HDS

HIGH DENSITY SCRUBBER

DRY SCRUBBERS for the removal of:

- High concentrations of corrosive contaminants
- Odors generated in municipal wastewater, industrial plants, and sewage treatment

STAINLESS STEEL • MILD STEEL • ALUMINUM

CA CIRCUL-AIRE

THE HIGH DENSITY SCRUBBER (HDS)

The High Density Scrubber (HDS) removes corrosive, malodorous and toxic contaminants and is designed for applications requiring high removal efficiency and extensive media life.

The HDS system integrates three principal components: an industrial blower, a vessel containing chemical media and a discharge particulate filter section. The contaminated air is blown through an even-flow plenum section by the skid-mounted industrial blower. The air is then forced up through a deep bed of MULTI-MIX® media for removal of gaseous contaminants such as hydrogen sulfide, sulfur dioxide, chlorine, ammonia, etc. The selection of media and its depth depends on the type and severity of the challenge contaminants.

To ensure optimum contaminant removal efficiency, a minimum residence time of 1.0 second is maintained. After chemical purification, the air is further filtered by ASHRAE rated final filters at 40% (MERV 9) and 90% (MERV 14) efficiency. The air is then discharged. Periodically, samples of operating media are analyzed free of charge at our laboratory to verify media life and ensure optimum system performance *(see TECH-CHEK™ Services at back of brochure)*.

THE PROBLEMS

Many manufacturing processes result in the release of multiple airborne contaminants that lead to odor and corrosion problems. Oil and gas refineries, pulp and paper plants, and wastewater treatment facilities all generate a variety of harmful contaminants. In particular, hydrogen sulphide, an undesirable by-product of many processes is malodorous, toxic and highly volatile.

For example, in wastewater treatment facilities, basin detention times, loadings to biological processes and sludge generation potential can influence odor levels. Septage and sludge handling systems are also common sources of strong odors. Odor generation is often the result of organic overloading, an inadequate supply of oxygen, improper ventilation or simply a failure to recognize that certain unit processes may require a special contaminant control technology. The Circul-Aire High Density Scrubber (HDS) can control these gases and provide the ventilation required in these spaces.

THE CONVENTIONAL SOLUTION

The traditional method for odor and corrosion control typically relies on wet scrubbers which use chemical solutions to neutralize odors. These types of systems are used in cases with very high concentrations (greater than 20 ppm) in order to reduce contaminant loads.

Unfortunately, wet scrubbers involve a major financial investment, require substantial maintenance, and have the potential to become an environmental hazard. In addition, wet scrubbers do not have the pull-down capacity to achieve low ppb gas leaving concentrations.

THE CIRCUL-AIRE SOLUTION

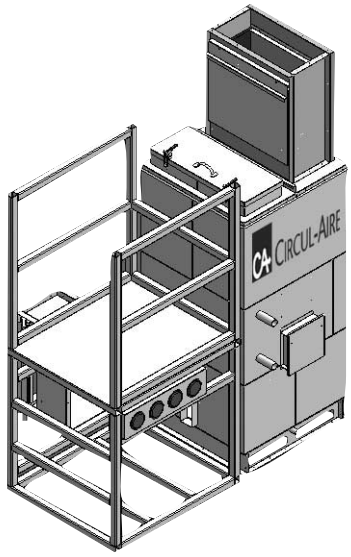
CIRCUL-AIRE's High Density Scrubbers (HDS) are vertical configuration dry scrubbers requiring smaller footprints filled with granular MULTI-MIX® media. For lower concentrations (less than 20 ppm), HDS dry scrubbers will efficiently remove contaminants to non-detectable levels. Servicing HDS scrubbers is minimal, only requiring annual bulk loading of the replacement media rather than the complex and frequent maintenance procedures necessary for wet scrubbers.

FEATURES

- Rugged industrial construction for maximum protection against corrosion and other severe environmental conditions.
- Complete range of MULTI-MIX® chemical media to suit various applications.
- Factory-assembled packages to facilitate installation and start-up. Partially assembled systems are also available where passage is restricted.
- Counter flow design to reduce maintenance downtime using gravity loading and unloading.

ADDITIONAL FEATURES

- 316 stainless steel construction, aluminum construction, or zinc coated steel protected by a three-coat corrosion resistant paint
- 30% (MERV 6) efficiency 2" (51 mm) pre-filter
- Various bed depths available for odor and corrosion control
- 40% (MERV 9) efficiency after-filter
- 90% (MERV 14) efficiency 12" (305 mm) final filter. Higher efficiencies also available
- Backward inclined pressure blowers, or radial blade design blowers available in stainless steel or mild steel
- Perforated 316 stainless steel media support platform
- Bulk media filling port (gravity)
- Bulk media discharge blast gate (gravity)
- Full-sized hinged access doors for particulate filters
- High pressure neoprene gasket and silicone sealed joints



CORROSION & ODOR CONTROL APPLICATIONS

- Pulp & paper mills
- Oil & gas refineries
- Incineration plants
- Sewage treatment plants
- Steel mills
- Pharmaceutical plants
- Electronic component manufacturing
- Bleach plants
- Computer rooms
- Chemical plants
- General manufacturing

