

**MC GRAPHICS, INC.  
AIR PERMIT  
O&M PLAN**

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M. C. Graphics Inc.  
Permit: 1030218.af.013

## DAILY TEMPERATURE LOG

WEEK OF: \_\_\_\_/\_\_\_\_/\_\_\_\_ TO \_\_\_\_/\_\_\_\_/\_\_\_\_

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

QUANTUM 4000 EMISSION UNIT 2		TEMPERATURE MIN. 550 DEGREES F MAX. 1,100 DEGREES F						
MACHINE	INLET							
	OUTLET							
CHART RECORDER	INLET							
	OUTLET							
DATE								
NAME								
ECOTHERM EMISSION UNIT 5		TEMPERATURE MIN. 1,400 DEGREES F						
COMBUSTION ZONE								
CHART RECORDER								
DATE								
NAME								

## QUANTUM 4000 MAINTENANCE LOG

Permit 1030218-011-AC, Emission Unit 002, Print Lines 2 and 3  
FOR OPERATIONAL PARAMETERS SEE MAINTENANCE PROCEDURES

MACHINE CONDITION: A – GOOD, B – FAIR, C – NEEDS ADJUSTMENT, D – NEEDS REPLACEMENT, E – NEEDS REPLACEMENT IMMEDIATELY

TASK	CONDITION	COMMENTS
<b>MONTHLY (640 hours)</b>		
Check air flow screens and ducting for debris (Section 4.3)		
Check for burned out indicator bulbs on control panel		
Check the burner linkage rod for the positions marked at initial start-up		
Check fan drive belts for correct alignment and belt tension (Section 4.4)		
Check for fan noise (Section 4.6)		
Check dampers for correct operation and linkage for tightness		
<b>SEMI-ANNUAL (3800 Hours)</b>		<b>June and December</b>
Check catalyst beds (Section 4.6)		
Check flame rod and spark igniter (Section 4.7)		
Inspect exterior of the oxidizer and the heat exchanger. Check for signs of hot spots or leakage (sapping). Consult TEC Systems if problem exists.		
Lubricate the exhaust fan motor bearings. Rotate shaft slowly while applying approximately 1 ounce of Mobilux SMC-32 or equivalent.		
<b>ANNUAL (7600 Hours)</b>		<b>December</b>
Check fan and motor shafts for end play, not to exceed .005 inch		_____ " observed end play.
Check all gaskets and seals. Replace if broken, brittle or leaking.		
Take catalyst samples for testing (Catalyst Sampling Procedures)		

## QUANTUM 4000 MAINTENANCE LOG 20\_\_\_\_

Permit 1030218-011-AC, Emission Unit 002, Print Lines 2 and 3

### REPAIR LOG

DATE	INT.	TYPE OF REPAIR	REASON FOR REPAIR

## Quantum 4000 spare parts

Burling temperature control model # 5130-J2-2-F-0004

Burling temperature control model # 5130-K1-2-F-0001

Dwyer differential pressure switch cat # C6452 1020

Honeywell pressure switch # C6452 1020

Omega thermocouple # NB1-1CSS-14U-12

Flame rod # 134005

Spark ignitor # 134021

50 LB drum catalyst material # 123050

Flame safeguard unit # 121548

[illegible]

NEEDED PARTS NOT ON PARTS LIST

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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## OXIDIZER GENERAL INFORMATION

The Quantum Catalytic Oxidizer is a pollution control device designed to eliminate most volatile organic compounds and solvent emissions. The oxidizer uses a natural gas-fired burner as the heat source.

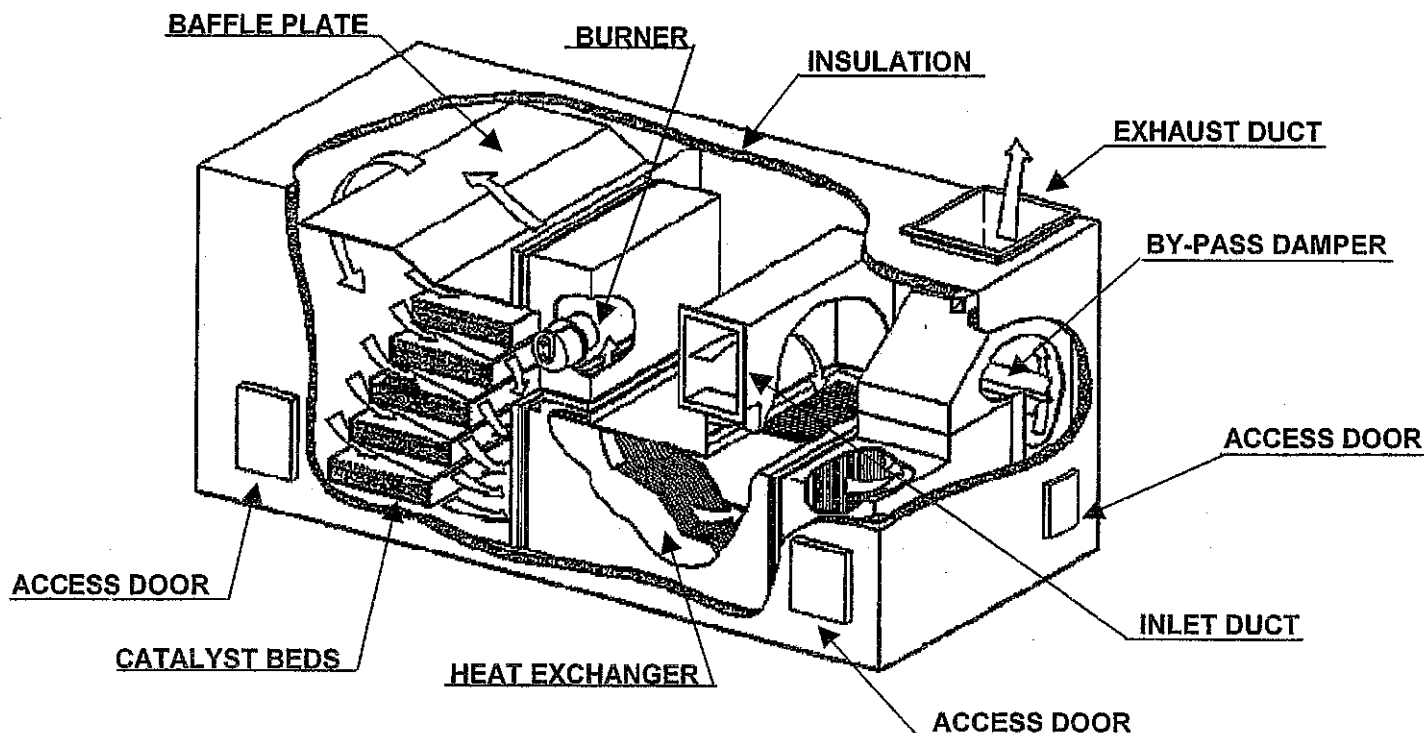
### GENERAL DATA

Manufacturer ----- TEC Systems  
Model --- Quantum 4000 Catalytic Oxidizer  
Job Number ----- 101710  
Date Of Install ----- 5/06/1992  
E.U. ID Number ----- 002  
Design Flow Rate ----- 4000 SCFM.  
Efficiency Rating At Design Flow ---- 95%  
Oxidation Catalyst ----- Grade 936

### SWITCHES AND TIMERS

Exhaust Fan Pressure switch ----- 1 in. WC.  
Combustion Blower Pressure Switch ----- 4 in. WC.  
Low Gas Pressure Switch ----- 15 in. WC.  
High Gas Pressure Switch ----- 1.2 PSI.  
Inlet High Temperature limit ----- 800 DEG. F.  
Outlet High Temperature Limit ----- 1100 DEG. F.  
Volume Photohelic ----- 3.0 / 3.6 in.  
Purge Timer ----- 1.5 min .  
Fan Off Delay Timer ----- 2 hrs.

1. The exhaust fan draws contaminated exhaust air from the process equipment and pushes the air through the oxidizer. A volume damper controls the volume of contaminated exhaust air.
2. The heat exchanger preheats the contaminated exhaust air by transferring heat from the treated air exiting the oxidizer.
3. The gas-fired heat source provides the heat to raise the temperature of the air to the required set point (approximately 650 degrees).
4. Oxidation of the volatiles in the exhaust air occurs in the catalyst beds. The beds are banked, split staged, and screened. The beds are designed so the heated contaminated exhaust air passes through approximately 7 inches of catalyst material.
5. The control system maintains airflows and temperatures in the oxidizer. This is accomplished with thermocouples, pressure sensors, switches, controllers, dampers, and heat source.

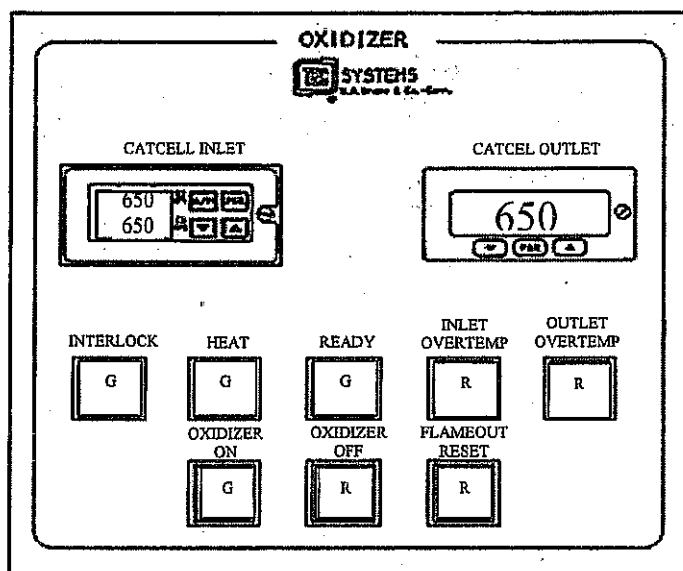




## OPERATOR CONTROLS

### CATCELL INLET Indicator and Selector

The CATCELL INLET indicator displays the inlet temperatures of the air stream in the catalyst chamber. The inlet sensor is located in the air stream before the catalyst beds. The controller must be preset for the operating air temperature of approximately 650 degrees Fahrenheit. The controller output controls the burner throttle and maintains the selected set point temperature.



### CATCELL OUTLET Monitor/Indicator

The CATCELL OUTLET monitor/indicator displays the outlet temperature of the air stream in the catalyst chamber. The outlet sensor is located in the air stream after the catalyst beds.

### INTERLOCKS Light

The green INTERLOCKS light indicates all safety interlocks are made after the purge cycle. After interlocks are made the heat source starts automatically. The light remains illuminated if all safety interlocks are maintained.

### HEAT Light

The green HEAT light indicates the heat source is ignited and the flame sensor detects flame. The light remains illuminated when the heat source is operating.

### READY Light

The green READY light indicates the ready temperature of approximately 550 degrees is reached and the oxidizer is ready to accept process exhaust.

