additionally installed closures on the individual clean gas covers.

The additional closures are similarly provided for covers in filter systems which are designed for a reduced explosion pressure.

4.2 Raw gas housing

Raw gas housing and dust collecting hopper together form the raw gas chamber. The size of the raw gas chamber is determined by the size and number of the required clean gas housing sections.

There are no partition walls inside the raw gas housing (2) (uniform raw gas distribution). The necessary reinforcement is obtained by the inner housing supports which can be screwed together on each section border.

The raw gas is supplied through the raw gas sockets (16). The baffle plate (15) arranged behind the raw gas sockets extends over the full length of the raw gas housing and is secured on the tubular struts and end plates.

4.3 Dust collecting hopper

The dust collecting hopper (3) is not divided by partition walls either. It is stiffened to the required extent by tubular struts which can be screwed together on each section border.

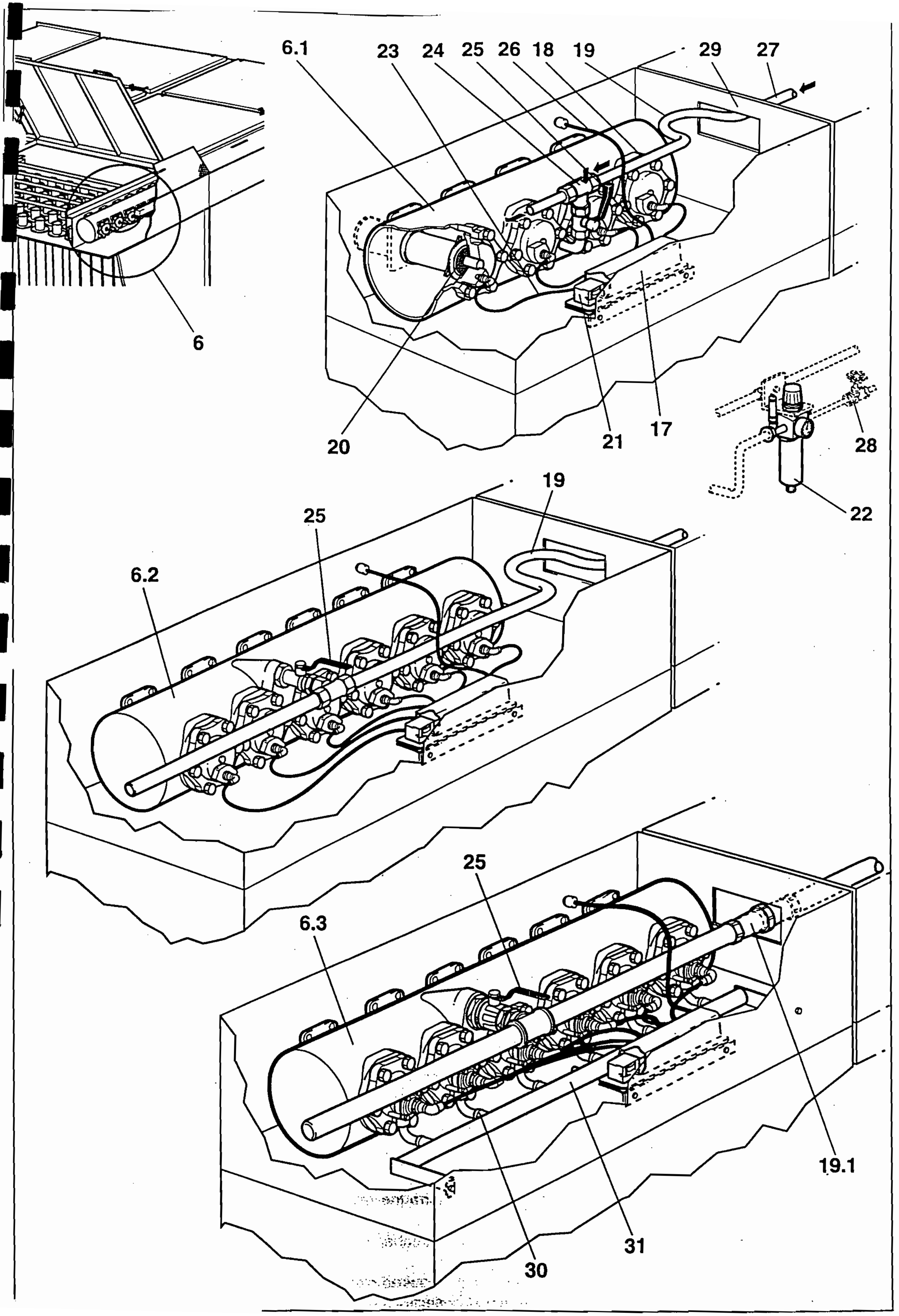
The upper end of the dust collecting hopper is provided with an all-around reinforcing frame of channel steel which serves as a substitute for supporting brackets and at the same time provides protection for the edges during transport. It serves furthermore as an assembly aid during the sealing and bolting together of the jointing lines.

A filter door may even be installed here, providing ease of access to the filter hopper.

4.4 Screw conveyor with discharge devices

Arranged underneath the dust collecting hopper are the conveying devices (screw conveyor with screw trough and screw shaft as well as bearings) and discharge devices (rotary valve, swinging flap valve) for the repelled dust. The drive (14) is provided for the screw conveyor.

Module 4 is always completely assembled in our works.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system for bag cleaning

The compressed air flow rate necessary for cleaning depends on the number and length of the filter bags applied. The size of the compressed air tanks mounted in the clean gas housing is adapted in our works to the required compressed air flow rate of the delivered filter system.

The following compressed air tanks may be installed:

- Compressed air tank (6.1) with four diaphragm valves 1 1/2" and a compressed air piping 1/2" (dimension: 18 x 1.5 acc. to DIN 2391)
- Compressed air tank (6.2) with six diaphragm valves 1 1/2" and a compressed air piping 1" (dimension: 28 x 1.5 acc. to DIN 2391)
- Compressed air tank (6.3) with six diaphragm valves 2 1/2" and a compressed air piping 1 1/2" (dimension: 48.3 x 3.25 acc. to DIN 2440)

The compressed air (operating overpressure: 6 bar) required for the filter system is provided by the operator by means of an amply dimensioned compressor or an already existing compressed air network with sufficient capacity.

Suitable processing units (such as adsorption driers) have to be used to prepare the compressed air in such a way that residues of dirt, oil and/or water have been largely removed from the compressed air before it enters the filter system.

Before leading the compressed air to the filter system, a maintenance unit (22) is to be fitted into the supply piping (27).

This maintenance unit should be permanently installed in proximity of the compressed air tanks (e.g. on the railing) and be easy to reach.

equipped with a safety valve which prevents a too high pressure build-up within the compressed air tanks.

An additional hand-operated shut-off valve (28) is provided by the customer in the supply piping between the compressed air processing unit and the maintenance unit.

The processed compressed air enters the compressed air tanks (6) via detachable connecting pipes (18).

All compressed air tanks are connected with one another. The connecting pipes run through passages (29) in the clean gas housing which are provided in our works from one section to the other.

Expansion elbows (19) are fitted into the connecting pipes of the compressed air tanks (6.1) and (6.2), whereas straight pipe ends with an appropriate moving collar (19.1) are installed in the pipes for the compressed air tanks (6.3).

Note:

For a filter system with up to five mounted compressed air tanks (corresponding to five clean gas housing sections) a compressed air supply from one side is sufficient. If there are more than five clean gas housing sections, the compressed air is supplied separately from two sides by one maintenance unit on each side (one maintenance unit supplies maximally 5 clean gas housing sections).

The T-piece (24) in the connecting pipe to the compressed air tank (6.1) and (6.2) is equipped with cutting ring screw connections which can be loosened again. The T-piece at the compressed air tank (6.3), however, is permanently screwed-in.

(Further information about the bolted connections can be taken from the BETHPULS Assembly Instructions)

enters the respective compressed air tank, the compressed air supply may be interrupted at any time for maintenance and/or repair jobs without the filter operation having to be stopped.

Each clean gas housing section is equipped with one compressed air tank with four or six diaphragm valves (20), depending on the number of filter bag rows fitted per section. The same number of solenoid valves (21) is provided for control of the diaphragm valves.

