

Bruce



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

January 8, 1990

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Kent Smith, Environmental Manager
Harris Semiconductor
P. O. Box 883
Melbourne, Florida 32902-0883

Dear Mr. Smith:

Re: Amendment of Construction Permits:

AC 05-147321	Bldg. 54
-150794	59
-157786	51
-157787	62
-158237	63
-159484	58
-161706	57
-164544	55

The Department has reviewed Ms. Nancy Baldisserotto's letter received December 13, 1989, requesting that the above referenced air construction permits' expiration dates be extended. The Department is in agreement with the basic request and the following will be changed and added:

A. AC 05-147321, -150794, -157786, -157787, -158237, -159484, -161706 and -164544.

o Expiration Date

From: April 30, 1990
To: June 30, 1990

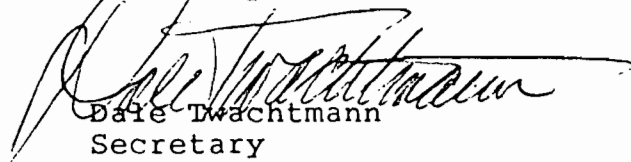
B. Attachment to be Incorporated

o Ms. Nancy Baldisserotto's letter received December 13, 1989.

Mr. Kent Smith
Page 2
January 8, 1990

This letter must be attached to your air construction permits, as referenced above, and shall become a part of the permits.

Sincerely,



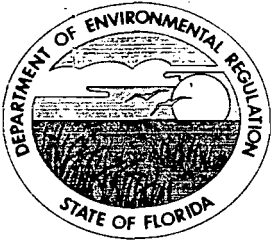
Dale Twachtman
Secretary

DT/plm

Attachment

c: C. Collins, Central Dist.
N. Baldisserotto, HS

Brown



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Lawton Chiles, Governor

Carol M. Browner, Secretary

June 4, 1991

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Alvin N. Critzer, Plant Manager
Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

Dear Mr. Critzer:

Re: Amendments to Construction Permit AC 05-180707

The Department has reviewed Mr. Constantine Triantafyllidis' letter received May 1, 1991, requesting amendments to the above referenced permit and to notification of the installation of two gas trap units. The Department acknowledges the installation of the gas traps; and, is in agreement with the request for amendments. Therefore, the following will be changed and added:

Expiration Date

FROM: January 31, 1991
TO: December 31, 1991

Specific Conditions Nos. 6 & 7

FROM:

6. By March 31 of each calendar year, an annual operating report shall be submitted to the DER's Central District office demonstrating compliance with the VOC/solvent emissions limit for Building 59 and shall be determined by a material balance scheme, which includes the following:

- a) a beginning inventory of full containers, cylinders and storage tanks at the beginning of each calendar year;
- b) plus all purchased deliveries after the beginning inventory (verifiable by invoices);
- c) minus all quantities picked-up and shipped-off the premise after the beginning inventory (verifiable by invoices);

Mr. Alvin N. Critzer

June 4, 1991

Page 2

- d) minus all quantities deep well injected during the calendar year, justified by assumptions and established scrubber efficiencies; and,
 - e) minus an ending inventory of full containers, cylinders, and storage tanks; and, shall occur at the beginning of the following calendar year.
7. Each scrubber system's efficiency and potential VOC/solvent and acid emissions shall be established by a sampling and analysis program, which includes:
- a) a sample shall be taken annually from each scrubber stack and analyzed using EPA Reference Method 25A;
 - b) the DER's Central District office shall receive 15 days notice in writing prior to sampling; and,
 - c) the report, summarizing the sampling results, shall be submitted to the DER's Central District office within 45 days after the last test run is completed.

TO:

6. By March 31 of each calendar year, an annual operating report shall be submitted to the DER's Central District office demonstrating compliance with the VOC/solvent emissions limit for Building 59.
7. Each scrubber system's efficiency and actual VOC/solvent emissions shall be established by a sampling and analysis program, which includes:
- a) a sample shall be taken annually from each scrubber stack and analyzed using EPA Reference Method 25A pursuant to F.A.C. Rule 17-2.700 and 40 CFR 60, Appendix A;
 - b) the DER's Central District office shall receive 15 days notice in writing prior to sampling;
 - c) the report, summarizing the sampling results, shall be submitted to the DER's Central District office within 45 days after the last test run is completed;
 - d) the efficiency of each control system shall be established by tests (inlet and outlet) once every five years for operation permit renewal; and,
 - e) the annual VOC emissions shall be calculated using actual emissions data derived from stack test sampling results and the actual operating hours for the affected source/building.

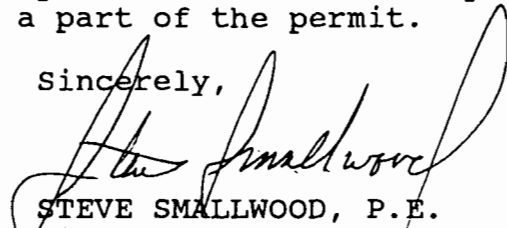
Mr. Alvin N. Critzer
June 4, 1991
Page 3

Attachment to be Incorporated:

o Mr. Constantine Triantafyllidis' letter received May 1, 1991.

This letter must be attached to your air construction permit, No. AC #5-180707, and shall become a part of the permit.

Sincerely,



STEVE SMALLWOOD, P.E.
Director
Division of Air Resources
Management

SS/BM/plm

c: C. Collins, Central Dist.
C. Triantafyllidis, HS

Attachment



April 22, 1991

Mr. Claire Fancy
Bureau Chief
Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Permit Number AC 05-180707
Building 59 Air Permit, Harris Semiconductor.

Dear Mr. Fancy:

By this letter, Harris Semiconductor Sector (HSS) hereby requests some minor additions and/or modifications to the above mentioned permit.

First, the facility is providing the Department with notice of its intent to add as a point source emission control two gas trap units (dry scrubbers) in conjunction with two dry vacuum pumps to treat emissions exhausted from the aluminum etching equipment located at the northwest of the fab area in Building 59. The gas traps will be located in the basement of Building 59 and are the Ebara gas traps, model GTE-3 along with the Ebara 50x20 Dry Vacuum Pumps.

The filter material of these units consists primarily of activated calcium hydroxide and charcoal. This alkaline media of the filters reacts with any boron trichloride and aluminum chloride emissions that may result from the aluminum etching process and forms a non-hazardous by-product. Information on the proposed gas trap units is provided in Attachment I. If the Department has no objection, we will proceed with the course of action described, with completion by the end of June.

Second, it is requested that specific condition 6, referencing the Annual Mass Balance requirement, be deleted from the above permit in favor of annual emissions monitoring. Similar to other Building permits, the annual emission sampling requirement provides accurate data on the nature and amount of VOC emissions emanating from Building 59. Also, annual emissions for this Building will be calculated through averaged monitored emissions and actual operating hours.

Lastly, based on the Department's approval of the above, it is requested that the above mentioned permit expiration date be extended from June 30, 1991 to December 31, 1991 to provide adequate time for the installation and final field adjustments of the proposed gas adsorption units.

RECEIVED
MAY 1 1991
DER-BAQM

If you have any questions or require any additional information concerning the above material, please contact me at (407) 729-5301.

Sincerely,

Constantine Triantafyllidis

Constantine Triantafyllidis, R.E.P.
Environmental Engineer

cc: B. Mitchell, Tallahassee
C. Collins, Orlando
K. Smith
J. Steiner

ATTACHMENT I.

**EBARA GAS TRAP (DRY SCUBBER) UNITS
BUILDING 59**

EBARA EXHAUST GAS TRAP

DESCRIPTION AND PRINCIPLE OF OPERATION

INTRODUCTION

The Ebara Gas Trap has been developed to remove fluorinated (SiF_4) and chlorinated components from exhaust gases produced in semiconductor manufacturing processes. Removal of fluorinated and chlorinated components is achieved by the chemical reactions of these components (in gas phase) and proprietary alkaline reactants in the gas trap. The proprietary alkaline reactants used in the gas trap have such a strong affinity for fluorinated and chlorinated chemicals that virtually complete removal of these compounds from the exhaust gas stream occurs.

CHEMISTRY AND OPERATION

The reaction vessel of the gas trap contains dry, alkaline solids which selectively seek the fluorinated and chlorinated compounds present in the exhaust gas. The alkali pellets chemically react with such gases as boron trichloride, chlorine, aluminum chloride, phosgene, and silicon tetrafluoride. The products of reaction are precipitated out and captured within the reaction vessel. Additives are available which can be included in the reaction vessel for catalyzing the conversion of carbon monoxide to carbon dioxide in the presence of air.

Exhaust gas containing fluorinated/chlorinated compounds is introduced at the bottom of the reaction bed. The gas passes through the reaction bed and emerges at the top. Virtually all the fluorinated/chlorinated compounds are chemically converted and captured in the reaction vessel contents as the gas flows through the bed.

Under normal operation, exhaust gas emerging from the gas trap will contain less than the maximum allowable concentrations of chlorinated and fluorinated compounds for human health and safety as established in standard health codes (ACGIH, NIOSH-IDLH). During operation, the weight of the reaction vessel will increase the fluorinated/chlorinated compounds are chemically reacted and captured. The reaction vessel is designed to be replaced when it has increased in weight by a specified quantity. The reaction vessel has a capacity to capture substantially more fluorinated/chlorinated compounds than the capacity specified for replacement.

Ebara gas traps are provided with sensitive scales, alarm lamps, and terminals which warn the operator when the reaction vessel has reached its design removal capacity.

REACTION VESSEL REMOVAL AND REPLACEMENT

WHEN THE REACTION VESSEL HAS REACHED ITS DESIGN CAPTURE CAPACITY, IT MUST BE ISOLATED USING A SERIES OF ISOLATION VALVES. THE REACTION VESSEL, A POLYETHYLENE CANISTER, CONTAINS SPENT CHEMICALS CONSISTING PRIMARILY OF CALCIUM HYDROXIDE.

THE RATE OF REACTION VESSEL REPLACEMENT DEPENDS ON THE SEMICONDUCTOR PROCESS AND WAFER PRODUCTION RATE.

THE SPENT REACTION VESSEL WEIGHT AND DIMENSIONS FOR THE GT3 GAS TRAP ARE PROVIDED BELOW:

SHAPE	:	CYLINDRICAL
WEIGHT	:	73 KGS AT REMOVAL (65 KGS NEW)
DIMENSIONS	:	15" DIAM. X 33" HIGH
VOLUME	:	15 GAL.

SAFETY FEATURES

IN ADDITION TO THE ALARM INDICATING SPENT WEIGHT OF THE REACTION VESSEL, ANOTHER ALARM WARNS THE OPERATOR OF AN ABNORMAL BACK PRESSURE AT THE GAS TRAP INLET. WHEN THE INLET PRESSURE IS HIGHER THAN A PRESET VALUE, AN ALARM LAMP IS LIT AND A SIGNAL CAN BE SENT TO A REMOTE RECEIVER.

ATTACHMENTS

FIGURE 1 - THIS FIGURE SHOWS TYPICAL PERFORMANCE OF A MODEL GT3 GAS TRAP ASSUMING AN INLET STREAM CONTAINING ONLY CHLORINATED COMPOUNDS.

FIGURE 2 - THIS FIGURE SHOWS THE OUTLINE DIMENSIONS AND KEY COMPONENTS OF THE GAS TRAP.

FIGURE 3 - THIS FIGURE SHOWS GAS FLOW THROUGH THE GAS TRAP.

INSTRUCTION MANUAL FOR GAS TRAP (GTE-3/4AA)

1. Summary

This system treats waste gas from chloricarbon dry etching to render it harmless. The adsorbent in the vessel eliminates the toxic components through chemical and physical reaction. The timing of adsorbent replacement is known by detecting the increase of vessel weight.

This system is to be used under the pressure less than 1 kgf/cm²(G) (usually less than 0.5 kgf/cm²(G))

2. Specifications

Gas flow rate :

Maximum ¹⁵ liter/min
(including 1 liter/min N₂ gas for purging on the pump side)

* Inflow gas concentration :

Maximum 2.4 % of BCl₃
Maximum 1.2 % of Cl₂
Maximum 1.7 % of CO
Maximum 0.5 % of COCl₂

Treated gas concentration :

BCl₃ less than 1 ppm
Cl₂ less than 1 ppm
CO less than 50 ppm
COCl₂ less than 0.1 ppm
(before the amount of treatment exceeds the normal value of 10 kg)

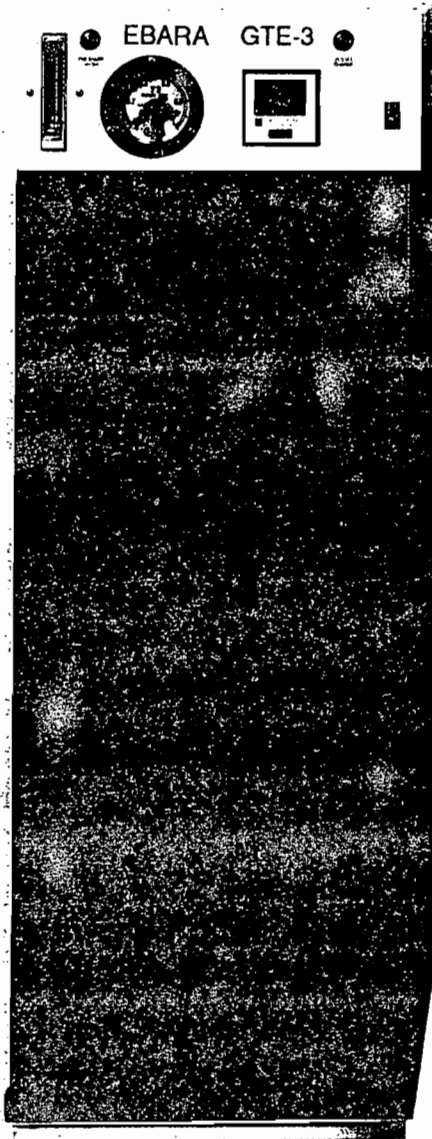
Adsorption volume :

Normal 10 kg
Maximum 14 kg
(However, these values are subject to change, depending on the inflow gas concentration and composition.)



EBARA

SAFE - CLEAN - RELIABLE EXHAUST TREATMENT SYSTEMS FOR THE SEMICONDUCTOR INDUSTRY



Ebara has installed more Dry Scrubbers and Exhaust Treatment Systems than any other manufacturer in the world. We are the only manufacturer that can supply the total vacuum system including a proven dry vacuum pump and an exhaust treatment system to handle the needs of your facility. Ebara's safe, reliable Exhaust Treatment Systems provide a unique solution to the toxic emission problems every semiconductor facility is faced with today. The Ebara Exhaust Treatment Systems are currently used in difficult applications such as metal etch, EPI and CVD. Only Ebara has looked at the overall vacuum pumping system as a package and designed the solution to answer all of your facility's problems.

The Ebara Exhaust Treatment Systems offer you the following advantages over others:

- .. Improved operating safety
- .. Improved and more economical environmental waste handling
- .. Dry Exhaust Treatment Systems for appropriate applications
- .. CDO (Controlled Decomposition and Oxidation) Systems where necessary
- .. Total vacuum system responsibility

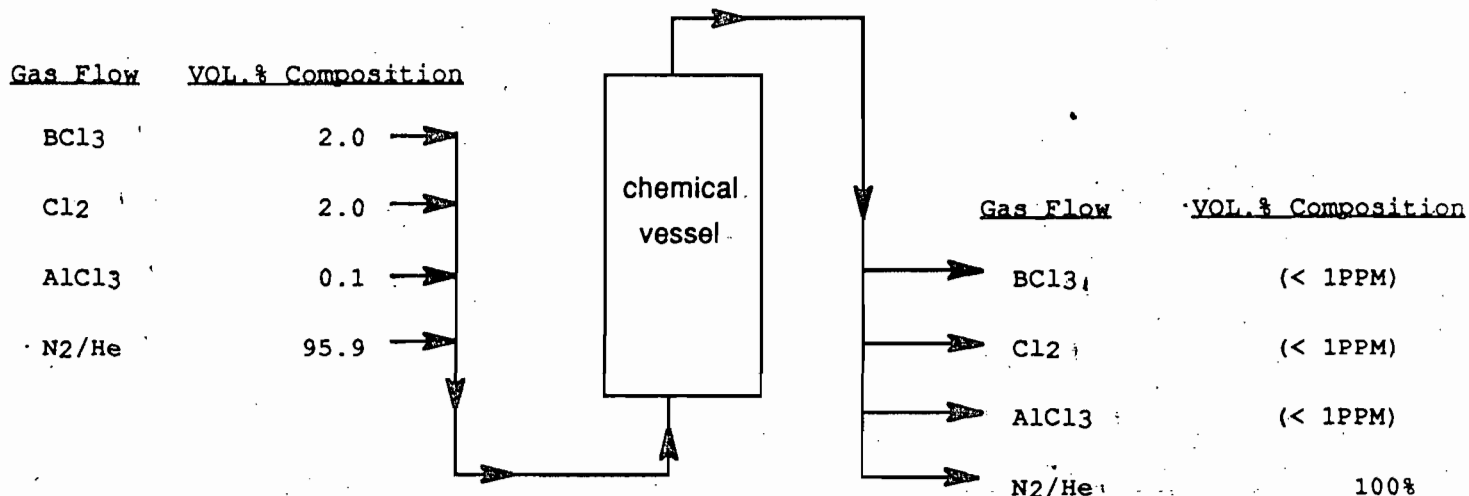
Experience the meaning of Ebara. . .

**SAFE, CLEAN, RELIABLE
EXHAUST TREATMENT SYSTEMS**

Best Available Copy

Ebara's exhaust treatment technology meets all the design objectives required by the semiconductor industry -- enhanced reliability, improved safety, cleaner vacuum, reduced toxic exhaust management problems, increased efficiency, ease of operation, and lower cost of ownership. Even in the harshest of processes, the Ebara Oil-Free Dry Pump and Exhaust Treatment System is clearly superior to conventional systems.

To cope with the demands of the Semiconductor industry, various types of individual exhaust treatment systems have been developed to overcome the shortcomings of conventional central exhaust systems. There are three alternatives to conventional wet exhaust systems: full-dry, semi-dry, and CDO. An example of the first full-dry method is Ebara's GTE-3 Dry Scrubber developed to remove fluorinated (SiF₄) and chlorinated (Cl) components from exhaust gases produced in dry etching processes. Removal of the fluorinated and chlorinated components is achieved by chemically reacting the exhaust gas components with proprietary alkaline reactants contained in the GTE-3 Dry Scrubber. The Dry Scrubbers employ a removable reaction vessel which the exhaust gas flows through, and when this vessel has reached its design capacity, sensitive load cells trigger alarms which warn the operator that it has to be changed. Under most process conditions the contents of the reaction vessel is able to be disposed of in a non-hazardous Class 3 landfill. The diagram below shows the gas flow through a typical GTE Dry Scrubber system.



Additional systems for other processes, including silane, are also available without the hazards of an open flame. Ebara is the only vacuum technology company which designs and tests its products under actual operating conditions before they are released to production. Only with such a strong commitment can a company manufacture such reliable products. With our variety of field proven Exhaust Treatment Systems, Ebara can solve your hazardous waste management problems you are facing today, as well as those you will encounter in the future.

If you care about improving your process, minimizing downtime and operating costs, improving your wafer production, improving your wafer yield, and improving the environment we live in, turn to the company that does also --

EBARA

WESTERN U.S.A.

EASTERN U.S.A.

EBARA TECHNOLOGIES INCORPORATED
 3560 BASSETT STREET
 SANTA CLARA, CALIFORNIA 95038
 (800) 535-5376 FAX (408) 496-2801

EBARA TECHNOLOGIES INCORPORATED
 ONE PARKLAWN DRIVE
 BETHEL, CONNECTICUT 06801
 (203) 790-1080 FAX (203) 790-7404

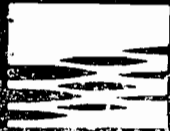


SPECIFICATION OF MULTI-STAGE DRY PUMP

MODEL 50 X 20 UERR6M

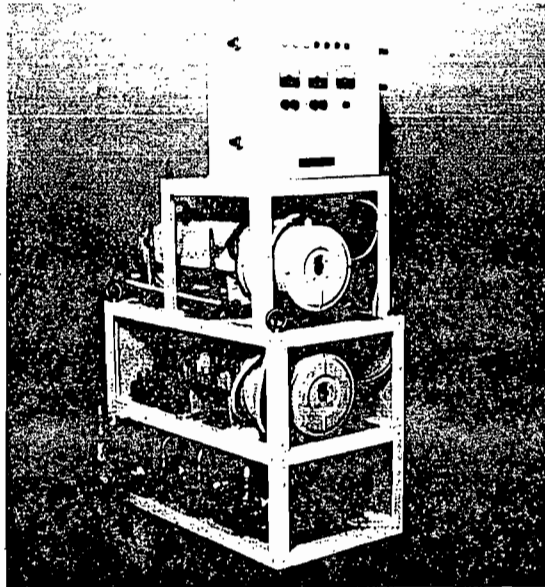
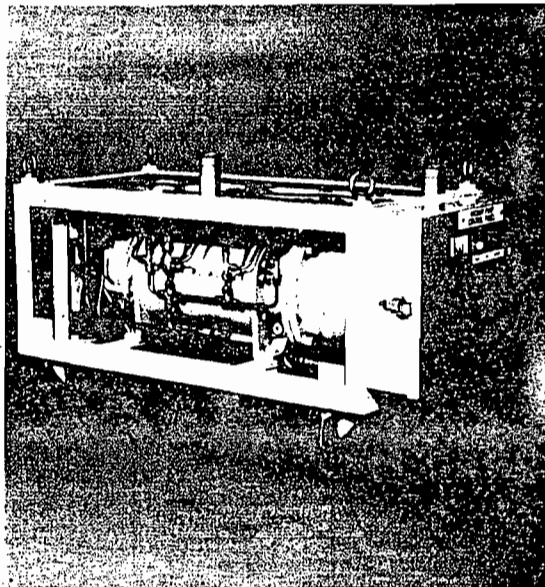
	<u>ENGLISH</u>	<u>METRIC</u>
PUMPING SPEED		
60 Hz	127 CFM	3600 L/MIN
50 HZ	106 CFM	3000 L/MIN
ULTIMATE PRESSURE	4 X 10 ⁻³	4 X 10 ⁻³
FLANGE RATING:		
INLET	----- KF 50 -----	
OUTLET	----- KF 40 -----	
N ₂ PURGE:		
INLET CONNECTION	----- 1/4" TUBE CONNECTOR -----	
PRESSURE		
REQUIRED INLET	14 TO 100 PSIG	1 - 7 KgF/CM ² G
REGULATOR GAUGE	14 PSIG	1 KgF/CM ² G
QUANTITY FOR		
SHAFT SEAL FOREPUMP	----- 9.5 SLM -----	
COOLING WATER:		
INLET & OUTLET CONNECTIONS	----- 3/8" NPT FEMALE -----	
PRESSURE	57 PSIG	4 KgF/CM ²
DIFFERENTIAL PRESSURE	14 - 28 PSI	1 - 2 KgF/CM ²
QUANTITY	1.3 - 2.0 GPM	5 - 8 L/MIN
LUBRICATION FLUID:		
QUANTITY	27 FLUID OZ.	0.8 LITERS
WEIGHT: TOTAL	740 LBS.	340 Kg
MOTOR - 5 HP:		
POWER	----- 3.7 KW -----	
VOLTAGE	----- 208 VOLT/3 PH -----	
CURRENT	----- 19.1 AMP -----	
FREQUENCY	----- 60 Hz -----	
ROTATING SPEED	----- 3440 RPM -----	

REMARKS:



EBARA

CLEAN RELIABLE OIL-FREE VACUUM PUMPS FOR THE SEMICONDUCTOR INDUSTRY



Ebara has installed more Dry Vacuum Pumps than any other manufacturer in the world. Our rugged construction and proven roots-type design ensures continuous, reliable oil-free performance. The Ebara Dry Pump is the oil-free pump which survives where other dry pumps fail: in applications such as SiN₂ LPCVD, PECVD, CVD, Metal Etch, PVD, Ion Implantation, load locks, and others. Other manufacturers claim their vacuum pumps are designed specifically for harsh semiconductor processes, but Ebara is the only vacuum pump designed and tested under actual operating conditions in our process clean room before it's released to production. Only with such a strong commitment like this can a company manufacture such a reliable product. The Ebara Dry Pump stands up to the most aggressive gases and vapors months, even years, longer than other pumps in the same application.

Ebara Dry Oil-Free Vacuum Pumps offer you the following advantages over others

- .. Improved process repeatability
- .. Increased operating safety
- .. Improved environmental waste handling with our Dry Exhaust Treatment System option
- .. Clean vacuum with no oil backstreaming with designs up to 640 CFM
- .. Lower operating cost -- no consumables for oils, filters or exhaust silencers
- .. Increased reliability - virtually maintenance free operation with field proven, continuous operation for over 12 months with no breakdowns in harsh applications

Experience the meaning of Ebara. . . .

CLEAN RELIABLE OIL-FREE VACUUM

BEST AVAILABLE COPY

Ebara's oil-free vacuum pumping technology meets all the design objectives for vacuum pumping systems in the semiconductor industry -- enhanced reliability, improved safety, cleaner vacuum, reduced toxic exhaust management problems, reduced maintenance, increased efficiency, ease of operation, lower operating costs, and lower cost of ownership. The Ebara Oil-Free Pump is clearly superior to conventional vacuum pumps in the harshest of

mechanism. While other dry pumping systems claim to produce oil-free pumping, they must incorporate a standard roots-type booster stage for most process requirements. This roots type booster has a seal design which puts only one seal between the process gas and the gear lubrication fluid. This allows the gas to migrate freely into and out of the oil filled gear casing chamber from the pumping chamber, resulting in a system not truly dry as claimed. The Ebara Dry Pump uses an improved, purged double seal design and is the only oil-free dry pump in capacities up to 640 CFM as listed below. It has been field proven to be superior to these other systems and to the conventional oil-sealed systems for harsh processing conditions. Therefore, in the semiconductor industry, the yield or wafer quality can only be improved with an Ebara vacuum system.

Pump Size	40 x 20	65 x 40	50 x 20	80 x 25	150 x 40
Number of stages	5	5	6	6	6
Displacement (swept volume)	53	124	164	383	824
Peak speed (CFM)	41	99	127	297	636
Ultimate vacuum (TORR) with full purge	30×10^{-3}	30×10^{-3}	4×10^{-3}	4×10^{-3}	4×10^{-3}
Cooling water flow (l/m)	5-8	5-8	5-8	5-8	5-8
Motor Power (HP)	3 HP	5 HP	5 HP	8 HP	10 HP

If you care about improving your process, minimizing downtime and operating costs, improving your wafer production, improving your wafer yield, and improving the environment we live in, turn to the company who does also --

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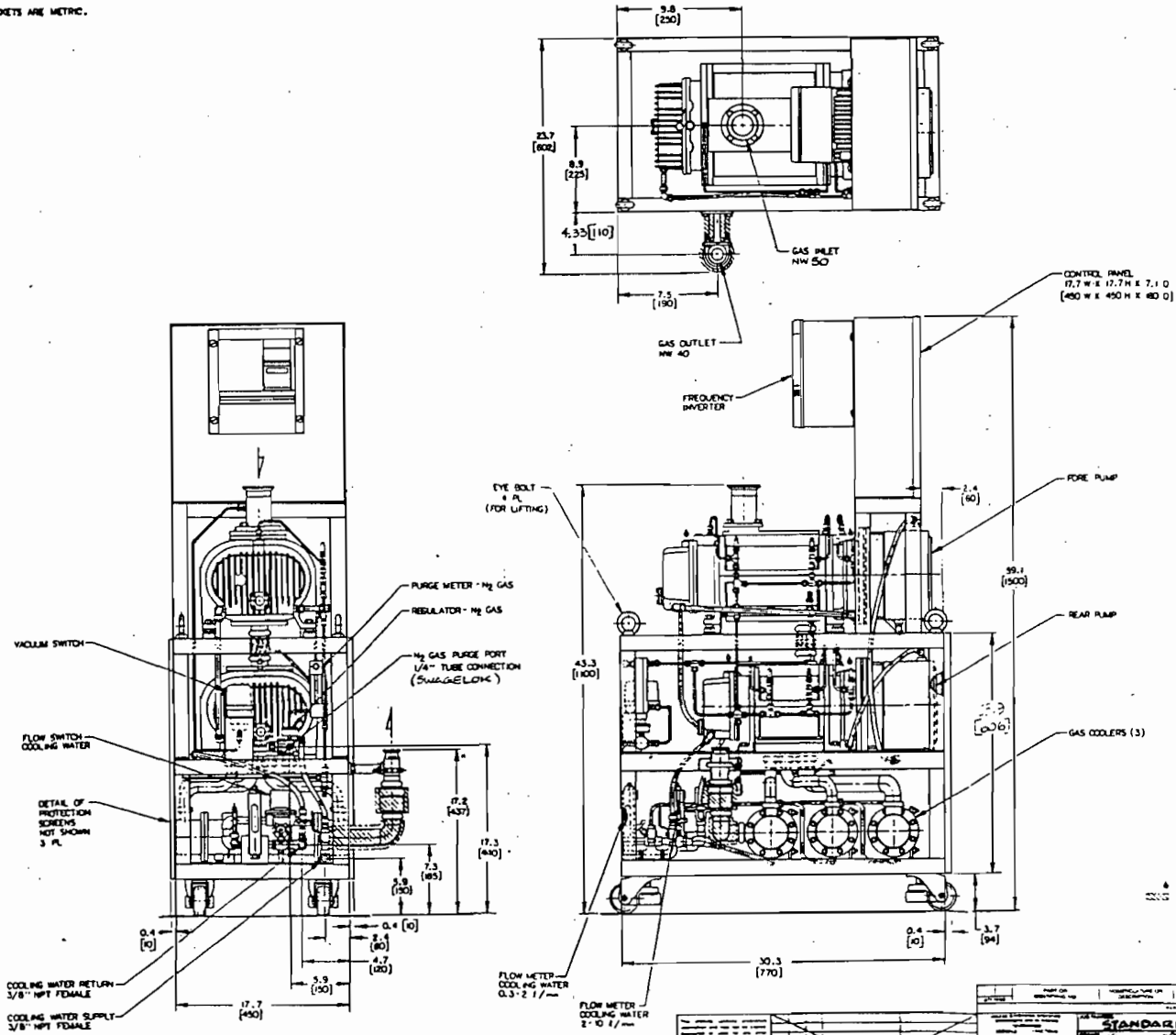
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EBARA TECHNOLOGIES INCORPORATED
ONE PARKLAWN DRIVE
BETHEL, CONNECTICUT 06801
(203) 790-1080 FAX (203) 790-7404

NOTES: UNLESS OTHERWISE SPECIFIED

1. INTERPRET DRAWING PER DDD-STD-100.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
3. DIMENSIONS AND VALUES IN BRACKETS ARE METRIC.



STANDARD S. KELLEY 277		GARA INTERNATIONAL CORPORATION VACUUM PRODUCTS DIVISION 1400 W. 10TH ST. MILWAUKEE, WIS. 53233	
MULTISTAGE VACUUM PUMP OUTLINE DRAWING SOX 20 LITEREM		E1 VP110013	

VP110013



April 22, 1991

Mr. Claire Fancy
Bureau Chief
Bureau of Air Regulation
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Permit Number AC 05-180707
Building 59 Air Permit, Harris Semiconductor.

Dear Mr. Fancy:

By this letter, Harris Semiconductor Sector (HSS) hereby requests some minor additions and/or modifications to the above mentioned permit.

First, the facility is providing the Department with notice of its intent to add as a point source emission control two gas trap units (dry scrubbers) in conjunction with two dry vacuum pumps to treat emissions exhausted from the aluminum etching equipment located at the northwest of the fab area in Building 59. The gas traps will be located in the basement of Building 59 and are the Ebara gas traps, model GTE-3 along with the Ebara 50x20 Dry Vacuum Pumps.

The filter material of these units consists primarily of activated calcium hydroxide and charcoal. This alkaline media of the filters reacts with any boron trichloride and aluminum chloride emissions that may result from the aluminum etching process and forms a non-hazardous by-product. Information on the proposed gas trap units is provided in Attachment I. If the Department has no objection, we will proceed with the course of action described, with completion by the end of June.

Second, it is requested that specific condition 6, referencing the Annual Mass Balance requirement, be deleted from the above permit in favor of annual emissions monitoring. Similar to other Building permits, the annual emission sampling requirement provides accurate data on the nature and amount of VOC emissions emanating from Building 59. Also, annual emissions for this Building will be calculated through averaged monitored emissions and actual operating hours.

Lastly, based on the Department's approval of the above, it is requested that the above mentioned permit expiration date be extended from June 30, 1991 to December 31, 1991 to provide adequate time for the installation and final field adjustments of the proposed gas adsorption units.

RECEIVED
MAY 1 1991
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If you have any questions or require any additional information concerning the above material, please contact me at (407) 729-5301.

Sincerely,

Constantine Triantafyllidis

Constantine Triantafyllidis, R.E.P.
Environmental Engineer

cc: B. Mitchell, Tallahassee
C. Collins, Orlando
K. Smith
J. Steiner

ATTACHMENT I.

**EBARA GAS TRAP (DRY SCUBBER) UNITS
BUILDING 59**

EBARA EXHAUST GAS TRAP

DESCRIPTION AND PRINCIPLE OF OPERATION

INTRODUCTION

The Ebara Gas Trap has been developed to remove fluorinated (SiF_4) and chlorinated components from exhaust gases produced in semiconductor manufacturing processes. Removal of fluorinated and chlorinated components is achieved by the chemical reactions of these components (in gas phase) and proprietary alkaline reactants in the gas trap. The proprietary alkaline reactants used in the gas trap have such a strong affinity for fluorinated and chlorinated chemicals that virtually complete removal of these compounds from the exhaust gas stream occurs.

CHEMISTRY AND OPERATION

The reaction vessel of the gas trap contains dry, alkaline solids which selectively seek the fluorinated and chlorinated compounds present in the exhaust gas. The alkali pellets chemically react with such gases as boron trichloride, chlorine, aluminum chloride, phosgene, and silicon tetrafluoride. The products of reaction are precipitated out and captured within the reaction vessel. Additives are available which can be included in the reaction vessel for catalyzing the conversion of carbon monoxide to carbon dioxide in the presence of air.

Exhaust gas containing fluorinated/chlorinated compounds is introduced at the bottom of the reaction bed. The gas passes through the reaction bed and emerges at the top. Virtually all the fluorinated/chlorinated compounds are chemically converted and captured in the reaction vessel contents as the gas flows through the bed.

Under normal operation, exhaust gas emerging from the gas trap will contain less than the maximum allowable concentrations of chlorinated and fluorinated compounds for human health and safety as established in standard health codes (ACGIH, NIOSH-IDLH). During operation, the weight of the reaction vessel will increase the fluorinated/chlorinated compounds are chemically reacted and captured. The reaction vessel is designed to be replaced when it has increased in weight by a specified quantity. The reaction vessel has a capacity to capture substantially more fluorinated/chlorinated compounds than the capacity specified for replacement.

Ebara gas traps are provided with sensitive scales, alarm lamps, and terminals which warn the operator when the reaction vessel has reached its design removal capacity.

REACTION VESSEL REMOVAL AND REPLACEMENT

WHEN THE REACTION VESSEL HAS REACHED ITS DESIGN CAPTURE CAPACITY, IT MUST BE ISOLATED USING A SERIES OF ISOLATION VALVES. THE REACTION VESSEL, A POLYETHYLENE CANISTER, CONTAINS SPENT CHEMICALS CONSISTING PRIMARILY OF CALCIUM HYDROXIDE.

THE RATE OF REACTION VESSEL REPLACEMENT DEPENDS ON THE SEMICONDUCTOR PROCESS AND WAFER PRODUCTION RATE.

THE SPENT REACTION VESSEL WEIGHT AND DIMENSIONS FOR THE GT3 GAS TRAP ARE PROVIDED BELOW:

SHAPE	:	CYLINDRICAL
WEIGHT	:	73 KGS AT REMOVAL (65 KGS NEW)
DIMENSIONS	:	15" DIAM. X 33" HIGH
VOLUME	:	15 GAL.

SAFETY FEATURES

IN ADDITION TO THE ALARM INDICATING SPENT WEIGHT OF THE REACTION VESSEL, ANOTHER ALARM WARNS THE OPERATOR OF AN ABNORMAL BACK PRESSURE AT THE GAS TRAP INLET. WHEN THE INLET PRESSURE IS HIGHER THAN A PRESET VALUE, AN ALARM LAMP IS LIT AND A SIGNAL CAN BE SENT TO A REMOTE RECEIVER.

ATTACHMENTS

FIGURE 1 - THIS FIGURE SHOWS TYPICAL PERFORMANCE OF A MODEL GT3 GAS TRAP ASSUMING AN INLET STREAM CONTAINING ONLY CHLORINATED COMPOUNDS.

FIGURE 2 - THIS FIGURE SHOWS THE OUTLINE DIMENSIONS AND KEY COMPONENTS OF THE GAS TRAP.

FIGURE 3 - THIS FIGURE SHOWS GAS FLOW THROUGH THE GAS TRAP.

INSTRUCTION MANUAL FOR GAS TRAP (GTE-3/4AA)

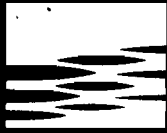
1. Summary

This system treats waste gas from chloricarbon dry etching to render it harmless. The adsorbent in the vessel eliminates the toxic components through chemical and physical reaction. The timing of adsorbent replacement is known by detecting the increase of vessel weight.

This system is to be used under the pressure less than 1.0 kgf/cm²(G) (usually less than 0.5 kgf/cm²(G))

2. Specifications

Gas flow rate :	Maximum ¹⁵ liter/min (including 1 liter/min N ₂ gas for purging on the pump side)
* Inflow gas concentration :	Maximum 2.4 % of BCl ₃ Maximum 1.2 % of Cl ₂ Maximum 1.7 % of CO Maximum 0.5 % of COCl ₂
Treated gas concentration :	BCl ₃ less than 1 ppm Cl ₂ less than 1 ppm CO less than 50 ppm COCl ₂ less than 0.1 ppm (before the amount of treatment exceeds the normal value of 10 kg)
Adsorption volume :	Normal 10 kg Maximum 14 kg (However, these values are subject to change, depending on the inflow gas concentration and composition.)



EBARA

SAFE - CLEAN - RELIABLE EXHAUST TREATMENT SYSTEMS FOR THE SEMICONDUCTOR INDUSTRY



Ebara has installed more Dry Scrubbers and Exhaust Treatment Systems than any other manufacturer in the world. We are the only manufacturer that can supply the total vacuum system including a proven dry vacuum pump and an exhaust treatment system to handle the needs of your facility. Ebara's safe, reliable Exhaust Treatment Systems provide a unique solution to the toxic emission problems every semiconductor facility is faced with today. The Ebara Exhaust Treatment Systems are currently used in difficult applications such as metal etch, EPI and CVD. Only Ebara has looked at the overall vacuum pumping system as a package and designed the solution to answer all of your facility's problems.

The Ebara Exhaust Treatment Systems offer you the following advantages over others:

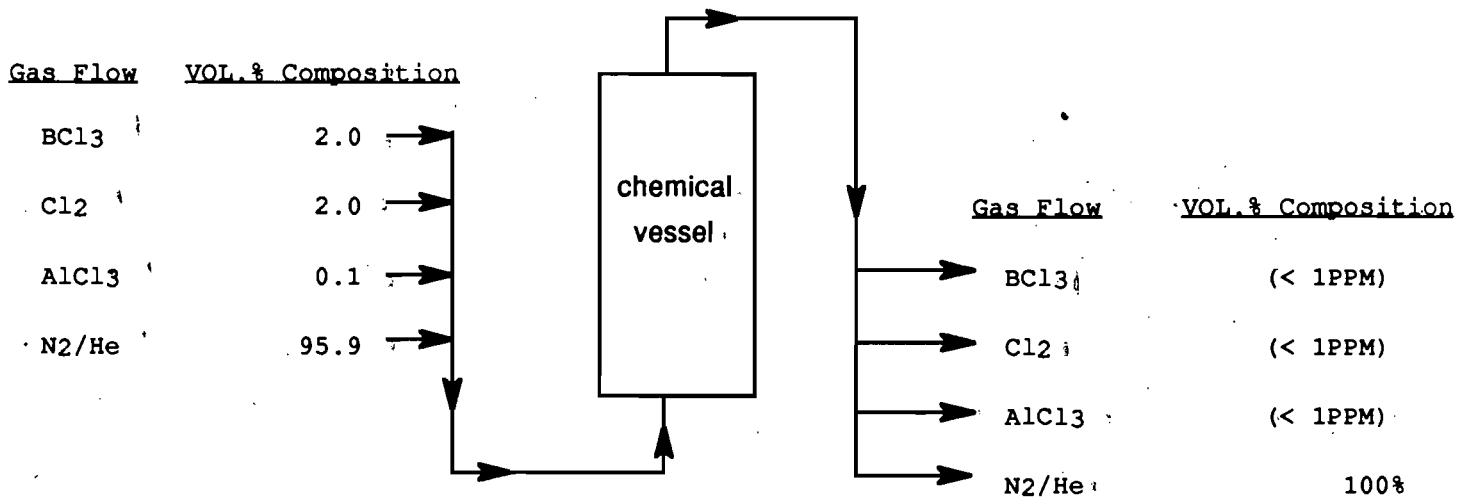
- .. Improved operating safety
- .. Improved and more economical environmental waste handling
- .. Dry Exhaust Treatment Systems for appropriate applications
- .. CDO (Controlled Decomposition and Oxidation) Systems where necessary
- .. Total vacuum system responsibility

Experience the meaning of Ebara. . .

**SAFE, CLEAN, RELIABLE
EXHAUST TREATMENT SYSTEMS**

Ebara's exhaust treatment technology meets all the design objectives required by the semiconductor industry -- enhanced reliability, improved safety, cleaner vacuum, reduced toxic exhaust management problems, increased efficiency, ease of operation, and lower cost of ownership. Even in the harshest of processes, the Ebara Oil-Free Dry Pump and Exhaust Treatment System is clearly superior to conventional systems.

To cope with the demands of the Semiconductor industry, various types of individual treatment methods have been developed to overcome the shortcomings of conventional central wet treatment or dilution methods. There are three alternatives to conventional wet exhaust treatment: full-dry, semi-dry, and CDO. An example of the first full-dry method is Ebara's GTE-3 Dry Scrubber developed to remove fluorinated (SiF4) and chlorinated (Cl) components from exhaust gases produced in dry etching processes. Removal of the fluorinated and chlorinated components is achieved by chemically reacting the exhaust gas components with proprietary alkaline reactants contained in the GTE-3 Dry Scrubber. The Dry Scrubbers employ a removable reaction vessel which the exhaust gas flows through, and when this vessel has reached its design capacity, sensitive load cells trigger alarms which warn the operator that it has to be changed. Under most process conditions the contents of the reaction vessel is able to be disposed of in a non-hazardous Class 3 landfill. The diagram below shows the gas flow through a typical GTE Dry Scrubber system.



Additional systems for other processes, including silane, are also available without the hazards of an open flame. Ebara is the only vacuum technology company which designs and tests its products under actual operating conditions before they are released to production. Only with such a strong commitment can a company manufacture such reliable products. With our variety of field proven Exhaust Treatment Systems, Ebara can solve your hazardous waste management problems you are facing today, as well as those you will encounter in the future.

If you care about improving your process, minimizing downtime and operating costs, improving your wafer production, improving your wafer yield, and improving the environment we live in, turn to the company that does also --

EBARA

WESTERN U.S.A.

EASTERN U.S.A.

EBARA TECHNOLOGIES INCORPORATED
 3560 BASSETT STREET
 SANTA CLARA, CALIFORNIA 95038
 (800) 535-5376 FAX (408) 496-2801

EBARA TECHNOLOGIES INCORPORATED
 ONE PARKLAWN DRIVE
 BETHEL, CONNECTICUT 06801
 (203) 790-1080 FAX (203) 790-7404



SPECIFICATION OF MULTI-STAGE DRY PUMP

MODEL 50 X 20 UERR6M

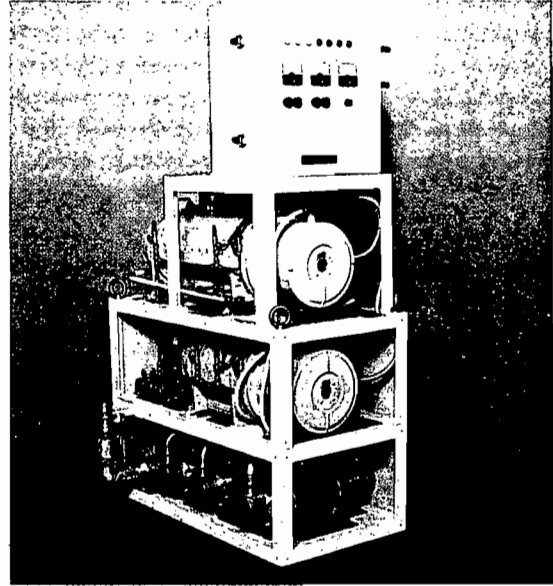
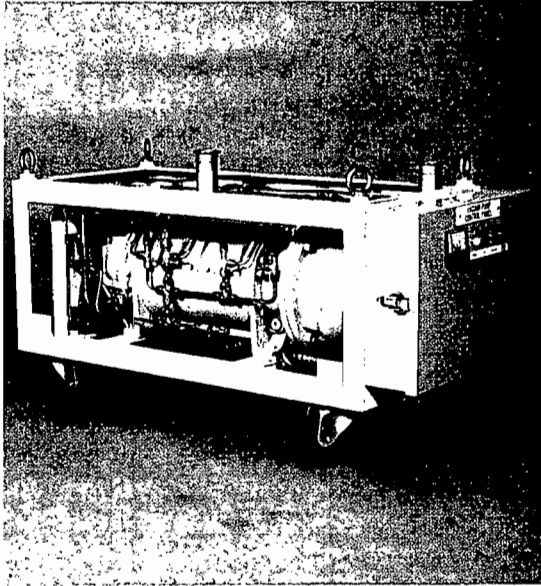
	<u>ENGLISH</u>	<u>METRIC</u>
PUMPING SPEED		
60 Hz	127 CFM	3600 L/MIN
50 HZ	106 CFM	3000 L/MIN
ULTIMATE PRESSURE	4 X 10 ⁻³	4 X 10 ⁻³
FLANGE RATING:		
INLET	----- KF 50 -----	
OUTLET	----- KF 40 -----	
N ₂ PURGE:		
INLET CONNECTION	----- 1/4" TUBE CONNECTOR -----	
PRESSURE		
REQUIRED INLET	14 TO 100 PSIG	1 - 7 KgF/CM ² G
REGULATOR GAUGE	14 PSIG	1 KgF/CM ² G
QUANTITY FOR		
SHAFT SEAL FOREPUMP	----- 9.5 SLM -----	-----
COOLING WATER:		
INLET & OUTLET CONNECTIONS	----- 3/8" NPT FEMALE -----	
PRESSURE	57 PSIG	4 KgF/CM ²
DIFFERENTIAL PRESSURE	14 - 28 PSI	1 - 2 KgF/CM ²
QUANTITY	1.3 - 2.0 GPM	5 - 8 L/MIN
LUBRICATION FLUID:		
QUANTITY	27 FLUID OZ.	0.8 LITERS
WEIGHT: TOTAL	740 LBS.	340 Kg
MOTOR - 5 HP:		
POWER	----- 3.7 KW -----	-----
VOLTAGE	----- 208 VOLT/3 PH -----	-----
CURRENT	----- 19.1 AMP -----	-----
FREQUENCY	----- 60 Hz -----	-----
ROTATING SPEED	----- 3440 RPM -----	-----

REMARKS:



EBARA

CLEAN RELIABLE OIL-FREE VACUUM PUMPS FOR THE SEMICONDUCTOR INDUSTRY



Ebara has installed more Dry Vacuum Pumps than any other manufacturer in the world. Our rugged construction and proven roots-type design ensures continuous, reliable oil-free performance. The Ebara Dry Pump is the oil-free pump which survives where other dry pumps fail: in applications such as SiN₂ LPCVD, PECVD, CVD, Metal Etch, PVD, Ion Implantation, load locks, and others. Other manufacturers claim their vacuum pumps are designed specifically for harsh semiconductor processes, but Ebara is the only vacuum pump designed and tested under actual operating conditions in our process clean room before it's released to production. Only with such a strong commitment like this can a company manufacture such a reliable product. The Ebara Dry Pump stands up to the most aggressive gases and vapors months, even years, longer than other pumps in the same application.

Ebara Dry Oil-Free Vacuum Pumps offer you the following advantages over others

- .. Improved process repeatability
- .. Increased operating safety
- .. Improved environmental waste handling with our Dry Exhaust Treatment System option
- .. Clean vacuum with no oil backstreaming with designs up to 640 CFM
- .. Lower operating cost -- no consumables for oils, filters or exhaust silencers
- .. Increased reliability - virtually maintenance free operation with field proven, continuous operation for over 12 months with no breakdowns in harsh applications

Experience the meaning of Ebara. . . .

CLEAN RELIABLE OIL-FREE VACUUM

Ebara's oil-free vacuum pumping technology meets all the design objectives for vacuum pumping systems in the semiconductor industry -- enhanced reliability, improved safety, cleaner vacuum, reduced toxic exhaust management problems, reduced maintenance, increased efficiency, ease of operation, lower operating costs, and lower cost of ownership. The Ebara Oil-Free Pump is clearly superior to conventional vacuum pumps in the harshest of processes.

Ebara Dry Pumps do not allow backstreaming of oil into the vacuum process from the pumping mechanism. While other dry pumping systems claim to produce oil-free pumping, they must incorporate a standard roots-type booster stage for most process requirements. This roots type booster has a seal design which puts only one seal between the process gas and the gear lubrication fluid. This allows the gas to migrate freely into and out of the oil filled gear casing chamber from the pumping chamber, resulting in a system not truly dry as claimed. The Ebara Dry Pump uses an improved, purged double seal design and is the only oil-free dry pump in capacities up to 640 CFM as listed below. It has been field proven to be superior to these other systems and to the conventional oil-sealed systems for harsh processing conditions. Therefore, in the semiconductor industry, the yield or wafer quality can only be improved with an Ebara vacuum system.

Pump Size	40 x 20	65 x 40	50 x 20	80 x 25	150 x 40
Number of stages	5	5	6	6	6
Displacement (swept volume)	53	124	164	383	824
Peak speed (CFM)	41	99	127	297	636
Ultimate vacuum (TORR) with full purge	30 x 10 ⁻³	30 x 10 ⁻³	4 x 10 ⁻³	4 x 10 ⁻³	4 x 10 ⁻³
Cooling water flow (l/m)	5-8	5-8	5-8	5-8	5-8
Motor Power (HP)	3 HP	5 HP	5 HP	8 HP	10 HP

If you care about improving your process, minimizing downtime and operating costs, improving your wafer production, improving your wafer yield, and improving the environment we live in, turn to the company who does also --

EBARA

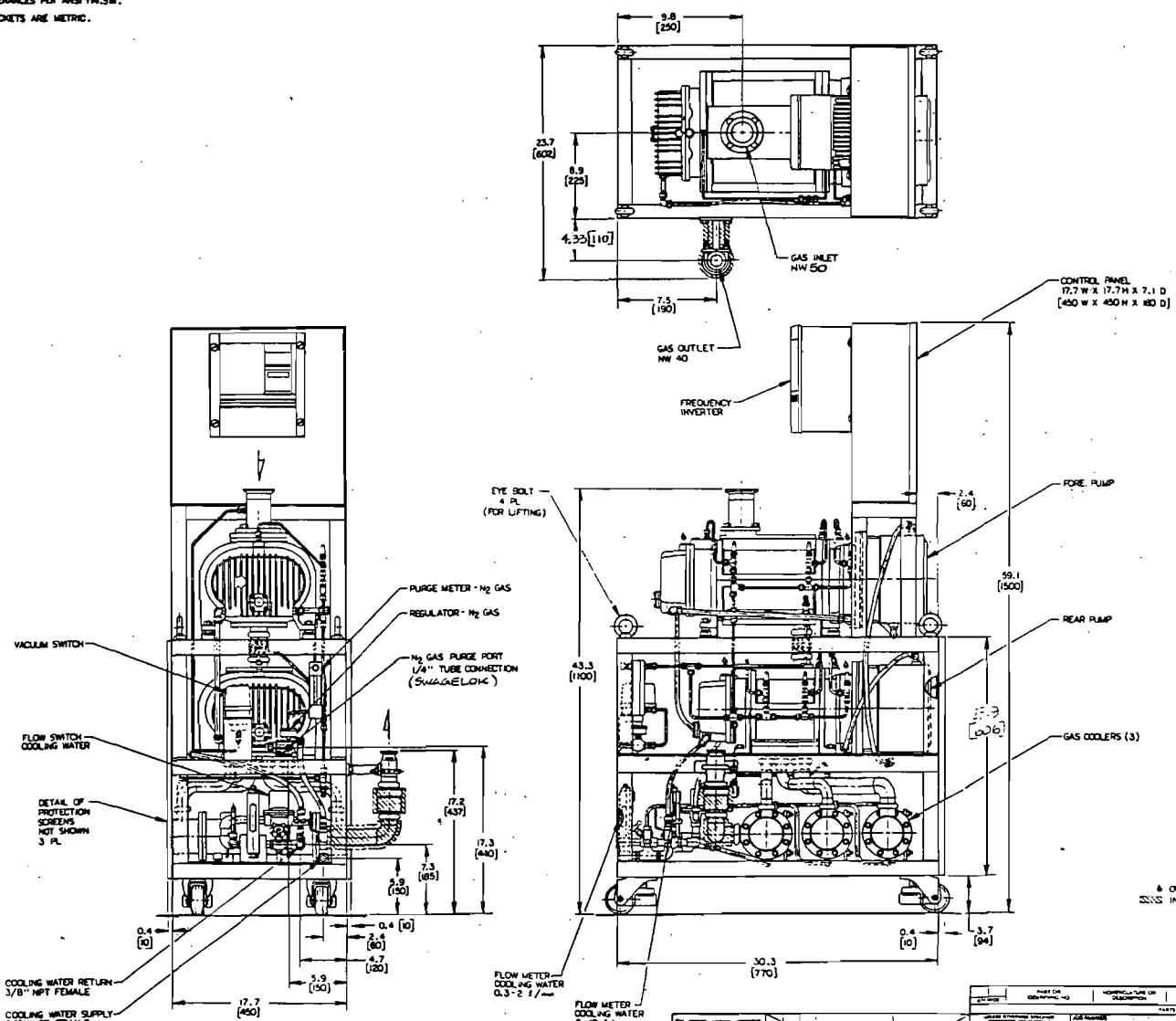
WESTERN U.S.A.

EBARA TECHNOLOGIES INCORPORATED
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 (203) 790-1080 FAX (203) 790-7404

- NOTES: UNLESS OTHERWISE SPECIFIED
1. INTERPRET DRAWING PER DOD-STD-100.
 2. INTERPRET DIMENSIONS AND TOLERANCES PER ANSI Y14.5M.
 3. DIMENSIONS AND VALUES IN BRACKETS ARE METRIC.

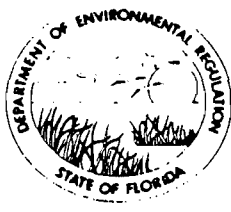


PART OR IDENTIFICATION NO. MANUFACTURE TYPE OR IDENTIFICATION STANDARD SPECIFICATION		DATE DRAWN BY CHECKED BY DESIGNED BY APPROVED BY	
STANDARD S. POLLEY		EBAAA INTERNATIONAL CORPORATION VACUUM PRODUCTS DIVISION 5000 W. 20th St. DENVER, CO. 80202	
MULTISTAGE VACUUM PUMP OUTLINE DRAWING 50 X 20 LER66M		E VPI10013	

AC 05-165757
 Bldg #4
 Harris Semiconducto
 Brevard County

STATE OF FLORIDA
 DEPARTMENT OF ENVIRONMENTAL REGULATION

TWIN TOWERS OFFICE BUILDING
 2670 BLAIR STONE ROAD
 TALLAHASSEE, FLORIDA 32399-2400



BOB MARTINEZ
 GOVERNOR
 DALE TWACHTMANN
 SECRETARY

APPLICATION FOR PERMIT TO CONSTRUCT/OPERATE AIR POLLUTANT EMISSION SOURCE

This form is not intended to be self-explanatory. An instruction booklet for air permit application forms is available from any office of the department. The booklet provides general instructions for both the applicant and the department as well as specific instructions for each numbered field.

All applicable fields must be filled in, all applicable supplemental requirements addressed, and the appropriate application fee submitted for the application to be considered complete and for the department to take action upon it. Shaded fields are reserved for DER use and must be left blank by the applicant.

APPLICATION TYPE & FACILITY IDENTIFICATION

1. Type of Permit Application (Check One)				2. Facility Identification Code				
Construction	Initial Modif.	Initial Operation	Site Cert.	Amend-ment	Dist.	Office	County	Facility
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3	0	0	5

DER Form 17-2.1000(1) - Page 1
 Effective:

Best Available Copy

CERTIFICATIONS

1. Statement By Owner Or Authorized Representative

I, the undersigned, am the owner or authorized representative* of the facility described in this application. I certify that the statements made in this application for a permit are true, correct, and complete to the best of my knowledge. Further, I agree to operate and maintain the source of air pollutants and pollution control equipment described in this application so as to comply with all provisions of Chapter 403, Florida Statutes, and all applicable rules and regulations of the Department of Environmental Regulation and revisions thereof. I also understand that a permit, if granted by the department, will be nontransferable, and I will promptly notify the department upon sale or legal transfer of the permitted source.

Attach letter of authorization if not currently on file.

Signature

Date

2. Professional Engineer Information

Name

Florida Registration Number

Organization/Firm

Street or Post Office Box

City

State

Zip

Telephone Number

3. Statement By Professional Engineer Registered In Florida (where required by Chapter 471, F.S.)

I, the undersigned, certify that the engineering features of this project have been designed or examined by me or individuals under my direct supervision and found to be in conformity with modern engineering principles applicable to the control of emissions of the air pollutants characterized in this permit application. There is reasonable assurance, in my professional judgment, that the source of air pollutants and the pollution control equipment, when properly operated and maintained, will comply with all applicable statutes of the State of Florida and all applicable rules and regulations of the Department of Environmental Regulation.

