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**Twin City Fan & Blower Guide Specification
Plenum Fans: Model EPLFN, Direct Drive**

**Twin City Fan & Blower’s Model EPLFN Commercial Duty Plenum** **Fans** incorporate the same performance and quality characteristics of the E-Series plenum fans, but in a lighter duty, more economical design. The EPLFN offers a competitive cost advantage over full-framed plenum fan designs in light to medium duty applications with static pressures of 12 inches wg or less.

The compact direct drive EPLFN offers reduced maintenance by eliminating shafts, bearings and V-belt drives. The EPLFN is a great choice for applications requiring clean airstreams as there is no belt residue in the airstream. The arrangement 4 configuration offers space savings with a reduced fan footprint. Different performance points can be achieved either through wheel width reduction or varying motor speeds. Models EPLFN is AMCA certified for Sound and Air.

**Application**

Sizes (wheel diameters): 12.25 to 49.0 inches (311 mm to 1245 mm)
Airflow: Up to 68,800 CFM (116,890 m3/hour)
Static Pressure: Up to 12 inches wg (2,984 Pa)

Twin City Fan & Blower (TCF) is an industry leading designer and manufacturer of high quality commercial and industrial fans and is a division of Twin City Fan Companies, Ltd. Our extensive product line includes centrifugal fans and blowers, axial fans, and power roof ventilators. For the commercial market, TCF supplies ventilation fans for retail and office buildings, restaurants, schools, hospitals, and government buildings. TCF’s industrial fans are used in a wide variety of process applications for numerous industries including Petrochemical, Nuclear, Cement, Steel, and Air Pollution Control. Special materials, construction, coatings, and accessories are available to fit any application requirements.

TCF has completed thousands of successful installations across the globe and has a proven track record for tackling the most technically complex applications within the fan industry. TCF is also known for its technical design capabilities, comprehensive testing services, and responsive sales team. Due to the company’s extensive expertise and long-standing reputation for proven quality, TCF products continue to be specified around the globe.

TCF occupies over 1,000,000 sq. ft. of manufacturing space across ten facilities in the U.S, with expanded manufacturing and service operations located in South America, Europe, India, China, and Singapore. Headquarters are located in Minneapolis, Minnesota, which houses the management, sales and marketing, accounting, human resources, material management, engineering personnel, as well as a state-of-the-art AMCA accredited testing lab.

We recommend you consult with your Twin City Fan & Blower Sales Representative, who can be contacted through: Twin City Fan & Blower, Minneapolis MN; (763) 551-7600; email: tcf\_sales@tcf.com; [www.tcf.com](http://www.tcf.com).

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SECTION 23 34 16.04 – PLENUM FANS

1. GENERAL
	* + 1. SUMMARY
				1. Section includes plenum fans, direct drive.
			2. REFERENCE STANDARDS
				1. Air Movement and Control Association International, Inc. (AMCA): [www.amca.org](http://www.amca.org):

AMCA Standard 204 - Balance Quality and Vibration Levels for Fans

AMCA Standard 205 - Energy Efficiency Classification for Fans

AMCA Standard 210 - ASHRAE 51 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating

AMCA Publication 211 - Certified Ratings Program - Product Rating Manual for Fan Air Performance

AMCA Standard 300 - Reverberant Room Method for Sound Testing of Fans

AMCA Publication 311 - Certified Ratings Program - Product Rating Manual For Fan Sound Performance

* + - * 1. National Electrical Manufacturers Association (NEMA): [www.nema.org](http://www.nema.org)

NEMA MG 1 – Motors and Generators

* + - * 1. National Fire Protection Association (NFPA): [www.nfpa.org](http://www.nfpa.org):

NFPA 70 - National Electric Code

* + - * 1. Office of Statewide Health Planning and Development (OSHPD): https://www.oshpd.ca.gov/

OSHPD Special Seismic Certification Preapproval OSP-0355-10

ICC-ES AC 156 – Acceptance Criteria for Seismic Certification by Shake-Table Testing of Nonstructural Components

* + - 1. ACTION SUBMITTALS
				1. Product Data: Include the following:

Rated capacities and operating characteristics.

