1. GENERAL

1.01 SUBMITTALS

.1 Submit shop drawings/product data sheets for fans and accessories. Include following:

.1 certified fan performance curves at specified operating point with flow, static pressure and HP clearly plotted;

.2 certified sound power data that conforms to specified levels;

.3 product data sheets for all accessories;

.4 product data sheets for fan motors.

1.02 CLOSEOUT SUBMITTALS

.1 Submit with delivery of each unit a copy of the factory inspection report, and include a copy of each report with O&M Manual project closeout data.

.2 Submit a site inspection and start-up report from manufacturer's representative as specified in Part 3 of this section.

.3 Supply reviewed copies of fan/curb assembly shop drawings or product data to trade who will cut roof openings for fans, and ensure openings are properly located.

.4 Supply reviewed copies of fan assembly shop drawings or product data to trade who will form/prepare wall openings for fans, and ensure openings are properly located.

.5 Submit a signed copy of destratification fan manufacturer's 5 year extended parts and labour warranty.

.6 Submit a signed copy of ceiling mounted fan manufacturer's extended 3 year warranty.

.7 Training attendance records.

1.03 QUALITY ASSURANCE

.1 Fan manufacturers, as applicable, are to be current members of the Air Movement and Control Association International Inc. (AMCA), and fans are to be rated (capacity and sound performance) and certified in accordance with requirements of following standards:

.1 ANSI/AMCA Standard 210, Laboratory Method of Testing Fans for Certified Aerodynamic Performance Rating;

.2 AMCA Standard 211, Product Rating Manual for Fan Air Performance;

.3 ANSI/AMCA Standard 300, Reverberant Room Method for Sound Testing of Fans;

.4 AMCA Standard 311, Product Rating Manual for Fan Sound Performance;

.5 AMCA Standard 99-2408, Operating Limits for Centrifugal Fans.

2. PRODUCTS

2.01 CENTRIFUGAL FANS

.1 Centrifugal fans in accordance with drawing schedule, each capable of operating over the complete pressure class limits as specified in AMCA Standard 99-16.

.2 Continuously welded heavy-gauge steel housing, braced and reinforced as required to prevent vibration or pulsation, equipped with a discharge flange, spun, aerodynamically designed inlet cones or venturies with wire grid guards, drain plug, and epoxy enamel coated both inside and outside to a 3 mm dry film thickness.

.3 Continuously welded, stable, non-overloading wheel with die-formed steel blades and, unless otherwise required, a cast iron hub, statically and dynamically balanced prior to assembly, then balanced as an assembly and braced and secured to base prior to shipment.

.4 AISI C1040 or C1050 hot rolled steel fan shaft, accurately turned, ground, polished, and ring gauged for accuracy, and sized for a first critical speed of at least 1.25 times the maximum rated speed for fan, and heavy-duty, grease lubricated, ball or roller, self-aligning pillow block type bearings selected for an AFBMA L-10 minimum average bearing life in excess of 200,000 hours, and equipped with extended copper lubrication lines terminated in lubrication fittings immediately inside fan section access door.

.5 NEMA Premium TEFC motor, adjustable V-belt drive selected for 40% service factor based on motor nameplate data, and OHSA guard, all in accordance with requirements of Section 20 05 00 – Common Work Results for Mechanical.

.6 Fan and motor support base is to be rigid, welded structural steel, vibration isolated base with steel cross members, factory cleaned, deburred, and finished with epoxy enamel, and complete with a slide type motor base and stable, colour coded spring mounts with sound pads

selected to suit static deflection and maximum equipment load and to operate at not greater than 2/3 solid load, and shipping restraints.

.7 Maximum acceptable sound power levels at the fan outlet are as follows:

Fan	Octave Bands							
	1	2	3	4	5	6	7	8
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

.8 Unless otherwise specified, finish is to consist of rust inhibiting primer applied to cleaned and deburred metal surfaces prior to assembly, then a second coat of primer after assembly and an air dried epoxy enamel finished coat both inside and outside to a 3 mm dry film thickness.