Signature

Date

(Affix Seal)

AIR020	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>	<input type="checkbox"/>
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FACILITY INFORMATION

1. Facility Owner (40 Characters) Harris Semiconductor		2. Facility Ownership Code	
3. Facility Name/Location (40 Characters) Palm Bay Road		4. Facility Loc. Zip Code 32901	
5. Facility City Palm Bay / Brevard County		6. City Code	
7. Facility Type Code/Description Y; 4-01-003-99 Tons VOC/solvent consumed		8. On Table 500-1? NO	
9. Facility UTM Coordinates (km)	Zone 17	East 538.70	North 3100.90
10. Facility Lat./Long. (o, ', ")	Latitude 28° 01' 20"		Longitude 80° 36' 10"
11. Facility Compliance Tracking Codes	CDS 1	VOC A 1a	
12. Facility Comment (60 Characters) Building 4; manufacturing integrated circuits			

AIR021	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>	<input type="checkbox"/>
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OWNER/CONTACT INFORMATION

1. Organization Authorized Representative											
Name											
L. R. Hulker, Facilities Dept.											
(40 Characters)											
Organization/Firm											
Harris Semiconductor											
(40 Characters)											
Street Address or P. O. Box						:	City				
P. O. Box 883						:	Melbourne				
State			:	Zip			:	Telephone			
Florida			:	32901			:	(407) 724-7229			
2. Facility Contact											
Name											
Same As Above											
(40 Characters)											
Organization/Firm											
(40 Characters)											
Street Address or P. O. Box						:	City				
						:					
State			:	Zip			:	Telephone			
			:				:				

SOURCE/PROCESS DESCRIPTION & PROJECT INFORMATION (DO NOT ENTER INTO APIS)

<p>1. Source Identifier</p> <div style="border: 1px solid black; width: 30px; height: 30px; margin: 10px auto;"></div>	<p>2. Current DER Permit Number</p> <p style="text-align: center;">AC 05-165757</p>
<p>3. Description of Source</p> <p style="text-align: center;">integrated circuit manufacturing</p>	
<p>4. Description of Process</p> <p style="text-align: center;">too lengthy - see Technical Evaluation or Application Attachment</p>	
<p>5. Nature and Extent of Proposed Project</p> <p style="text-align: center;">This project involves the replacement of existing control systems and the addition of 5 new reactor stations.</p>	
<p>6. Projected Dates of Commencement and Completion of Construction</p> <p style="text-align: center;">Source (Building #4) is already existing - exp. date of 12-31-90</p>	

AIRO30	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>	<input type="checkbox"/>
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SOURCE PROCESSING/TRACKING INFORMATION

1. Construction Permit/PPS Information					
Permit Number Assigned This App.	PPS Number Assigned This App.	Fee Paid			
AC 05-165757	NA	200.00			
Date Permit Issued/Site Cert. Approved MM/DD/YY			Date This Permit Expires MM/DD/YY		
09/13/89			12/31/90		
Probable Completion Date MM/DD/YY					
12/31/90					
2. Operation Permit Information					
Permit Number Assigned This App.		Fee Paid	AOR Required?		
AO -			Yes		
Date This Permit Issued MM/DD/YY			Date This Permit Expires MM/DD/YY		
3. Description of Source Addressed in This Application (60 Characters)					
Building #4 ; manufacturing of integrated circuits					
4. Source Initial Construction Date MM/DD/YY				5. Source Type Code	
original after-the-fact permitting: 6/30/84 AC05-104524				A	
6. Source SIC Code					
Major Group 36					
7. NSPS	8. NESHAP	9. III(d)	10. PSD	11. NAA NSR	12. RACT
13. Source Comment (120 Characters)					
Building #4 ; manufacturing of integrated circuits					

AIRO32	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>
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SOURCE OPERATING SCHEDULE/RATE INFORMATION

1. Typical Operating Schedule	hr/dy	dy/wk	wk/yr	
	24	7	52	
2. Typical % Hours of Operation By Season	DJF	MAM	JJA	SON
	25	25	25	25
3. Requested Operating Schedule Limit(s)	hr/dy	dy/wk	wk/yr	hr/yr
	24	7	52	8760
DO NOT ENTER INTO APIS				
4. Permitted Operating Schedule Limit(s)	hr/dy	dy/wk	wk/yr	hr/yr
	24	7	52	8760
5. Maximum Process Rate	Units			
(Really Not App)	11 TPY VOC consumed			
6. Maximum Production Rate	Units			
(Really Not App)	11 TPY VOC consumed			

AIR033	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>	<input type="checkbox"/>
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SOURCE EMISSION POINT/CONTROL INFORMATION

1. Emission Point Type 3	2. Point ID on Dia- F04301 gram	3. Sources with Common Stack		
4. Stack Height (ft) 13.5	5. Exit Diameter (ft) 26" 2.17'		6. Exit Temperature (°F) ambient (75°)	
7. Actual Volumetric Flow Rate (acfm)			8. Dry Standard Flow Rate (dscfm) 10,000	
9. Nonstack Emission Height (ft)	10. Building Dimensions (ft)	Height	Width	
11. Point UTM Coordinates (Optional) (km)	East	North	12. Good Engineering Practice Stack Height (ft)	
13. Emission Point Comment (52 Characters)				
14a. Description of Control Equipment 'a' a Harrison horizontal cross-flow fume scrubber using polypropylene plastic saddle packing for acid gas and VOC/solvent vapor removal; Model # HF-100				
14b. Description of Control Equipment 'b'				
15. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal acid and VOC/solvent contaminated water; on-site deep-well injection and pond aeration (stagnant)				

AIR033						APIS	
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SOURCE EMISSION POINT/CONTROL INFORMATION

1. Emission Point Type 3	2. Point ID on Dia- F04502 gram	3. Sources with Common Stack					
4. Stack Height (ft)		5. Exit Diameter (ft)		6. Exit Temperature (°F)			
7. Actual Volumetric Flow Rate (scfm)				8. Dry Standard Flow Rate (scfm) 6,900			
9. Nonstack Emission Height (ft)		10. Building Dimensions (ft)		Height		Width	
11. Point UTM Coordinates (Optional) (km)		East		North		12. Good Engineering Practice Stack Height (ft)	
13. Emission Point Comment (52 Characters)							
14a. Description of Control Equipment 'a' a Dual Indi horizontal cross-flow fume scrubber using polypropylene packing for acid gas and VOC/solvent vapor removal; Model # F-101							
14b. Description of Control Equipment 'b'							
15. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal							

AIR033						APIS	
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SOURCE EMISSION POINT/CONTROL INFORMATION

1. Emission Point Type 3	2. Point ID on Dia- F04503 gram	3. Sources with Common Stack					
4. Stack Height (ft)		5. Exit Diameter (ft)		6. Exit Temperature (°F) ambient (75°)			
7. Actual Volumetric Flow Rate (acfm)				8. Dry Standard Flow Rate (dscfm) 10,000			
9. Nonstack Emission Height (ft)		10. Building Dimensions (ft)		Height		Width	
11. Point UTM Coordinates (Optional) (km)		East		North		12. Good Engineering Practice Stack Height (ft)	
13. Emission Point Comment (52 Characters)							
14a. Description of Control Equipment 'a' a Harrison horizontal cross-flow							
14b. Description of Control Equipment 'b'							
15. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal							

AIR033	□	□	□	□	□	□	□	APIS	□	□
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SOURCE EMISSION POINT/CONTROL INFORMATION

1. Emission Point Type 3	2. Point ID on Diagram F04504	3. Sources with Common Stack		
4. Stack Height (ft)	5. Exit Diameter (ft)	6. Exit Temperature (°F)		
7. Actual Volumetric Flow Rate (acfm)		8. Dry Standard Flow Rate (dscfm)		
9. Nonstack Emission Height (ft)	10. Building Dimensions (ft)	Height	Width	
11. Point UTM Coordinates (Optional) (km)	East	North	12. Good Engineering Practice Stack Height (ft)	
13. Emission Point Comment (52 Characters)				
14a. Description of Control Equipment 'a'				
14b. Description of Control Equipment 'b'				
15. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal				

AIR033						APIS	
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SOURCE EMISSION POINT/CONTROL INFORMATION

1. Emission Point Type 3	2. Point ID on Dia-gram FOY805	3. Sources with Common Stack					
4. Stack Height (ft)		5. Exit Diameter (ft)		6. Exit Temperature (°F)			
7. Actual Volumetric Flow Rate (acfm)				8. Dry Standard Flow Rate (dscfm)			
9. Nonstack Emission Height (ft)		10. Building Dimensions (ft)		Height		Width	
11. Point UTM Coordinates (Optional) (km)		East		North		12. Good Engineering Practice Stack Height (ft)	
13. Emission Point Comment (52 Characters)							
14a. Description of Control Equipment 'a'							
14b. Description of Control Equipment 'b'							
15. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal							

AIR033						APIS	
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SOURCE EMISSION POINT/CONTROL INFORMATION

1. Emission Point Type 3	2. Point ID on Dia- FO4506 gram	3. Sources with Common Stack					
4. Stack Height (ft)		5. Exit Diameter (ft)		6. Exit Temperature (°F)			
7. Actual Volumetric Flow Rate (acfm)				8. Dry Standard Flow Rate (dscfm)			
9. Nonstack Emission Height (ft)		10. Building Dimensions (ft)		Height		Width	
11. Point UTM Coordinates (Optional) (km)		East		North		12. Good Engineering Practice Stack Height (ft)	
13. Emission Point Comment (52 Characters)							
14a. Description of Control Equipment 'a'							
14b. Description of Control Equipment 'b'							
15. Liquid/Solid Wastes Generated by Control Equipment and Methods/Locations of Disposal							

AIR034	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>
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SOURCE PROCESS INFORMATION (PAGE __ OF __)

1. Component Process or Type of Fuel Employed			
2. Source Classification Code for Above Process/Fuel		3. Requested Annual Rate Limit DO NOT ENTER INTO APIS	
4. Rate Unit Code	5. Maximum Hourly Rate	6. Permitted Annual Rate Limit	
7. Estimated Annual Rate	8. % Sulfur in Fuel	9. % Ash in Fuel	10. 10 ⁶ Btu/Unit (as Fired) in Fuel
11. SCC Comment for Above Process/Fuel (52 Characters)			

1. Component Process or Type of Fuel Employed			
2. Source Classification Code for Above Process/Fuel		3. Requested Annual Rate Limit DO NOT ENTER INTO APIS	
4. Rate Unit Code	5. Maximum Hourly Rate	6. Permitted Annual Rate Limit	
7. Estimated Annual Rate	8. % Sulfur in Fuel	9. % Ash in Fuel	10. 10 ⁶ Btu/Unit (as Fired) in Fuel
11. SCC Comment for Above Process/Fuel (52 Characters)			

Best Available Copy

AIR037	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>
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RFP INFORMATION

1. RFP Tracked?		
2. Base Year Actual Emissions		
Base Year	VOC (lb/day)	NOX (lb/day)
:	:	:
:	:	:
:	:	:
3. Projected Year Allowable Emissions		
Proj. Year	VOC (lb/day)	NOX (lb/day)
:	:	:
:	:	:
:	:	:
4. Comments		

AIR038	□	□	□	□	□	□	APIS	□	□
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PSD INFORMATION

1. PSD Increment Consuming/Expanding?	
2. Baseline Emissions:	
SO2 Short Term (lb/hr)	SO2 Annual (ton/yr)
PM Short Term (lb/hr)	PM Annual (ton/yr)
3. Comments	

AIR040	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>	<input type="checkbox"/>
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POLLUTANT INFORMATION (PAGE __ OF __)

1. Pollutant Emitted ID	2. Total % Efficiency of Control
3. Primary Control Device Code	4. Secondary Control Device Code
5. Emission Factor	6. Emission Factor Reference
7. Potential Emission : (lb/hr)	: (ton/yr)
8. Estimated Emission (ton/yr)	9. Emission Estimate Method Code
10. Requested Emission Limit(s) : lb/hr : ton/yr DO NOT ENTER INTO APIS	11. Requested Emission Limit in Units Other Than lb/hr DO NOT ENTER INTO APIS
12. Allowable Emissions : lb/hr : ton/yr	13. Allowable Emission in Units Other Than lb/hr
14. Regulation Code	15. CEM Required?
16. Compliance Test Frequency	17. Frequency Base Date
18. Pollutant Comment (60 Characters)	

AIR042	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>
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VISIBLE EMISSIONS INFORMATION (PAGE OF)

1. Visible Emissions Subtype							
ID							
2. Requested Opacity Limit(s)	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center; border-right: 1px dashed black;">Normal Conditions</td> <td style="width: 50%; text-align: center;">Exceptional Conditions</td> </tr> <tr> <td style="text-align: center; border-right: 1px dashed black;">%</td> <td style="text-align: center;">%</td> </tr> <tr> <td style="text-align: center; border-right: 1px dashed black;">DO NOT ENTER INTO APIS</td> <td style="text-align: center;">min/hr</td> </tr> </table>	Normal Conditions	Exceptional Conditions	%	%	DO NOT ENTER INTO APIS	min/hr
Normal Conditions	Exceptional Conditions						
%	%						
DO NOT ENTER INTO APIS	min/hr						
3. Allowable Opacity	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center; border-right: 1px dashed black;">Normal Conditions</td> <td style="width: 50%; text-align: center;">Exceptional Conditions</td> </tr> <tr> <td style="text-align: center; border-right: 1px dashed black;">%</td> <td style="text-align: center;">%</td> </tr> <tr> <td style="text-align: center; border-right: 1px dashed black;"></td> <td style="text-align: center;">min/hr</td> </tr> </table>	Normal Conditions	Exceptional Conditions	%	%		min/hr
Normal Conditions	Exceptional Conditions						
%	%						
	min/hr						
4. Regulation Code	5. CEM Required?						
6. Test Frequency	7. Frequency Base Date						

AIR043								APIS	
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FUGITIVE EMISSIONS INFORMATION (PAGE __ OF __)

1. Fugitive Pollutant Emitted
ID
2. Fugitive Emission Source and Control Information
3. Quantifiable Fugitive Emission (ton/yr)

AIR046																			APIS		
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TOXIC POLLUTANT INFORMATION PART I (PAGE PAIR __ OF __)

'RESERVED'																				
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AIR047

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APIS

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TOXIC POLLUTANT INFORMATION PART II (PAGE PAIR ___ OF ___)

'RESERVED'

AIR060	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>
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BOILER INFORMATION

1. Boiler Manufacturer
2. Boiler Model Number
3. Boiler Type
4. Maximum Heat Input Rate (10^6 Btu/hr)
5. Maximum Steam Production Rate (lb/hr) and/or Horsepower
6. Generator Nameplate Rating (gross MW)
7. Boiler Comment (104 Characters)

INCINERATOR/RESOURCE RECOVERY INFORMATION

1. Incinerator Manufacturer													
2. Incinerator Type													
3. Incinerator Maximum Capacity	lb/hr : : ton/day												
4. Dwell Time/Temperature sec. @ °F	5. Afterburner Temperature °F												
6. Type(s) of Waste Incinerated <table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">_ (Trash 0)</td> <td style="width: 33%;">_ (Rubbish 1)</td> <td style="width: 33%;">_ (Refuse 2)</td> </tr> <tr> <td>_ (Garbage 3)</td> <td>_ (Organic 4)</td> <td>_ (Nonsolid By-Prod 5)</td> </tr> <tr> <td>_ (Solid By-Prod 6)</td> <td>_ (MSW 7)</td> <td>_ (Hazardous Waste 8)</td> </tr> <tr> <td colspan="3">_ (Other) Description</td> </tr> </table>		_ (Trash 0)	_ (Rubbish 1)	_ (Refuse 2)	_ (Garbage 3)	_ (Organic 4)	_ (Nonsolid By-Prod 5)	_ (Solid By-Prod 6)	_ (MSW 7)	_ (Hazardous Waste 8)	_ (Other) Description		
_ (Trash 0)	_ (Rubbish 1)	_ (Refuse 2)											
_ (Garbage 3)	_ (Organic 4)	_ (Nonsolid By-Prod 5)											
_ (Solid By-Prod 6)	_ (MSW 7)	_ (Hazardous Waste 8)											
_ (Other) Description													
7. Generator Nameplate Rating (gross MW)													
8. Incinerator Comment (104 Characters)													

AIR062	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	APIS	<input type="checkbox"/>	<input type="checkbox"/>
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STORAGE TANK INFORMATION (PAGE OF)

1. Liquid Storage Tank ID	2. Storage Tank Type of Control
3. Storage Tank Product	4. Storage Tank Size Category (bbl)
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 10,500 67,000 250,000
5. Storage Tank Capacity (10 ³ gal)	6. Storage Tank Est. Annual Throughput (10 ³ gal)
7. Storage Tank Comment (60 Characters)	

1. Liquid Storage Tank ID	2. Storage Tank Type of Control
3. Storage Tank Product	4. Storage Tank Size Category (bbl)
	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 10,500 67,000 250,000
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	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 10,500 67,000 250,000
5. Storage Tank Capacity (10 ³ gal)	6. Storage Tank Est. Annual Throughput (10 ³ gal)
7. Storage Tank Comment (60 Characters)	

SUPPLEMENTAL REQUIREMENTS

1. If not submitted previously, provide an up-to-date 8-1/2" x 11" map (e.g., the relevant portion of a USGS topographic map) showing the location of the facility and points of air pollutant emissions in relation to residences, roads, and other features of the surrounding area. Attached Submitted Previously
2. If not submitted previously, provide an up-to-date 8-1/2" x 11" plot plan of the facility showing the location of manufacturing processes, control equipment, stacks, vents, and sources of fugitive emissions. Attached Submitted Previously
3. If not submitted previously, provide an up-to-date 8-1/2" x 11" flow diagram identifying the individual operations and processes. Indicate where raw materials enter, where solid and liquid wastes exit, where gaseous and/or particulate emissions are evolved, and where finished products are obtained. Attached Submitted Previously
4. For a construction permit application, provide an estimate of the maximum uncontrolled emission rate (in lb/hr) of each pollutant emitted and show the derivation of each such estimate (e.g., AP-42 emission factor). For a construction permit application involving the combustion of any fuel other than distillate oil, liquefied petroleum gas, or natural gas, provide an ultimate analysis of the fuel to be used. The ultimate analysis should give the density, the heat content, and the percent content by weight of carbon, hydrogen, oxygen, sulfur, nitrogen, ash, and moisture.
5. For a construction permit application, show the bases of the potential (after control) emission estimates (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and describe the proposed methods for showing proof of compliance with any applicable emission limiting standards.
6. For a construction permit application, provide design details for all air pollution control systems (e.g., for baghouse, include cloth to air ratio; for scrubber, include cross-section sketch, design pressure drop, etc.). For each such system, provide either a copy of the manufacturer's guarantee of control efficiency or an engineering estimate of control efficiency as certified by a registered professional engineer. Items 4, 5, and 6 should be consistent; i.e., $\text{Uncontrolled Emission} = (\text{Potential Hourly Emission}) / (1 - \text{Control Efficiency})$.
7. For a construction permit application subject to review under Rule 17-2.500, "Prevention of Significant Deterioration," or Rule 17-2.510, "New Source Review for Nonattainment Areas," provide all additional information required by the department under such rule (e.g., summary of contemporaneous emission changes, BACT or LAER evaluation, monitoring data, summary of modeling results, one copy of all pertinent model output, etc.).
8. For a permit application subject to the "Reasonably Available Control Technology" provisions of Rule 17-2.650, provide all additional information required by the department under that rule.
9. For a permit application involving the incineration of hazardous wastes, provide all additional information required by the department under Rule 17-30 and Chapter 403, Florida Statutes.
10. Submit the appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Florida Department of Environmental Regulation.



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION NOTICE OF PERMIT

Mr. L. R. Hutker, P.E.
Director, Facilities Department
Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

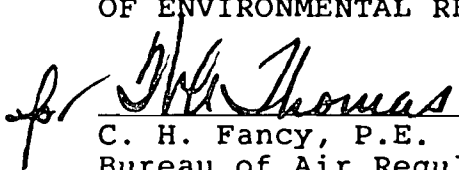
September 13, 1989

Enclosed is construction permit No. AC 05-165757 for Harris Semiconductor to consolidate permits previously issued for Building No. 4 and to construct two new two staged scrubber systems at Harris Semiconductor's existing facility in Palm Bay, Brevard County Florida. This permit is issued pursuant to Section 403, Florida Statutes.

Any party to this permit has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this permit is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION


C. H. Fancy, P.E.
Bureau of Air Regulation

Copy furnished to:

C. Collins, Central District
N. Baldisseroto, Harris Semiconductor

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF PERMIT and all copies were mailed before the close of business on 9-15-89.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to
§120.52(9), Florida Statutes, with
the designated Department Clerk,
receipt of which is hereby
acknowledged.

Martha J. Wise 9-15-89
Clerk Date

Final Determination

**Harris Semiconductor
Brevard County
Palm Bay, Florida**

**Construction Permit Number
AC 05-165757**

**Florida Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Regulation**

September 8, 1989

Final Determination

The construction permit application has been reviewed by the Department. Public Notice of the Department's Intent to Issue was published in the Florida Today Newspaper on August 11, 1989. The Technical Evaluation and Preliminary Determination were available for public inspection at the DER's Central District and Division of Air Resources Management offices.

There were no comments received on the proposed action. Therefore, it is recommended that the proposed construction permit be issued as drafted.

CAPE PUBLICATIONS, INC.

The Times
Published Weekly on Wednesdays

RECEIVED

AUG 14 1989

DER - BAQM

THE TRIBUNE

Published Weekly on Wednesdays



Published Daily

STATE OF FLORIDA
COUNTY OF BREVARD

Before the undersigned authority personally appeared Linda L. Spicer who on

oath says that he/she is Legal Advertising Clerk

of the FLORIDA TODAY, a newspaper published in Brevard County,

Florida; that the attached copy of advertising being a

Legal Notice

in the matter of

permit to consolidate multiple permits previously issued for

Building No. 4 in the _____ Court

was published in the FLORIDA TODAY NEWSPAPER

in the issues of August 11, 1989

Affiant further says that the said FLORIDA TODAY NEWSPAPER

is a newspaper published in said Brevard County, Florida and that the said newspaper has heretofore been continuously published in said Brevard County, Florida regularly as stated above, and has been entered as second class mail matter at the post office in COCOA,

said Brevard County, Florida for a period of one year next preceeding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in said newspaper.

Linda L. Spicer

Sworn and subscribed to before me this

11th day of August A.D., 19 89

Chalky [Signature]

Notary Public
State of Florida at Large
Commission Expires March 29, 1992

State of Florida
Department of
Environmental Regulation
Notice of Intent to Issue
The Department of Environmental Regulation gives notice of its intent to issue a permit to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits take place; and, to construct install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future. The proposed project will occur at the applicant's existing facility located on Palm Bay Road, City of Palm Bay, in Brevard County, Florida. A determination of Best Available Control Technology (BACT) was not required. The Department is issuing this intent to issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2400 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The petition shall contain the following information:

- (a) The name, address and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. A.C.R. 12D-1.01. The Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.307 F.A.C.

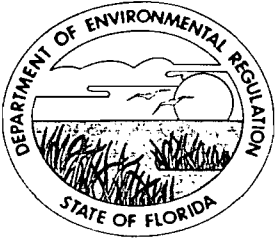
The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at: Department of Environmental Regulation, Bureau of Air Quality Management, 2400 Blair Stone Road, Tallahassee, Florida 32399-2400.

Department of Environmental Regulation
Central District office
3319 Maguire Blvd., Suite 332
Orlando, Florida 32803-3767

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 14 days of the publication of this notice

Department of Environmental Regulation
3319 Maguire Blvd., Suite 332
Orlando, Florida 32803-3767

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Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

PERMITTEE:
Harris Semiconductor
P. O. Box 883
Melbourne, FL 32901

Permit Number: AC 05-165757
Expiration Date: December 31, 1990
County: Brevard
Latitude/Longitude: 28°01'20"N
80°36'10"W
Project: Building 4

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. 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:

For the permitting of Building 4, in order to consolidate multiple permits previously issued for this building/source and to allow the construction/installation of new two-staged (venturi and packed-bed) scrubber systems, which will remove acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

- o F04S01: a Harrison 10,000 scfm horizontal cross-flow fume scrubber using polypropylene plastic saddle packing for acid gas and VOC/solvent vapor removal; Model No. HF-100;
- o F04S02: a Duall Ind. 6,900 cfm horizontal cross-flow fume scrubber using polypropylene packing for acid gas and VOC/solvent vapor removal; Model No. F-101;
- o F04S03: a Harrison 10,000 scfm horizontal cross-flow fume scrubber using polypropylene plastic saddle packing for acid gas and VOC/solvent vapor removal; Model No. HF-100;
- o F04S04: a 10,450 cfm fume scrubber for acid gas removal;
- o F04S05: a Beverly Pacific 1,000 scfm vertical counter-current fume scrubber using polypropylene packing for acid gas (sil-tet loading) removal; Model No. PS-2VT; and,
- o F04S06: Epi and poly reactor two-stage ejector venturi scrubber systems; also, a two-stage ejector venturi scrubber system to service the Tylan system: all to be updated once contracted, installed, tested and analyzed.

The building/source is located at the permittee's existing facility located on Palm Bay Road, in the City of Palm Bay. The UTM coordinates are Zone 17, 538.7 km East and 3100.9 km North.

The Source Classification Codes are: Major Group 36
o Cold Solvent Cleaning/ 4-01-003-99 Tons VOC/Solvent
Stripping Consumed

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

The source shall be in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. Application to Construct Air Pollution Sources, DER Form 17-1.202(1), and Mr. L. R. Hutker's cover letter received June 2, 1989.
2. Ms. Nancy Baldisserotto's letter with attachment received July 17, 1989.
3. Technical Evaluation and Preliminary Determination dated August 3, 1989.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

- a. Have access to and copy any records that must be kept under the conditions of the permit;
- b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- a. a description of and cause of non-compliance; and
- b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. .

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

14. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. The maximum allowable VOC/solvent emissions from Building No. 4 shall be 11.0 tons per year.
2. The VOC/solvent vapor and acid gas exhaust scrubbers must be on during the working hours.
3. Permitted hours of operation are 8760.
4. Objectionable odors shall not be allowed off plant property pursuant to F.A.C. Rule 17-2.620(2).
5. An inspection and maintenance plan shall be submitted to the DER's Central District office as part of the operating permit application. The plan shall include provisions for the prevention and correction of VOC/solvent losses from leaks and equipment malfunctions.
6. By March 31 of each calendar year, an annual operating report shall be submitted to the DER's Central District office demonstrating compliance with the VOC/solvent emissions limit for Building No. 4. The emissions shall be determined by a material balance scheme, verifiable on a monthly basis, and shall include the following:
 - a) a beginning inventory of full containers, cylinders and storage tanks at the beginning of each calendar year;
 - b) plus all purchased deliveries after the beginning inventory (verifiable by invoices);

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

SPECIFIC CONDITION:

- c) minus all quantities picked-up and shipped-off the premise after the beginning inventory (verifiable by invoices);
- d) minus all quantities deep well injected during the calendar year, justified by assumptions and established scrubber efficiencies; and,
- e) minus an ending inventory of full containers, cylinders, and storage tanks; and, should occur at the beginning of the following calendar year.

7. Each scrubber system's efficiency and potential VOC/solvent emissions shall be established by a sampling and analysis program, which includes:

- a) a sample shall be taken annually from each scrubber stack and analyzed using EPA Reference Method 25 or, with Department approval, EPA Reference Method 25A, 40 CFR 60, Appendix A;
- b) the DER's Central Florida District office shall receive at least 15 days notice in writing prior to sampling; and,
- c) the report, summarizing the sampling results, shall be submitted to the DER's Central District office within 45 days after the last test run is completed.

8. This permit will supercede all other permits previously issued on this source/Building No. 4.

9. The source/Building No. 4 is subject to all applicable provisions of F.A.C. Chapters 17-2 and 17-4.

10. Projected potential acid emissions are 1.5 TPY (to be amended after testing and analyses have been performed on the new scrubber systems for the epi and poly reactors and Tylan system).

11. Building No. 4 is subject to the provisions of F.A.C. Rules 17-2.240: Circumvention; 17-2.250: Excess Emissions; and, 17-4.130: Plant Operation - Problems.

12. Any modification pursuant to F.A.C. Rule 17-2.100(119), Modification, shall be submitted to the DER's Central District office and the Bureau of Air Regulation office for approval.

13. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the BAR prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

PERMITTEE:
Harris Semiconductor

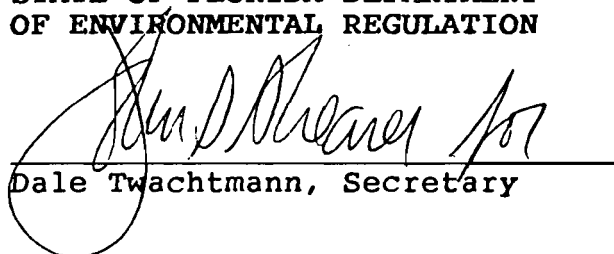
Permit Number: AC 05-165757
Expiration Date: December 31, 1990

SPECIFIC CONDITIONS:

14. An application for an operation permit must be submitted to the Central District office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever comes first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rule 17-4.220).

Issued this 13th day
of September, 1989

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION


Dale Twachtmann, Secretary



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

August 3, 1989

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

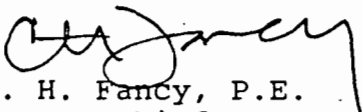
Mr. L. R. Hutker, P.E.
Director, Facilities Department
Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

Dear Mr. Hutker:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permit for Harris Semiconductor to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits take place; and, to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

Please submit any written comments you wish to have considered concerning the Department's proposed action to Mr. Bill Thomas of the Bureau of Air Quality Management.

Sincerely,


C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/kt

Attachments

cc: C. Collins, C District
N. Baldisserotto, HS

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Application for Permit by:

Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

DER File No. AC 05-165757

INTENT TO ISSUE

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit (copy attached) for the proposed project as detailed in the application specified above. The Department is issuing this Intent to Issue for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, Harris Semiconductor, applied on March 6, 1989, to the Department of Environmental Regulation for a permit to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits takes place; and, to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

The Department has permitting jurisdiction under Chapter 403, Florida Statutes, and Florida Administrative Code Rules 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that an air construction permit is required for the proposed work.

Pursuant to Section 403.815, F.S. and DER Rule 17-103.150, F.A.C., you (the applicant) are required to publish at your own expense the enclosed Notice of Intent to Issue Permit. The notice shall be published one time only within 30 days, in the legal ad section of a newspaper of general circulation in the area affected. For the purpose of this rule, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. The applicant shall provide proof of publication to the Department, at the address specified within seven days of publication. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permit.

The Department will issue the permit with the attached conditions unless a petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, F.S.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within 14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of receipt of this intent, whichever first occurs. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information;

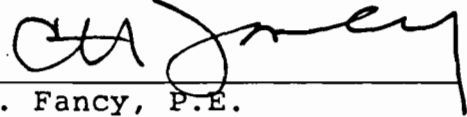
- (a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application(s) have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office in General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such

person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION



C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

Copies furnished to:

C. Collins, C District
L. R. Hutker, P.E., HS

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF INTENT TO ISSUE and all copies were mailed before the close of business on 8-3-89.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to
§120.52(9), Florida Statutes, with
the designated Department Clerk,
receipt of which is hereby
acknowledged.

Martha J. Wise
Clerk

8-3-89
Date

State of Florida
Department of Environmental Regulation
Notice of Intent to Issue

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits take place; and, to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future. The proposed project will occur at the applicant's existing facility located on Palm Bay Road, City of Palm Bay, in Brevard County, Florida. A determination of Best Available Control Technology (BACT) was not required. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information;

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by Petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Department of Environmental Regulation
Central District Office
3319 Maguire Blvd., Suite 232
Orlando, Florida 32803-3767

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 14 days of the publication of this notice will be considered in the Department's final determination.

Technical Evaluation
and
Preliminary Determination

Harris Semiconductor
Brevard County
Palm Bay, Florida

Construction Permit Number:
AC 05-167757

Florida Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Quality Management
Central Air Permitting

August 3, 1989

I. Application

A. Applicant

Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

B. Project and Location

The applicant has applied for a construction permit to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits take place; and, to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

The existing facility is located on Palm Bay Road, City of Palm Bay, Florida. The UTM coordinates are Zone 17, 538.7 km East and 3100.9 km North.

C. Process and Controls

1. Building 4

The primary manufacturing operations in Building 4 are materials fabrication where the initial steps in the manufacturing of integrated circuits take place. A variety of research and development experiments are performed under exhausted wet stations. Wet stations, water scrubbing units, bake ovens and spin rinse dryers are utilized for cleaning and drying of wafer surfaces. Exhausted chemical cabinets hold virgin chemicals until they are ready for use. In addition, several waste collection areas are also exhausted to control systems.

The source/building presently contains 31 exhausted wet stations. Approximately one-fifth of these house vats containing solvents. Three of these stations have heated solvent vats and three stations have covered solvent vats.

a. Epideposition and Polydeposition Reactor Scrubbers

The existing poly and epi reactor scrubber systems will be replaced with two-stage ejector venturi scrubber systems. Each reactor will have its own first-stage ejector venturi scrubber. After passing through an impingement section of the scrubber system, the gas will be forced through a liquid trap, combined with other scrubber gases, and fed to packed bed scrubbing units where second-stage scrubbing occurs. Each second stage unit will consist of an ejector venturi gas scrubber with a vertical packed bed.

The Tylan system, which is a support system to the poly reactors, will have its own dedicated first-stage scrubber system and will exhaust to a common second-stage unit as well.

Makeup water will be provided via a primary source, treated acid wastewater from Semiconductor's on-site wastewater treatment plant, and a secondary source, reclamation water from the Harris' groundwater remediation project. The water will be fed to closed top sumps that will provide the water supply to the scrubbers in the first stage, and to the packed bed scrubber sumps in the second stage. The water will be recirculated from the sumps to the individual venturi scrubbers in the first stage, and from the packed bed scrubber sumps to the venturi scrubbers in the second stage. Caustic will be automatically injected into the sumps in order to prevent solidification of silane compounds. Scrubber sump blowdown water will be sent to Semiconductor's on-site wastewater treatment plant.

In addition to the poly and epi reactor scrubbers, other control equipment is employed to control emissions from process exhaust in Building 4. The following is a description of each of these exhaust systems:

- F04S01 - Combined solvent/acid scrubber; services gas cabinets in HPM room as well as equipment in Tube Clean and Epi rooms. The gas cabinets are exhausted as a precautionary measure. Most of the contaminants entering this system would be a result of the cleaning operations under the exhausted hoods. It also provides purge line exhaust for the hydrogen chloride tube trailer outside of Building 4. When the hydrogen chloride lines are purged, the resulting pressure is relieved by venting the air to F04S01. The system also treats vent exhaust from the silicon tetrachloride ('sil-tet') storage area. In the sil-tet storage area, silicon tetrachloride is transferred from large drums to smaller drums for manufacturing use. The air displaced from the smaller drums is vented to F04S01. Air flow to the scrubber from both the HCl tube trailer and the sil-tet drums is manually controlled by valves.
- F04S02 - Combined solvent/acid scrubber; services furnaces, wet stations, and process equipment in the Diffusion area.
- F04S03 - Combined solvent/acid scrubber; services equipment in Backlap, Wet Chemistry, DI Grind, Electrochemistry, Polish, Final Screen, and Engineering lab areas.
- F04S04 - Acid scrubber; services exhaust from equipment in Wet Chemistry, Diffusion, Electrochemistry/Polish, and Engineering lab areas.

F04S05 - Services the silicon tetrachloride storage area located outside of the building. The scrubber treats emissions that may occur in the storage confinement as a result of system leaks and/or spills. The unit is turned on as a precautionary measure for approximately one hour a day when silicon tetrachloride is being transferred from the large storage drum to smaller drums for manufacturing use.

F04S08 - Facilities I.D. number assigned to an exhaust fan (also referred to as fan No. F04E20), which provides exhaust to equipment in the Photoresist and Wet Chemistry areas.

In addition to the above mentioned systems, several fans are used to provide heat exhaust for process equipment (i.e., F04E07, F04E08 and F04E12, which exhaust heat generated from the Epi, Poly and Gemini reactors; and, F04E10, F04E12 and F04E27, which exhaust heat from diffusion furnaces). It should be noted that no chemically contaminated exhaust is contained in these heated air streams; in each case where contaminated exhaust exists, the exhaust is ducted through separate lines to wet scrubbers.

In addition, exhaust fans F04E18 and F04E23 handle process exhaust from wafer grinders.

2. General

A material balance scheme will be used to account for the annual VOC/solvent emissions released into the atmosphere by the building/source and facility. A program of sampling and analysis will be used to assess the VOC/solvent emissions from each building/source.

The Standard Industrial Classification Codes are:

- o Major Group 36: Electrical and Electronic Machinery, Equipment, and Supplies
- o Industry Group No. 367: Electronic Components and Accessories
- o Industry No. 3674: Semiconductors and Related Devices

The Source Classification Codes are: Major Group 36 - Cold Solvent Cleaning/Stripping

- o Building 4 4-01-003-99 Tons VOC/solvent consumed

II. Rule Applicability

The proposed project is subject to preconstruction review under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code (F.A.C.) Chapters 17-2 and 17-4.

The application package was deemed complete on June 2, 1989.

The existing facility is located in an area designated attainment for all pollutants.

Since the facility is not one of those contained in Table 500-1, F.A.C. Chapter 17-2, the VOC/solvent threshold for triggering new source review pursuant to F.A.C. Rule 17-2.500(5) is 250 TPY.

The following table presents the projected potential acid emissions from Building No. 4:

Table 1

Source	Potential Acid Emissions (TPY)
Building 4	
o F04S01	0.04
o F04S02	1.06
o F04S03	0.10
o F04S04	0.26
o F04S05	0.02
Total:	1.48

Note: o Annual hours of operation at 8760.

o The potential acid emissions from the proposed new epi and poly reactor scrubber systems are not included; to be quantified after installation through testing and analysis. The above also applies to the proposed new Tylan system scrubber system.

The following table presents the projected potential VOC/solvent emissions from the entire facility:

Table 2

Building	Potential VOC/solvent Emissions (TPY)
4	10.96
51	33.29
54	95.65
57	1.66
58	3.24
59	0.50
60	trace
61	0.25
62	0.83
63	6.14
Total:	152.50

Note: Annual hours of operation at 8760.

Since the potential emissions are less than 250 TPY for the facility, the potential emissions projected from Building 4 will be reviewed pursuant to F.A.C. Rule 17-2.520, Sources Not Subject to Prevention of Significant Deterioration or Nonattainment Requirements.

Since there is no specific emission limiting standard contained in F.A.C. Rule 17-2.600 nor are there any standards of performance for new stationary sources contained in F.A.C. Rule 17-2.660, the source/Building 4 will be permitted in accordance with F.A.C. Rule 17-2.620, General Pollutant Emission Limiting Standards.

In F.A.C. Rule 17-2.620(1)(a), no person shall store, pump, handle, process, load, unload or use in any process or installation volatile organic compounds or organic solvents without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department. Pursuant to F.A.C. Rule 17-2.620(2), no person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor. Objectionable odor is defined as any odor present in the outdoor atmosphere which, by itself or in combination with other odors, is or may be harmful or injurious to human health or welfare, which unreasonably interferes with the comfortable use and enjoyment of life or property, or which creates a nuisance according to F.A.C. Rule 17-2.100(132).

The building operations/source is subject to the provisions of F.A.C. Rules 17-2.240: Circumvention; 17-2.250: Excess Emissions; and, 17-4.130: Plant Operation - Problems.

III. Summary of Emissions

A. Emission Limitations

The regulated pollutant emissions from this building/source are VOC/solvents in accordance with F.A.C. Rule 17-2.620.

Specific acid solutions are also being used during the manufacturing operations. There are no specific emission limiting standards for these specific acids. However, the acid vapors will be scrubbed to reduce emissions.

The following table presents the maximum allowable VOC/solvent emissions and the potential acid vapor emissions from Building 4 in TPY:

Table 3

Building	Maximum Allowable VOC/Solvent Emissions	Potential Acid Vapor Emissions
4	11.0	1.5

Note: o Annual hours of operation at 8760.

o Potential acid emissions to be revised after scrubber system installations (epi and poly reactors and Tylan system), testing and analysis.

The permitted emissions are in compliance with all requirements of F.A.C. Chapters 17-2 and 17-4.

B. Air Quality Impacts

From the technical review of the application packages and supplementary material, an air quality analysis was not required.

V. Conclusion

A system of material balance and sampling/analysis will be used to account for and verify pollutant emissions from the facility and each building/source and their associated scrubber systems.

Based on the information provided by Harris Semiconductor, the Department has reasonable assurance that the consolidation of multiple permits previously issued for this source/building and the construction/installation of the new two-staged (venturi and packed-bed) scrubber systems, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2, of the Florida Administrative Code.

J. H. Thomas
8/3/89



July 14, 1989

Mr. Bruce Mitchell
Engineer
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: Bldg. 4 Consolidated Air Permit Application
Pending FDER Permit No. AC 05-165757
HARRIS SEMICONDUCTOR

Dear Mr. Mitchell:

This memo is in response to our phone conversation on July 13th, during which you requested clarification on the number of scrubber systems that are proposed to be installed as part of Semiconductor's epi/poly scrubber upgrade project. You may find it helpful to refer to Table 1 while reviewing the following information.

Current plans are to replace all existing epi and poly scrubbers with new venturis. As was previously the case, each reactor will have it's own dedicated scrubber, with epi reactors #08, #10 and #11 each being serviced by two. (This is because each of these three reactors operate at atmospheric and reduced pressure; the atmospheric reactor vents must be kept separate from the vacuum vents.) The Tylan system will have its own venturi scrubber as well. In addition, 5 venturi scrubbers will be installed for future reactor installations. These plans call for the installation of 34 venturi scrubbers. With the exception of the Tylan system scrubber, all first-stage exhaust will then be ducted to one of two packed bed scrubbers for second stage treatment. Five sumps are proposed to provide the gaseous/liquid interface for the first stage scrubbers.

The design engineering phase of this project is currently 30% complete. If you have any further questions, please feel free to call me at (407) 729-4061.

Sincerely,

Nancy Baldisserotto
Environmental Engineer

RECEIVED
JUL 17 1989
DER-BAQM

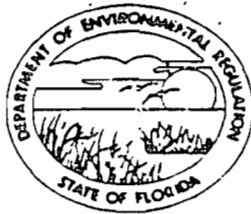
HARRIS SEMICONDUCTOR
 PROPOSED SCRUBBER SYSTEMS
 FOR EPI & POLY REACTORS
 AND TYLAN SYSTEM

EPI/POLY REACTOR #	NEW FIRST STAGE VENTURI #	NEW SECOND STAGE SCRUBBER
-----	-----	-----
POLY #01	P-01	PACKED BED SCRUBBER #1
POLY #02	P-02	
POLY #03	P-03	
POLY #04	P-04	
POLY #05	P-05	
POLY #06	P-06	
POLY #07	P-07	
POLY #08	P-08	
POLY #09	P-09	
POLY #10	P-10	
POLY #11	P-11	
POLY #12	P-12	
POLY #13	P-13	
FUTURE POLY	P-14	
EPI #01	E-01	PACKED BED SCRUBBER #2
EPI #02	E-02	
EPI #03	E-03	
EPI #04	E-04	
EPI #05	E-05	
EPI #06	E-06	
EPI #07	E-07	
EPI #08 ATM	E-08	
EPI #08 RP	E-09	
EPI #09	E-10	
EPI #10 ATM	E-11	
EPI #10 RP	E-12	
EPI #11 ATM	E-13	
EPI #11 RP	E-14	
EPI #12	E-15	
FUTURE EPI ATM	E-16	
FUTURE EPI RP	E-17	
FUTURE EPI ATM	E-18	
FUTURE EPI RP	E-19	
TYLAN SYSTEM	TYL-1	

DEPARTMENT OF ENVIRONMENTAL REGULATION

\$200 pd.
6-2-89
Recpt. # 1176

WIN TOWERS OFFICE BUILDING
2600 BLAIR STONE ROAD
TALLAHASSEE, FLORIDA 32301-8241



AC05-165757

BOB GRAHAM
GOVERNOR

VICTORIA J. TSCHINKEL
SECRETARY

APPLICATION TO OPERATE/CONSTRUCT AIR POLLUTION SOURCES

SOURCE TYPE: Stationary [] New¹ [X] Existing¹
APPLICATION TYPE: [] Construction [] Operation [X] Modification
COMPANY NAME: Harris Semiconductor COUNTY: Brevard

Identify the specific emission point source(s) addressed in this application (i.e. Lime Kiln No. 4 with Venturi Scrubber; Peaking Unit No. 2, Gas Fired) Building 4 Materials Fab

SOURCE LOCATION: Street Palm Bay Road City Palm Bay
UTM: East 17-538700 North 17-3100900
Latitude 28° 01' 20" N Longitude 80° 36' 10" W

APPLICANT NAME AND TITLE: Lawrence R. Hutker; Director, Facilities Department
APPLICANT ADDRESS: P.O. Box 883, Melbourne, FL 32901

SECTION I: STATEMENTS BY APPLICANT AND ENGINEER

A. APPLICANT

I am the undersigned owner or authorized representative* of Harris Semiconductor

I certify that the statements made in this application for a modified permit are true, correct and complete to the best of my knowledge and belief. Further, I agree to maintain and operate the pollution control source and pollution control facilities in such a manner as to comply with the provision of Chapter 403, Florida Statutes, and all the rules and regulations of the department and revisions thereof. I also understand that a permit, if granted by the department, will be non-transferable and I will promptly notify the department upon sale or legal transfer of the permitted establishment.

*Attach letter of authorization

Signed: L. R. Hutker
L. R. Hutker, Director, Facilities Dept.
Name and Title (Please Type)

Date: _____ Telephone No. (407) 724-7229

B. PROFESSIONAL ENGINEER REGISTERED IN FLORIDA (where required by Chapter 471, F.S.)

This is to certify that the engineering features of this pollution control project have been designed/examined by me and found to be in conformity with modern engineering principles applicable to the treatment and disposal of pollutants characterized in the permit application. There is reasonable assurance, in my professional judgment, that

¹ See Florida Administrative Code Rule 17-2.100(57) and (104)

the pollution control facilities, when properly maintained and operated, will discharge an effluent that complies with all applicable statutes of the State of Florida and the rules and regulations of the department. It is also agreed that the undersigned will furnish, if authorized by the owner, the applicant a set of instructions for the proper maintenance and operation of the pollution control facilities and, if applicable, pollution sources.

Signed Lawrence R. Hutker

Lawrence R. Hutker
Name (Please Type)

Harris Semiconductor
Company Name (Please Type)

P.O. Box 883, Melbourne, Florida 32901
Mailing Address (Please Type)

Florida Registration No. 35972 Date: _____ Telephone No. (407) 724-7229

SECTION II: GENERAL PROJECT INFORMATION

1. Describe the nature and extent of the project. Refer to pollution control equipment, and expected improvements in source performance as a result of installation. State whether the project will result in full compliance. Attach additional sheet if necessary.

This is a modification and consolidation of existing air permits.

2. Schedule of project covered in this application (Construction Permit Application Only)

Start of Construction N/A Completion of Construction _____

3. Costs of pollution control system(s): (Note: Show breakdown of estimated costs only for individual components/units of the project serving pollution control purposes. Information on actual costs shall be furnished with the application for operation permit.)

N/A

4. Indicate any previous DER permits, orders and notices associated with the emission point, including permit issuance and expiration dates.

See insert One.

INSERT ONE.

LIST OF PREVIOUS FDER AIR PERMITS FOR BUILDING 4

PERMIT NO.	ISSUED	EXPIRES
AC 05-104524	1/15/86	6/30/86
AC 05-104525	1/15/86	6/30/86
AO 05-109845	11/05/85	cancelled
AO 05-109846	11/05/85	10/30/90
AO 05-109850	11/05/85	10/30/90
AO 05-109852	11/05/85	10/30/90
AO 05-115803	5/20/86	5/22/91
AO 05-121934	9/16/86	9/14/91

E. Requested permitted equipment operating time: hrs/day 24 ; days/wk 7 ; wks/yr 52
if power plant, hrs/yr _____; if seasonal, describe: _____

F. If this is a new source or major modification, answer the following questions.
(Yes or No)

1. Is this source in a non-attainment area for a particular pollutant? No
a. If yes, has "offset" been applied? _____
b. If yes, has "Lowest Achievable Emission Rate" been applied? _____
c. If yes, list non-attainment pollutants. _____

2. Does best available control technology (BACT) apply to this source?
If yes, see Section VI. No

3. Does the State "Prevention of Significant Deterioration" (PSD)
requirement apply to this source? If yes, see Sections VI and VII. No

4. Do "Standards of Performance for New Stationary Sources" (NSPS)
apply to this source? No

5. Do "National Emission Standards for Hazardous Air Pollutants"
(NESHAP) apply to this source? No

H. Do "Reasonably Available Control Technology" (RACT) requirements apply
to this source? No

a. If yes, for what pollutants? _____

b. If yes, in addition to the information required in this form,
any information requested in Rule 17-2.650 must be submitted.

Attach all supportive information related to any answer of "Yes". Attach any justifi-
cation for any answer of "No" that might be considered questionable.

SECTION III: AIR POLLUTION SOURCES & CONTROL DEVICES (Other than Incinerators)

A. Raw Materials and Chemicals Used in your Process, if applicable:

Description	Contaminants		Utilization Rate - lbs/hr	Relate to Flow Diagram
	Type	% wt		
---SEE ATTACHMENT C ---				

B. Process Rate, if applicable: (See Section V, Item 1)

1. Total Process Input Rate (lbs/hr): not applicable

2. Product Weight (lbs/hr): not applicable

C. Airborne Contaminants Emitted: (Information in this table must be submitted for each emission point, use additional sheets as necessary)

Name of Contaminant	Emission ¹		Allowed Emission Rate per Rule 17-2	Allowable Emission lbs/hr	Potential ⁴ Emission		Relate to Flow Diagram
	Maximum lbs/hr	Actual T/yr			lbs/yr	T/yr	
---SEE ATTACHMENT B ---							

¹See Section V, Item 2.

²Reference applicable emission standards and units (e.g. Rule 17-2.600(5)(b)2. Table II, E. (1) - 0.1 pounds per million BTU heat input)

³Calculated from operating rate and applicable standard.

⁴Emission, if source operated without control (See Section V, Item 3).

J. Control Devices: (See Section V, Item 4)

Name and Type (Model & Serial No.)	Contaminant	Efficiency	Range of Particles Size Collected (in microns) (If applicable)	Basis for Efficiency (Section V Item 5)
---SEE ATTACHMENT D ---				

E. Fuels

Type (Be Specific)	Consumption*		Maximum Heat Input (MMBTU/hr)
	avg/hr	max./hr	

*Units: Natural Gas--MMCF/hr; Fuel Oils--gallons/hr; Coal, wood, refuse, other--lbs/hr.

Fuel Analysis:

Percent Sulfur: _____ Percent Ash: _____

Density: _____ lbs/gal Typical Percent Nitrogen: _____

Heat Capacity: _____ BTU/lb _____ BTU/gal

Other Fuel Contaminants (which may cause air pollution): _____

F. If applicable, indicate the percent of fuel used for space heating.

Annual Average _____ Maximum _____

G. Indicate liquid or solid wastes generated and method of disposal.

Waste water from air scrubbers is discharged to on-site Waste Water Treatment

Plant--discharge to deepwell under UIC - Permit #UC05-126519.

-----SEE ATTACHMENT D-----

H. Emission Stack Geometry and Flow Characteristics (Provide data for each stack):

Stack Height: _____ ft. Stack Diameter: _____ ft.
 Gas Flow Rate: _____ ACFM _____ DSCFM Gas Exit Temperature: _____ °F.
 Water Vapor Content: _____ % Velocity: _____ FPS

SECTION IV: INCINERATOR INFORMATION

not applicable

Type of Waste	Type 0 (Plastics)	Type I (Rubbish)	Type II (Refuse)	Type III (Garbage)	Type IV (Pathological)	Type V (Liq. & Gas By-prod.)	Type VI (Solid By-prod.)
Actual lb/hr Incinerated							
Uncontrolled (lbs/hr)							

Description of Waste _____

Total Weight Incinerated (lbs/hr) _____ Design Capacity (lbs/hr) _____

Approximate Number of Hours of Operation per day _____ day/wk _____ wks/yr. _____

Manufacturer _____

Date Constructed _____ Model No. _____

	Volume (ft) ³	Heat Release (BTU/hr)	Fuel		Temperature (°F)
			Type	BTU/hr	
Primary Chamber					
Secondary Chamber					

Stack Height: _____ ft. Stack Diameter: _____ Stack Temp. _____

Gas Flow Rate: _____ ACFM _____ DSCFM* Velocity: _____ FPS

*If 90 or more tons per day design capacity, submit the emissions rate in grains per standard cubic foot dry gas corrected to 50% excess air.

Type of pollution control device: Cyclone Wet Scrubber Afterburner

Other (specify) _____

BEST AVAILABLE COPY

Brief description of operating characteristics of control devices: _____

Ultimate disposal of any effluent other than that emitted from the stack (scrubber water, ash, etc.):

NOTE: Items 2, 3, 4, 6, 7, 8, and 10 in Section V must be included where applicable.

SECTION V: SUPPLEMENTAL REQUIREMENTS

Please provide the following supplements where required for this application.

1. Total process input rate and product weight -- show derivation [Rule 17-2.100(127)]
2. To a construction application, attach basis of emission estimate (e.g., design calculations, design drawings, pertinent manufacturer's test data, etc.) and attach proposed methods (e.g., FR Part 60 Methods 1, 2, 3, 4, 5) to show proof of compliance with applicable standards. To an operation application, attach test results or methods used to show proof of compliance. Information provided when applying for an operation permit from a construction permit shall be indicative of the time at which the test was made.
3. Attach basis of potential discharge (e.g., emission factor, that is, AP42 test).
4. With construction permit application, include design details for all air pollution control systems (e.g., for baghouse include cloth to air ratio; for scrubber include cross-section sketch, design pressure drop, etc.)
5. With construction permit application, attach derivation of control device(s) efficiency. Include test or design data. Items 2, 3 and 5 should be consistent: actual emissions = potential (1-efficiency).
6. An 8 1/2" x 11" flow diagram which will, without revealing trade secrets, identify the individual operations and/or processes. Indicate where raw materials enter, where solid and liquid waste exit, where gaseous emissions and/or airborne particles are evolved and where finished products are obtained.
7. An 8 1/2" x 11" plot plan showing the location of the establishment, and points of airborne emissions, in relation to the surrounding area, residences and other permanent structures and roadways (Example: Copy of relevant portion of USGS topographic map).
8. An 8 1/2" x 11" plot plan of facility showing the location of manufacturing processes and outlets for airborne emissions. Relate all flows to the flow diagram.

Best Available Copy

- 9. The appropriate application fee in accordance with Rule 17-4.05. The check should be made payable to the Department of Environmental Regulation.
- 10. With an application for operation permit, attach a Certificate of Completion of Construction indicating that the source was constructed as shown in the construction permit.

SECTION VI: BEST AVAILABLE CONTROL TECHNOLOGY

A. Are standards of performance for new stationary sources pursuant to 40 C.F.R. Part 61 applicable to the source?

[] Yes [] No

Contaminant	Rate or Concentration

B. Has EPA declared the best available control technology for this class of sources (if yes, attach copy)

[] Yes [] No

Contaminant	Rate or Concentration

C. What emission levels do you propose as best available control technology?

Contaminant	Rate or Concentration

D. Describe the existing control and treatment technology (if any).

- 1. Control Device/System:
- 2. Operating Principles:
- 3. Efficiency:
- 4. Capital Costs:

Explain method of determining

5. Useful Life:

6. Operating Costs:

7. Energy:

8. Maintenance Cost:

9. Emissions:

Contaminant	Rate or Concentration

10. Stack Parameters

- a. Height: ft. b. Diameter: ft.
- c. Flow Rate: ACFM d. Temperature: °F
- e. Velocity: FPS

E. Describe the control and treatment technology available (As many types as applicable use additional pages if necessary).

1.

- a. Control Device: b. Operating Principles:
- c. Efficiency:¹ d. Capital Cost:
- e. Useful Life: f. Operating Cost:
- g. Energy:² h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:
- j. Applicability to manufacturing processes:
- k. Ability to construct with control device, install in available space, and operate within proposed levels:

2.

- a. Control Device: b. Operating Principles:
- c. Efficiency:¹ d. Capital Cost:
- e. Useful Life: f. Operating Cost:
- g. Energy:² h. Maintenance Cost:
- i. Availability of construction materials and process chemicals:

¹Explain method of determining efficiency.

²Energy to be reported in units of electrical power - KWH design rate.

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

3.

a. Control Device:

b. Operating Principles:

c. Efficiency:¹

d. Capital Cost:

e. Useful Life:

f. Operating Cost:

g. Energy:²

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

4.

a. Control Device:

b. Operating Principles:

c. Efficiency:¹

d. Capital Costs:

e. Useful Life:

f. Operating Cost:

g. Energy:²

h. Maintenance Cost:

i. Availability of construction materials and process chemicals:

j. Applicability to manufacturing processes:

k. Ability to construct with control device, install in available space, and operate within proposed levels:

F. Describe the control technology selected:

1. Control Device:

2. Efficiency:¹

3. Capital Cost:

4. Useful Life:

5. Operating Cost:

6. Energy:²

7. Maintenance Cost:

8. Manufacturer:

9. Other locations where employed on similar processes:

a. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

Explain method of determining efficiency.

Energy to be reported in units of electrical power - KWH design rate.

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:¹

Contaminant	Rate or Concentration

(8) Process Rate:¹

b. (1) Company:

(2) Mailing Address:

(3) City:

(4) State:

(5) Environmental Manager:

(6) Telephone No.:

(7) Emissions:¹

Contaminant	Rate or Concentration

(8) Process Rate:¹

10. Reason for selection and description of systems:

¹Applicant must provide this information when available. Should this information not be available, applicant must state the reason(s) why.

SECTION VII - PREVENTION OF SIGNIFICANT DETERIORATION

A. Company Monitored Data

1. _____ no. sites _____ TSP _____ () SO₂ _____ Wind spd/dir

Period of Monitoring _____ / _____ / _____ to _____ / _____ / _____
month day year month day year

Other data recorded _____

Attach all data or statistical summaries to this application.

Specify bubbler (B) or continuous (C).

2. Instrumentation, Field and Laboratory

a. Was instrumentation EPA referenced or its equivalent? Yes No

b. Was instrumentation calibrated in accordance with Department procedures?
 Yes No Unknown

B. Meteorological Data Used for Air Quality Modeling

1. _____ Year(s) of data from _____ / _____ / _____ to _____ / _____ / _____
month day year month day year

2. Surface data obtained from (location) _____

3. Upper air (mixing height) data obtained from (location) _____

4. Stability wind rose (STAR) data obtained from (location) _____

C. Computer Models Used

1. _____ Modified? If yes, attach description.

2. _____ Modified? If yes, attach description.

3. _____ Modified? If yes, attach description.

4. _____ Modified? If yes, attach description.

Attach copies of all final model runs showing input data, receptor locations, and principle output tables.

D. Applicant's Maximum Allowable Emission Data

Pollutant	Emission Rate
TSP	_____ grams/sec
SO ₂	_____ grams/sec

E. Emission Data Used in Modeling

Attach list of emission sources. Emission data required is source name, description of point source (on NEDS point number), UTM coordinates, stack data, allowable emissions, and normal operating time.

F. Attach all other information supportive to the PSD review.

G. Discuss the social and economic impact of the selected technology versus other applicable technologies (i.e., jobs, payroll, production, taxes, energy, etc.). Include assessment of the environmental impact of the sources.

H. Attach scientific, engineering, and technical material, reports, publications, journals, and other competent relevant information describing the theory and application of the requested best available control technology.

HARRIS SEMICONDUCTOR
AIR PERMIT -- BUILDING 4
ATTACHMENT A
PROCESS DESCRIPTION

BUILDING 4 CONSOLIDATED AIR PERMIT

PROCESS DESCRIPTION

Building 4 is the materials fabrication building for Palm Bay Harris Semiconductor. It is in this building that the initial steps in the manufacturing of integrated circuits take place. The following narrative denotes the different processes and equipment employed.

Single crystal silicon slices undergo silicon and dopant deposition under high temperatures in epideposition ('epi'), polydeposition ('poly'), and Gemini reactors. Hydrogen acts as a reducing agent, promoting a reaction with the chlorinated silane gases introduced into the sealed reactor chamber. This results in the deposition of a layer of silicon on the wafer surface. Dopant gases may be introduced into the system at the time of this reaction. These dopants become embedded in the crystalline lattice of the wafer surface and modify it's electrical resistivity. Controlled concentrations of trichlorosilane are dispensed to the poly reactors by the Tylan system. Trichlorosilane is dispensed from a pressurized tank to a one of two bubbler tanks, where hydrogen is saturated with trichlorosilane; the saturated trichlorosilane is then sent to a concentration control panel, where hydrogen is used to trim the concentration for use in the reactors.

Batch processing in high-temperature diffusion furnaces takes place in order to grow a thin layer of oxide on each slice (or 'wafer.'). Tube clean units clean the glass boats that hold the wafers when they are being oxidized. Photolithography techniques are used to form patterns on the slices. Coaters spin a thin layer of "photoresist" on the wafer; the circuit pattern is projected onto the wafers via "aligners", and developers are then used to remove unpolymerized areas of photoresist. Wafer surfaces are chemically etched in order to remove layers of silicon dioxide, silicon nitride, and polysilicon. The wet chemical etching solutions are contained in open-surface dip tanks within exhausted wet stations. Electrochemical etchers are also employed to etch silicon surfaces. Chemical baths are used to strip photoresist off the wafer. Wafers are physically ground to a desired thickness in grinders and sanders. Polishers are used to burnish product surfaces. Glassware and reactor parts are rinsed in hooded wet stations. The building contains areas dedicated to the storage of process gas cylinders in specially designed and monitored gas cabinets. A variety of research and development experiments are performed under exhausted wet stations. Throughout the building, wet stations, wafer scrubbing units, bake ovens and spin rinse dryers are utilized for cleaning and drying of wafer surfaces. Chemical cabinets safely hold virgin chemicals until they are ready for use. In addition, several waste collection areas are exhausted.