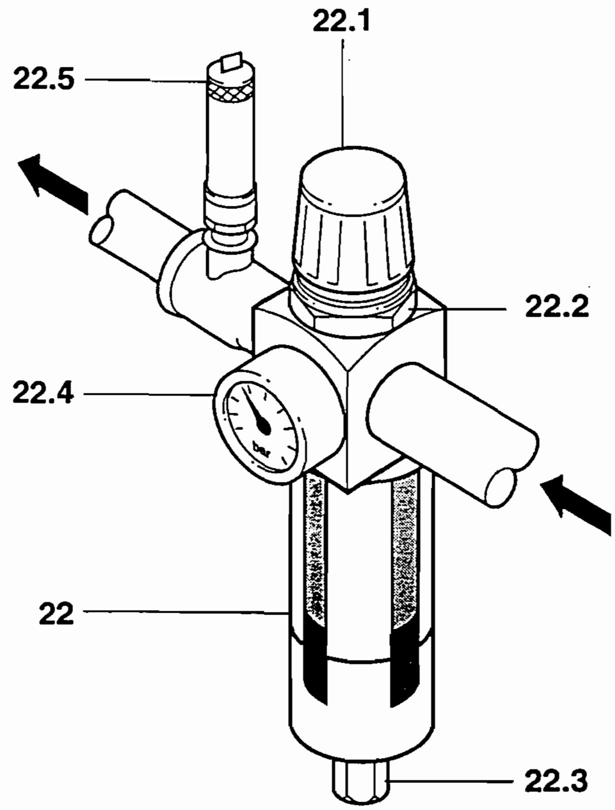
The solenoid valves of one section are encased in a separate aluminium box in dust- and waterproof design in accordance with DIN 40050 (protected to IP 65).

If the filter system is installed outdoors, the solenoid valve box (17) can be equipped with a heating in order to prevent freezing of the solenoid valves. This heating ensures that the temperature in the solenoid valve box does not drop below 7°C. The base plate of the solenoid valve box is screwed to the valve chamber longitudinal side of the clean gas housing.

Each individual solenoid valve is connected with one diaphragm valve via the flexible control air pipe (23).

The used control air is led back to the clean gas housing through the flexible control air return pipe (26).

In the compressed air tank (6.3) the control air return pipe is additionally equipped with silencers (30) which are fixed to a common return pipe (31) in a detachable way. The return pipe is screwed at both ends to the valve chamber longitudinal side of the clean gas housing.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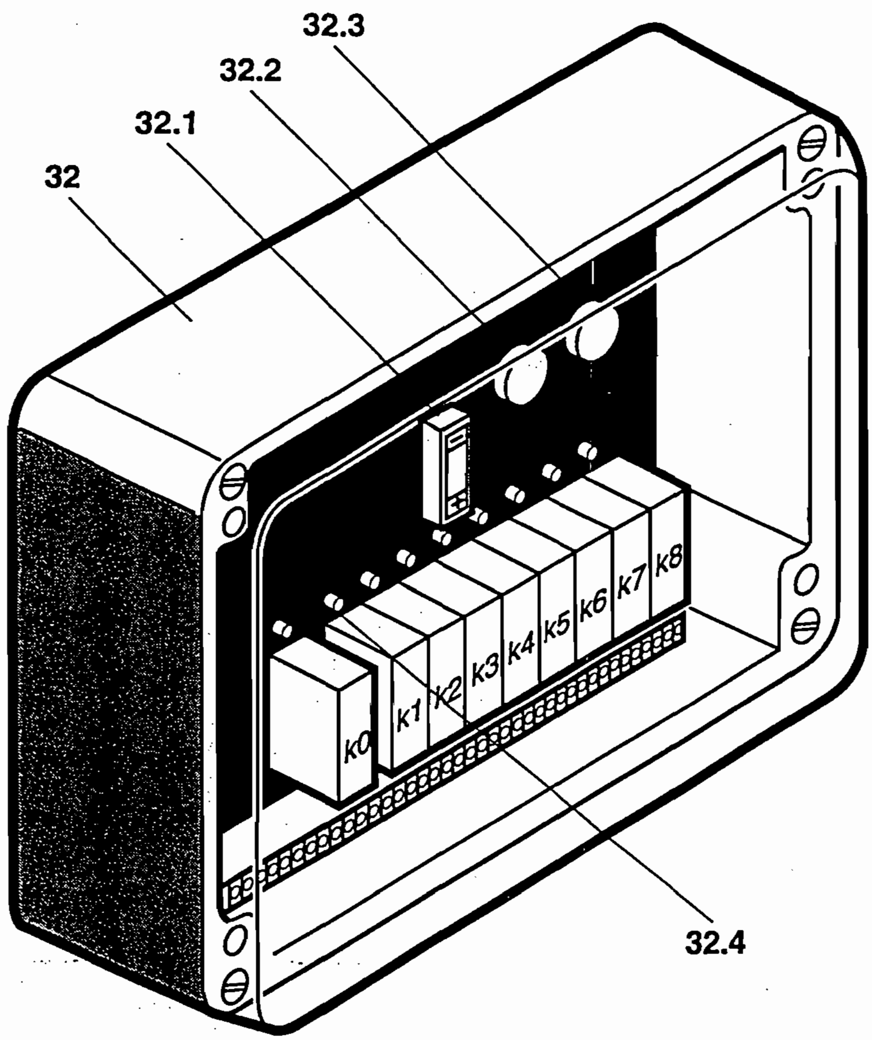
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4.6 Maintenance unit

The maintenance unit (22) is designed as a filter/controller combination to prevent breakdown during operation of the filter system caused by water, oil and/or other impurities occurring in the processed compressed air.
The maintenance unit consists of a filter with automatic condensate drain, a reducing valve with pressure regulating screw, a manometer and a safety valve.
After pulling up the movable pressure regulating screw (22.1), the air pressure required for bag cleaning (operating overpressure: 6 bar) can be set by means of the reducing valve (pressure reducer) and be controlled on the manometer (22.4). In order to avoid an unintentional alteration in the pressure setting, the regulating screw on the reducing valve must be tightened by pressing it down after the setting has been completed. The maintenance unit must be situated in the compressed air piping in such a way that the automatic condensate drain (22.3) points to the bottom and the safety valve (22.5) is positioned between maintenance unit and compressed air tank.
The forming condensate must be discharged by the automatic condensate drain in an ecologically beneficial manner.
By means of the fastening nut (22.2) the maintenance unit can be safely mounted on a fixing angle.
If the maintenance unit is installed outdoors, freezing of the unit must definitely be prevented by appropriate measures (such as heating, insulation).