### INLET OVERTEMP Light

The red INLET OVERTEMP light indicates the air temperature before the catalyst beds is above the maximum preset limit (approximately 800 degrees). This disables interlocks and shuts down the heat source. The green INTERLOCKS light goes out.

### OUTLET OVERTEMP Light

The red OUTLET OVERTEMP light indicates the air temperature after the catalyst beds is above the maximum preset limit (approximately 1100 degrees). This disables interlocks and shuts down the heat source. The green INTERLOCKS light goes out.

### OXIDIZER ON Push Button and Light

The OXIDIZER ON push button enables the start relay to begin the starting sequence. The light on the push button illuminates when the exhaust fan proof of flow switch closes. The light remains illuminated during normal operation.

### OXIDIZER OFF Push Button and Light

The OXIDIZER OFF push button shuts down the oxidizer. To shut down the oxidizer, press the OXIDIZER OFF push button. The red light on the push button illuminates when the exhaust fan proof of flow switch opens.

## Checking For Debris

1. Shut off and lockout the electrical power.
2. Inspect the fresh air inlet screen, process equipment screens, and filters. Clean with vacuum cleaner.
3. Inspect the interior of the oxidizer through access doors. Remove any debris with a vacuum cleaner.
4. Inspect and replace door gaskets if necessary.
5. Inspect interior for cracks
6. Close all access doors then restore electrical power.

## Drive Belt Alignment and Tension

1. Shut off and lockout the oxidizer electrical power.
2. Remove the fan belt drive guard.
3. Check the drive belt sheave alignment. The sheaves must be at right angles to the drive shaft with the faces in line.
4. Inspect the drive belts for wear.
5. If new belts are necessary, replace belts in sets.
6. The belts must be tensioned as shown

## Fan Adjustments and Maintenance

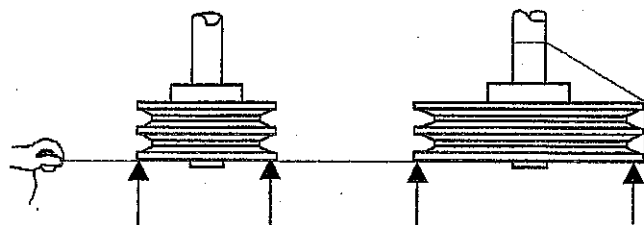
### Exhaust Fan

1. Inspect the drive shafts for wear, end play (not to exceed .005 inch) or component interference.
2. Tension the belts using the adjusting bolts along the underside of the motor mounting base. Fan and motor shafts must be parallel to provide even tension.
3. Lubricate fan motor and shaft bearings by rotating the shaft slowly and applying Mobil Polyrex EM grease. Take care not to over grease bearings as this can damage bearing seals
4. Re-install guards before operating.

### Combustion Blower

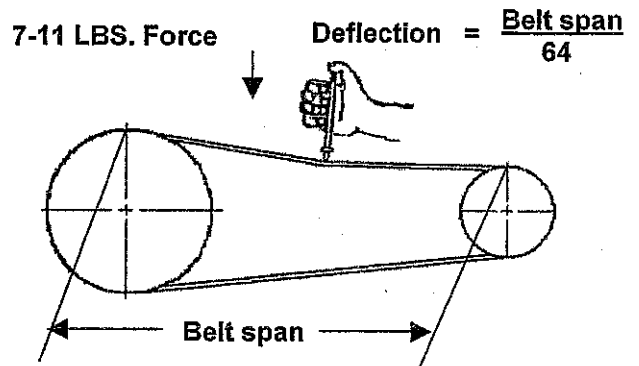
1. Check the tightness of mounting bolts.
2. Lubricate fan and motor bearings with Mobil Polyrex EM. Take care not to over grease bearings as this can damage bearing seals.

### Drive Belt Alignment



**CORD TOUCHING SHEAVES AT  
POINTS INDICATED BY ARROWS.**

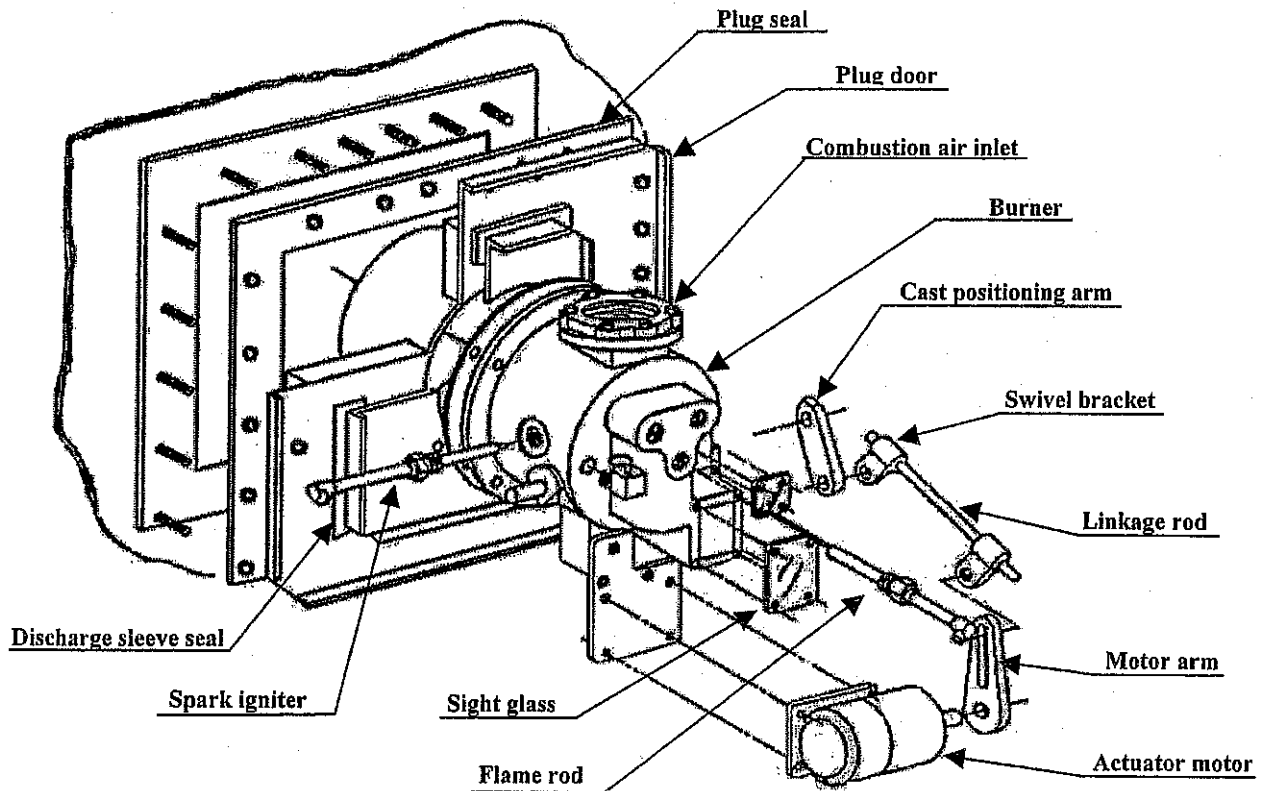
### Drive Belt Tension



## Burner

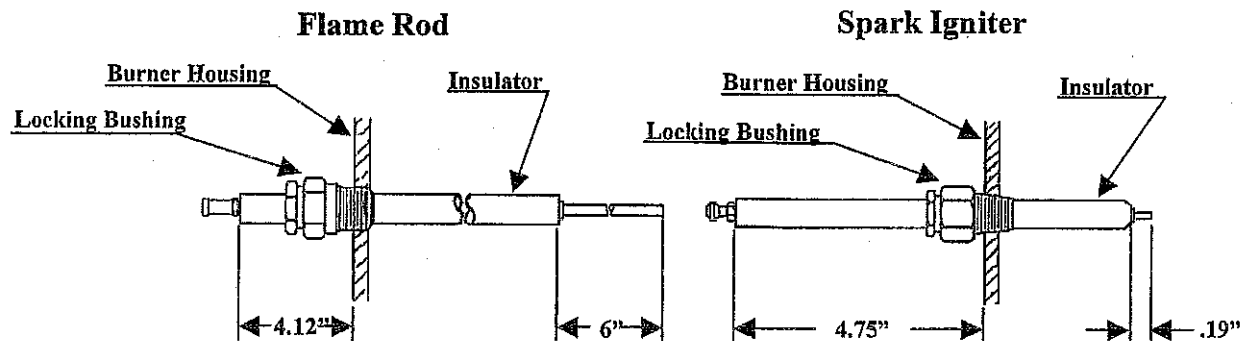
Inspect the burner throttle linkage to ensure that all jam nuts and linkage connecting rods are tight. Loose linkage causes loss of burner control.

### Burner Component Location

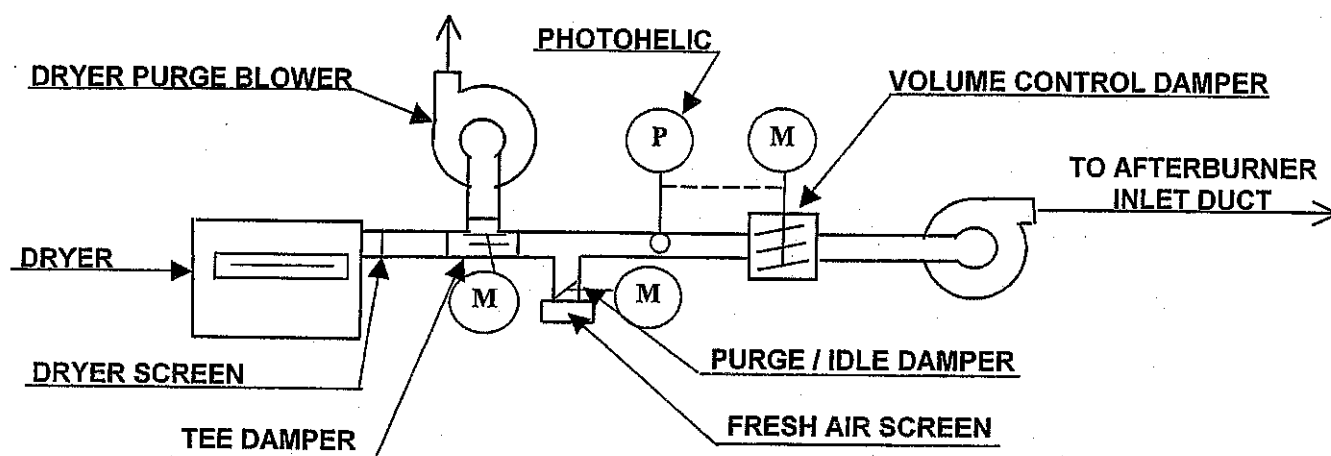


### Flame Rod and Spark Igniter

1. Turn off electrical power to flame rod and spark igniter during inspection.
2. Remove the electrical connector. Unscrew the locking bushing at the base of the connector then remove the flame rod or spark igniter.
3. Measure the flame rod and compare the length with the dimensions below. The flame rod is considered damaged if less than the recommended length.
4. The flame rod or spark igniter should be replaced if it is bent, burned, or have cracked porcelain. A coated rod that is not damaged can be cleaned with a wire brush and re-used.
5. Install flame rod or spark igniter and adjust to the recommended depth.