The building presently contains 31 exhausted wet stations; approximately one-fifth of these house vats containing solvents. Three of these stations are known to have heated solvent vats, and three stations have covered solvent vats.

EPIDEPOSITION & POLYDEPOSITION REACTOR SCRUBBERS

As previously mentioned, the materials fabrication area employs poly reactors and epi reactors in order to deposit silicon and dopants on the wafer surfaces. The effluent gases from these units are presently vented to water scrubbing systems residing on the roof of building 4 (see attachment E. for scrubber locations.)

The current scrubbers are a simple spray-type design; the water feed to the scrubbers is treated groundwater supplied from Harris's groundwater reuse project. The pH of this water is neutral (approximately 7.) Wastewater from the scrubbers is piped to sump T-101 which discharges to Semiconductor's on-site wastewater treatment plant.

Harris Semiconductor is presently planning to replace the existing epideposition and polydeposition scrubber systems in order to reduce maintenance labor and improve effluent contaminant treatment efficiency (see figure 3.2 for project schedule.)

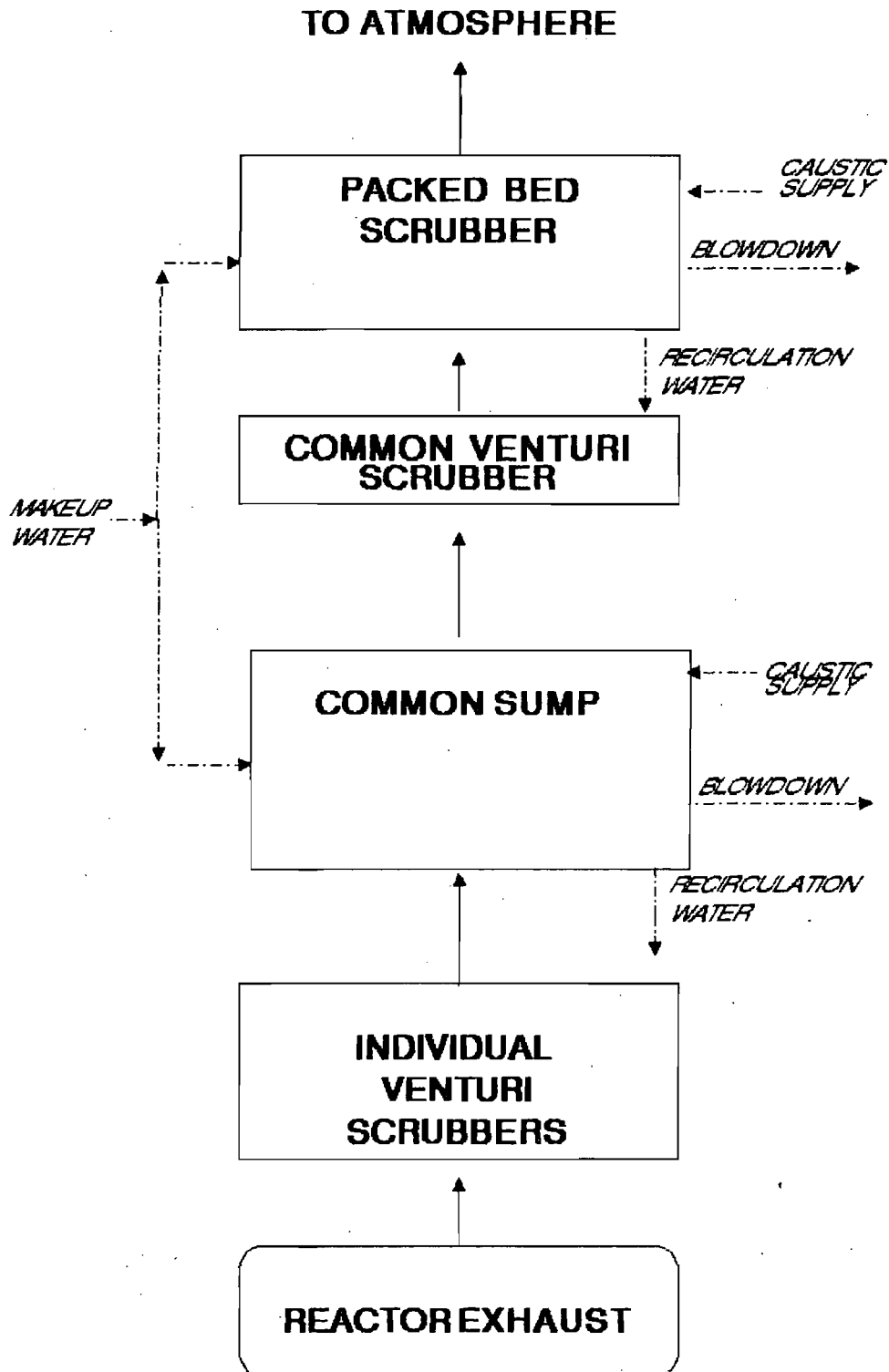
During April of 1989, an engineering firm examined the reactors' exhaust treatment requirements, and developed a customized scrubber system design for the reactor process exhaust (see process flow chart on the following page.) The suggested location for the scrubbing units is the northeast ground outside building 4 (see proposed location map in attachment E.)

In the proposed design, each reactor exhaust connects to an individual first-stage ejector venturi gas scrubber in a two-stage scrubbing system. Exhaust is drawn into the scrubber body by a high-velocity spray. This gas/liquid mixture then passes into the impingement section of the scrubber system. From there, the gas is forced through a liquid trap, combined, and fed to packed bed scrubbing units where second-stage scrubbing occurs. Each second-stage unit consists of an ejector venturi gas scrubber that draws the gas streams in and forces them out through a vertical packed bed. The exhaust from the bed is fed to the outlet of a scrubber unit and is discharged to atmosphere. The Tylan system feeds its own dedicated first-stage scrubber which exhausts to a common second-stage unit as well.

Makeup water will be provided via a primary source, treated acid wastewater from Semiconductor's on-site wastewater treatment plant, and a secondary source, reclamation water from the Harris's groundwater remediation project. The water will be fed to closed top sumps that will provide the water supply to the scrubbers in the first stage, and to the packed bed scrubber sumps in the second stage. The water will be recirculated from the sumps to the individual venturi scrubbers in the first stage, and from the packed bed scrubber sumps to the venturi scrubbers in the second stage. Caustic will be automatically injected into the sumps in order to prevent solidification of silane compounds. Scrubber sump blowdown water will be sent to Semiconductor's on-site wastewater treatment plant.

PROCESS FLOW DIAGRAM

PROPOSED EPI/POLY SCRUBBER SYSTEM

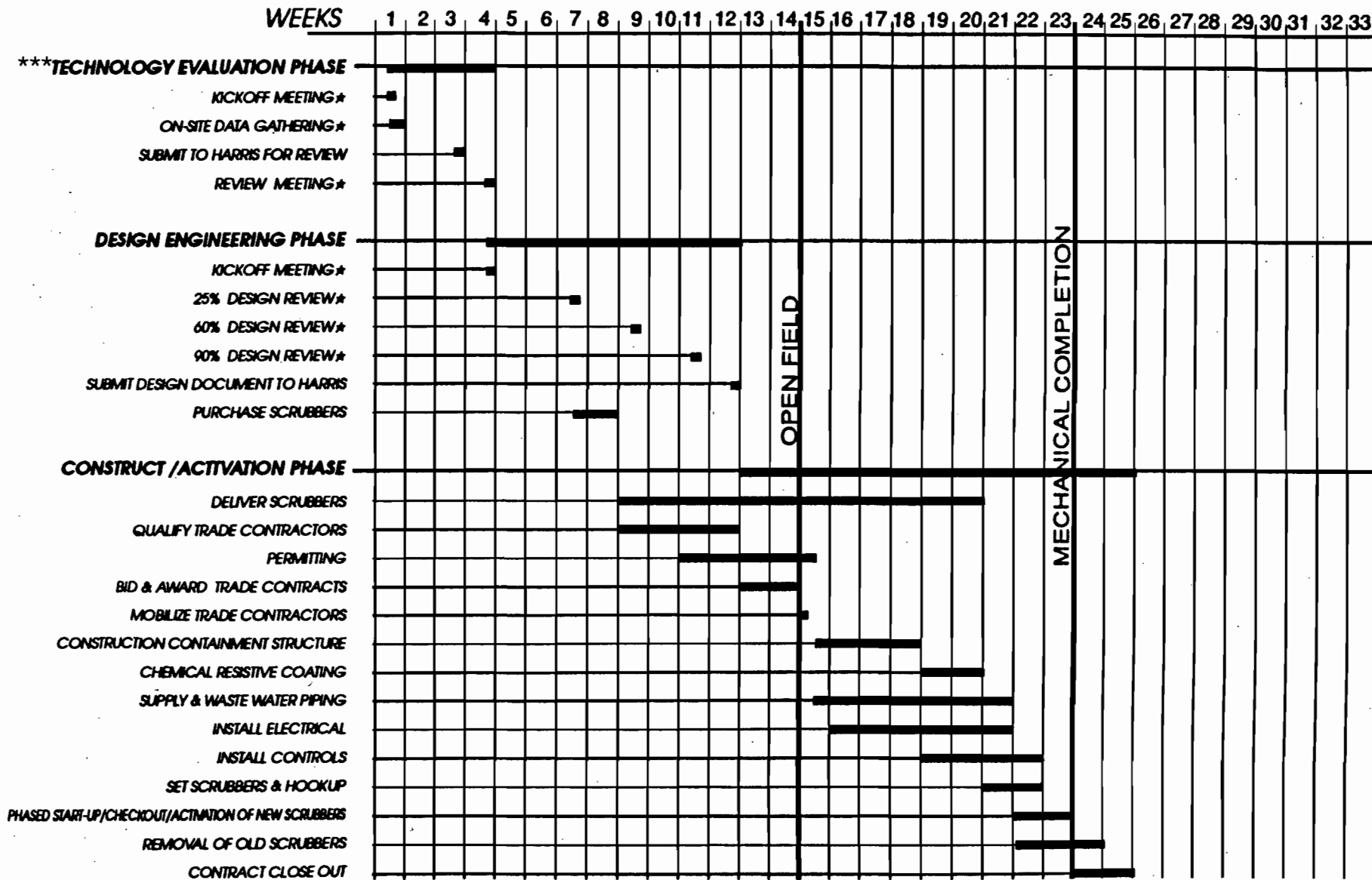


The following table identifies the estimated costs of Semiconductor's reactor scrubber replacement project:

1. Technology Evaluation Phase (now complete).....\$22,000.00*
2. Design Engineering Phase.....\$74,000.00*
3. Construct/activation Phase.....\$650,000.00**

* Capital money approved.

** Pending capital approval.



PRELIMINARY PROJECT SCHEDULE

HARRIS CORPORATION
REACTOR SCRUBBER SYSTEM REPLACEMENT
 Melbourne, Florida

★ IN MELBOURNE, FLORIDA



*** NOW COMPLETE

FIGURE 3-2

EXHAUST SYSTEMS (CONTINUED)

In addition to the poly and epi reactor scrubbers, the following equipment is employed to control emissions from process exhaust in building 4 (see attachment E. for locations, and attachment D. for control equipment information.) The following is a description of each of these exhaust systems. Additional information on the units is contained in attachment D.

- Hazardous
and
Pyrophoric
materials*
- F04S01 - Combined solvent/acid scrubber; services gas cabinets in HPM room as well as equipment in Tube Clean and Epi rooms. The gas cabinets are exhausted as a precautionary measure. Most of the contaminants entering this system would be a result of the cleaning operations under the exhausted hoods. Also provides purge line exhaust for the hydrogen chloride tube trailer outside of building 4. When the hydrogen chloride lines are purged, the resulting pressure is relieved by venting the air to F04S01. The system also treats vent exhaust from the silicon tetrachloride ('sil-tet') storage area. In the sil-tet storage area, silicon tetrachloride is transferred from large drums to smaller drums for manufacturing use. The air displaced from the smaller drums is vented to F04S01. Air flow to the scrubber from both the HCl tube trailer and the sil-tet drums is manually controlled by valves.
- F04S02 - Combined solvent/acid scrubber; services furnaces, wet stations, and process equipment in the Diffusion area.
- F04S03 - Combined solvent/acid scrubber; services equipment in Backlap, Wet Chemistry, DI Grind, Electrochemistry, Polish, Final Screen, and Engineering lab areas.
- F04S04 - Acid scrubber; services exhaust from equipment in Wet Chemistry, Diffusion, Electrochemistry/Polish, and Engineering Lab areas.
- F04S05 - Services the silicon tetrachloride storage area located outside of the building. The scrubber treats emissions that may occur in the storage confinement as a result of system leaks and/or spills. The unit is turned on as a precautionary measure for approximately one hour a day when silicon tetrachloride is being transferred from the large storage drum to smaller drums for manufacturing use. Emissions were detected as hydrogen chloride due to the presence of the chloride ion.
- F04S08 - Facilities I.D. number assigned to an exhaust fan (also referred to as fan no. F04E20) which provides exhaust to equipment in the Photoresist and Wet Chemistry areas.

In addition to the above mentioned systems, several fans are used to provide heat exhaust for process equipment. Examples of this are fan nos. F04E07, F04E08, and F04E12 which exhaust heat generated from the Epi, Poly and Gemini reactors, and fan no. F04E10, F04E12, and F04E27 that exhaust heat from diffusion furnaces. It should be noted that the no chemically contaminated exhaust is contained in these heated air streams; in each case, contaminated exhaust is ducted through separate lines to wet scrubbers.

In addition, exhaust fans F04E18 and F04E23 handle process exhaust from wafer grinders.

HARRIS SEMICONDUCTOR

AIR PERMIT - BUILDING 4

ATTACHMENT B

AIR EMISSIONS

SOLVENT MONITORING--BUILDING 4

Monitoring work was performed on the building 4 scrubber systems F04S01, F04S02, F04S03 and F04S08 during December of 1986 and August of 1987. Tests conducted include EPA methods 25A (flame ionization detection) and TO-1 (Tenax adsorption and GC/MS analysis.) The results of the testing is included in this application.

FID test results revealed that total accumulative monitored VOC emissions for the building were 10.96 tons/year expressed as propane. This figure is based on a hypothetical production schedule of 8760 hours a year. The following assumptions were made regarding monitoring work on this building:

-VOC values refer to all organic emissions including organic solvents.

-All data was corrected for 2 ppm background noise that is normally present in the ambient air.

-The F.I.D. accumulative emission figure is based on the maximum concentration of VOC's observed during the monitoring time frame.

EPA METHOD 25-A (F.I.D. ANALYSIS) BUILDING 04
VOC EMISSIONS DURING FULL PRODUCTION

TEST DATE	SCRUBBER #	PRODUCTN SCHEDULE (HRS/YR)	VOC EMISSIONS (TON/YR)
12/20/86	F04S01	8760	0.26
11/20/87	F04S02	8760	min
12/21/86	F04S03	8760	1.93
11/21/87	F04S08	8760	8.77

TOTAL PROJECTED VOC EMISSIONS FOR BUILDING 04 = 10.96 TONS/YEAR

EPA METHOD TO-1: GC/MASS SPEC ANALYSIS OF SCRUBBER EMISSIONS
NOVEMBER RESULTS-BUILDING 4

	F04S02	F04S08
ACETONE (LB/HR)	---	---
XYLENES (LB/HR)	---	0.50
ETHYL BENZENE (LB/HR)	---	0.08
1,2-DICHLOROBENZENE (LB/HR)	---	---
1,1-DICHLOROETHENE (LB/HR)	---	---
TETRACHLOROETHENE (LB/HR)	---	---
1,1,1-TRICHLOROETHANE (LB/HR)	---	---

ACID MONITORING--BUILDING 4

Monitoring was performed on the building 4 scrubber systems F04S01, F04S02, F04S03, F04S04, and F04S05 in December of 1988. Samples were collected using modified EPA method 8 sampling train. The impinger medium consisted of a 0.1 N sodium hydroxide solution. The analytical methodology utilized to determine the ions of highest concentration is as follows:

Chloride ion--EPA Method 325.3

Fluoride ion--EPA Method 340.2

Nitrate, phosphite, and sulfate ions--ion chromatography

All results were in pounds per hour as "X", where "X" represents the acid compound present in highest concentration.

The test results revealed that the total accumulative monitored acid emissions for the building were 1.476 tons/year expressed as hydrochloric, hydrofluoric, nitric, phosphoric and sulfuric acids. This figure is based on a hypothetical production schedule of 8760 hours a year. The monitoring was performed over an 8 hour time interval when the full production was occurring.

When a resulting acid concentration was expressed as a "less than 'y' " value, where 'y' represents the lowest detectable limit possible using the analytical methodology employed, acid emissions were taken to be equal to this 'y' limit value.

RESULTS OF ACID MONITORING--BUILDING 4

PERFORMED ON SCRUBBER OUTLET
IN DECEMBER OF 1988

Scrub #	HCl	HF	Nitric Acid	Phosphoric Acid	Sulfuric Acid	TOTAL (TON/YR)
F04S01 (LB/HR)	0.002	0.001	0.002	0.004	0.001	0.044
(TON/YR)	0.009	0.004	0.009	0.018	0.004	
F04S02 (LB/HR)	0.18	0.038	0.005	0.015	0.003	1.056
(TON/YR)	0.788	0.166	0.022	0.066	0.013	
F04S03 (LB/HR)	0.011	0.003	0.002	0.006	0.001	0.101
(TON/YR)	0.048	0.013	0.009	0.026	0.004	
F04S04 (LB/HR)	0.042	0.004	0.003	0.008	0.002	0.258
(TON/YR)	0.184	0.018	0.013	0.035	0.009	
F04S05 (LB/HR)	0.0040	N/A	N/A	N/A	N/A	0.018
(TON/YR)	0.018	0.000	0.000	0.000	0.000	
						----- 1.476

TOTAL EMISSIONS FROM SCRUBBER OUTLETS = 1.476 TONS/YEAR

HARRIS SEMICONDUCTOR
AIR PERMIT --- BUILDING 4
ATTACHMENT C
RAW MATERIALS AND CHEMICALS

HARRIS SEMICONDUCTOR

BUILDING 04
PROCESS CHEMICALS

2-methyl-4-isothiazolin-3-one
5-chloro-2-methyl-4
acetic acid
ammonium bifluoride
ammonium fluoride
ammonium hydroxide
ammonium persulfate
ammonium titrate
antioxidant
bis-(tributyltin) oxide
calcium hypochlorite
cation exchange polymer
chromic acid
chromium trioxide
cupric nitrate
cupric sulfate
cyclized polyisoprene
diatomaceous earth
dichlorodifluoromethane
diethanolamine
ethylenediamine tetraacetic acid disodium salt
ferric chloride
glycol
graphite
hydrochloric acid
hydrofinished paraffinic petroleum oil
hydrofluoric acid
hydrogen peroxide
hydroquinone
inorganic acid
isoparaffinic hydrocarbons
lanthanum chloride
lead
lithium compound
mercury
monoethanolamine
morpholine
nitric acid
n-alkyl dimethyl benzyl ammonium chloride
paraffinic petroleum oil
paraffinic grease
phosphoric acid
photoactive compound
poly (methyl methacrylate)
polystyrene sulfonic acid
potassium chloride
potassium hydrate
polyglycol

(CONTINUED)

BUILDING 04 PROCESS CHEMICALS (CONT.)

potassium hydroxide
potassium monobasic phosphate
potassium monochloride
potassium silicate
resin
silicon
silicon dioxide
silicon tetrachloride
sodium bicarbonate
sodium dibasic phosphate
sodium hydroxide
sodium hypochlorite
sodium metasilicate
sodium molybdate
sodium tetraborate
sulfuric acid
surfactant
synthetic rubber
terpene resin
tetramethyl ammonium hydroxide
thymol
trichlorosilane
trichlorotrifluoroethane
trisodium phosphate
white oil

HARRIS SEMICONDUCTOR

BUILDING 04
PROCESS GASES

acetylene
argon
arsine
boron tribromide
carbon dioxide
diborane
dichlorosilane
freon 11
helium
hydrogen
hydrogen chloride
nitrogen
oxygen
phosphine
propane
trichlorosilane

HARRIS SEMICONDUCTOR

BUILDING 04
SOLVENTS

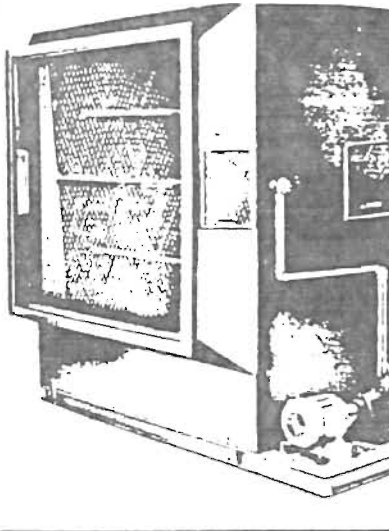
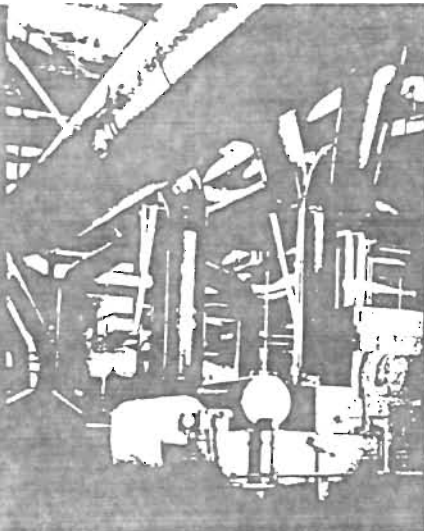
1,1,1 trichloroethane
2-butanone
5-methyl-2-hexanone
acetone
ammonia
aromatic bisazide
butyl propanol
cellosolve acetate
cyclohexane
cyclopentanone
diacetone alcohol
dimethyl ether propellant
diodomethane
ethyl 3-ethoxypropionate
ethyl alcohol
ethyl cyanoacrylate
ethylbenzene
ethylene glycol monobutyl ether
hexane
HMDS
isobutane
isopropanol
melamine resin
methyl alcohol
methyl ethyl ketone
methyl methacrylate
novalak resin
n-butyl acetate
n-butyl alcohol
n-hexane
n-methyl pyrrolidone
n-methyl-2-pyrrolidone
organic resin
oxyphenol polyethoxylate
polytetrafluoroethylene
propylene glycol
propylene glycol monomethyl ether
propylene glycol monomethyl ether acetate
stoddard solvent
trichlorotrifluoroethane
xylene

HARRIS SEMICONDUCTOR

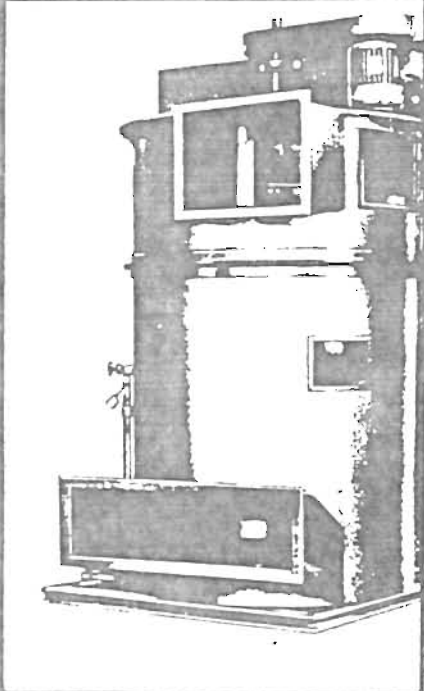
AIR PERMIT - - BUILDING 4

ATTACHMENT D

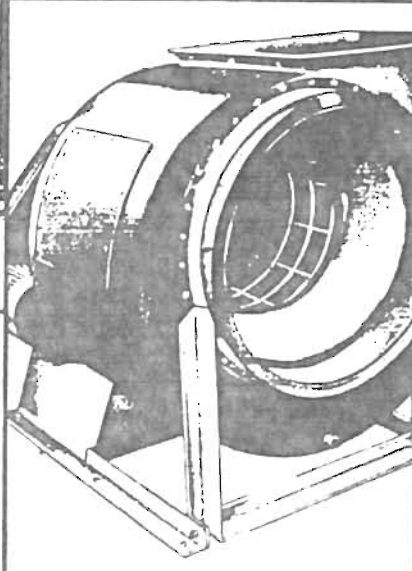
CONTROL EQUIPMENT



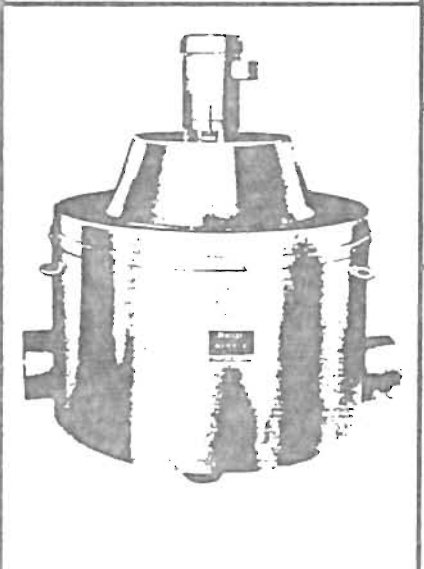
704502
 MEET YOUR
POLLUTION
CONTROL
 REQUIREMENTS
 WITH THE LEADER IN
PVC FABRICATIONS



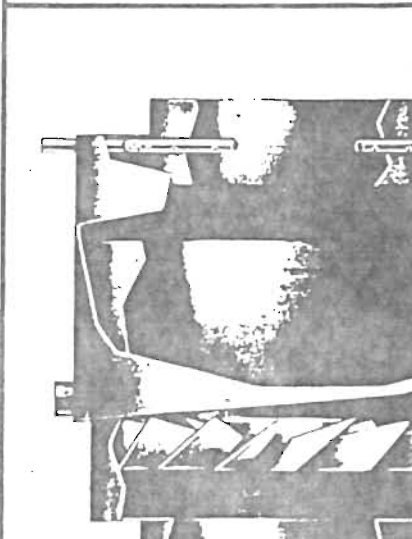
Duall



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PVC CONSTRUCTED
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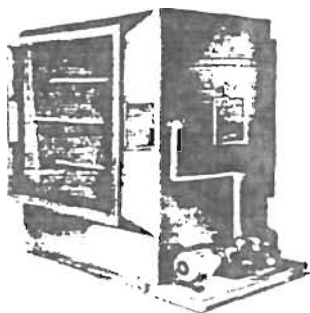
Duall
 INDUSTRIES, INC.

700 S. McMillan Street • Owosso, Michigan 48867
 Phone (517) 725-8184 • Telex 228-532

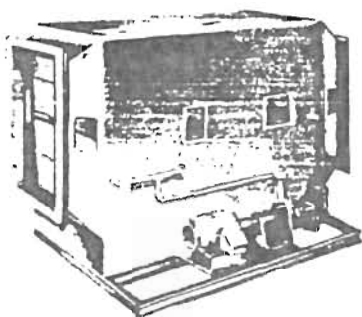
Duall

Fume Scrubbers in 6 Types

F-101 SERIES



Single Pack



Double Pack

Duall Single Pack (four Stage) Fume Scrubbers solve most industrial air pollution problems. They are especially effective on water soluble fumes and odors, or with pH control on many low soluble contaminants.

Some typical proven applications are:

- Acid fumes.
- Plating fumes.
- Cleaning fumes.
- Lab hood fumes.
- Anodizing fumes.
- Pickling fumes.
- Rust-proofing fumes.
- Die-casting fumes.
- Water soluble odors.

Duall Single Pack Fume Scrubbers incorporate these advantages:

- Low cost.
- Low maintenance.
- Low water consumption.
- Low static pressure drop.
- 100% corrosion resistant.

Duall Double Pack (six stage) Fume Scrubbers offer the broadest range of answers to industrial air pollution problems. By double scrubbing the air these scrubbers provide maximum efficiency on tough fumes and odors which can not be completely absorbed in a single pack type scrubber.

Duall's Double Pack Scrubbers have proven effective on the following typical applications:

- Bright dip fumes.
- Strip tank fumes.
- Etching fumes.
- Most low solubility fumes and odors.

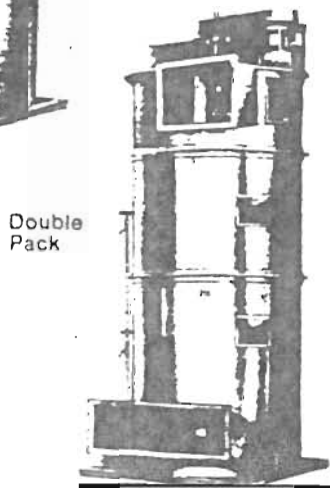
Our Double Pack Fume Scrubbers offer all the advantages of the Single Pack units as well as the broadest range of applications.

All Duall Fume Scrubbers can be modified for custom installation with multiple packs or extended depth packs. Multiple modular units are available for capacities larger than standard.

FW-300 SERIES

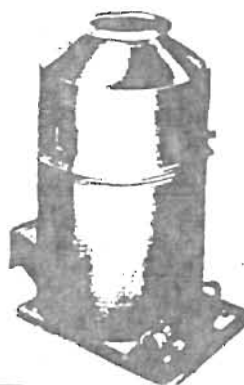


Single Pack



Double Pack

PT-500 SERIES



Single Pack

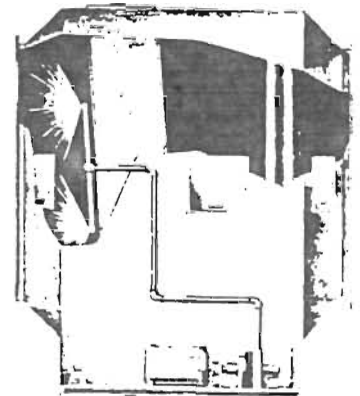


Double Pack

See page 6 for complete specs and performance data.

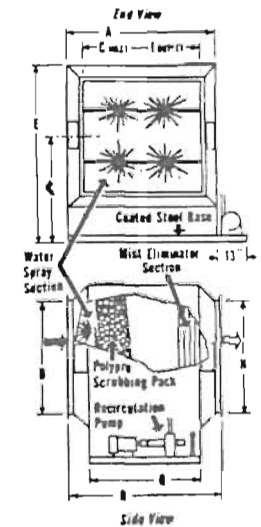
F-101 HORIZONTAL SINGLE FILTER PACK

Being our most popular scrubber design, this compact 100% corrosion resistant P.V.C. unit has proven its efficiency nationwide. The Dual F-101 incorporates high efficiency, low maintenance filter media and the open orifice type spray nozzles, for the assurance of a thoroughly saturated collection chamber. Our mist eliminator outlet section gives four air direction changes to properly remove the entrained moisture. Where a horizontal installation is preferred, the F-101 should be your choice.



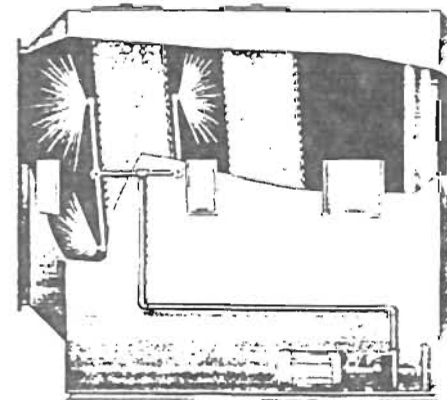
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14	69	57	57	60	82	57	57	44	47 1/2		55	247	61	231	66	87	61	231	46	52 1/2	
16	74	62	62	61	87	62	62	45	50		60	269	61	253	66	87	61	253	46	52 1/2	
18	81	65	65	61	91	65	65	45	52 1/2												

☉ Larger sizes on request.



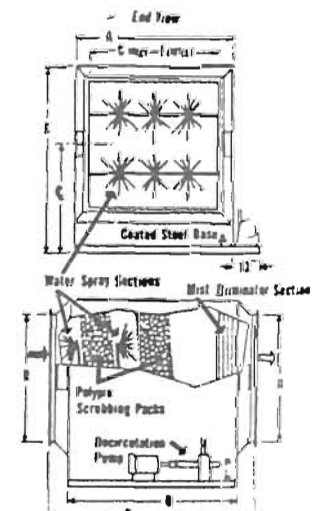
F-101D HORIZONTAL DOUBLE FILTER PACK

An extra heavy duty scrubber for real "tuffies". It incorporates two filter packs with two sets of sprays for more thorough scrubbing... plus an effective mist eliminator at the air outlet. Serious concentrations of rough fumes, such as nitric, hydrofluoric, and hydrochloric acid are double scrubbed through six stages for maximum efficiency. Use this high efficiency fume scrubber, at only a small increase in price.

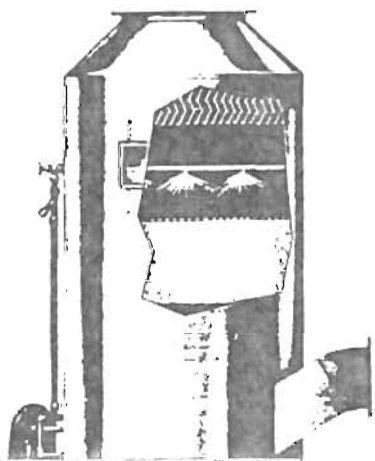
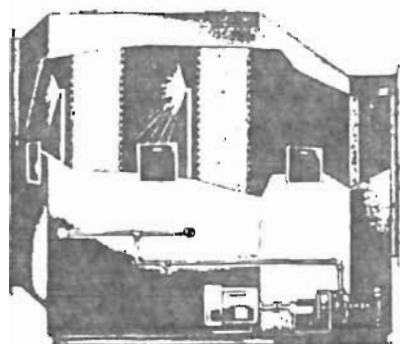
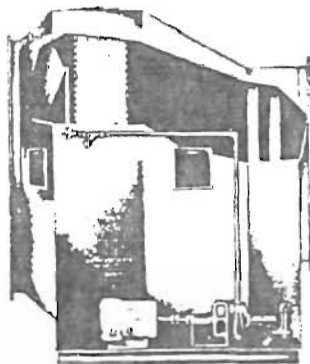
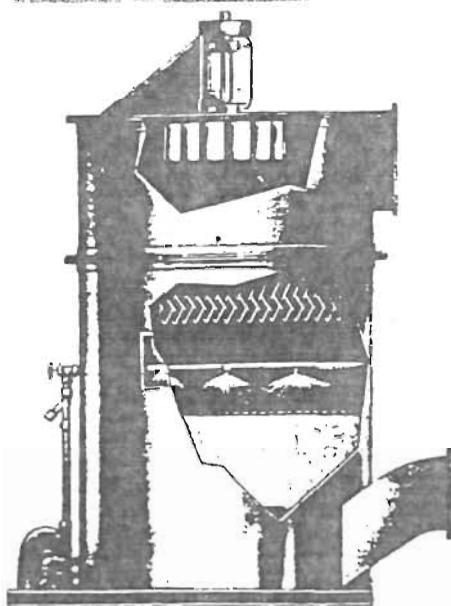


CFM in 000's	DIMENSIONS IN INCHES										CFM in 000's	DIMENSIONS IN INCHES									
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6	45	37	37	74	58	37	37	62	35 1/2		35	157	61	141	87	91	61	141	67	52 1/2	
8	52	44	44	75	65	44	44	63	39		40	179	61	163	87	91	61	163	67	52 1/2	
10	58	46	46	80	71	46	46	64	42		45	202	61	186	87	91	61	186	67	52 1/2	
12	64	52	52	81	77	52	52	65	45		50	224	61	208	87	91	61	208	67	52 1/2	
14	69	57	57	81	82	57	57	65	47 1/2		55	247	61	231	87	91	61	231	67	52 1/2	
16	74	62	62	82	87	62	62	66	50		60	269	61	253	87	91	61	253	67	52 1/2	
18	81	65	65	82	91	65	65	66	52 1/2												

☉ Larger sizes on request.



Best Available Copy



Duall INDUSTRIES

PVC Constructed, 100% Corrosion Free

FUME SCRUBBERS

FW-300 Vertical Pack with Blower

500 TO 12,000 C.F.M. . . plus multiple installations

This packed tower type scrubber is not only a space saver, it's also a true economy model. It incorporates a built-in rugged fan with convenient exterior, belt driven, TEFCBB motor. During installation, the horizontal air discharge can be swivelled 360° before sealing into permanent position. Efficiency is equal to the F-101 and the PT-500. Compactness and versatility make it an unusually popular model. This FW-300 saves three ways . . . in initial cost, installation, and in space. Also available with double pack.

F-101 Horizontal Single Filter Pack

500 TO OVER 60,000 C.F.M. . . plus multiple installations

Being our most popular scrubber design, this compact 100% corrosion resistant P.V.C. unit has proven its efficiency in 46 states. The Duall F-101 incorporates high efficiency, low maintenance filter media and the open orifice type spray nozzles, for the assurance of a thoroughly saturated collection chamber. Our mist eliminator outlet section gives four air direction changes to properly remove the entrained moisture. Where a horizontal installation is preferred, the F-101 should be your choice.

F-101-D Horizontal Double Filter Pack

500 TO OVER 60,000 C.F.M. . . plus multiple installations

An extra heavy duty scrubber for real "tuffies". It incorporates two filter packs with two sets of sprays for more thorough scrubbing . . . plus an effective mist eliminator at the air outlet. Serious concentrations of rough fumes, such as nitric, hydrofluoric, and hydrochloric acid are double scrubbed through six stages for maximum efficiency. For such problems in your plant, use this high efficiency fume scrubber, at only a small increase in price.

PT-500 Vertical Pack

500 TO OVER 30,000 C.F.M. . . plus multiple installations

The upright PT-500 is the space saver. This scrubber is a vertical packed tower type designed to fit into restricted spaces where floor space is at a premium. Its efficiency is equal to the F-101, and also 100% corrosion-free. Air flow is up through a thoroughly water saturated bed of filter media. The mist eliminator pack near the top outlet assures properly dried air. If space is your problem, take a good look at the PT-500. Also available with double pack.

Duall

770 South McMillan St.

P.O. Box 1000

Dual FUME SCRUBBERS

SPECIFICATIONS and PERFORMANCE DATA

DESCRIPTIONS

F-101. Horizontal (cross-flow), four stage, wet scrubber. This model has maximum efficiency on water soluble contaminants and odors, but is also effective on low soluble contaminants with the use of chemical neutralizers.

F-101D. Horizontal (cross-flow), six stage, wet scrubber. The F-101D is especially designed for use on stubborn low solubility contaminants or where extremely high scrubbing efficiency is required on normal contaminants.

FW-300. Vertical (counter-flow), four stage, wet scrubber with integral blower. Efficiency is equal to the F-101.

FW-300D. Vertical (counter-flow), six stage, wet scrubber with integral blower. Efficiency is equal to the F-101D.

PT-500. Vertical (counter-flow), four stage, wet scrubber. Efficiency is equal to the F-101.

PT-500D. Vertical (counter-flow), six stage, wet scrubber. Efficiency is equal to the F-101D.

All Dual Fume Scrubbers are constructed of P.V.C. and Polypropylene corrosion resistant materials and include a rugged coated steel base with lifting lugs. All above units are available with extended depth packing.

SCRUBBING PRINCIPLES

Contaminant removal is accomplished by first slowing the fumes to a velocity below 500 fpm and then passing the fumes through two scrubbing stages in the single pack models and four stages in the double pack types. The fumes first pass through a water spray or curtain during which a percentage of the larger contaminant particles drop out and the remaining fumes are saturated. The second stage consists of a 12" deep pack of polypropylene high surface, non-clogging, spherical plate packing media* which is continuously wetted by the spray nozzles. The saturated fumes are impinged upon the packing and the contaminants are absorbed and carried away in the wash water. The first and second stages are repeated in the double pack fume scrubbers.

*Several types of alternate packing media are available on request.

MIST ELIMINATION

After passing through the scrubbing sections, the air is moisture laden and must pass through a two stage gravity mist eliminator section. This final stage of P.V.C. eliminator blades provides four 30° changes in direction and eliminates entrained water.

WATER SUPPLY

All Dual Fume Scrubbers may be supplied with water either directly from your supply or from an integral or remote recirculation system supplied with the scrubber. It is generally recommended that a recirculation system be used to conserve water except on very low cfm units. The actual fresh water consumption on the single pack series with recirculation is only 0.05 to 0.15 gpm/1000 cfm depending on the contaminant involved. On the double pack models, water consumption ranges from 0.1 to 0.3 gpm/1000 cfm. This represents 5% of the water being recirculated. Dual scrubbers are self-draining and may be installed out-doors in sub-zero conditions without freeze-up. If these conditions exist, a remote recirculation system should be specified for placement in a heated area.

All Dual Scrubbers come complete with fittings for the addition of chemical neutralizers, if required. A complete chemical metering and pumping system is available upon request.

MATERIALS

Every Dual Fume Scrubber is shipped complete with an integral coated steel base. No special mounting is required. Simply connect the duct, the water and power supply, and the unit is ready for operation. Complete installation and operating instructions are supplied with all Dual Scrubbers.

PRESSURE DROP

The following pressure drops are applicable for Scrubbers operated at design CFM:

F-101	2.0" w.g.	FW-300D	3.0" w.g.
F-101D	3.0" w.g.	PT-500	2.0" w.g.
FW-300	2.0" w.g.	PT-500D	3.0" w.g.

On the FW-300 series, the blower is designed for 2.0" external static pressure.

FW-300 BLOWER SECTION

The top section of the FW-300 Fume Scrubber consists of a Dual P.V.C. centrifugal blower complete with motor and OSHA belt guard and shaft cover. The blower section may be rotated through 360° to obtain any desired angle between scrubber inlet and blower outlet. This blower section is same low maintenance, guaranteed corrosion resistant blower described in Dual Brochure No. CI-131, and NH-151.

MAINTENANCE

All Dual Fume Scrubbers incorporate low maintenance components from front to back, including the packing, plumbing system and eliminators. Quick opening inspection doors are at all critical points.

DUAL FUME SCRUBBERS
Typical Average Fume Removal Efficiencies

MODELS▶ CONTAMINATES ▼	Single Pack Series:	Double Pack Series:	Single Pack Series:	Double Pack Series:
	F-101 PT-500 FW-300	F-101D PT-500D FW-300D	with added Chemical Neutralizer (pH Control)	
Acetic Acid	95-98	98-99	—	—
Alkaline Cleaners	96-99	98-99	—	—
Aluminum Bright Dip*	80-85	85-90	—	—
Anodizing	96-99	98-99	—	—
Aqua Regia	80-85	85-90	85-90	90-95
Boric Acid	85-90	90-95	—	—
Caustic Cleaners	98-99	99	—	—
Caustic Soda	98-99	99	—	—
Chlorine	80-85	85-90	85-90	90-95
Chromic Acid	98-99	99	—	—
Copper Chloride	75-80	80-85	85-90	90-95
Cyanide Solutions	98-99	99	—	—
Ferric Chloride	80-85	83-88	—	—
Ferric Nitrate	96-98	98-99	—	—
Ferrous Chloride	90-95	95-98	—	—
Ferrous Sulfate	95-97	96-98	—	—
Fluosilicic Acid	95-98	98-99	—	—
Hydrochloric Acid	80-85	85-90	90-95	95-98
Hydrogen Cyanide	85-90	90-95	—	—
Hydrofluoric Acid	90-93	95-98	—	—
Hydrofluosilicic Acid	95-98	98-99	—	—
Hydrogen Peroxide	90-95	95-99	—	—
Hydrogen Sulfide	70-75	75-80	85-90	95-98
Nickel Chloride	80-85	85-90	90-95	95-98
Nickel Sulfate	80-85	85-90	90-95	95-98
Nitric Acid	75-80	85-90	—	—
Nitrogen Dioxide (NO ₂)	45-50	50-60	65-70	70-75
Nitric — HF Acid	75-80	85-90	—	—
Perchloric Acid	95-98	96-99	—	—
Phosphoric Acid	96-99	98-99	—	—
Potassium Dichromate	96-98	98-99	—	—
Selenium Sulfide	96-98	98-99	—	—
Sodium Chloride	96-98	98-99	—	—
Sodium Fluoride	90-95	95-98	—	—
Sodium Glutamate	96-98	98-99	—	—
Sodium Hydroxide	98-99	99	—	—
Sulfur Dioxide	70-75	75-80	80-85	85-90
Sulfuric Acid	96-98	98-99	—	—
Tin Chlorides	75-80	80-85	85-90	90-95
Zinc Chloride	75-80	80-85	—	—
Zinc Nitrate	96-98	98-99	—	—
Zinc Sulfate	96-98	98-99	—	—

* These efficiencies are for the combined nitric and phosphoric fume. The efficiency for the NO₂ portion of the fume only will be as listed above.

© The above efficiencies are intended as guide representing average values. Specific combinations and concentrations of fumes may result in a significant variation from the above.

TECHNICAL BULLETIN

*Duall
Industries*

No. 121-9

DUALL SCRUBBERS INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

Date 3/1/80

Superseding Bulletin 4/24/79

Page 1

1. AIR FLOW

Units are normally designed to be on the suction side of the fan. Air flow through units must be in the direction indicated. Too large a deviation from the design flow (CFM) will affect the efficiency of the scrubber.

2. SUPPORTING THE UNIT

The scrubber rests on a steel channel base making the unit self-supporting. This steel base may be suspended from overhead structure or rest on any media suitable to support the unit's weight.

3. CONNECTION TO VENTILATION DUCT

To eliminate the possibility of water running down the duct, there should be a minimum of 4 ft. of horizontal duct before the scrubber transition. This should be sloped slightly towards the bottom of the scrubber. The flanges should be field drilled on approximately 4"-5" centers. A soft foam type chemically compatible gasket material is recommended between the scrubber flange and the duct flange.

4. ELECTRICAL CONNECTION

Proper electrical connection complying with local codes should be made to the pump motor.

5. UNITS WITH INTERNAL RECIRCULATION SYSTEM

Units should be installed in heated areas or protected from freezing. Fresh water must be supplied by connecting the supply line to the flowmeter provided. This flowmeter is mounted on the side of the scrubber. The make-up water line should be valved to provide a maximum of 5% of the recirculation rate as shown on the side of the scrubber. The scrubber drain is connected to customer's waste drain line. If this line must go to a sump, it must be submerged 6"-8" below the lowest expected level, or a plumber's "P" trap should be installed. This will prevent air from flowing into the drain line and interfering with proper drainage of the scrubber. Liquid build-up in the scrubber can interfere seriously with the proper operation of the scrubber.

BEFORE START-UP, INSPECT THE INSIDE OF THE SCRUBBER AND REMOVE ANY FOREIGN MATERIAL FROM THE UNIT. SHUT THE WASTE DRAIN VALVE AND FILL THE SCRUBBER BASE SUMP WITH WATER UNTIL WATER FLOWS FROM THE OVERFLOW DRAIN. WATER IS INTRODUCED THRU THE FLOWMETER AND CAN ALSO BE INTRODUCED BY A HOSE PLACED THRU THE INSPECTION DOORS. When the water reaches the overflow level, the pump and fan may be started.

6. UNITS DESIGNED WITH REMOTE RECIRCULATION TANK AND PUMP

All units designed for remote recirculation require a separate recirculation tank with an adequately sized overflow and waste drain. The use of the remote recirculation tank will permit the installation of self-draining scrubber outside the building and the recirculation tank inside the building. The scrubber must be elevated for proper drain return to the recirculation tank. The scrubber drain pipe must be submerged 6" to 8" below the lowest expected liquid level in the tank and on the opposite side from the pump suction. The pipe end should be cut on a 60° angle with the long opening facing the tank side. For information on start-up and make-up water, please refer to Section 5 above. Make-up water may be introduced into the recirculation tank through the separate flowmeter provided for installation into water line.

7. PUMPS

Pumps should be operated in accordance with the enclosed manufacturer's instructions. Pumps with mechanical seals should be given particularly special attention to assure operation as directed. Pump motor should be electrically bumped to check for proper rotation. Motors and pumps are aligned and checked for proper operation before shipment. Customer is cautioned that misalignment may occur during shipment. Check for misalignment by manually rotating the shaft while observing coupling alignment using a straight edge or a dial indicator. Pumps provided with a packing gland are pre-adjusted to drip approximately 30 drops per minute. Drain fittings are provided on the pump or on a collection pan which should be plumbed to the waste drain. Pump motor should be interlocked with fan to provide approximately two (2) minutes pump operation before fan may be started. Pumps should not be started until the scrubber base or remote recirculation tank are filled to the overflow level. During the early break-in period, the pump packing gland should be checked for proper weeping. If incorrect, check pump manufacturer's instructions for correction procedure.

8. CHEMICAL ADDITIONS

In some cases, liquid caustic (sodium hydroxide solution) or an acid solution may be metered into the recirculation system to increase scrubber efficiency. A threaded coupling is provided in the side of the self-contained recirculation scrubbers for introduction of this chemical addition. Chemical addition for scrubbers provided with remote recirculation tanks is made by adding the solution to the recirculation tank. When using solid caustic, care should be taken in mixing to assure that no solid material is pumped into the scrubber or recirculation tank which may cause a build-up. The pH of the recirculation tank should be maintained in a range that will achieve the desired scrubber efficiency while preventing the appearance of a build-up on the packing. A pH control package may be purchased from Duall to provide a chemical feed pump and pH control to maintain the recirculation solution in the satisfactory range.

TECHNICAL BULLETIN

*Duall
Industries*

No. 121-9

DUALL SCRUBBERS INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

Date 3/1/80

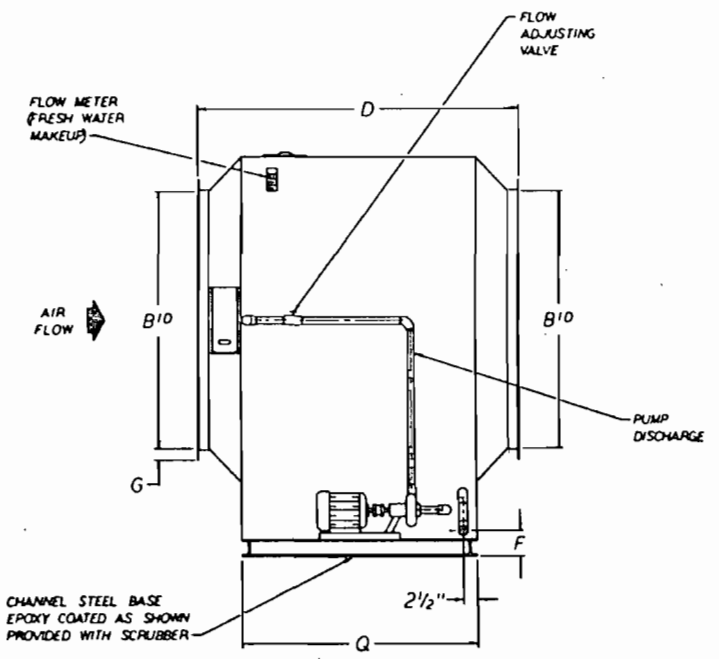
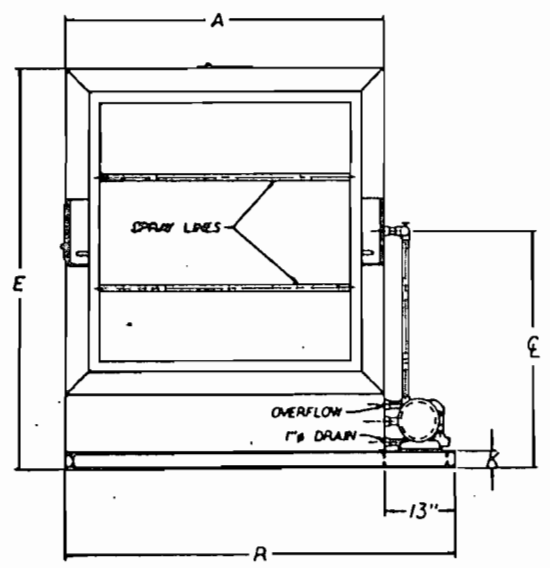
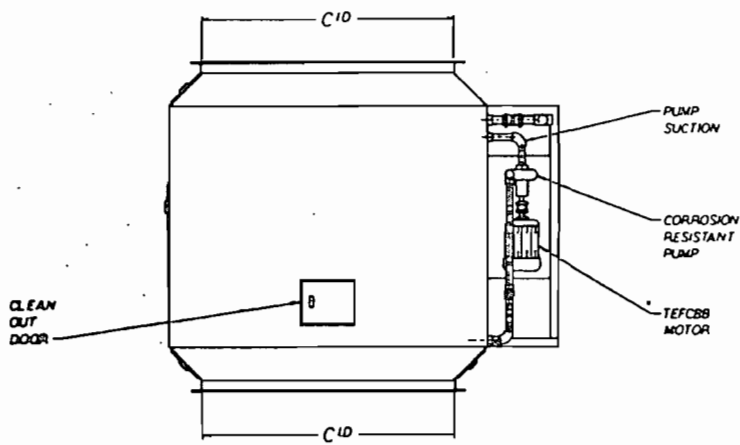
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9. PERIODIC MAINTENANCE SCHEDULE

Inspection doors are provided in all scrubber units for periodic inspection. While it is not expected that maintenance will be required, periodic inspection on a monthly basis is suggested. This inspection should include the following:

- A. Check spray nozzles with the pump and fan in operation. All nozzles should produce a full 360° spray pattern. If any nozzles are found to be spraying incorrectly, the pump should be stopped, the header pipe removed, and each nozzle cleaned individually. When the cleaned header system has been replaced, the pump may be re-started.
- B. Check the face of the scrubber and the spray nozzles for any indication of a build-up of solids. If a surface build-up has occurred, it may be removed by spraying the pack with high pressure water, by chemical treatment of the scrubbing solution to dissolve the scale, or by manually removing the surface build-up. An analysis of the material build-up can be made to determine its nature. A dissolving additive, compatible with P.V.C. then could be added to the recycling reservoir for closed loop cleaning. During this type of cleaning, the drain and make-up water valves should be closed. During this operation, someone should frequently check the operation of the nozzles, and solution level to prevent pump damage. Prior to putting the system back in service, the cleaning solution should be drained and the scrubber refilled with fresh water. Steam should not be used to clean the scrubber.
- C. Check the water level in the scrubber. While the scrubber is in operation, it should maintain a solution of approximately 3"-6" in the bottom of the scrubber on a remote recirculation system and to the overflow on others.



CFM	0.5	1	2	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60
A	18	22	28	32	37	41	45	52	58	64	69	74	81	88	97	104	112	123	135	157	179	202	224	247	269
B	10	14	20	24	29	33	37	44	46	52	57	62	65	61	61	61	61	61	61	61	61	61	61	61	61
C	10	14	20	24	29	33	37	44	46	52	57	62	69	72	81	88	96	107	119	141	163	186	208	231	253
D	49	50	50	51	52	52	53	54	59	60	60	61	61	66	66	66	66	66	66	66	66	66	66	66	66
E	30	34	40	44	49	53	58	65	71	77	82	87	91	91	91	91	91	91	91	91	91	91	91	91	91
F	3/2	3/2	3/2	3/2	3/2	3/2	4/2	4/2	4/2	4/2	4/2	4/2	5/2	5/2	5/2	5/2	5/2	5/2	5/2	5/2	5/2	5/2	5/2	5/2	5/2
G	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
K	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4
Q	37	38	38	39	40	40	41	42	43	44	44	45	45	46	46	46	46	46	46	46	46	46	46	46	46
R	31	35	41	45	50	54	58	65	71	77	82	87	94	101	110	117	125	136	148	170	192	215	237	260	282
E	21	23	26	28	30 1/2	32 1/2	35 1/2	39	42	45	48 1/2	50	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2
OVERFLOW	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
PUMP SUCTION	1	1	1	1	1	1	1	1 1/4	1 1/4	1 1/2	1 1/2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
PUMP DISCHARGE	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2	2	2	2	2
LIQUID RATE GPM	15	3	6	9	12	15	18	24	30	36	42	48	54	60	66	72	78	84	90	105	120	135	150	165	180

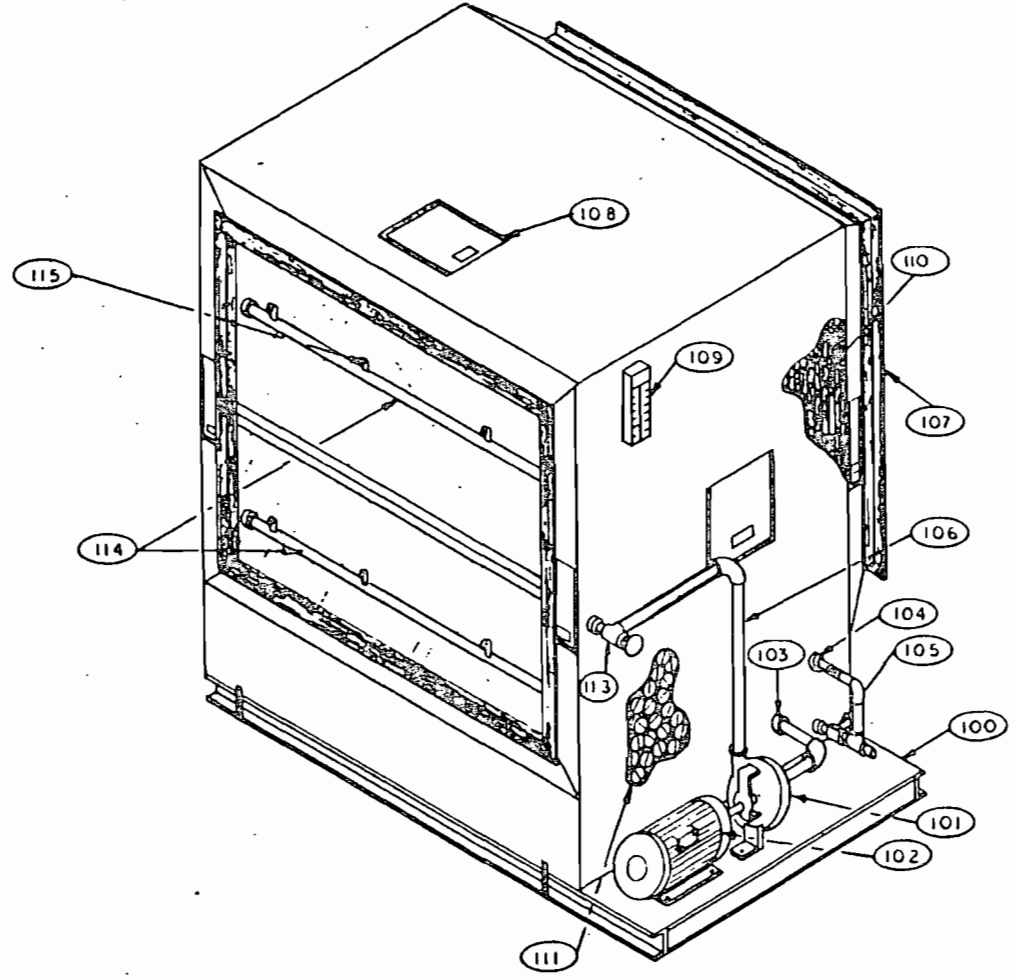
NOTE: CFM IN THOUSANDS

F-101 FUME SCRUBBER			
WITH SELF CONTAINED RECIRCULATION			
DUAL INDUSTRIES, INC. OWOSSO, MI			
DATE	DUAL JOB NO.		
PURCHASER			
PURCHASER P.O. NO.			
PURCHASER LOCATION			
JOB NAME			
JOB LOCATION			
SPECIFICATION NO.	ITEM NO.		
CAPACITY		CFM	
PRESSURE DROP		W.G.	
LIQUID RECIRCULATION RATE		GPM	
LIQUID PRESSURE		T.D.H.	
MAKEUP RATE		GPM	
RECIRCULATION PUMP			
PUMP CAPACITY	GPM		T.D.H.
PUMP HP			
PUMP VOLTAGE	V	PH	HZ.