4.7 Electronic control unit

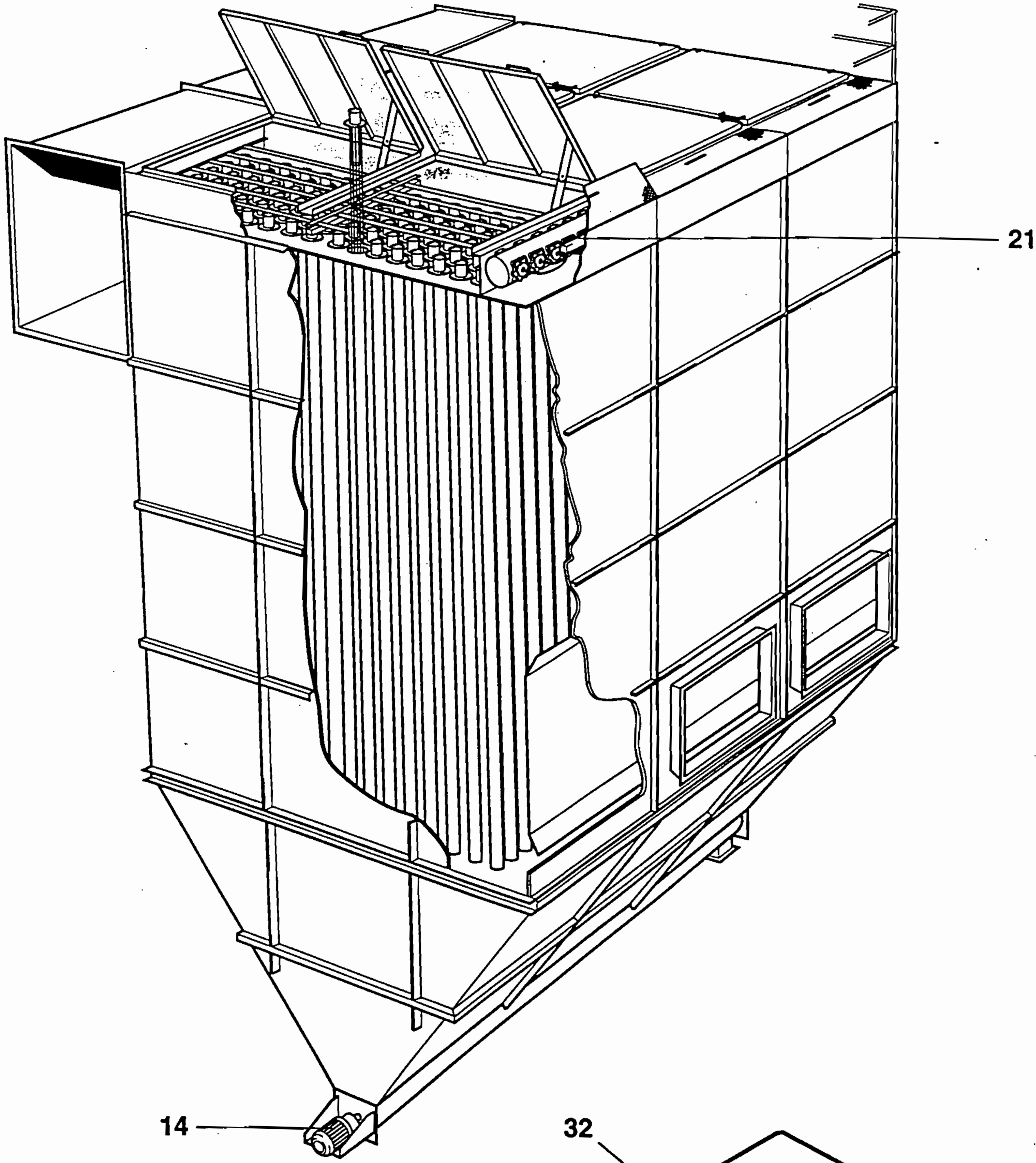
The electronic control units MVS 8 and MVS 16 serve to control the solenoid valves. The compressed air pulses necessary for the cleaning of the filter bags are released by pulse control of the solenoid valves.
The casing of the control unit is designed dust- and waterproof in accordance with DIN 40050 (protected to IP 65). It has maximally 8 (MVS 8) or 16 (MVS 16) floating relay outlets which are actuated in periodic sequence. The number of outlets required per control unit (32) can be set by the installed coder switch (32.1).
All outlets are adjustable for a pulse duration ranging from 50 to 150 msec.

Note:

The optimal pulse duration is set in our factory to suit the BETHPULS bag filter which is delivered. It depends on the design and length of the filter bags. It should only be changed on consultation with the BETH customer service.
The pulse duration can be changed by the potentiometer (32.2), the interval duration by the potentiometer (32.3) within the above-mentioned range.
The activation of the solenoid valve which has just been actuated is indicated by the associated light emitting diode (32.4).
The control units are equipped with a floating changeover contact for connection of an external and fault indication which monitors the internal control voltage.
The control unit MVS 16 can be provided with an additional monitoring card (type SMK 16 B) which permits the control of the following functions:

- Pressure pulse (external)
- Cycle time (internal)
- Interval duration (internal)
- Pulse duration (internal)

(For further details see the separate Operating Instructions MVS 16).
By the connection of an external contact assembly (hand switch, press switch, time switch) the pulse control of the solenoid valves can even be started or stopped with the supply voltage being already switched on.
For the installation of the control unit the operator of the filter system should choose a well accessible place which is free from vibration, taking also into consideration the permissible temperature range (see chapter 2). If the equipment is mounted outdoors, it must additionally be protected from rain and direct sunshine.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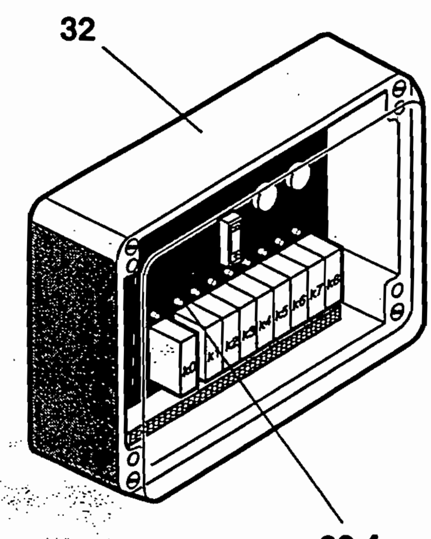
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32.4

ness for operation

After correct and complete performance of all jobs described in the BETH Assembly Instructions the operational readiness of the respective BETHPULS bag filter can be established.

The operational readiness of the filter system should only be established by instructed technical personnel. In this manner wrong or incomplete adjustments will be avoided.

The characteristic performance features and connection values of the respective BETHPULS bag filter can be taken from the technical data sheet supplied together with the filter, and from the indications in chapter 2.

Before the filter system is started up for the first time, all major functions have to be checked.

When starting the filter for the first time it is essential to observe the safety regulations specified in chapter 1!

In order to avoid personal injury and material damage the filter system may only be started up and operated by competent personnel! The maximally permitted operating pressure must by no means be exceeded!

The pressure of the safety valve set in our works must not be changed!

Defective functioning of the devices installed for the control of the air pressure (manometer, safety valve) may result in personal injury and/or mate-

The supplied arrangement plan shall be used to check the direction of rotation of the screw conveyor and, if necessary, specially trained personnel shall adjust the sense of rotation by changing the connection cable clamping of the screw conveyor drive (14).

All connections and sealing areas of the compressed air supply system are to be checked for possible leakages. The operational readiness of the solenoid valves (21) and their actuation are to be checked on the electronic control unit (32).

Note:

After the power supply has been switched on, the state of readiness of each solenoid valve is indicated by a metallic clicking as soon as it is actuated. The activation of the solenoid valve can be recognized by the lighting-up of its associated light emitting diode (32.4).

Attention!

Before the first start-up of the filter system, it is essential to check that there are no foreign parts in the filter housing or dust collecting hopper and/or in the conveying and discharge devices. Any tools or other accessories left behind after assembly may cause serious damage to the conveying and discharge devices, and this in turn may impair the whole filter operation. Therefore, any foreign parts left behind must definitely be removed!

carry out the following checks:

Are all safety and protection devices operative?

Is the filter system supplied with the right voltage (see type plates)?

Has the electrical main connection been duly installed with an appropriate fuse protection?

Have all necessary cable connections been correctly and tightly installed?

Has the main switch been unlocked and switched on?

Have all filter bags been correctly fitted?

Has the compressed air supply piping been duly mounted?

Have the maintenance unit and the safety valve in the compressed air piping been duly installed?

Is the air pressure high enough?

Are all shut-off valves in the compressed air supply piping open?

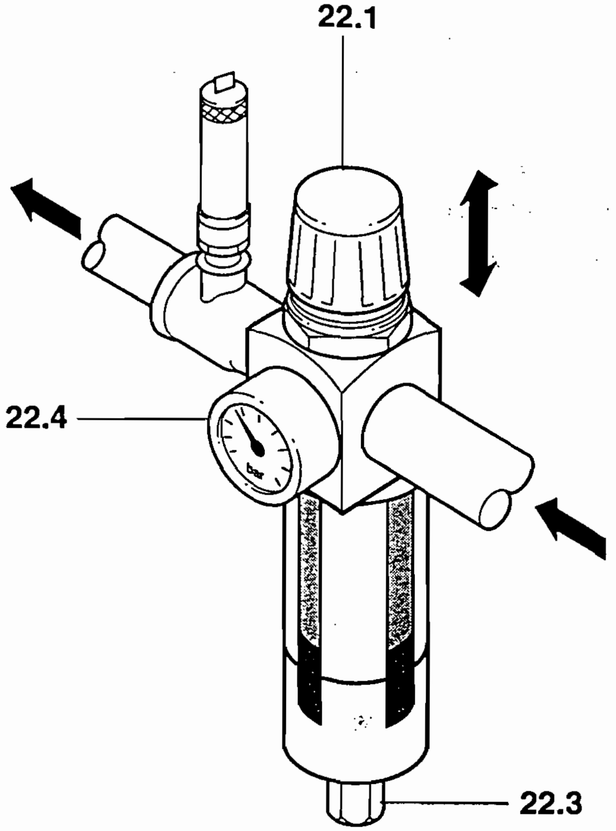
Have all necessary discharge pipes been installed according to the regulations for environmental protection?