Fan Performance Data: Fan performance curves with flow, static pressure and horsepower.

Sound Performance Data: Fan inlet and outlet sound power levels in eight octave bands and, A-weighted overall inlet and outlet sound power level or sone values.

Motor ratings and electrical characteristics.

Furnished specialty components.

Specified accessories.

Dimensioned standard drawings indicating dimensions, weights, and attachments to other work.

Specifier: If Contractor will be required to provide engineering drawings and calculations for vibration, seismic, or high wind design, insert requirements here.

* + - 1. INFORMATIONAL SUBMITTALS
				1. Source quality-control reports.
				2. Field quality-control reports.
				3. ISO-9001 certificate.
			2. CLOSEOUT SUBMITTALS
				1. Operation and Maintenance Data: Include routine maintenance, adjustment requirements, safety information, and troubleshooting guide.
			3. QUALITY ASSURANCE
				1. Manufacturer Qualifications: Approved ISO 9001-compliant manufacturer listed in this Section with minimum 10 years' experience in manufacture of similar products in successful use in similar applications, and with an ASME NQA-1 compliant Program.

Specifier: Retain paragraph below if Owner allows substitutions but requires strict control over qualifying of substitutions.

Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:

Product data, including certified independent test data indicating compliance with requirements.

Project references: Minimum of 5 installations not less than 5 years old, with Owner contact information.

Sample warranty.

Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.

Approved manufacturers must meet separate requirements of Submittals Article.

* + - * 1. AMCA Compliance:

Provide fan types tested in accordance with AMCA Standard 210 (air performance) and AMCA Standard 300 (sound performance) in an AMCA-accredited laboratory.

Provide fan units rated according to AMCA Standard 211 (air performance) and AMCA Standard 311 (sound performance).

Provide fan types rated according to AMCA Standard 205 (fan efficiency grade).

* + - 1. COORDINATION
				1. Coordinate sizes and locations of supports required for fan units.
				2. Coordinate sizes and locations of equipment supports, roof curbs, and roof penetrations.
			2. FIELD CONDITIONS
				1. Handling and Storage: Handle and store fan units in accordance with manufacturer's published instructions. Examine units upon delivery for damage. Store units protected from weather.
			3. WARRANTY

Specifier: Consult TCF for available special Project-specific warranties.

* + - * 1. Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to furnish replacement components for fan units that demonstrate defects in workmanship or materials under normal use within warranty period specified.

Warranty Period: 12 months from startup or 18 months from shipment by manufacturer, whichever first occurs.

1. PRODUCTS
	* + 1. MANUFACTURER
				1. Basis-of-Design Manufacturer: Provide fan units manufactured by **Twin City Fan & Blower**, Minneapolis MN; (763) 551-7600; email: tcf\_sales@tcf.com; website: [www.tcf.com](http://www.tcf.com).
				2. Source Limitations: Obtain plenum fans from a single manufacturer.
			2. PERFORMANCE REQUIREMENTS
				1. Fan Performance Ratings: [Project site elevation-based] [Sea level elevation-based].
				2. AMCA Compliance: Provide units that bear the AMCA-Certified Ratings Seal.
				3. Compliance: Classified under AMCA Standard 205.
				4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70.
			3. PLENUM FANS
				1. Description: Direct - driven, plenum fan units, configured for horizontal flow of relatively clean air for Heating, Ventilating, and Air-Conditioning (HVAC) applications.

Basis of Design Product: **Twin City Fan & Blower, Model EPLFN**.

Permanently attach nameplate displaying serial number and unit information.

* + - * 1. Construction:

Fans shall be unhoused and incorporate a non-overloading type aluminum backward inclined airfoil blade wheel, heavy-gauge galvanized or finish painted steel frame and inlet plate.

* + - * 1. Frame and Inlet Panel:

Frame: Heavy-gauge galvanized or finish painted steel mounting rails and motor mount for direct drive applications.

Inlet Plate: Heavy-gauge galvanized or finish painted steel construction.