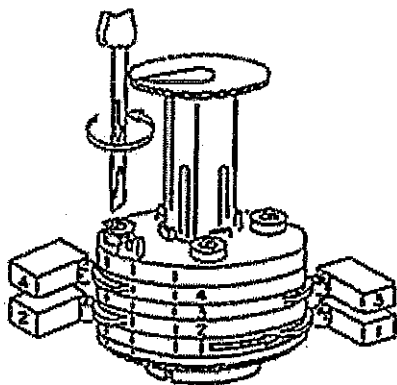
## DAMPERS



### TRAVEL LIMIT SWITCH ADJUSTMENT (IF REQUIRED)

Description - Each travel limit switch is individually operated and adjusted by a cam within the cam block assembly. The cam block is supplied with four (4) color-coded cams and requires no disassembly for adjustment.

1. Manually operate the actuator into the position requiring adjustment.
2. locate proper cam(s) by color or number code for the switch to be adjusted.
3. Place screwdriver in slot of correct color or number coded adjustment button. Lightly depress adjustment button with screwdriver to engage cam.
4. Turn screwdriver to rotate cam until limit switch is tripped.  
NOTE: Clockwise rotation of screwdriver will rotate cam clockwise.
5. Remove screwdriver and ensure that the adjustment button has returned to its original position, thus locking cam in position.



CAM NUMBER	COLOR CODE	DESCRIPTION
4	GRAY	AUX. CIRCUIT
3	BLUE TAN	AUX. CIRCUIT
2	BLACK	TRAVEL LIMIT
1	WHITE	TRAVEL LIMIT

### TEE DAMPER

Cam switch 3 opens when damper full closed to oxidizer

Cam switch 4 opens when damper 75% open to oxidizer

### PURGE / IDLE DAMPER

Cam switch 3

Cam switch 4

### VOLUME DAMPER

Cam switch 3 not used

Cam switch 4 not used

### HOT AIR BY-PASS DAMPER

Cam switch 3

Cam switch 4

## Checking Catalyst Beds

Most of the settling of the split stage catalyst bed occurs in the first three months of operation. For best results the catalyst level must be up to the top of each stage.

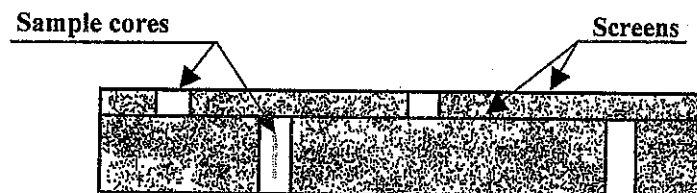
1. Shut off and lockout electrical power.
2. Remove access door.
3. Inspect the catalyst beds for settling of catalyst material in each stage of the beds.
  - a. Check for cracks in expansion joints, catalyst leakage through screens, and catalyst dust build up downstream from the beads.
  - b. Check that the perforated top plates are in place on each bed.
  - c. Look for smaller than normal, pure white beads. These beads have their active metals rubbed away and are no longer functional. Refill beds that contain over 50 percent of these beads.
  - d. Top-off any beds that are not full.
4. Every year, remove sample cores from the middle bed. A sample consists of a short core from the top two inches of the bed and a long core from the bottom five inches of the bed.
5. Install access doors and restore electrical power.

## Catalyst Sampling Procedures

The sample cores are located in the middle tray. A sample consists of a short core from the top bed and a long core from the bottom bed. It may be necessary to remove the top bed to gain access to the bottom test cores.

Take care to replace the remaining top test cores with the proper side up.

When the sample cores are removed, the top of each core should be marked as TOP.



## Getting an Analysis

*When sending a catalyst sample from a pollution control unit to MEGTEC Systems for analysis it is very important to include the following information.*

1. Testing requires a purchase order, purchase order number, or other written payment authorization from the customer. In general, we cannot enter the sample into the system until some means of payment is established. A typical catalyst test includes an activity test, a surface area analysis and a PIXE scan.
  2. Name, address, and phone number of who to contact with results of the analysis.
  3. MEGTEC Systems job number of the pollution control unit sampled and date of installation.  
JOB NUMBER 101710      INSTALLED 5/06/1992
  4. Date of installation of the catalyst into the unit (month and year). Dates of any previous catalyst sampling and any topping-off of beds.
  5. Reason for the sample to be analyzed. Such as routine maintenance, smoke, odor problems, etc.
- Catalyst samples and their support documentation should then be sent to:

MEGTEC Systems  
Pollution Abatement Laboratory  
830 Prosper Road P.O. Box 5030  
DePere, WI 54115-50300

## 4.1 Introduction

This section provides a guide for the weekly, monthly, semi-annual, and annual maintenance of the oxidizer. For operation and maintenance of vendor equipment, refer to information in Section VIII - Vendor Data.

## 4.2 Maintenance Check list

### WARNING

Personnel must know the oxidizer is being serviced. Refer to Section 1.5 for information on tagging equipment that is being serviced.

#### Weekly Checks (160 Hours)

1. Check air flow screens and ducting for debris. (Refer to Section 4.3.)
2. Check for burned out indicator bulbs on control panel.

#### Monthly Checks (640 Hours)

1. Check the burner linkage rod for the positions marked at initial start-up.
2. Check exhaust fan drive belts for correct alignment and belt tension. (Refer to Section 4.4.)
3. Check for fan noise. (Refer to Section 4.6.)
4. Check dampers for correct operation and linkage for tightness.

#### Semi-Annual Checks (3800 Hours)

1. Check the catalyst beds. (Refer to Section 4.6.)
2. Check the flame rod and spark ignitor. (Refer to Section 4.7.)
3. Inspect the exterior of the oxidizer and the heat exchanger. Check for signs of hot spots or leakage (sapping). Consult TEC Systems if such a problem exists.

4. Lubricate the exhaust fan motor bearings. Rotate shaft slowly while applying approximately 1 ounce of Mobilux SMC-32 or Shell Alvania #2.

#### Annual Checks (7600 Hours)

1. Check fan and motor shafts for end play, not to exceed .005 inch.
2. Check all gaskets and seals. Replace if broken, brittle, or leaking.

**IMPORTANT:** *The oxidizer must be inspected annually for excessive temperature damage. TEC Systems recommends a maintenance check by a TEC Systems service technician. For information, contact TEC Systems Service Department during normal working hours.*

## 4.3 Checking For Debris

Personnel must know the oxidizer is being serviced.

### CAUTION

Perform this procedure after the oxidizer has cooled.

1. Shut off and lockout the electrical power.
2. Inspect the fresh air inlet screen, combustion blower screen (if equipped), process equipment screens, and filters. Clean with vacuum cleaner.
3. Inspect the interior of the oxidizer through access doors. Remove any debris with a vacuum cleaner.
4. Inspect and replace door gasketing if necessary.
5. Inspect interior for cracks.
6. Close all access doors, then restore electrical power.

## 4.4 Drive Belt Alignment and Tension

Personnel must know the oxidizer is being serviced. Refer to Section 1.5 for information on tagging equipment that is being serviced.

## 4-2 Section IV - Maintenance

1. Shut off and lockout the oxidizer electrical power.
2. Remove the fan belt drive guard.
3. Check the drive belt sheave alignment. The sheaves must be at right angles to the drive shaft with the faces in line as shown in Figure 4-1.
4. Inspect the drive belts for wear.
5. If new belts are necessary, replace belts in sets.
6. The belts must be tensioned as shown in Figure 4-2.

**IMPORTANT:** Fan belts must be re-tensioned after 60 hours of initial operation.

### 4.5 Fan Adjustments and Maintenance

This section describes the maintenance required for the exhaust and combustion blower fans.

#### Exhaust Fan

1. Inspect the drive shafts for wear, end play (not to exceed .005 inch) or component interference.

2. Tension the belts using the adjusting bolts along the underside of the motor mounting base. Fan and motor shafts must be parallel to provide even tension.
3. Lubricate fan motor and shaft bearings by rotating the shaft slowly and applying grease. Take care not to overgrease bearings as this can damage bearing seals.
4. Re-install guards before operating.

#### Combustion Blower

1. Check the tightness of mounting bolts.
2. Lubricate fan and motor bearings as specified by the fan manufacturer. Take care not to overgrease bearings as this can damage bearing seals.

### 4.6 Checking Catalyst Beds

Some settling of the catalyst beds occurs in the first six months of operation. The catalyst level must be up to the appropriate level of each bed. Check the catalyst beds after the first six months of operation, then once a year thereafter.

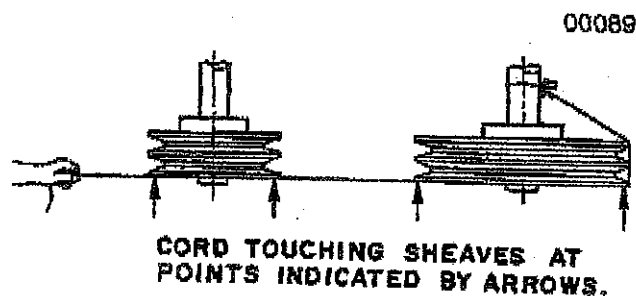


Figure 4-1. Drive Belt Alignment

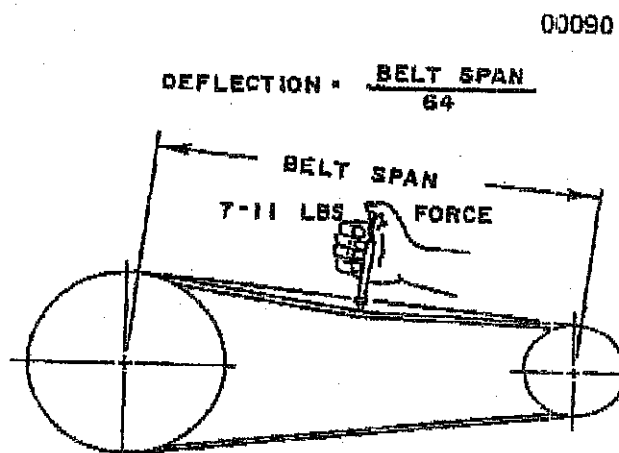


Figure 4-2. Drive Belt Tension

## Section IV - Maintenance

4-3

1. Shut off and lockout electrical power.

### CAUTION

This procedure is to be performed after the oxidizer has cooled.