Have all tools or other auxiliary equipment been removed from the filter housing?

Are all covers and cladding parts on the filter housing closed?

Are all components of the filter system ready for operation?

Is the whole filter system ready for operation?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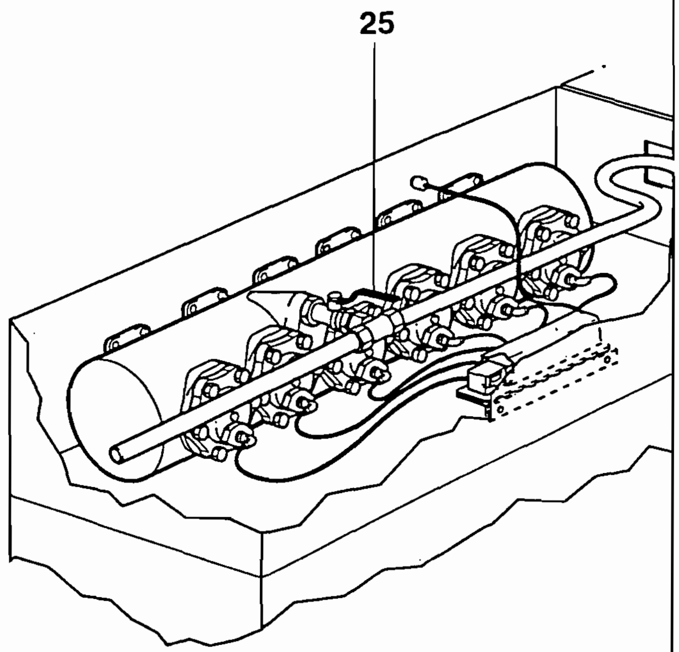
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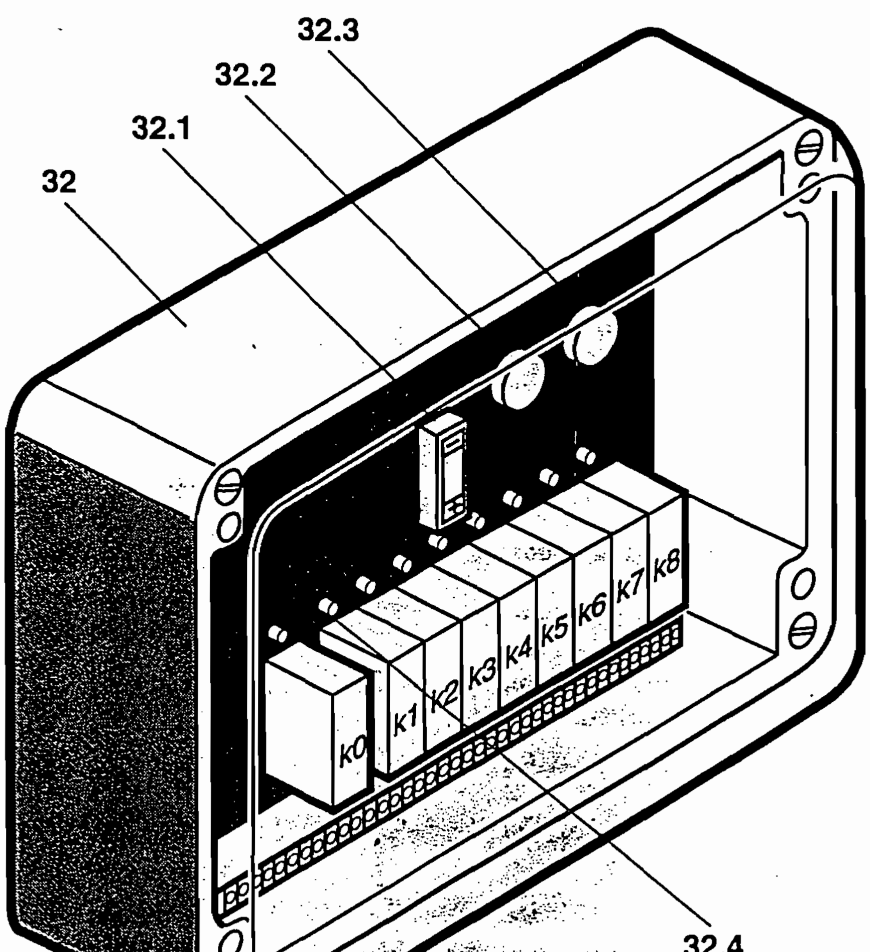
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5.2 Operation

5.2.1 Adjustments

Check and operating elements of the electronic control unit:

(32.1) Coder switch

(32.2) Potentiometer for adjustment of the pulse duration

(32.4) Light emitting diodes for indication of the solenoid valve activated

External circuit closer/circuit breaker (installed by the operator) for power supply of the control unit.

External circuit closer/circuit breaker for power supply of the conveying and discharge devices.

The number of outlets required per control unit can be set by actuation of the coder switch (32.1) ("+" = more or "-" = less outlets). The outlets are adjustable for a pulse duration ranging from 50 to 150 msec. The interval duration is recognizable by the deactivation (diode lights are out) of the light emitting diodes (32.4).

With a continuous connection, the interval duration between the actuation of two successive solenoid valves must not exceed 70 sec. The interval duration is the quotient from the adjusted cycle time by the number of the used outlets (solenoid valves):

$$\text{Interval (I)} = \frac{\text{cycle time}}{\text{number (n)}}$$

Example:

$$I = \frac{180 \text{ sec.}}{10} \text{ 18 sec.}$$

Note:

The optimal pulse duration is already set in our factory to suit the delivered filter system. It depends on the execution and length of the filter bags installed (the pulse duration must not exceed a maximum of 150 msec.). The pulse and interval duration can, however, be reset by the potentiometers (32.2) and (32.3) (if necessary).

The pulse duration prescribed by our works should only be changed on consultation with the BETH customer service.

5.2.2 Switching on

When switching on the filter system follow the below order:

1. **Valve**
2. **Screw conveyor**
3. **Compressed air control for bag cleaning operation**
4. **Fan**

When starting up the compressed air supply for the bag cleaning, follow the procedure set out below:

- Open all existing hand-operated shut-off valves (25) in the connecting pipes to the compressed air tanks.
- Set the required cleaning pressure by the reducing valve of the maintenance unit. Do this in the following way:
- First pull out the pressure regulating screw (22.1) and then turn it until the required cleaning pressure is indicated on the manometer (22.4).

  Note:
  If the indicated pressure is too low, increase the pressure by turning the pressure regulating screw clockwise. If it is too high, turn the screw anti-clockwise.
- When the correct cleaning pressure can be read on the manometer (22.4), press the pressure regulating screw down again. The set pressure will then be fixed.

  Note:
  The cleaning pressure is to be set at a minimum of 6 bar operating overpressure (normally).
- Switch on the power supply for the electronic control unit (32). The adjustments of the control unit are to be carried out as described under section 5.2.1.

Note:
After the switching-on operation has been completed, the activation of each individual solenoid valve is indicated by an audible clicking, as soon as it is actuated. When a solenoid valve is activated, the associated light emitting diode (32.4) in the control unit will light up as well.

Important:
After the first start-up check all the bolted connections on the compressed air pipes for tightness and, if necessary, tighten them. In addition, check the automatic condensate drain (22.3) for functioning and tightness.

