

PART 1 - GENERAL

- 1.1 DESCRIPTION .1 Design, fabricate, supply, deliver, inspect the installation, field start-up and operator training of an weld fume exhaust collector system complete with controls and accessories as indicated.
- 1.2 STANDARDS .1 Equipment to comply with the latest edition of all applicable codes and regulations including but not limited to the following:
- .1 American Society of Mechanical Engineers (ASME);
 - .2 Canadian Standards Association (CSA);
 - .3 Canadian Electrical Manufacturers Association (CEMA);
 - .4 National Electrical Manufacturers Association (NEMA);
 - .5 American Society for Testing and Materials (ASTM)
 - .6 American National Standards Institute (ANSI);
 - .7 Electrical and Electronic Manufacturing Association of Canada (EEMAC);
 - .8 Canadian Electrical Code;
 - .9 CGSB.
- .2 Canadian Standards shall take precedence over all other standards in the case of conflicting requirements.
- .3 Electrical equipment to comply with Division 26.
- .4 Whenever standards and regulations are mentioned in these specifications, they refer to the latest issue thereof.
- .5 In case of any conflict between these specifications and any of the above standards, the most stringent standard will have precedence.
- 1.3 SHOP DRAWINGS .1 Submit shop drawings in accordance with specifications.
- 1.4 QUALIFICATIONS .1 Furnish equipment specified under this Section by a single manufacturer with single-source responsibility. Manufacturer must be qualified and experienced in the design, construction, and operation of odour control systems, and regularly produce such

systems.

- .2 Furnish all important details of construction including: model numbers, dimensions, operating weights, operating parameters and ranges, anchor bolt templates, and installation instructions.

1.5 DELIVERY TO
SITE

- .1 General Contractor to provide machinery and labour to unload and placing the equipment into storage.
- .2 Manufacturer to deliver equipment to the site completely assembled and ready for placing on concrete equipment pad by general contractor.

1.6 INSPECTION

- .1 The Departmental Representative reserves the right to reject acceptance or delivery of any or all pieces of equipment found, upon inspection, to have any or all of the following: deficiencies, blisters, chips, crazing, cracks, burned areas, dry spots, foreign matter, surface porosity, or sharp discontinuity. Any item, which does not satisfy the specification, will be rejected.
- .2 The Departmental may provide and direct inspectors to inspect the equipment at the place of fabrication or upon arrival at the job-site. The manufacturer will furnish all reasonable assistance, if required by the Departmental Representative, for the proper inspection of the Work. The inspector will have the authority to reject Work that does not conform to the requirements of this specification and/or other pertinent sections. Inspection does not relieve the manufacturer from any obligation to perform the Work strictly in accordance with the specification. Replace Work not in accordance with the specification by the manufacturer at the manufacturer's expense.
- .3 Shop inspection and quality control reports must accompany equipment delivery consisting of, but not limited to, the following:
 - .1 Verification of thickness of all finishes.
 - .2 Shop test and certification of operation.

1.7 SPECIAL TOOLS

- .1 Special tools required for normal operation and maintenance of the equipment will be supplied by the Manufacturer. The operation and maintenance manual

must identify each such tool and where it is used.

1.8 SPARE PARTS

- .1 Provide following spare parts:
 - .1 Two (2) spare fan belts.
 - .2 Set of filters.

1.9 EQUIPMENT
HANDLING

- .1 Protect parts so that no damage or deterioration will occur in transit or during prolonged storage at the site.
- .2 Mark each box, crate, or package to show its contents and the net weight.
- .3 Provide instructions for loading, unloading and storage requirements emphasizing any precautions or procedures required. These instructions to precede delivery of equipment to the site.
- .4 Coordinate delivery and unloading to prevent double handling.
- .5 Storage equipment in area approved by the Departmental Representative and in accordance with the manufacturer's written instructions prior to installation on site.