TAG:

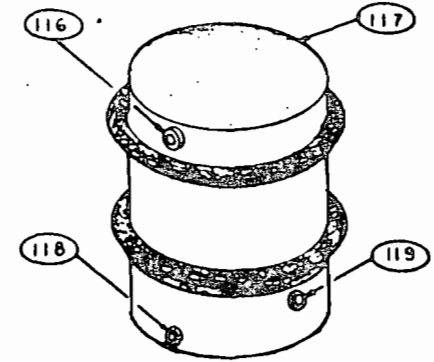
D-101-1015

F-101 FUME SCRUBBER			
WITH SELF CONTAINED RECIRCULATION			
SCALE	QUANTITY	DATE	REVISION

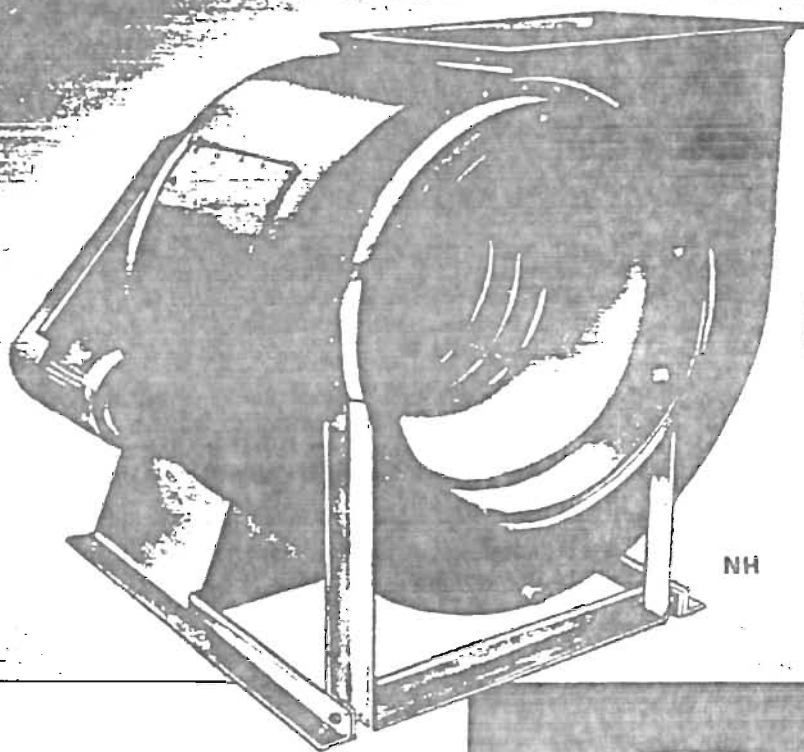


DUAL F-101 FUME SCRUBBER PARTS LIST	
NO:	PART
100	EPOXY COATED STEEL BASE
101	CORROSION RESISTANT PUMP
102	TEFCBB MOTOR — — V./ PH./ — CY. — H.P. — R.P.M.
103	PUMP SUCTION COUPLING (P.V.C.)
104	OVERFLOW COUPLING (P.V.C.)
105	DRAIN VALVE (P.V.C.)
106	PUMP DISCHARGE LINE (P.V.C.)
107	FLANGE (P.V.C.)
108	CLEAR OR P.V.C. CLEANOUT DOORS
109	FLOW METER — — —
110	ELIMINATOR SECTION (P.V.C.)
111	POLYPROPYLENE PACKING
113	SPRAY HEADER VALVE (P.V.C.)
114	SPRAY HEADER (P.V.C.)
115	SPRAY NOZZLES

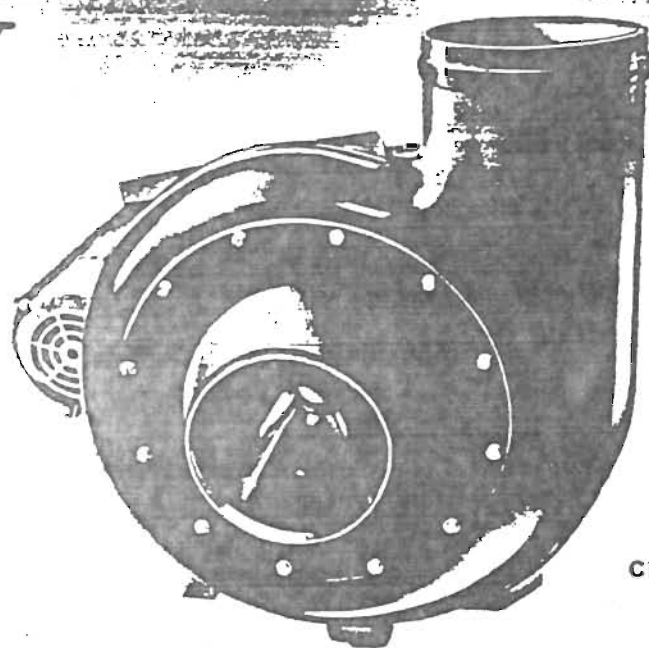
PARTS LIST FOR REMOTE RECIRCULATION TANK	
116	OVERFLOW (P.V.C.)
117	REMOTE TANK (P.V.C.)
118	DRAIN (P.V.C.)
119	PUMP SUCTION COUPLING (P.V.C.)



BEST AVAILABLE COPY



NH



CI

SPECIFY THE BEST ...

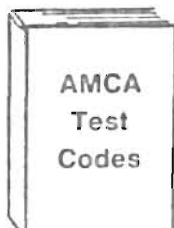
Duall

INDUSTRIES

- HIGH EFFICIENCY ●
- BROAD PERFORMANCE RANGE ●
- LOW OPERATING COST ●
- QUIET OPERATION ●

FANS

PVC FABRICATED
 CENTRIFUGAL TYPES
CI, NH, and RV
 IN SIZES TO OVER
70,000 CFM.
CORROSION RESISTANT



AMCA
Test
Codes

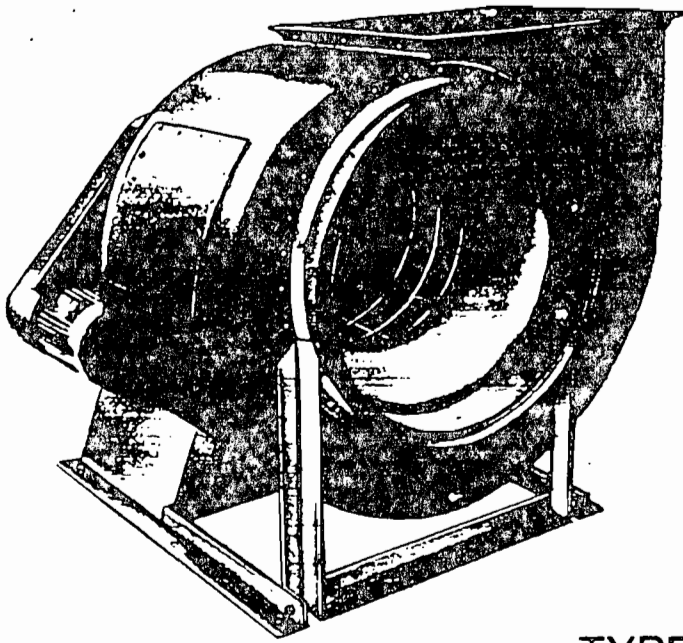
Capacity tables listed in this catalog are calculated based on tests made in accordance with the applicable AMCA Standard Test Code. Rated capacities are based on standard air density of .075 pounds per cubic foot at sea level (29.92" Barometric Pressure), dry air, and 70°F.

- CHEMICALS
- ELECTRONICS
- PAPER MAKING
- NUCLEAR METALS
- MARINE
- PLATING
- UTILITIES
- TEXTILES
- PHOTOGRAPHY
- PETROLEUM
- PICKLING
- MISC. INDUSTRIES

Duall INDUSTRIES, INC.

700 South McMillan St.
Owosso, Michigan 48867

P.O. Box 1000
Forest City, N.C. 28043



Dull
INDUSTRIES

PVC
CONSTRUCTED
CENTRIFUGAL
FANS

TYPE NH TO OVER 70,000 CFM

**To Accurately Specify
Your Requirements
You Will Need . . .**

1. Volume at the inlet in CFM.
2. The inlet static pressure.
3. The inlet air temperature.
4. If gas, not air, the density or specific gravity.
5. Elevation above sea level.
6. Characteristics of the electric current.

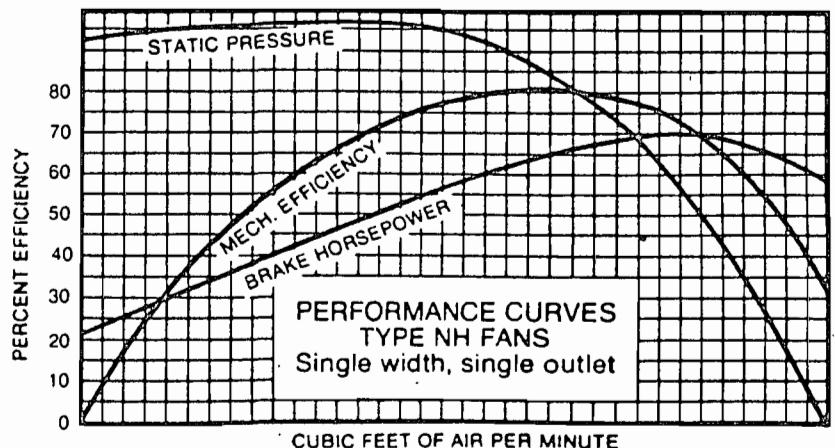
**Construction
Features**

DULL PVC FANS are built to last. Features include: Heavy angle iron bracing. Over-capacity shaft and bearings. Formed PVC venturi inlet for streamlined flow into the wheel with its own matching cone, resulting in very high efficiency and quiet operation. Operating temperatures up to 155°F. All PVC housing. PVC coated steel wheel. PVC inlet and outlet angle flanges. Phenolic coated steel frame. PVC drain. OSHA belt and shaft guards.

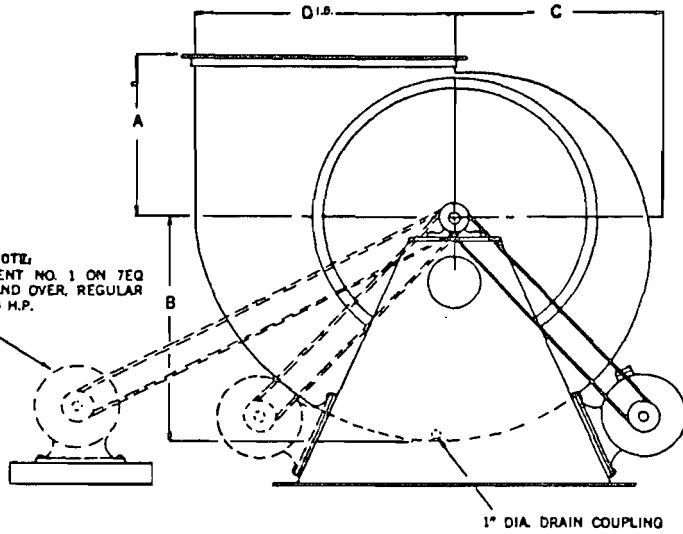
- HIGH EFFICIENCY.
- ECONOMICAL OPERATION.
- QUIET, SMOOTH RUNNING.
- GREAT CORROSION RESISTANCE.
- LOW MAINTENANCE.
- QUICK, EASY INSTALLATION.

These large corrosion resistant P.V.C. constructed fans with their stable and efficient performance are preferred in most plants where a corrosive atmosphere prevails. The P.V.C., heavy duty constructed housings, with the steel reinforced plastisol coated wheel, make this excellent fan inherently quiet. Among the other fine features included are phenolic coated steel base, TEFCBB motor, drain, flanged inlet and outlet, OSHA approved shaft cover and belt guard, and a readily accessible access door. All offered as standard equipment at no increase in price. All Dull fans carry a one year warranty against corrosion.

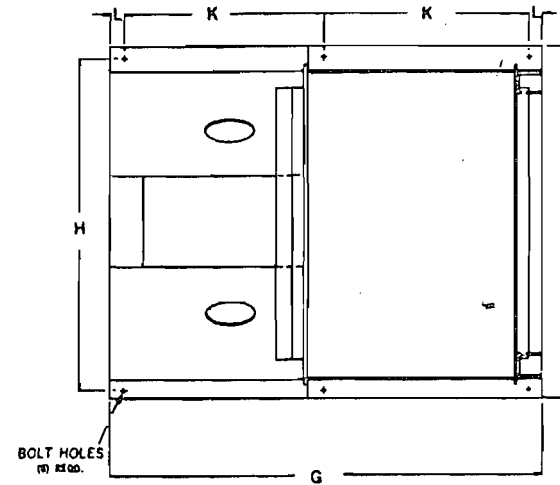
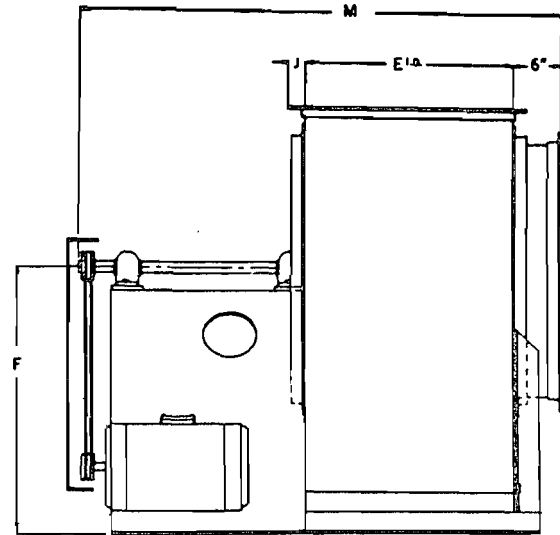
Excellent Performance



NOTE:
USE ARRANGEMENT NO. 1 ON 7EQ
MOTOR 30 H.P. AND OVER, REGULAR
MOTORS OVER 40 H.P.



NOTE: Do not use this drawing for Dimension for Bottom
Horizontal Discharge Fans.



CENTRIFUGAL NH FAN NO.		
DUALL INDUSTRIES, Inc. OWOSSO, MICH.		
DRAWN BY	USER	CLASS
DATE	LOCA.	ARR
ROTATION	PURCH.	CFM
V PH CY	LOCA.	SP
CERTIFIED BY	JOB NO.	BHP

DIMENSIONS IN INCHES

CENTRIFUGAL NH FAN NO.

FAN NO.	A	B	C	D.I.D.	E.I.D.	F	G	H	I	J	K	L	M	P.I.D.	SHAFT DIA.	KEYWAY	BOLT HOLES DIA.
24 1/2	10 1/8	11 1/8	9 3/4	12 3/4	9 3/4	14 1/2	26 1/8	19 1/4	21 1/4	1 1/2	12 1/2	1	33 3/8	13 1/4	1 3/8	1/4 x 1/8	1/2
27	10 7/8	12 3/4	10 3/8	14	10 3/4	16	27 1/8	20 1/4	22 1/4	1 1/2	12 1/2	1	34 3/8	14 1/4	1 3/8	1/4 x 1/8	1/2
30	11 1/8	13 3/4	11 1/8	15 3/8	11 3/4	17 1/2	35	22	24	1 1/2	16 1/2	1	43	15 1/2	1 3/8	3/8 x 1/8	1/2
33	12 3/8	14 1/2	12 3/8	17 1/8	13 1/8	19 1/2	38 7/8	23 3/8	25 3/8	1 1/2	18 3/8	1	43 3/8	17 3/8	1 3/8	3/8 x 1/8	1/2
36 1/2	13 1/2	16 3/4	14 1/2	19	14 1/2	20 1/2	39 3/4	25	27	1 1/2	18 7/8	1	48 1/8	19 1/4	1 3/8	3/8 x 3/8	1/2
40	14 3/8	18 3/8	15 3/8	20 7/8	15 7/8	23 1/2	43 3/8	27 1/2	30	1 1/2	20 3/8	1 1/4	51 3/8	21	1 1/2	3/8 x 3/8	1/2
44 1/2	16	20 3/4	17 3/4	23 3/4	17 3/8	25	45	31	33 1/2	1 1/2	21 1/4	1 1/4	52	23 3/8	1 1/2	3/8 x 3/8	1/2
49	17 3/8	22 1/2	18 1/8	25 1/2	19 1/2	27	47 1/2	33 3/8	35 3/8	1 1/2	22 1/2	1 1/4	55 3/8	26	1 1/2	1/2 x 1/4	1/2
54	18 1/8	24 1/2	20 3/4	28 1/8	21 1/2	30	49 1/2	36 1/4	38 3/4	1 1/2	23 1/2	1 1/4	57 1/8	29	1 1/2	1/2 x 1/4	1/2
60	20 3/8	27 1/4	23 1/2	31 1/4	23 3/8	33	51 7/8	40	42 1/2	1 1/2	24 1/8	1 1/4	60 3/8	32	2 1/8	1/2 x 1/4	1/2
66	22 3/8	30	25 3/8	34 3/8	26 1/4	36	55 1/2	44	47	1 1/2	26 1/4	1 1/2	63 3/8	34 1/2	2 3/8	3/8 x 3/8	3/8
73	24 7/8	33 1/2	28	38	29	40	59 1/4	48	51	1 1/2	28 3/8	1 1/2	66 1/8	38 1/2	2 3/8	3/8 x 3/8	3/8
80 1/2	27 3/4	36 1/2	30 7/8	42	32	43 3/4	63	53	56	2	30	1 1/2	72	42 1/4	2 1/2	3/8 x 3/8	3/8
89	30 1/2	40 3/4	34 1/2	46 1/2	35 3/8	44 3/4	66 7/8	58	61	2	31 3/8	1 1/2	76 3/8	46 1/4	2 1/2	3/4 x 3/8	3/8
98	33 3/4	44 3/8	37 3/8	51 1/8	39	48	77 1/2	64	67	2	37 1/4	1 1/2	81 3/8	51 1/4	3 1/8	3/4 x 3/8	3/8
108	37	49 3/8	41 3/8	56 1/2	43 3/8	52	81 1/2	69	72	2	39 1/4	1 1/2	91 3/8	56	3 1/8	3/4 x 3/8	3/8
120	41	54 1/2	46 3/8	62 1/2	47 3/4	57 3/4	86	75	78	2	41 1/2	1 1/2	98 3/8	62	3 1/8	1 x 1/2	3/8

CLASSES

I AND II

DUAL TYPE NH FANS

NON-OVERLOADING MEDIUM SPEED HIGH EFFICIENCY

Outlet Size 23 3/4" x 31 1/4" I.D.

Inlet Size 32" I.D.

Tip Speed = RPM X 7.85

Wheel Diameter 30 in.

Outlet Area 5.15 Sq. Ft. Inside

Max. BHP = 6.71 $\left(\frac{\text{RPM}}{1000}\right)^3$

SIZE 60

SINGLE WIDTH
SINGLE INLET

6900 CFM @ 4" SP

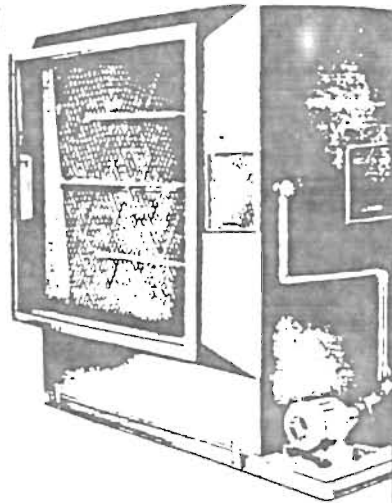
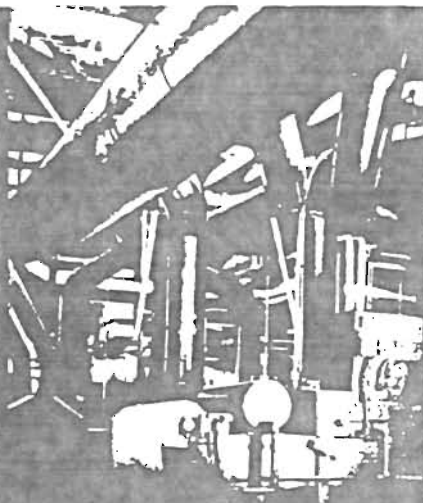
Volume of Air CFM	Outlet Velocity Feet per Minute	1/4" SP		3/8" SP		1/2" SP		5/8" SP		3/4" SP		1" SP		1 1/4" SP		1 1/2" SP		1 3/4" SP			
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4120	800	402	.30	434	.40	466	.50	498	.61	528	.73	559	.85	588	.99	644	1.29	699	1.61	752	1.94
4635	900	427	.36	457	.46	486	.58	515	.70	544	.82	573	.95	601	1.08	654	1.38	705	1.70	755	2.05
5150	1000	453	.43	481	.55	508	.66	535	.79	562	.92	589	1.06	615	1.19	666	1.48	715	1.81	762	2.17
5665	1100	480	.52	506	.63	531	.76	556	.90	581	1.03	606	1.17	631	1.32	680	1.62	726	1.94	771	2.30
6180	1200	507	.61	531	.74	555	.87	578	1.01	602	1.16	625	1.31	649	1.46	695	1.78	740	2.10	783	2.45
6695	1300	535	.72	557	.85	580	.99	602	1.14	624	1.29	645	1.45	667	1.61	711	1.94	754	2.28	796	2.64
7210	1400	563	.84	584	.99	605	1.14	626	1.29	647	1.45	667	1.61	688	1.78	729	2.12	770	2.48	811	2.85
7725	1500	591	.98	611	1.14	630	1.29	651	1.46	671	1.62	690	1.79	710	1.96	748	2.32	788	2.70	826	3.03
8240	1600	621	1.14	638	1.29	657	1.46	676	1.63	695	1.80	714	1.98	732	2.16	769	2.53	806	2.93	843	3.32
8755	1700			666	1.47	684	1.65	701	1.83	720	2.00	738	2.19	755	2.37	791	2.77	825	3.17	861	3.59
9270	1800			694	1.67	711	1.85	728	2.05	745	2.24	763	2.42	779	2.62	813	3.02	846	3.44	879	3.87
9785	1900			722	1.88	739	2.08	755	2.28	770	2.48	788	2.67	804	2.87	836	3.29	868	3.72	900	4.17
10300	2000					767	2.32	782	2.53	797	2.75	813	2.95	829	3.15	860	3.58	891	4.02	922	4.48
10815	2100					795	2.59	810	2.80	824	3.02	838	3.24	854	3.46	884	3.89	914	4.35	944	4.83
11330	2200					823	2.87	838	3.10	857	3.33	865	3.55	879	3.79	909	4.23	937	4.70	966	5.20
11845	2300							866	3.41	885	3.65	893	3.90	906	4.13	934	4.60	961	5.06	989	5.61
12360	2400							921	3.76	934	4.00	945	4.25	960	4.50	984	5.00	1010	5.51	1037	6.03
12875	2500							980	4.13	990	4.37	1001	4.65	1014	4.89	1037	5.41	1061	5.92	1086	6.44
13390	2600									1048	5.20	1058	5.51	1069	5.77	1092	6.28	1113	6.85	1136	7.42
14420	2800									1106	6.18	1116	6.44	1125	6.70	1145	7.31	1168	7.93	1187	8.50
15450	3000									1164	7.26	1174	7.57	1182	7.83	1202	8.45	1224	9.12	1241	9.73

Volume of Air CFM	Outlet Velocity ft per M	2" SP		2 1/2" SP		3" SP		3 1/2" SP		4" SP		4 1/2" SP		5" SP		5 1/2" SP		6" SP		6 1/2" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5150	1000	808	2.55	898	3.34																
5665	1100	815	2.69	901	3.52																
6180	1200	825	2.84	907	3.68	986	4.60	1062	5.51	1133	6.70										
6695	1300	837	3.01	915	3.86	991	4.80	1065	5.77	1135	6.80										
7210	1400	850	3.23	925	4.06	998	5.01	1069	6.03	1139	7.06										
7725	1500	864	3.47	937	4.30	1007	5.20	1075	6.23	1141	7.31	1207	8.45	1269	9.58	1329	10.76	1387	11.95	1442	13.18
8240	1600	879	3.73	950	4.59	1018	5.46	1083	6.49	1147	7.57	1211	8.76	1272	9.94	1332	11.07	1389	12.36	1444	13.70
8755	1700	896	4.01	964	4.89	1030	5.82	1094	6.80	1155	7.93	1216	9.12	1275	10.30	1335	11.48	1391	12.88	1446	14.16
9270	1800	913	4.31	979	5.25	1043	6.18	1105	7.14	1165	8.24	1223	9.42	1281	10.66	1338	11.85	1394	13.29		
9785	1900	932	4.64	995	5.56	1057	6.54	1118	7.57	1176	8.60	1232	9.79	1288	11.02	1343	12.21	1398	13.65		
10300	2000	951	4.95	1012	5.92	1073	6.95	1131	7.98	1188	9.06	1243	10.20	1297	11.38	1350	12.72	1403	14.06		
10815	2100	972	5.30	1030	6.33	1089	7.36	1146	8.45	1201	9.53	1255	10.65	1308	11.85	1359	13.13	1410	14.47		
11330	2200	994	5.67	1049	6.70	1106	7.78	1161	8.91	1215	10.04	1268	11.18	1320	12.36	1370	13.60	1419	14.99		
11845	2300	1016	6.08	1069	7.16	1124	8.24	1172	9.37	1231	10.56	1282	11.74	1332	12.93	1381	14.21	1430	15.50		
12360	2400	1062	6.54	1112	7.62	1161	8.76	1211	9.88	1267	11.07	1317	12.31	1359	13.54	1406	14.83	1453	16.12		
12875	2500	1110	6.95	1157	8.60	1203	9.27	1249	10.45	1296	11.69	1344	12.82	1389	14.16	1435	15.45	1480	16.79		
13390	2600	1159	7.93	1204	9.12	1247	10.35	1290	11.59	1335	12.88	1379	14.21	1423	15.55	1466	16.89	1509	18.23		
14420	2800	1209	9.12	1253	10.30	1293	11.59	1335	12.88	1376	14.27	1417	15.60	1459	17.00	1498	18.38	1541	19.22		
15450	3000	1260	10.35	1302	11.64	1341	12.93	1380	14.32	1421	15.65	1458	17.16	1496	18.54	1536	20.03				
16480	3200	1314	11.69	1352	13.03	1390	14.42	1427	15.81	1465	17.25	1502	18.75	1539	20.29	1574	21.84				
17510	3400	1369	13.18	1403	14.63	1441	16.02	1476	17.51	1511	19.03	1547	20.55	1581	22.15	1616	23.74				

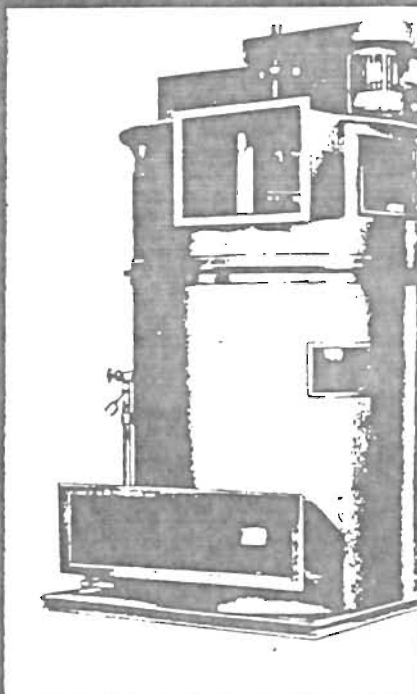
All Capacities Based on Standard Air (Density .075#/cu.ft.—70° F.—29.92" Hg. Bar.)

NOTES: (1) These ratings cover the performance of BOTH Class I and Class II Type NH Fans. Class I Fans can be used for ratings printed in black ONLY. Class II Fans can be used for ALL ratings printed in both black and grey. (2) Ball bearings are standard on all Type NH Fans. Sleeve bearings can be supplied for ratings printed ABOVE SOLID color line only. (3) Values underlined indicate the most efficient point of operation for each pressure.

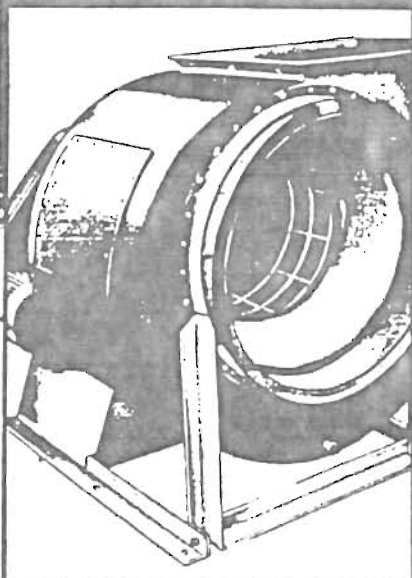
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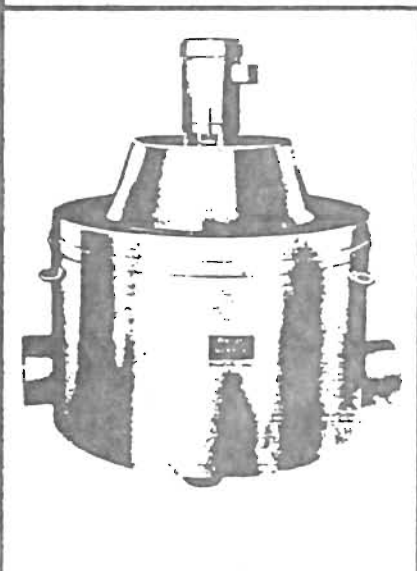
704502
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WITH THE LEADER IN
PVC FABRICATIONS



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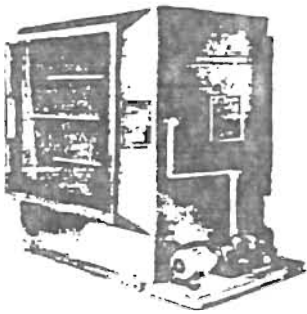
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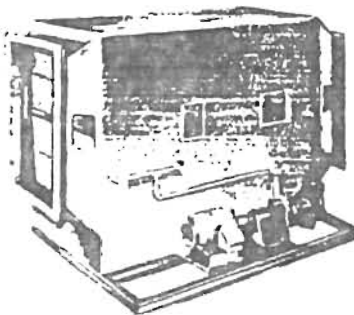
Duall

Fume Scrubbers in 6 Types

F-101 SERIES



Single Pack



Double Pack

Duall Single Pack (four Stage) Fume Scrubbers solve most industrial air pollution problems. They are especially effective on water soluble fumes and odors, or with pH control on many low soluble contaminants.

Some typical proven applications are:

- Acid fumes.
- Plating fumes.
- Cleaning fumes.
- Lab hood fumes.
- Anodizing fumes.
- Pickling fumes.
- Rust-proofing fumes.
- Die-casting fumes.
- Water soluble odors.

Duall Single Pack Fume Scrubbers incorporate these advantages:

- Low cost.
- Low maintenance.
- Low water consumption.
- Low static pressure drop.
- 100% corrosion resistant.

Duall Double Pack (six stage) Fume Scrubbers offer the broadest range of answers to industrial air pollution problems. By double scrubbing the air these scrubbers provide maximum efficiency on tough fumes and odors which can not be completely absorbed in a single pack type scrubber.

Duall's Double Pack Scrubbers have proven effective on the following typical applications:

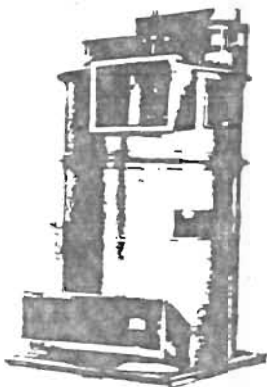
- Bright dip fumes.
- Strip tank fumes.
- Etching fumes.
- Most low solubility fumes and odors.

Our Double Pack Fume Scrubbers offer all the advantages of the Single Pack units as well as the broadest range of applications.

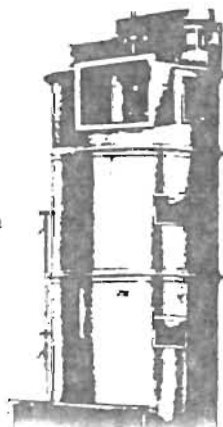
All Duall Fume Scrubbers can be modified for custom installation with multiple packs or extended depth packs. Multiple modular units are available for capacities larger than standard.

See page 6 for complete specs and performance data.

FW-300 SERIES



Single Pack

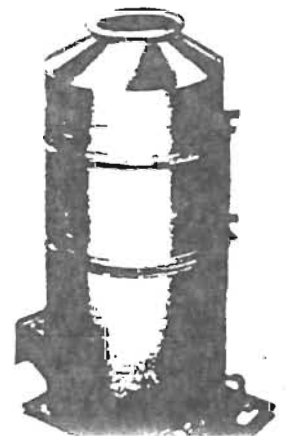


Double Pack

PT-500 SERIES



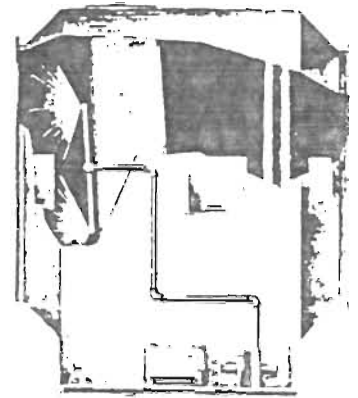
Single Pack



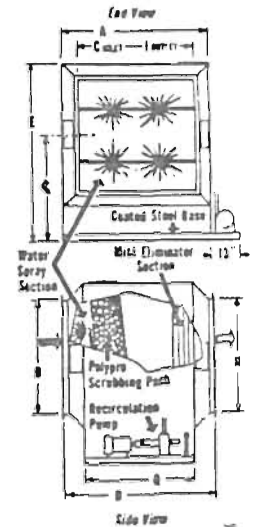
Double Pack

F-101 HORIZONTAL SINGLE FILTER PACK

Being our most popular scrubber design, this compact 100% corrosion resistant P.V.C. unit has proven its efficiency nationwide. The Dual F-101 incorporates high efficiency, low maintenance filter media and the open orifice type spray nozzles, for the assurance of a thoroughly saturated collection chamber. Our mist eliminator outlet section gives four air direction changes to properly remove the entrained moisture. Where a horizontal installation is preferred, the F-101 should be your choice.

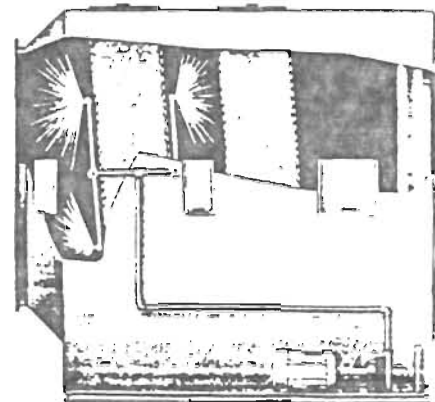


CFM in 000's	DIMENSIONS IN INCHES										CFM in 000's	DIMENSIONS IN INCHES									
	A	B	C	D	E	H	I	Q	¢	A		B	C	D	E	H	I	Q	¢		
0.5	18	10	10	49	30	10	10	37	21	20	88	61	72	66	87	61	72	46	52½		
1	22	14	14	50	34	14	14	38	23	22	97	61	81	66	87	61	81	46	52½		
2	28	20	20	50	40	20	20	38	26	24	104	61	88	66	87	61	88	46	52½		
3	32	24	24	51	44	24	24	39	28	26	112	61	96	66	87	61	96	46	52½		
4	37	29	29	52	49	29	29	40	30½	28	123	61	107	66	87	61	107	46	52½		
5	41	33	33	52	53	33	33	40	32½	30	135	61	119	66	87	61	119	46	52½		
6	45	37	37	53	58	37	37	41	35½	35	157	61	141	66	87	61	141	46	52½		
8	52	44	44	54	65	44	44	42	39	40	179	61	163	66	87	61	163	46	52½		
10	58	46	46	59	71	46	46	43	42	45	102	61	186	66	87	61	186	46	52½		
12	64	52	52	60	77	52	52	44	45	50	224	61	208	66	87	61	208	46	52½		
14	69	57	57	60	82	57	57	44	47½	55	247	61	231	66	87	61	231	46	52½		
16	74	62	62	61	87	62	62	45	50	60	269	61	253	66	87	61	253	46	52½		
18	81	65	65	61	91	65	65	45	52½	b	Larger sizes on request.										

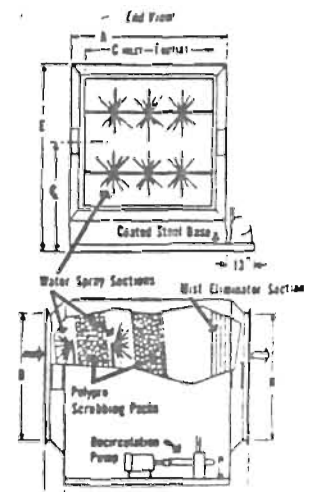


F-101D HORIZONTAL DOUBLE FILTER PACK

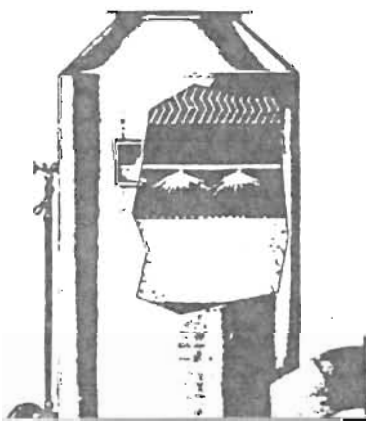
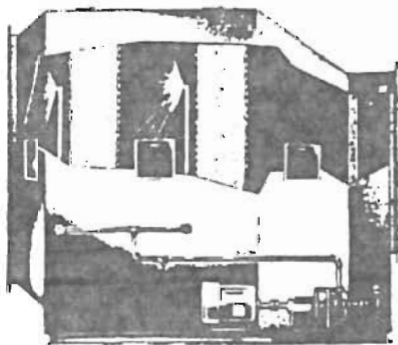
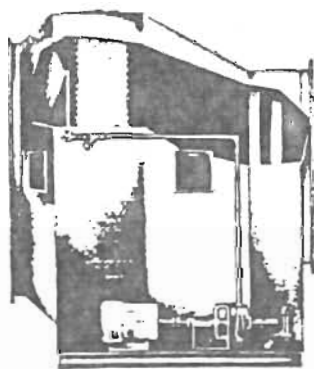
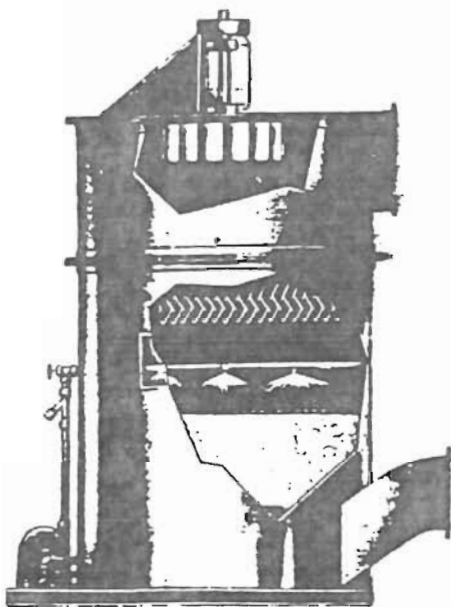
An extra heavy duty scrubber for real "tuffies". It incorporates two filter packs with two sets of sprays for more thorough scrubbing... plus an effective mist eliminator at the air outlet. Serious concentrations of rough fumes, such as nitric, hydrofluoric, and hydrochloric acid are double scrubbed through six stages for maximum efficiency. Use this high efficiency fume scrubber, at only a small increase in price.



CFM in 000's	DIMENSIONS IN INCHES										CFM in 000's	DIMENSIONS IN INCHES									
	A	B	C	D	E	H	I	Q	¢	A		B	C	D	E	H	I	Q	¢		
0.5	18	10	10	70	30	10	10	58	21	20	88	61	72	87	91	61	72	67	52½		
1	22	14	14	71	34	14	14	59	23	22	97	61	81	87	91	61	81	67	52½		
2	28	20	20	71	40	20	20	59	26	24	104	61	88	87	91	61	88	67	52½		
3	32	24	24	72	44	24	24	60	28	26	112	61	96	87	91	61	96	67	52½		
4	37	29	29	73	49	29	29	61	30½	28	123	61	107	87	91	61	107	67	52½		
5	41	33	33	73	53	33	33	61	32½	30	135	61	119	87	91	61	119	67	52½		
6	45	37	37	74	58	37	37	62	35½	35	157	61	141	87	91	61	141	67	52½		
8	52	44	44	75	65	44	44	63	39	40	179	61	163	87	91	61	163	67	52½		
10	58	46	46	80	71	46	46	64	42	45	202	61	186	87	91	61	186	67	52½		
12	64	52	52	81	77	52	52	65	45	50	224	61	208	87	91	61	208	67	52½		
14	69	57	57	81	82	57	57	65	47½	55	247	61	231	87	91	61	231	67	52½		
16	74	62	62	82	87	62	62	66	50	60	269	61	253	87	91	61	253	67	52½		
18	81	65	65	82	91	65	65	66	52½	b	Larger sizes on request.										



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Duall INDUSTRIES

PVC Constructed, 100% Corrosion Free

FUME SCRUBBERS

FW-300 Vertical Pack with Blower

500 TO 12,000 C.F.M. . . plus multiple installations

This packed tower type scrubber is not only a space saver, it's also a true economy model. It incorporates a built-in rugged fan with convenient exterior, belt driven, TEFCBB motor. During installation, the horizontal air discharge can be swivelled 360° before sealing into permanent position. Efficiency is equal to the F-101 and the PT-500. Compactness and versatility make it an unusually popular model. This FW-300 saves three ways . . . in initial cost, installation, and in space. Also available with double pack.

F-101 Horizontal Single Filter Pack

500 TO OVER 60,000 C.F.M. . . plus multiple installations

Being our most popular scrubber design, this compact 100% corrosion resistant P.V.C. unit has proven its efficiency in 46 states. The Duall F-101 incorporates high efficiency, low maintenance filter media and the open orifice type spray nozzles, for the assurance of a thoroughly saturated collection chamber. Our mist eliminator outlet section gives four air direction changes to properly remove the entrained moisture. Where a horizontal installation is preferred, the F-101 should be your choice.

F-101-D Horizontal Double Filter Pack

500 TO OVER 60,000 C.F.M. . . plus multiple installations

An extra heavy duty scrubber for real "tuffies". It incorporates two filter packs with two sets of sprays for more thorough scrubbing . . . plus an effective mist eliminator at the air outlet. Serious concentrations of rough fumes, such as nitric, hydrofluoric, and hydrochloric acid are double scrubbed through six stages for maximum efficiency. For such problems in your plant, use this high efficiency fume scrubber, at only a small increase in price.

PT-500 Vertical Pack

500 TO OVER 30,000 C.F.M. . . plus multiple installations

The upright PT-500 is the space saver. This scrubber is a vertical packed tower type designed to fit into restricted spaces where floor space is at a premium. Its efficiency is equal to the F-101, and also 100% corrosion-free. Air flow is up through a thoroughly water saturated bed of filter media. The mist eliminator pack near the top outlet assures properly dried air. If space is your problem, take a good look at the PT-500. Also available with double pack.

Duall FUME SCRUBBERS

SPECIFICATIONS and PERFORMANCE DATA

DESCRIPTIONS

F-101 Horizontal (cross-flow), four stage, wet scrubber. This model has maximum efficiency on water soluble contaminants and odors, but is also effective on low soluble contaminants with the use of chemical neutralizers.

F-101D Horizontal (cross-flow), six stage, wet scrubber. The F-101D is especially designed for use on stubborn low solubility contaminants or where extremely high scrubbing efficiency is required on normal contaminants.

FW-300 Vertical (counter-flow), four stage, wet scrubber with integral blower. Efficiency is equal to the F-101.

FW-300D Vertical (counter-flow), six stage, wet scrubber with integral blower. Efficiency is equal to the F-101D.

PT-500 Vertical (counter-flow), four stage, wet scrubber. Efficiency is equal to the F-101.

PT-500D Vertical (counter-flow), six stage, wet scrubber. Efficiency is equal to the F-101D.

All Duall Fume Scrubbers are constructed of P.V.C. and Polypropylene corrosion resistant materials and include a rugged coated steel base with lifting lugs. All above units are available with extended depth packing.

SCRUBBING PRINCIPLES

Contaminant removal is accomplished by first slowing the fumes to a velocity below 500 fpm and then passing the fumes through two scrubbing stages in the single pack models and four stages in the double pack types. The fumes first pass through a water spray or curtain during which a percentage of the larger contaminant particles drop out and the remaining fumes are saturated. The second stage consists of a 12" deep pack of polypropylene high surface, non-clogging, spherical plate packing media* which is continuously wetted by the spray nozzles. The saturated fumes are impinged upon the packing and the contaminants are absorbed and carried away in the wash water. The first and second stages are repeated in the double pack fume scrubbers.

*Several types of alternate packing media are available on request.

MIST ELIMINATION

After passing through the scrubbing sections, the air is moisture laden and must pass through a two stage gravity mist eliminator section. This final stage of P.V.C. eliminator blades provides four 30° changes in direction and eliminates entrained water.

WATER SUPPLY

All Duall Fume Scrubbers may be supplied with water either directly from your supply or from an integral or remote recirculation system supplied with the scrubber. It is generally recommended that a recirculation system be used to conserve water except on very low cfm units. The actual fresh water consumption on the single pack series with recirculation is only 0.05 to 0.15 gpm/1000 cfm depending on the contaminant involved. On the double pack models, water consumption ranges from 0.1 to 0.3 gpm/1000 cfm. This represents 5% of the water being recirculated. Duall scrubbers are self-draining and may be installed out-doors in sub-zero conditons without freeze-up. If these conditions exist, a remote recirculation system should be specified for placement in a heated area.

All Duall Scrubbers come complete with fittings for the addition of chemical neutralizers, if required. A complete chemical metering and pumping system is available upon request.

MATERIALS

Every Duall Fume Scrubber is shipped complete with an integral coated steel base. No special mounting is required. Simply connect the duct, the water and power supply, and the unit is ready for operation. Complete installation and operating instructions are supplied with all Duall Scrubbers.

PRESSURE DROP

The following pressure drops are applicable for Scrubbers operated at design CFM:

F-101	2.0" w.g.	FW-300D	3.0" w.g.
F-101D	3.0" w.g.	PT-500	2.0" w.g.
FW-300	2.0" w.g.	PT-500D	3.0" w.g.

On the FW-300 series, the blower is designed for 2.0" external

FW-300 BLOWER SECTION

The top section of the FW-300 Fume Scrubber consists of a Duall P.V.C. centrifugal blower complete with motor and OSHA belt guard and shaft cover. The blower section may be rotated through 360° to obtain any desired angle between scrubber inlet and blower outlet. This blower section is same low maintenance, guaranteed corrosion resistant blower described in Duall Brochure No. CI-131, and NH-151.

MAINTENANCE

All Duall Fume Scrubbers incorporate low maintenance components from front to back, including the packing, plumbing system and eliminators. Quick opening inspection doors are at all critical points.

DUALL FUME SCRUBBERS
Typical Average Fume Removal Efficiencies

MODELS▶ CONTAMINATES ▼	Single Pack Series: F-101 PT-500 FW-300	Double Pack Series: F-101D PT-500D FW-300D	Single Pack Series: with added Chemical Neutralizer (pH Control)	Double Pack Series:
Acetic Acid	95-98	98-99	—	—
Alkaline Cleaners	96-99	98-99	—	—
Aluminum Bright Dip*	80-85	85-90	—	—
Anodizing	96-99	98-99	—	—
Aqua Regia	80-85	85-90	85-90	90-95
Boric Acid	85-90	90-95	—	—
Caustic Cleaners	98-99	99	—	—
Caustic Soda	98-99	99	—	—
Chlorine	80-85	85-90	85-90	90-95
Chromic Acid	98-99	99	—	—
Copper Chloride	75-80	80-85	85-90	90-95
Cyanide Solutions	98-99	99	—	—
Ferric Chloride	80-85	83-88	—	—
Ferric Nitrate	96-98	98-99	—	—
Ferrous Chloride	90-95	95-98	—	—
Ferrous Sulfate	95-97	96-98	—	—
Fluosilicic Acid	95-98	98-99	—	—
Hydrochloric Acid	80-85	85-90	90-95	95-98
Hydrogen Cyanide	85-90	90-95	—	—
Hydrofluoric Acid	90-93	95-98	—	—
Hydrofluosilicic Acid	95-98	98-99	—	—
Hydrogen Peroxide	90-95	95-99	—	—
Hydrogen Sulfide	70-75	75-80	85-90	95-98
Nickel Chloride	80-85	85-90	90-95	95-98
Nickel Sulfate	80-85	85-90	90-95	95-98
Nitric Acid	75-80	85-90	—	—
Nitrogen Dioxide (NO ₂)	45-50	50-60	65-70	70-75
Nitric — HF Acid	75-80	85-90	—	—
Perchloric Acid	95-98	96-99	—	—
Phosphoric Acid	96-99	98-99	—	—
Potassium Dichromate	96-98	98-99	—	—
Selenium Sulfide	96-98	98-99	—	—
Sodium Chloride	96-98	98-99	—	—
Sodium Fluoride	90-95	95-98	—	—
Sodium Glutamate	96-98	98-99	—	—
Sodium Hydroxide	98-99	99	—	—
Sulfur Dioxide	70-75	75-80	80-85	85-90
Sulfuric Acid	96-98	98-99	—	—
Tin Chlorides	75-80	80-85	85-90	90-95
Zinc Chloride	75-80	80-85	—	—
Zinc Nitrate	96-98	98-99	—	—
Zinc Sulfate	96-98	98-99	—	—

* These efficiencies are for the combined nitric and phosphoric fume. The efficiency for the NO₂ portion of the fume only will be as listed above.

© The above efficiencies are intended as guide representing

TECHNICAL BULLETIN

*Duall
Industries*

No. 121-9

DUALL SCRUBBERS INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

Date 3/1/80

Superseding Bulletin 4/24/79

Page 1

1. AIR FLOW

Units are normally designed to be on the suction side of the fan. Air flow through units must be in the direction indicated. Too large a deviation from the design flow (CFM) will affect the efficiency of the scrubber.

2. SUPPORTING THE UNIT

The scrubber rests on a steel channel base making the unit self-supporting. This steel base may be suspended from overhead structure or rest on any media suitable to support the unit's weight.

3. CONNECTION TO VENTILATION DUCT

To eliminate the possibility of water running down the duct, there should be a minimum of 4 ft. of horizontal duct before the scrubber transition. This should be sloped slightly towards the bottom of the scrubber. The flanges should be field drilled on approximately 4"-5" centers. A soft foam type chemically compatible gasket material is recommended between the scrubber flange and the duct flange.

4. ELECTRICAL CONNECTION

Proper electrical connection complying with local codes should be made to the pump motor.

5. UNITS WITH INTERNAL RECIRCULATION SYSTEM

Units should be installed in heated areas or protected from freezing. Fresh water must be supplied by connecting the supply line to the flowmeter provided. This flowmeter is mounted on the side of the scrubber. The make-up water line should be valved to provide a maximum of 5% of the recirculation rate as shown on the side of the scrubber. The scrubber drain is connected to customer's waste drain line. If this line must go to a sump, it must be submerged 6"-8" below the lowest expected level, or a plumber's "P" trap should be installed. This will prevent air from flowing into the drain line and interfering with proper drainage of the scrubber. Liquid build-up in the scrubber can interfere seriously with the proper operation of the scrubber.

BEFORE START-UP, INSPECT THE INSIDE OF THE SCRUBBER AND REMOVE ANY FOREIGN MATERIAL FROM THE UNIT. SHUT THE WASTE DRAIN VALVE AND FILL THE SCRUBBER BASE SUMP WITH WATER UNTIL WATER FLOWS FROM THE OVERFLOW DRAIN. WATER IS INTRODUCED THRU THE FLOWMETER AND CAN ALSO BE INTRODUCED BY A HOSE PLACED THRU THE INSPECTION DOORS. When the water reaches the overflow level, the pump and fan may be started.

6. UNITS DESIGNED WITH REMOTE RECIRCULATION TANK AND PUMP

All units designed for remote recirculation require a separate recirculation tank with an adequately sized overflow and waste drain. The use of the remote recirculation tank will permit the installation of self-draining scrubber outside the building and the recirculation tank inside the building. The scrubber must be elevated for proper drain return to the recirculation tank. The scrubber drain pipe must be submerged 6" to 8" below the lowest expected liquid level in the tank and on the opposite side from the pump suction. The pipe end should be cut on a 60° angle with the long opening facing the tank side. For information on start-up and make-up water, please refer to Section 5 above. Make-up water may be introduced into the recirculation tank through the separate flowmeter provided for installation into water line.

7. PUMPS

Pumps should be operated in accordance with the enclosed manufacturer's instructions. Pumps with mechanical seals should be given particularly special attention to assure operation as directed. Pump motor should be electrically bumped to check for proper rotation. Motors and pumps are aligned and checked for proper operation before shipment. Customer is cautioned that misalignment may occur during shipment. Check for misalignment by manually rotating the shaft while observing coupling alignment using a straight edge or a dial indicator. Pumps provided with a packing gland are pre-adjusted to drip approximately 30 drops per minute. Drain fittings are provided on the pump or on a collection pan which should be plumbed to the waste drain. Pump motor should be interlocked with fan to provide approximately two (2) minutes pump operation before fan may be started. Pumps should not be started until the scrubber base or remote recirculation tank are filled to the overflow level. During the early break-in period, the pump packing gland should be checked for proper weeping. If incorrect, check pump manufacturer's instructions for correction procedure.

8. CHEMICAL ADDITIONS

In some cases, liquid caustic (sodium hydroxide solution) or an acid solution may be metered into the recirculation system to increase scrubber efficiency. A threaded coupling is provided in the side of the self-contained recirculation scrubbers for introduction of this chemical addition. Chemical addition for scrubbers provided with remote recirculation tanks is made by adding the solution to the recirculation tank. When using solid caustic, care should be taken in mixing to assure that no solid material is pumped into the scrubber or recirculation tank which may cause a build-up. The pH of the recirculation tank should be maintained in a range that will achieve the desired scrubber efficiency while preventing the appearance of a build-up on the packing. A pH control package may be purchased from Duall to provide a chemical feed pump and pH control to maintain the recirculation solution in the satisfactory range.

TECHNICAL BULLETIN

*Duall
Industries*

No

121-9

DUALL SCRUBBERS INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

Date 3/1/80

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9. PERIODIC MAINTENANCE SCHEDULE

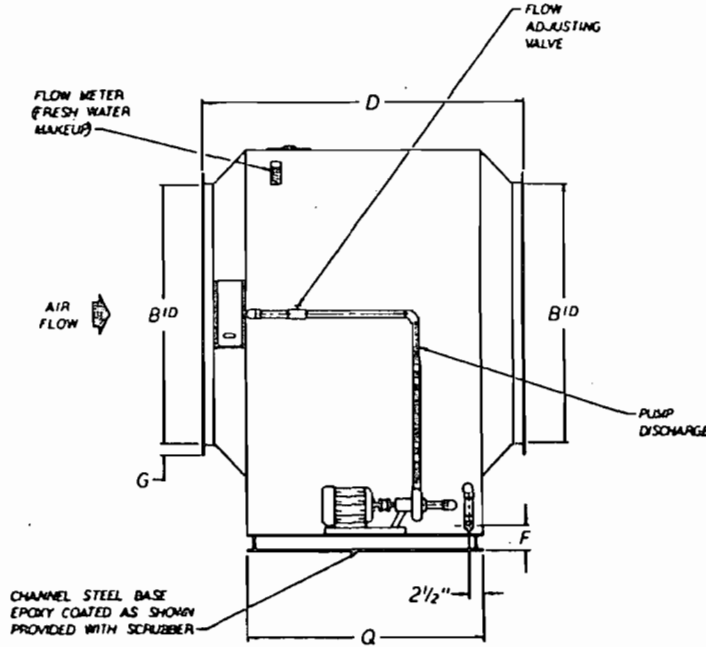
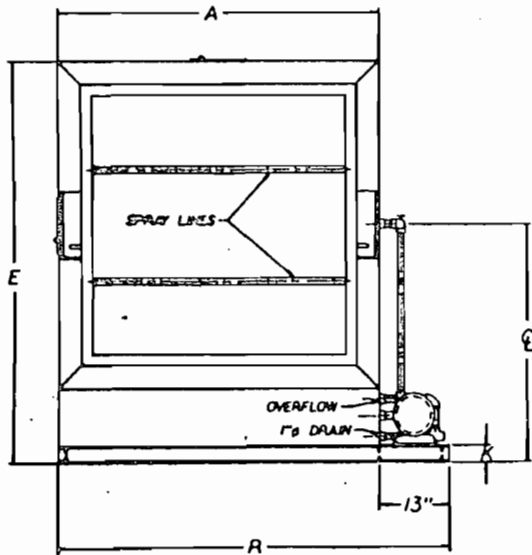
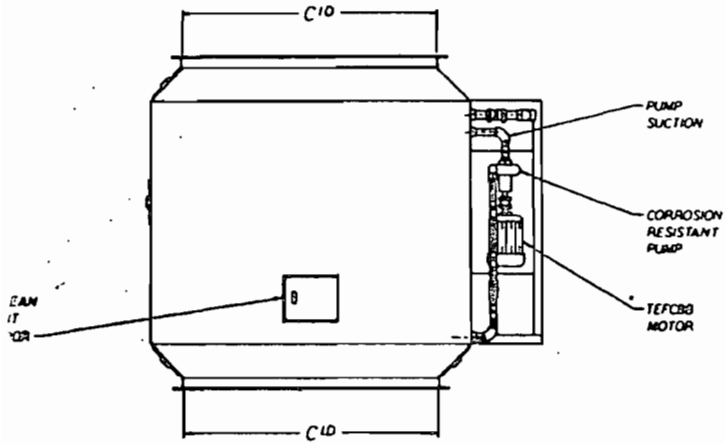
Inspection doors are provided in all scrubber units for periodic inspection. While it is not expected that maintenance will be required, periodic inspection on a monthly basis is suggested. This inspection should include the following:

- A. Check spray nozzles with the pump and fan in operation. All nozzles should produce a full 360° spray pattern. If any nozzles are found to be spraying incorrectly, the pump should be stopped, the header pipe removed, and each nozzle cleaned individually. When the cleaned header system has been replaced, the pump may be re-started.
- B. Check the face of the scrubber and the spray nozzles for any indication of a build-up of solids. If a surface build-up has occurred, it may be removed by spraying the pack with high pressure water, by chemical treatment of the scrubbing solution to dissolve the scale, or by manually removing the surface build-up. An analysis of the material build-up can be made to determine its nature. A dissolving additive, compatible with P.V.C. then could be added to the recycling reservoir for closed loop cleaning. During this type of cleaning, the drain and make-up water valves should be closed. During this operation, someone should frequently check the operation of the nozzles, and solution level to prevent pump damage. Prior to putting the system back in service, the cleaning solution should be drained and the scrubber refilled with fresh water. Steam should not be used to clean the scrubber.
- C. Check the water level in the scrubber. While the scrubber is in operation, it should maintain a solution of approximately 3"-6" in the bottom of the scrubber on a remote recirculation system and to the overflow on others.