OPTIONS

- Service/media loading platform, FRP or steel construction
- 100% Fan redundancy (back-up capacity)
- Preheat section
- Control panel (prewired or shipped loose)
- Gas monitors
- Custom bed depths
- Pressure-Gradient Control System (PGCS)
- Differential Pressure Monitoring System (DPMS)
- Manual or motorized damper
- Intake louvre
- Intake mist eliminators
- Fiberglass reinforced plastic fans
- Stainless steel fans
- Explosion proof motors and motor starter panels
- Spark resistant fan construction
- Graphite impregnation for static control (FRP fans)
- Silencers
- Temperature sensors
- Custom equipment sizes

Table 1 - FILTER REQUIREMENTS/AIR FLOW CAPACITIES

HDS Unit		Chemical Media Housing Size/Model									
		26	33	39	44	54	62	73	82	90	100
Approx. Air Flow Range	CFM	280 to 400	450 to 650	650 to 950	800 to 1200	1200 to 1800	1600 to 2400	2300 to 3200	2800 to4200	3600 to 5200	4300 to 6250
	m^3/hr	476 to 680	765 to 1105	1105 to 1615	1360 to 2040	2040 to 3060	2720 to 4080	3910 to 5440	4760 to 7140	6120 to 8840	7310 to 10625
Media Volume Per 1-inch Bed Depth		0.39 ft^3	0.63 ft^3	0.88 ft^3	1.12 ft^3	1.69 ft^3	2.22 ft^3	3.08 ft^3	3.89 ft^3	4.94 ft^3	5.88 ft^3
Pre-Filter 30% (MERV 6) eff.											
12" x 12" x 2"		1	-	-	-	-	-	-	-	-	-
24" x 12" x 2"		-	1	-	-	-	1	-	-	2	2
24" x 24" x 2"		-	-	1	1	1	1	2	2	2	2
After-Filter 40% (MERV 9) eff.											
12" x 12" x 4"		1	-	-	-	-	-	-	-	-	-
24" x 12" x 4"		-	1	-	-	-	1	-	-	2	2
24" x 24" x 4"		-	-	1	1	1	1	2	2	2	2
Final Filter 90% (MERV 14) eff.											
12" x 12" x 12"		1	-	-	-	-	-	-	-	-	-
24" x 12" x 12"		-	1	-	-	-	1	-	-	2	2
24" x 24" x 12"		-	-	1	1	1	1	2	2	2	2

HDS CHEMICAL MEDIA WEIGHTS:
Media Weight = (Density of Media) x Volume
Media Densities: MM-1000 = 55 lb./ft^3 (880 kg/m^3)
MM-1355 = 43 lb./ft^3 (681 kg/m^3)
MM-1955 = 47 lb./ft^3 (745 kg/m^3)
MM-3000 = 30 lb./ft^3 (480 kg/m^3)
MM-7000 = 41 lb./ft^3 (656 kg/m^3)
MM-8000 = 31 lb./ft^3 (497 kg/m^3)
MM-9000 = 38 lb./ft^3 (609 kg/m^3)
NOTE: Media densities listed above are average densities and may vary between batches.

NOTE: The HDS unit weights listed on page 7 do not include the chemical media weight. For total operating weight, add the calculated media weight to weights on page 7.

Table 2 - FAN PERFORMANCE

Size/Model	Air Flow		Radial Blade Steel Fan, SISW Fan Arrangement					
			MM-1955 or MM-1355 *Unit Pressure Drop Approx. 8.5" (2.1 KPa) WC			MM-3000, 7000 or 9000 *Unit Pressure Drop Approx. 10.0" (2.5 KPa) WC		
	CFM	m^3/hr	RPM	BHP	HP (KW)	RPM	BHP	HP (KW)
26	300	510	3551	0.90	2.0 (1.5)	3260	1.01	2.0 (1.5)
33	500	850	3666	1.30	2.0 (1.5)	3731	1.90	3.0 (2.2)
39	800	1360	2845	1.95	3.0 (2.2)	3066	2.32	5.0 (3.0)
44	1000	1700	2918	2.42	5.0 (3.0)	3132	2.84	5.0 (3.0)
54	1630	2770	2428	3.93	5.0 (3.0)	2604	4.60	7.5 (5.5)
62	2000	3400	2132	4.85	7.5 (5.5)	2289	570	7.5 (5.5)
73	2800	4760	1799	6.31	7.5 (5.5)	1935	7.38	10.0 (7.5)
82	3500	5950	1548	7.85	10.0 (7.5)	1666	9.20	15.0 (11.0)
90	4400	7480	1346	9.64	15.0 (11.0)	1450	11.40	15.0 (11.0)
100	5200	8840	1371	11.50	15.0 (11.0)	1472	13.40	15.0 (11.0)

BASED ON: 2-second residence time and chemical media bed velocity @ 75 FPM (0.38 m/s).
*Includes 1.0" (249 Pa) WC external static pressure.