PART 2 - PRODUCTS

2.1 WELD COLLECTION
SYSTEM

- .1 Weld fume collection system to be a cartridge style consisting of sixteen nanofiber fire retardent cartridge and a belt driven centrifugal blower in a draw-through arrangement, designed for the 100% removal of weld contaminants in exhaust air streams for typical welding processes.
- .2 Housing construction shall be 10 ga. ASTM hot rolled for a pressure rating of +/- 5000Pa (20")WG. The unit shall be epoxy powder coated inside and outside. Maximum operating temperatures shall be 82.2 degC(180 degF)
- .3 Arrange configuration such that the contaminated air flows into the bottom inlet plenum and is drawn upward through the media bed. Treated air will discharge out the top of the vessel through a polypropylene, centrifugal air ventilator.

- .4 Inlet location shall be front top above cartridge portholes.
- .5 Outlet location shall be bottom side of clean air plenum.
- .6 Filtration - The dust collector must include nanofibre high-efficiency cartridge filters. These filters shall be constructed using nanofibre filtration technology, and be MERV 15 rated when tested in accordance with Ashrae 52.2. This MERV 15 filter efficiency rating shall be obtained when testing new filters, without pre-coating or without previously applied dust cake on the filter media. The nanofibre surface layer fibers are to have 90% of its fibres sized less than 150 nanometers in diameter, continuously run filaments that are rated to be up to 99.9% efficient on 0.3 micron size particulate at operational efficiency. The cartridge filter size shall be 351mm OD x 600mL (13.84"OD x 26"L) in size, and be comprised of 23.7m² (255 sq. ft.) of a blend of cellulose and synthetic fibers. Filters in the unit are to be arranged in a horizontal plane. Filters shall be installed at a perfectly horizontal arrangement and not at any angle, which allows dust to be released during filter change out. Cartridges are to be high efficiency fire retardant media.
- .7 Automatic on-line cleaning system shall be provided to allow for sequential cleaning of each set of filter cartridges. A timer shall be supplied control associated sequential activation the solenoid valves in a cascading pattern.
- .8 Cartridge access shall be through the front portholes and there shall be no requirements for tools during replacement of cartridges. The dust collector filter access doors shall utilize a "quick release" type handle, not a screw-on knob, which does not require any tools for cartridge filter replacement. Note: Access door installation shall not be a "blind" connection hidden behind the door.
- .9 When the compressed air solenoid valves activate, a burst of 620-690 kPa(90-100 psi) compressed air is released through the pulse pipe nozzle into the centre of each cartridge media set. The resulting shock wave and induced clean air shall momentarily reverse the primary flow through the filter set and dislodge any accumulated dust cake. The downward airflow within the unit shall also sweep particulate past the filters to the bottom of the collector and into the hopper.
- .10 Aerodynamic design shall permit the free-fall of

dislodged dust to the hopper and shall minimize direct impingement of dust particles on the media, thus minimizing abrasion and dust buildup.

- .11 Compressed air manifold and pulse valves shall be mounted to the rear of the unit (25mm (1") compressed air connection). Each pulse pipe shall have a 25mm single diaphragm air valve. The pilot solenoid valve control panel shall be NEMA 4 and remote mounted on nearby wall. The solid state printed circuit timer shall be in a NEMA 4 enclosure and remote mounted on nearby wall.
- .12 Magnahelic differential pressure gage shall be provided to monitor status of the filter cartridges.
- .13 Dust Drawer: The dust collector shall include a drawer designed to provide the connection from the dust collector outlet to a removable dust drawer for ease of cleaning.
- .14 Construct fan assembly from 300 series s.s. and aluminum in accordance with AMCA Class B for spark-resistant performance. Bearings shall be L10 life based for average performance of 200,000 hours. Motor shall be T.E.F.C. and power wiring and junction boxes shall be suitable for installation in CSA Class III. Provide resilient mounts and frame for fan and motor.
- .15 Blower to be capable of exhausting the air flow rate indicated.
- .16 Fan motor: be single speed (1750 rpm).
- .17 Weld exhaust system to include prefabricated galvanized steel exhaust ducts.
- .18 Weld exhaust control system to include multiple weld fume extraction arms with associated mounting brackets, mounting stanchions, etc...
- .19 The fume extraction arm shall be 2134 mm (7 ft) in length. The 159 mm (6.25") diameter wall mounted ball bearing mounted extraction arm shall include a powder coated carbon steel mounting bracket with 10 mm (3/8") bolt holes and will have a hanging flange mounted to the underside for mounting the articulated arm. The female spider pivot joint for connecting the machined steel shaft of the shoulder assembly houses two sets of ball bearing rollers for easy lateral movement of the extraction arm. The fume extraction arm is provided with an external sway adjustment friction pad set. The internal support shoulder mechanism shall have an air-foil designed friction pad pivot and will have