00111

2. Remove access door.
3. Inspect the catalyst beds for settling of catalyst material in each stage of the beds.
  - a. Check for cracks in expansion joints, catalyst leakage through screens, and catalyst dust build up downstream from the beds.
  - b. Check that the perforated top plates are in place on each bed.
  - c. Look for smaller than normal, pure white beads. These beads have their active metals rubbed away and are no longer functional. Refill beds that contain over 50 percent of these beads.
  - d. Top-off any beds that are not full.
4. Once a year, remove sample cores from the test bed. (Refer to Figure 4-3.) A sample consists of a short core from the top two inches of the bed and a long core from the bottom five inches of the bed.
5. For information on sample core analysis contact TEC Systems, W.R. Grace & Co.-Conn, Pollution Abatement Laboratory, 830 Prosper Road/P.O. Box 30, DePere, WI 54115-0030.

00121

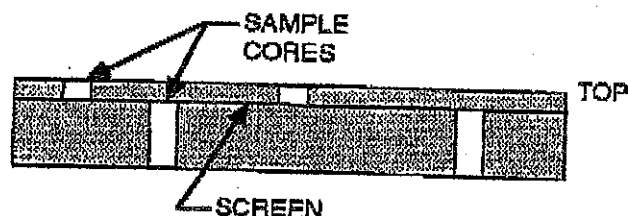


Figure 4-3. Catalyst Sample Cores

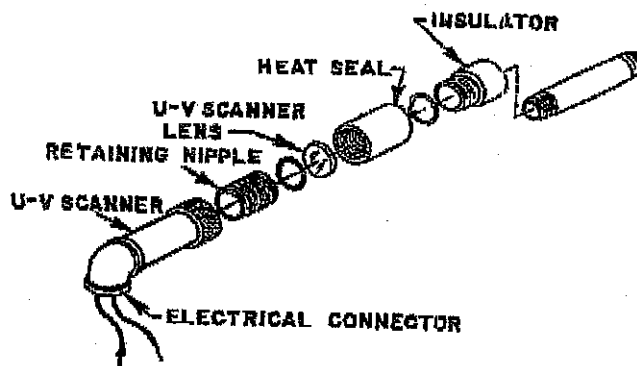


Figure 4-4. Ultraviolet Flame Scanner

6. Install access doors and restore electrical power.

### 4.7 Burner, Ultraviolet Scanner, Flame Rod, and Spark Ignitor Maintenance

Adjustments should be made by qualified technicians only. Contact TEC Systems service department, as required.

#### Ultraviolet Scanner (Optional)

1. Loosen the knurled mounting ring to disconnect the scanner from the heat seal. Loosen the heat seal from the insulator to expose the ultraviolet scanner head and the heat seal lens. (Refer to Figure 4-4).
2. Check the condition of the two "o" ring seals on either side of the heat seal lens and replace as required.
3. Blow off any loose particles with clean air.
4. Gently brush the remaining particles with a soft cloth or camel hair brush.
5. Clean the lens with water and soft cloth or lens paper.
6. Finger prints, grease or solvent buildups may be cleaned with Acetone, denatured alcohol, ethanol, hexane or photographic lens cleaner.





## ECOTHERM MAINTENANCE LOG

Permit 1030218-011-AC, Emission Unit 005, Print Line 4

FOR OPERATIONAL PARAMETERS SEE MAINTENANCE PROCEDURES

MACHINE CONDITION: A – GOOD, B – FAIR, C – NEEDS ADJUSTMENT, D – NEEDS REPLACEMENT, E – NEEDS REPLACEMENT IMMEDIATELY

TASK	CONDITION	COMMENTS
<b>MONTHLY</b>		
Clean the fan mesh (Page 2)		
Check that the dryer screen on the console or in the switch cabinet is still legible (Page 2)		
Clean the operator screen (page 2)		
Clean the dust filter in the switch cabinet (Page 3)		
Drain the pneumatic system and check the compressed air system is = 87 psi (Page 3)		____ psi
Check the bearings (Page 3)		
Check the UV cell. The lamp is OK if the green lamp is lit on A2218 for the upper cell and A2231 for the lower cell. Replace if needed. (Page 4)		
Check gas safety valves for leakage (Pages 5-6)		
Clean gas filters (Page 6)		
Check V-belts and tighten as needed. (Page 7)		
<b>QUARTERLY</b>		<b>March, June, September and December</b>
Clean the airbars (Page 8)		
<b>SEMI-ANNUAL</b>		<b>June and December</b>
Clean the spark plugs (Page 9)		
<b>ANNUAL</b>		<b>December</b>
Clean the operator screen (Page 2)		
Replace UV lamp (Page 4)		
Check IR camera (Page 10)		
Clean the electric motor (Page 11)		
Check the thermocouples (Page 12)		
Check the burners (Page 13)		
Replace V belts (Page 7)		

## ECOTHERM MAINTENANCE LOG 20\_\_\_\_

Permit 1030218-011-AC, Emission Unit 005, Print Line 4

### REPAIR LOG

DATE	INIT.	TYPE OF REPAIR	REASON FOR REPAIR

Spark plug Part #wh919129, quantity 4

[illegible]

NEEDED PARTS NOT ON PARTS LIST

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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PART DESCRIPTION

PART # IF KNOWN

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## GENERAL DATA

Manufacturer ----- Goss, Contiweb  
 Model ----- Ecotherm  
 Model Number ----- 121-1020  
 Machine Number ----- ECC10067  
 Type ----- EC02 Thermal Oxidizer  
 Date Of Install ----- 9/24/2004  
 E.U. ID Number ----- 005  
 Design Flow Rate ----- 3,300 SCFM  
 Efficiency Rating At design Flow ----- 95%

## SWITCHES

Section 1 Pressure Switch ----- 1.1 MBAR  
 Section 2 Pressure Switch ----- 1.8 MBAR  
 Section 3 Pressure Switch ----- 1.8 MBAR  
 Section 4 Pressure Switch ----- 2.3 MBAR  
 High Temperature Limit Switch --- 1526 DEG. F.  
 Low Temperature Limit Switch --- 1292 DEG. F.  
 Shut Down Timer ----- 10 MIN.

## PROCESS DESCRIPTION AND CONTROLS

### Monitoring the process

The processes and functions in the dryer are monitored by the following control elements:

The UV cell (UV) detects the flame.

The pressure switch (PS) monitors the pressure on the burner, (Standby pressure, Production pressure and Blanket wash pressure).

The pressure switch (PS) monitors the air pressure behind the burner air fan.

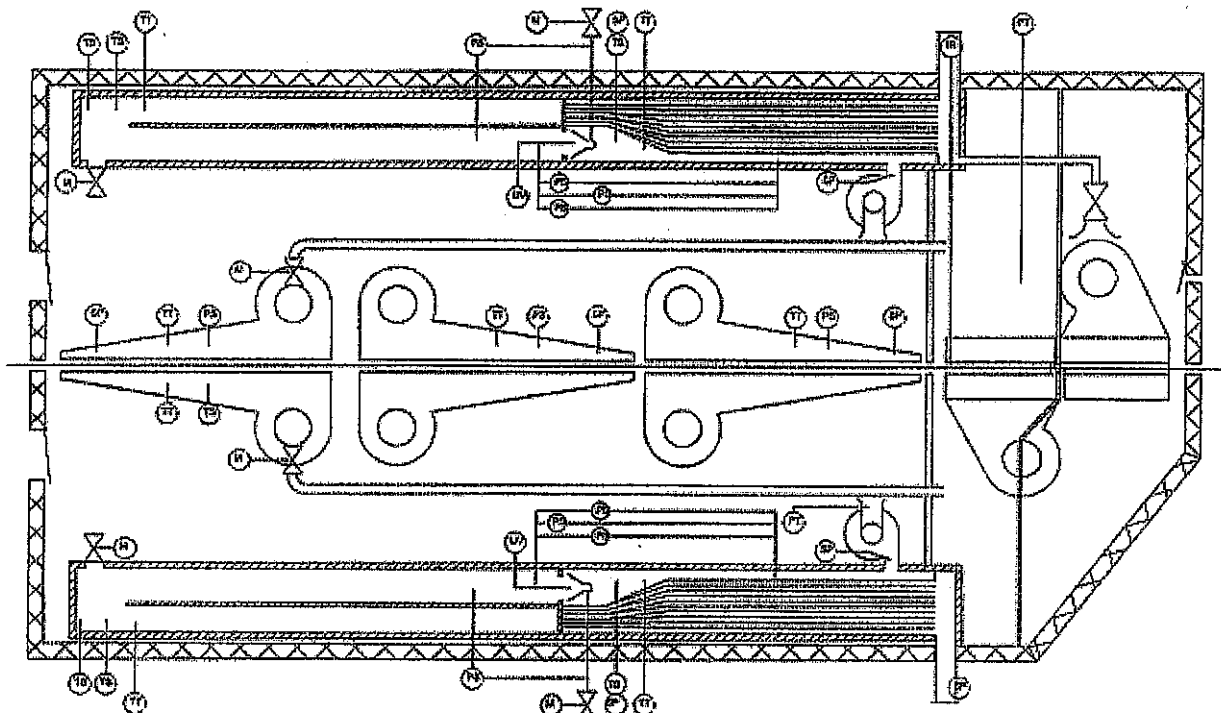
The pressure transmitter (PT) measures the air pressure in the burner fan.

The temperature switch (TS) monitors the maximum temperature (830°C) (1526°F) in the burner chambers and the minimum temperature during production.

The temperature transmitter (TT) measures the temperature in both burner chambers, in section 1 at the top and the bottom, and in all other drying sections only at the top.

The sampling point (SP) is used for incidental measurement of the pressure or the ppm's during blanket wash.

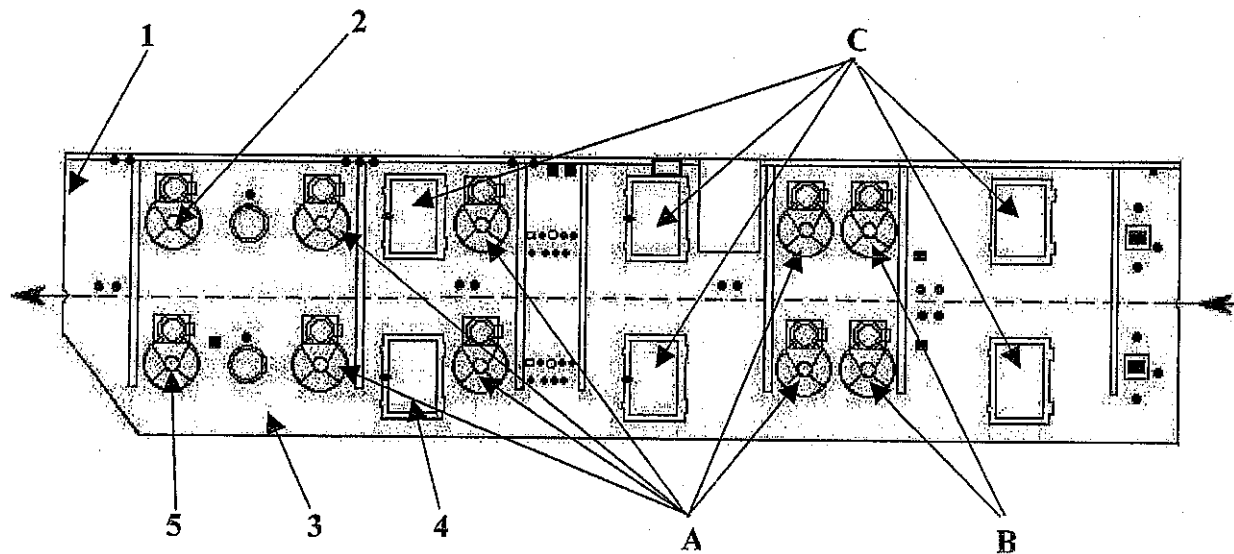
The infrared temperature sensor (IR) measures the web temperature.