5.2.3 Switching off

When switching off the filter system follow the below order:

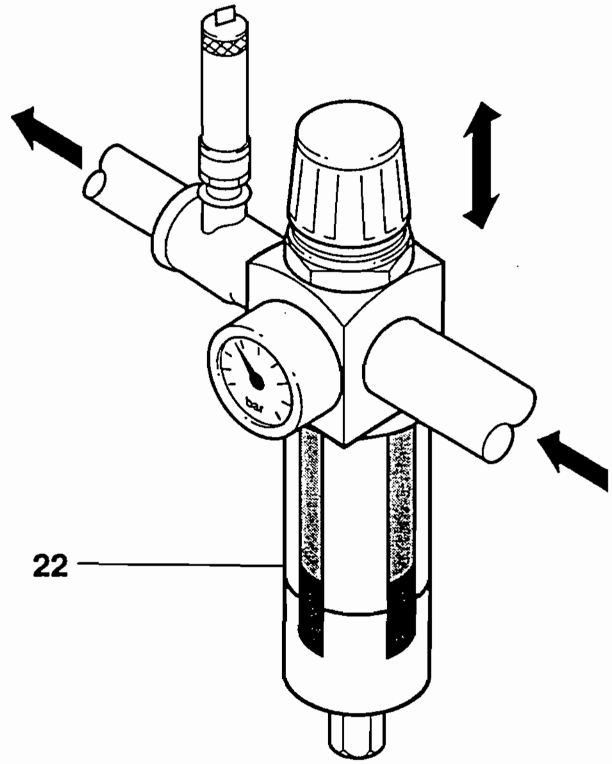
1. **Fan**
2. **Compressed air control for bag cleaning operation**

(The pulse control of the solenoid valves is not interrupted until approx. 10 min. after the fan has been switched off)

3. Screw conveyor

4. Valve

(The conveying and discharge devices still run between 15 and 30 min. after the compressed air control for the bag cleaning has been stopped)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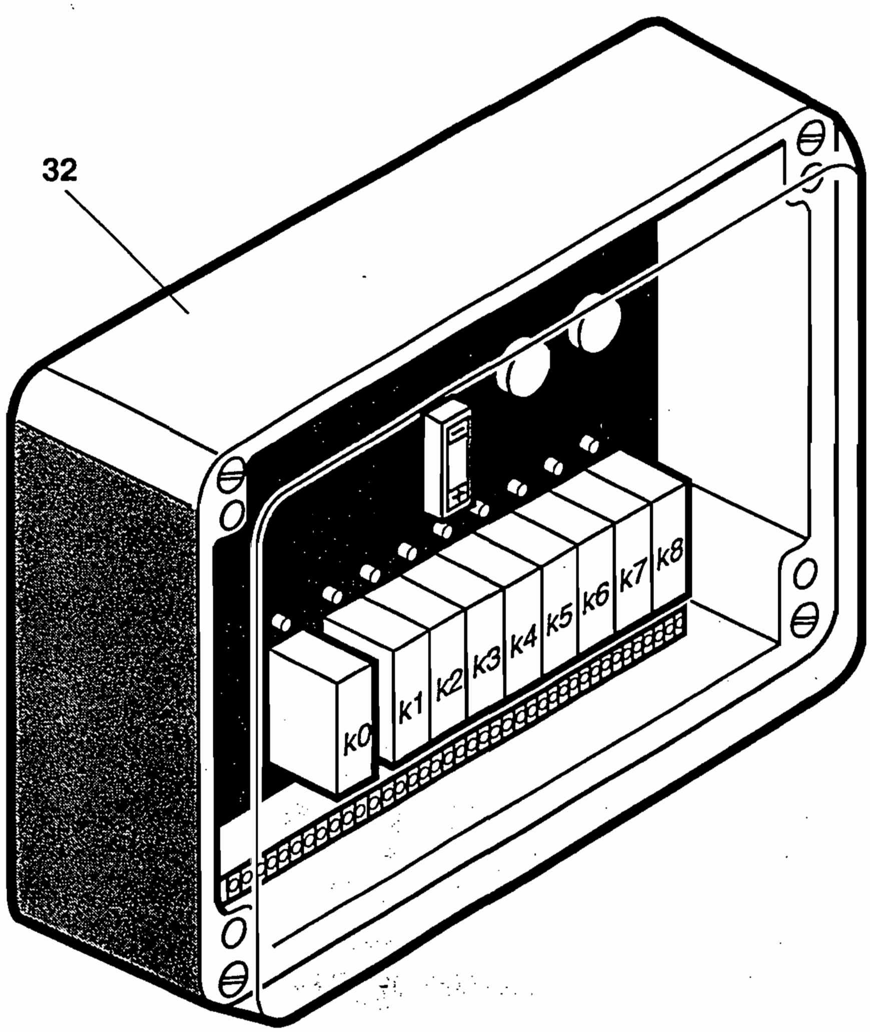
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6 Inspection and Maintenance

6.1 General

Inspection and repair jobs may only be performed by qualified and instructed technical personnel in consideration of all the safety regulations specified in chapter 1!
Before starting replacement and repair jobs cut the power supply of the filter system (disconnect all switches!) and ensure it against unintentional reconnection (e. g. by mounting information signs)!
Interrupt the compressed air supply of the compressed air tank to be maintained (see chapter 6.5).
Safety and protection devices and the admissible noise level of the filter system are to be checked at regular intervals (at least once a year) and after repair work by a person versed in the relevant check regulations.

Note:
Inspection and maintenance jobs can partially be carried out even without interruption of the filter operation (see chapter 6.3).

The following components of the BETHPULS bag filter are to be inspected at regular intervals and, if necessary, to be maintained:

- Filter bags
- Compressed air system for bag cleaning
- Screw conveyor with drive and bearings
- Valve with drive and bearings

Note:
The inspection and maintenance periods mentioned in chapter 6.2 must be observed!

6.2 Maintenance plan

In order to ensure trouble-free operation of the filter system the following inspection and maintenance intervals must be adhered to:

Daily:

- Filter resistance
- Air pressure in the compressed air tanks

Every 2 weeks:

- Cycle time
- Pulse duration
- Cleaning pressure
- State of the compressed air
- Operativeness of the reducing valve
- Operativeness of the safety valve
- Operativeness of the manometer
- Operativeness of the automatic condensate drain
- Tightness between filter bags and bag suspension plate

Every 4 weeks:

- Solenoid valve control
- Operativeness of the solenoid valves
- Operativeness of the diaphragm valves
- Tightness of the compressed air pipes
- Wear of the conveying devices
- Tightness and operativeness of the discharge devices
- Damage to the seals on the clean gas covers and the filter door (if any)

Every 26 weeks:

- Operational check of all diaphragms in the diaphragm valves

6.3 Maintenance jobs

Inspection and maintenance jobs are to be performed at regular intervals in the following way:

- Check permissible filter resistance by means of a pressure differential measuring instrument or a suitable U-tube manometer and compare it with the basic setting.

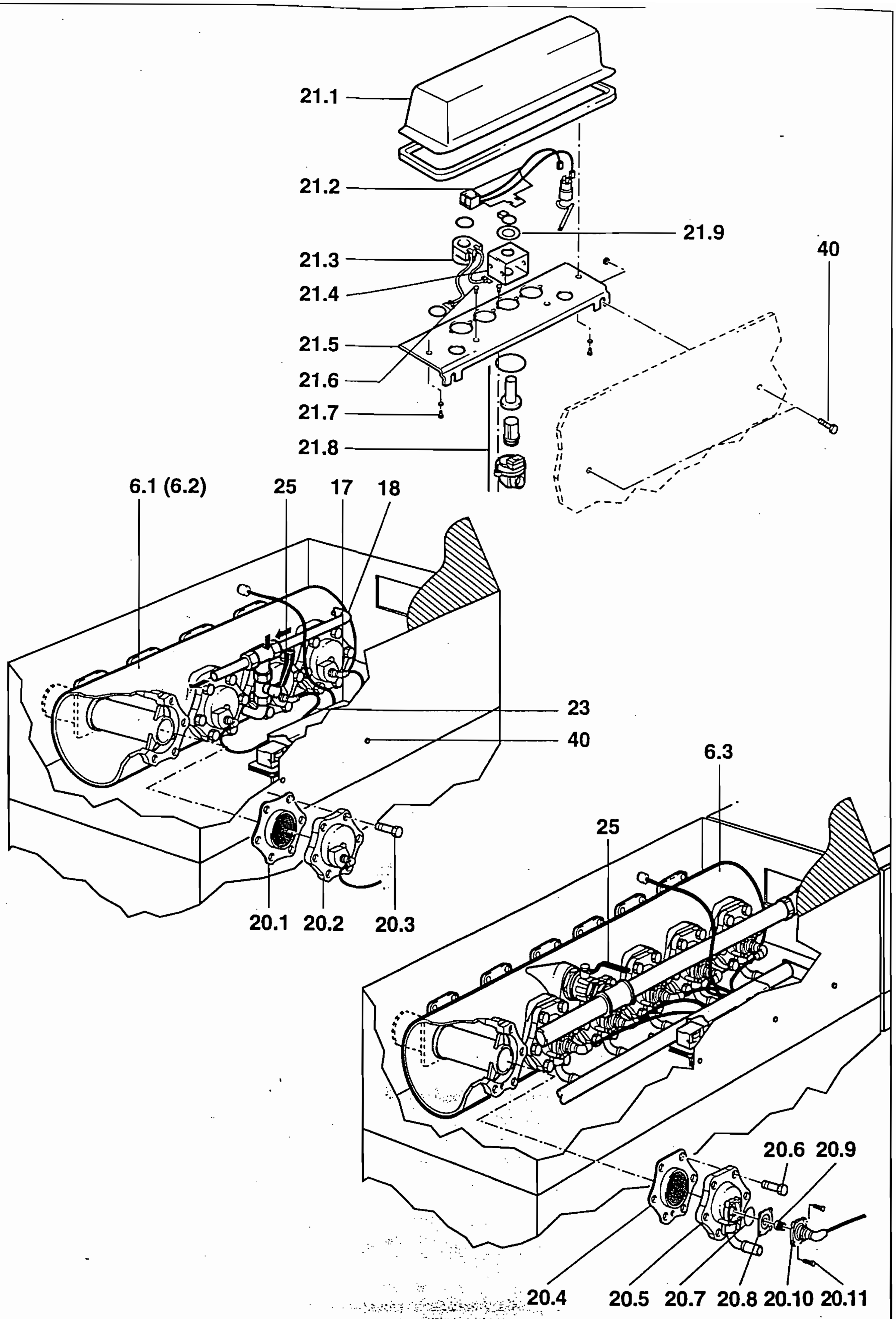
  If the measured filter resistance is too high, decrease the filter resistance by changing the set cycle time, pulse duration and/or the cleaning pressure (on consultation with the BETH customer service).