a tubular steel support brace which is bolted to the inner arm 20 gauge powder coated aluminum connection tube. An externally adjustable elbow joint will be constructed from polycarbonate and connects the inner arm tube to the outer arm tube. It shall be provided with an external friction pad set for each side of the elbow and will be held in place by an external adjustment knob on each side. The universal wrist joint is supplied with a double plane double pivot to allow the hood to be angled 110 degrees throughout a 360 degree rotation. The hood collar and ring handle assembly will be comprised of a durable 60 degree spun aluminum hood housed with a safety mesh screen and will have an opening of 298 mm (11.75") diameter. The removable hood will be connected to the hood positioning collar through the use of an adjustable latch. The positioning collar will be made of a polycarbonate material including a ratcheted manual shut-off damper. All sections of the fume extraction arm will be interconnected by a 159 mm (6.25") diameter flame resistant double wall, neoprene coated woven polyamide with an external spring steel helix. The wall mounted ball bearing fume extraction arm shall have precise airflows and static pressure curves as tested in accordance with AMCA standard 500-D-98.

- .20 Materials of construction as well as miscellaneous hardware must be suitable for extended service in a welding fume collection system environment.
- .21 Fan silencers are made of heavy welded steel construction filled with high density acoustical absorption material. Silencers operate efficiently at temperatures up to 315.6°C (600°F). The fan duct silencer is designated to reduce the noise level generated by the quoted air moving device to less than 82 dBA at 1525 mm (5') under normal operating conditions. Silencer comes with square to round adapter for connection between silencer and fan housing.
- .22 After Filter: (Safety HEPA). The filter is configured with 2 filters high by 3 filters wide. Air volume rating is 943 LPS (2,000 CFM) per filter for a total of 5660 LPS (12,000 CFM) capacity. The return air safety filters are designed to ensure clean air is discharged from the dust collection system. Each Return Air Safety Filter consists of a side access housing package complete with two-stage filtering system. The housing is constructed of 16 gauge, reinforced galvanized steel and is designed for 250Pa (10" w.g.). The housing includes a 38 mm (1.5"), standing flange with pre-punched holes to facilitate field installation, if required. Channel braced access doors with sponge neoprene gaskets are provided on both sides and include adjustable, positive sealing

latches. The filters are track mounted and held in place by holding frames and springs to ensure positive sealing of the filters for proper gasket compression.

A static pressure tap is included between the pre-filters and final filters. A Magnehelic gauge (field mounted) is included to monitor filter pressure drop. The two-stage filtering system consists of 600 x 600 x 60 (24" x 24" x 2") pre-filters and 600 x 600 x 300 (24" x 24" x 12") box cell final filters.

Pre-filters: average 25-30 percent efficiency, 90-92 percent arrestance ratings and are designed to extend the life of the final filters. The box cell final filters: 90-95 percent efficiency when tested by ASHRAE Test Standard 51.1-92 and have 99 percent arrestance rating.

2.2 INSTRUMENTATION

- .1 Provide weld fume collection system complete with all instrumentation required to facilitate the automatic operation and monitoring of the proposed system equipment.
- .2 Instruments must be either ULC or CSA approved and corrosion resistant.
- .3 Supplied instrumentation to be of a proven design for each application, and be selected to suit their applicable operating process and environmental requirements.
- .4 Instrumentation parts subject to wear, corrosion, or other deterioration, or requiring adjustment, inspection or repair, be accessible and capable of convenient field maintenance.