## Cleaning the fan mesh

*Check that nobody is inside the dryer before closing the inspection doors. The inspection doors cannot be opened from the inside.*

1. Remove the grille from the air intake on the chill roller stand.
2. Clean the grille mesh of the upper circulation fan in the chill roller stand.
3. Remove the lower plating from the chill roller stand on the work side. Pull the lower plating towards you until it has clicked loose on two sides. Then lift the plating to remove it.
4. Remove the inspection door.
5. Clean the grille mesh of the lower circulation fan in the chill roller stand.
6. Assemble the manhole and the plating.
7. Clean the grille mesh of the other circulation fans A and burner fans B  
They are accessible through the upper and lower inspection doors C (gear side).
8. Close the inspection doors and fit the plating.



## Checking the operator screen

1. Check that the dryer screen on the console or in the switch cabinet is still legible.

## Cleaning the operator screen

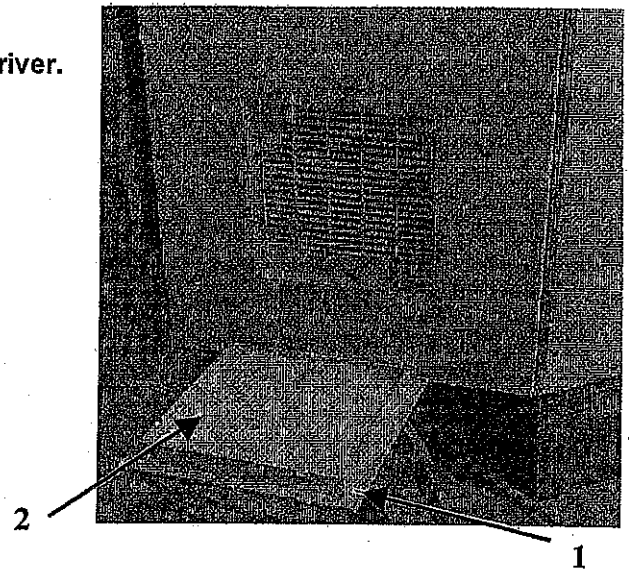
1. Remove the dryer screen from the console.
2. Clean the screen and the bottom of the Plexiglas guard using a clean rag and a detergent (Ammonia based glass cleaner, Isopropyl alcohol).

*Note: Do not use any thinner, organic solvents or detergents with a high acid content to clean the screen.*

3. Clean the switch cabinet screen using a clean rag and a detergent.

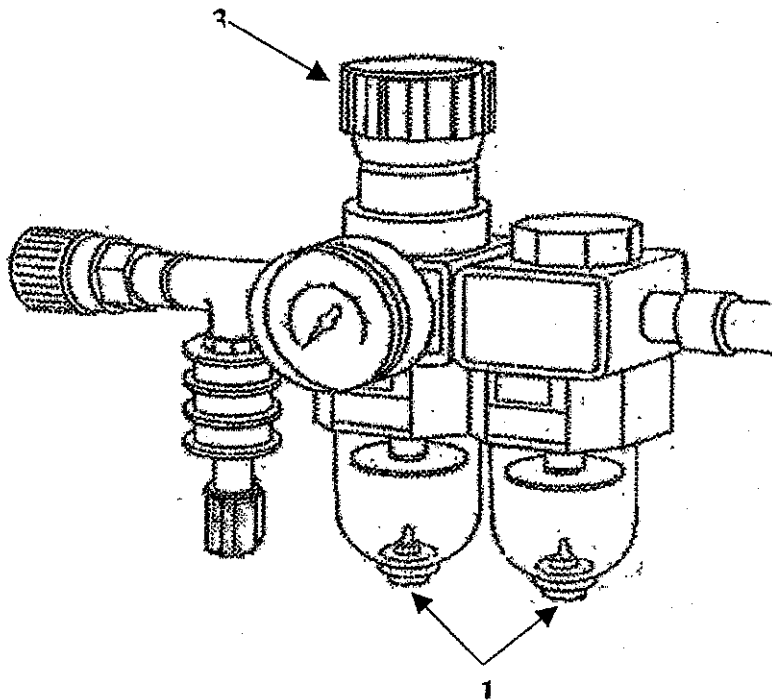
### **Cleaning the dust filter(s) in the switch cabinet**

1. Pry the plastic grille loose at the corners using a screwdriver.
  2. Remove the dust filter.
  3. Remove the dust using a vacuum cleaner or tap it on it.
- Note: Replace the dust filter if it is beyond cleaning.*
4. Reinstall the dust filter and the grille.



### **Draining the pneumatic system and checking the compressed air pressure**

1. Hold a cup under the reservoir of the pneumatic system and undo the black screw.
2. Tighten the screw when the reservoir is empty.
3. Check the main pressure IPR and adjust it if necessary (should be 6 bar / 87 psi.).



### **Checking the bearings**

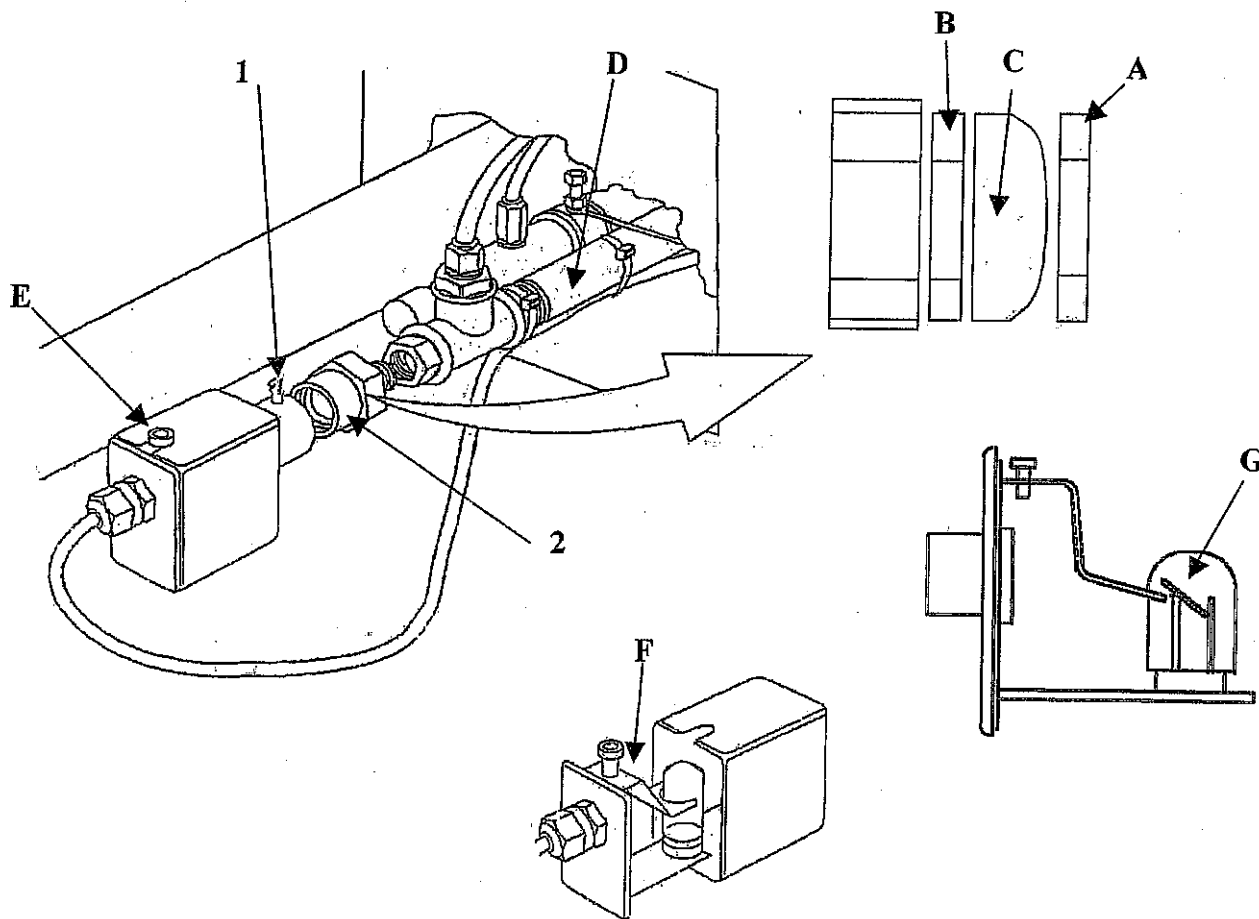
1. Rotate motor shafts by hand check the bearings for wear, end play, excessive vibration.
2. Replace any worn bearings.

## Checking the UV cell

1. Loosen the screw two turns and remove the UV cell from the holder.
2. Disassemble the inner ring using Seeger ring tongs. Remove the first sealing ring A, the lens and the second sealing ring B.
3. Clean the lens C using a clean, soft and dry rag, (remove any grease with denatured alcohol, i.e. ethanol).
4. Clean the inside of the tube D with a pipe cleaner and blow it clean with high-pressure air.
5. Assemble in reversed order of disassembly.

*Note: Make sure that the lens is straight.*

6. Switch on the dryer. Hold a flame in front of the UV cell. The lamp is OK if the green lamp is lit on A2218 for the upper cell (A2231 lower cell).
7. The UV lamp must be replaced if the green LED fails to light.