60 HERTZ

Table 3a - MOTOR PERFORMANCE (TEFC HIGH EFFICIENCY MOTORS)

HP (kw)	Full Load rpm	Voltage/3ø/60 Hz				NEMA Code		Full Load Efficiency
		460		575				
		FLA	LRA	FLA	LRA	DESIGN	CODE	%
1.0 (0.75)	1720	1.6	11.5	1.28	9.2	B	L	82.5
1.5 (1.1)	1710	2.2	17	1.75	13.6	B	L	84.0
2.0 (1.5)	1740	2.95	23	2.35	18	B	L	84.0
3.0 (2.2)	1740	4	32	3.2	25.6	B	K	87.5
5.0 (3.0)	1740	6.25	46	5	37	B	J	87.5
7.5 (5.5)	1740	9.3	62	7.5	50	B	H	89.5
10.0 (7.5)	1750	12.5	81	10	65	B	H	89.5
15.0 (11.0)	1750	17.6	112	14.1	90	B	G	91.0
20.0 (15.0)	1760	23	140	18.5	112	B	G	91.0

INSULATION: Class F
TEMPERATURE: 80°C at Rated H.P.
SERVICE FACTOR: 1.15
RATING: Continuous
ALSO AVAILABLE: • Explosion Proof
• IP55
• 2-Speed Motors

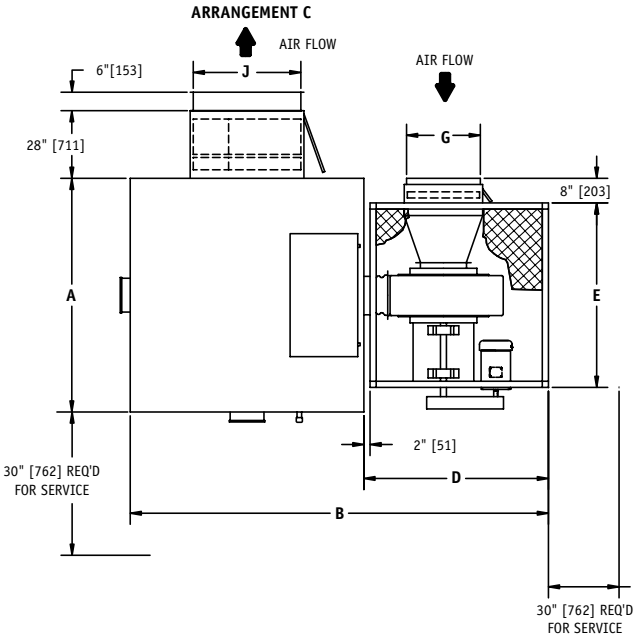
50 HERTZ

Table 3b - MOTOR PERFORMANCE (TEFC HIGH EFFICIENCY MOTORS)

HP (kw)	Full Load rpm	380V/3ø/50 Hz		NEMA Code		Full Load Efficiency
		FLA	LRA	DESIGN	CODE	%
1.0 (0.75)	1430	1.9	13.5	B	L	82.5
1.5 (1.1)	1425	2.6	20	B	L	84.0
2.0 (1.5)	1425	3.6	28.1	B	L	84.0
3.0 (2.2)	1450	4.8	38	B	K	87.5
5.0 (3.0)	1450	7.6	56	B	J	87.5
7.5 (5.5)	1450	11.3	76	B	H	89.5
10.0 (7.5)	1460	15.1	98	B	H	89.5
15.0 (11.0)	1460	21.3	136	B	G	91.0
20.0 (15.0)	1465	27.8	170	B	G	91.0

INSULATION: Class F
TEMPERATURE: 80°C at Rated H.P.
SERVICE FACTOR: 1.0
RATING: Continuous