.9 Factory secured seismic restraint connection hardware.

.10 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 CML Northern Blower;

.5 PennBarry.

2.02 EXPLOSION-PROOF CENTRIFUGAL FANS

.1 Explosion-proof centrifugal fans in accordance with drawing schedule, each capable of operating over complete pressure class limits as specified in AMCA Standard 99-2408 and rated Spark A in accordance with AMCA Standard 99-0401, Classification for Spark Resistant Construction.

.2 Housing constructed as per ASTM Standard 99-0401 to suit "Spark" classification, with a wheel direct connected to an explosion-proof TEFC motor conforming to requirements specified in Section 20 05 00 – Common Work Results for Mechanical, statically and dynamically balanced prior to assembly, then balanced as an assembly and secured to base prior to shipment.

.3 Rigid, welded structural steel, vibration isolated fan support base with steel cross members, factory cleaned, deburred, and finished with epoxy enamel, and complete with stable, colour coded spring mounts with sound pads selected to suit static deflection and maximum equipment

load and to operate at not greater than 2/3 solid load, and shipping restraints.

.4 Factory secured seismic restraint connection hardware.

.5 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 CML Northern Blower;

.5 PennBarry.

2.03 UTILITY FANS

.1 Centrifugal, single width and inlet, factory run tested utility fans in accordance with drawing schedule, and capable of operating over complete pressure class limits as specified in AMCA Standard 2408.

.2 Rotatable, continuously welded heavy-gauge steel housing, braced and reinforced as required to prevent vibration or pulsation, equipped with a spun, aerodynamically designed inlet cone, and an attached welded steel bearing and motor support platform.

.3 Riveted aluminum or welded steel wheel, statically and dynamically balanced.

.4 For belt driven fans only, AISI C1040 or C1045 hot rolled steel shaft, accurately turned, ground, polished, and ring gauged for accuracy, and sized for a first critical speed of at least 1.43 times maximum rated speed for fan, equipped with heavy-duty, grease lubricated, ball, pillow block type bearings, selected for a minimum average AFBMA L-50 bearing life of 200,00 hours at the maximum fan RPM, and secured to bearing support platform, and an adjustable V-belt drive with OHSA guard (weather cover) in accordance with requirements of Section 20 05 00 – Common Work Results for Mechanical.

.5 NEMA Premium TEFC motor conforming to requirements of Section 20 05 00 – Common Work Results for Mechanical.

.6 Unless otherwise specified, the finish is to consist of rust inhibiting primer applied to cleaned and deburred metal surfaces prior to assembly, then a second coat of primer after assembly and an air dried epoxy enamel finished coat both inside and outside to a 3 mm dry film thickness.

.7 Factory secured seismic restraint connection hardware.

.8 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 CML Northern Blower;

.5 PennBarry.

2.04 CENTRIFUGAL INLINE FANS

.1 Centrifugal, ULC listed, factory run tested rectangular inline fans in accordance with drawing schedule.

.2 Heavy-gauge galvanized steel housing with removable side panels to permit removal of power assembly without disturbing duct connections, universal mounting brackets and hardware including spring vibration isolators to accommodate horizontal or vertical mounting as required, a flanged inlet panel with inlet venturi, a flanged outlet panel, both with duct connection collars, and galvanized steel wire grid fan inlet/outlet guard(s).

.3 Non-overloading aluminium wheel with backward inclined blades with matching inlet venturi, statically and dynamically balanced as an assembly.

.4 For belt-drive fans only, hot rolled steel shaft, accurately turned, ground, and polished, and sized for a first critical speed of at least 1.25 times maximum rated speed for fan, and heavy-duty, self-aligning pillow block type bearings selected for an AFBMA L-50 minimum average life in excess of 500,000 hours and equipped with lubrication line and fitting, and an adjustable V-belt drive with guard conforming to requirements of Section 20 05 00 – Common Work Results for Mechanical.