Incorporate removable spun inlet cone designed for smooth airflow into accompanying fan wheel inlet retaining ring.

Fabricate with formed lip around unit suitable for attachment of flexible boot connector.

* + - * 1. Fan Capacities, Characteristics, and Configuration: Refer to Drawing schedule.
				2. Fan Wheel: Provide wheel with nine airfoil-shaped extruded aluminum blades, and non-tapered style blade retaining ring on inlet side. Fabricate hollow blade wheels with continuous welds around edges.

Specifier: Fan wheel can be fabricated between 50% and 105% of standard dimension. If special wheel width is required, retain the following paragraph and enter the custom percentage.

Cut fan wheel width [\_\_\_\_\_] percent of standard dimension.

* + - * 1. Inlet Cone: Provide spun steel inlet cones, manufacturer's standard thickness for wheel size, matched to wheel intake rim.

Specifier: Retain option in the following paragraph when space constraints require smaller fan dimensions.

* + - * 1. Motor: Comply with NEMA MG-1 for designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 section "Common Motor Requirements for HVAC Equipment."

Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

Motor Speed: [3,600] [1,800] [1,200] [900] rpm.

Specifier: Select motor enclosure type in first following subparagraph.

Enclosure Type: [Open, Drip Proof (ODP)] [Totally Enclosed Fan Cooled (TEFC)].

Provide motors that comply with the Energy Independence and Security Act of 2007 (EISA).

Specifier: For motors controlled by VFDs, retain the following subparagraph.

When controlled with a Variable Frequency Drive (VFD), provide premium efficiency motors suitable for inverter duty use.

Specifier: Select motor electrical data in following subparagraphs, or show this data on the drawing fan schedule. Do not show the data in both places.

Electrical Data:

Voltage: [115] [208] [230] [277] [460] [\_\_\_\_\_] V; [1] [3] phase; 60 Hz.

Full Load Amps: [\_\_\_\_\_] A.

Specifier: For motors controlled by VFDs, retain following subparagraph.

Variable Frequency Drive: Provide variable frequency drive (VFD) in [NEMA 1] [NEMA 3R] [NEMA 4] [NEMA 4X] enclosure, in accordance with Division 26 section "Low Voltage Controllers].

* + - * 1. Motor Pedestal: Heavy-duty motor mounting platform.
				2. Vibration Isolation:

Specifier: Select from paragraph below to specify the required isolation. If more than one type of isolation is required, coordinate the selected options with project design documents to show required isolators on the Fan Schedule.

Provide [spring] [neoprene-in-shear] vibration isolators, [and seismic restraints] in accordance with fan manufacturer's requirements, and Division 23, Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

Spring Isolators: Select for [1 inch (25.4 mm)] [2 inch (51 mm)] deflection.

* + - * 1. Accessories:

Specifier: Accessories listed in subparagraphs below are optional TCF features for this unit. Consult TCF representative for recommended options based upon Project requirements.

Specifier: If factory disconnect is required, select NEMA enclosure rating in following paragraph, and select one subparagraph below to specify factory or field mounting.

Disconnect Switch: Provide unfused disconnect switch, NEMA [1] [3R] [4] [4X], selected in accordance with Division 26 section "Enclosed Switches."

Ship disconnect switch loose for field mounting and wiring.

Factory mount and wire disconnect switch.

Safety Screens and Guards:

Inlet Safety Screen: Welded wire safety screens

Specifier: Select option in the following paragraph to require partially open or totally enclosed outlet guard.

Outlet Guard: Welded wire safety screens [open at bottom] [enclosing fan outlet on all sides].

Shaft Grounding Ring: Provide conductive ring to stay in continuous contact with motor shaft to collect stray currents and shunt them to frame ground.

Mounting Brackets:

Thrust Isolator Mounting Brackets: Steel brackets located near fan inlet panel to mount thrust restraint isolators.

Height Saving Brackets - Mounting brackets that allow fan to be mounted closer to floor grade and reduce overall fan height.

Specifier: Where flow measurement is required, retain following subparagraph. This ring sensor can be used with instrumentation provided by Twin City Fan, or instrumentation provided as the work of a separate contract.