Plan



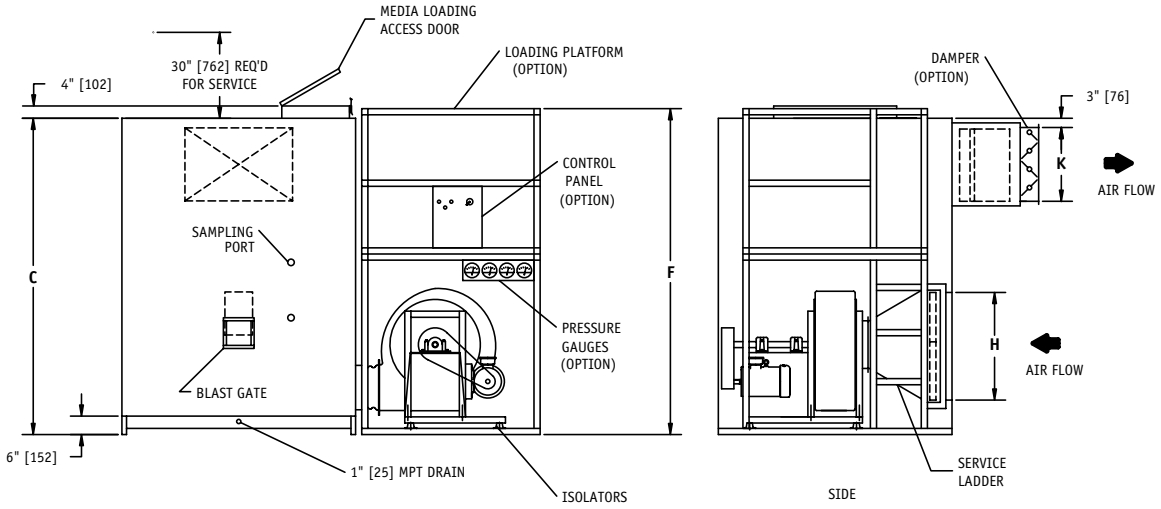
CIRCUL-AIRE

DIMENSIONS FOR HORIZONTAL & VERTICAL DISCHARGE MODEL

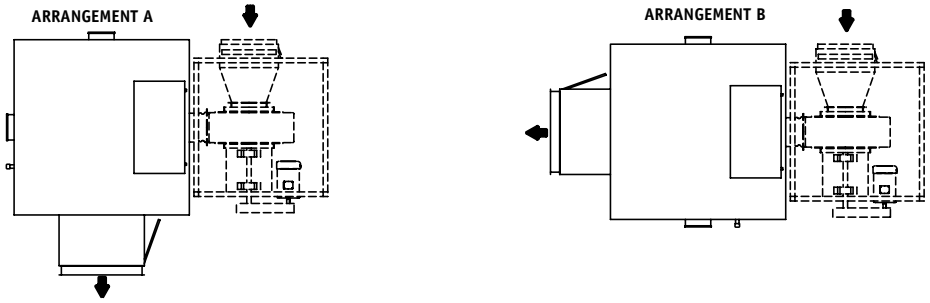
Size Model	A	B	C MAX	D	E
26	26 (660)	56 (1422)	70 (1778)	30 (762)	30 (762)
33	33 (838)	71 (1803)	80 (2032)	38 (965)	36 (914)
39	39 (1118)	89 (2388)	95 (2413)	50 (1270)	44 (1118)
44	44 (1118)	94 (2388)	95 (2413)	50 (1270)	44 (1118)
54	54 (1372)	104 (2642)	85 (2159)	50 (1270)	44 (1118)
62	62 (1575)	112 (2849)	85 (2159)	50 (1270)	50 (1270)
73	73 (1930)	135 (3429)	90 (2286)	62 (1575)	62 (1575)
82	82 (2083)	148 (3759)	90 (2286)	62 (1575)	62 (1575)
90	82 (2083)	170 (4318)	100 (2540)	66 (1676)	66 (1676)
100	82 (2083)	190 (4829)	100 (2540)	66 (1676)	66 (1676)

NOTE: Drawing is not to scale.
Dimensions listed are inches (mm).
*Chemical media not included in weights.