.5 TEFC motor conforming to requirements specified in Section 20 05 00 – Common Work Results for Mechanical, mounted out of the airstream, complete with a cover, and factory pre-wired to a NEMA 4 disconnect switch.

.6 For fans as scheduled, factory supplied accessories as follows:

.1 for fans as scheduled, housing insulation (lining), consisting of neoprene spray coated glass fibre semi-rigid insulation meeting NFPA 90A requirements and 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102, permanently secured in place with no exposed edges;

.2 for fans as scheduled, a galvanized steel filter box with frame suitable for 25 mm (2") thick disposable panel type filters;

.3 factory secured seismic restraint connection hardware.

.7 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 JencoFan;

.5 Carnes Company Inc.

2.05 PLENUM FANS

.1 Centrifugal airfoil design plenum fans in accordance with drawing schedule, designed without a scroll type housing, and capable of operating over complete pressure class limits as specified in AMCA Standard 99-2408.

.2 Heavy-gauge reinforced steel inlet plate with perimeter square formed lip, spun steel inlet cone bolted to inlet plate for smooth airflow into venturi shaped inlet cone of the fan wheel, and a welded structural steel framework forming a mounting base and bearing support platform welded to the inlet plate.

.3 Non-overloading wheel with 9 backward inclined, die-formed, airfoil design steel blades continuously welded to a spun inlet cone, back plate, and cast iron hub, statically and dynamically balanced as an assembly, and designed for critical speeds of at least 1.25 times maximum class speed.

.4 For belt driven fans, AISI C1040 or C1050 hot rolled steel shaft, accurately turned, ground, polished and ring gauged for accuracy, and sized for a first critical speed of at least 1.25 times maximum rated speed for fan, and heavy-duty, grease lubricated, ball or roller self-aligning pillow block type bearings selected for an AFBMA L-10 minimum average life in excess of 200,000 hours and equipped with extended copper tube lubrication lines terminated in accessible lubrication fittings, and an adjustable V-belt drive selected for 40% service factor based on motor nameplate data and conforming to requirements specified in Section 20 05 00 – Common Work Results for Mechanical.

.5 NEMA Premium TEFC motor conforming to requirements specified in Section 20 05 00 – Common Work Results for Mechanical.

.6 Rigid, welded structural steel, vibration isolated fan and motor support base with steel cross members, factory cleaned, deburred, and finished with epoxy enamel, and complete with slide type motor base, and stable, colour coded spring mounts with neoprene sound pads selected to suit static deflection and to operate at not greater than 2/3 solid load, and equipped with shipping restraints.

.7 Rigid, open mesh galvanized steel screen enclosure with fan wheel access facilities, and a removable galvanized steel mesh inlet screen.

.8 Minimum acceptable AMCA sound power levels at the fan outlet are as follows:

Fan	Octave Bands							
	1	2	1	4	1	6	1	8
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]
[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]	[ ]

.9 Unless otherwise specified, factory finish is to consist of rust inhibiting primer applied to cleaned and deburred surfaces prior to assembly, then a second coat of primer after assembly and an air dried epoxy enamel finish applied to all inside and outside surfaces to a 3 mm dry film thickness.

.10 Factory secured seismic restraint connection hardware.

.11 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 CML Northern Blower;

.5 PennBarry.

2.06 ROOF MOUNTED EXHAUST FANS

.1 Centrifugal, ULC listed, factory run tested roof mounted exhaust fans in accordance with drawing schedule.

.2 Spun aluminium housing with deep venturi inlet, aluminium curb cap with continuously welded corners, pre-punched mounting holes, galvanized steel or aluminium bird screen, and EMT conduit chase to the motor compartment.

.3 Centrifugal, non-overloading aluminum wheel with backward inclined blades matched to inlet venturi, statically and dynamically balanced as an assembly.