Duall Industries, Inc. 700 South McMillan St., Owosso, Michigan, 48867 Area Code 517/725-8184

CFM	05	1	2	3	4	5	6	8	10	12	14	16	18	20	22	24	26	28	30	35	40	45	50	55	60
A	18	22	28	32	37	41	45	52	58	64	69	74	81	88	97	104	112	123	135	157	179	202	224	247	269
B	10	14	20	24	29	33	37	44	46	52	57	62	65	61	61	61	61	61	61	61	61	61	61	61	61
C	10	14	20	24	29	33	37	44	46	52	57	62	69	72	81	88	96	107	119	141	163	186	208	231	253
D	49	50	50	51	52	52	53	54	59	60	60	61	61	66	66	66	66	66	66	66	66	66	66	66	66
E	30	34	40	44	49	53	58	65	71	77	82	87	91	91	91	91	91	91	91	91	91	91	91	91	91
F	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	4 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	5 1/2	
G	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
K	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4
Q	37	38	38	39	40	40	41	42	43	44	44	45	45	46	46	46	46	46	46	46	46	46	46	46	46
R	31	35	41	45	50	54	58	65	71	77	82	87	94	101	110	117	125	136	148	170	192	215	237	260	282
U	21	23	26	28	30 1/2	32 1/2	35 1/2	39	42	45	47 1/2	50	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	52 1/2	
OVERFLOW	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	
PUMP SUCTION	1	1	1	1	1	1	1	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	1 1/8	
PUMP DISCHARGE	3/4	3/4	3/4	3/4	3/4	3/4	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	
LIQUID RATE GPM	15	3	6	9	12	15	18	24	30	36	42	48	54	60	66	72	78	84	90	105	120	135	150	165	180

NOTE: CFM IN THOUSANDS

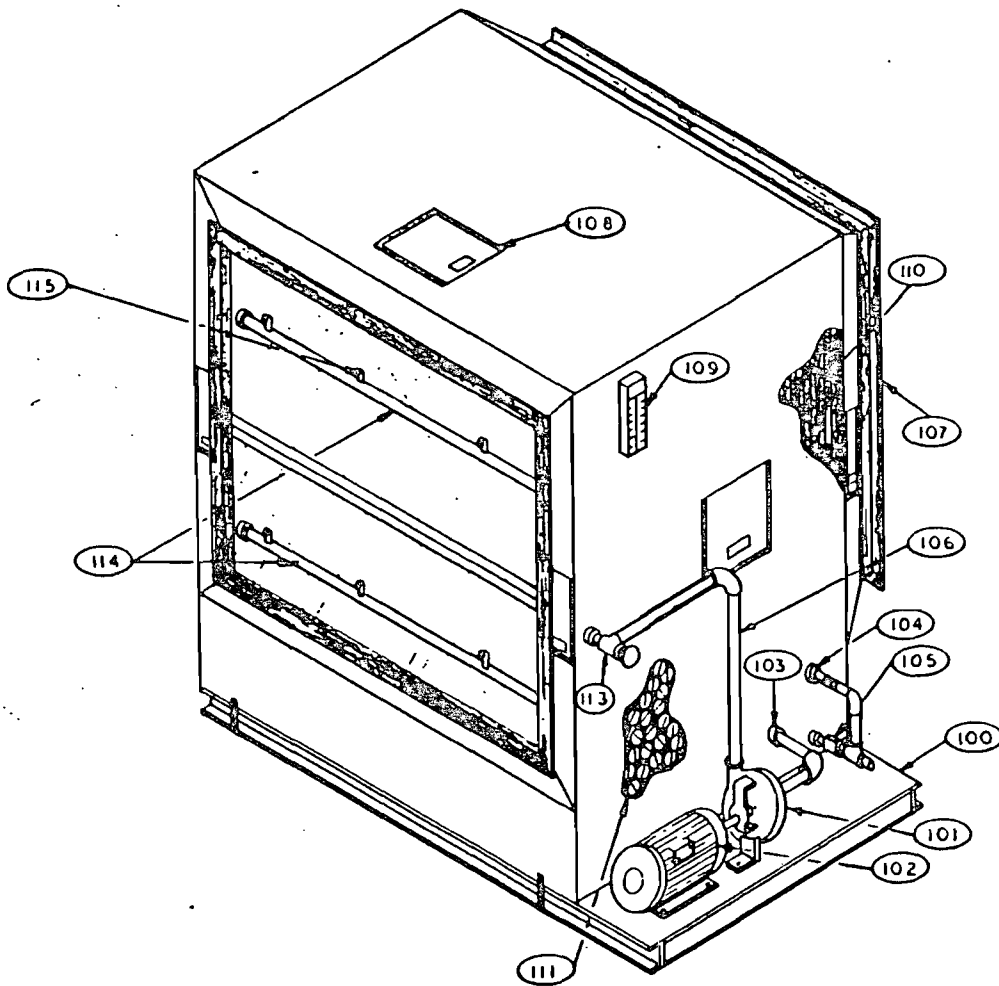


F-101 FUME SCRUBBER	
WITH SELF CONTAINED RECIRCULATION	
DUAL INDUSTRIES, INC. OWOSSO, MI	
DATE	DUAL JOB NO
PURCHASER	
PURCHASER P.O. NO	
PURCHASER LOCATION	
JOB NAME	
JOB LOCATION	
SPECIFICATION NO	ITEM NO.
CAPACITY	CFM
PRESSURE DROP	WG
LIQUID RECIRCULATION RATE	GPM
LIQUID PRESSURE	TDH
MAKEUP RATE	GPM
RECIRCULATION PUMP	
PUMP CAPACITY	GPM TDH
PUMP HP	
PUMP VOLTAGE	V PH Hz

TAG:

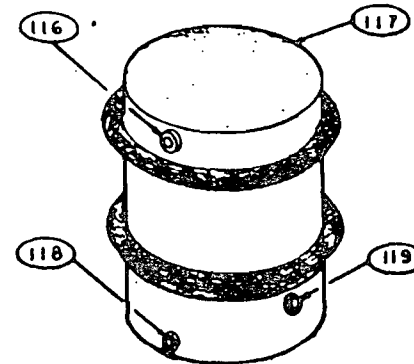
D-101-106

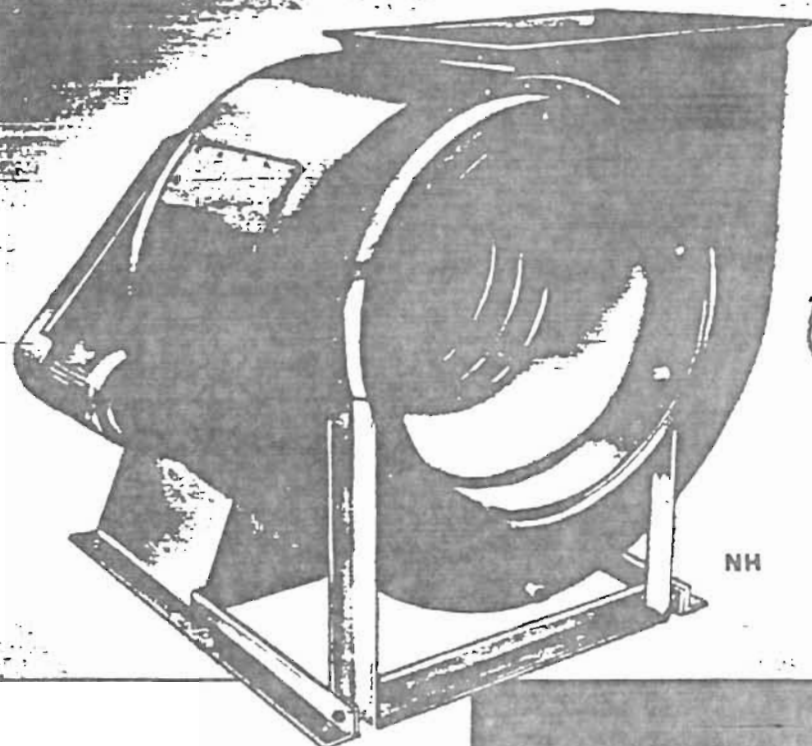
F101 FUME SCRUBBER	
WITH SELF CONTAINED RECIRCULATION	
DATE	DUAL JOB NO
PURCHASER	
PURCHASER P.O. NO	
PURCHASER LOCATION	
JOB NAME	
JOB LOCATION	
SPECIFICATION NO	ITEM NO.
CAPACITY	CFM
PRESSURE DROP	WG
LIQUID RECIRCULATION RATE	GPM
LIQUID PRESSURE	TDH
MAKEUP RATE	GPM
RECIRCULATION PUMP	
PUMP CAPACITY	GPM TDH
PUMP HP	
PUMP VOLTAGE	V PH Hz



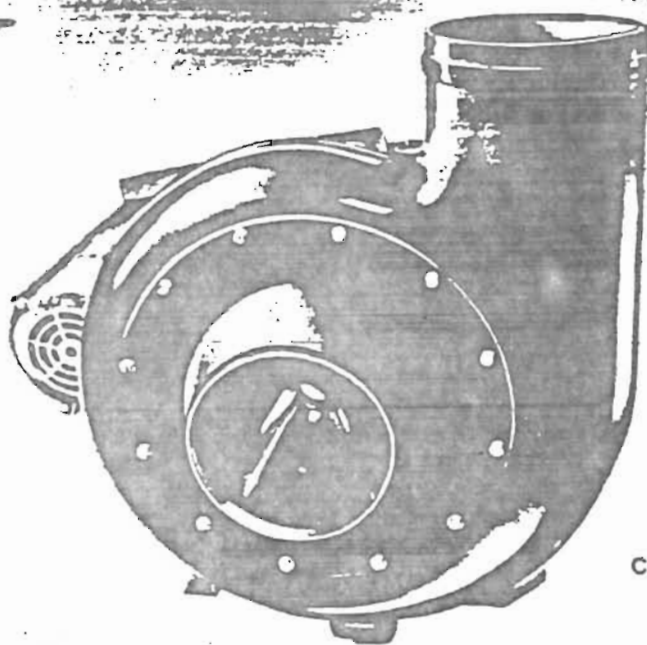
DUALL F-101 FUME SCRUBBER PARTS LIST	
NO:	PART
100	EPOXY COATED STEEL BASE
101	CORROSION RESISTANT PUMP
102	TEFCBB MOTOR — V./ PH./ — CY. — H.P. — R.P.M.
103	PUMP SUCTION COUPLING (P.V.C.)
104	OVERFLOW COUPLING (P.V.C.)
105	DRAIN VALVE (P.V.C.)
106	PUMP DISCHARGE LINE (P.V.C.)
107	FLANGE (P.V.C.)
108	CLEAR OR P.V.C. CLEANOUT DOORS
109	FLOW METER — — — —
110	ELIMINATOR SECTION (P.V.C.)
111	POLYPROPYLENE PACKING
113	SPRAY HEADER VALVE (P.V.C.)
114	SPRAY HEADER (P.V.C.)
115	SPRAY NOZZLES

PARTS LIST FOR REMOTE RECIRCULATION TANK	
116	OVERFLOW (P.V.C.)
117	REMOTE TANK (P.V.C.)
118	DRAIN (P.V.C.)
119	PUMP SUCTION COUPLING (P.V.C.)





NH



CI

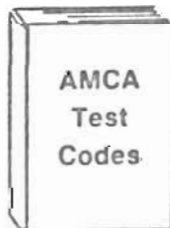
SPECIFY THE BEST . . .

Duall

INDUSTRIES

- HIGH EFFICIENCY
- BROAD PERFORMANCE RANGE
- LOW OPERATING COST
- QUIET OPERATION

- CHEMICALS
- ELECTRONICS
- PAPER MAKING
- NUCLEAR METALS
- MARINE
- PLATING
- UTILITIES
- TEXTILES
- PHOTOGRAPHY
- PETROLEUM
- PICKLING
- MISC. INDUSTRIES



AMCA
Test
Codes

FANS

PVC FABRICATED
CENTRIFUGAL TYPES

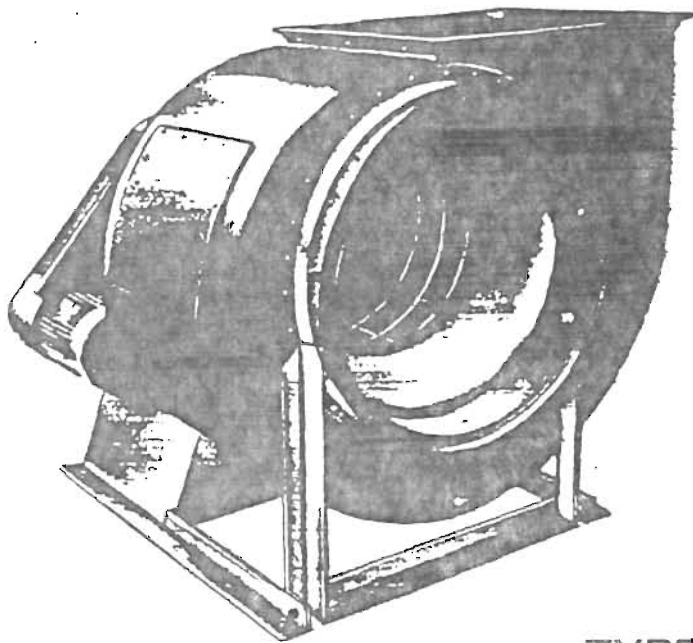
CI, NH, and RV
IN SIZES TO OVER
70,000 CFM.
CORROSION RESISTANT

Capacity tables listed in this catalog are calculated based on tests made in accordance with the applicable AMCA Standard Test Code. Rated capacities are based on standard air density of .075 pounds per cubic foot at sea level (29.92" Barometric Pressure), dry air, and 70°F.

Duall INDUSTRIES, INC.

700 South McMillan St.

P.O. Box 1000



Duall
INDUSTRIES

PVC
CONSTRUCTED

CENTRIFUGAL
FANS

TYPE **NH** TO OVER **70,000** CFM

**To Accurately Specify
Your Requirements
You Will Need . . .**

1. Volume at the inlet in CFM.
2. The inlet static pressure.
3. The inlet air temperature.
4. If gas, not air, the density or specific gravity.
5. Elevation above sea level.
6. Characteristics of the electric current.

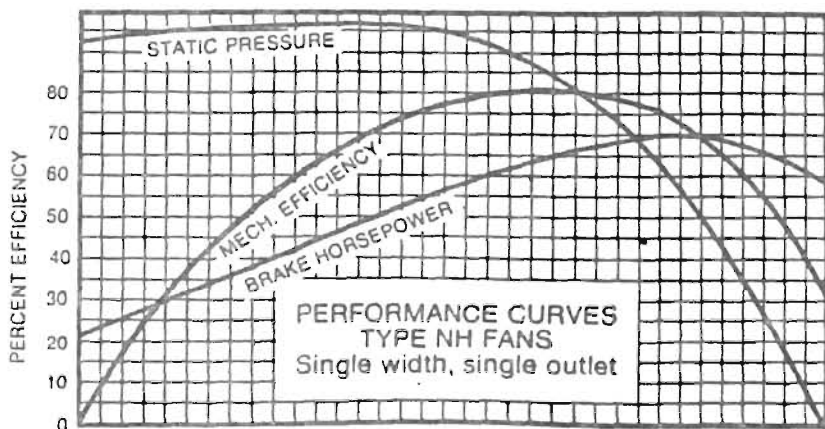
- HIGH EFFICIENCY.
- ECONOMICAL OPERATION.
- QUIET, SMOOTH RUNNING.
- GREAT CORROSION RESISTANCE.
- LOW MAINTENANCE.
- QUICK, EASY INSTALLATION.

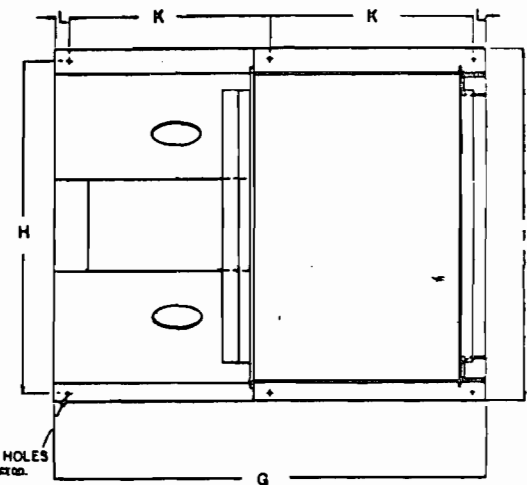
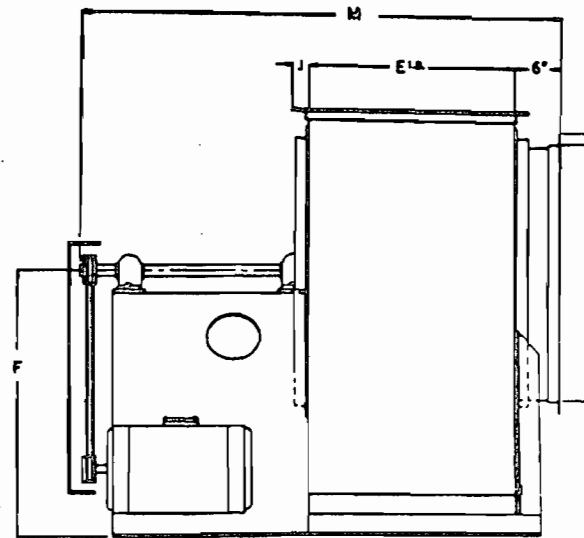
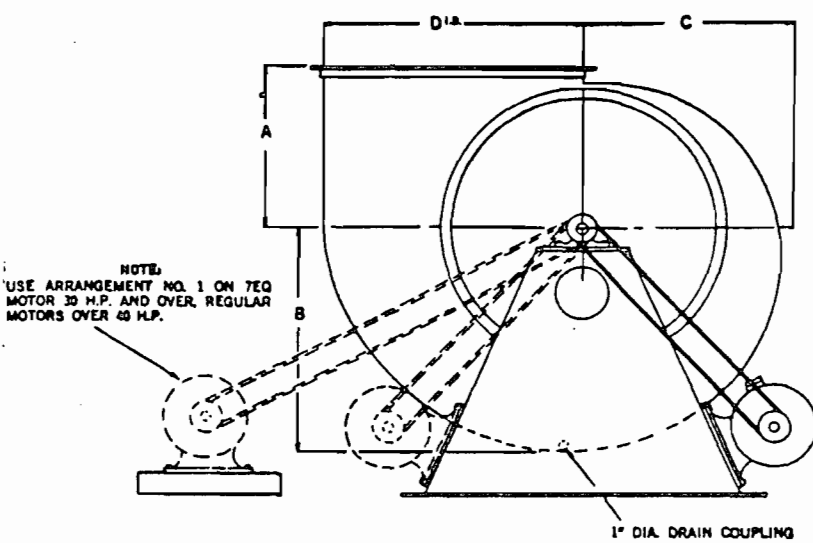
**Construction
Features**

DUALL PVC FANS are built to last. Features include: Heavy angle iron bracing. Over-capacity shaft and bearings. Formed PVC venturi inlet for streamlined flow into the wheel with its own matching cone, resulting in very high efficiency and quiet operation. Operating temperatures up to 155°F. All PVC housing. PVC coated steel wheel. PVC inlet and outlet angle flanges. Phenolic coated steel frame. PVC drain. OSHA belt and shaft guards.

These large corrosion resistant P.V.C. constructed fans with their stable and efficient performance are preferred in most plants where a corrosive atmosphere prevails. The P.V.C., heavy duty constructed housings, with the steel reinforced plastisol coated wheel, make this excellent fan inherently quiet. Among the other fine features included are phenolic coated steel base, TEFCBB motor, drain, flanged inlet and outlet, OSHA approved shaft cover and belt guard, and a readily accessible access door. All offered as standard equipment at no increase in price. All Duall fans carry a one year warranty against corrosion.

Excellent Performance





NOTE: Do not use this drawing for Dimension for Bottom Horizontal Discharge Fans.

CENTRIFUGAL NH FAN NO.		
DUALL INDUSTRIES, Inc. OWOSSO, MICH.		
DRAWN BY	USER	CLASS
DATE	LOCA.	ARR
ROTATION	PURCH.	CFM
V PH CY	LOCA.	SP
CERTIFIED BY	JOB NO.	BHP

DIMENSIONS IN INCHES

CENTRIFUGAL NH FAN NO.

FAN NO.	A	B	C	D.I.D.	E.I.D.	F	G	H	I	J	K	L	M	P.I.D.	SHAFT DIA.	KEYWAY	BOLT HOLES DIA.
24½	10⅞	11⅞	9¾	12¾	9¾	14½	26⅞	19¼	21¼	1½	12½	1	33⅞	13¾	1⅞	¼ x ¼	½
27	10⅞	12⅞	10⅞	14	10¾	16	27⅞	20¼	22¼	1½	12½	1	34⅞	14¼	1⅞	¼ x ¼	½
30	11⅞	13⅞	11⅞	15⅞	11¾	17½	35	22	24	1½	16½	1	43	15½	1⅞	⅝ x ⅝	½
33	12⅞	14⅞	12⅞	17⅞	13¾	19½	38⅞	23⅞	25⅞	1½	18⅞	1	43⅞	17⅞	1⅞	⅝ x ⅝	½
36½	13½	16⅞	14½	19	14½	20½	39¾	25	27	1½	18⅞	1	48⅞	19¼	1⅞	⅞ x ⅞	½
40	14⅞	18⅞	15⅞	20⅞	15⅞	23½	43⅞	27½	30	1½	20⅞	1¼	51⅞	21	1⅞	⅞ x ⅞	½
44½	16	20⅞	17⅞	23¼	17⅞	25	45	31	33½	1½	21¼	1¼	52	23⅞	1⅞	⅞ x ⅞	½
49	17⅞	22⅞	18⅞	25½	19½	27	47½	33⅞	35⅞	1½	22½	1¼	55⅞	26	1⅞	½ x ½	½
54	18⅞	24⅞	20⅞	28⅞	21½	30	49½	36¼	38¼	1½	23½	1¼	57⅞	29	1⅞	½ x ½	½
60	20⅞	27⅞	23⅞	31¼	23⅞	33	51⅞	40	42½	1½	24⅞	1¼	60⅞	32	2⅞	½ x ½	½
66	22⅞	30	25⅞	34⅞	26¼	36	55½	44	47	1½	26¼	1½	63⅞	34½	2⅞	⅞ x ⅞	⅞
73	24⅞	33⅞	28	38	29	40	59¼	48	51	1½	28⅞	1½	66⅞	38½	2⅞	⅞ x ⅞	⅞
80½	27⅞	36⅞	30⅞	42	32	43¾	63	53	56	2	30	1½	72	42¼	2⅞	⅞ x ⅞	⅞
89	30½	40⅞	34⅞	46½	35⅞	44¾	66⅞	58	61	2	31⅞	1½	76⅞	46¼	2⅞	⅞ x ⅞	⅞
98	33¾	44⅞	37⅞	51⅞	39	48	77½	64	67	2	37¼	1½	81⅞	51¼	3⅞	⅞ x ⅞	⅞
108	37	49⅞	41⅞	56½	43⅞	52	81½	69	72	2	39¼	1½	91⅞	56	3⅞	⅞ x ⅞	⅞
120	41	54⅞	46⅞	62½	47¾	57¾	86	75	78	2	41½	1½	98⅞	62	3⅞	1 x ½	⅞

Best Available Copy

CLASSES

I AND II

DUAL TYPE NH FANS

NON-OVERLOADING MEDIUM SPEED HIGH EFFICIENCY

Outlet Size 23 3/4" x 31 1/4" I.D.

Wheel Diameter 30 in.

Inlet Size 32" I.D.

Outlet Area 5.15 Sq. Ft. Inside

Tip Speed = RPM X 7.85

Max. BHP = $6.71 \left(\frac{RPM}{1000}\right)^3$

SIZE 60
SINGLE WIDTH
SINGLE INLET

6,900 CFM @ 4" SP

Volume of Air CFM	Outlet Velocity Feet per Minute	1/4" SP		3/8" SP		1/2" SP		5/8" SP		3/4" SP		1" SP		1 1/4" SP		1 1/2" SP		1 3/4" SP			
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP		
4120	800	402	.30	434	.40	466	.50	498	.61	528	.73	559	.85	588	.99	644	1.29	699	1.61	752	1.94
4635	900	427	.36	457	.46	486	.58	515	.70	544	.82	573	.95	601	1.08	654	1.38	705	1.70	755	2.05
5150	1000	453	.43	481	.55	508	.66	535	.79	562	.92	589	1.06	615	1.19	666	1.48	715	1.81	762	2.17
5665	1100	480	.52	506	.63	531	.76	556	.90	581	1.03	606	1.17	631	1.32	680	1.62	726	1.94	771	2.30
6180	1200	507	.61	531	.74	555	.87	578	1.01	602	1.16	625	1.31	649	1.46	695	1.78	740	2.10	783	2.45
6695	1300	535	.72	557	.85	580	.99	602	1.14	624	1.29	645	1.45	667	1.61	711	1.94	754	2.28	796	2.64
7210	1400	563	.84	584	.99	605	1.14	626	1.29	647	1.45	667	1.61	688	1.78	729	2.12	770	2.48	811	2.85
7725	1500	591	.98	611	1.14	630	1.29	651	1.46	671	1.62	690	1.79	710	1.96	748	2.32	788	2.70	826	3.08
8240	1600	621	1.14	638	1.29	657	1.46	676	1.63	695	1.80	714	1.98	732	2.16	769	2.53	806	2.93	843	3.32
8755	1700			666	1.47	684	1.65	701	1.83	720	2.00	738	2.19	755	2.37	791	2.77	825	3.17	861	3.59
9270	1800			694	1.67	711	1.85	728	2.05	745	2.24	763	2.42	779	2.62	813	3.02	846	3.44	879	3.87
9785	1900			722	1.88	739	2.08	755	2.28	770	2.48	788	2.67	804	2.87	836	3.29	868	3.72	900	4.17
10300	2000					767	2.32	782	2.53	797	2.75	813	2.95	829	3.15	860	3.58	891	4.02	922	4.48
10815	2100					795	2.59	810	2.80	824	3.02	838	3.24	854	3.46	884	3.89	914	4.35	944	4.83
11330	2200					823	2.87	838	3.10	857	3.33	865	3.55	879	3.79	909	4.23	937	4.70	966	5.20
11845	2300							866	3.41	885	3.65	893	3.90	906	4.13	934	4.60	961	5.06	989	5.61
12360	2400							921	3.76	934	4.00	945	4.25	960	4.50	984	5.00	1010	5.51	1037	6.03
12875	2500							980	4.13	990	4.37	1001	4.65	1014	4.89	1037	5.41	1061	5.92	1086	6.44
13390	2600									1048	5.20	1058	5.51	1069	5.77	1092	6.28	1113	6.85	1136	7.42
14420	2800									1106	6.18	1116	6.44	1125	6.70	1145	7.31	1168	7.93	1187	8.50
15450	3000									1164	7.26	1174	7.57	1182	7.83	1202	8.45	1224	9.12	1241	9.73

Volume of Air CFM	Outlet Velocity ft per M	2" SP		2 1/2" SP		3" SP		3 1/2" SP		4" SP		4 1/2" SP		5" SP		5 1/2" SP		6" SP		6 1/2" SP	
		RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5150	1000	808	2.55	898	3.34																
5665	1100	815	2.69	901	3.52																
6180	1200	825	2.84	907	3.68	986	4.60	1062	5.51	1133	6.70										
6695	1300	837	3.01	915	3.86	991	4.80	1065	5.77	1135	6.83										
7210	1400	850	3.23	925	4.06	998	5.01	1069	6.03	1139	7.06										
7725	1500	864	3.47	937	4.30	1007	5.20	1075	6.23	1141	7.31	1207	8.45	1269	9.58	1329	10.76	1387	11.95	1442	13.18
8240	1600	879	3.73	950	4.59	1018	5.46	1083	6.49	1147	7.57	1211	8.76	1272	9.94	1332	11.07	1389	12.36	1444	13.70
8755	1700	896	4.01	964	4.89	1030	5.82	1094	6.80	1155	7.93	1216	9.12	1275	10.30	1335	11.48	1391	12.88	1446	14.16
9270	1800	913	4.31	979	5.25	1043	6.18	1105	7.14	1165	8.24	1223	9.42	1281	10.66	1338	11.85	1394	13.29		
9785	1900	932	4.64	995	5.56	1057	6.54	1118	7.57	1176	8.60	1232	9.79	1288	11.02	1343	12.21	1398	13.65		
10300	2000	951	4.95	1012	5.92	1073	6.95	1131	7.98	1188	9.06	1243	10.20	1297	11.38	1350	12.72	1403	14.06		
10815	2100	972	5.30	1030	6.33	1089	7.36	1146	8.45	1201	9.53	1255	10.65	1308	11.85	1359	13.13	1410	14.47		
11330	2200	994	5.67	1049	6.70	1106	7.78	1161	8.91	1215	10.04	1269	11.18	1320	12.36	1370	13.60	1419	14.99		
11845	2300	1016	6.08	1069	7.16	1124	8.24	1178	9.37	1231	10.56	1283	11.74	1332	12.93	1381	14.21	1430	15.50		
12360	2400	1062	6.54	1112	7.62	1161	8.76	1211	9.88	1267	11.07	1311	12.31	1359	13.54	1406	14.83	1453	16.12		
12875	2500	1110	6.95	1157	8.60	1203	9.27	1249	10.45	1295	11.63	1344	12.82	1389	14.16	1435	15.45	1480	16.79		
13390	2600	1159	7.93	1204	9.12	1247	10.35	1290	11.59	1335	12.88	1379	14.21	1423	15.55	1466	16.89	1509	18.23		
14420	2800	1209	9.12	1253	10.30	1293	11.59	1335	12.88	1376	14.27	1417	15.69	1458	17.00	1498	18.38	1541	19.73		
15450	3000	1260	10.35	1302	11.64	1341	12.93	1380	14.32	1421	15.65	1458	17.16	1496	18.54	1536	20.03				
16480	3200	1314	11.69	1352	13.03	1390	14.42	1427	15.81	1465	17.25	1502	18.75	1538	20.29	1574	21.84				
17510	3400	1369	13.18	1403	14.63	1441	16.02	1476	17.51	1511	19.06	1547	20.55	1583	22.15	1616	23.74				

All Capacities Based on Standard Air (Density .075#/cu.ft.—70° F.—29.92" Hg. Bar.)

NOTES: (1) These ratings cover the performance of BOTH Class I and Class II Type NH Fans. Class I Fans can be used for ratings printed in black ONLY. Class II Fans can be used for ALL ratings printed in both black and grey. (2) Ball bearings are standard on all Type NH Fans. Sleeve bearings can be supplied for ratings printed ABOVE SOLID color line only. (3) Values underlined indicate the most efficient point of operation for each pressure.

TECHNICAL BULLETIN

*Duall
Industries*

No

131-7

DUALL CI & NH FANS, & ROOF VENTILATORS INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

Date 4/24/79

Superseding Bulletin 10/13/75

Page 1

1. INSTALLATION

All applicable electrical codes should be followed.
Do Not Lift By The Shaft.

The fan frame must be securely bolted to a rigid support using the holes provided. The frame should be level and care taken in tightening the bolts so that no torque is applied to the frame. If vibration appears, isolators should be installed.

On fans, the drain coupling should be plumbed to the waste drain. The CI and NH fans are also used on FW-300 fan-scrubbers and roof ventilators. On the FW-300, the fan is either shipped separately or attached to the scrubber, depending on the height of units.

2. OPERATION

Each Duall fan is completely tested statically and dynamically balanced in our plant, but prior to operating, the belt tension should be checked in case that rough handling during shipment has caused them to go out of adjustment. The interior of the fan housing should also be inspected for the presence of any foreign objects which, if found, must be removed prior to operation. The fan may now be operated. Any severe out of balance condition should be noted and reported to Duall Industries immediately. Do not run the fan in an out of balance condition as damage could occur.
Don't Forget To Check For Proper Rotation.

3. MAINTENANCE

Motor and Bearings: Routine maintenance required. See manufacturer's recommendations.

IMPORTANT: Be sure fan is shut off prior to removal of inspection doors or any maintenance or inspection procedure.

Fan Wheel: The inspection door should be periodically removed and the wheel inspected. Any build-up of foreign material on the wheel should be carefully removed and the coating inspected for damage. If the coating is found to be damaged, this condition should be reported to Duall Industries immediately.

For systems ventilating nitric acid fumes, FRP wheels are recommended on NH fans. Ask for a recommended coating for CI fan wheels.

P.V.C. FAN WEIGHTS WITH ADD-ON WEIGHTS FOR MOTORS

<u>BLOWER SIZE</u>	<u>WEIGHT</u>	<u>MOTOR FRAME</u>	<u>H.P.</u>	<u>WEIGHT</u>
6 CI	130	143T	1	43
8 CI	170	145T	1½	48
10 CI	210	145T	2	48
24½NH	225	182T	3	72
27 NH	245	184T	5	82
30 NH	250	213T	7½	145
33 NH	342	215T	10	160
36½NH	390	254T	15	230
40 NH	440	256T	20	250
44½NH	490	284T	25	355
49 NH	550	286T	30	390
54 NH	650	324T	40	550
60 NH	758	326T	50	610
66 NH	954	364T	60	835
73 NH	1240	365T	75	920
80½NH	1400	404T	100	1145
89 NH	1650			
98 NH	2070			
108½NH	2205			
120 NH	2755			

TECHNICAL BULLETIN

*Duall
Industries*

No.

131-4

GENERAL DESIGN DATA
BLOWERS

Date 1/8/80

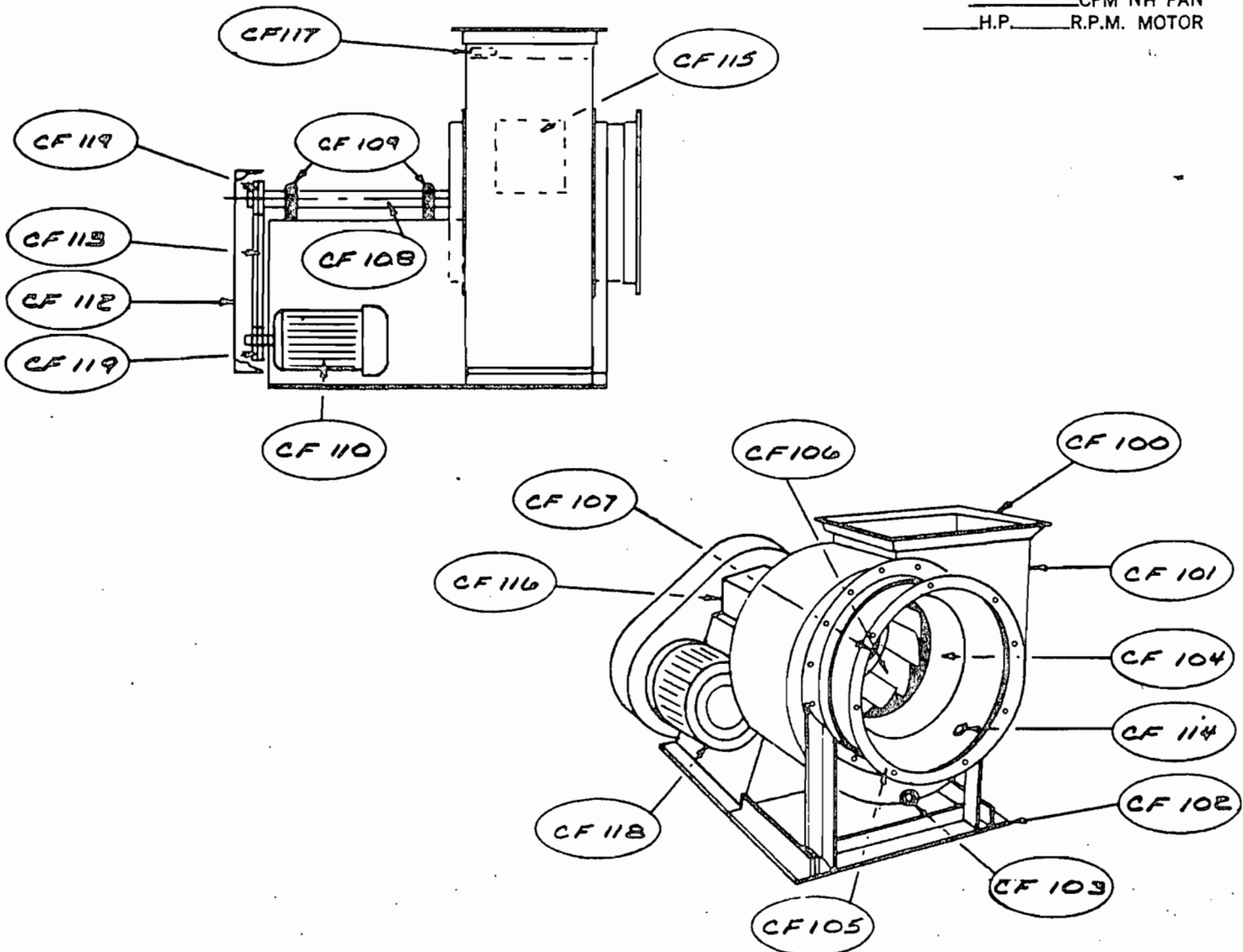
Page 1

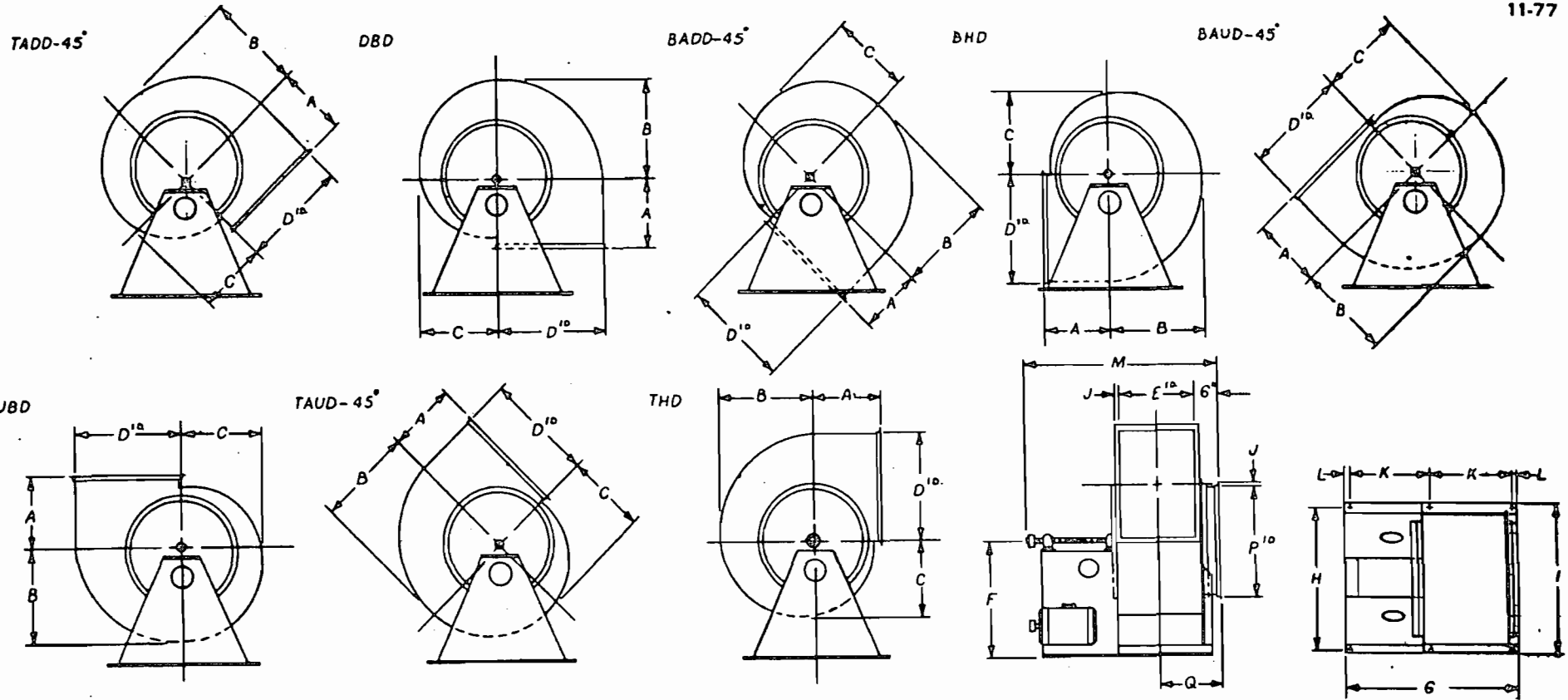
- A. Determine total CFM required (consider CFM required for future additions to system).
- B. Determine static pressure at which blower must operate.
 1. Small duct system (5 drops or less) use 1"
 2. Larger duct system (15 drops or less) use 2"
 3. Scrubber - 2"
 4. Moisture extractor - 3/4"
- C. Determine proper blower size and horsepower.
 1. Consider any specified factors such as outlet velocity.
 2. Refer to Duall rating tables and choose a size and horsepower based on the above factors. The blower should be selected from the second or third set of ratings from the bottom of the table to allow for variation in CFM or static pressure.
 3. Class 2 ratings are printed in light grey. The Class must be noted.

DUAL IND. CENTRIFUGAL FAN PARTS LIST

No.	Part
CF100	P.V.C. Outlet Flange
CF101	P.V.C. Fan Housing
CF102	Plastisol Coated Steel Base
CF103	P.V.C. Drain
CF104	P.V.C. Inlet Cone
CF105	P.V.C. Inlet Flange
CF106	Plastisol Coated Steel Wheel (No.)
CF107	Plastisol Coated Steel Wheel Hub
CF108	Shaft
CF109	Shaft Bearings
CF110	Motor
CF112	Belt Guard (Fully Enclosed)
CF113	Belts
CF114	P.V.C. Bolt Cap
CF115	P.V.C. Clean Out
CF116	P.V.C. Shaft Cover
CF117	Fan Serial No. (Plate)
CF118	Adjustable (Sliding) Base
CF119	Fan and Motor Sheves

_____ CFM NH FAN
 _____ H.P. _____ R.P.M. MOTOR



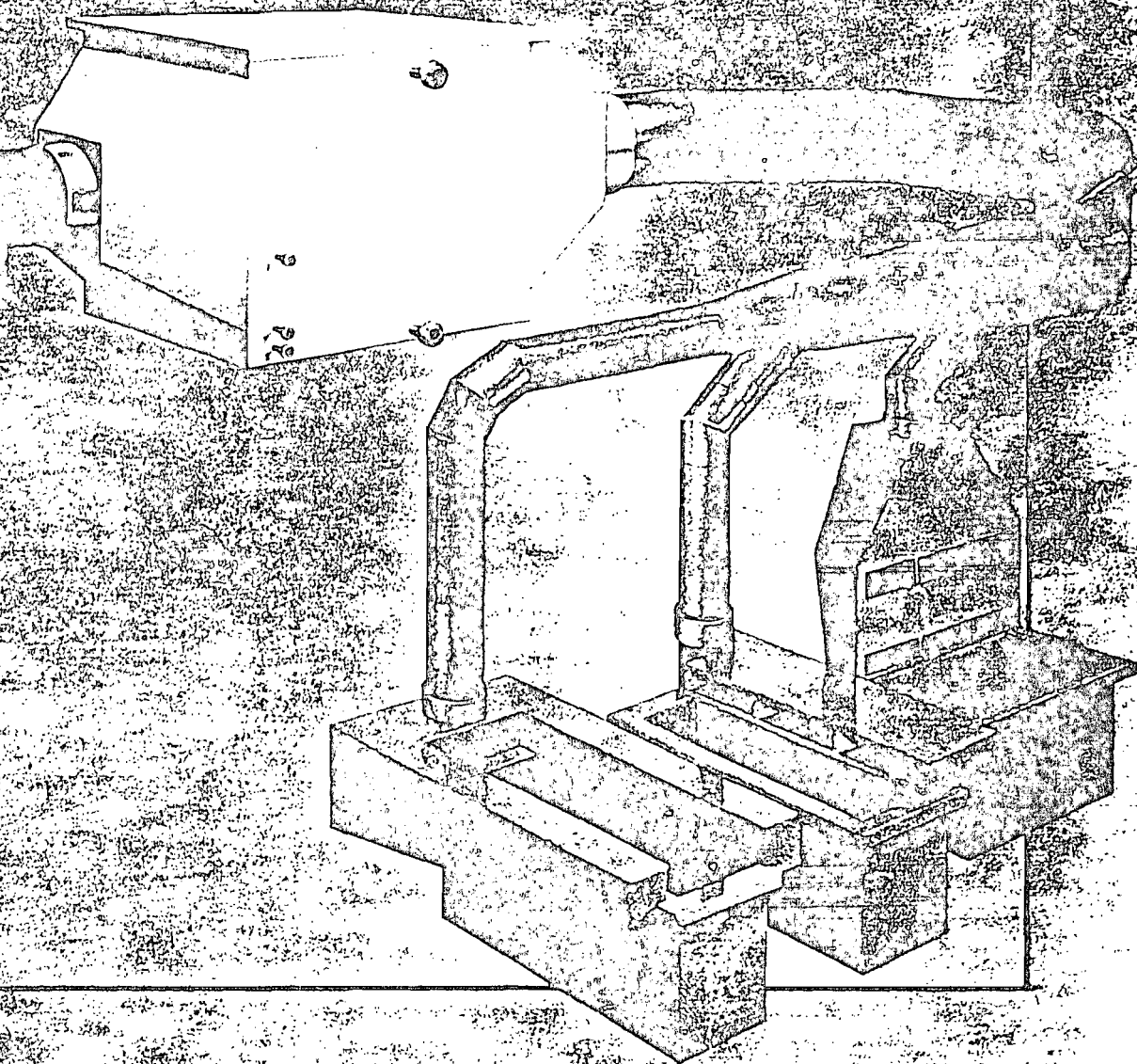


FAN NO.	A	B	C	D ¹⁰	E ¹⁰	F	G	H	I	J	K	L	M	P ¹⁰	Q	SHAFT DIA	KEYWAY	BOLT HOLES DIA
24	10 3/8	11 1/2	9 3/4	12 3/4	9 3/4	14 1/2	26 1/2	19 1/4	21 1/4	1 1/2	12 3/4	1	33 3/8	15 1/4	10 7/8	1 3/16	1/4 x 1/8	1/2
27	10 7/8	12 3/4	10 3/8	14	10 3/4	16	27 1/2	20 1/4	22 1/4	1 1/2	12 3/4	1	34 5/8	14 1/4	11 3/8	1 3/16	1/4 x 1/8	1/2
30	11 1/8	13 1/4	11 1/2	15 3/4	11 3/4	17 1/2	35	22	24	1 1/2	16 1/2	1	43	15 1/2	11 7/8	1 5/16	5/8 x 1/8	1/2
33	12 3/8	14 1/2	12 5/8	17 1/2	13 1/8	19 1/2	38 3/4	23 3/4	25 3/4	1 1/2	18 1/2	1	43 3/8	17 3/8	12 3/8	1 5/16	5/8 x 1/8	1/2
36	13 1/2	16 1/4	14 1/2	19	14 1/2	20 1/2	39 1/2	25	27	1 1/2	18 3/4	1	48 1/8	19 1/4	13 1/4	1 7/8	3/4 x 1/2	1/2
40	14 5/8	18 3/16	15 3/8	20 7/8	15 3/8	23 1/2	43 3/8	27 1/2	30	1 1/2	20 1/2	1 1/4	51 3/8	21	13 13/16	1 11/16	1/2 x 3/4	1/2
44	16	20 3/4	17 3/8	23 1/4	17 3/8	25	45	31	33 1/2	1 1/2	21 1/4	1 1/4	52	23 3/8	14 1/2	1 11/16	1/2 x 3/4	1/2
49	17 3/8	22 3/4	18 1/2	25 1/2	19 1/2	27	47 1/2	33 3/4	35 3/4	1 1/2	22 1/2	1 1/4	55 1/2	26	15 1/2	1 13/16	1/2 x 1/4	1/2
54	18 13/16	24 1/2	20 3/4	28 3/8	21 1/2	30	49 1/2	36 1/2	38 3/4	1 1/2	23 1/2	1 1/4	57 1/2	29	16 1/4	1 13/16	1/2 x 1/4	1/2
60	20 1/8	27 1/4	23 3/4	31 1/4	23 3/4	33	51 3/8	40 1/2	42 1/2	1 1/2	24 1/2	1 1/4	60 3/8	32	17 3/8	2 1/16	1/2 x 1/4	1/2
66	22 3/8	30	25 3/4	34 3/8	26 1/2	36	55 1/2	44	47	1 1/2	26 1/4	1 1/2	63 1/2	34 1/2	19 3/8	2 1/16	3/8 x 1/2	3/8
73	24 1/2	33 3/8	28	38	29	40	59 1/4	48	51	1 1/2	28 3/8	1 1/2	66 1/2	38 1/2	20 1/2	2 1/16	3/8 x 1/2	3/8
80	27 1/4	36 13/16	30 7/8	42	32	43 3/4	63	53	56	2	30	1 1/2	72	42 1/2	22	2 1/16	3/8 x 1/2	3/8
89	30 1/2	40 1/2	34 3/8	46 1/2	35 3/4	44 3/4	66 3/8	58	61	2	31 1/2	1 1/2	76 3/8	46 1/4	23 1/2	2 1/16	3/4 x 1/2	3/8
98	33 1/4	44 1/2	37 3/8	51 1/2	39	48	77 1/2	64	67	2	37 1/2	1 1/2	81 1/2	51 1/4	25 1/2	3 1/16	1/2 x 1/2	3/8
108	37	49 1/2	41 3/8	56 1/2	43 3/4	52	81 1/2	69	72	2	39 1/4	1 1/2	91 1/2	56	27 1/2	3 1/16	1/2 x 1/2	3/8
120	41	54 1/2	46 1/2	62 1/2	47 1/2	57 1/2	86	75	78	2	41 1/2	1 1/2	98 1/2	62	29 3/8	3 1/16	1 x 1/2	3/8

NOTE:
ON DBD, BADD AND BHD
UNITS CONSULT FACTORY FOR
E DIMENSION AS HOUSING
COULD COME BELOW FRAME
OR INTERFERE WITH CONNECT-
ING ANGLES.

CENTRIFUGAL NH FAN NO.		
DUAL INDUSTRIES, Inc. OWOSSO, MICH.		
DRAWN BY	USER	CLASS
DATE	LOCA.	ARR
ROTATION	PURCH.	CFM
V PH CY	LOCA.	SP

Plastic Packed Scrubbers



THE HARRISON SYSTEM

Harrison is a prime designer and producer of complete plastic exhaust systems, custom engineered scrubbing systems, as well as duct and fittings, tanks, and hoods. As a result of this capability and experience, design and manufacture of standard, pre-engineered fume scrubbers is a natural extension.

MATERIALS

Self-supporting or fiberglass armored PVC and Polypropylene, fiberglass armored Kynar, and solid fiberglass construction offers a wide range of resistance to acids, alkalis, solvents, and other corrosives at operating temperatures to approximately 250°F. Harrison systems do not use any metal in contact with the process stream.

PRE-ENGINEERING

Pre-engineered design reduces cost by eliminating the necessity to re-invent each item ordered. It results in more reliable service thru improved workmanship achieved by repetitive production control, and speeds quotations and approval drawings because costs and designs are immediately available. In addition to significant savings in approval and order time, Harrison reduces delivery time by stocking scrubber components including packing, support grids, distributor plates, nozzles, duct reducers, and sheet stock.

SCRUBBER CONFIGURATION

Most fume removal applications can be served by the two scrubber designs shown in this catalog. Vertical Counter Current style directs liquid down vertically, and unwanted fumes upward in the opposite direction. Horizontal Cross Flow unit directs liquid down vertically, but unwanted fumes are driven horizontally at 90° to the liquid. In both designs, liquid and fumes are inter-mixed in the packed bed section of the scrubber where fumes are removed by chemical reaction or water solubility. Scrubber shape does not affect performance. Horizontal design presents a low profile and is suitable where head room is limited. Verticals require more head room, but use only minimum floor space.

SCRUBBER DESIGN AND OPERATION

Highest scrubber efficiency (volumetric % of contaminate removed) is obtained by having the proper amount of contact surface area (packing) wetted by sufficient liquid (recirculated liquid rate) for an optimum residence time (packing depth) to allow unwanted fumes to take a treacherous path thru the wetted packing to permit their maximum removal from the carrier air stream by chemical reaction or water solubility.

Air stream resistance encountered in the packing (static pressure loss) is a function of air velocity, cross-sectional packing area, and packing depth. Harrison scrubbers utilize proven packing depth to achieve efficiencies approaching 99+%, when operated within recommendations.

LIQUID DISTRIBUTION AND MIST ELIMINATION

Simple liquid distribution is achieved thru a main header pipe feeding perforated laterals, without use of troublesome spray nozzles. Nozzles are subject to plugging, and produce a difficult-to-remove atomized mist carryover. In the Harrison design, any large droplets of liquid caught in the upward moving air stream are easily and efficiently removed by a short bed of dry packing located above the liquid distributor.

STATIC PRESSURE LOSS

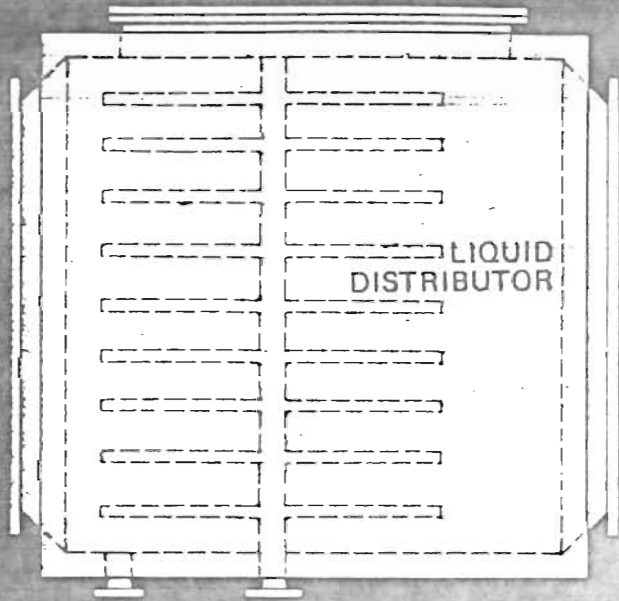
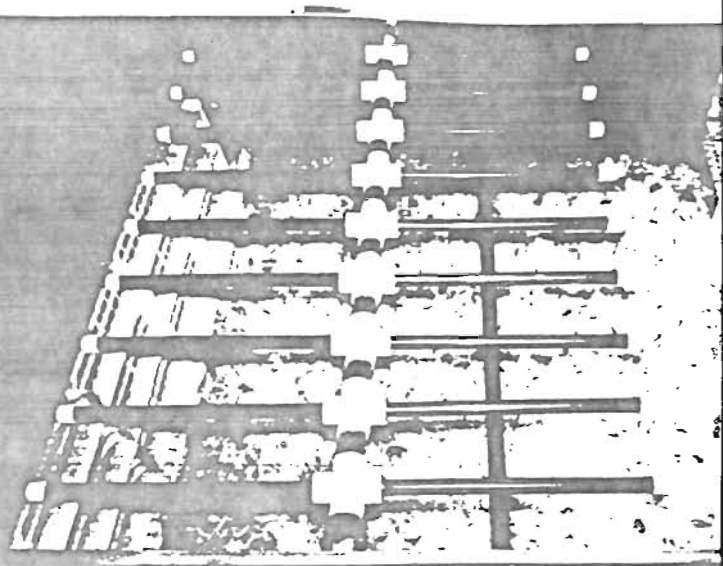
Use of high-surface-area, low-pressure-drop plastic saddles in a balanced design result in low static pressure loss of only 0.4 inches H₂O (w.g.) per foot of packed depth in Vertical Counter Current scrubbers, and 0.33 in Horizontal Cross Flow units. At the same time, sufficient irrigation rates constantly keep saddles clear of potential sludge buildup. Thereby, continuous, non-clogging operation at a proper rate of intermixing turbulence between liquid and fumes is achieved for 99+% efficiency.

LIQUID SUMP OPERATION

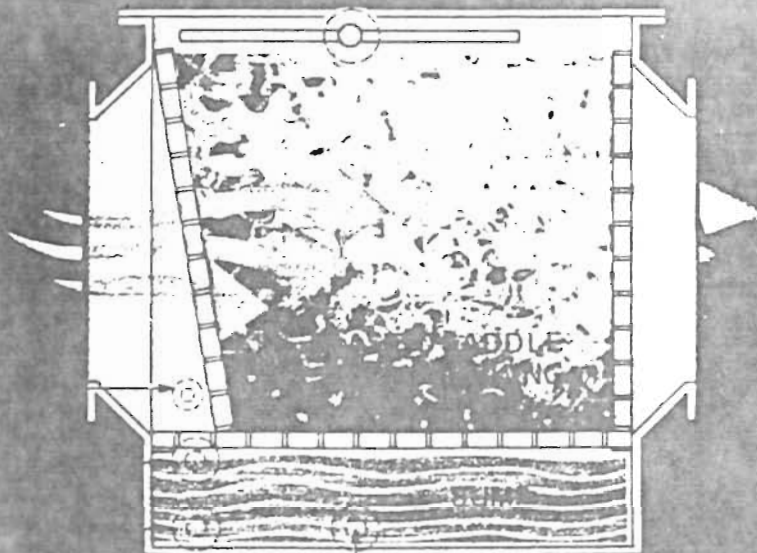
Harrison scrubbers employ an integral liquid recirculating sump which reduces amount of liquid consumption required by 90 to 95% in most applications. Therefore, considerably less effluent must be handled and treated. The sump reservoir is contained within the scrubber itself. Harrison recommends optimum rate of effluent removal. When effluent is acidic only, additional liquid conservation can be obtained with either scrubber design with the simple optional recovery system shown with the vertical scrubber drawing on page 4. If central treating facilities exist, no sump, recirculation, or independent recovery is needed. In this case, treated liquid would be directed over the packing in a single pass, then treated, then returned to the scrubber, etc. In both instances where effluent is treated, liquid consumption would be reduced to only that amount lost by evaporation.

Harrison

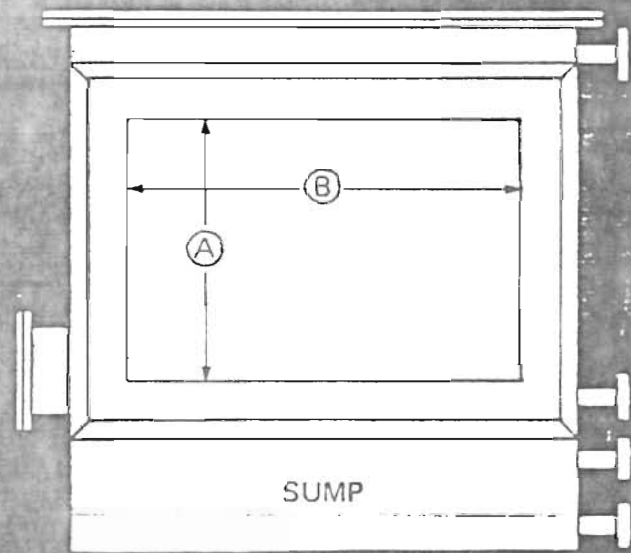
Box 184 Aurora Ohio 44202/216-562-9545



TOP VIEW



SIDE VIEW (CUT-A-WAY)



INLET SIDE VIEW

HORIZONTAL CROSS-FLOW

Model	CFM	Inlet & Outlet A x B In.	Length L Ft.	Width W In.	C	D In.	E In.	F In.	G In.	Sump Capacity Gal.	Rec. Liquid CFM	Overall Height In.	Ship Wt. Lbs.	Operat'n Wt. Lbs.
HF-8	800	11x11	6	17	1/2	1	1	1 1/4	1	58	47	35	182	646
HF-12	1,200	14x14	6	20	1/2	1	1	1 1/4	1	69	21	38	274	781
HF-17	1,700	18x18	8	24	1/2	1	1	1 1/4	1 1/4	82	24	42	275	926
HF-21	2,100	21x21	8	27	1/2	1	1	1 1/4	1 1/4	92	28	45	316	1028
HF-25	2,500	24x24	8	30	1/2	1	1	1 1/4	1 1/4	102	32	48	357	1166
HF-31	3,100	28x28	10	33	1/2	1	1	1 1/4	1 1/4	115	36	51	419	1313
HF-37	3,700	32x32	10	36	1/2	1	1	1 1/4	1 1/4	128	40	54	481	1445
HF-45	4,500	36x36	12	39	1/2	1	1	1 1/4	1 1/4	141	44	57	553	1669
HF-50	5,000	40x40	12	42	1/2	1	1	1 1/4	1 1/4	154	48	60	615	1733
HF-57	5,700	44x44	14	45	1/2	1	1	1 1/4	1 1/4	167	52	63	690	1950
HF-65	6,500	48x48	14	48	1/2	1	1	1 1/4	1 1/4	180	56	66	774	2216
HF-75	7,500	52x52	16	51	1/2	1	1	1 1/4	1 1/4	193	60	69	868	2490
HF-85	8,500	56x56	16	54	1/2	1	1	1 1/4	1 1/4	206	64	72	972	2784
HF-95	9,500	60x60	18	57	1/2	1	1	1 1/4	1 1/4	219	68	75	1086	3096
HF-105	10,500	64x64	18	60	1/2	1	1	1 1/4	1 1/4	232	72	78	1200	3420
HF-120	12,000	72x72	20	63	1/2	1	1	1 1/4	1 1/4	258	80	84	1344	3864
HF-140	14,000	80x80	22	66	1/2	1	1	1 1/4	1 1/4	284	88	90	1500	4320
HF-160	16,000	88x88	24	69	1/2	1	1	1 1/4	1 1/4	310	96	96	1668	4788
HF-180	18,000	96x96	26	72	1/2	1	1	1 1/4	1 1/4	336	104	102	1836	5268
HF-200	20,000	104x104	28	75	1/2	1	1	1 1/4	1 1/4	362	112	108	2010	5760
HF-220	22,000	112x112	30	78	1/2	1	1	1 1/4	1 1/4	388	120	114	2190	6264
HF-240	24,000	120x120	32	81	1/2	1	1	1 1/4	1 1/4	414	128	120	2376	6776
HF-260	26,000	128x128	34	84	1/2	1	1	1 1/4	1 1/4	440	136	126	2568	7304
HF-280	28,000	136x136	36	87	1/2	1	1	1 1/4	1 1/4	466	144	132	2766	7848

Selection Guide

41-33-6N31

HARTZELL MODEL CODE

Blower Series No. 41
 Wheel Diameter, Inches 33
 Wheel Type 6N
 Horsepower Code 3
 Motor RPM/Phase GO3

3 Phase 3 = 1750
 1 Phase C = 1750

How To Use Capacity Tables

- (1) Select size, RPM and BHP for a given air delivery and pressure of a centrifugal blower from rating tables, pages 10 through 21. Performance ratings are based on standard air conditions, sea level 70°F. and 29.92 inches barometric pressure giving an air density of .075 lbs. per cubic foot. The specific gravity of air equals 1.00 at these conditions.
- (2) If non-standard temperature or altitude is involved, correct to standard air density (see Table 1).
- (3) For speeds above ratings consult factory.