  Important information:
  If the filter resistance is too high and all resetting possibilities have been exhausted, the replacement of the filter bags becomes indispensable. This is the only means to keep the troublefree operation of the filter system ensured.

- The cycle time, pulse and interval duration are to be checked/changed on the control unit (32) as described in chapter 5.2.1.
- The cleaning pressure, state of the compressed air as well as the operativeness of the manometer, the automatic condensate drain and the reducing valve are to be checked on the maintenance unit (22) according to chapter 5.2.2.

  Note:
  The data of the manometer may be recorded on the occasion of certain operating situations (e.g. setting of cleaning pressure) and be later compared with the current data for operational test.

- The sealing between the filter bags and the bag suspension plate can be improved by increasing the pressure acting against the flanges of the jet pipes (tightening of the cap nuts (see chapter 6.6).
- The operativeness and control of the solenoid valves as well as the per-



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...manent ventilation of the same are to be checked and, if necessary, readjusted as described in chapter 5.2. If the compressed air does not escape from the solenoid valve, the solenoid valve is defective. Defective component parts of the solenoid valve are to be replaced as stated in chapter 6.4.

Note: If the light emitting diodes in the electronic control unit do not light up when the solenoid valves are actuated, or do not go out after the actuation is completed, the control unit is defective.

- Build-up of air pressure after end of cleaning operation is to be regularly checked on the manometer as indicated in chapter 5.2 (the originally set air pressure in the compressed air tank must immediately regenerate).
  If the pressure fails to increase, the diaphragm in the respective diaphragm valve has to be replaced.
  Defective diaphragms are to be replaced as described in chapter 6.5.
- If the maintenance unit (22) does not work, check the valve seat for dirt accumulations and the diaphragm and spring for damage according to manufacturer's instructions.
- Damaged seals on the covers of the clean gas housing and on the filter door are to be replaced according to the BETH Spare Parts List.
- The maintenance work on the drives and bearings of the screw conveyor and valve as well as on the other discharge devices is to be performed as specified in the manufacturer's instructions.

... solenoid valve parts

When replacing defective solenoid valves or their component parts, follow the procedure set out below:

- Switch out the filter system as described in chapter 5.2.3.
  Then open the cover of the respective cleaning unit and fix it with the lifting-up element.
- Unscrew 2 fastening screws (21.7) on the base plate (21.5) and then remove the cover (21.1).
- Loosen the clamping spring (21.9) on the coil head and subsequently disconnect the coil (21.3) and pull it off together with the yoke (21.4)

If the complete solenoid valve is to be replaced:

- Draw out all control air pipes (23) at the side of the solenoid valve box.
- Loosen 2 hexagon head screws (40) and then pull out the solenoid valve box (17) with its fixing links (long holes in the angle of the base plate) through the space between the compressed air tank and the connecting piping (18).
- Remove cover (21.1) and coil (21.3) as described above.
- Unscrew the two slotted screws (21.6) and pull down the complete solenoid valve (21.8) and, if necessary, disassemble it into its component parts.

If the heating element (if installed) shall be replaced as well:

- Take the heating element (21.2) off the base plate (21.5).
- Assemble the new component parts (see BETH Spare Parts List) in reverse order.

... of diaphragms

Replace defective diaphragms in the following way:

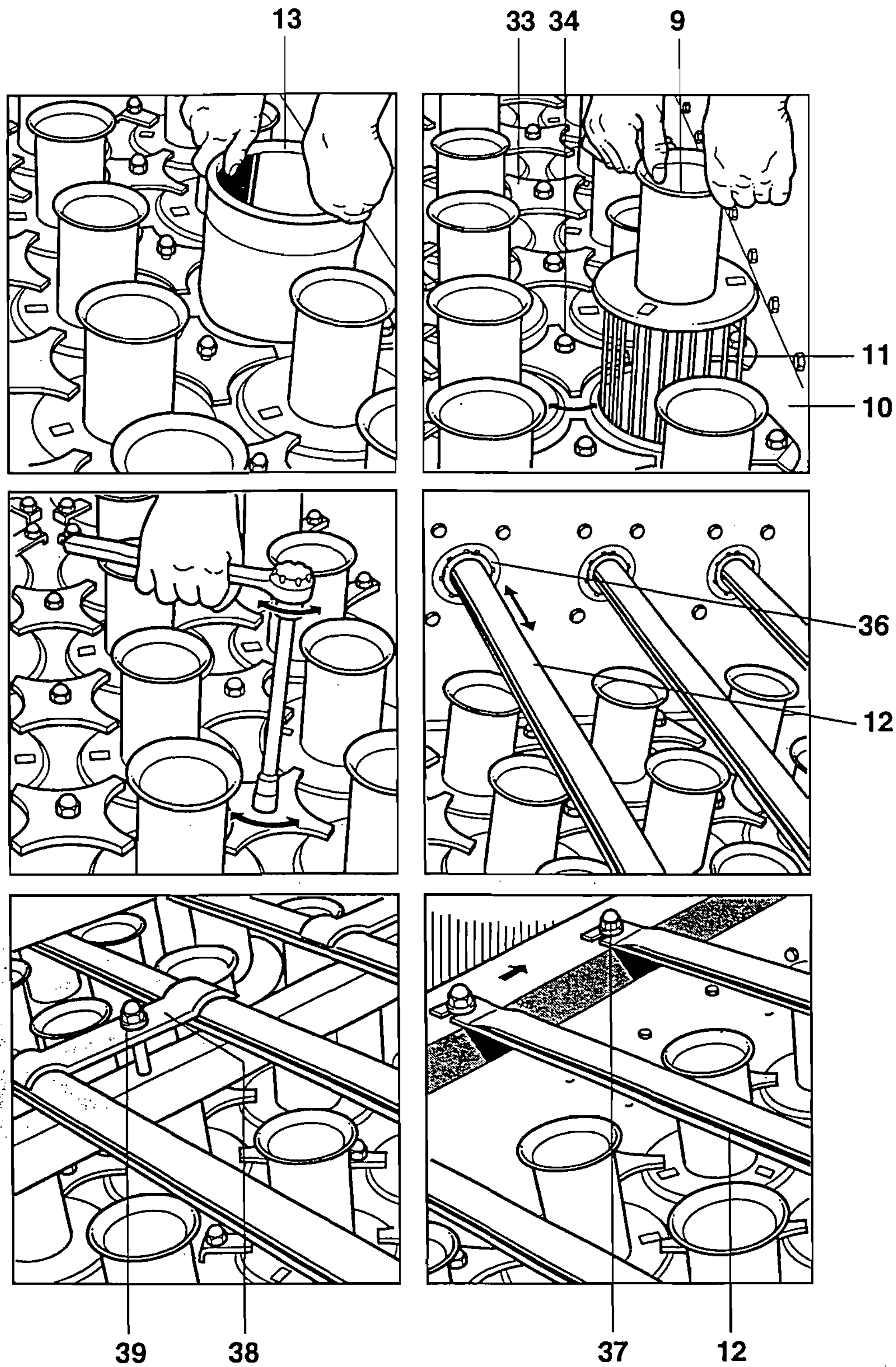
- Switch off the filter system as described in chapter 5.2.3, open the cover of the respective cleaning unit and fix it with the lifting-up element.
- Close the hand-operated shut-off valve (25) of the associated compressed air tank.
  Note:
  The external compressed air supply does not have to be interrupted during replacement of the diaphragms.
- Render the compressed air tank pressure free by repeated cycling of the cleaning operation.