.4 For belt-drive fans only, hot rolled steel shaft, accurately turned, ground, and polished, and sized for a first critical speed of at least 1.25 times maximum rated speed for fan, and one-piece grease lubricated pillow block type bearings selected for an AFBMA L-50 minimum average life in excess of 500,000 hours at maximum catalogue operating speed and equipped with a lubrication fitting, and a heavy-gauge galvanized steel adjustable V-belt drive with guard conforming to requirements of Section 20 05 00 – Common Work Results for Mechanical.

.5 Motors are to conform to requirements specified in Section 20 05 00 – Common Work Results for Mechanical, mounted on vibration isolation in a compartment outside of the airstream, and factory pre-wired to a NEMA 4 disconnect switch.

.6 Prefabricated, minimum 300 mm (12") high heavy-duty aluminum roof mounting curb with factory installed wood nailer, 40 mm (1-½") thick insulation, continuously welded seams, and damper tray.

.7 For fans as scheduled, factory supplied accessories as follows:

.1 gravity backdraft damper with #20 gauge galvanized steel frame and #26 gauge aluminum blades with felt edge blade seals;

.2 non-corrosive motorized damper with linkage, end switch, and motor with voltage to match fan motor;

.3 continuous non-corrosive piano type curb hinge to permit access to fan, damper and connecting duct, complete with retaining chain and a security hasp to prevent removal of unit from curb cap and prevent building entry through connecting ductwork;

.4 2-speed switch and 2-speed double winding 1-phase motor in accordance with Section 20 05 00 – Common Work Results for Mechanical;

.5 factory secured seismic restraint connection hardware.

.8 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 JencoFan;

.5 Carnes Company Inc.

2.07 SIDEWALL PROPELLER FANS

.1 Axial flow type, ULC listed, factory run tested propeller fans in accordance with drawing schedule.

.2 Heavy-gauge galvanized steel drive component frame bolted or welded to formed galvanized steel fan panel equipped with formed flanged edges, pre-punched mounting holes, and a deep formed inlet venturi.

.3 Fabricated steel blades unless otherwise specified, welded to a heavy-gauge steel hub, and dynamically balanced.

.4 For belt-drive fans only, AISI 1045 cold rolled steel shaft, accurately turned, ground, and polished, and sized for a first critical speed of at least 1.25 times maximum rated speed for fan, and grease lubricated or permanently lubricated, sealed, ball type pillow block bearings selected for an AFBMA L-50 minimum average life in excess of 200,000 hours at maximum fan RPM, with a variable pitch adjustable V-belt drive with guard conforming to requirements of Section 20 05 00 – Common Work Results for Mechanical.

.5 Motor in accordance with requirements specified in Section 20 05 00 – Common Work Results for Mechanical.

.6 Unless otherwise specified, all bare steel surfaces are to be cleaned, primed, and factory finished with epoxy equipment enamel.

.7 Factory supplied accessories as follows:

.1 #16 gauge G90 galvanized steel wall box with removable screen guard, equipped with mounting flanges with pre-punched holes;

.2 back draft damper with galvanized steel frame, aluminum blades with felt edge seals, stainless steel shaft, and OHSA damper guard;

.3 galvanized steel weather hood with removable galvanized steel wire mesh bird screen, with mounting flanges equipped with pre-punched mounting holes;

.4 OHSA motor side guard with galvanized steel side panels and removable galvanized steel wire mesh screen;

.5 factory secured seismic restraint connection hardware.

.8 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 JencoFan;

.5 Carnes Company Inc.;

.6 PennBarry.

2.08 CORROSION RESISTANT CENTRIFUGAL FANS

.1 Centrifugal FRP fans in accordance with drawing schedule, with drive arrangement and configuration as indicated on drawings, and capable of operating over complete pressure class limits as specified in AMCA Standard 99-2408.