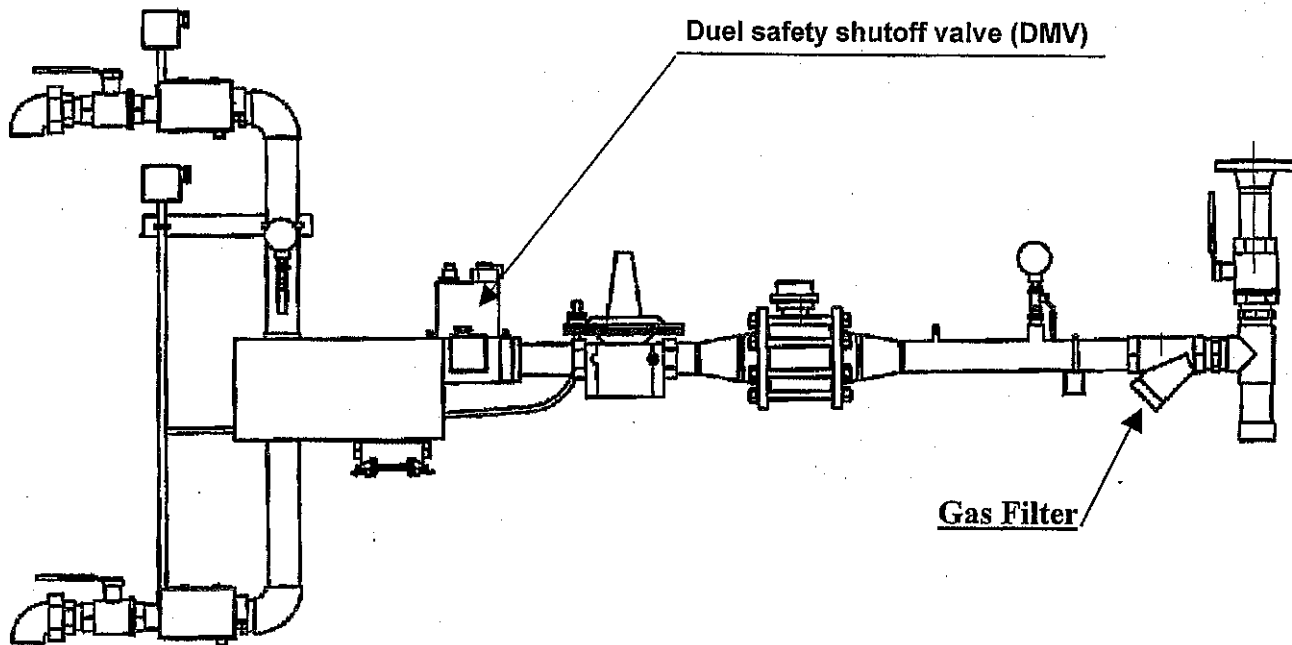
## Replacing the UV lamp

*When replacing the UV lamp you must not touch the new lamp with your bare fingers.*

1. Loosen screw E one turn and take the UV cell from the housing.
2. Pull the UV lamp out of its holder F.
3. Place the UV lamp in the correct position in the holder G.
4. Install the unit in the housing and tighten screw E.
5. Check the UV cell.



## Gas safety valves



### Valve leakage test

This test checks the sealing capabilities of the DMV automatic shutoff valves. This test requires test nipples installed in the downstream accessory port of both automatic shutoff valves to make the required hose connection. (Port 2 and 3)

- 1) Externally leak test the valve. DUNGS recommends using an all purpose liquid leak detector solution (Snoop™ or a soapy water solution). Apply the liquid leak detector solution to the areas indicated below. The presence of bubbles indicates a leak. Be sure to test any accessories mounted to the Valve.
- 2) De-energize valve # 1 and #2.
- 3) Close the upstream manual ball valve, and close the downstream manual ball valve.
- 4) Be sure that both test nipples are properly installed in port 2 and 3 and are leak tight.
- 5) Fill a glass of water at least 1 inch from the bottom. Connect a 1/4" flexible hose to a rigid tube. The rigid tube shall be 1/4 in. diameter and have a 45° cut at the end that is not connected to the flexible hose. The rigid tube can be made from either aluminum, copper or plastic.
- 6) Using a screwdriver, slowly open the Vi test nipple (port 2) by turning it counter clockwise to depressurize the volume between the two valves.
- 7) Connect the 1/4" flexible hose to test nipple.
- 8) Open the upstream manual ball valve.
- 9) Immerse the 1/4 in. tube vertically 1/2 in. (12.7 mm) into the glass of water.
- 10) If bubbles emerge from the rigid tube, let the rate stabilize and count the number of bubbles appearing during a 10 second period. (See chart below for leakage rates.)
- 11) Repeat the same procedure for valve V2 (port 3), except that valve #1 needs to be opened at step 7 above. (Energize only terminal 2 on the DIN connector).

After completing the above tests:

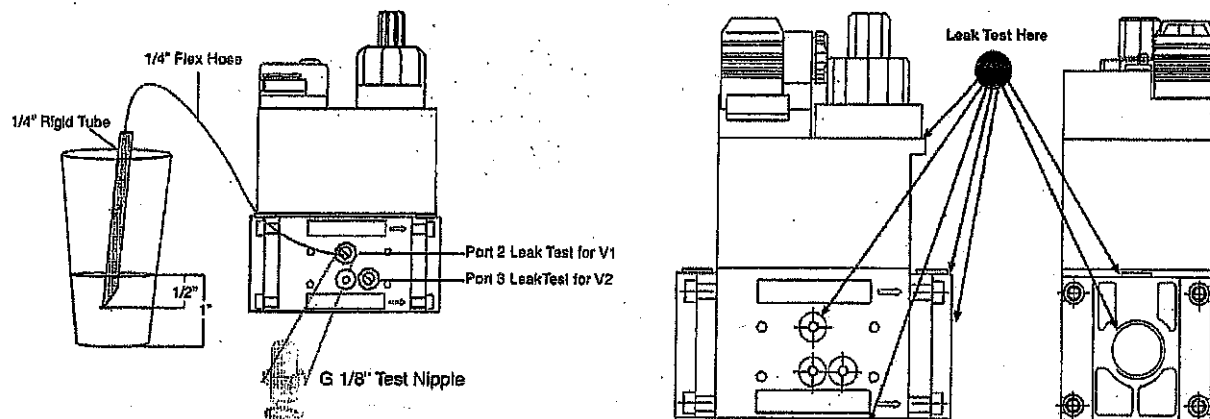
(procedure continues on next page)

- 12) Close the upstream and downstream manual ball valves. De-energize the safety shutoff valves.
- 13) Remove the flexible hose, and close the test nipples.
- 14) Open the upstream manual ball valve, and energize both valves.
- 15) Use soapy water to leak test all test nipples to ensure that there are no leaks.
- 16) De-energize the safety shutoff valves.
- 17) Open the downstream manual ball valve.

Model	Allowable Valve Seat Leakage*	# of Bubbles in 10.sec		
		AIR	Natural Gas	LP
DMV D(LE) 701/6 (507/11)	264 cc/hr	5	6	4
DMV D(LE) 702/6 (512/11)	494 cc/hr	9	11	7
DMV D(LE) 703/6 (520/11)	494 cc/hr	9	11.	7

\*Based on air, and test conditions per UL 429 Section 29. (Air or inert gas at a pressure of 1/4 psig and also at a pressure of one and one-half times maximum operating pressure differential, but not less than 1/2 psig. This test shall be applied with the valve installed in its intended position.) Volume of bubble defined in Table 2 of FCI70-2-1998.

**WARNING: If leakage values are exceeded replace valve immediately.**



## GAS FILTER

### Storage

1. Strainers are thoroughly cleaned to remove fluids, rust and other foreign materials after testing and before shipping.
2. Plastic covers are pressed firmly in both ends to keep the strainers clean.  
*Do not remove plastic covers until ready to install.*
3. Strainers should be stored in a suitably sheltered place to prevent contamination by weather, dirt, or dampness.

### Cleaning

- a. screw out the drain plug located on the top of the cover
- b. drain the liquid
- c. screw out the bolts and for the nuts of the cover
- d. remove the cover
- e. take out the screen
- f. clean the screen
- g. for re-assembly : repeat the operations in the opposite.

*Care should be taken that the screen is in the correct position and centered in the cover.*

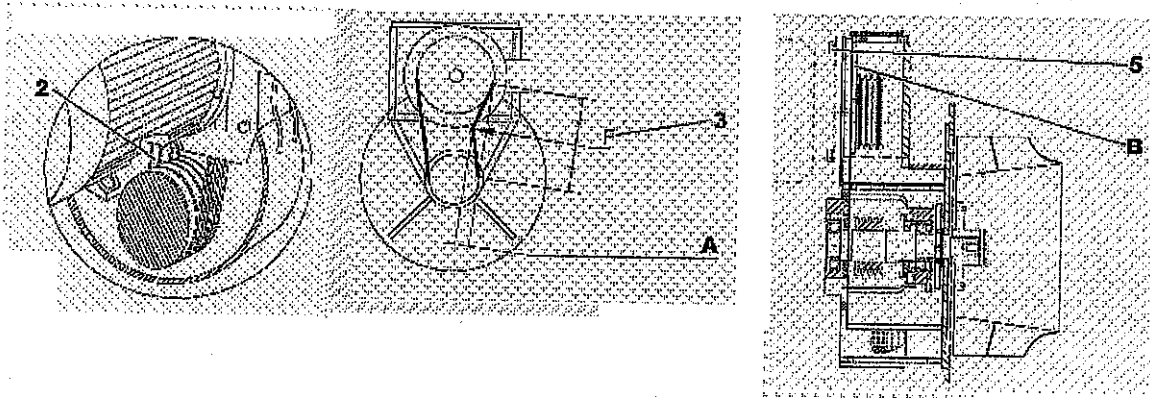
## Checking and tightening the V-belts

1. Remove the cover.
2. Check that the V-belts are not damaged. Replace all V -belts if damage is found on one or several V -belts.
3. Measure the tension  $F$  of all V -belts.
4. Retighten the V -belts if the calculated average force is less than 35 N (8 lbf.).

*Note: Replace al V-belts if the mutual difference is more than 5 N (1 lbf.).*

5. Loosen the screws of the electric motor until it can be moved.
6. Tighten the setscrews B in turns and equally. Measure the tension on one V-belt while tightening and tighten until F-retighten (new: F-new) has been reached.  
Tighten the screws of the electric motor and carry out point 3.
7. Assemble the cover and switch on the dryer.

F-retighten	F-new
Tension $F = 40 \text{ N (9 lbf)}$	Tension $F = 45 \text{ N (10 lbf)}$
Depression $A = 6 \text{ mm (0.24 in.)}$	Depression $A = 6 \text{ mm (0.24 in.)}$



## Replacing the V-belts

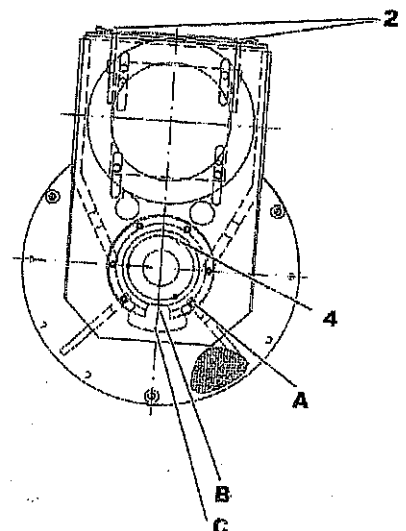
1. Loosen the screws of the electric motor until it can be moved.
2. Loosen the set screws one by one and by the same number of turns.
3. Repeat this until the V -belts have sufficient play. Remove the V-belts from the electric motor.
4. Loosen the screws three turns.