Elevation



Horizontal Discharge Model - Optional discharge arrangements



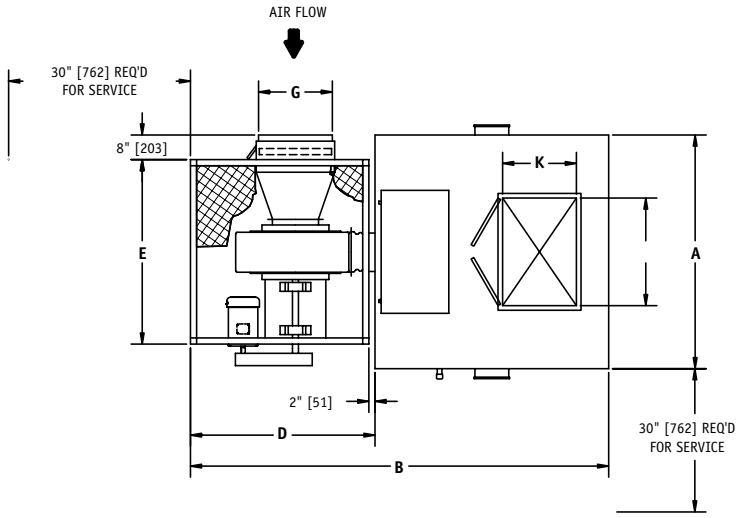
CIRCUL-AIRE

DIMENSIONS FOR HORIZONTAL & VERTICAL DISCHARGE MODEL

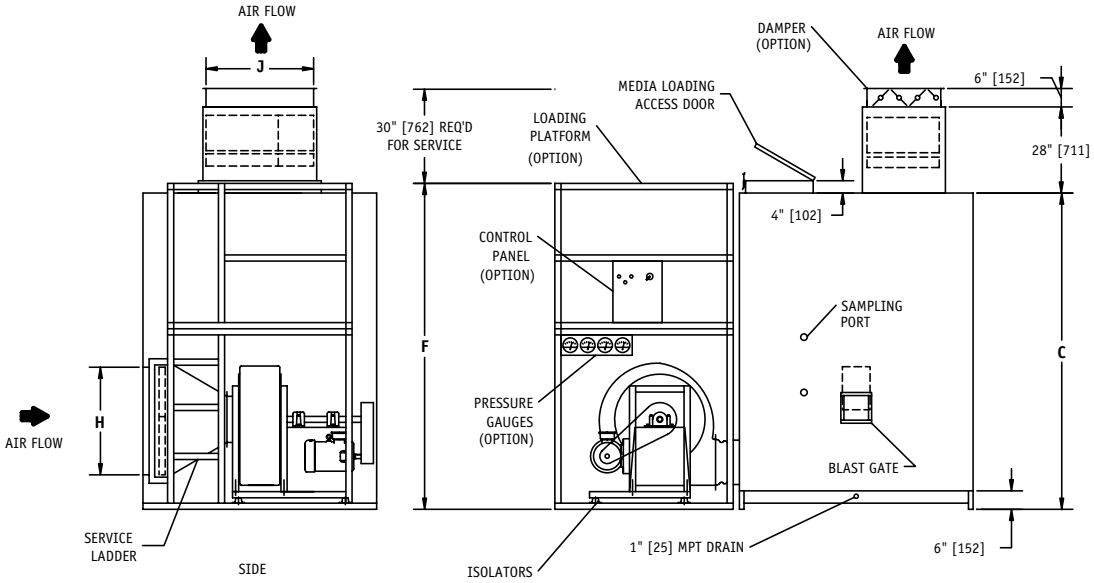
F	G	H	J	K	Weight* lb. (kg)
72 (1829)	12 (305)	12 (305)	12 (305)	12 (305)	1079 (490)
78 (1981)	12 (305)	24 (610)	24 (610)	12 (305)	1320 (599)
85 (2159)	24 (610)	24 (610)	24 (610)	24 (610)	1686 (765)
85 (2159)	24 (610)	24 (610)	24 (610)	24 (610)	1888 (857)
85 (2159)	24 (610)	24 (610)	24 (610)	24 (610)	2250 (1020)
88 (2235)	24 (610)	36 (914)	36 (914)	24 (610)	2838 (1287)
98 (2489)	24 (610)	48 (1220)	48 (1220)	24 (610)	3304 (1499)
98 (2489)	24 (610)	48 (1220)	48 (1220)	24 (610)	3800 (1724)
101 (2565)	36 (914)	48 (1220)	60 (1524)	24 (610)	4636 (2103)
101 (2565)	36 (914)	48 (1220)	72 (1829)	24 (610)	4978 (2258)

NOTE: Drawing is not to scale.
Dimensions listed are inches (mm).
*Chemical media not included in weights.

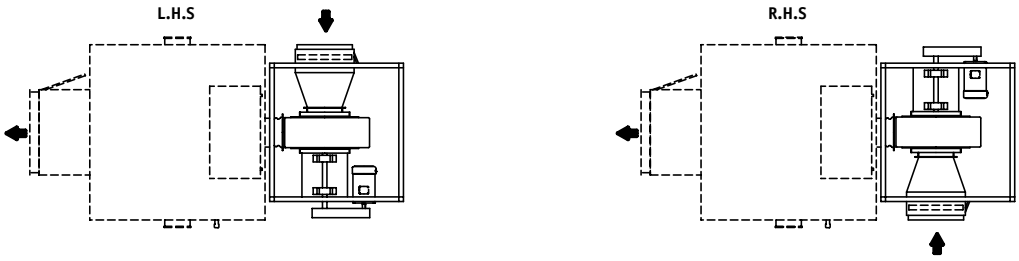
Plan



Elevation

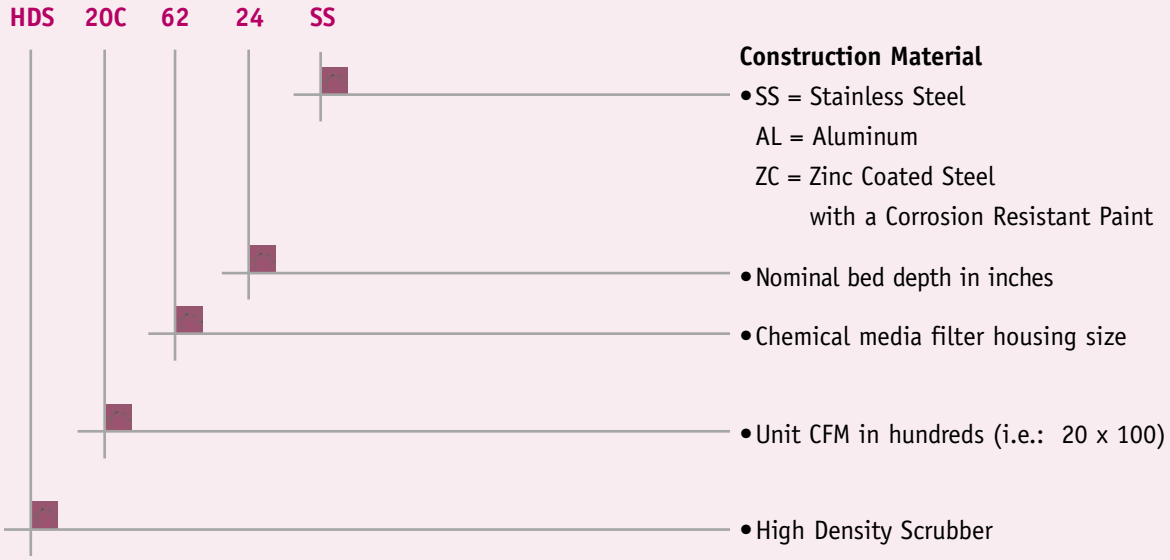


Vertical Discharge Model - Optional intake filter location (right hand or left hand side)