.2 Aerodynamically designed housing with high efficiency inlet, manufactured from resins, UV inhibited, reinforced with fibreglass, and with bolts holding housing to support plate encapsulated in FRP, and no uncoated metal in contact with corrosive air stream. Each assembly is to be complete with graphite impregnated interior casing, lifting lugs, type 304 stainless steel fasteners, a FRP ridge inside casing to divert condensation from dripping over hub and shaft, a flanged inlet and outlet, and an impeller inspection and service access door.

.3 Backward curved FRP wheel electronically statically and dynamically balanced after assembly, with an integral metal back plate encapsulated in resin and with hub extended to outside housing, a removable FRP cap to cover impeller end of shaft, and a vacuum hub seal to prevent contaminated air from escaping from fan housing.

.4 For belt driven fans, type 316 stainless steel shaft, accurately turned, ground, polished, and ring gauged for accuracy, and sized for a first critical speed of at least 1.25 times maximum rated speed for fan, and complete with guard, and heavy-duty, sealed, grease lubricated, ball or roller, self-aligning pillow block type bearings selected for an AFBMA L-10 minimum average bearing life in excess of 200,000 hours, and equipped with extended copper lubrication lines terminated in lubrication fittings at exterior of fan assembly, and an adjustable V-belt drive selected for 50% service factor based on motor nameplate data, with FRP OHSA guard in accordance with requirements of Section 20 05 00 – Common Work Results for Mechanical.

.5 NEMA Premium TEFC motor conforming to requirements of Section 20 05 00 – Common Work Results for Mechanical.

.6 Rigid, welded structural steel unitary fan and motor support base, factory cleaned and finished with 4 to 6 mm thick baked powder epoxy enamel.

.7 Factory secured seismic restraint connection hardware.

.8 Manufacturers:

.1 M. K. Plastics Corp.;

.2 New York Blower Co.;

.3 Pasticair Inc.

2.09 VANEAXIAL FANS

.1 Vaneaxial, ULC listed, factory run tested fans in accordance with drawing schedule.

.2 Heavy-gauge welded ASTM A-569 hot rolled steel housing with inlet and outlet flanges, and, on the discharge side of fan wheel, aerodynamically designed stationary straightening guide vanes welded to both inner cylinder and fan housing interior.

.3 Propeller type wheel, solid, one-piece casting of A356-T6 aluminium with 7 airfoil shape blades and an integral centre hub, machined to proper diameter, secured to fan/motor shaft by means of a taper-lock bushing, and statically and dynamically balanced as an assembly.

.4 For belt-drive fans only, AISI 1040 or 1045 hot rolled steel shaft, accurately turned, ground, and polished, and sized for a first critical speed of at least 1.43 times maximum rated speed for fan, and heavy-duty, self-aligning, grease lubricated pillow block type bearings selected for an AFBMA L-50 minimum average life in excess of 200,000 hours at maximum fan RPM and equipped with extended lubrication lines terminated at housing exterior in lubrication fittings, and an adjustable V-belt drive with guard conforming to requirements of Section 20 05 00 – Common Work Results for Mechanical. Drive assembly is to extend through a 2-piece aerodynamically shaped belt fairing welded continuously to both inner cylinder housing fan shaft and bearings, and fan housing.

.5 TEFC foot mounted motor conforming to requirements specified in Section 20 05 00 – Common Work Results for Mechanical.

.6 Steel surfaces of entire fan assembly, excluding fan shaft, are to be thoroughly degreased, deburred, coated with rust-preventive primer, and finished with equipment enamel. Coat fan shaft with a petroleum-based rust protectant.

.7 For fans as scheduled, factory supplied accessories as follows:

.1 vibration isolators;

.2 torosoidal shaped inlet bell, flanged, drilled and bolted to fan's flanged inlet;

.3 galvanized steel wire grid fan inlet/outlet guard(s);

.4 inlet/outlet cones, flanged at both ends and drilled to match fan flanges;

.5 steel support legs welded to fan flanges;

.6 formed steel angle support clips welded to fan housing;

.7 factory secured seismic restraint connection hardware.