*Note: Only loosen the screws. Do not remove them!*

5. Remove the screws of ring A.
6. Feed half the V-belt through the notches.
7. Hold one part of the V-belt in the upper notch B and hold the other part of the V-belt in the lower notch C.
8. Turn ring A 360°.
9. Repeat points 6 up to and including 8 for all V-belts.

*Note: Use the same procedure to fit the V-belts.*

- 10 Fit the screws of ring A.
- 11 Install the new V-belts.
- 12 Tighten the V-belts.
- 13 Check the tensions  $F$  after 24 machine hours.



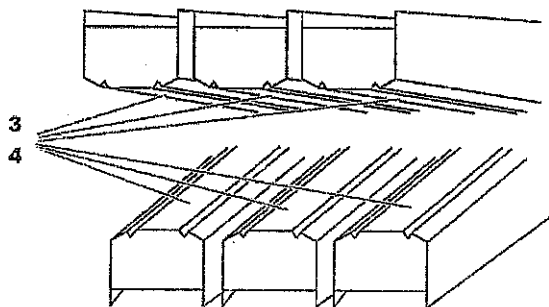
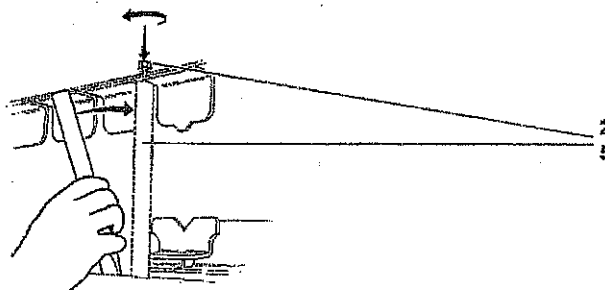
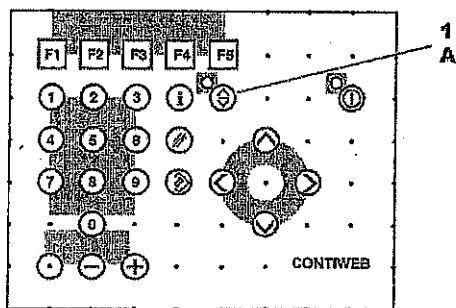
## Cleaning the airbars

*Mark the correct location before disassembling an airbar. The airbars are not all identical. Leave at least the first, central and last airbars at the bottom of every section. The airbar manifold is connected to them.*

1. Open the door by pushing button A on the control panel.
2. Lock the door. Move every pipe up (one per cooling section) and screw the screw into the open end of the pipe.
3. Remove any shreds of paper and other dirt from the top surface of the airbars in all sections.
4. Inspect the air nozzles. Clean the air nozzles with the scraper if necessary.

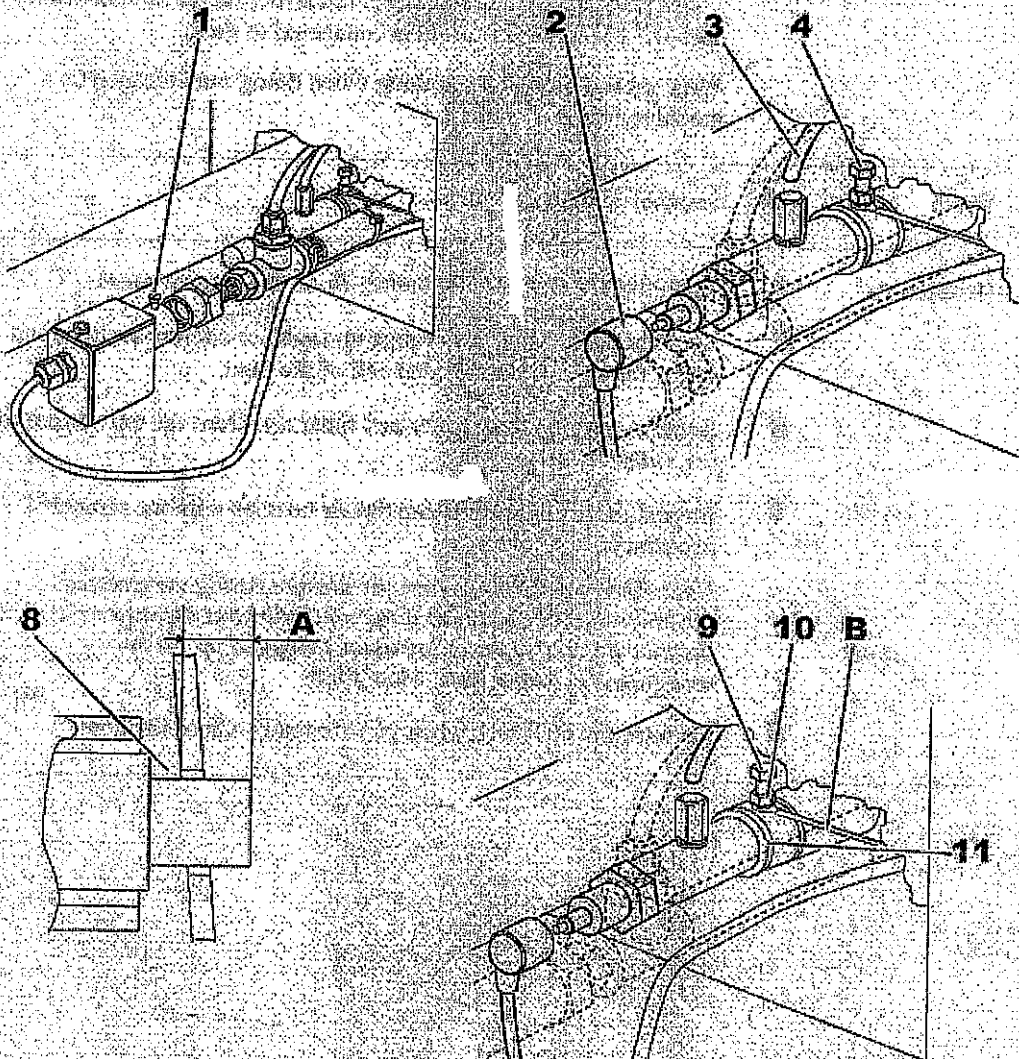
*Note: Disassemble and clean the airbars (using compressed air and steel wire brushes) if too much dirt has deposited on them or if the air nozzles are almost clogged up (to be recognized by paper dust: white film).*

5. Remove the door lock when you are ready. Close the door.



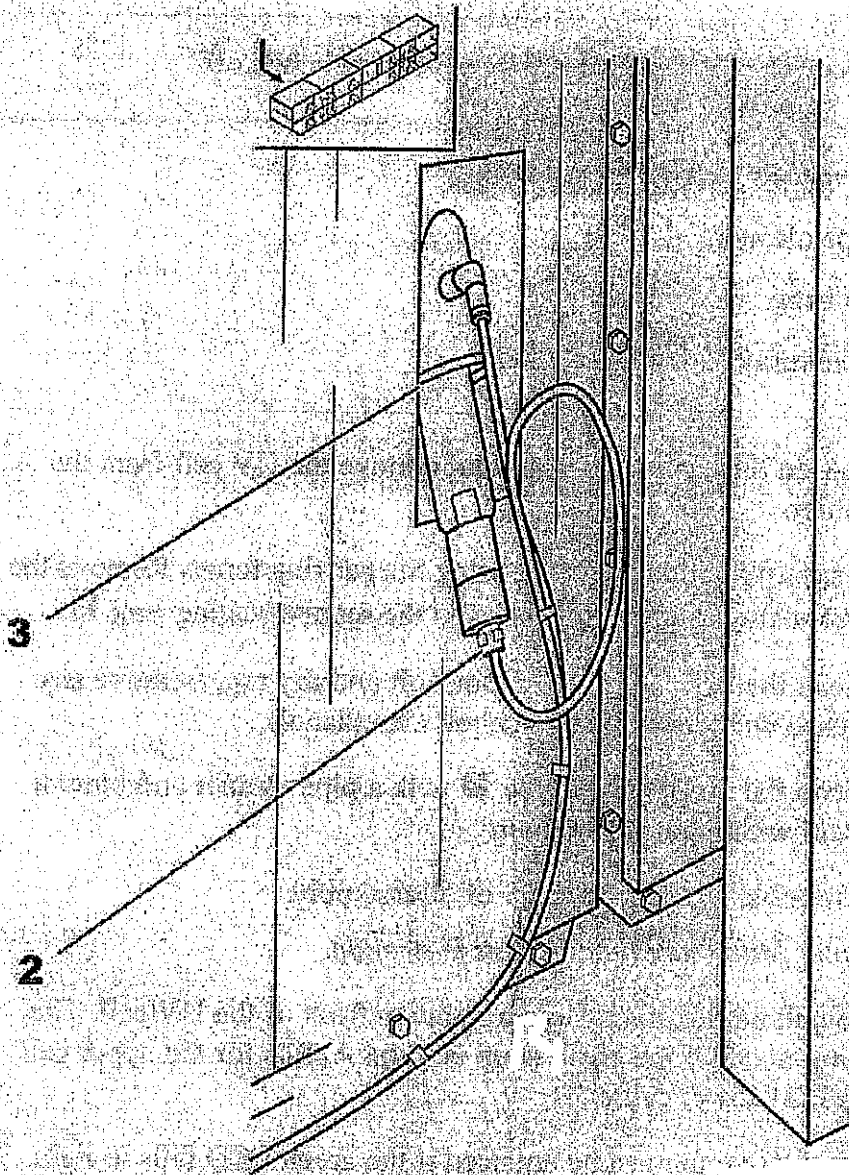
## Cleaning the spark plugs

1. Loosen the screw two turns and remove the UV cell from the holder.
2. Remove the cap from the spark plug.
3. Undo the air connection.
4. Loosen the lock nut and loosen the screw two turns. Carefully remove the entire spark plug from the tube.
5. Clean the inside of the tube with a steel pipe cleaner and blow it clean with high-pressure air.
6. Check the electrodes for corrosion (remove any stains with a Brillo pad or a copper brush). Replace the spark plug *if* necessary.
7. Spray the outside of the spark plug tube with Loctite 7671 to stop corrosion.
8. Insert the spark plug into the tube and check (by feeling) during assembly that the tip of the spark plug is properly located in the burner A (approx. 10 mm (0.4 in)), turn the spark plug *if* necessary.
9. Hold the spark plug against the stop and tighten the screw.
10. Tighten the lock nut so that the earth wire B makes proper contact.
11. Push the V-ring against the stop.
12. Fit the air connection and the spark plug cap.