NOMENCLATURE

EXAMPLE: HIGH DENSITY SCRUBBER: HDS-20C-6224SS



HDS GENERAL SPECIFICATIONS

Provide a Circul-Aire model HDS factory-fabricated gas phase air purification system or equal suitable in design for the removal of both organic and inorganic contaminants as indicated on the schedule and drawing.

The unit manufacturer shall have been engaged in the fabrication and design of deep bed scrubber systems for no less than the last ten years. Strict adherence to sizes and capacities shall be maintained. Any deviation from the specifications must be approved by the engineer's office.

All components shall comply with the following standards:

- ASHRAE: Standard for filters
- AMCA: Standard for fans
- ASTM: Standard for testing methods
- ASW: Standard for welding
- IEEE: Standard for electrical
- ANSI: Standard for sound
- OSHA: Standard for safety
- ISA: Instrument Society of America

The HDS as manufactured by Circul-Aire shall be capable of delivering the specified air volume with total reduced sulfur concentration less than _____ parts per billion (ppb) when challenged with _____ ppm of total reduced sulfur.

The HDS air purification system and chemical media shall be manufactured and provided by Circul-Aire.

The manufacturer shall also have the in-house capability of analyzing the chemical media in the system to determine the degree of saturation. This shall be a service provided at no additional charge for the life of the system. Formal reports shall be issued directly to the client to aid in maintenance scheduling.

The air purification system shall be ____% efficient (ex: 99.5%) in the removal of gases ensuring no bypass of gaseous contaminants. The purification system shall consist of, but not be limited to, a 30% (MERV 6) pre-filter section, 12 to 40" (305 mm to 1016 mm) media bed section, 40% (MERV 9) after-filter and 90 - 99% (MERV 14) final filter. All particulate filters shall be ASHRAE rated.

CHEMICAL MEDIA FILTER HOUSING

The chemical media filter housing shall be constructed of: (select one) 14-gauge 316 stainless steel, 10-gauge aluminum, or 14-gauge zinc coated steel). The housing shall be non insulated, single wall construction, reinforced to provide structural integrity. The housing shall be designed to provide a high degree of sealing integrity with all floor to wall and wall to wall interfaces specially sealed for weatherproofing and high static pressure leakage prevention.

The chemical media filter bed support shall consist of 20 gauge stainless steel 316 perforated sheets. The platform shall be structurally reinforced. The perforated stainless steel sheets shall be on 5/32" (4 mm) staggered centers with 3/32" (2.4 mm) diameter perforations with a minimum of 33% free area.

A raised hinged access lid shall be provided on top of the section for media loading and removal. The access door shall include stainless steel hinges complete with positive pressure, quick release stainless steel latches. The entire perimeter of the access lid shall contain a closed cell neoprene gasket to provide a weather and air tight seal.

The media unloading shall also be accomplished via a bolted and gasketed discharge port located at the base of the chemical media section. A minimum of two sample ports and one media sample probe shall be provided to allow for periodic chemical media sampling.

Chemical Media

- The deep bed HDS system as manufactured by Circul-Aire shall be _____ " (_____ mm) deep in direction of air flow complete with _____ ft^3 (_____ L) of MM-_____ (1000, 3000, 7000, 9000, 1355, 1955) chemical media as manufactured by Circul-Aire.
- The system residence time shall be a minimum of _____ seconds.
- Please refer to individual MULTI-MIX® media specification sheets for media details.

MM-1000

The MULTI-MIX® MM-1000 shall be UL Class 1 nonflammable, and is produced in 1/8" (3 mm) diameter spherical purple pellets and composed of activated alumina impregnated with potassium permanganate. The activated alumina collects odor molecules through adsorption. The odor molecules thereby come in contact with the potassium permanganate, which is evenly distributed throughout the pellets. The odor molecule is chemically oxidized.

MM-3000

The MULTI-MIX® MM-3000 shall be UL Class 1 nonflammable and consists of an extruded coal based activated carbon of 1/8" (3 mm). Physical adsorption removes the gas molecules, which is similar to condensation on a surface. Activated carbon is used for a wide range of contaminants with higher affinity to specific gases.

MM-7000

The MULTI-MIX® MM-7000 is manufactured in 1/8" (3 mm) diameter extruded cylinders and consists of activated carbon impregnated with phosphoric acid. Phosphoric acid is impregnated into the carbon to provide enhanced efficiency and capacity for alkaline contaminants. After adsorption, a chemical reaction follows to neutralize the contaminants.