Replacement of the diaphragms in the 1 1/2"-valves of the compressed air tanks (6.1) and (6.2):

- Unscrew 6 fastening screws (20.3) and then swing the valve cover (20.2) forward and to the side.
- Remove the defective diaphragm (20.1) and mount the new diaphragm in reverse order.

Replacement of the diaphragms in the 2 1/2"-valves of the compressed air tank (6.3):

- Unscrew 4 fastening screws (20.11) of the respective pilot valve cover (20.10) and then remove it.
- Take off the pilot diaphragm (20.8) together with the pilot diaphragm spring (20.9) and the body seal (20.7).
- Now unscrew the 6 fastening screws (20.6) and swing the valve cover (20.5) first forward and then to the side. Remove main diaphragm (20.4).
- Carry out assembly in reverse order and then open hand-operated shut-off valve again (25).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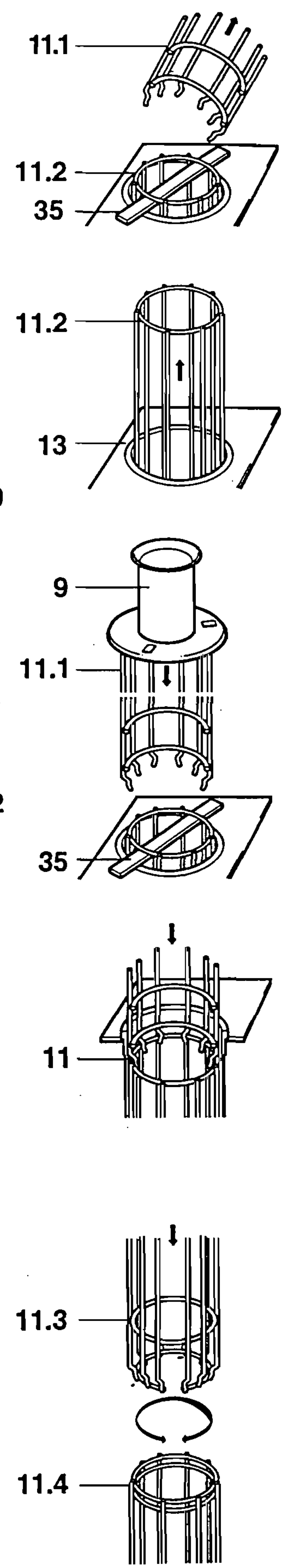
11.1
11.2
35
11.2
13
9
11.1
35
11
11.3
11.4

6.6 Replacement of filter bags

The insertion and removal of the filter bags is carried out from the clean gas chamber. During the replacement work all the mounting parts of the jet manifolds and jet tubes remain connected to the clean gas housing.

The filter bags should be replaced by sections in the following manner:

- Switch off the filter system as described in chapter 5.2.3. Then open whatever clean gas cover you choose and fix it with its lifting-up element.

  Before starting the work, place an amply dimensioned and strong working board or the like onto the sockets of the jet tubes (9) to ensure safe access!

- Loosen the cap nuts (39) by a fitting box spanner only so far that the fastening (38) for the jet manifolds can be removed. Put the fastening aside.
- Loosen the cap nuts (37) by a fitting box spanner only so far that the flattened side of the jet manifolds (12) can be swung aside.
- Pull all existing jet manifolds out of the compressed air inlets (36) of the compressed air tank and put them aside.
- Now loosen the cap nuts (34) by a fitting box spanner until the pressure plates (33) can be moved by hand. Subsequently, turn the pressure plates until the filter bags can be easily pulled out at the jet tubes (9).
- Pull the jet tube together with its retaining cage (11) out of the opening in the bag suspension plate (the jet tubes are screwed home to the respective retaining cage).

If the retaining cage consists of two parts:

- When pulling the retaining cage out, secure the lower cage part (11.2) or (11.4) at the coupling point to the upper part by an auxiliary cross-piece (35) made of flat steel or the like as shown on the opposite side.

  Note:

  All lower parts of the bag retaining cages have bottoms which are permanently connected to the cages.

- Press the reinforcements on the upper cage part with claw connection (11.1) to the side or on the upper cage part with ring connection (11.3) press them together and thereby loosen the connection of the two cage parts.

  Then put the upper cage part aside.

  Note:

  The upper parts of the retaining cages are always fitted with a coupling at the lower end (claw or double ring connection).

- Remove auxiliary cross-piece (35) again and subsequently pull out the complete lower cage part and put it aside.
- Pull out the complete filter bag (13).
- After having removed the filter bags from all sections, insert the new filter bags in reverse order.
- Suspend the new filter bag (see BETH Spare Parts List) into the bag suspension plate (10). The stitched-in steel ring at the upper end of the filter bag serves as suspension ring.
- Insert one filter bag (11) after the other.

  Note:

  When inserting two-piece retaining cages first suspend lower cage part (11.2) or (11.4) into the respective filter bag (13) and secure it by an auxiliary cross-piece (35).

  Then position the upper cage part (11.1) or 11.3) on the lower part and establish the connection of both cage parts by locking their couplings into place. Remove the auxiliary cross-piece and lower the complete retaining cage.

- Turn the pressure plates (33) by hand so that they evenly rest upon the flanges of the jet tubes (9) which surround them.
- Subsequently, press the pressure plates (34) evenly onto the flanges of the jet tubes by tightening the respective cap nuts (34) so that there will be no leaks between clean gas and raw gas housing.
- Secure the jet manifolds (12) as described above, but in reverse order.
- Release the lifting-up elements from their fixing and close clean gas covers again.
- Finally restart the filter system as specified in chapter 5.2.2.

Fault clearance

Fault	Cause	Elimination
Filter system does not start up, or malfunctioning of individual filter components during operation	External main switch is disconnected. (Emergency switch is actuated)	Switch on external main switch. (Unlock emergency switch)
	Fuse is blown or is defective.	Eliminate the cause and put the fuse in again or replace it.
	The following faults could, for example, be indicated:	
	No compressed air available.	Establish compressed air supply as described in chapter 5.2.
	Control unit is not activated or defective.	Check control unit. (See chapter 5.2)
	Conveying or discharge devices are not activated or defective.	Check all conveying and discharge devices. (See chapter 5.2)
	Fan is not activated.	Check fan.
	Motor protection switch is blown.	Correct motor malfuntion acc. to manufacturer's instruction and reconnect motor protection switch.
Exhaust efficiency is inadequate.	Filter resistance is too high.	Reset cycle time, pulse duration and/or cleaning pressure acc. to chapter 6.3.
	Fan performance is insufficient.	Check direction of rotation.
	Throttle valve has been wrongly adjusted.	Readjust throttle valve acc. to BETH indications.
Filter resistance is too high.	Cleaning operation is not optimal.	Fault elimination as specified unter point "Cleaning is inadequate".
	Filter bags are dirty.	Replace filter bags as described in chapter 6.6.
Dust content in clean gas is too high.	Filter bags are not correctly inserted.	Increase the pressure which the pressure plates exert on the flanges of the jet tubes as described in chapter 6.6. (Tighten cap nuts)
	Filter bags are defective.	Replace filter bags as described in chapter 6.6.