2.3 CONTROLS

- .1 Provide an integral control panel to house the weld collection control system, fan starter, air flow monitoring system, main fused disconnect switch, local annunciation (on/off, fault, etc), and associated control wiring. Panel to include external on/off selector switch for the fan. Starter controls to be accessible with panel closed.
- .2 Control panel enclosure to be NEMA 4.
- .3 Mount control panel controls (selector switches, pilot lights, etc.) on an inner hinged mounting door. Hinge outer control panel door and provide complete with padlocking attachment to prevent unauthorized access to plant controls.

- .4 Construct control panel for connection of a 600V, 3 phase, 60 Hz single feed power supply.
- .5 Provide a main, heavy duty, fused disconnect switch for disconnection of power to the main control panel. The disconnect switch to be a quick-make, quick-break type of ampere rating and number of poles to match the load requirements of the control panel. Fuse holders must be suitable without adapters for the size and type of fuse installed. The disconnect switch must be operable from either the front or side without opening the enclosure door and there shall be provision for padlocking the disconnect switch in the off position by a minimum of three padlocks. The disconnect switch must have a defeatable door interlock to prevent the door from opening when the operating handle is on.
- .6 Motor starters to be three phase magnetic starters, sized in accordance with manufacturer's instructions for the motor being controlled. Motor starters to be NEMA design. IEC equipment or half size motor starters are not acceptable. Motor starters to have a 120V, 60Hz operating coil and to have a minimum of one (1) spare normally open and one (1) spare normally closed run contact. Overload relays to be solid state with visible trip indication, adjustable overload protection, phase loss protection and ground fault protection.
- .7 Control transformers to have primary and secondary fuses. Transformer VA rating to have 100VA capacity in excess of the total operating requirements. Secondary fuses to be HRC, Class CC. Primary fuses to be HRC, Class J.
- .8 Power fuses to be high rupturing capacity (HRC) type, minimum 200kA interrupting rating (momentary RMS symmetrical). Use Class J, fast acting type for the main disconnect switch and for non-motor load circuits. Use Class J, time delay type (capable of carrying 500% of its rated current for 10 seconds minimum) for motor loads.
- .9 Required selector switches, alarm and indicating lights to be Allen Bradley 800H Series or approved equal.
- .10 Control panel to have a minimum short circuit rating of 18KA (momentary rms symmetrical) at 600Vac, 3 phase.
- .11 Control panel to have the following dry contacts (rated minimum 5A at 120V) for connection to a PLC-control system.
 - .1 Fan run status
 - .2 Fan Fault

.3 Air Flow Fail

- 2.4 ELECTRICAL REQUIREMENTS
- .1 Electrical equipment must meet or exceed the Canadian Electrical Code.
 - .2 Motors to be TEFC, rated 600V6AC, 60 Hz, 3 phase.

PART 3 - EXECUTION

- 3.1 MEDIA
- .1 Contractor shall supply enough spare cartridge media to carry out full media change.
 - .2 Media shall be installed in the unit at time of installation.
 - .3 Media to be supplied in appropriate packaging for storage by Departmental representative.

- 3.2 SUPERVISION AND START-UP
- .1 Provide for a total of one (1) full day consisting of a half day of on-site installation inspection and start-up service for the weld fume collection system and half day training along with supply of video showing maintenance and media installation to be provided to the Departmental Representative after training. Service will be provided by a factory trained technician. Quotation to be inclusive of all expenses. Bear all costs should additional time on the site be necessary as a result of failure of the units and system to perform as required.
 - .2 Test the system under actual operating conditions to the extent that is possible at the time of commissioning.

- 3.3 LUBRICATION
- .1 Provide sufficient quantity of grease or oil of the correct grade necessary for the initial start-up operation of the equipment.