.8 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 CML Northern Blower;

.5 PennBarry;

.6 JencoFan;

.7 Carnes Company Inc.

2.10 CEILING MOUNTED DESTRATIFICATION FANS

.1 Northwest Envirofan "Gold Line" white, down-blowing, extra heavy-duty industrial grade, CSA certified direct drive ceiling mount destratification fans in accordance with drawing schedule, each complete with:

.1 curved aluminum fan blades secured to a steel hub;

.2 permanent magnet, brushless, non-ventilated, heat sink design motor rated for continuous operation at maximum speed in a 55°C (130°F) ambient temperature and capable of modulating fan speed from 0 to 100% without the use of a gearbox or other mechanical means of control, and a factory programmed controller housed in an enclosure independent of motor to minimize starting and braking torques, with a simple diagnostic program and a LED to identify and relay faults in system;

.3 250 mm (10") long down rod, a 330 mm (13") long galvanized steel safety chain, and all other required mounting and securing hardware;

.4 400 mm (16") long power cord with 3-prong plug, factory pre-wired to motor;

.5 "Protecto-Guard" welded wire fan guard sized to suit fan blade size;

.6 120 volt variable speed (Off-High-Low) solid-state infinite speed fan controller with stainless steel faceplate designed to mount to a 100 mm (4") outlet box and to control fan groupings as indicated on drawings;

.7 factory secured seismic restraint connection hardware.

.2 Manufacturers:

.1 Northwest Envirofan;

.2 Big Ass Fan Co.;

.3 Marley Engineered Products "Leading Edge".

2.11 CEILING MOUNTED FANS

.1 ULC listed and labelled ceiling mounted centrifugal, AMCA rated and certified (capacity and sound to AMCA Standards 211 and 311), exhaust fans in accordance with drawing schedule, complete with:

.1 minimum #20 gauge galvanized steel housing equipped with duct connection collar(s), integral spring loaded aluminum backdraft damper, 12 mm (½") thick acoustic insulation meeting 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102, multi-position mounting brackets, and an integral CSA certified electrical receptacle in an outlet box for plug-in connection of fan motor;

.2 low RPM, resiliently mounted, direct connected fan wheel and motor assembly with a forward curved, statically and dynamically balanced galvanized steel or calcium carbonate filled polypropylene centrifugal wheel direct connected to a 1-phase motor conforming to requirements specified in Section 20 05 00 – Common Work Results for Mechanical, and equipped with a length of power cord and plug;

.3 for fans as indicated and/or scheduled, a white calcium carbonate exhaust grille;

.4 factory supplied accessories in accordance with drawing schedule, as follows:

.1 rectangular to round duct transitions;

.2 roof cap with backdraft damper and birdscreen;

.3 wall cap with backdraft damper and birdscreen.

.2 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 CML Northern Blower;

.5 PennBarry.

2.12 ROOF MOUNTED FILTERED SUPPLY FANS

.1 Low profile louvre penthouse type, weatherproof, packaged, centrifugal, factory run tested, roof mounted filtered supply fans as per the drawing schedule.

.2 Hood is to be all aluminium welded structural framing and aluminium alloy blade extrusions with mitred corners, removable top cap pitched for water run-off, side access panel, expanded aluminium mesh bird screen, formed filter channels, 25 mm (1") thick glass fibre insulation meeting 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102, and an aluminium curb cap.

.3 Galvanized steel fan housing of lock seam construction, braced to minimize pulsation and/or vibration and complete with spun, aerodynamically designed inlet cones or venturies, duct adaptor designed to fit over roof curb and permit duct connection before fan is set in place, and a fan inlet screen.