MM-9000

The MULTI-MIX® MM-9000 is manufactured in 1/8" (3 mm) diameter extruded cylinders and consists of activated carbon impregnated with potassium hydroxide. Potassium hydroxide is impregnated into the carbon to provide enhanced efficiency and capacity for acid type contaminants. After adsorption, a chemical reaction follows to neutralize the contaminants.

MM-1355

A 50% by volume mixture of MM-1000 with MM-3000 for multiple gases.

MM-1955

A 50% by volume mixture of MM-1000 with MM-9000 for multiple gases.

INLET SECTION AND PRE-FILTERS

Section shall be constructed of: (select one) 316 stainless steel, aluminum, or zinc coated steel, single wall-uninsulated. Access door shall include stainless steel hinges complete with positive pressure stainless steel latches.The entire perimeter of the access door shall contain a closed cell neoprene gasket.

Pre-Filters

Roughing pre-filters shall be 2" (51 mm) deep in direction of air flow having a minimum efficiency reported value of 30% (MERV 6) by ASHRAE Standard 52.2-1999 test method using atmospheric dust. Filters shall be UL Class 2 as per Standard 900. The preformed pleated design with reinforced fabric media, laminated to a supporting steel wire grip shall not have an initial resistance greater than 0.24" (60 Pa) WC at 500 FPM (2.5 m/s).

DISCHARGE SECTION & FILTERS

Section shall be constructed of: (select one) 316 stainless steel, aluminum, or zinc coated steel, single wall-uninsulated. Access door shall include stainless steel hinges complete with positive pressure stainless steel latches. The entire perimeter of the access door shall contain a closed cell neoprene gasket.

After-Filters

Roughing after-filters shall be 4" (102 mm) deep in direction of air flow having a minimum efficiency reported value of 30% (MERV 6) based on ASHRAE Standard 52.2-1999 test method using atmospheric dust. Filters shall be UL Class 2 as per Standard 900. The preformed pleated design with reinforced fabric laminated to a supporting steel wire grip shall not have an initial resistance greater than 0.24" (60 Pa) WC at 500 FPM (2.5 m/s).

Final Filters

Final filters shall be 12" (305 mm) deep in direction of air flow having a minimum efficiency reported value of not less than 90% (MERV 14) by ASHRAE Standard 52.2-1999 test method using atmospheric dust. Filters shall be UL Class 2 as per Standard 900. The filter frame shall consist of a minimum 3/4" (19 mm) particle board frame with 90% glass medium, corrugated aluminum separators and a rubber based adhesive sealant which is self-extinguishing. The initial resistance shall be no greater than 0.55" (137 Pa) WC at 500 FPM (2.5 m/s).

FAN SECTION

The fan shall provide _____ CFM (____ m^3/h) at _____ inches WC (____Pa) of external static pressure. Depending on CFM and static pressure, one of the following fans can be used.

Steel Fans, SWSI, Backward Inclined or Radial Blade

The fan shall be a single-width single inlet with radial or backward inclined blade design. Fan housing is to be heavy gauge, continuously welded construction to prevent leakage. Fan wheels shall be statically and dynamically balanced.

(Select from one of the following paragraphs a) or b):

a) All parts in contact with the airstream shall be constructed of **stainless steel** with the bearing support constructed of mild steel, rigidly supporting the shaft and bearings.

b) The entire fan shall be constructed of **mild steel** with a corrosion resistant coating.

Fan wheel, inlet diameters and outlet areas shall be in accordance with the standard dimensions adopted by AMCA for industrial centrifugal fans. The shaft's first critical speed shall be at least 130% of the fan's maximum operating speed. Fan ratings shall be based on tests made in accordance with AMCA standards and licensed to bear the AMCA certified ratings seal for air performance.

OR

Fiberglass Reinforced Plastic Fans (FRP)

Fan shall be constructed in accordance with the ASTM D-4167 standard specification for fiber-reinforced plastic fans and blowers and CGSB41-GP-22 standard for process equipment. Fan housings shall be of solid FRP hand lay-up construction utilizing polyester and vinyl ester flame retardant resins offering high chemical resistance. Glass veil shall be used on all airstream surfaces giving resin rich liner for optimum chemical resistance. All internal hardware shall be FRP encapsulated. Shafts shall be hot rolled steel accurately turned, ground, polished and gauged for accuracy and encapsulated with FRP in way of airstream. Shafts shall be sized so that the first critical speed is at least 1.35 times the maximum operating speed. Bearing pedestal and inlet support shall be of steel construction.

(Select from one of the following paragraphs a) or b):

a) Impellers shall be solid FRP composites of *radial bladed design* having steel hub embedded and encapsulated into the backplate, and statically and dynamically balanced to ensure smooth operation at running speed;

OR

b) Impellers shall be solid FRP composites of *backward inclined design* with a venturi inlet cone and a sprocket embedded and encapsulated into the backplate. The wheel is locked on to the shaft by using a taperlock bushing which is protected from the airstream by an FRP cap. A static and dynamic balance of the component is done to ensure smooth operation.