How to use Hartzell Model Code

EXAMPLE:

Assume the required performance to be 16,276 CFM at 3" SP standard air. Reading across the 33" Rating Table, page 13, we find a blower RPM of 1306 and brake horsepower of 14.5. Motor horsepower required is 15; therefore, horsepower code is "O". Type specification would be "GO3". The complete blower specification would read: Series 41-33-GO3.

Horsepower Code

Horsepower	¼	⅓	½	¾	1	1½	2	3	5	7½	10	15	20	25	30	40	50	60	75	100
Code Letter	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W

Altitude - Temperature Correction

Temperatures above or below 70° at sea level (0 ft.) are read vertically between the double lines, giving the proper correction factors. Altitudes above sea level at a constant 70°F. temperature are read horizontally between the double lines giving those factors. Any other factors are obtained by reading down to the desired temperature, then across to the desired altitude.

Example:

Assume the required performance to be 12,520 CFM at 6.15" SP, 175° F. and 2000 feet altitude.

1. Table 1 gives a factor of 1.30.

2. 6.15" SP × 1.30 = 8.0" SP for 70° F. at sea level.
3. A backward curved centrifugal blower, size 33", selected from the rating tables for the new condition shows 12,520 CFM at 8.0" SP, 1537 RPM and 23.9 BHP.
4. Correct the horsepower and static pressure in Item 3 to non-standard performance by dividing by the factor:
 $8.0" \text{ SP} \div 1.30 = 6.15 \text{ SP}$
 $23.9 \text{ BHP} \div 1.30 = 18.38 \text{ BHP}$
5. Final performance of this size 33" backward curved centrifugal blower at assumed conditions:
 12,520 CFM at 6.15" SP, 1537 RPM, 18.38 BHP. 175° F. and 2000 Ft.

Table 1 - Combined Altitude - Temperature Correction Factors

ALT. FT. / °F. TEMP.	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000
-50	0.77	0.80	0.83	0.86	0.89	0.92	0.96	1.00	1.04	1.08	1.12	1.16	1.21
-25	0.82	0.85	0.89	0.92	0.95	0.98	1.03	1.07	1.11	1.15	1.20	1.24	1.29
0	0.87	0.90	0.94	0.97	1.01	1.04	1.09	1.13	1.17	1.22	1.27	1.31	1.37
25	0.91	0.95	0.98	1.02	1.06	1.09	1.14	1.18	1.23	1.27	1.33	1.37	1.43
50	0.96	1.00	1.04	1.08	1.11	1.15	1.20	1.25	1.30	1.34	1.40	1.45	1.51
70	1.00	1.04	1.08	1.12	1.16	1.20	1.25	1.30	1.35	1.40	1.46	1.51	1.57
100	1.06	1.10	1.14	1.19	1.23	1.27	1.33	1.38	1.43	1.48	1.55	1.60	1.66
125	1.10	1.14	1.19	1.23	1.28	1.32	1.38	1.43	1.49	1.54	1.61	1.66	1.73
150	1.15	1.20	1.24	1.29	1.33	1.38	1.44	1.50	1.55	1.61	1.68	1.74	1.81
175	1.20	1.25	1.30	1.34	1.39	1.44	1.50	1.56	1.62	1.68	1.75	1.81	1.88
200	1.25	1.30	1.35	1.40	1.45	1.50	1.56	1.63	1.69	1.75	1.83	1.89	1.96
250	1.34	1.39	1.45	1.50	1.55	1.61	1.68	1.74	1.81	1.88	1.96	2.02	2.10
300	1.43	1.49	1.54	1.60	1.66	1.72	1.79	1.86	1.93	2.00	2.09	2.16	2.25
350	1.53	1.59	1.65	1.71	1.77	1.84	1.91	1.99	2.07	2.14	2.23	2.31	2.40
400	1.62	1.69	1.75	1.82	1.89	1.96	2.04	2.12	2.20	2.27	2.35	2.45	2.55
450	1.72	1.79	1.86	1.93	2.00	2.08	2.16	2.24	2.33	2.41	2.50	2.60	2.70
500	1.81	1.88	1.96	2.03	2.11	2.19	2.28	2.36	2.46	2.54	2.62	2.74	2.85
550	1.91	1.98	2.06	2.14	2.22	2.30	2.40	2.49	2.58	2.68	2.77	2.89	3.00
600	2.00	2.08	2.16	2.24	2.33	2.42	2.50	2.61	2.71	2.80	2.90	3.03	3.14

NOTE: Above table has inverted values. Actual density is the reciprocal of the above values.

Abrasive/Erosive Atmospheres

HartKoate is an abrasive/erosive resistant coating developed by Hartzell for application in environments where abrasive/erosive conditions may exist. HartKoate helps prevent premature deterioration of equipment in environments where uncoated fans may fail.

Impact resistant HartKoate is applied to a 50-60 mil thickness suitable for temperatures to 200°F.

HartKoate is particularly appropriate for use when water mist and/or abrasive particles exist in the air stream.

Contact your Hartzell representative for further details concerning the application of HartKoate coating to fiberglass fans in corrosive atmospheres.

Installation Weights- Bearing/Shaft Sizes

Series 41

Size	Type	Net Wt. (lbs.)	Shaft/Bearing Sizes	Size	Type	Net Wt. (lbs.)	Shaft/Bearing Sizes	Size	Type	Net Wt. (lbs.)	Shaft/Bearing Sizes	Size	Type	Net Wt. (lbs.)	Shaft/Bearing Sizes									
15"	GH3	526	17/16"	40"	GI3	1885	27/16"	19"	FI3	372	17/16"	30"	FL3	626	15/16"									
	GI3	526	17/16"		GJ3	1885	27/16"		FJ3	372	17/16"		FM3	629	15/16"									
	GJ3	529	17/16"		GK3	1912	27/16"		FK3	399	17/16"		FN3	649	15/16"									
	GK3	529	17/16"		GL3	1932	27/16"		FL3	444	17/16"		FO3	709	15/16"									
	GL3	549	17/16"		GM3	1972	27/16"		FM3	447	17/16"		FP3	739	15/16"									
	GM3	554	17/16"		GN3	1987	27/16"		FN3	466	17/16"		FQ3	779	15/16"									
22"	GH3	772	11 1/16"	49"	GO3	2047	27/16"	23"	FO3	517	17/16"	33"	FR3	869	15/16"									
	GI3	772	11 1/16"		GP3	2077	27/16"		FP3	547	17/16"		FS3	909	15/16"									
	GJ3	776	11 1/16"		GQ3	2127	27/16"		FQ3	587	17/16"		FT3	1004	15/16"									
	GK3	776	11 1/16"		GR3	2177	27/16"		FR3	667	17/16"		*FU3	529	15/16"									
	GL3	806	11 1/16"		GS3	2277	27/16"		26"	FJ3	404		11 1/16"	Series 42	10"	FC3	63							
	GM3	813	11 1/16"		GT3	2327	27/16"			FK3	431		11 1/16"					12"	FF3	78				
GN3	854	11 1/16"	Series 43	16"	FH3	302	13/16"	FL3		451	11 1/16"	14"	FG3								96			
GO3	865	11 1/16"						GM3		2465	2 5/16"											FM3	496	11 1/16"
GP3	926	11 1/16"						GN3		2483	2 5/16"											FN3	516	11 1/16"
27"	GI3	954						1 5/16"		GO3	2558											2 5/16"	FO3	535
	GJ3	959						1 5/16"	GP3	2596	2 5/16"			FP3	565	11 1/16"								
	GK3	959						1 5/16"	GQ3	2658	2 5/16"			FQ3	605	11 1/16"								
	GL3	996	1 5/16"	GR3	2721	2 5/16"	FR3	695	11 1/16"															
	GM3	1004	1 5/16"	GS3	2846	2 5/16"	FS3	735	11 1/16"															
	GN3	1054	1 5/16"	GT3	2908	2 5/16"	FK3	489	11 1/16"															
GO3	1069	1 5/16"	GU3	2958	2 5/16"	FL3	509	11 1/16"																
GP3	1144	1 5/16"	GV3	3063	2 5/16"	FM3	555	11 1/16"																
GQ3	1164	1 5/16"	GW3	3123	2 5/16"	FN3	574	11 1/16"																
GR3	1190	1 5/16"				FO3	625	11 1/16"																
33"	GI3	1355	2 3/16"				FP3	655	11 1/16"															
	GJ3	1355	2 3/16"				FQ3	715	11 1/16"															
	GK3	1382	2 3/16"				FR3	805	11 1/16"															
	GL3	1397	2 3/16"				FS3	845	11 1/16"															
	GM3	1454	2 3/16"				FT3	940	11 1/16"															
	GN3	1482	2 3/16"																					
	GO3	1514	2 3/16"																					
	GQ3	1544	2 3/16"																					
	GP3	1544	2 3/16"																					
	GQ3	1594	2 3/16"																					
GR3	1644	2 3/16"																						

*Net Installation weights are for Arrangement 1. (Less motor & drive.)

Metric Conversion Table

FROM	TO	MULTIPLY BY
Inches (in.)	Millimeter (mm)	25.400
Feet (ft.)	Meter (m)	0.3048
Velocity (ft./min.)	Meter/Second (m/s)	0.00508
Volume Flow (cfm)	Cubic Meter/Second (m ³ /s)	0.00047195
Pressure (in. w.g.)	Pascal (N/m ²)	248.36
Density (lb./ft. ³)	Kilogram/Cubic Meter (Kg/m ³)	16.018
Power (hp)	Watt (w)	745.70
Square Foot (ft. ²)	Square Meter (m ²)	0.09290
Square Inch (in. ²)	Square Meter (m ²)	0.0006451

Inlet diameter: 28" I.D.
Outlet area: 4.21 sq. ft. inside

Wheel diameter: 27.250"
Wheel circumference: 7.003 ft.

10 000 CFM @ 4" TSP

	OV	1/4" SP		1" SP		1 1/4" SP		2" SP		3" SP		4" SP		5" SP		6" SP		7" SP	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
4210	1000					859	1.45	936	1.90	1097	3.20	1249	4.30						
4631	1100					889	1.60	967	2.15	1123	3.45	1257	4.60	1391	5.80				
5052	1200					911	1.90	1008	2.45	1146	3.55	1275	5.00	1406	6.40	1522	7.50		
5473	1300			850	1.45	936	1.90	1043	2.60	1171	3.90	1296	5.35	1411	6.70	1535	8.10	1647	9.50
5894	1400			890	1.70	970	2.10	1061	3.00	1207	4.40	1321	5.60	1435	7.10	1553	8.60	1660	10.30
6315	1500			932	1.90	1005	2.40	1086	3.10	1240	4.60	1353	5.90	1460	7.60	1572	9.25	1671	10.90
6736	1600	886	1.55	970	2.15	1045	2.70	1113	3.40	1273	4.90	1390	6.45	1488	8.00	1591	9.80	1687	11.50
7157	1700	925	1.75	1010	2.45	1081	3.00	1146	3.60	1294	5.00	1425	6.80	1517	8.20	1616	10.10	1709	12.00
7578	1800	977	2.10	1050	2.60	1121	3.30	1184	3.90	1318	5.20	1456	7.20	1556	9.00	1644	10.55	1736	12.45
7999	1900	1025	2.30	1092	2.90	1158	3.60	1225	4.30	1343	5.60	1479	7.60	1594	9.70	1675	11.25	1764	13.10
8420	2000	1067	2.50	1142	3.30	1200	4.00	1265	4.75	1379	6.10	1500	7.65	1627	10.10	1717	12.10	1794	13.75
9262	2200	1158	3.30	1217	3.90	1281	4.80	1342	5.60	1450	7.25	1558	8.75	1673	10.90	1787	13.60	1869	15.50
10104	2400	1250	4.00	1313	5.00	1368	5.80	1420	6.60	1529	8.60	1623	10.20	1725	11.90	1831	14.20	1934	17.10
10946	2600	1352	5.10	1404	6.00	1458	7.00	1506	7.60	1607	9.90	1700	11.70	1788	13.50	1882	15.30	1979	17.90
11788	2800	1446	6.30	1496	7.25	1540	8.10	1589	9.10	1684	10.90	1777	13.10	1858	15.20	1937	17.00	2026	19.20
12630	3000	1543	7.50	1589	8.50	1634	9.55	1678	10.50	1772	12.80	1858	15.00	1941	17.60	2014	19.40	2087	21.30
13472	3200	1639	8.90	1680	9.85	1721	11.00	1767	12.25	1854	14.50	1942	17.00	2015	19.40	2089	21.60	2159	23.90
14314	3400	1740	10.60	1773	11.55	1817	13.10	1860	14.00	1944	16.60	2022	19.20	2097	21.90	2167	24.50	2231	26.50
15156	3600	1832	12.40	1872	13.75	1912	14.80	1953	16.00	2026	18.50	2104	21.00	2178	24.00	2249	27.00		
15998	3800	1936	14.50	1969	15.60	2006	16.70	2038	18.40	2118	21.20	2187	23.90	2261	26.60				
16840	4000	2029	16.80	2064	18.00	2097	19.40	2134	20.50	2200	23.20	2280	26.50						
17682	4200	2127	19.40	2160	20.90	2186	21.90	2239	23.80										
18524	4400	2232	22.30	2266	23.80														

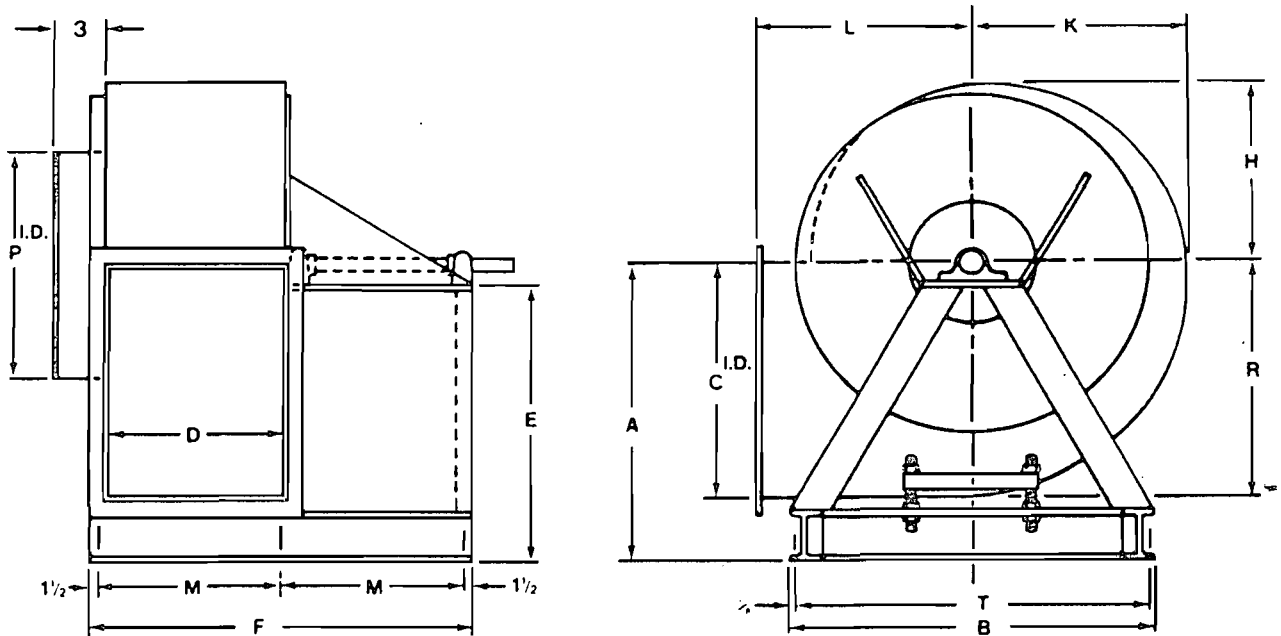
	OV	8" SP		9" SP		10" SP		11" SP		12" SP	
CFM	FPM	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP	RPM	BHP
5894	1400	1762	11.90								
6315	1500	1774	12.40	1870	14.30						
6736	1600	1785	13.20	1884	15.20	1974	16.90				
7157	1700	1803	13.90	1900	16.00	1986	18.00	2073	19.75	2154	21.60
7578	1800	1825	14.55	1917	16.85	2003	18.70	2085	20.70	2166	22.60
7999	1900	1848	15.10	1934	17.40	2019	19.60	2100	21.70	2180	24.00
8420	2000	1875	15.75	1957	18.10	2039	20.50	2118	22.60	2200	25.10
9262	2200	1939	17.30	2008	19.25	2087	21.80	2161	24.40	2239	27.00
10104	2400	2020	19.60	2089	21.60	2149	23.70	2221	26.10	2289	28.70
10946	2600	2076	21.00	2159	23.80	2223	26.00	2283	28.20		
11788	2800	2117	22.00	2216	25.50	2293	28.40				
12630	3000	2168	23.70	2267	27.20						
13472	3200	2230	25.80								

Performance shown is with inlet and outlet ducts.
RPM shown is nominal and performance is based on actual speed of test.
BHP includes belt drive losses.

Principal Dimensions

Size	Wheel Dia.	A	B	C	D	E	F	H	K	L	M	P	R	T	Max. Motor Frame Size	
															ODP	TEFC
15	15 ⁵ / ₈	32 ¹ / ₄	33 ¹ / ₂	16 ¹ / ₈	11 ¹ / ₁₆	30 ¹ / ₄	41	12 ¹ / ₁₆	14 ⁹ / ₁₆	16 ³ / ₁₆	19	16	16 ¹ / ₁₆	31 ³ / ₄	326T	286T
22	22 ⁹ / ₁₆	32 ¹ / ₂	33 ¹ / ₂	23 ³ / ₈	17 ¹ / ₈	30 ¹ / ₄	46	18 ⁷ / ₁₆	21 ³ / ₁₆	21 ¹ / ₈	21 ¹ / ₂	23	23 ¹ / ₁₆	31 ³ / ₄	326T	286T
27	27⁷/₈	38⁷/₈	43¹/₂	29¹/₂	21¹/₂	35⁷/₈	51¹/₂	22⁷/₈	26⁷/₈	24¹/₂	24¹/₂	28¹/₂	29⁷/₈	41¹/₂	326T	286T
33	33 ³ / ₁₆	43 ¹ / ₄	50	35 ⁷ / ₁₆	25 ¹ / ₁₆	40 ³ / ₈	56	27 ¹ / ₁₆	31 ¹³ / ₁₆	29 ³ / ₁₆	26 ¹ / ₂	34 ¹ / ₄	35 ¹ / ₁₆	48 ¹ / ₂	326T	286T
40	41 ¹ / ₂	51 ¹ / ₄	59	43 ³ / ₁₆	31 ³ / ₈	48 ³ / ₈	62	33 ¹³ / ₁₆	38 ¹³ / ₁₆	35 ⁷ / ₈	29 ¹ / ₂	41 ⁷ / ₈	43 ³ / ₈	57 ¹ / ₄	326T	286T
49	50 ³ / ₁₆	61 ³ / ₈	73	52 ⁵ / ₈	38 ¹ / ₈	58	92	41	47 ¹ / ₈	40	44 ¹ / ₂	50 ¹³ / ₁₆	53 ¹ / ₄	71 ¹ / ₄	447T	447T

NOTES: ON 15 AND 22 SIZES WITH 254T FR. AND LARGER MOTORS, BASE DIMENSIONS MUST BE CERTIFIED BY THE FACTORY. DIMENSIONS AND SPECIFICATIONS ARE SUBJECT TO CHANGE. CERTIFIED PRINTS ARE AVAILABLE.

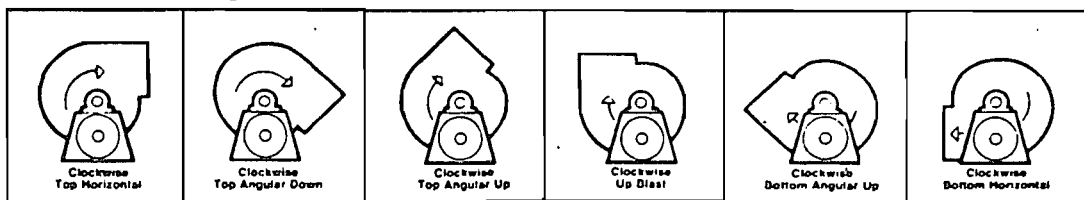


Material Specifications — Inches

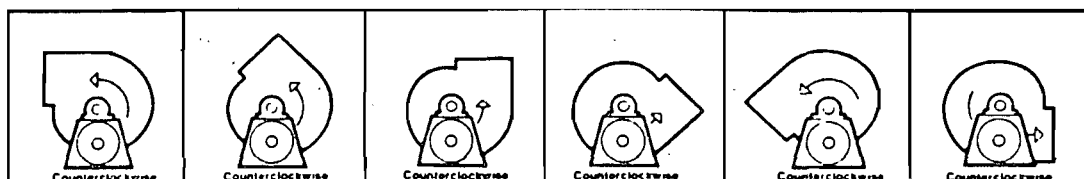
Size	HOUSING (Thickness)				(H.R.S.) FAN STAND			WHEEL (Thickness)		
	Scroll	Inlet Cone	Flanges		Back Plate	H-Beam	Channel	Blade	Back Plate	Outer Panel
			Inlet	Outlet						
15	5/16	3/16	3/16	5/16	1/2	6 x 4	4	1/4	1/2	1/2
22	5/16	7/16	1/4	5/16	1/2	6 x 4	4	1/4	5/8	5/8
27	1/2	1/2	3/16	1/2	1/2	6 x 4	4	3/16	3/4	3/4
33	1/2	5/8	3/8	1/2	1/2	6 x 4	4	3/8	7/8	7/8
40	9/16	3/4	7/16	9/16	1/2	6 x 4	4	7/16	1	1
49	5/8	15/16	9/16	5/8	1/2	6 x 4	4	1	1 3/8	1 3/8

Blower Discharges

Clockwise



Counterclockwise



HARTZELL FAN

BELT DRIVE FANS MAINTENANCE AND LUBRICATION

THE MOTOR BEARINGS AND FAN BEARINGS ON BELT DRIVE FANS SHOULD BE GREASED AT REGULAR INTERVALS. MTR.MFG.GREASING INSTRUCTIONS & RECOMMENDATIONS SHOULD BE FOLLOWED CLOSELY. AVOID THE USE OF A PRESSURE GREASING SYSTEM WHICH TENDS TO FILL THE BEARING CHAMBER COMPLETELY. DO NOT OVER GREASE. NOTE: ON MOTORS WITH NON-REGREASABLE, SEALED BEARING, NO LUBRICATION IS REQUIRED FOR THE LIFE OF THE BEARING. THE FOLLOWING TABLE LISTS THE TIME INTERVALS BETWEEN FAN GREASING TO INSURE PROPER LUBRICATION IN ADVERSE CONDITIONS OF HEAT & DUST. USE ONLY 1 OR 2 SHOTS WITH A HAND GUN IN MOST CASES. MAXIMUM HANDGUN RATING 40 P.S.I.

CONDITIONS AROUND BEARING	OPERATING TEMPERATURE OF FAN	** GREASING INTERVALS	** FOR VERTICAL INSTALLATIONS GREASING INTERVALS SHOULD BE TWICE AS FREQUENT AS TABLE VALUES
FAIRLY CLEAN	UP TO 120 F 120 F TO 160 F 160 F TO 200 F PLUS*	6 MONTHS TO 12 MONTHS 2 MONTHS TO 3 MONTHS 1 MONTH TO 2 MONTHS	
MODERATE TO EXTREMELY DIRTY	UP TO 160 F 160 F TO 200 F PLUS*	1 MONTH TO 2 MONTHS 2 WEEKS TO 4 WEEKS	
COLD STORAGE ROOM		EVERY DEFROSTING PERIOD OR NO MORE THAN 4 MONTHS	

*FOR FAN APPLICATIONS OVER 200 F GREASING INTERVALS SHOULD BE FROM SEVERAL DAYS TO 2 WEEKS, DEPENDING ON THE TEMPERATURE

THE FOLLOWING GREASES, OR ONE THAT IS EQUIVALENT TO THE GENERAL DESCRIPTION, ARE RECOMMENDED FOR THE FOLLOWING TEMPERATURES OR EXCESSIVE MOISTURE APPLICATIONS:

OPERATING CONDITIONS	USE GREASE EQUIVALENT TO THESE GRADES
TEMPERATURES -85 F TO 0 F	ESSO-BEACON #325 (-85 F) MOBIL GREASE #28 (-85 F) SHELL OIL-AEROSHELL NO. 1B (-85 F) SHELL OIL AEROSHELL NO. 22 (-85 F) SHELL OIL AEROSHELL NO. 7 (-100 F) **DOW CORNING-DC33, DC41, DC44 (-40 F) NOTE: NOT MISCIBLE WITH NON-SILICON BASED GREASES.
GENERAL DESCRIPTION:	VERSATILE MULTIPURPOSE MICROGEL THICKENED SYNTHETIC HYDROCARBON GREASE WITH CORROSION INHIBITORS, ANTIOXIDANT ADDITIVES, WATER RESISTANCE TENDENCIES AND EP CHARACTERISTICS.

TEMPERATURE 0 F TO 200 F INCLUSIVE (ALSO USE FOR HEAVY CONDENSATION OR DIRECT SPLASH OF WATER)	TEXACO-PREMIUM RP#2 OR REGAL AFB#2 AMERICAN OIL-RYKON PREMIUM#2 OR AMOLITH#2 UNION 78-UNOBA EP#2 (275 F) GULF OIL CORP.-GULF CROWN EP#2 MOBIL OIL-MOBILUX EP#2 SHELL OIL-SHELL ALVANIA EP#2 CHEVRON-CHEVRON SRI #2 ATLANTIC RICHFIELD-LITHOLENE EP#2 STANDARD OIL-FACTRAN EP#2 CONOCO-CONOLITH EP#2
GENERAL DISCRIPTION:	MULTIPURPOSE NLGI#2 GREASE FROM LITHIUM SOAP WITH EP CHARACTERISTICS, RUST INHIBITORS, ANTI-OXIDANT ADDITIVES & GOOD WATER RESISTANCE TENDENCIES.

TEMPERATURES OVER 200 F CONSULT WITH HARTZELL ENGINEERS ON HI TEMP FAN APPLICATIONS.	MOBIL OIL-MOBIL GREASE #28 (350 F) ESSO-BEACON #325 (350 F) SHELL OIL-AEROSHELL NOS. 18 & 22 (400 F) **DOW CORNING-DC44 & DC41 (400 F) NOTE: NOT MISCIBLE WITH NON-SILICON BASED GREASES.
GENERAL DESCRIPTION:	VERSATILE MULTIPURPOSE MICROGEL THICKENED SYNTHETIC HYDROCARBON GREASE WITH CORROSION INHIBITORS, ANTIOXIDANT ADDITIVES, WATER RESISTANCE TENDENCIES AND EP CHARACTERISTICS.

THE BEARINGS ON THIS FAN SHAFT HAVE BEEN GREASED AT THE FACTORY FOR THE FOLLOWING APPLICATION:

- GENERAL PURPOSE (UNION 78 UNOBA EP#2)
- HIGH TEMPERATURE (MOBIL GREASE #28)
- LOW TEMPERATURE (MOBIL GREASE #28)
- EXTREME MOISTURE (UNION 78 UNOBA EP#2)
- OTHER _____

BELT TENSION--EXCESSIVE TENSION OF THE BELTS PUTS AN ADDED LOAD ON THE BEARING & REDUCES BEARING LIFE. TO AVOID THIS CONDITION, TIGHTEN BELTS AS SHOWN ON THE REVERSE SIDE.

**NOTE: WHEN USING DOW CORNING SILICON BASED GREASES, FAN BEARINGS SHOULD BE COMPLETELY PURGED OF EXISTING GREASE. BEARINGS SHOULD BE ROTATED WHILE PURGING TO INSURE EXISTING GREASE IS PURGED AS BEST POSSIBLE.

INSTALLING, TENSIONING AND CHECKING V-DRIVES

GENERAL DRIVE TENSIONING GUIDELINES:

1. IDEAL TENSION IS THE TENSION AT WHICH THE BELT WILL NOT SLIP UNDER PEAK LOAD CONDITIONS.
2. OVER TENSIONING SHORTENS BELT AND BEARING LIFE.
3. KEEP BELTS FREE FROM FOREIGN MATERIAL WHICH MAY CAUSE SLIPPING.
4. MAKE PERIODIC V-DRIVE INSPECTION. TENSION WHEN SLIPPING. THE USE OF BELT DRESSING IS NOT RECOMMENDED.
5. BEFORE INSTALLING A NEW SET OF V-BELTS, CHECK THE CONDITION OF THE SHEAVES. DIRTY OR RUSTY SHEAVES IMPAIR THE DRIVES EFFICIENCY AND ABRASE THE BELTS, RESULTING IN PREMATURE FAILURE. ALSO, WORN SHEAVES CAN SHORTEN THE BELT LIFE BY AS MUCH AS 50%.
6. DO NOT USE A NEW OR USED BELT AS A REPLACEMENT FOR A UNIT OF A SET. IF A BELT BREAKS A NEW SET OF MATCHED BELTS IS NECESSARY. ALWAYS REPLACE BELTS WITH THE SAME KIND THAT WERE ON THE FAN BEFORE.
7. AFTER PROPERLY TENSIONING THE BELTS, DOUBLE-CHECK TO BE SURE THE SHEAVE GROOVES ARE CORRECTLY ALIGNED, AND THAT ALL SHAFTING IS PARALLEL.

INSTALLATION AND CHECKING METHODS:

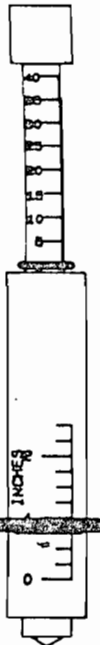
I. VISUAL METHOD

1. WHEN INSTALLING BELTS, REDUCE THE CENTER DISTANCE SO THAT THE BELTS MAY BE PLACED IN THE SHEAVE GROOVES WITHOUT FORCING. ARRANGE THE BELTS SO THAT THE TOP AND BOTTOM SPANS HAVE ABOUT THE SAME AMOUNT OF SAG. APPLY TENSION TO THE BELTS BY INCREASING THE CENTER DISTANCE UNTIL BELTS ARE SNUG AND HAVE A LIVE SPRINGING ACTION WHEN STRUCK WITH THE HAND.
2. OPERATE THE DRIVE A FEW MINUTES TO SEAT THE BELTS IN THE SHEAVE GROOVES. OBSERVE THE OPERATION OF THE DRIVE UNDER ITS HIGHEST LOAD CONDITIONS (USUALLY STARTING). A SLIGHT BOWING OF THE SLACK SIDE OF THE DRIVE INDICATES ADEQUATE TENSION. EXCESSIVE BOWING OR SLIPPAGE INDICATES INSUFFICIENT TENSION. IF THE SLACK SIDE REMAINS TAUT DURING THE PEAK LOAD, THE DRIVE IS TOO TIGHT.
3. NEW DRIVE TENSION SHOULD BE CHECKED SEVERAL TIMES DURING THE FIRST 24 HOURS OF OPERATION, BY OBSERVING THE SLACK SIDE SPAN.

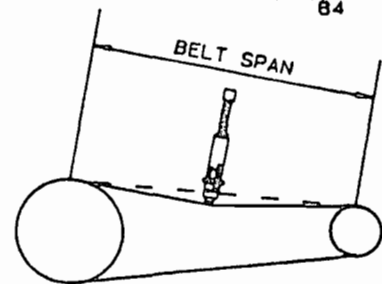
II. TENSIONING GAGE METHOD

WHEN A TENSION GAGE IS AVAILABLE & THE CENTER OF THE BELT SPAN IS ACCESSIBLE, THE FOLLOWING METHOD MAY BE USED. TO DETERMINE THE POUNDS FORCE REQUIRED TO TENSION A DRIVE WITH A BELT TENSIONER, PROCEED AS FOLLOWS:

1. MEASURE THE BELT SPAN AS SHOWN & CALCULATE THE DEFLECTION INCHES USING THE GIVEN EQUATION. SET LARGE O-RING FOR CALCULATED INCHES OF DEFLECTION.
2. SET SMALL O-RING AT 0 AND PRESS DOWN THE BELT TENSIONER AT CENTER OF BELT SPAN AS SHOWN.
 - A. ON A SINGLE BELT DRIVE, DEPRESS BELT TENSIONER UNTIL THE LARGE O-RING IS EVEN WITH BOTTOM OF A STRAIGHT EDGE PLACED ACROSS THE OUTSIDE EDGE OF THE TWO SHEAVES.
 - B. ON MULTIPLE BELT DRIVE, DEPRESS BELT TENSIONER UNTIL LARGE O-RING IS EVEN WITH THE TOP OF THE NEXT BELT. AVERAGE READINGS FROM ALL BELTS IS THE VALUE TO USE IN THE TABLES BELOW.
3. REMOVE TENSION GAGE & OBSERVE THE NEW POSITION OF THE SMALL O-RING IS SET AT THE NUMBER OF DEFLECTION POUNDS FOR THE SET NUMBER OF INCHES.
4. COMPARE THIS READING, OR THE AVERAGE OF SEVERAL READINGS IN THE CASE OF MULTIPLE BELTS, TO THE NEW/USED VALUES IN THE TABLES BELOW FOR THE PROPER BELT CROSS SECTION. IF READINGS DO NOT FALL IN THIS RANGE, READJUST THE BELT TENSION AS DESCRIBED IN THE VISUAL METHOD AND REPEAT MEASUREMENT.



$$\text{DEFLECTION} = \frac{\text{BELT SPAN}}{84}$$



EXAMPLE:

1. BELT SPAN = 64" AND SMALL SHEAVE IS 8.0 P.D. WITH COG BELTS.
2. 64"/84 = .76" REQUIRED DEFLECTION.
3. SET LARGE O-RING AT 1" ON GAGE INCH SCALE.
4. SET SMALL O-RING AT ZERO ON PLUNGER.
5. PRESS DOWN ON BELTS WITH GAGE UNTIL LARGE O-RING IS EVEN WITH THE NEXT BELT OR A STRAIGHT EDGE, WHICHEVER THE CASE MAY BE. WITH MULTIPLE BELTS, SEVERAL READINGS ARE NEEDED TO GET AN AVERAGE.
6. USE THE POUND FORCE READING OR AVERAGE OF SEVERAL READINGS REQUIRED FOR 1" DEFLECTION IN THE TABLES BELOW.
7. THE "B" BELT TABLE FOR 8.0" P.D. SMALL SHEAVE SHOULD HAVE A DEFLECTION FORCE BETWEEN 7.3 & 10.3 LBS.
8. INCREASE OR DECREASE THE TENSION ON BELTS UNTIL THE DEFLECTION FORCE IS BETWEEN 7.3 & 10.3 LBS.

CROSS SECTION	SMALLEST SHEAVE DIAMETER	R.P.M. RANGE	BELT DEFLECTION FORCE			
			STD. BELTS		COG BELTS	
			USED	NEW	USED	NEW
A. AX	3.0-3.0	1000-2500	9.7	8.8	4.1	0.1
		2501-4000	8.8	4.2	3.4	5.0
	3.0-4.8	1000-2500	4.5	8.8	5.0	7.4
	2501-4000	9.8	5.7	4.3	0.4	
	3.0-7.0	1000-2500	5.4	6.0	6.7	6.4
	2501-4000	4.7	7.0	5.1	7.8	
B. BX	3.4-4.8	200-2500	5.3	7.9	4.0	7.8
		2501-4000	4.8	6.0	4.0	6.2
	4.4-6.0	200-2500	5.3	7.9	7.1	10.5
	2501-4000	4.5	6.7	7.1	6.1	
	5.0-6.0	200-2500	6.3	6.4	6.8	12.8
	2501-4000	6.0	6.9	7.3	10.3	
C. CX	7.0-8.0	200-1740	11.0	17.0	14.7	21.0
		1741-2000	8.4	10.0	11.0	17.5
	8.0-10.0	200-1740	14.1	21.0	16.0	29.5
	1741-2000	12.5	16.5	14.5	21.0	
D	12.0-18.0	200-250	24.0	37.0	25.0	37.0
		251-1500	21.2	31.3	21.0	31.0
	18.0-20.0	200-250	20.4	45.0	20.1	45.0
	251-1500	23.5	38.0	23.0	38.0	

CROSS SECTION	SMALLEST SHEAVE DIAMETER	R.P.M. RANGE	BELT DEFLECTION FORCE			
			STD. BELTS		COG BELTS	
			USED	NEW	USED	NEW
SV, SVX	2.2-2.4	1000-2500	N/A	N/A	3.3	4.9
		2501-4000	N/A	N/A	2.8	4.3
	2.25-3.25	1000-2500	3.8	5.1	4.2	6.0
		2501-4000	6.0	4.4	3.9	5.0
4.12-6.0	1000-2500	4.0	7.3	5.3	7.9	
	2501-4000	4.4	6.8	4.0	7.3	
SV, SVX	4.4-6.7	200-1740	N/A	N/A	10.2	18.2
		1741-2000	N/A	N/A	6.8	18.2
		2001-4000	N/A	N/A	8.0	6.5
	7.1-10.0	200-1740	12.7	10.0	14.0	22.1
		1741-2000	11.2	10.7	13.7	20.1
	11.0-18.0	200-1740	15.5	23.4	17.1	25.0
1741-2000		14.0	21.0	15.0	25.0	
8V	12.0-17.0	200-250	23.0	43.3	N/A	N/A
		251-1500	20.8	29.0	N/A	N/A
	18.0-22.4	200-250	23.0	38.2	N/A	N/A
251-1500		26.9	32.7	N/A	N/A	

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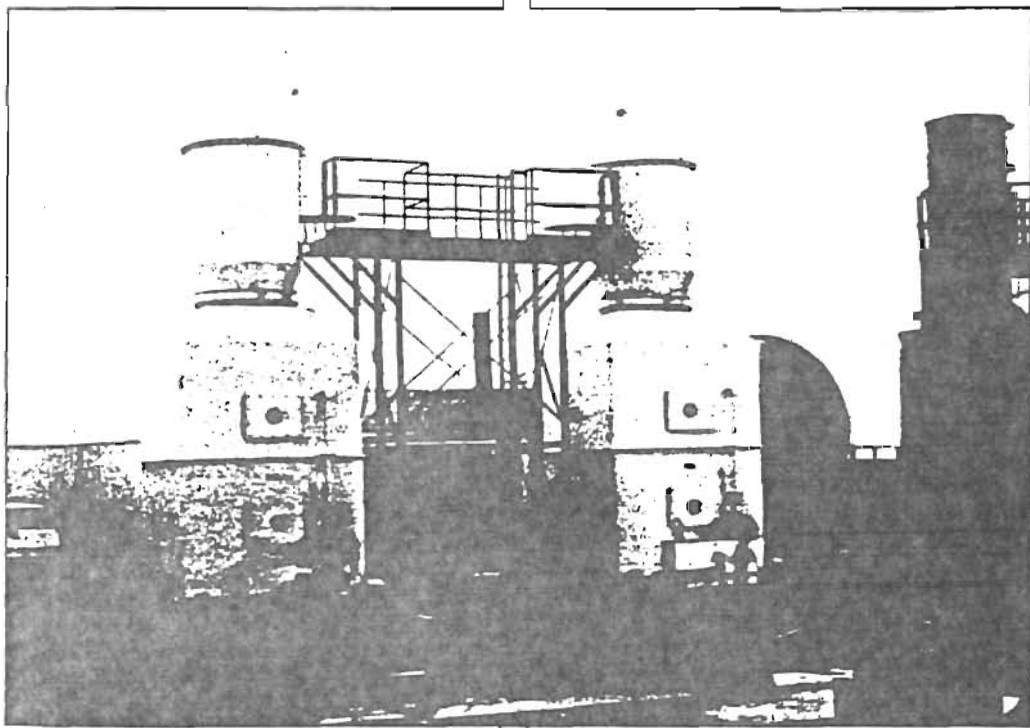
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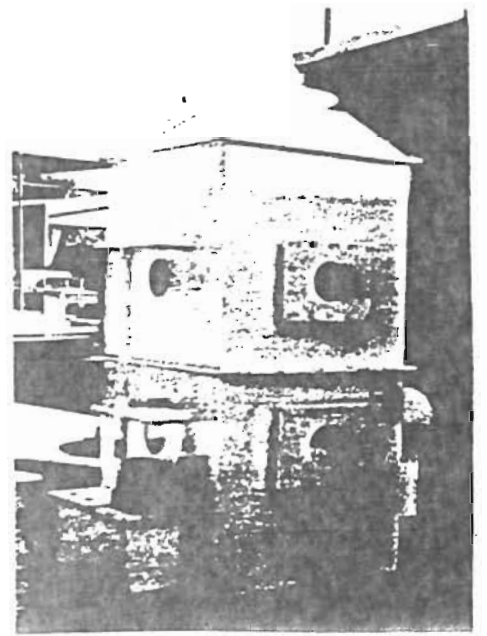
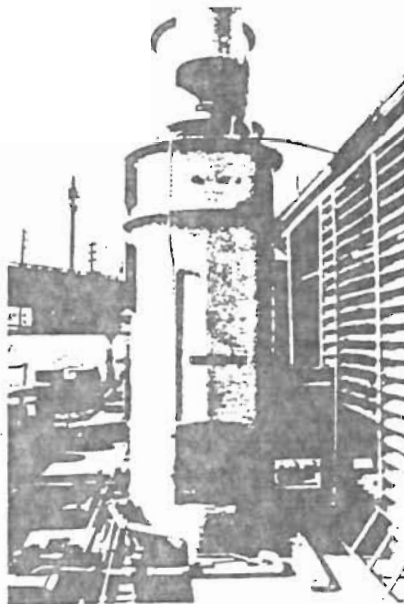
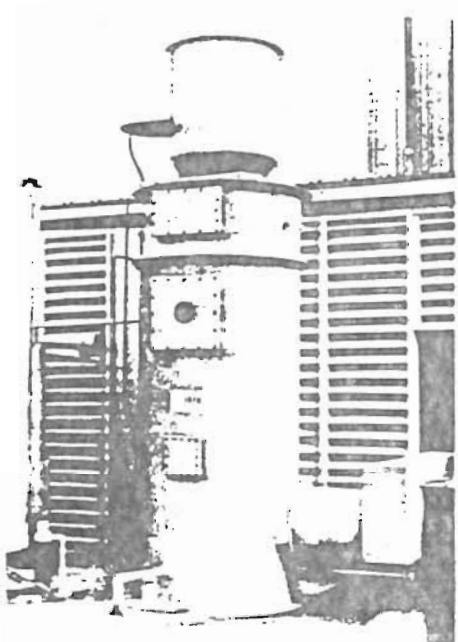
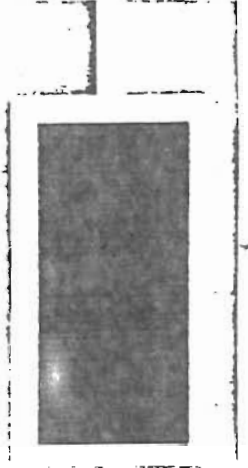
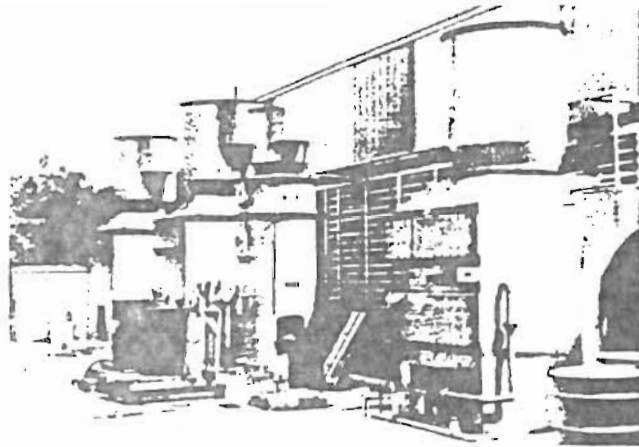
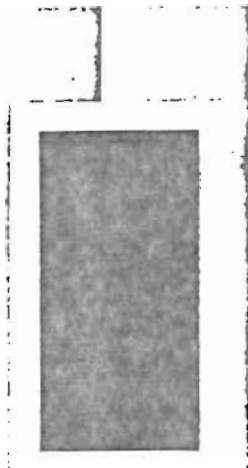
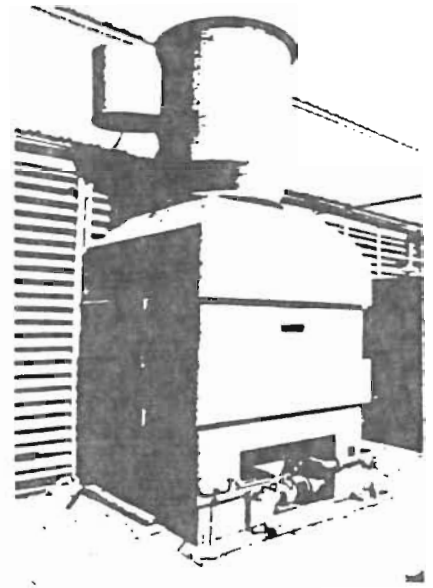
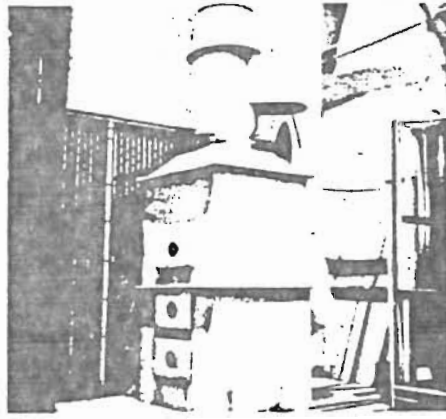
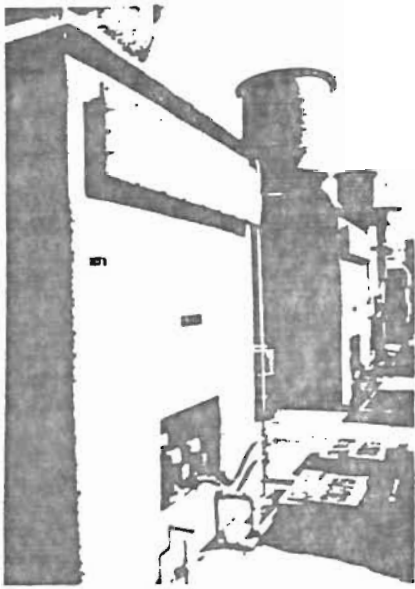
BEVERLY PACIFIC CORPORATION

Industrial Systems Division

SCRUBBERS

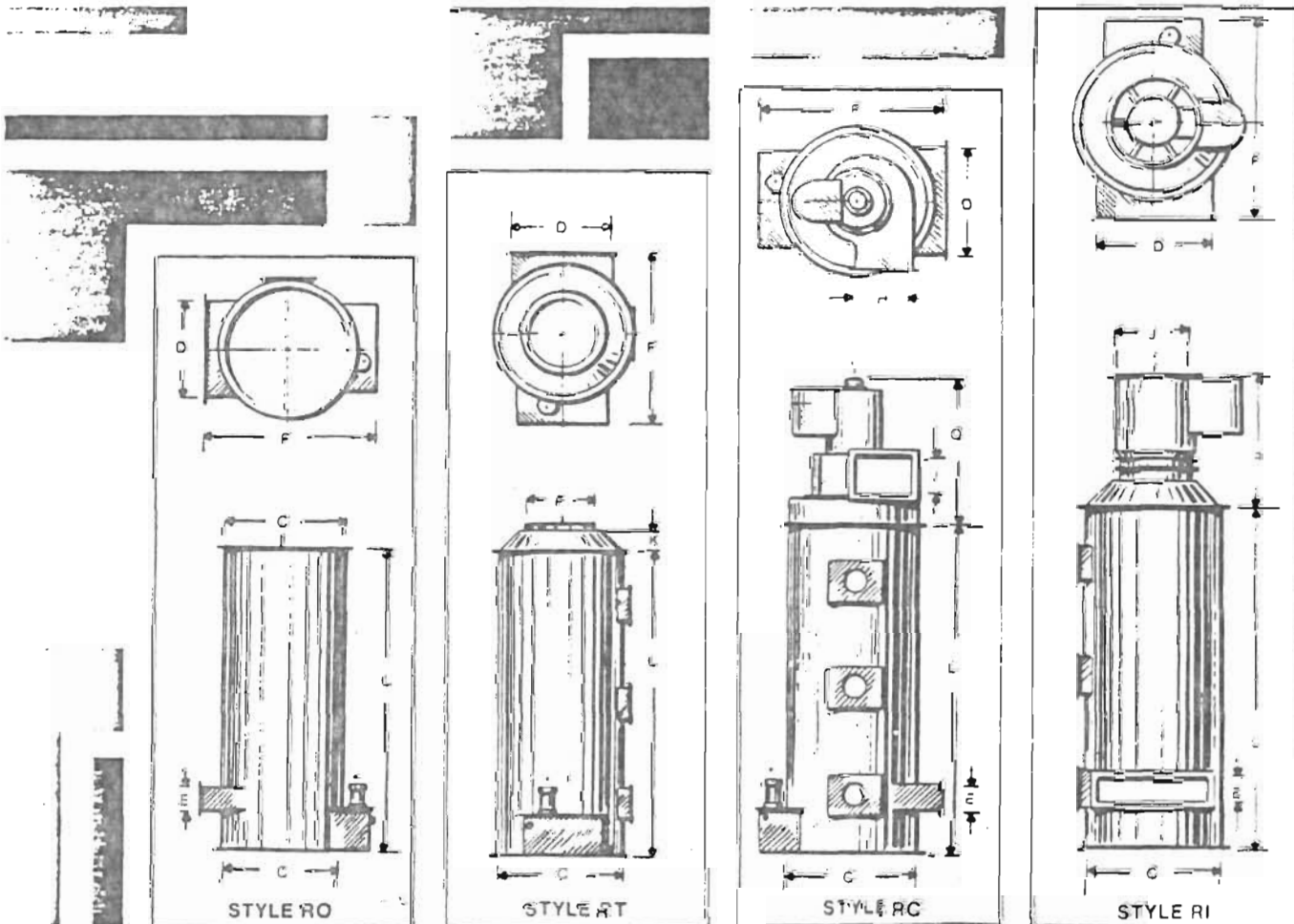


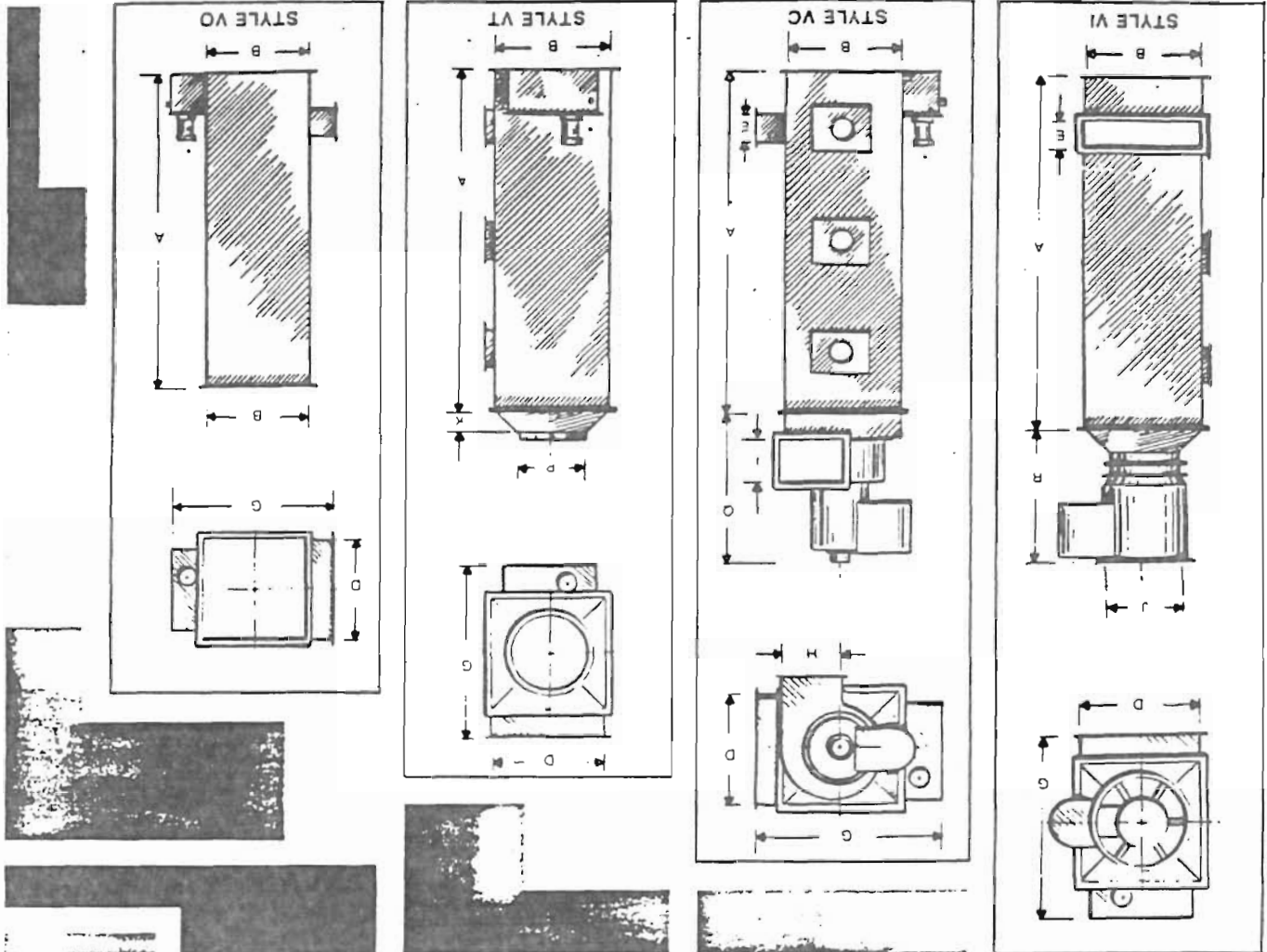
FIBERGLASS REINFORCED PLASTIC



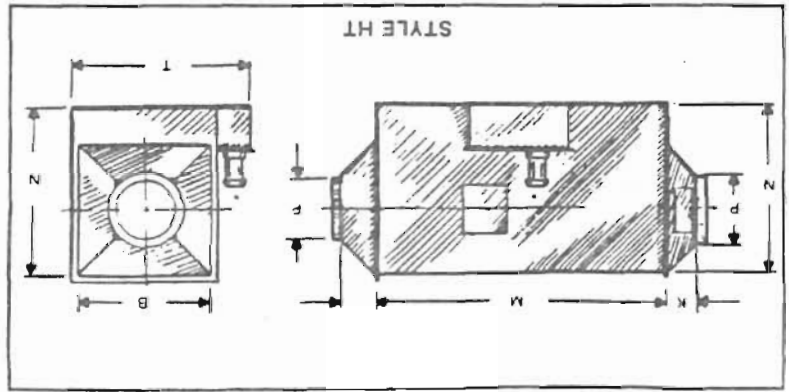
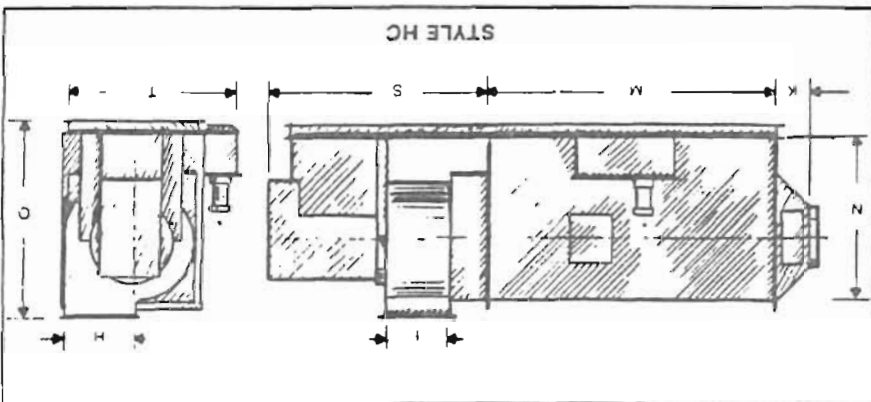
PACKED SCRUBBER DIMENSIONAL CHART
MODEL NUMBERS
DIMENSIONS IN INCHES

	PS-2	PS-4	PS-6	PS-8	PS-12	PS-18	PS-24	PS-30	PS-40	PS-50
A	78	82	84	94	101	108	112	114	118	118
B	24	36	42	48	60	72	84	96	108	120
C	28	40	48	58	72	84	96	108	120	136
D	22	34	40	46	58	70	80	92	104	116
E	6	8	10	11	12	16	18	20	24	24
F	46	58	66	76	90	102	114	126	138	154
G	42	54	60	66	78	90	102	114	126	138
H	13½	16½	22½	26½	29½	35½	39	47½	52½	63½
I	10½	12½	17	20½	22½	27	30	37½	40½	49½
J	18	22	28	34	38	45	50	62	66	80
K	6	8	10	10	12	16	19	20	24	24
L	84	87	89	104	112	118	122	124	128	128
M	64	64	70	77	89	102	102	102	114	114
N	35	49	55	62	78	88	103	116	128	142
O	38	52	58	65	79	91	106	119	131	145
P	14	16	22	26	30	36	42	50	54	66
Q	45	50	61	64	68	72	78	86	93	103
R	35	44	55	65	75	85	94	108	120	141
S	46	52	59	69	72	79	82	97	100	110
T	36	48	54	60	72	84	96	108	120	132
WHEEL DIA.	12½	15	20	24½	27	33	36½	44½	49	60
CFM x 1000	1-2	2-4	4-6	6-8	8-12	12-18	18-24	24-30	30-40	40-50
RECIRC. GPM	7	15	25	35	45	75	105	135	175	225
MAKE-UP GPM	0.7	1.9	2.0	3.0	4.0	7.0	10.0	13.0	17.0	22.0
HT OP. WT.	388	745	1110	1570	2690	4085	5670	7595	11790	16040
HT SHIP WT.	220	385	550	770	1210	1925	2750	3795	5390	7040
VT OP. WT.	318	660	1060	1500	2630	3910	5470	7400	11550	15800
VT SHIP WT.	150	300	500	700	1150	1750	2550	3600	5260	6800





May require one or more pumps.



COMPUTERIZED PACKING MEDIA SELECTION

The most common mistake made by scrubber manufacturers today is the use of only one type of packing media for all types of contaminant removal. Beverly Pacific Corporation scrubbers are designed with a computer program assist to determine the most beneficial packing media to achieve high removal efficiency coupled with low pressure drop providing the user with the ultimate in lower operating costs consistent with the contaminant removal requirements.

SCRUBBER CONFIGURATIONS

Beverly Pacific Corporation manufactures scrubbers of both crossflow and counter-current configurations.