.4 Centrifugal, non-overloading aluminum wheel with backward inclined blades continuously welded to rim and back plate, and statically and dynamically balanced as an assembly.

.5 Disposable, 50 mm (2") thick glass fibre media filters, ULC Class 2, 20% – 35% efficient, minimum MERV 6 as per ASHRAE 52.2, enclosed in permanent galvanized steel frames with metal retainers on both sides.

.6 ANSI 1040 or 1045 cold rolled steel shaft, accurately turned, ground, and polished, and sized for a first critical speed of at least 1.25 times maximum rated speed for fan, and one-piece grease lubricated pillow block type bearings selected for an AFBMA minimum average life in excess of 200,000 hours at maximum catalogue operating speed and equipped with zinc rich paint coated steel bearing supports and a lubrication fitting.

.7 Motor mounted on a slide type base and factory pre-wired to a NEMA 4 disconnect switch on unit casing, and adjustable V-belt drive with guard conforming to requirements of Section 20 05 00 – Common Work Results for Mechanical.

.8 Prefabricated, minimum 300 mm (12") high heavy-duty aluminum roof mounting curb with factory installed wood nailer, 40 mm (1-½") thick insulation meeting 25/50 flame spread/smoke developed ratings when tested in accordance with CAN/ULC S102, and continuously welded seams.

.9 Non-corrosive motorized damper supplied loose for site installation in connecting ductwork, equal to T. A. Morrison TAMCO Series 9000 insulated damper with linkage, end switch, and a Belimo or equal motor with voltage to match fan motor.

.10 Factory secured seismic restraint connection hardware.

.11 Manufacturers:

.1 Twin City Fan and Blower;

.2 Loren Cook Co.;

.3 Greenheck Fan Corp.;

.4 CML Northern Blower;

.5 PennBarry;

.6 JencoFan;

.7 Carnes Company Inc.

3. EXECUTION

3.01 INSTALLATION OF CENTRIFUGAL FANS

.1 Provide centrifugal fans.

.2 Secure each base mounted fan in place, level and plumb, on vibration isolation on a concrete housekeeping pad.

.3 Secure suspended units in place from structure, level, and plumb, by means of vibration isolation spring hangers, properly sized galvanized steel hanger rods and galvanized structural steel angle or channel trapeze supports.

.4 Install explosion-proof units in accordance with classification requirements.

.5 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.6 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.7 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.8 Include for a 1/2 day on-site operation demonstration and training session. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

3.02 INSTALLATION OF UTILITY FANS

.1 Provide utility fans.

.2 Secure each fan in place, level, and plumb, on vibration isolation on a concrete housekeeping pad or base as indicated.

.3 Secure suspended units in place from structure, level, and plumb, by means of vibration isolation spring hangers, properly sized galvanized steel hanger rods, and galvanized structural steel angle or channel trapeze supports.

.4 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.5 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.6 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.7 Include for a 4 hour on-site operation demonstration and training session. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

3.03 INSTALLATION OF CENTRIFUGAL INLINE FANS

.1 Provide inline centrifugal fans.

.2 Secure each fan in place from structure with vibration isolation, independent of connecting ductwork and in accordance with fan manufacturer's instructions.

.3 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.4 Ensure duct connections are made using flexible connection material.

.5 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.6 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.7 Include for a 4 hour on-site operation demonstration and training session. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

3.04 INSTALLATION OF PLENUM FANS

.1 Provide plenum fans in air handling system plenums.

.2 Secure fans in place, level, and plumb, on vibration isolation.

.3 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.4 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.5 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.6 Include for a 1/2 day on-site operation demonstration and training session. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

3.05 INSTALLATION OF ROOF MOUNTED EXHAUST FANS

.1 Provide roof mounted exhaust fans.

.2 Supply a roof mounting curb with each fan and hand curbs to roofing trade on roof for mounting and flashing into roof construction as part of roofing work. Secure fans in place on curbs.