Mild Steel Coatings

All fans shall have a prime finish coat of red oxide primer. Unless otherwise specified this will then be followed by two coats of corrosion resistant aliphatic polyurethane finish on all mild steel surfaces.

Fan and Motor Vibration Isolation Base

The fan and motor shall be mounted on a structural steel base of sufficient strength to resist with minimum deflection all loads resulting from normal operation of the fan. Rubber-in-shear isolators shall be supplied and selected with a maximum transmissibility of 25%.

Guards

V-belt drives are to be protected by guards that encompass all sides of the drive. Any expanded mesh or ventilation openings in the guard are to be «finger proof» to meet OSHA requirements. Guards shall be completely removable. Each guard shall be complete with two shaft holes opposite both the fan and motor shaft for the purpose of allowing tachometer readings.

V-Belt Drives

Each fan shall be complete with a matched set of V-belt sheaves rated at a safety factor of 1.5 times the driving motor nameplate horsepower. Motor drive shall be variable pitch up to and including 7.5 HP (5.5 kw) and fixed pitch beyond this point.

Fan Bearings

Bearings shall be selected to have a minimum L10 life of 60,000 hours including belt pull. All grease lubricated bearings that are not directly accessible shall be fitted with extended grease leads terminating at some convenient accessible location in the fan housing or unit casing.

OPTIONS

Media Loading/Service Platform

The media loading platform shall be constructed of tubular steel, painted with a corrosion resistant paint. The platform shall be equipped with a non-skid service platform, safety guardrail and access ladder (fiberglass reinforced plastic also available).

Pressure Gauges

Dwyer series 2000 magnehelic gauges shall be provided across each particulate filter section and one additional gauge across the entire media section. All gauges shall be mounted in a single panel flush to the system. Gauges shall be pre-tubed with color coded CPVC tubing. Gauges shall have both metric and imperial units.

Disconnect

The HDS system shall come complete with a pre-wired unit mounted NEMA-12 (4 or 4X) disconnect.

Motor Starter Panel

The motor starter panel shall come complete with a NEMA-12 (4 or 4X) enclosure. Panel shall be complete with non-fused disconnect switch, motor contactors, motor line fuses, 24 volt control circuit c/w on/off lights and on/off selector switch.

Manual Damper

An opposed blade manual damper shall be provided on the discharge filter section. The damper blades shall be constructed of extruded aluminum with *(select one)* stainless steel, zinc coated steel or aluminum frame.

Pressure Gradient Control System (PGCS)

Pressure gradient control system shall maintain room pressure at _____ " WC (_____ Pa). System shall be complete with motorized damper, damper motor (120V), pressure differential switch, and room manometer.

Customized Controls

Customized controls are available on demand. Items may include air flow switches, pressure gradient control systems, audible alarms, photohelic gauges, explosion proof and air flow stations, gas sensors, etc.

MULTI-MIX® MEDIA & TECH-CHEK™ SERVICE

CIRCUL-AIRE's MULTI-MIX® is a proven filter media which provides continuous purification of corrosive, odorous and toxic contaminants in industrial and commercial environments. MULTI-MIX® media combines the adsorption properties of activated carbon and enhanced carbons with the oxidation properties of chemically impregnated alumina. For more information on MULTI-MIX® media, refer to our MULTI-MIX® brochures.

Media analysis through our lifetime TECH-CHEK™ Program ensures maximum efficiency of our products. A complete computerized report establishes media replacement schedule for each unit. CIRCUL-AIRE's in-house laboratory can also provide additional performance tests against specific air contaminants.

REACTIVITY MONITORING SERVICE (REMO) & SURVEYOR®

CIRCUL-AIRE's Reactivity Monitoring Service (REMO) diagnoses according to the corrosion levels established by the Instrument Society of America (ISA) from mild to severe (G1 to GX). Severity level is gauged by means of reactivity monitoring coupons which are installed in strategic areas for periods of 30 to 90 days.

These REMO coupons contain specially treated copper and silver strips that react with the environment. After exposure, coupons are analyzed to determine film thickness and chemistry; the data is further used to determine MULTI-MIX® media selection and then normalized to a one-month value for Instrument Society of America (ISA) classification. The silver coupon can also be analyzed to evaluate the presence of chlorine and to determine humidity levels.

The SURVEYOR® on-line environmental monitoring provides the operator with real-time evaluation of the room's environment as per the Instrument Society of America (ISA) classification for applications where instantaneous readings are required.

SEALING INTEGRITY VERIFICATION (SIV)

The Sealing Integrity Verification (SIV) measures the protected area where process control equipment is located. Building enclosures can never be perfectly sealed. Often leakage allows contaminated air to infiltrate usually in significant quantities, even to the extent of preventing the required pressurization.

The Sealing Integrity Verification (SIV) measures room differential pressure and flow pressure of pressurization/depressurization. The values are used to calculate probable effective leakage area and geometry. Should verification analysis prove improper sealing, leakage identification and sealing procedures are implemented.

Printed in Canada.

LIT00201-CA0804-2K

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