The CROSSFLOW design is of low profile, rectangular shape wherein the contaminated air stream moves horizontally through the packing media and is scrubbed by the liquid flowing downward through the packing. This configuration is ideal for roof-top mounting and is available in ten (10) standard sizes with or without integral centrifugal fans.

The COUNTER-CURRENT design is offered in two (2) configurations, round or rectangular. While the round tower unit is the most economical in initial cost, the rectangular tower unit permits larger CFM volume using the same amount of floor space. In the counter-current design, the contaminated airstream flows up through the packing media and is scrubbed by the liquid flowing downward. The round and rectangular tower units are each offered in ten (10) sizes and are available with or without integral inline or centrifugal fans.

SCRUBBER MAKE-UP WATER CONSUMPTION

Beverly Pacific's scrubber design is based on a scrubbing liquid recirculation rate of 5 GPM per 1000 CFM of contaminated air. Of that 5 GPM, losses due to absorption and/or evaporation range from 0.2 GPM to 0.6 GPM, depending on inlet gas temperature and gas stream dust load.

ENTRAINMENT SEPARATION

The unique design of Beverly Pacific's mist eliminator section provides up to 99+% moisture particle entrapment at a pressure drop of approximately 0.5" W.G.

CONSTRUCTION

The structural housings are fabricated of Fiberglass Reinforced Plastic (FRP) materials which provide structural strength, are corrosion-resistant and light in weight. Resin selection depends on the corrosive element involved. Resins can also be of fire-retardant grade if required. Our construction technique employs the use of female molds resulting in an extremely smooth, attractive, gelcoated exterior surface (note the upper right photo on the facing page). Beverly Pacific Corporation's construction methods meet or exceed the requirements of NBS-PS 15-69 for custom contact-molded reinforced polyester chemical resistant process equipment.

OPTIONAL EQUIPMENT, FITTINGS AND ACCESSORIES

FITTINGS, such as drain, overflow, make-up water, access doors, etc. can usually be located to facilitate installation and maintenance.

RECIRCULATION RESERVOIR(S) are normally an integral part of the scrubber but, if required, can be furnished for remote installation.

RECIRCULATION PUMP(S) can be located within the built-in reservoir, but can also be installed in remote reservoir units.

SPECIAL RESERVOIR(S) can be furnished in applications where it is necessary to remove non-soluble particulate accumulation to prevent pump damage and minimize maintenance.

pH CONTROL SENSING/METERING equipment can be provided where contaminate absorption requires the addition of acid or caustic to the recirculated scrubbing liquid.

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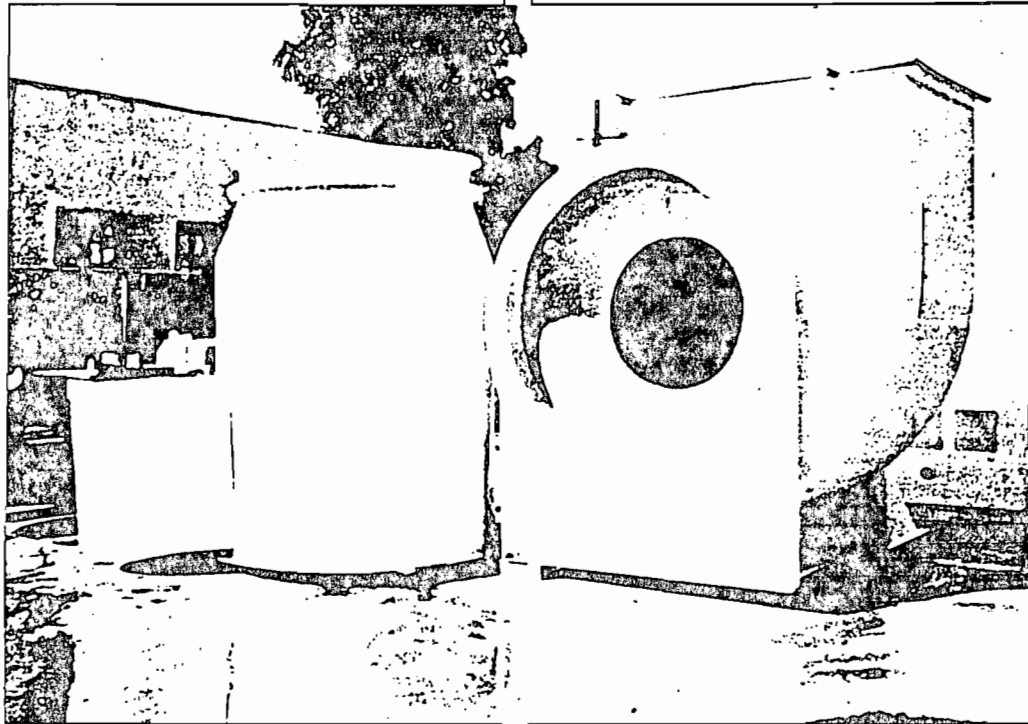
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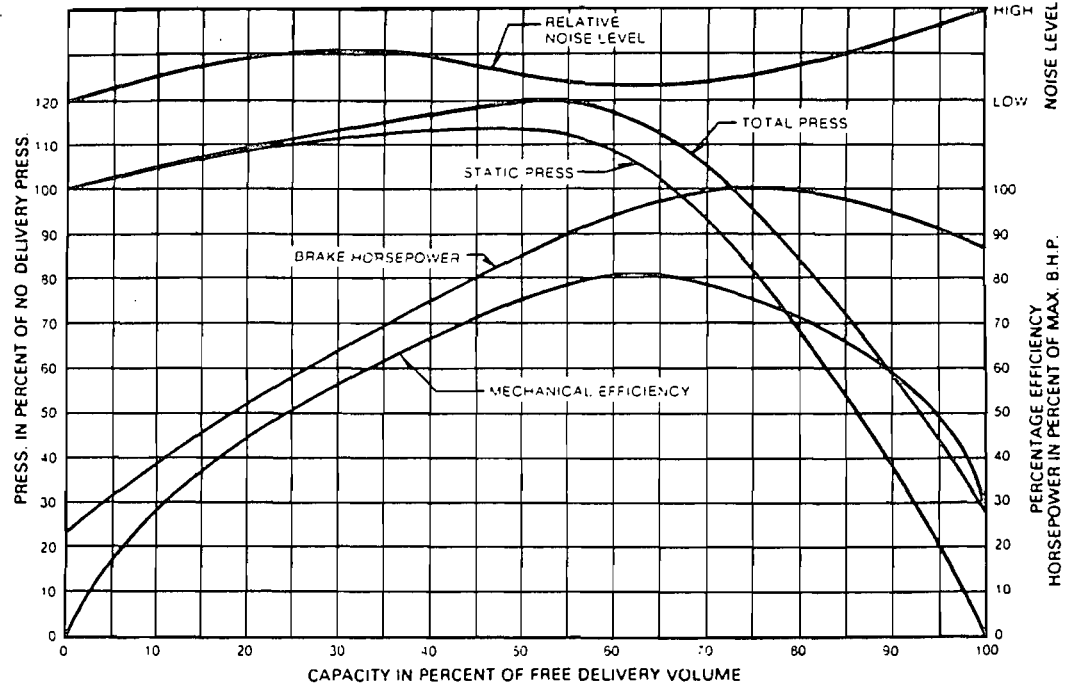
Industrial Systems Division

EXHAUST FANS

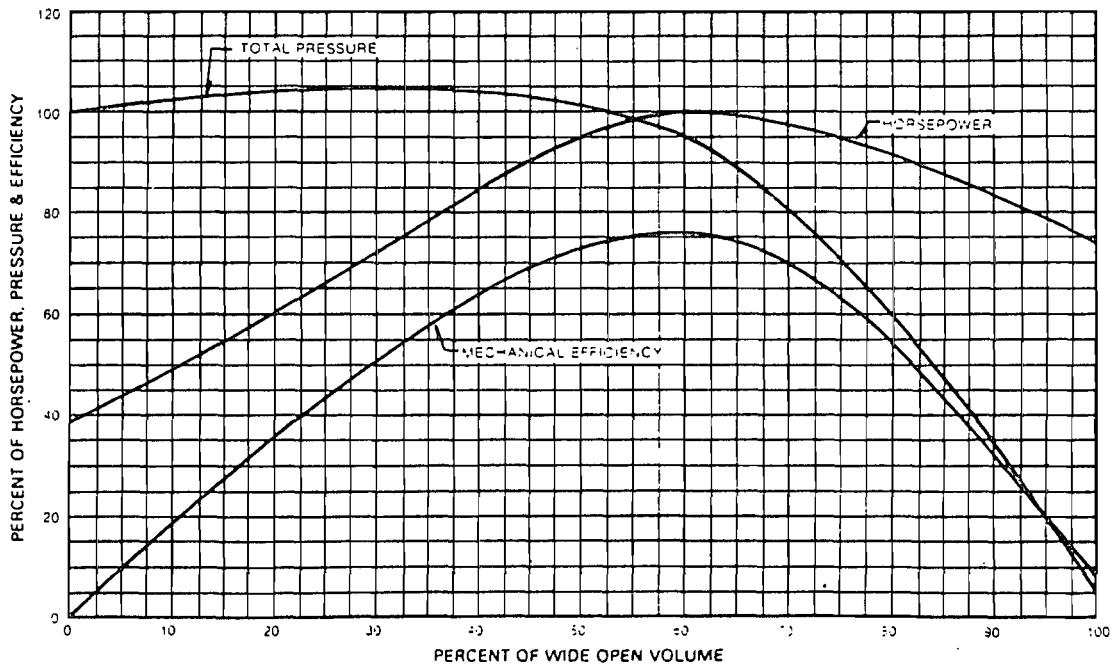


FIBERGLASS REINFORCED PLASTIC

BEVERLY PACIFIC CORPORATION CENTRIFUGAL FAN CHARACTERISTIC CURVE



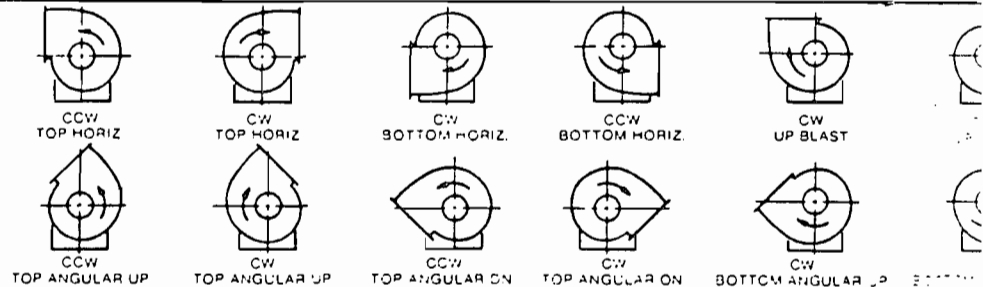
BEVERLY PACIFIC CORPORATION INLINE FAN CHARACTERISTIC CURVE



CENTRIFUGAL INDUSTRIAL EXHAUST FANS

	CB-12	CB-13	CB-15	CB-16	CB-18	CB-20	CB-22	CB-24	CB-27	CB-30	CB-33
MID-RANGE CFM RECOMMENDED	2,150	2,625	3,200	3,900	4,750	5,800	7,075	8,650	10,550	12,875	15,700
FAN WHEEL DIAMETER	12 $\frac{1}{4}$	13 $\frac{1}{2}$	15	16 $\frac{1}{2}$	18 $\frac{1}{4}$	20	22 $\frac{1}{4}$	24 $\frac{1}{2}$	27	30	33
A	13 $\frac{1}{2}$	14 $\frac{1}{2}$	16 $\frac{1}{2}$	18 $\frac{1}{4}$	20	22	24 $\frac{1}{2}$	26	29 $\frac{1}{4}$	32 $\frac{1}{4}$	36
B	10 $\frac{3}{8}$	11 $\frac{3}{8}$	12 $\frac{3}{8}$	14 $\frac{3}{8}$	15	17	18 $\frac{3}{8}$	20 $\frac{1}{2}$	22 $\frac{3}{4}$	25	27
C	13 $\frac{3}{8}$	14 $\frac{3}{8}$	16 $\frac{3}{8}$	18 $\frac{3}{8}$	20	22 $\frac{1}{2}$	24	26 $\frac{1}{4}$	29 $\frac{1}{2}$	32	35 $\frac{1}{4}$
D	34 $\frac{1}{4}$	35 $\frac{1}{4}$	40 $\frac{1}{4}$	42 $\frac{1}{4}$	45	47 $\frac{1}{4}$	54	57 $\frac{1}{4}$	61 $\frac{1}{2}$	64 $\frac{1}{4}$	66 $\frac{1}{4}$
E	22 $\frac{1}{4}$	22 $\frac{1}{2}$	27 $\frac{1}{4}$	29 $\frac{1}{4}$	32 $\frac{3}{8}$	38 $\frac{1}{2}$	39 $\frac{1}{4}$	43 $\frac{1}{4}$	49	53	58 $\frac{1}{4}$
F	15	16	18	19	20	23	26	28	30	33	36
G	11	11 $\frac{1}{2}$	12 $\frac{1}{2}$	14	15 $\frac{1}{2}$	17 $\frac{1}{4}$	19	21 $\frac{1}{2}$	23	25 $\frac{1}{2}$	28 $\frac{1}{2}$
H	13 $\frac{3}{8}$	14 $\frac{3}{8}$	15 $\frac{3}{8}$	17 $\frac{3}{8}$	18	21	22 $\frac{3}{4}$	24 $\frac{1}{2}$	26 $\frac{3}{4}$	29	31
I	16	16	18 $\frac{1}{4}$	18 $\frac{1}{4}$	20	20 $\frac{1}{2}$	23	23	25	26	26
J	3	3	4	4	4	4	6	6	6	6	6
K	9 $\frac{1}{4}$	10 $\frac{1}{4}$	11 $\frac{1}{4}$	12 $\frac{1}{2}$	13 $\frac{1}{2}$	15	16	18	20 $\frac{1}{2}$	22	24
L	9 $\frac{1}{4}$	10 $\frac{1}{4}$	11 $\frac{1}{4}$	12 $\frac{1}{2}$	13 $\frac{1}{2}$	15	16	18	20 $\frac{1}{2}$	22	24
M	3 $\frac{1}{2}$	3 $\frac{1}{4}$	4 $\frac{1}{4}$	4 $\frac{1}{2}$	5	5 $\frac{1}{4}$	6 $\frac{1}{8}$	6 $\frac{1}{8}$	7 $\frac{1}{8}$	8 $\frac{1}{4}$	9 $\frac{1}{2}$
DRIVE SHAFT DIAMETER	1	1	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$
SHIPPING WEIGHT POUNDS	170	205	230	400	550	600	650	720	850	1,000	1,380

DESIGNATION OF DIRECTION OF ROTATION AND DISCHARGE



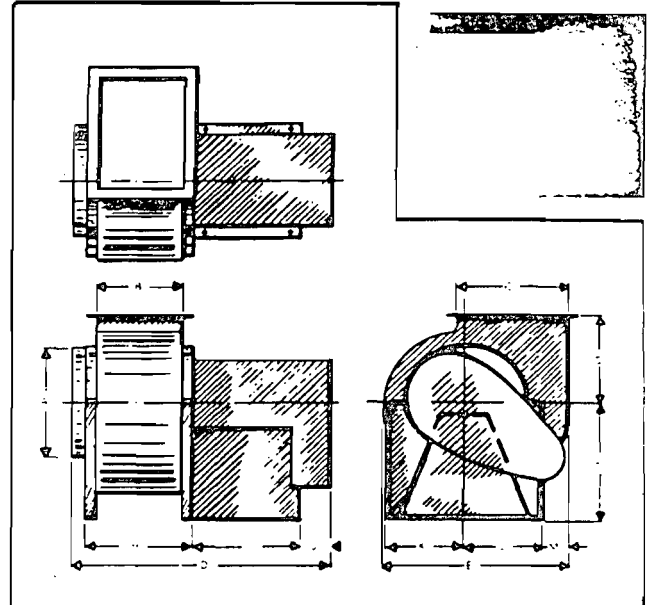
DIRECTION OF ROTATION IS DETERMINED FROM DRIVE SIDE

INLINE EXHAUST FANS

	IB-12	IB-15	IB-18	IB-20	IB-22	IB-24	IB-27	IB-30	IB-33	IB-36	IB-40
MID-RANGE CFM RECOMMENDED	2,550	3,842	4,648	5,614	6,948	6,424	10,242	12,644	15,300	18,718	22,761
FAN WHEEL DIAMETER	12 $\frac{1}{4}$	15	18 $\frac{1}{4}$	20	22 $\frac{1}{4}$	24 $\frac{1}{2}$	27	30	33	36 $\frac{1}{2}$	40 $\frac{1}{2}$
P	21"	28"	32 $\frac{1}{2}$ "	36 $\frac{1}{2}$ "	40"	47"	53"	55"	58"	63 $\frac{3}{4}$ "	70"
Q	14"	16"	20"	22"	24"	26"	30"	32"	36"	42"	46"
R	18"	22"	26"	28"	32"	34"	38"	42"	45"	50"	56"
S	2"	2"	2"	2"	2"	3"	3"	3"	3"	3"	3"
T	23"	28"	31"	32"	34"	35"	37"	39"	40 $\frac{1}{2}$ "	45"	52"
U	2"	2"	2"	2"	2"	3"	3"	3"	3"	3"	3"
DRIVE SHAFT DIAMETER	1	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	1 $\frac{1}{16}$	2 $\frac{1}{16}$	2 $\frac{1}{16}$
SHIPPING WEIGHT POUNDS	90	130	290	320	350	380	450	525	730	850	1,110

DIMENSIONAL CHART

CB-40	CB-44	CB-49	CB-54	CB-60	CB-66	
23.375	28.525	34.775	42.450	51.775	63.175	MID-RANGE CFM RECOMMENDED
40 $\frac{1}{4}$	44 $\frac{1}{2}$	49	54 $\frac{1}{4}$	60	66	FAN WHEEL DIAMETER
44 $\frac{1}{2}$	49	54	60	66	72	A
34 $\frac{1}{2}$	37 $\frac{1}{2}$	40 $\frac{3}{4}$	44 $\frac{3}{4}$	49 $\frac{3}{4}$	54 $\frac{3}{4}$	B
43	47 $\frac{1}{4}$	52 $\frac{3}{8}$	57 $\frac{3}{8}$	63 $\frac{3}{8}$	70 $\frac{1}{4}$	C
79 $\frac{3}{4}$	84 $\frac{3}{4}$	88	93	97 $\frac{3}{8}$	104 $\frac{3}{8}$	D
72 $\frac{1}{2}$	79 $\frac{1}{2}$	88 $\frac{1}{4}$	97	108	119	E
42	49 $\frac{3}{4}$	49	54	59	64	F
34 $\frac{1}{2}$	37 $\frac{1}{2}$	41	46	50 $\frac{1}{2}$	55	G
40 $\frac{1}{2}$	43 $\frac{1}{2}$	48 $\frac{3}{4}$	50 $\frac{3}{4}$	53 $\frac{3}{4}$	60 $\frac{3}{4}$	H
27 $\frac{1}{2}$	29 $\frac{1}{2}$	29 $\frac{1}{2}$	31 $\frac{1}{4}$	33	33	I
8	8	8	8	8	8	J
25 $\frac{3}{4}$	26 $\frac{3}{4}$	30	34	37	40	K
25 $\frac{3}{4}$	26 $\frac{3}{4}$	30	34	37	40	L
11 $\frac{1}{4}$	12 $\frac{1}{4}$	14 $\frac{3}{16}$	15 $\frac{3}{16}$	17 $\frac{3}{16}$	19 $\frac{3}{16}$	M
2 $\frac{3}{16}$	2 $\frac{7}{16}$	2 $\frac{7}{16}$	2 $\frac{15}{16}$	2 $\frac{15}{16}$	2 $\frac{15}{16}$	DRIVE SHAFT DIAMETER
2,050	2,300	2,650	3,110	3,525	4,000	SHIPPING WEIGHT POUNDS



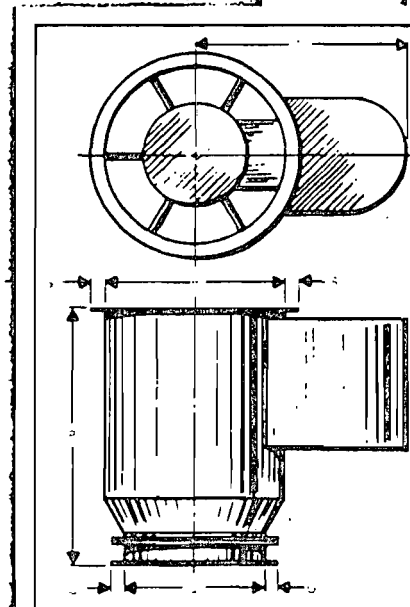
Beverly Pacific's FRP constructed fans have a "Type A" classification for spark resistance.

STANDARD CLASSIFICATIONS FOR SPARK RESISTANT CONSTRUCTION

TYPE	CONSTRUCTION
A	All parts of the fan in contact with the air or gas being handled shall be made of non-ferrous material.
B	The fan shall have an entirely non-ferrous wheel and non-ferrous ring about the opening through which the shaft passes.
C	The fan shall be so constructed that a shift of the wheel or shaft will not permit two ferrous parts of the fan to rub or strike.

DIMENSIONAL CHART

IB-49	IB-54	IB-60	IB-66	
33.733	41.349	50.579	61.201	MID-RANGE CFM RECOMMENDED
49	54 $\frac{1}{4}$	60	66	FAN WHEEL DIAMETER
84"	93"	104"	116"	P
54"	60"	66"	72"	Q
68"	72"	80"	88"	R
3"	3"	3"	3"	S
65"	68"	72"	76"	T
3"	3"	3"	3"	U
2 $\frac{7}{16}$	2 $\frac{15}{16}$	2 $\frac{15}{16}$	2 $\frac{15}{16}$	DRIVE SHAFT DIAMETER
1,420	1,650	1,800	2,100	SHIPPING WEIGHT POUNDS



EXHAUST FAN INTRODUCTION

Beverly Pacific's complete line of centrifugal and inline exhaust fans have proven their reliability with years of successful, continuous corrosive service throughout the nation and around the world.

Our solid "FRP" construction defies corrosion and each is designed to provide smooth, quiet and maintenance-free operation . . . this superior combination permits peak performance with the lowest possible power consumption.

A wide selection of standard models, types and sizes are available to meet your specific requirements.

FAN WHEEL SUPERIORITY

The Beverly Pacific fan wheels are fabricated of corrosion-resistant Fiberglass Reinforced Plastic (FRP) materials. The fan wheel design is that of a "backward curve blade," Class II construction, and are available in standard sizes of 12 $\frac{1}{4}$ " through 66" diameters.

All of Beverly Pacific's fan wheels are both statically and dynamically balanced and run on a test stand prior to final assembly to insure continuous, vibration-free performance.

Every surface in contact with the air stream is corrosion resistant. The steel hub (providing the positive-lock connection to the drive shaft) is totally encapsulated in the wheel laminate and even the weight added during the wheel balancing process is corrosion resistant, Fiberglass Reinforced Plastic materials.

Should your particular requirement involve moving a volume of only a few hundred CFM at $\frac{1}{4}$ " S.P. or over 80,000 CFM at 6" S.P., Beverly Pacific has a proven standard size to meet your requirement.

EXHAUST FANS STANDARD AND OPTIONAL EQUIPMENT

Standard Equipment: Beverly Pacific's centrifugal fans are equipped with a scroll bottom drain and flanged discharge outlet, and are furnished with a purchaser's choice of twelve (12) discharge outlet directions and a choice of right or left fan wheel rotation. Both of our fan styles, centrifugal and inline, are equipped with an OSHA approved belt guard and powered by 230-460/30/60 Hz motors . . . totally enclosed, fan-cooled, (TEFC) up to 20 horsepower, and Multi-guard motors are furnished when horsepower requirements are 25 or larger. Also, as standard equipment, Beverly Pacific furnishes the following list of first-line, top quality drive components which were selected based on motor horsepower, RPM, tip speed and weight of fan wheel, with a safety factor of 1.3 times the motor horsepower.

- a. **BEARINGS** — Beverly Pacific furnishes Dodge-Type K pillow blocks on the inline model. These Dodge bearings have Timken-tapered roller bearings, are fully self-aligning and designed to meet the stringent demands of power transmission. Based on radial and thrust load computations, bearing life expectancy is in excess of 100,000 hours.
- b. **SHEAVES** — Beverly Pacific Corporation furnishes Dodge sheaves, which are cast from the finest quality gray iron and machined to rigid quality control specifications. Groove design and spacing conforms to ASA, MPTA and RMA standards. These sheaves are equipped with Taper-Lock bushings, a superior mounting well recognized and widely used in industry.
- c. **V-BELTS** — Beverly Pacific furnishes Dodge Sealed-Life Belts, Type A, B and C which have a longer wearing protective cover, crowned top, concave sidewall, exceptional stability and an improved cord section which prevents failures caused by cord separation.
- d. **WHEEL BACKING PLATES** — Beverly Pacific uses Rex taper-lock, single-duty, Type B, steel sprocket, in the backing plate of all FRP fan wheels. This steel sprocket is completely embedded and encased with FRP materials to prevent corrosion attack.
- e. **DRIVE SHAFTS** — Beverly Pacific uses ground and polished, 1045 TGP shafting rounds, as produced by Inland Steel. This medium carbon steel is used because of its greater strength and hardness. The mechanical properties, based on $\frac{3}{4}$ " — 1 $\frac{1}{4}$ " diameter round bars of 1045, include a tensile strength of 98,000 PSI, yield strength of 59,000 PSI and a Brinell Hardness of 212.

HARRIS SEMICONDUCTOR -- AIR PERMIT INFORMATION

CURRENT PERMIT

BUILDING: 04
PERMIT NUMBER: AC 05-104525
PERMIT TYPE : CONSTRUCTION
DATE ISSUED : 01/15/86
RENEWAL DATE: 04/01/86
DATE EXPIRES: 06/30/86

AREA SERVED: EPITAXIAL. HCL VENT
PROCESS DESCRIPTION: NORTH CHEMICAL VAPOR SCRUBBER

PERMIT LIMITS

VOL. RATE (SCFM): 10,000
ACID MIST (LB/HR): 0.0005
SOLVENTS (LB/HR): 0.0005
VOCS (LB/HR): --
OPER. (HRS/YEAR): 8760

SPECIFIC CONDITIONS

ANNUAL OPERATING REPORT :
NOTIFICATION OF VE TEST :
ANNUAL VIS EMISSION TEST:

EQUIPMENT INFORMATION

MANUFACTURER : HARRISON
LOCATION : B04 ROOF
HARRIS ID NUMBER : F04S01
VOLUME FLOW RATE (CFM): 10,000
RECIRCULATION RATE (GPM): 65
MAKEUP WATER RATE (GPM): 6.0
MODEL NUMBER : HF-100
STACK HEIGHT (FT): 13.5
STACK DIAMETER (IN): 26
STACK VELOCITY (FPM): 2712
DUCT MATERIAL :

PERMIT HISTORY

PERMIT NUMBER: AC 05-104525
DATE EXPIRED : 06/30/86

PERMIT NUMBER:
DATE EXPIRED :

PERMIT NUMBER:
DATE EXPIRED :

Best Available Copy

SCRUBBER INFORMATION

HARRIS ID # : F04S01
MANUFACTURER : HARRISON
SERIAL NUMBER: N/A
DESCRIPTION : HORIZONTAL CROSS-FLOW, PLASTIC SADDLE PACKING, LIQUID DISTRIBUTION THROUGH MAIN HEADER, NO SPRAY NOZZLES

MODEL NUMBER : HF-100
MATERIAL : POLYPRO

DESIGN DATA
VOLUME FLOW RATE (CFM): 10000
RECIRCULATION RATE (GPM): 65
PRESSURE DROP (IN):
MAKE UP RATE (GPM): 6.0

ACTUAL DATA
VOLUME FLOW RATE (CFM): 8220
RECIRCULATION RATE (GPM): NR
PRESSURE DROP (IN): (0.7) DATE: 12/20/8
MAKE UP RATE (GPM): 2 DATE: 6/3/87

RECIRCULATION PUMP INFORMATION

MANUFACTURER : LELAND FARADAY
SERIAL NUMBER: N/A
BRKR LOCATION: #8
MODEL NUMBER : 92J310A
HP : 1 RPM : 3450
FED FROM MCC :

FAN INFORMATION

HARRIS ID # : F04E01
MANUFACTURER : HARTZELL
SERIAL NUMBER: 50043
DESCRIPTION : CENTRIFUGAL BLOWER, BACKWARD CURVED BLADES

MODEL NUMBER: 41-27-GN3
MATERIAL : FIBERGLASS

DESIGN DATA
VOLUME FLOW RATE (CFM): 10.000
STATIC PRESS (IN): 4.0

ACTUAL DATA
VOLUME FLOW RATE (CFM): 8,220
SPEED (RPM):
STATIC PRESS (IN):
DATE:
DATE: 12/20/8

FAN MOTOR INFORMATION

MANUFACTURER :
SERIAL NUMBER:
BRKR LOCATION: #6
MODEL NUMBER :
HP : 10 RPM : 1725
FED FROM MCC :

HARRIS SEMICONDUCTOR

-- AIR PERMIT INFORMATION

CURRENT PERMIT

BUILDING: 04
PERMIT NUMBER: AO 05-115803
PERMIT TYPE : OPERATING

DATE ISSUED : 05/20/86
RENEWAL DATE: 03/23/91
DATE EXPIRES: 05/22/91

AREA SERVED: DIFFUSION
PROCESS DESCRIPTION: OXI/DIFFUSION EXPANSION EXHAUST SCRUBBER

PERMIT LIMITS

VOL. RATE (SCFM): NOT SPEC.
ACID MIST (LB/HR): 0.0104
SOLVENTS (LB/HR): 0.0068
VOCS (LB/HR): --
OPER. (HRS/YEAR): 8760

SPECIFIC CONDITIONS

ANNUAL OPERATING REPORT : 03/01
NOTIFICATION OF VE TEST : NOT SPEC.
ANNUAL VIS EMISSION TEST: NOT SPEC.

EQUIPMENT INFORMATION

MANUFACTURER : DUALL IND.
LOCATION : B04 ROOF
HARRIS ID NUMBER : F04S02
VOLUME FLOW RATE (CFM): 6,900
RECIRCULATION RATE (GPM): 42
MAKEUP WATER RATE (GPM): 2.0

MODEL NUMBER : F-101
STACK HEIGHT (FT):
STACK DIAMETER (IN):
STACK VELOCITY (FPM):
DUCT MATERIAL :

PERMIT HISTORY

PERMIT NUMBER: AO 05-38485 (FAN 25, SCRUB 26)
DATE EXPIRED : 04/08/86

PERMIT NUMBER:
DATE EXPIRED :

PERMIT NUMBER:
DATE EXPIRED :

HARRIS SEMICONDUCTOR -- AIR PERMIT INFORMATION

CURRENT PERMIT

BUILDING: 04 DATE ISSUED : 01/15/86
PERMIT NUMBER: AC 05-104524 RENEWAL DATE: 04/01/86
PERMIT TYPE : CONSTRUCTION DATE EXPIRES: 06/30/86

AREA SERVED: FINAL SCREEN CLEAN, GRIND, BACKLAP
PROCESS DESCRIPTION: SOUTH CHEMICAL VAPOR SCRUBBER

PERMIT LIMITS

VOL. RATE (SCFM): 10.000
ACID MIST (LB/HR): 0.0008
SOLVENTS (LB/HR): 0.0091
VOCS (LB/HR): --
OPER. (HRS/YEAR): 8760

SPECIFIC CONDITIONS

ANNUAL OPERATING REPORT :
NOTIFICATION OF VE TEST :
ANNUAL VIS EMISSION TEST:

EQUIPMENT INFORMATION

MANUFACTURER : HARRISON MODEL NUMBER : HF-100
LOCATION : B04 ROOF
HARRIS ID NUMBER : F04S03 STACK HEIGHT (FT): 15
VOLUME FLOW RATE (CFM): 10,000 STACK DIAMETER (IN): 26
RECIRCULATION RATE (GPM): 65 STACK VELOCITY (FPM): 2712
MAKEUP WATER RATE (GPM): 6.0 DUCT MATERIAL :

PERMIT HISTORY

PERMIT NUMBER: AC 05-104524
DATE EXPIRED : 06/30/86

PERMIT NUMBER:
DATE EXPIRED :

PERMIT NUMBER:
DATE EXPIRED :

SCRUBBER INFORMATION

HARRIS ID # : F04S03
MANUFACTURER : HARRISON MODEL NUMBER : HF-100
SERIAL NUMBER: N/A MATERIAL : POLYPRO
DESCRIPTION : HORIZONTAL CROSS-FLOW, PLASTIC SADDLE PACKING, LIQUID
DISTRIBUTION THROUGH MAIN HEADER, NO SPRAY NOZZLES

DESIGN DATA

VOLUME FLOW RATE (CFM): 10,000 PRESSURE DROP (IN):
RECIRCULATION RATE (GPM): 65 MAKE UP RATE (GPM): 6.0

ACTUAL DATA

VOLUME FLOW RATE (CFM): 10,600 PRESSURE DROP (IN): (1.2) DATE: 12/21/8
RECIRCULATION RATE (GPM): N/R MAKE UP RATE (GPM): 5 DATE: 06/03/8

RECIRCULATION PUMP INFORMATION

MANUFACTURER : A. O. SMITH CORP MODEL NUMBER : P56M247
SERIAL NUMBER: 6A84 HP : 1.5 RPM : 3450/2850
BRKR LOCATION: #7 FED FROM MCC :

FAN INFORMATION

HARRIS ID # : F04E03
MANUFACTURER : HARTZELL MODEL NUMBER: 41-27-GN3
SERIAL NUMBER: 50043 MATERIAL : FIBERGLASS
DESCRIPTION : CENTRIFUGAL BLOWER, BACKWARD CURVED BLADES

DESIGN DATA

VOLUME FLOW RATE (CFM): 10,000 STATIC PRESS (IN): 4.0

ACTUAL DATA

VOLUME FLOW RATE (CFM): 10,600 SPEED (RPM): DATE:
STATIC PRESS (IN): DATE: 12/21/8

FAN MOTOR INFORMATION

MANUFACTURER : MODEL NUMBER :
SERIAL NUMBER: HP : 10 RPM : 1725
BRKR LOCATION: #5 FED FROM MCC :

SCRUBBER INFORMATION

HARRIS ID # : F04S04
MANUFACTURER : UNKNOWN
SERIAL NUMBER:
DESCRIPTION :

MODEL NUMBER :
MATERIAL :

DESIGN DATA

VOLUME FLOW RATE (CFM):
RECIRCULATION RATE (GPM):

PRESSURE DROP (IN):
MAKE UP RATE (GPM):

ACTUAL DATA

VOLUME FLOW RATE (CFM):
RECIRCULATION RATE (GPM): 10

PRESSURE DROP (IN): N/E DATE: 6/3/87
MAKE UP RATE (GPM): 5 DATE: "

RECIRCULATION PUMP INFORMATION

MANUFACTURER : DELCO
SERIAL NUMBER: 8RGSND77503
BRKR LOCATION: ON BLOWER

MODEL NUMBER : F4324
HP : 2 RPM : 3465
FED FROM MCC :

FAN INFORMATION

HARRIS ID # : F04E04
MANUFACTURER : HARTZELL
SERIAL NUMBER: 15748
DESCRIPTION : CENTRIFUGAL BLOWER, BACKWARD CURVED BLADES

MODEL NUMBER: 41-33-GP3
MATERIAL : FIBERGLASS

DESIGN DATA

VOLUME FLOW RATE (CFM):

STATIC PRESS (IN):

ACTUAL DATA

VOLUME FLOW RATE (CFM):

SPEED (RPM): DATE:
STATIC PRESS (IN): DATE:

FAN MOTOR INFORMATION

MANUFACTURER :
SERIAL NUMBER:
BRKR LOCATION:

MODEL NUMBER :
HP : 20 RPM :
FED FROM MCC :

HARRIS SEMICONDUCTOR -- AIR PERMIT INFORMATION

CURRENT PERMIT

BUILDING: 04 DATE ISSUED : 09/16/86
PERMIT NUMBER: AO 05-121934 RENEWAL DATE: 07/16/91
PERMIT TYPE : OPERATING DATE EXPIRES: 09/14/91

AREA SERVED: SIL-TET LOAD
PROCESS DESCRIPTION: ACID VAPOR SCRUBBER (SIL-TET LOADING)

PERMIT LIMITS

VOL. RATE (SCFM): 1000
ACID MIST (LB/HR): 0.0095
SOLVENTS (LB/HR): --
VOCS (LB/HR): --
OPER. (HRS/YEAR): 1560

SPECIFIC CONDITIONS

ANNUAL OPERATING REPORT : 03/01
NOTIFICATION OF VE TEST : 10/26
ANNUAL VIS EMISSION TEST: 11/10

EQUIPMENT INFORMATION

MANUFACTURER : BEVERLY PACIFIC MODEL NUMBER : PS-2VT
LOCATION : B04 EAST GROUND
HARRIS ID NUMBER : F04S05 STACK HEIGHT (FT): 34
VOLUME FLOW RATE (CFM): 2,000 STACK DIAMETER (IN): 14
RECIRCULATION RATE (GPM): 10 STACK VELOCITY (FPM):
MAKEUP WATER RATE (GPM): 0.5 DUCT MATERIAL : polypro

PERMIT HISTORY

PERMIT NUMBER: AC 05-108258
DATE EXPIRED : 06/30/86

PERMIT NUMBER:
DATE EXPIRED :

PERMIT NUMBER:
DATE EXPIRED :

SCRUBBER INFORMATION

HARRIS ID # : F04S05
MANUFACTURER : BEVERLY PACIFIC MODEL NUMBER : PS-2VT
SERIAL NUMBER: F-600 MATERIAL : FIBERGLASS
DESCRIPTION : VERTICAL COUNTER-CURRENT, NON-CLOGGING PVC SPRAY NOZZLES
POLYPROPYLENE PACKING, PVC MIST ELIMINATOR

DESIGN DATA

VOLUME FLOW RATE (CFM): 2,000 PRESSURE DROP (IN):
RECIRCULATION RATE (GPM): 10 MAKE UP RATE (GPM): 0.5

ACTUAL DATA

VOLUME FLOW RATE (CFM): 1,000 PRESSURE DROP (IN): N/E DATE: 6/3/87
RECIRCULATION RATE (GPM): N/E MAKE UP RATE (GPM): N/E DATE: "

RECIRCULATION PUMP INFORMATION

MANUFACTURER : FILTER PUMP IND MODEL NUMBER : 350205-79
SERIAL NUMBER: F981 HP : 0.5 RPM : 2850/3450
BRKR LOCATION: NEXT TO UNIT FED FROM MCC :

FAN INFORMATION

HARRIS ID # : F04E26
MANUFACTURER : BEVERLY PACIFIC MODEL NUMBER: 1B-12
SERIAL NUMBER: MATERIAL : FIBERGLASS
DESCRIPTION : IN LINE DUCT-AXIAL BLOWER

DESIGN DATA

VOLUME FLOW RATE (CFM): 2,000 STATIC PRESS (IN):

ACTUAL DATA

VOLUME FLOW RATE (CFM): 1,000 SPEED (RPM): DATE:
STATIC PRESS (IN): DATE:

FAN MOTOR INFORMATION

MANUFACTURER : MODEL NUMBER :
SERIAL NUMBER: HP : RPM :
BRKR LOCATION: FED FROM MCC :

HARRIS SEMICONDUCTOR -- AIR PERMIT INFORMATION

CURRENT PERMIT

BUILDING: 04 DATE ISSUED : 11/05/85
PERMIT NUMBER: AO 05-109846 RENEWAL DATE: 08/31/90
PERMIT TYPE : OPERATING DATE EXPIRES: 10/30/90

AREA SERVED: EPITAXIAL, POLYSILICON DEPOSITION
PROCESS DESCRIPTION: 4 EPI REACTORS WITH 4 SCRUBBERS (SYS 6, 7 AND 8)

PERMIT LIMITS

VOL. RATE (SCFM): NOT SPEC.
ACID MIST (LB/HR): 0.49
SOLVENTS (LB/HR): ---
VOCS (LB/HR): ---
OPER. (HRS/YEAR):

SPECIFIC CONDITIONS

ANNUAL OPERATING REPORT : 03/01
NOTIFICATION OF VE TEST : 11/06
ANNUAL VIS EMISSION TEST: 11/21

EQUIPMENT INFORMATION

MANUFACTURER : IN-HOUSE MODEL NUMBER :
LOCATION : BLDG 4 ROOF
HARRIS ID NUMBER : F04S06 STACK HEIGHT (FT):
VOLUME FLOW RATE (CFM): STACK DIAMETER (IN):
RECIRCULATION RATE (GPM): STACK VELOCITY (FPM):
MAKEUP WATER RATE (GPM): DUCT MATERIAL :

PERMIT HISTORY

PERMIT NUMBER: AO 05-36148 (SYSTEM 6, 800 CFM)
DATE EXPIRED : 11/18/85

PERMIT NUMBER: AO 05-36149 (SYSTEM 7, 800 CFM)
DATE EXPIRED : 11/18/85

PERMIT NUMBER: AO 05-36150 (SYSTEM 8, 800 CFM)
DATE EXPIRED : 11/18/85

SCRUBBER INFORMATION

HARRIS ID # : N/A (F04S06)
MANUFACTURER :
SERIAL NUMBER:
DESCRIPTION : 4 EPI SCRUBBERS

MODEL NUMBER :
MATERIAL :

DESIGN DATA

VOLUME FLOW RATE (CFM):
RECIRCULATION RATE (GPM):

PRESSURE DROP (IN):
MAKE UP RATE (GPM):

ACTUAL DATA

VOLUME FLOW RATE (CFM):
RECIRCULATION RATE (GPM):

PRESSURE DROP (IN): DATE:
MAKE UP RATE (GPM): DATE:

RECIRCULATION PUMP INFORMATION

MANUFACTURER :
SERIAL NUMBER:
BRKR LOCATION:

MODEL NUMBER :
HP : RPM :
FED FROM MCC :

FAN INFORMATION

HARRIS ID # :
MANUFACTURER :
SERIAL NUMBER:
DESCRIPTION :

MODEL NUMBER:
MATERIAL :

DESIGN DATA

VOLUME FLOW RATE (CFM):

STATIC PRESS (IN):

ACTUAL DATA

VOLUME FLOW RATE (CFM):

SPEED (RPM): DATE:
STATIC PRESS (IN): DATE:

FAN MOTOR INFORMATION

MANUFACTURER :
SERIAL NUMBER:
BRKR LOCATION:

MODEL NUMBER :
HP : RPM :
FED FROM MCC :

HARRIS SEMICONDUCTOR -- AIR PERMIT INFORMATION

CURRENT PERMIT

BUILDING: 04 DATE ISSUED : 11/05/85
PERMIT NUMBER: AO 05-109852 RENEWAL DATE: 08/31/90
PERMIT TYPE : OPERATING DATE EXPIRES: 10/30/90

AREA SERVED: PHOTORESIST, WET CHEMISTRY
PROCESS DESCRIPTION: SILICON WAFER CHEMICAL TREATMENT (SYS 10)

PERMIT LIMITS

VOL. RATE (SCFM): 3620
ACID MIST (LB/HR): --
SOLVENTS (LB/HR): 0.473
VOCS (LB/HR): --
OPER. (HRS/YEAR): 6336

SPECIFIC CONDITIONS

ANNUAL OPERATING REPORT : 03/01
NOTIFICATION OF VE TEST : 11/06
ANNUAL VIS EMISSION TEST: 11/21

EQUIPMENT INFORMATION

MANUFACTURER : N/A MODEL NUMBER : N/A
LOCATION :
HARRIS ID NUMBER : F04S08 STACK HEIGHT (FT):
VOLUME FLOW RATE (CFM): STACK DIAMETER (IN):
RECIRCULATION RATE (GPM): N/A STACK VELOCITY (FPM):
MAKEUP WATER RATE (GPM): N/A DUCT MATERIAL : GALV

PERMIT HISTORY

PERMIT NUMBER: AO 05-36154 (FAN 349)
DATE EXPIRED : 11/19/85

PERMIT NUMBER:
DATE EXPIRED :

PERMIT NUMBER:
DATE EXPIRED :

Best Available Copy

SCRUBBER INFORMATION

HARRIS ID # : N/A (F04S08)
MANUFACTURER : N/A MODEL NUMBER : N/A
SERIAL NUMBER: N/A MATERIAL : N/A
DESCRIPTION : N/A (NO SCRUBBER PRESENT)

DESIGN DATA
VOLUME FLOW RATE (CFM): N/A PRESSURE DROP (IN): N/A
RECIRCULATION RATE (GPM): N/A MAKE UP RATE (GPM): N/A

ACTUAL DATA
VOLUME FLOW RATE (CFM): N/A PRESSURE DROP (IN): N/A DATE: N/A
RECIRCULATION RATE (GPM): N/A MAKE UP RATE (GPM): N/A DATE: N/A

RECIRCULATION PUMP INFORMATION

MANUFACTURER : N/A MODEL NUMBER : N/A
SERIAL NUMBER: N/A HP : N/A RPM : N/A
BRKR LOCATION: N/A FED FROM MCC : N/A

FAN INFORMATION

HARRIS ID # : F04E20
MANUFACTURER : LOREN COOK MODEL NUMBER: 24
SERIAL NUMBER: 74080-9742 MATERIAL :
DESCRIPTION : CENTRIFUGAL BLOWER

DESIGN DATA
VOLUME FLOW RATE (CFM): 3620 STATIC PRESS (IN):

ACTUAL DATA
VOLUME FLOW RATE (CFM): 4545 SPEED (RPM): DATE:
STATIC PRESS (IN): DATE: 01/13/8

FAN MOTOR INFORMATION

MANUFACTURER : MODEL NUMBER :
SERIAL NUMBER: HP : 7.5 RPM :
BRKR LOCATION: FED FROM MCC :

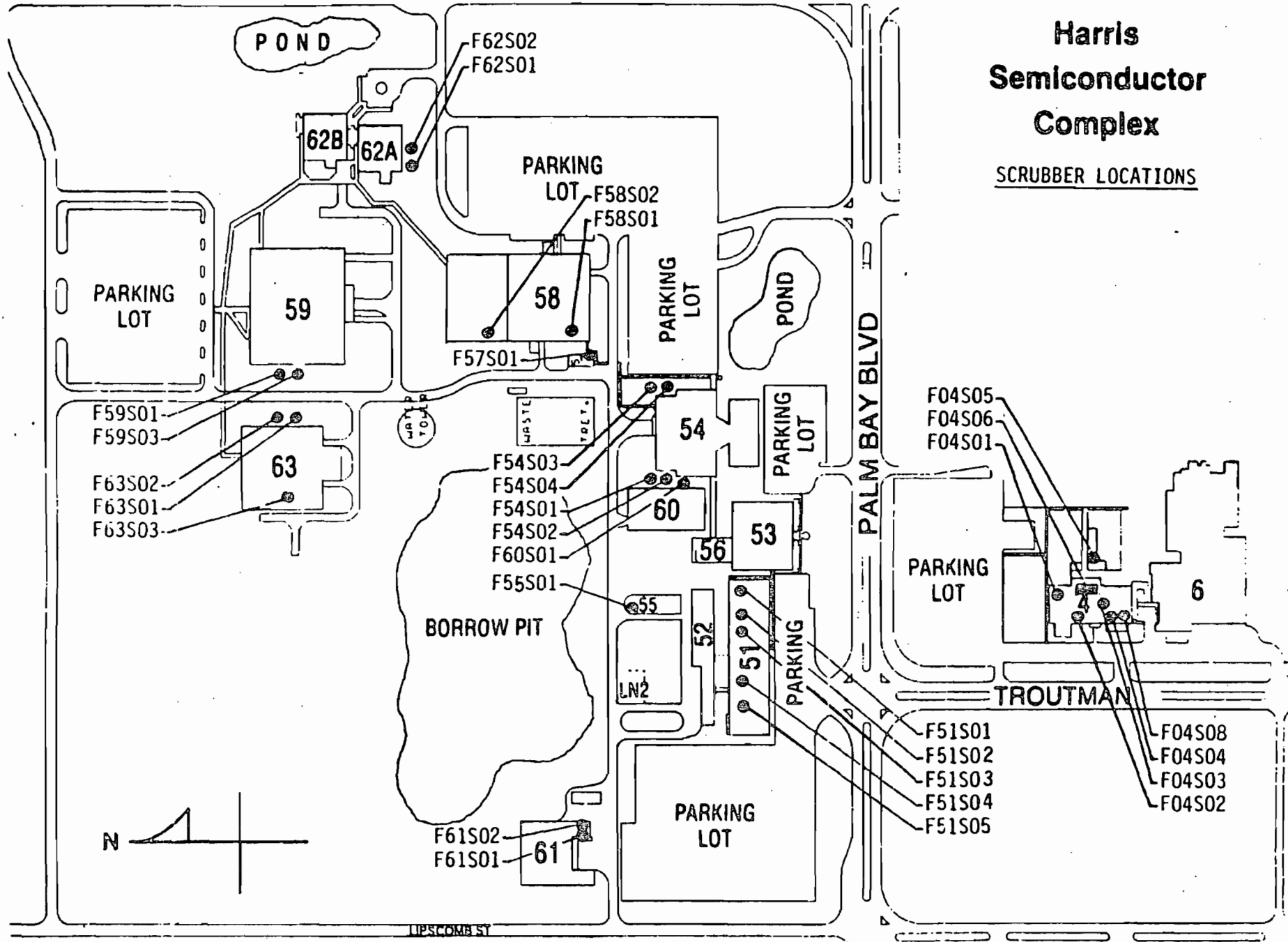
Attachment :

HARRIS SEMICONDUCTOR
AIR PERMIT -- BUILDING 4
ATTACHMENT E
SITE LOCATION MAPS

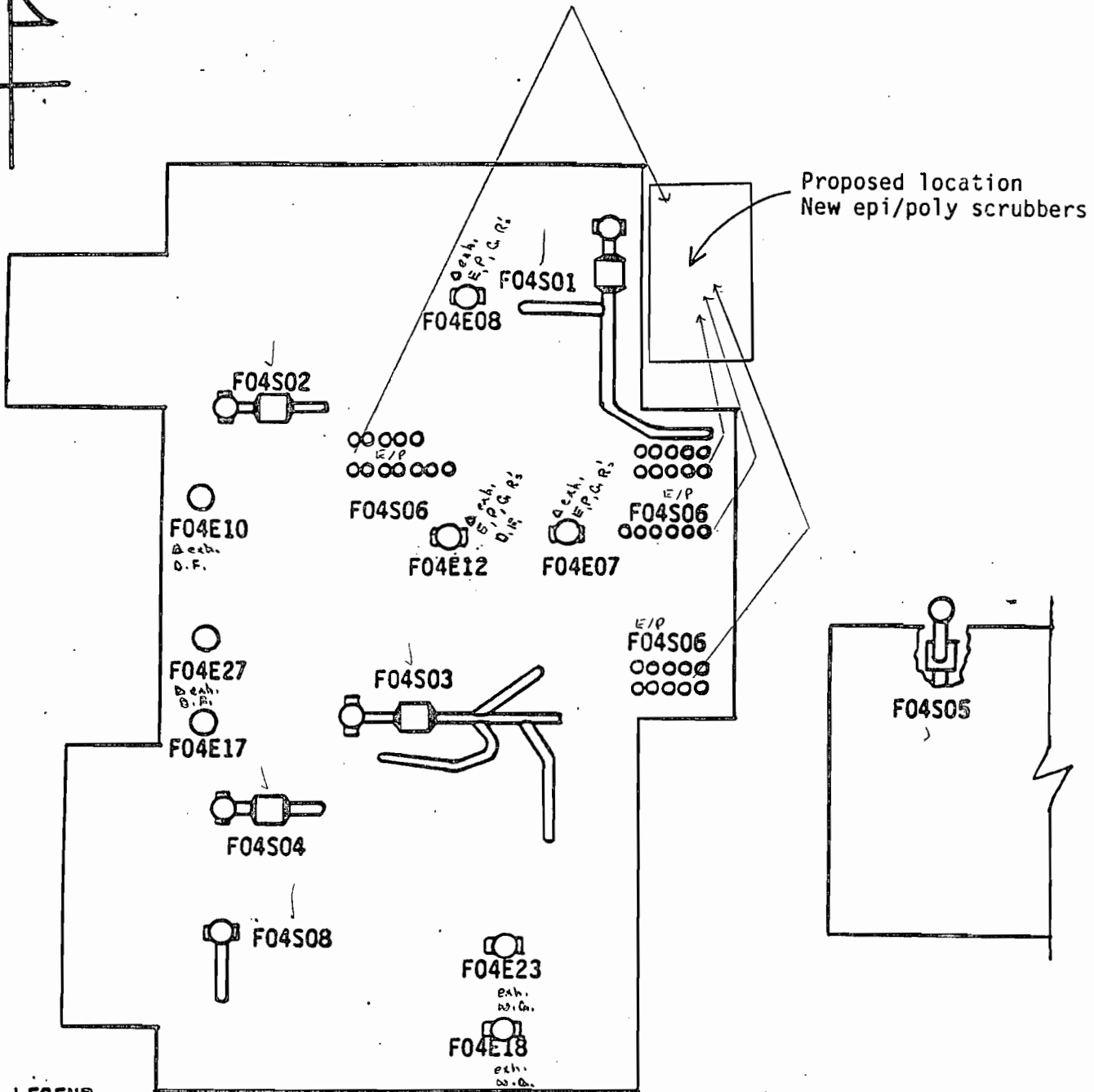
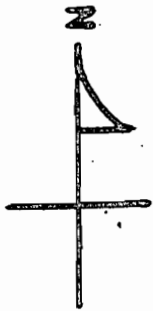
APOLLO BLVD

Harris Semiconductor Complex






SCRUBBER LOCATIONS



HARRIS SEMICONDUCTOR
SCRUBBER LOCATIONS
BUILDING 4



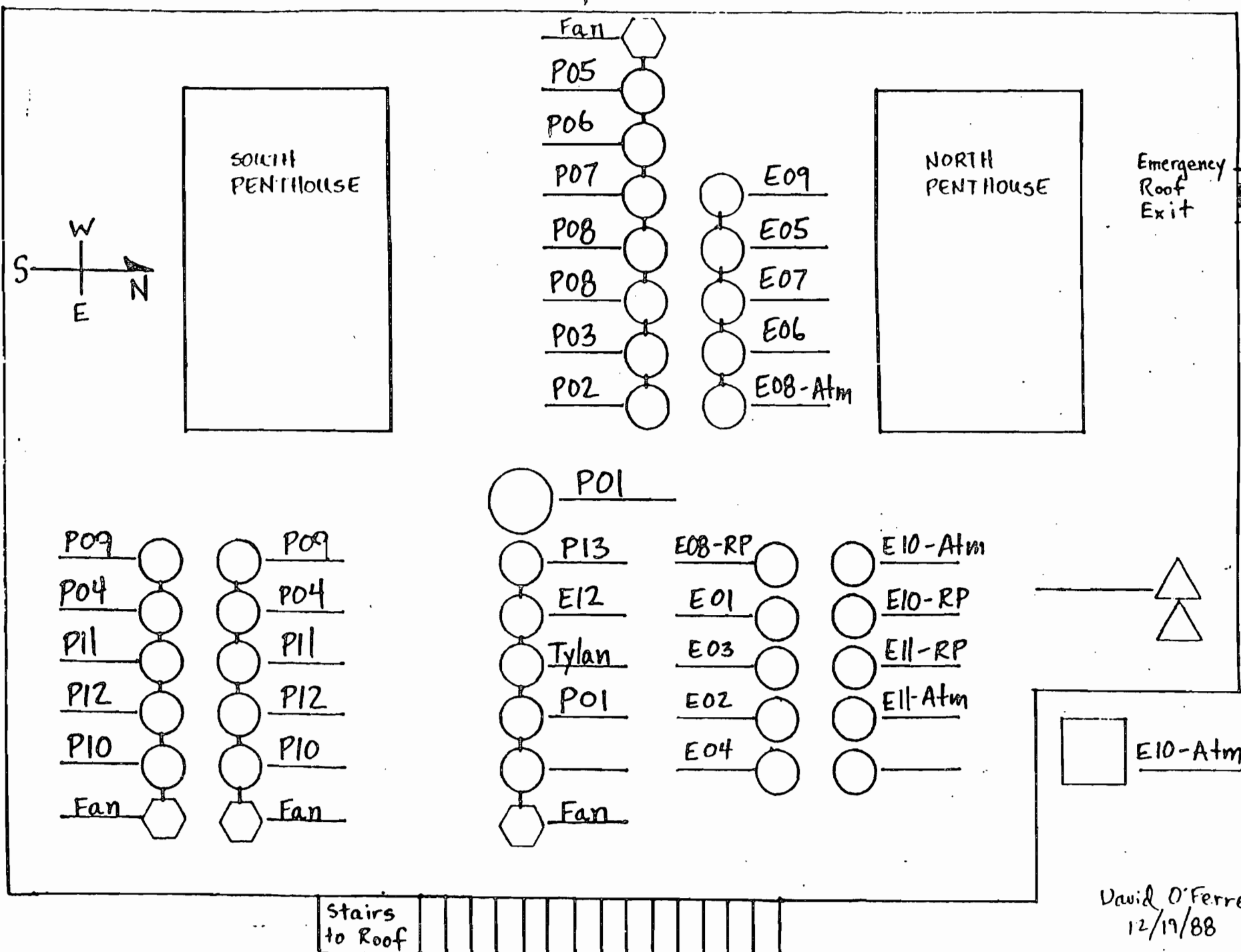
LEGEND

-  - Horizontal Scrubber
-  - Vertical Scrubber
-  - Exhaust Stack
-  - Exhaust Fan
-  - Stack mounted on fan

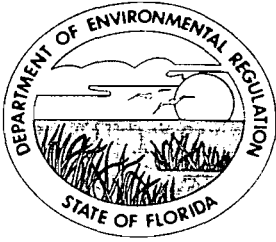
BUILDING 4 E-PI AND POLY REACTOR SCRUBBER LAYOUT

Facility ID: X-5550

Best Available Copy



David O'Ferrel
12/19/88



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION NOTICE OF PERMIT

Mr. L. R. Hutker, P.E.
Director, Facilities Department
Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

A' tras

September 13, 1989

Enclosed is construction permit No. AC 05-165757 for Harris Semiconductor to consolidate permits previously issued for Building No. 4 and to construct two new two staged scrubber systems at Harris Semiconductor's existing facility in Palm Bay, Brevard County Florida. This permit is issued pursuant to Section 403, Florida Statutes.

Any party to this permit has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this permit is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

C. H. Fancy

C. H. Fancy, P.E.
Bureau of Air Regulation

Copy furnished to:

C. Collins, Central District
N. Baldisseroto, Harris Semiconductor

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF PERMIT and all copies were mailed before the close of business on 9-15-89.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to
§120.52(9), Florida Statutes, with
the designated Department Clerk,
receipt of which is hereby
acknowledged.

Martha J. Wise 9-15-89
Clerk Date

Final Determination

**Harris Semiconductor
Brevard County
Palm Bay, Florida**

**Construction Permit Number .
AC 05-165757**

**Florida Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Regulation**

September 8, 1989

Final Determination

The construction permit application has been reviewed by the Department. Public Notice of the Department's Intent to Issue was published in the Florida Today Newspaper on August 11, 1989. The Technical Evaluation and Preliminary Determination were available for public inspection at the DER's Central District and Division of Air Resources Management offices.

There were no comments received on the proposed action. Therefore, it is recommended that the proposed construction permit be issued as drafted.

CAPE PUBLICATIONS, INC.

The Times

Published Weekly on Wednesdays

RECEIVED

AUG 14 1989

DER - BAQM

THE TRIBUNE

Published Weekly on Wednesdays



Published Daily

STATE OF FLORIDA
COUNTY OF BREVARD

Before the undersigned authority personally appeared Linda L. Spicer who on oath says that he/she is Legal Advertising Clerk of the FLORIDA TODAY, a newspaper published in Brevard County, Florida; that the attached copy of advertising being a Legal Notice

_____ in the matter of _____ permit to consolidate multiple permits previously issued for Building No. 4 in the _____ Court

was published in the FLORIDA TODAY NEWSPAPER in the issues of August 11, 1989

Affiant further says that the said FLORIDA TODAY NEWSPAPER is a newspaper published in said Brevard County, Florida and that the said newspaper has heretofore been continuously published in said Brevard County, Florida regularly as stated above, and has been entered as second class mail matter at the post office in COCOA, said Brevard County, Florida for a period of one year next preceeding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebate, commission or refund for the purpose of securing this advertisement for publication in said newspaper.