## Checking the IR camera

1. Remove the lower plating from the last drying section on the work side. Pull the lower plating towards you until it has clicked loose on two sides. Then lift the plating to remove it.
2. Unscrew the electrical connection.
3. Loosen the lock nut and screw the IR camera out of the tube.
4. Clean the lens with a soft, clean and dry rag. Only use denatured alcohol (ethanol) to remove any grease.
5. Clean the inside of the tube with a pipe cleaner and blow it clean with high-pressure air.
6. Fit the IR camera.
7. Assemble the plating.
8. Switch on the dryer.
9. Check the operation by comparing the specified value of a sheet of paper placed under the camera at SP44A (input 16), Temp. web 2, on a cold dryer to the values of the temperature sensor of the last drying section; the difference must not be more than 5 °C (41°F).

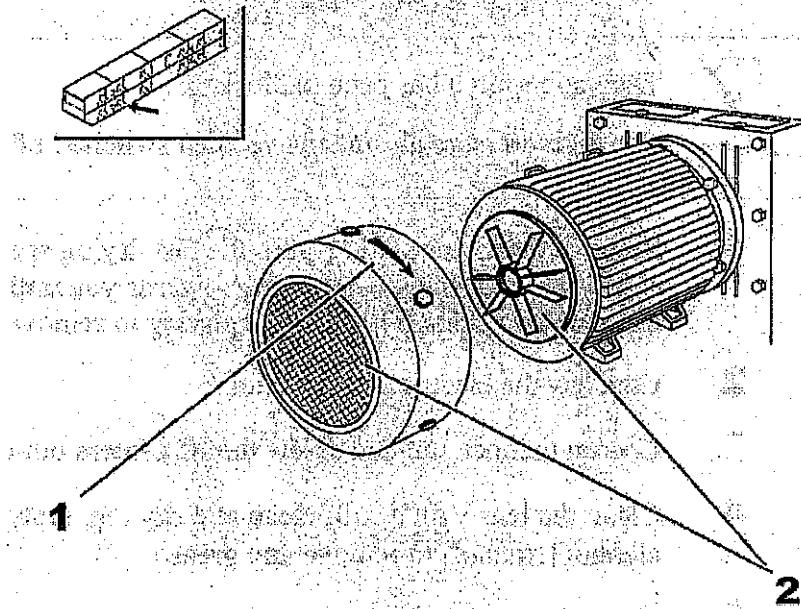


## Cleaning the electric motor

1. Remove the cover from the electric motor.

*Note: If the motor running direction is indicated on the cover (by an arrow) you have to make sure that this cover is put back on the same motor again later.*

2. Clean the cover (grille), the fan and the motor cooling fins.



## Checking the thermocouples

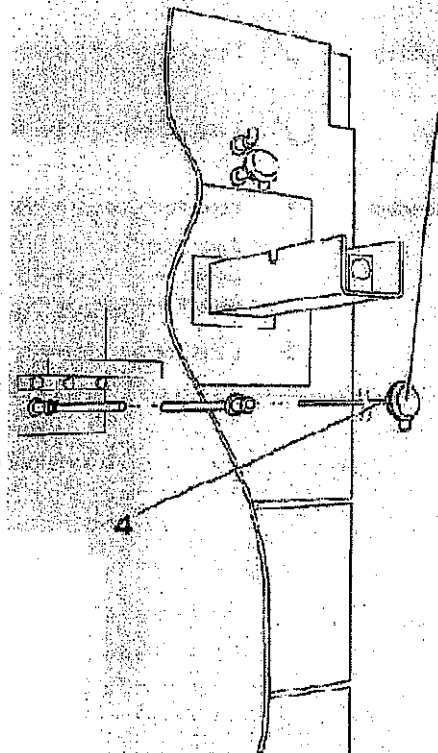
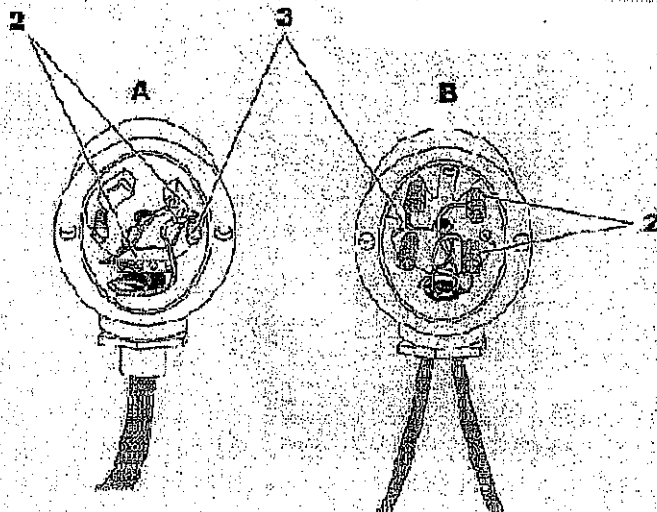
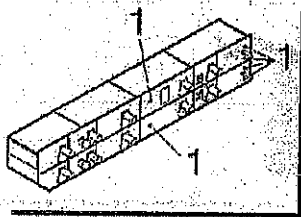
1. Remove the cover from the thermocouple (2 screws) and check the thermocouple for corrosion. If this is OK, continue from point 6.
2. Note the wire colors for the following connections:

A (converter block)	B (connection block)
+ and - for the voltage connection.	The color of the dot to which this is connected.
+ and - to the thermocouple.	

3. Remove the converter block or the connection block (2 screws). Carefully pull the converter block or the connection block with the thermocouple out of the housing.
4. Fit a new sealing ring (silicon rubber). Check that the sealing ring on the thermocouple rests against the ridge on the end plate.

*Note: The long thermocouples (1) (6 x) for the combustion chamber must also be slid into the guide tube on the inside of the dryer. Monitor this via the inspection doors. Wear protective clothing if the dryer is hot.*

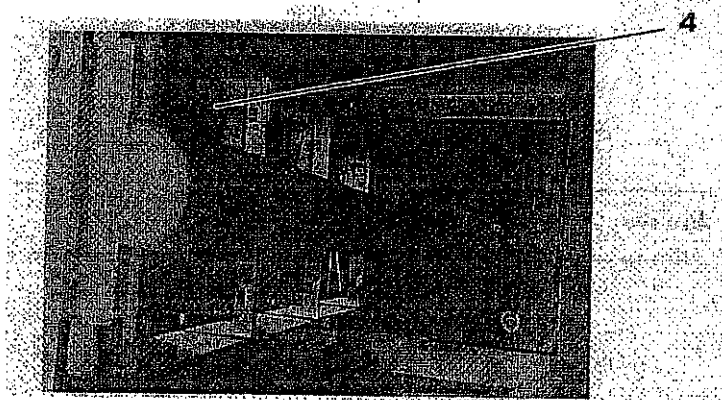
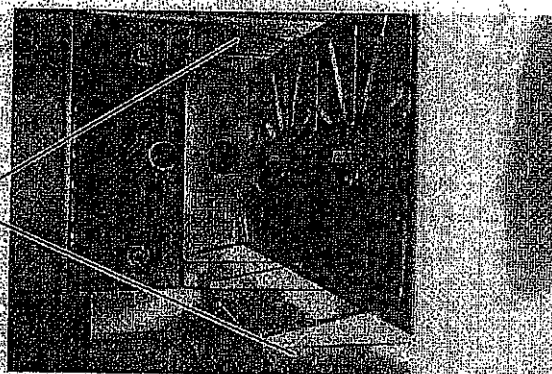
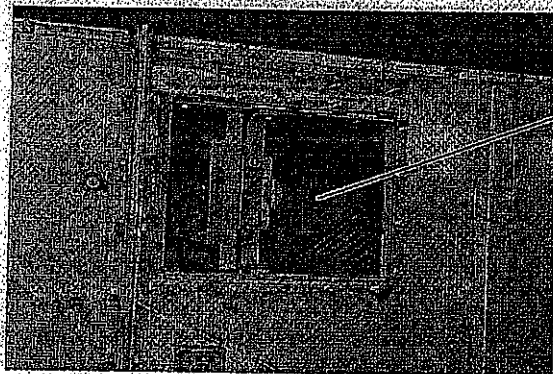
5. Connect the wires following your notes. Check the operation of the thermocouple via SP44. Assemble the thermocouple cover.
6. Check the temperatures of the thermocouple covers during operation. They must not be hot.





## Checking the burners

1. Remove the plating for the upper and lower burners. *Note: Only the upper plating is screwed.*
2. Remove the insulating sheets.
3. Remove the inspection door.
4. Check that the plates around the burner head are not deformed.
5. The burner must be replaced if the plates are deformed.



## Catalyst Sampling Procedures

The sample cores are located in the middle tray. A sample consists of a short core from the top bed and a long core from the bottom bed. It may be necessary to remove the top bed to gain access to the bottom test cores.

Take care to replace the remaining top test cores with the proper side up.

When the sample cores are removed, the top of each core should be marked as TOP.

## Getting an Analysis

*When sending a catalyst sample from a pollution control unit to MEGTEC Systems for analysis it is very important to include the following information.*

1. Testing requires a purchase order, purchase order number, or other written payment authorization from the customer. In general, we cannot enter the sample into the system until some means of payment is established. A typical catalyst test includes an activity test, a surface area analysis and a PIXE scan.
  2. Name, address, and phone number of who to contact with results of the analysis.
  3. MEGTEC Systems job number of the pollution control unit sampled and date of installation.  
JOB NUMBER      INSTALED
  4. Date of installation of the catalyst into the unit (month and year). Dates of any previous catalyst sampling and any topping-off of beds.
  5. Reason for the sample to be analyzed. Such as routine maintenance, smoke, odor problems, etc.
- Catalyst samples and their support documentation should then be sent to:

MEGTEC Systems  
Pollution Abatement Laboratory  
830 Prosper Road P.O. Box 5030  
DePere, WI 54115-50300

## Catalyst Activity Procedure

The tabled data shows the measured efficiency of the catalyst sample under laboratory conditions. The lab test consists of passing a stream of solvent laden air through a small vessel which holds the sample. The flow is controlled such that the sample is exposed to a space velocity typical of a pollution control unit (12000 GHSV). The flow stream used is an approximately 625 ppm n-hexane in air mixture which corresponds to a 6% LFL concentration. n-hexane is significantly more difficult to oxidize than most printing ink oils, but was chosen as the test solvent due to repeatability and ease of use. The sample (reactor) is first heated in an oven and allowed to equilibrate at the setpoint temperature. The sample's conversion efficiency is then evaluated by measuring the hydrocarbon concentration in the stream before and after the catalyst by FID.

Conversion efficiency obtained in the laboratory accurately reflects the relative activity of the sample tested compared to fresh catalyst, but does not predict the conversion efficiency to be expected from a unit containing this catalyst. Laboratory testing provides activity levels under standard conditions, which allows the sample to be compared to a large databank of samples tested under those same conditions. Based on accumulated knowledge of catalyst activity under standard conditions, a judgment can be made regarding catalyst performance. *Please note that test conditions are not the same as field conditions, but are in fact, more rigorous. Typically field performance is better than laboratory performance.*