.3 Install dampers in curb damper tray and secure in place.

.4 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.5 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.6 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.7 Include for a 4 hour on-site operation demonstration and training session. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

3.06 INSTALLATION OF SIDEWALL PROPELLER FANS

.1 Provide sidewall propeller fans. Coordinate location(s) and size(s) of wall opening(s) with trade preparing the opening(s).

.2 Rigidly secure each fan and accessories in place to structure in accordance with fan manufacturer's instructions.

.3 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.4 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.5 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

3.07 INSTALLATION OF FRP CENTRIFUGAL FANS

.1 Provide FRP centrifugal fans.

.2 Secure each base mounted fan in place, level, and plumb, on corrosion resistant vibration isolation on a concrete housekeeping pad.

.3 Secure suspended units in place from structure, level and plumb, by means of corrosion resistant vibration isolation spring hangers, properly sized type 316 stainless steel hanger rods and a structural type 316 stainless steel angle, or channel support structure.

.4 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.5 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.6 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

3.08 INSTALLATION OF VANEAXIAL FANS

.1 Provide vaneaxial fans.

.2 Secure each fan in place to or from structure with vibration isolation as indicated, independent of connecting ductwork.

.3 Ensure duct connections are made using flexible connection material.

.4 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.5 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.6 For equipment/system start-up requirements, Refer to Section 20 05 00 – Common Work Results for Mechanical.

.7 Include for a 1/2 day on-site operation demonstration and training session. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

3.09 INSTALLATION OF CEILING DESTRATIFICATION FANS

.1 Provide ceiling destratification fans.

.2 Secure each fan in place at the ceiling from structure in accordance with manufacturer's instructions and drawing details. Confirm exact locations prior to roughing-in. Install safety chains and fan blade guards.

.3 Plug each fan motor into an adjacent receptacle.

.4 Supply a fan speed controller for fans as indicated and hand to electrical trade at site for wall mounting and connection to fan motor controllers. Confirm exact speed controller locations prior to installation, and include for identification of each speed controller.

.5 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.6 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.7 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.8 Include for a 1/2 day on-site operation demonstration and training session. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration, with abnormal events.

3.10 INSTALLATION OF CEILING FANS

.1 Provide ceiling exhaust fans.

.2 Secure each ceiling mounted fan housing in place in ceiling space, flush with suspended ceiling.

.3 Secure suspended units in place from structure, level, and plumb, by means of vibration isolation spring hangers and galvanized steel hanger rods.

.4 Plug fan motors into housing receptacles.

.5 Supply exterior wall/roof discharge caps as indicated.

.6 Hand roof caps to roof trade for installation and flashing into roof construction as part of roofing work.

.7 Install wall caps and secure in place. Caulk perimeter of each wall cap in accordance with caulking requirements specified in Division 07.

.8 Connect fan housings and discharges with ductwork.

.9 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.10 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

3.11 INSTALLATION OF ROOF MOUNTED FILTERED SUPPLY FANS

.1 Provide roof mounted filtered supply fans.

.2 Supply a roof mounting curb with each fan and hand curbs to roofing trade on roof for mounting and flashing into roof construction as part of roofing work. Secure fans in place on curbs.

.3 Brace and secure each unit in accordance with requirements specified in Section 20 05 48.16 – Seismic Controls for Mechanical Systems.

.4 Secure duct adaptors in place on curbs on foam tape or other suitable gasket material, and install motorized dampers (supplied loose) in connecting ductwork. Coordinate connection of power from fan starter to damper motor with electrical trade who will make the connection.

.5 For equipment/system manufacturer certification requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

.6 For equipment/system start-up requirements, refer to Section 20 05 00 – Common Work Results for Mechanical.

3.12 CLOSEOUT ACTIVITIES

.1 Include for a 4 hour on-site operation demonstration and training session. Training is to be a full review of all components including but not limited to a full operation and maintenance demonstration.

End of Section