Linda L. Spicer

Sworn and subscribed to before me this 11th day of August A.D., 19 89

Chalky [Signature]

Notary Public
State of Florida at Large
Commission Expires March 29, 1992

State of Florida
Department of
Environmental Regulation
Notice of Intent to Issue
The Department of Environmental Regulation gives notice of its intent to issue a permit to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits take place; and to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future. The proposed project will occur at the applicant's existing facility located on Palm Bay Road, City of Palm Bay, in Brevard County, Florida. A determination of Best Available Control Technology (BACT) was not required. The Department is issuing this intent to issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The petition shall contain the following information:

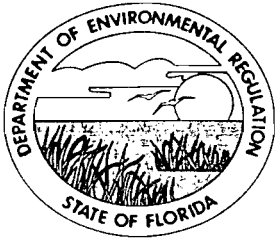
- (a) The name, address and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
- (b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
- (c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
- (d) A statement of the material facts disputed by Petitioner, if any;
- (e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
- (f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
- (g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207 F.A.C.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at: Department of Environmental Regulation, Bureau of Air Quality Management, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400

Department of Environmental Regulation
Central District Office
3319 Maguire Blvd., Suite 232
Orlando, Florida 32803-3767

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 14 days of the publication of this notice



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

PERMITTEE:
Harris Semiconductor
P. O. Box 883
Melbourne, FL 32901

Permit Number: AC 05-165757
Expiration Date: December 31, 1990
County: Brevard
Latitude/Longitude: 28°01'20"N
80°36'10"W
Project: Building 4

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. 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:

For the permitting of Building 4, in order to consolidate multiple permits previously issued for this building/source and to allow the construction/installation of new two-staged (venturi and packed-bed) scrubber systems, which will remove acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

- o F04S01: a Harrison 10,000 scfm horizontal cross-flow fume scrubber using polypropylene plastic saddle packing for acid gas and VOC/solvent vapor removal; Model No. HF-100;
- o F04S02: a Duall Ind. 6,900 cfm horizontal cross-flow fume scrubber using polypropylene packing for acid gas and VOC/solvent vapor removal; Model No. F-101;
- o F04S03: a Harrison 10,000 scfm horizontal cross-flow fume scrubber using polypropylene plastic saddle packing for acid gas and VOC/solvent vapor removal; Model No. HF-100;
- o F04S04: a 10,450 cfm fume scrubber for acid gas removal;
- o F04S05: a Beverly Pacific 1,000 scfm vertical counter-current fume scrubber using polypropylene packing for acid gas (sil-tet loading) removal; Model No. PS-2VT; and,
- o F04S06: Epi and poly reactor two-stage ejector venturi scrubber systems; also, a two-stage ejector venturi scrubber system to service the Tylan system: all to be updated once contracted, installed, tested and analyzed.

The building/source is located at the permittee's existing facility located on Palm Bay Road, in the City of Palm Bay. The UTM coordinates are Zone 17, 538.7 km East and 3100.9 km North.

The Source Classification Codes are: Major Group 36
o Cold Solvent Cleaning/ 4-01-003-99 Tons VOC/Solvent
Stripping Consumed

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

The source shall be in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. Application to Construct Air Pollution Sources, DER Form 17-1.202(1), and Mr. L. R. Hutker's cover letter received June 2, 1989.
2. Ms. Nancy Baldisserotto's letter with attachment received July 17, 1989.
3. Technical Evaluation and Preliminary Determination dated August 3, 1989.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

- a. Have access to and copy any records that must be kept under the conditions of the permit;
- b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- a. a description of and cause of non-compliance; and
- b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules. .

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. The permittee shall comply with the following:

- a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.
- b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

14. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. The maximum allowable VOC/solvent emissions from Building No. 4 shall be 11.0 tons per year.
2. The VOC/solvent vapor and acid gas exhaust scrubbers must be on during the working hours.
3. Permitted hours of operation are 8760.
4. Objectionable odors shall not be allowed off plant property pursuant to F.A.C. Rule 17-2.620(2).
5. An inspection and maintenance plan shall be submitted to the DER's Central District office as part of the operating permit application. The plan shall include provisions for the prevention and correction of VOC/solvent losses from leaks and equipment malfunctions.
6. By March 31 of each calendar year, an annual operating report shall be submitted to the DER's Central District office demonstrating compliance with the VOC/solvent emissions limit for Building No. 4. The emissions shall be determined by a material balance scheme, verifiable on a monthly basis, and shall include the following:
 - a) a beginning inventory of full containers, cylinders and storage tanks at the beginning of each calendar year;
 - b) plus all purchased deliveries after the beginning inventory (verifiable by invoices);

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

SPECIFIC CONDITION:

- c) minus all quantities picked-up and shipped-off the premise after the beginning inventory (verifiable by invoices);
 - d) minus all quantities deep well injected during the calendar year, justified by assumptions and established scrubber efficiencies; and,
 - e) minus an ending inventory of full containers, cylinders, and storage tanks; and, should occur at the beginning of the following calendar year.
7. Each scrubber system's efficiency and potential VOC/solvent emissions shall be established by a sampling and analysis program, which includes:
- a) a sample shall be taken annually from each scrubber stack and analyzed using EPA Reference Method 25 or, with Department approval, EPA Reference Method 25A, 40 CFR 60, Appendix A;
 - b) the DER's Central Florida District office shall receive at least 15 days notice in writing prior to sampling; and,
 - c) the report, summarizing the sampling results, shall be submitted to the DER's Central District office within 45 days after the last test run is completed.
8. This permit will supercede all other permits previously issued on this source/Building No. 4.
9. The source/Building No. 4 is subject to all applicable provisions of F.A.C. Chapters 17-2 and 17-4.
10. Projected potential acid emissions are 1.5 TPY (to be amended after testing and analyses have been performed on the new scrubber systems for the epi and poly reactors and Tylan system).
11. Building No. 4 is subject to the provisions of F.A.C. Rules 17-2.240: Circumvention; 17-2.250: Excess Emissions; and, 17-4.130: Plant Operation - Problems.
12. Any modification pursuant to F.A.C. Rule 17-2.100(119), Modification, shall be submitted to the DER's Central District office and the Bureau of Air Regulation office for approval.
13. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the BAR prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

PERMITTEE:
Harris Semiconductor

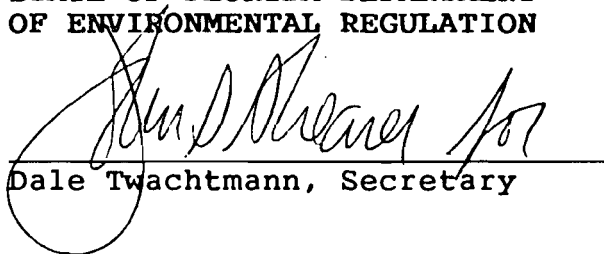
Permit Number: AC 05-165757
Expiration Date: December 31, 1990

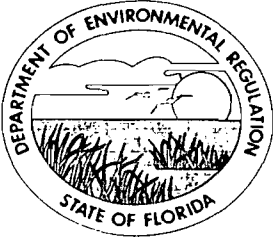
SPECIFIC CONDITIONS:

14. An application for an operation permit must be submitted to the Central District office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever comes first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rule 17-4.220).

Issued this 13th day
of September, 1989

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION


Dale Twachtmann, Secretary



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
NOTICE OF PERMIT

Mr. L. R. Hutker, P.E.
Director, Facilities Department
Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

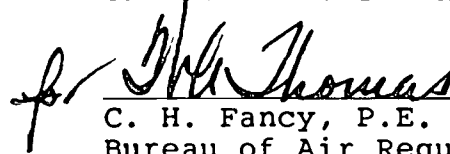
September 13, 1989

Enclosed is construction permit No. AC 05-165757 for Harris Semiconductor to consolidate permits previously issued for Building No. 4 and to construct two new two staged scrubber systems at Harris Semiconductor's existing facility in Palm Bay, Brevard County Florida. This permit is issued pursuant to Section 403, Florida Statutes.

Any party to this permit has the right to seek judicial review of the permit pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this permit is filed with the Clerk of the Department.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION


C. H. Fancy, P.E.
Bureau of Air Regulation

Copy furnished to:

C. Collins, Central District
N. Baldisseroto, Harris Semiconductor

Final Determination

Harris Semiconductor
Brevard County
Palm Bay, Florida

Construction Permit Number .
AC 05-165757

Florida Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Regulation

September 8, 1989

Final Determination

The construction permit application has been reviewed by the Department. Public Notice of the Department's Intent to Issue was published in the Florida Today Newspaper on August 11, 1989. The Technical Evaluation and Preliminary Determination were available for public inspection at the DER's Central District and Division of Air Resources Management offices.

There were no comments received on the proposed action. Therefore, it is recommended that the proposed construction permit be issued as drafted.

Best Available Copy
CAPE PUBLICATIONS, INC.

The Times
Published Weekly on Wednesdays

RECEIVED

AUG 14 1989

DER - BAQM

THE TRIBUNE
Published Weekly on Wednesdays



Published Daily

STATE OF FLORIDA
COUNTY OF BREVARD

Before the undersigned authority personally appeared Linda L. Spicer who on

oath says that he/she is Legal Advertising Clerk

of the FLORIDA TODAY, a newspaper published in Brevard County,

Florida; that the attached copy of advertising being a

Legal Notice

in the matter of

permit to consolidate multiple permits previously issued for

Building No. 4 in the _____ Court

was published in the FLORIDA TODAY NEWSPAPER

in the issues of August 11, 1989

Affiant further says that the said FLORIDA TODAY NEWSPAPER

is a newspaper published in said Brevard County, Florida and that the said newspaper has heretofore been continuously published in said Brevard County, Florida regularly as stated above, and has been entered as second class mail matter at the post office in COCOA,

said Brevard County, Florida for a period of one year next preceeding the first publication of the attached copy of advertisement; and affiant further says that he has neither paid nor promised any person, firm or corporation any discount, rebote, commission or refund for the purpose of securing this advertisement for publication in said newspaper.

Linda L. Spicer

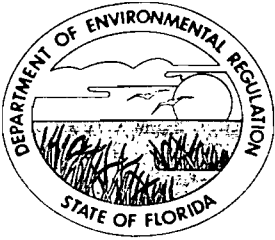
Sworn and subscribed to before me this

11th day of August A.D., 19 89

Cheryl J. Burke

Notary Public
State of Florida at Large
Commission Expires March 29, 1992

State of Florida
Department of
Environmental Regulation
Notice of Intent to Issue
The Department of Environmental Regulation gives notice of its intent to issue a permit to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits take place; and, to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future. The proposed project will occur at the applicant's existing facility located on Palm Bay Road, City of Palm Bay, in Brevard County, Florida. A determination of Best Available Control Technology (BACT) was not required. The Department is issuing this intent to issue for the reasons stated in the Technical Evaluation and Preliminary Determination.
A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2400 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.
The petition shall contain the following information:
(a) The name, address and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;
(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;
(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;
(d) A statement of the material facts disputed by Petitioner, if any;
(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;
(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and
(g) A statement of the relief sought by petitioner stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.
If a petition is filed, the administrative hearing process is designed to formulate a agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207 F.A.C.
The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays. At: Department of Environmental Regulation Bureau of Air Quality Management 2400 Blair Stone Road Tallahassee, Florida 32399-2400
Department of Environmental Regulation Central District office 3119 Maguire Blvd., Suite 337 Orlando, Florida 32803-3767
Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 14 days of the publication of this notice



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

PERMITTEE:
Harris Semiconductor
P. O. Box 883
Melbourne, FL 32901

Permit Number: AC 05-165757
Expiration Date: December 31, 1990
County: Brevard
Latitude/Longitude: 28°01'20"N
80°36'10"W
Project: Building 4

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. 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:

For the permitting of Building 4, in order to consolidate multiple permits previously issued for this building/source and to allow the construction/installation of new two-staged (venturi and packed-bed) scrubber systems, which will remove acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

- o F04S01: a Harrison 10,000 scfm horizontal cross-flow fume scrubber using polypropylene plastic saddle packing for acid gas and VOC/solvent vapor removal; Model No. HF-100;
- o F04S02: a Duall Ind. 6,900 cfm horizontal cross-flow fume scrubber using polypropylene packing for acid gas and VOC/solvent vapor removal; Model No. F-101;
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- o F04S04: a 10,450 cfm fume scrubber for acid gas removal;
- o F04S05: a Beverly Pacific 1,000 scfm vertical counter-current fume scrubber using polypropylene packing for acid gas (sil-tet loading) removal; Model No. PS-2VT; and,
- o F04S06: Epi and poly reactor two-stage ejector venturi scrubber systems; also, a two-stage ejector venturi scrubber system to service the Tylan system: all to be updated once contracted, installed, tested and analyzed.

The building/source is located at the permittee's existing facility located on Palm Bay Road, in the City of Palm Bay. The UTM coordinates are Zone 17, 538.7 km East and 3100.9 km North.

The Source Classification Codes are: Major Group 36
o Cold Solvent Cleaning/ 4-01-003-99 Tons VOC/Solvent
Stripping Consumed

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

The source shall be in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. Application to Construct Air Pollution Sources, DER Form 17-1.202(1), and Mr. L. R. Hutker's cover letter received June 2, 1989.
2. Ms. Nancy Baldisserotto's letter with attachment received July 17, 1989.
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GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

- a. Have access to and copy any records that must be kept under the conditions of the permit;
- b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- a. a description of and cause of non-compliance; and
- b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

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11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. The permittee shall comply with the following:

a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

14. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. The maximum allowable VOC/solvent emissions from Building No. 4 shall be 11.0 tons per year.
2. The VOC/solvent vapor and acid gas exhaust scrubbers must be on during the working hours.
3. Permitted hours of operation are 8760.
4. Objectionable odors shall not be allowed off plant property pursuant to F.A.C. Rule 17-2.620(2).
5. An inspection and maintenance plan shall be submitted to the DER's Central District office as part of the operating permit application. The plan shall include provisions for the prevention and correction of VOC/solvent losses from leaks and equipment malfunctions.
6. By March 31 of each calendar year, an annual operating report shall be submitted to the DER's Central District office demonstrating compliance with the VOC/solvent emissions limit for Building No. 4. The emissions shall be determined by a material balance scheme, verifiable on a monthly basis, and shall include the following:
 - a) a beginning inventory of full containers, cylinders and storage tanks at the beginning of each calendar year;
 - b) plus all purchased deliveries after the beginning inventory (verifiable by invoices);

PERMITTEE:
Harris Semiconductor

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SPECIFIC CONDITION:

- c) minus all quantities picked-up and shipped-off the premise after the beginning inventory (verifiable by invoices);
- d) minus all quantities deep well injected during the calendar year, justified by assumptions and established scrubber efficiencies; and,
- e) minus an ending inventory of full containers, cylinders, and storage tanks; and, should occur at the beginning of the following calendar year.

7. Each scrubber system's efficiency and potential VOC/solvent emissions shall be established by a sampling and analysis program, which includes:

- a) a sample shall be taken annually from each scrubber stack and analyzed using EPA Reference Method 25 or, with Department approval, EPA Reference Method 25A, 40 CFR 60, Appendix A;
- b) the DER's Central Florida District office shall receive at least 15 days notice in writing prior to sampling; and,
- c) the report, summarizing the sampling results, shall be submitted to the DER's Central District office within 45 days after the last test run is completed.

8. This permit will supercede all other permits previously issued on this source/Building No. 4.

9. The source/Building No. 4 is subject to all applicable provisions of F.A.C. Chapters 17-2 and 17-4.

10. Projected potential acid emissions are 1.5 TPY (to be amended after testing and analyses have been performed on the new scrubber systems for the epi and poly reactors and Tylan system).

11. Building No. 4 is subject to the provisions of F.A.C. Rules 17-2.240: Circumvention; 17-2.250: Excess Emissions; and, 17-4.130: Plant Operation - Problems.

12. Any modification pursuant to F.A.C. Rule 17-2.100(119), Modification, shall be submitted to the DER's Central District office and the Bureau of Air Regulation office for approval.

13. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the BAR prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

PERMITTEE:
Harris Semiconductor

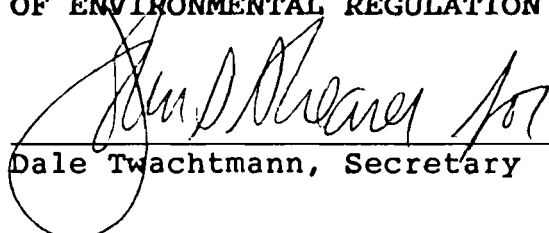
Permit Number: AC 05-165757
Expiration Date: December 31, 1990

SPECIFIC CONDITIONS:

14. An application for an operation permit must be submitted to the Central District office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever comes first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rule 17-4.220).

Issued this 13th day
of September, 1989

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION


Dale Twachtmann, Secretary

Bauer's (887)



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

August 3, 1989

CERTIFIED MAIL-RETURN RECEIPT REQUESTED

Mr. L. R. Hutker, P.E.
Director, Facilities Department
Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

Dear Mr. Hutker:

Attached is one copy of the Technical Evaluation and Preliminary Determination and proposed permit for Harris Semiconductor to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits take place; and, to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

Please submit any written comments you wish to have considered concerning the Department's proposed action to Mr. Bill Thomas of the Bureau of Air Quality Management.

Sincerely,

C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

CHF/kt

Attachments

cc: C. Collins, C District
N. Baldisserotto, HS

BEFORE THE STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

In the Matter of
Application for Permit by:

Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

DER File No. AC 05-165757

INTENT TO ISSUE

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit (copy attached) for the proposed project as detailed in the application specified above. The Department is issuing this Intent to Issue for the reasons stated in the attached Technical Evaluation and Preliminary Determination.

The applicant, Harris Semiconductor, applied on March 6, 1989, to the Department of Environmental Regulation for a permit to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits takes place; and, to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

The Department has permitting jurisdiction under Chapter 403, Florida Statutes, and Florida Administrative Code Rules 17-2 and 17-4. The project is not exempt from permitting procedures. The Department has determined that an air construction permit is required for the proposed work.

Pursuant to Section 403.815, F.S. and DER Rule 17-103.150, F.A.C., you (the applicant) are required to publish at your own expense the enclosed Notice of Intent to Issue Permit. The notice shall be published one time only within 30 days, in the legal ad section of a newspaper of general circulation in the area affected. For the purpose of this rule, "publication in a newspaper of general circulation in the area affected" means publication in a newspaper meeting the requirements of Sections 50.011 and 50.031, F.S., in the county where the activity is to take place. The applicant shall provide proof of publication to the Department, at the address specified within seven days of publication. Failure to publish the notice and provide proof of publication within the allotted time may result in the denial of the permit.

The Department will issue the permit with the attached conditions unless a petition for an administrative proceeding (hearing) is filed pursuant to the provisions of Section 120.57, F.S.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permit applicant and the parties listed below must be filed within 14 days of receipt of this intent. Petitions filed by other persons must be filed within 14 days of publication of the public notice or within 14 days of receipt of this intent, whichever first occurs. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information;

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by Petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

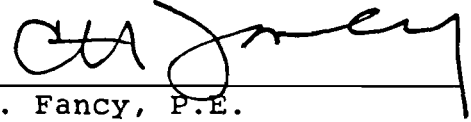
(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application(s) have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office in General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such

person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION



C. H. Fancy, P.E.
Deputy Chief
Bureau of Air Quality
Management

Copies furnished to:

C. Collins, C District
L. R. Hutker, P.E., HS

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this NOTICE OF INTENT TO ISSUE and all copies were mailed before the close of business on 8-3-89.

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to
§120.52(9), Florida Statutes, with
the designated Department Clerk,
receipt of which is hereby
acknowledged.

Martha J. Wise
Clerk

8-3-89
Date

State of Florida
Department of Environmental Regulation
Notice of Intent to Issue

The Department of Environmental Regulation hereby gives notice of its intent to issue a permit to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits take place; and, to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future. The proposed project will occur at the applicant's existing facility located on Palm Bay Road, City of Palm Bay, in Brevard County, Florida. A determination of Best Available Control Technology (BACT) was not required. The Department is issuing this Intent to Issue for the reasons stated in the Technical Evaluation and Preliminary Determination.

A person whose substantial interests are affected by the Department's proposed permitting decision may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400, within fourteen (14) days of publication of this notice. Petitioner shall mail a copy of the petition to the applicant at the address indicated above at the time filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, Florida Statutes.

The Petition shall contain the following information;

(a) The name, address, and telephone number of each petitioner, the applicant's name and address, the Department Permit File Number and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action or proposed action;

(d) A statement of the material facts disputed by Petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this Notice. Persons whose substantial interests will be affected by any decision of the Department with regard to the application have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of publication of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

The application is available for public inspection during normal business hours, 8:00 a.m. to 5:00 p.m., Monday through Friday, except legal holidays, at:

Department of Environmental Regulation
Bureau of Air Quality Management
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Department of Environmental Regulation
Central District Office
3319 Maguire Blvd., Suite 232
Orlando, Florida 32803-3767

Any person may send written comments on the proposed action to Mr. Bill Thomas at the Department's Tallahassee address. All comments mailed within 14 days of the publication of this notice will be considered in the Department's final determination.

Technical Evaluation
and
Preliminary Determination

Harris Semiconductor
Brevard County
Palm Bay, Florida

Construction Permit Number:
AC 05-167757
5

Florida Department of Environmental Regulation
Division of Air Resources Management
Bureau of Air Quality Management
Central Air Permitting

August 3, 1989

I. Application

A. Applicant

Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

B. Project and Location

The applicant has applied for a construction permit to consolidate multiple permits previously issued for Building No. 4, which is a source involved with materials fabrication where the initial steps in the manufacturing of integrated circuits take place; and, to construct/install new two-staged (venturi and packed-bed) scrubber systems, which will control acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

The existing facility is located on Palm Bay Road, City of Palm Bay, Florida. The UTM coordinates are Zone 17, 538.7 km East and 3100.9 km North.

C. Process and Controls

1. Building 4

The primary manufacturing operations in Building 4 are materials fabrication where the initial steps in the manufacturing of integrated circuits take place. A variety of research and development experiments are performed under exhausted wet stations. Wet stations, water scrubbing units, bake ovens and spin rinse dryers are utilized for cleaning and drying of wafer surfaces. Exhausted chemical cabinets hold virgin chemicals until they are ready for use. In addition, several waste collection areas are also exhausted to control systems.

The source/building presently contains 31 exhausted wet stations. Approximately one-fifth of these house vats containing solvents. Three of these stations have heated solvent vats and three stations have covered solvent vats.

a. Epideposition and Polydeposition Reactor Scrubbers

The existing poly and epi reactor scrubber systems will be replaced with two-stage ejector venturi scrubber systems. Each reactor will have its own first-stage ejector venturi scrubber. After passing through an impingement section of the scrubber system, the gas will be forced through a liquid trap, combined with other scrubber gases, and fed to packed bed scrubbing units where second-stage scrubbing occurs. Each second stage unit will consist of an ejector venturi gas scrubber with a vertical packed bed.

The Tylan system, which is a support system to the poly reactors, will have its own dedicated first-stage scrubber system and will exhaust to a common second-stage unit as well.

Makeup water will be provided via a primary source, treated acid wastewater from Semiconductor's on-site wastewater treatment plant, and a secondary source, reclamation water from the Harris' groundwater remediation project. The water will be fed to closed top sumps that will provide the water supply to the scrubbers in the first stage, and to the packed bed scrubber sumps in the second stage. The water will be recirculated from the sumps to the individual venturi scrubbers in the first stage, and from the packed bed scrubber sumps to the venturi scrubbers in the second stage. Caustic will be automatically injected into the sumps in order to prevent solidification of silane compounds. Scrubber sump blowdown water will be sent to Semiconductor's on-site wastewater treatment plant.

In addition to the poly and epi reactor scrubbers, other control equipment is employed to control emissions from process exhaust in Building 4. The following is a description of each of these exhaust systems:

- F04S01 - Combined solvent/acid scrubber; services gas cabinets in HPM room as well as equipment in Tube Clean and Epi rooms. The gas cabinets are exhausted as a precautionary measure. Most of the contaminants entering this system would be a result of the cleaning operations under the exhausted hoods. It also provides purge line exhaust for the hydrogen chloride tube trailer outside of Building 4. When the hydrogen chloride lines are purged, the resulting pressure is relieved by venting the air to F04S01. The system also treats vent exhaust from the silicon tetrachloride ('sil-tet') storage area. In the sil-tet storage area, silicon tetrachloride is transferred from large drums to smaller drums for manufacturing use. The air displaced from the smaller drums is vented to F04S01. Air flow to the scrubber from both the HCl tube trailer and the sil-tet drums is manually controlled by valves.
- F04S02 - Combined solvent/acid scrubber; services furnaces, wet stations, and process equipment in the Diffusion area.
- F04S03 - Combined solvent/acid scrubber; services equipment in Backlap, Wet Chemistry, DI Grind, Electrochemistry, Polish, Final Screen, and Engineering lab areas.
- F04S04 - Acid scrubber; services exhaust from equipment in Wet Chemistry, Diffusion, Electrochemistry/Polish, and Engineering lab areas.

F04S05 - Services the silicon tetrachloride storage area located outside of the building. The scrubber treats emissions that may occur in the storage confinement as a result of system leaks and/or spills. The unit is turned on as a precautionary measure for approximately one hour a day when silicon tetrachloride is being transferred from the large storage drum to smaller drums for manufacturing use.

F04S08 - Facilities I.D. number assigned to an exhaust fan (also referred to as fan No. F04E20), which provides exhaust to equipment in the Photoresist and Wet Chemistry areas.

In addition to the above mentioned systems, several fans are used to provide heat exhaust for process equipment (i.e., F04E07, F04E08 and F04E12, which exhaust heat generated from the Epi, Poly and Gemini reactors; and, F04E10, F04E12 and F04E27, which exhaust heat from diffusion furnaces). It should be noted that no chemically contaminated exhaust is contained in these heated air streams; in each case where contaminated exhaust exists, the exhaust is ducted through separate lines to wet scrubbers.

In addition, exhaust fans F04E18 and F04E23 handle process exhaust from wafer grinders.

2. General

A material balance scheme will be used to account for the annual VOC/solvent emissions released into the atmosphere by the building/source and facility. A program of sampling and analysis will be used to assess the VOC/solvent emissions from each building/source.

The Standard Industrial Classification Codes are:

- o Major Group 36: Electrical and Electronic Machinery, Equipment, and Supplies
- o Industry Group No. 367: Electronic Components and Accessories
- o Industry No. 3674: Semiconductors and Related Devices

The Source Classification Codes are: Major Group 36 - Cold Solvent Cleaning/Stripping

- o Building 4 4-01-003-99 Tons VOC/solvent consumed

II. Rule Applicability

The proposed project is subject to preconstruction review under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code (F.A.C.) Chapters 17-2 and 17-4.

The application package was deemed complete on June 2, 1989.

The existing facility is located in an area designated attainment for all pollutants.

Since the facility is not one of those contained in Table 500-1, F.A.C. Chapter 17-2, the VOC/solvent threshold for triggering new source review pursuant to F.A.C. Rule 17-2.500(5) is 250 TPY.

The following table presents the projected potential acid emissions from Building No. 4:

Table 1

Source	Potential Acid Emissions (TPY)
Building 4	
o F04S01	0.04
o F04S02	1.06
o F04S03	0.10
o F04S04	0.26
o F04S05	0.02
Total:	1.48

Note: o Annual hours of operation at 8760.

o The potential acid emissions from the proposed new epi and poly reactor scrubber systems are not included; to be quantified after installation through testing and analysis. The above also applies to the proposed new Tylan system scrubber system.

The following table presents the projected potential VOC/solvent emissions from the entire facility:

Table 2

Building	Potential VOC/solvent Emissions (TPY)
4	10.96
51	33.29
54	95.65
57	1.66
58	3.24
59	0.50
60	trace
61	0.25
62	0.83
63	6.14
Total:	152.50

Note: Annual hours of operation at 8760.

Since the potential emissions are less than 250 TPY for the facility, the potential emissions projected from Building 4 will be reviewed pursuant to F.A.C. Rule 17-2.520, Sources Not Subject to Prevention of Significant Deterioration or Nonattainment Requirements.

Since there is no specific emission limiting standard contained in F.A.C. Rule 17-2.600 nor are there any standards of performance for new stationary sources contained in F.A.C. Rule 17-2.660, the source/Building 4 will be permitted in accordance with F.A.C. Rule 17-2.620, General Pollutant Emission Limiting Standards.

In F.A.C. Rule 17-2.620(1)(a), no person shall store, pump, handle, process, load, unload or use in any process or installation volatile organic compounds or organic solvents without applying known and existing vapor emission control devices or systems deemed necessary and ordered by the Department. Pursuant to F.A.C. Rule 17-2.620(2), no person shall cause, suffer, allow or permit the discharge of air pollutants which cause or contribute to an objectionable odor. Objectionable odor is defined as any odor present in the outdoor atmosphere which, by itself or in combination with other odors, is or may be harmful or injurious to human health or welfare, which unreasonably interferes with the comfortable use and enjoyment of life or property, or which creates a nuisance according to F.A.C. Rule 17-2.100(132).

The building operations/source is subject to the provisions of F.A.C. Rules 17-2.240: Circumvention; 17-2.250: Excess Emissions; and, 17-4.130: Plant Operation - Problems.

III. Summary of Emissions

A. Emission Limitations

The regulated pollutant emissions from this building/source are VOC/solvents in accordance with F.A.C. Rule 17-2.620.

Specific acid solutions are also being used during the manufacturing operations. There are no specific emission limiting standards for these specific acids. However, the acid vapors will be scrubbed to reduce emissions.

The following table presents the maximum allowable VOC/solvent emissions and the potential acid vapor emissions from Building 4 in TPY:

Table 3

Building	Maximum Allowable VOC/Solvent Emissions	Potential Acid Vapor Emissions
4	11.0	1.5

Note: o Annual hours of operation at 8760.

o Potential acid emissions to be revised after scrubber system installations (epi and poly reactors and Tylan system), testing and analysis.

The permitted emissions are in compliance with all requirements of F.A.C. Chapters 17-2 and 17-4.

B. Air Quality Impacts

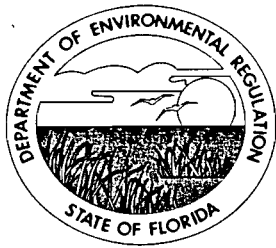
From the technical review of the application packages and supplementary material, an air quality analysis was not required.

V. Conclusion

A system of material balance and sampling/analysis will be used to account for and verify pollutant emissions from the facility and each building/source and their associated scrubber systems.

Based on the information provided by Harris Semiconductor, the Department has reasonable assurance that the consolidation of multiple permits previously issued for this source/building and the construction/installation of the new two-staged (venturi and packed-bed) scrubber systems, as described in this evaluation, and subject to the conditions proposed herein, will not cause or contribute to a violation of any air quality standard, PSD increment, or any other technical provision of Chapter 17-2 of the Florida Administrative Code.

J. H. Thomas
8/3/89



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

PERMITTEE:
Harris Semiconductor
P. O. Box 883
Melbourne, FL 32901

Permit Number: AC 05-165757
Expiration Date: December 31, 1990
County: Brevard
Latitude/Longitude: 28°01'20"N
80°36'10"W
Project: Building 4

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Chapters 17-2 and 17-4. 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:

For the permitting of Building 4, in order to consolidate multiple permits previously issued for this building/source and to allow the construction/installation of new two-staged (venturi and packed-bed) scrubber systems, which will remove acid emissions from various reactors and production systems, to replace the existing control systems and to allow for five additional reactor installations in the future.

- o F04S01: a Harrison 10,000 scfm horizontal cross-flow fume scrubber using polypropylene plastic saddle packing for acid gas and VOC/solvent vapor removal; Model No. HF-100;
- o F04S02: a Duall Ind. 6,900 cfm horizontal cross-flow fume scrubber using polypropylene packing for acid gas and VOC/solvent vapor removal; Model No. F-101;
- o F04S03: a Harrison 10,000 scfm horizontal cross-flow fume scrubber using polypropylene plastic saddle packing for acid gas and VOC/solvent vapor removal; Model No. HF-100;
- o F04S04: a 10,450 cfm fume scrubber for acid gas removal;
- o F04S05: a Beverly Pacific 1,000 scfm vertical counter-current fume scrubber using polypropylene packing for acid gas (sil-tet loading) removal; Model No. PS-2VT; and,
- o F04S06: Epi and poly reactor two-stage ejector venturi scrubber systems; also, a two-stage ejector venturi scrubber system to service the Tylan system: all to be updated once contracted, installed, tested and analyzed.

The building/source is located at the permittee's existing facility located on Palm Bay Road, in the City of Palm Bay. The UTM coordinates are Zone 17, 538.7 km East and 3100.9 km North.

The Source Classification Codes are: Major Group 36
o Cold Solvent Cleaning/ 4-01-003-99 Tons VOC/Solvent
Stripping Consumed

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

The source shall be in accordance with the permit application, plans, documents, amendments and drawings, except as otherwise noted in the General and Specific Conditions.

Attachments are listed below:

1. Application to Construct Air Pollution Sources, DER Form 17-1.202(1), and Mr. L. R. Hutker's cover letter received June 2, 1989.
2. Ms. Nancy Baldisserotto's letter with attachment received July 17, 1989.
3. Technical Evaluation and Preliminary Determination dated August 3, 1989.

GENERAL CONDITIONS:

1. The terms, conditions, requirements, limitations, and restrictions set forth in this permit are "Permit Conditions" and are binding and enforceable pursuant to Sections 403.161, 403.727, or 403.859 through 403.861, Florida Statutes. The permittee is placed on notice that the Department will review this permit periodically and may initiate enforcement action for any violation of these conditions.

2. This permit is valid only for the specific processes and operations applied for and indicated in the approved drawings or exhibits. Any unauthorized deviation from the approved drawings, exhibits, specifications, or conditions of this permit may constitute grounds for revocation and enforcement action by the Department.

3. As provided in Subsections 403.087(6) and 403.722(5), Florida Statutes, the issuance of this permit does not convey any vested rights or any exclusive privileges. Neither does it authorize any injury to public or private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations. This permit is not a waiver of or approval of any other Department permit that may be required for other aspects of the total project which are not addressed in the permit.

4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgement of title, and does not constitute authority for the use of submerged lands unless herein provided and the necessary title or leasehold interests have been obtained from the State. Only the Trustees of the Internal Improvement Trust Fund may express State opinion as to title.

5. This permit does not relieve the permittee from liability for harm or injury to human health or welfare, animal, or plant life, or property caused by the construction or operation of this

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

permitted source, or from penalties therefore; nor does it allow the permittee to cause pollution in contravention of Florida Statutes and Department rules, unless specifically authorized by an order from the Department.

6. The permittee shall properly operate and maintain the facility and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit, as required by Department rules. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with the conditions of the permit and when required by Department rules.

7. The permittee, by accepting this permit, specifically agrees to allow authorized Department personnel, upon presentation of credentials or other documents as may be required by law and at a reasonable time, access to the premises, where the permitted activity is located or conducted to:

- a. Have access to and copy any records that must be kept under the conditions of the permit;
- b. Inspect the facility, equipment, practices, or operations regulated or required under this permit; and
- c. Sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

Reasonable time may depend on the nature of the concern being investigated.

8. If, for any reason, the permittee does not comply with or will be unable to comply with any condition or limitation specified in this permit, the permittee shall immediately provide the Department with the following information:

- a. a description of and cause of non-compliance; and
- b. the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the non-compliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

The permittee shall be responsible for any and all damages which may result and may be subject to enforcement action by the Department for penalties or for revocation of this permit.

9. In accepting this permit, the permittee understands and agrees that all records, notes, monitoring data and other information relating to the construction or operation of this permitted source which are submitted to the Department may be used by the Department as evidence in any enforcement case involving the permitted source arising under the Florida Statutes or Department rules, except where such use is proscribed by Sections 403.73 and 403.111, Florida Statutes. Such evidence shall only be used to the extent it is consistent with the Florida Rules of Civil Procedure and appropriate evidentiary rules.

10. The permittee agrees to comply with changes in Department rules and Florida Statutes after a reasonable time for compliance, provided, however, the permittee does not waive any other rights granted by Florida Statutes or Department rules.

11. This permit is transferable only upon Department approval in accordance with Florida Administrative Code Rules 17-4.120 and 17-30.300, F.A.C., as applicable. The permittee shall be liable for any non-compliance of the permitted activity until the transfer is approved by the Department.

12. This permit or a copy thereof shall be kept at the work site of the permitted activity.

13. This permit also constitutes:

- () Determination of Best Available Control Technology (BACT)
- () Determination of Prevention of Significant Deterioration (PSD)
- () Compliance with New Source Performance Standards

14. The permittee shall comply with the following:

- a. Upon request, the permittee shall furnish all records and plans required under Department rules. During enforcement actions, the retention period for all records will be extended automatically unless otherwise stipulated by the Department.

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

GENERAL CONDITIONS:

b. The permittee shall hold at the facility or other location designated by this permit records of all monitoring information (including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation) required by the permit, copies of all reports required by this permit, and records of all data used to complete the application for this permit. These materials shall be retained at least three years from the date of the sample, measurement, report, or application unless otherwise specified by Department rule.

c. Records of monitoring information shall include:

- the date, exact place, and time of sampling or measurements;
- the person responsible for performing the sampling or measurements;
- the dates analyses were performed;
- the person responsible for performing the analyses;
- the analytical techniques or methods used; and
- the results of such analyses.

15. When requested by the Department, the permittee shall within a reasonable time furnish any information required by law which is needed to determine compliance with the permit. If the permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the Department, such facts or information shall be corrected promptly.

SPECIFIC CONDITIONS:

1. The maximum allowable VOC/solvent emissions from Building No. 4 shall be 11.0 tons per year.

2. The VOC/solvent vapor and acid gas exhaust scrubbers must be on during the working hours.

3. Permitted hours of operation are 8760.

4. Objectionable odors shall not be allowed off plant property pursuant to F.A.C. Rule 17-2.620(2).

5. An inspection and maintenance plan shall be submitted to the DER's Central Florida District office as part of the operating permit application. The plan shall include provisions for the prevention and correction of VOC/solvent losses from leaks and equipment malfunctions.

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

SPECIFIC CONDITION:

6. By March 31 of each calendar year, an annual operating report shall be submitted to the DER's Central Florida District office demonstrating compliance with the VOC/solvent emissions limit for Building No. 4. The emissions shall be determined by a material balance scheme, verifiable on a monthly basis, and shall include the following:

- a) a beginning inventory of full containers, cylinders and storage tanks at the beginning of each calendar year;
- b) plus all purchased deliveries after the beginning inventory (verifiable by invoices);
- c) minus all quantities picked-up and shipped-off the premise after the beginning inventory (verifiable by invoices);
- d) minus all quantities deep well injected during the calendar year, justified by assumptions and established scrubber efficiencies; and,
- e) minus an ending inventory of full containers, cylinders, and storage tanks; and, should occur at the beginning of the following calendar year.

7. Each scrubber system's efficiency and potential VOC/solvent emissions shall be established by a sampling and analysis program, which includes:

- a) a sample shall be taken annually from each scrubber stack and analyzed using EPA Reference Method 25 or, with Department approval, EPA Reference Method 25A, 40 CFR 60, Appendix A;
- b) the DER's Central Florida District office shall receive at least 15 days notice in writing prior to sampling; and,
- c) the report, summarizing the sampling results, shall be submitted to the DER's Central Florida District office within 45 days after the last test run is completed.

8. This permit will supercede all other permits previously issued on this source/Building No. 4.

9. The source/Building No. 4 is subject to all applicable provisions of F.A.C. Chapters 17-2 and 17-4.

10. Projected potential acid emissions are 1.5 TPY (to be amended after testing and analyses have been performed on the new scrubber systems for the epi and poly reactors and Tylan system).

PERMITTEE:
Harris Semiconductor

Permit Number: AC 05-165757
Expiration Date: December 31, 1990

SPECIFIC CONDITIONS:

11. Building No. 4 is subject to the provisions of F.A.C. Rules 17-2.240: Circumvention; 17-2.250: Excess Emissions; and, 17-4.130: Plant Operation - Problems.

12. Any modification pursuant to F.A.C. Rule 17-2.100(119), Modification, shall be submitted to the DER's Central Florida District office and the Bureau of Air Quality Management office for approval.

13. The permittee, for good cause, may request that this construction permit be extended. Such a request shall be submitted to the BAQM prior to 60 days before the expiration of the permit (F.A.C. Rule 17-4.090).

14. An application for an operation permit must be submitted to the Central District office at least 90 days prior to the expiration date of this construction permit or within 45 days after completion of compliance testing, whichever comes first. To properly apply for an operation permit, the applicant shall submit the appropriate application form, fee, certification that construction was completed noting any deviations from the conditions in the construction permit, and compliance test reports as required by this permit (F.A.C. Rule 17-4.220).

Issued this _____ day
of _____, 1989

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

Dale Twachtmann, Secretary

ATTACHMENT 1
(Available Upon Request)

ATTACHMENT 2



July 14, 1989

Mr. Bruce Mitchell
Engineer
Bureau of Air Quality Management
Florida Department of Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Subject: Bldg. 4 Consolidated Air Permit Application
Pending FDER Permit No. AC 05-165757
HARRIS SEMICONDUCTOR

Dear Mr. Mitchell:

This memo is in response to our phone conversation on July 13th, during which you requested clarification on the number of scrubber systems that are proposed to be installed as part of Semiconductor's epi/poly scrubber upgrade project. You may find it helpful to refer to Table 1 while reviewing the following information.

Current plans are to replace all existing epi and poly scrubbers with new venturis. As was previously the case, each reactor will have it's own dedicated scrubber, with epi reactors #08, #10 and #11 each being serviced by two. (This is because each of these three reactors operate at atmospheric and reduced pressure; the atmospheric reactor vents must be kept separate from the vacuum vents.) The Tylan system will have its own venturi scrubber as well. In addition, 5 venturi scrubbers will be installed for future reactor installations. These plans call for the installation of 34 venturi scrubbers. With the exception of the Tylan system scrubber, all first-stage exhaust will then be ducted to one of two packed bed scrubbers for second stage treatment. Five sumps are proposed to provide the gaseous/liquid interface for the first stage scrubbers.

The design engineering phase of this project is currently 30% complete. If you have any further questions, please feel free to call me at (407) 729-4061.

Sincerely,

Nancy Baldisserotto

Nancy Baldisserotto
Environmental Engineer

RECEIVED

JUL 17 1989

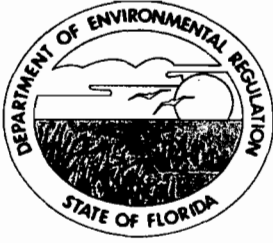
DER-BAQM

BEST AVAILABLE COPY

HARRIS SEMICONDUCTOR
PROPOSED SCRUBBER SYSTEMS
FOR EPI & POLY REACTORS
AND TYLAN SYSTEM

EPI/POLY REACTOR # -----	NEW FIRST STAGE VENTURI # -----	NEW SECOND STAGE SCRUBBER -----
POLY #01	P-01	
POLY #02	P-02	<p align="center">PACKED BED SCRUBBER #1</p>
POLY #03	P-03	
POLY #04	P-04	
POLY #05	P-05	
POLY #06	P-06	
POLY #07	P-07	
POLY #08	P-08	
POLY #09	P-09	
POLY #10	P-10	
POLY #11	P-11	
POLY #12	P-12	
POLY #13	P-13	
FUTURE POLY	P-14	
EPI #01	E-01	
EPI #02	E-02	
EPI #03	E-03	
EPI #04	E-04	
EPI #05	E-05	
EPI #06	E-06	
EPI #07	E-07	
EPI #08 ATM	E-08	
EPI #08 RP	E-09	
EPI #09	E-10	
EPI #10 ATM	E-11	
EPI #10 RP	E-12	
EPI #11 ATM	E-13	
EPI #11 RP	E-14	
EPI #12	E-15	
FUTURE EPI ATM	E-16	
FUTURE EPI RP	E-17	
FUTURE EPI ATM	E-18	
FUTURE EPI RP	E-19	
TYLAN SYSTEM	TYL-1	

Bruce's Copy



Florida Department of Environmental Regulation

Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, Florida 32399-2400

Bob Martinez, Governor

Dale Twachtmann, Secretary

John Shearer, Assistant Secretary

October 27, 1989

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Lawrence R. Hutker
Director, Facilities Department
Harris Semiconductor
Post Office Box 883
Melbourne, Florida 32901

Dear Mr. Hutker:

Re: Fume Scrubber Replacement - Building 51
AC 05-157786

The Department has reviewed Ms. Nancy Baldisserotto's letter received October 10, 1989, explaining the need to replace a fume scrubber (F51S05) with an existing fume scrubber (to be designated F51S05). The Department finds the request acceptable. However, if the efficiency of the existing replacement fume scrubber has never been determined, then tests should be conducted for this at your earliest possible date; also, the Central District office is to be notified in writing 15 days prior to conducting tests.

If there are any questions, please call Bruce Mitchell at (904)488-1344 or write to me at the above address.

Sincerely,

C. H. Fancy

C. H. Fancy, P.E.
Bureau of Air Regulation

CHF/BM/t

attachment

cc: C. Collins, Central District
N. Baldisserotto, HS



RECEIVED

October 6, 1989

OCT 12 1989

DER-BAQM

Mr. Claire Fancy
Deputy Chief
Bureau of Air Quality Management
Florida Department of
Environmental Regulation
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Re: Exhaust system modification; Permit No. AC 05-157786
Building 51 Consolidated Air Permit

Dear Mr. Fancy:

By this letter, we are providing the Department with notice that it is necessary to reactivate an existing water scrubber system to treat solvent exhaust currently handled by scrubber number F51S05. The current system has been experiencing a water carry-over problem that the manufacturers' representatives and our engineers have been unable to resolve.

The replacement scrubber system is an IPF model 153-350, 35,000 cfm horizontal cross-flow fume scrubber (see attachments). The scrubber is located in the west corner of the building 51 penthouse (see scrubber location map). It is estimated that the scrubber will be ready for use by November 1. It will be assigned the same facilities identification number F51S05 as the current system. Since this system has a greater capacity than the current system, it should function, at least, as well and perhaps better.

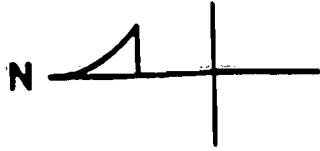
If the Department has no objection, we will proceed to close down the current system and activate this system in early November. If you have any questions, please give me a call at (407)729-4061.

Sincerely,

Nancy Baldisserotto
Environmental Engineer
Harris Semiconductor

E/303/89

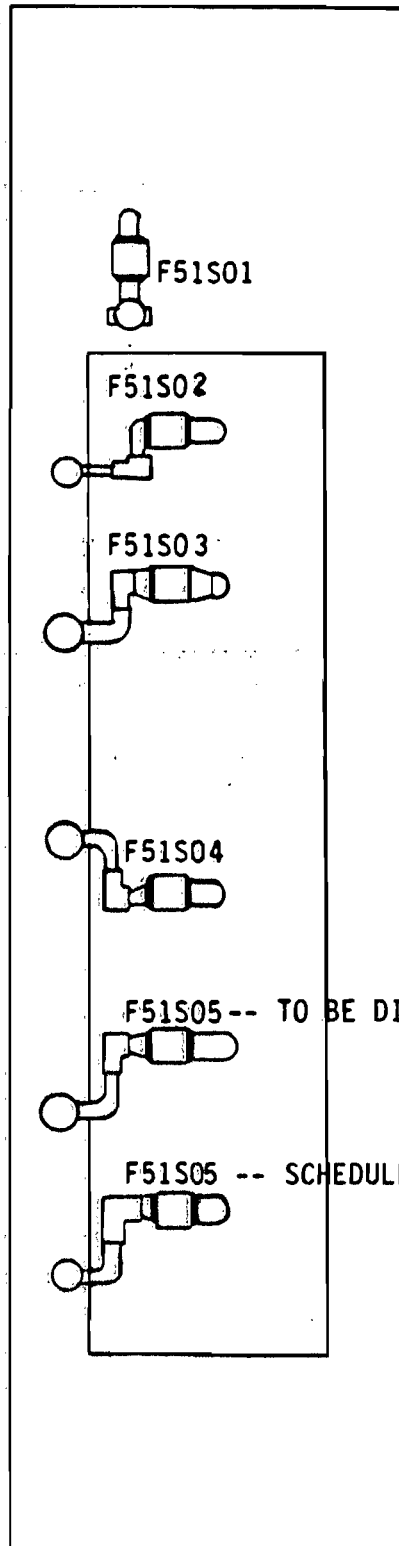
Attachments



HARRIS SEMICONDUCTOR
SCRUBBER LOCATIONS
BUILDING 51

LEGEND

	- Horizontal Scrubber
	- Vertical Scrubber
	- Exhaust Stack
	- Exhaust Fan
	- Stack mounted on fan
	- Epitaxial Scrubber



F51S01

F51S02

F51S03

F51S04

F51S05 -- TO BE DISCONTINUED

F51S05 -- SCHEDULED TO BE IN USE 11/01/89

FS-1 DATA SHEET

Submitted by Industrial Plastic Fabricators, Inc. April 15, 1975

Complete this data sheet and submit with proposal.

1. Manufacturer	Industrial Plastic Fabricators, Inc.
2. Model no.	151-350 153-350
3. Capacity, cfm	35,000
4. Casing material	PVC Backed with Fiberglass
5. Casing thickness	1/8" PVC/3/8" FRP
6. Motor nameplate horsepower	2 H.P.
7. Bhp at operating conditions	1.7
8. Pump capacity, gpm	36 GPM @ 30 FT. HD
9. Pump manufacturer	Vanton
10. Pump material	Polypropylene
11. Size and number of access doors	16" Diameter - 6
12. Type of fill	2" Polypro Tellerettes
13. Pressure drop at rated conditions, inches wg	1 1/2" Maximum
14. Amount of moisture carryover	.05% Maximum <i>- see high</i>
15. Estimated delivery from time of order, weeks	10-12 Weeks

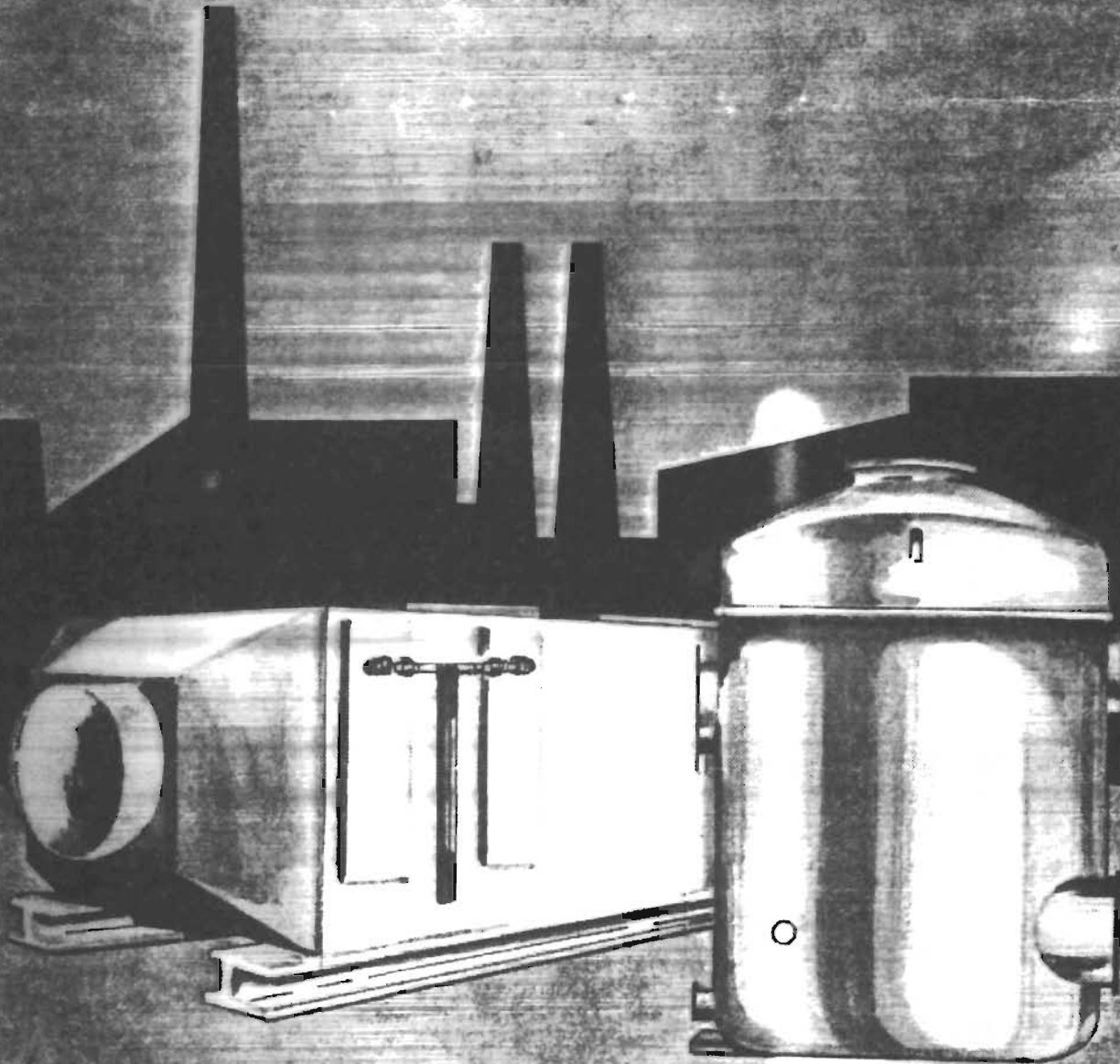


Industrial Plastic Fabricators

ENDICOTT STREET NORWOOD, MASSACHUSETTS
Telephone 762-2111



CORROSIVE RESISTANT
Fume Scrubbers



P.O. BOX 253, 290 PINE STREET • CANTON, MASSACHUSETTS 02021



IPF Scrubbers

IPF offers a complete package of services and equipment to assist in solving air pollution problems. They will take a step-by-step analysis of a particular problem and develop the correct solution. IPF will seek out the most cost effective method while prescribing the right equipment to do the job properly.

CONSULTING SERVICES

IPF engineers are available to advise each customer. They will work on location on a customer's particular air pollution problem. They will recommend the correct scrubber to meet the existing conditions or, if the need exists, design a complete ventilating system.

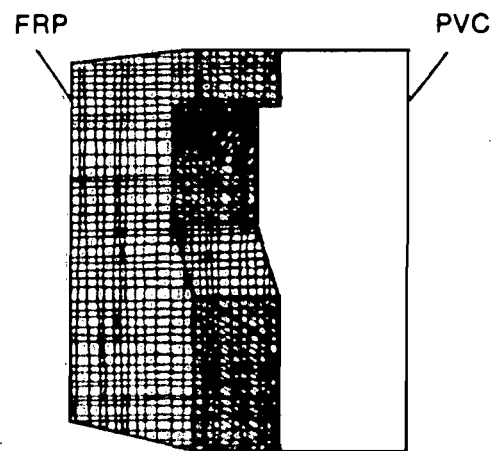
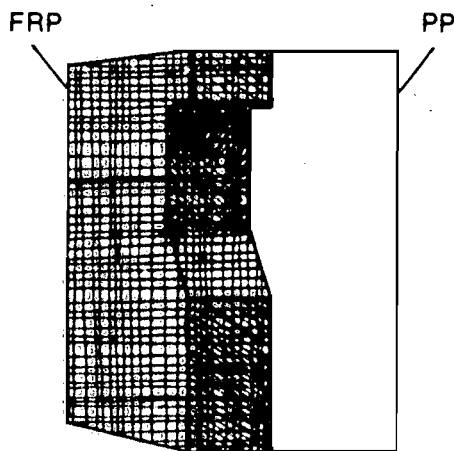
SCRUBBER EQUIPMENT

Efficiency—IPF scrubbers can be designed to remove up to 99.999% of airborne corrosives. Since each system is designed for a specific need, a high degree of efficiency can be designed into each unit, regardless of particle size.

99.999%

Packing Material—in any scrubbing system the packing material is the most important factor in the efficient operation of the equipment. IPF puts its own Compu-Pak packing material into each unit. Compu-Pak is a computer designed packing material, which is specially made for each application to entrap particles of various sizes and weights. Compu-Pak packing is made in various micron thicknesses with a patented interlocking weave to allow for maximum scrubbing efficiency. Thickness will depend upon desired efficiency, gas velocity, gas composition, droplet size, and particle construction.

Construction—each scrubber is made with corrosive resistant materials. Fiberglass, Type G PVC, or Type G polypropylene which are all inherently corrosive resistant are used in the construction of IPF units.



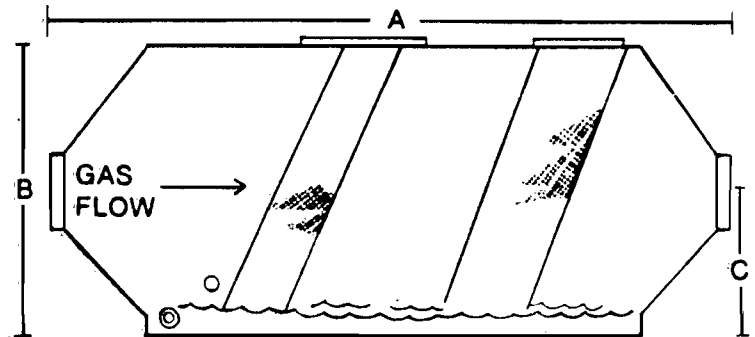


Horizontal Scrubbers

In an IPF horizontal scrubber the airflow containing corrosive particles enters the scrubbing unit and is immediately expanded to allow for equal distribution of the flow. The air is heavily sprayed with liquids as it passes into the first layer of packing and as it passes through the packing material. While passing through the packing, the corrosive particles are drawn to the packing through impingement and then flushed down into the sump area to be washed away. The clean airflow is then sprayed with additional liquids, in the form of a mist, to eliminate any particles which might still be present. It then goes into the mist eliminator which removes the moisture in the airflow.

The packing material is designed to provide excellent break-up of the liquid phase, creating maximum surface area for mass transfer with the vapor phase.

Horizontal scrubbers are recommended for use in situations where space limitations may be a problem.



Horizontal

MODEL	CFM CAPACITY	LIQUID RATE GPM	*1 TOTAL LENGTH A	*2 HEIGHT WITH SUMP B	WIDTH	BASE TO CL. INLET & OUTLET C	I.D. INLET & OUTLET	SHIPPING WEIGHT	OPERATING WEIGHT
H153-5	500	3-6	4'0"	2'3"	2.0	19½"	8"	160	530
H153-10	1,000	2-10	4'0"	2'3"	2.0	19½"	8"	160	530
H153-20	2,000	4-16	4'0"	3'6"	2.0	27"	12"	250	620
H153-40	4,000	8-32	7'0"	5'	3.0	36"	16"	900	2200
H153-50	5,000	10-40	7'0"	5'	3.6	36"	18"	1050	2600
H153-75	7,500	15-60	7'4"	5'	4.0	36"	22"	1200	3000
H153-100	10,000	20-80	7'4"	6'	4.6	42"	25"	1500	3600
H153-125	12,500	25-100	7'4"	7'	5.0	48"	25"	2000	4200
H153-150	15,000	30-120	8'0"	7'	5.6	48"	28"	2400	5100
H153-175	17,500	35-140	8'0"	8'	5.6	54"	28"	2700	5500
H153-200	20,000	40-160	9'0"	8'	6.0	54"	32"	3100	6400
H153-250	25,000	50-200	9'0"	8'	7.0	54"	36"	3500	7400
H153-300	30,000	60-240	10'0"	8'	8.0	54"	42"	4000	9000
H153-400	40,000	80-320	10'0"	10'	8.0	66"	48"	4680	9680

*1 Varies with the amount of packing.

*2 Deduct 10" if no sump required.

Static pressure drop is 0.41" per each 4 layers of packing at 96% efficiency.

All dimensions are approximate.

Make-up water is approximately 10% of GPM.