7 Fault clearance

Fault	Cause	Elimination
Cleaning is inadequate.	Cleaning pressure is too low.	Reset cleaning pressure acc. to chapter 5.2.2.
	Solenoid valve is dirty or defective (e.g. short circuit in the magnet coil).	Clean solenoid valve or replace defective solenoid valve parts acc. to chapter 6.4.
	Water, oil or other impurities in the compressed air.	Clean maintenance unit or, if required, exchange it. (See chapter 6.3)
	Manometer, filter/controller combination and/or safety valve defective.	Check maintenance unit acc. to chapter 6.3 or replace components.
	Compressed air supply piping is leaky.	Tighten bolted connections of compressed air piping.
	Diaphragm is defective.	Replace defective diaphragm acc. to chapter 6.5.
	Maximum cycle time is exceeded.	Reset maximum cycle time acc. to chapter 5.2.1.
	Malfunction or breakdown of control unit (MVS 8/MVS 16).	Check availability of control unit acc. to chapter 6.3 and, if necessary, replace it.
	Fuse in control unit is defective.	Check fuse and, if necessary, replace it.
	Connecting cable to control unit is loose.	Tighten connecting cable.
	Control or regulation fault in control unit.	See separate BETH Operating Instructions "Control Unit MVS 8 or MVS 16" or consult BETH customer service.
No dust is discharged from the dust collecting hopper.	Wrong direction of rotation of screw conveyor.	Have the direction of rotation changed by means of the BETH wiring layouts.
	Discharge sockets of dust collecting hopper and/or valve are clogged.	Clean discharge devices.
Screw conveyor works unsteadily.	Bearings are dirty or have grooves caused by stand-still.	Clean bearings acc. to manufacturer's instruction or exchange them.
	Screw blades are worn.	Have screw conveyor exchanged by BETH customer service.

BETH

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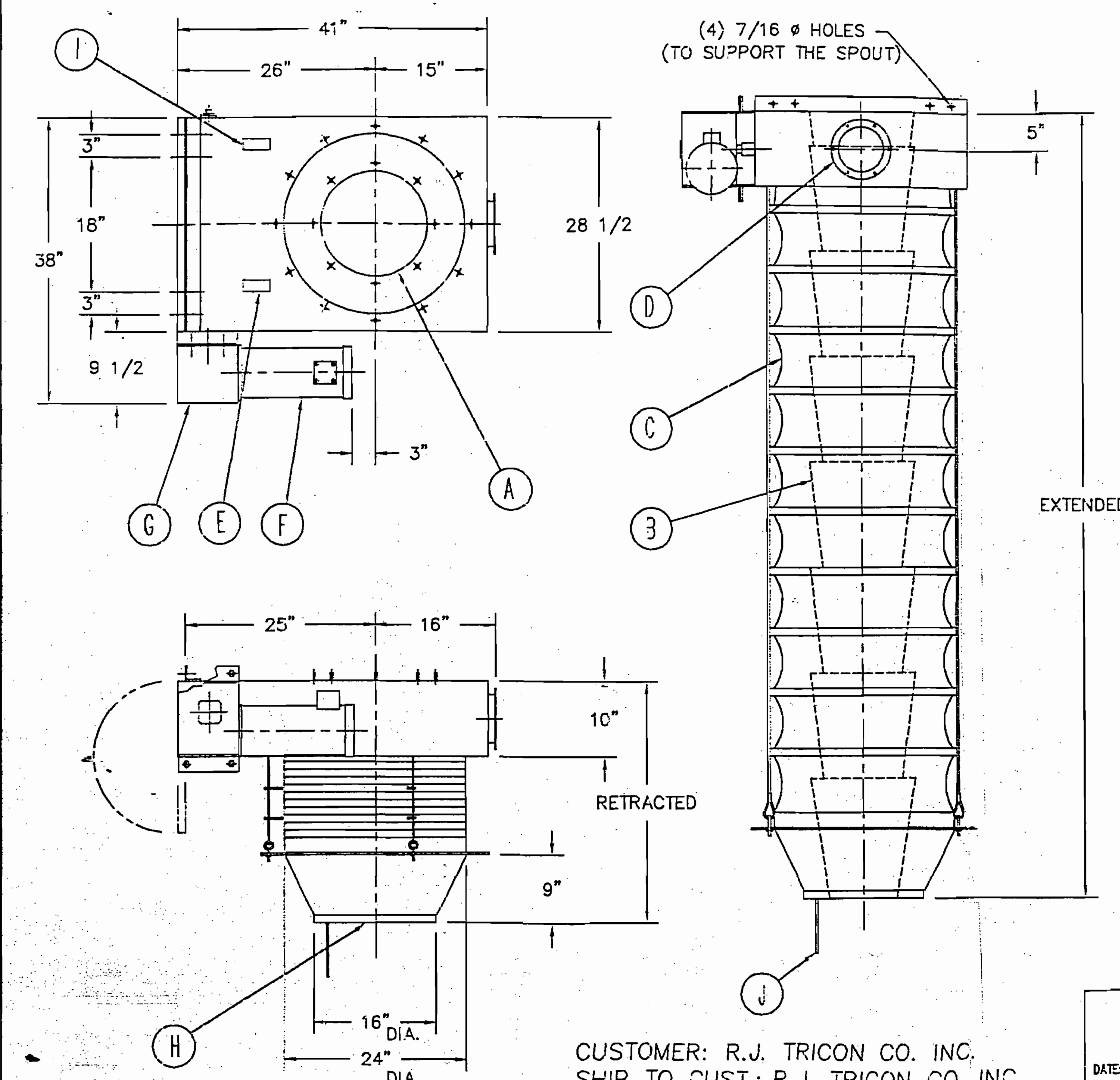
Telephone 0 33 / 25 82 10
Telex 215 139

DRAWING No: 6AA00125 | MAX. LOAD RATE: 80 TPH | PRODUCT: GRANULATED SUGAR | PRODUCT DENSITY: 50 PCF

/// REVISIONS ///

LTR.	DESCRIPTION	DATE	APVD



MODEL NO.: EV24-4 RET. HGT.: 2'-5" EXTD. HGT.: 6'-5"
SPOUT WEIGHT: 490#

A. PRODUCT INLET: DIA 14" BOLT PATTERN: (8) 3/8 DIA. BOLTS ON A 16" BC
TRANSITION: UPPER DIA: 14" LOWER DIA: 9" HGT: 10"
TOTAL HEIGHT: 10" MATERIAL: 304 S.S.

B. INNER CONES: UPPER DIA: 14" LOWER DIA: 9" HGT: 16"
NO.: 5 SPACING: 14" RET HGT: 29" MAT'L: 304 S.S.

C. OUTER SLEEVE: DIA: 24" OA LGTH: 62" NO. SECTIONS: 1
INNER RINGS: ALUM. OUTER RINGS: ALUM.
NO.: 7 RING SPACING: 8" FABRIC: URETHANE/NYLON 16OZ

D. DUST OUTLET: DIA: 6" BOLT SPACING: (6) 5/16" DIA HOLES ON 7 1/4" BC
MATERIAL: 304 S.S.

E. FULL UP LIMIT SWITCH NEMA 4

F. DRIVE MOTOR: HP: 1 RPM: 1800 VOLTAGE: 230/460
HZ.: 60 ENCL.: TEFC FRAME: 56C

G. GEAR REDUCER: TYPE: WORM RATIO: 60 TO 1

H. DISCHARGE OUTLET: DIA: 16" TYPE: ENCLOSED VEHICLE
MATERIAL: 304 S.S.

I. SLACK CABLE LIMIT SWITCH NEMA 4

J. PNEUMATIC LEVEL SENSOR NEMA 4 FOOD GRADE RATED
FUNCTION: PROVIDE INDICATION OF FULL VEHICLE

SPECIAL REQUIREMENTS: FOOD GRADE LEVEL SENSOR

FINISH: DCL STANDARD INDUSTRIAL ENAMEL (GRAY)

CUSTOMER: R.J. TRICON CO. INC.
SHIP TO CUST.: R.J. TRICON CO. INC.
P.O. No: E2652
JOB No: 95238
SERIAL No: EV24-6850/A-C (3 TOTAL)

MAILED FOR APPROVAL
DATE: 12-6-95

MAILED FOR CERTIFIED
DATE: 12-27-95

DETAIL	QNTY	DESCRIPTION	MATERIAL	WEIGHT

DCL
SPECIALISTS IN ADVANCED DESIGN LOADING SYSTEMS
P.O. BOX 125
CHARLEVOIX, MICHIGAN 49720
(616) 547-5600

TOLERANCES UNLESS OTHERWISE SPECIFIED
FRACTIONAL: 1/16" DECIMAL: .05 ANGULAR 1/2

DRAWN BY: JRR | SCALE: NONE
CHECKED BY: | DATE: 12-6-95

TITLE: BULK LOADING SPOUT FOR ENCLOSED
EV24-04-11144111X-BHJLZ

DRAWING No: 6AA00125

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