Piezometer Ring: Provide piezometer ring type differential pressure sensor with nylon tubing to connections for field-installed flow measuring instrumentation.

Pressure Transducer without Display: Provide piezometer ring and transducer to convert differential pressure readings to 4-20 mA DC signal proportional to flow.

Specifier: When required, retain enclosure option in following paragraph.

Pressure Transducer/Transmitter with Display [Panel Mounted] [NEMA 4X Enclosure]: Provide piezometer ring and transducer with local digital display to convert differential pressure readings to 4-20 mA DC signal proportional to flow. Program digital display to show fan flow in cubic feet per minute (cfm). Include two independently adjustable SPDT dry-contact outputs. [Mount pressure transducer/transmitter inside NEMA 4 enclosure.]

Specifier: Retain the following paragraph when OSHPD Seismic Certification is required for the project

Available accessories when OSHPD Seismic Certification is required are limited to the following:

• Piezometer Ring • Pressure Transducer/Transmitter

• Shaft Grounding Ring • Inlet Screen

• Protective Enclosure • Stainless Steel Nameplate

• Thrust Restraint Bracket

OSHPD Seismic Certification: Provide unit construction compliant with California’s Office of Statewide Health Planning and Development seismic certification of equipment and components.

The Design will be in Accordance with ASCE 7-10 Chapter 13.

Fan will be mounted to seismic spring isolators.

* + - 1. SOURCE QUALITY CONTROL
				1. Factory Run Test: Test run assembled fan units prior to shipment at specified operating speed or maximum RPM allowed. Statically and dynamically balance each wheel in accordance with AMCA 204 "Balance Quality and Vibration Levels for Fans" to Fan Application Category BV-3, Balance Quality Grade G6.3. Obtain balance readings by electronic equipment in the axial, vertical, and horizontal directions on each set of bearings.

Submit report of factory run test.

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine areas to receive fans. Notify Engineer regarding conditions that may adversely affect installation, operation, or maintenance of fans. Proceed with installation once conditions are in accordance with manufacturer's published instructions.
			2. PROTECTION
				1. Protect adjacent construction and finished surfaces during installation and testing.
				2. Except for operational testing, do not operate fan during construction.
			3. INSTALLATION
				1. Install fans in accordance with Contract documents and manufacturer's published instructions.

Specifier: Insert applicable installation requirements for vibration, seismic, and high wind design if applicable to installation.

* + - * 1. Install fan units with adequate clearances for service and maintenance.

Specifier: Coordinate duct installation and specialty arrangements with schematics on Drawings and with requirements specified in duct systems. If Drawings are explicit enough, these requirements may be reduced or omitted.

* + - * 1. Electrical Connections: Connect wiring in accordance with NFPA 70 and Division 26 section "Low-Voltage Electrical Power Conductors and Cables."

Ground and bond equipment according to Division 26 section "Grounding and Bonding for Electrical Systems."

* + - * 1. Equipment Identification: Label units according to Division 23 section "Identification for HVAC Piping and Equipment."
			1. FIELD QUALITY CONTROL

Specifier: Select option in paragraph below to define the party responsible for final tests and inspections to be performed.

* + - * 1. [Owner will retain] [Contractor shall retain] qualified testing agency to perform field tests and inspections.

Specifier: Retain first paragraph below to describe tests and inspections to be performed.

* + - * 1. Tests and Inspections:

Verify that unit is secured to supports, and that duct and electrical connections are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.

Verify that cleaning and adjusting are complete.

Verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation.

Verify that manual and automatic volume control, and fire and smoke dampers in connected ductwork systems are in fully open position.

Disable automatic temperature-control actuators, energize motor, adjust fan to indicated rpm, and measure and record motor voltage and amperage.

Shut unit down and reconnect automatic temperature-control actuators.

Remove and replace malfunctioning units and retest as specified above.

* + - * 1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
				2. Submit test and inspection reports.
			1. ADJUSTING AND CLEANING
				1. Adjust, clean, and maintain installed fan units in accordance with manufacturer's published instructions.

END OF SECTION