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**Twin City Fan & Blower Guide Specification
Propeller Fans: Model TCWP, Direct or Belt Driven**

**Twin City Fan & Blower Model TCWP Series** **Fixed Pitch Propeller Fans** are designed for high efficiency, low noise/low speed operation and are used for low pressure, high volume air moving applications such as air circulation and ventilation through a wall without attached duct work. The TCWP is available in either standard or reverse flow configurations.

**Application**

Model TCWP is designed for commercial applications that require high volume, low pressure exhaust or supply of clean air. The motor and drive are mounted in the airstream. Model TCWP is suitable for temperatures up to 140 deg. F (60 deg. C).

Sizes (propeller diameters):

 Arrangement 4: 12 to 48 inches (305 to 1219 mm)

 Arrangement 9: 24 to 48 inches (610 to 1219 mm)

Airflow: Up to 41,000 CFM (69,658 m3/hour)

Static pressure to 1.5 inches wg (373 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 23.08 – PROPELLER FANS

1. GENERAL
	* + 1. SUMMARY

Specifier: Select fan drive style in following paragraph.

* + - * 1. Section includes propeller wall fans, [belt driven] [direct driven].
			1. REFERENCE STANDARDS

Specifier: Delete ABMA standards in the following paragraph if only direct drive fans are required.

* + - * 1. American Bearing Manufacturers Association (ABMA): [www.americanbearings.org:](http://www.americanbearings.org:)

ABMA 9 – Load Ratings and Fatigue Life for Ball Bearings

ABMA 11 – Load Ratings and Fatigue Life for Roller Bearings

* + - * 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 210 -  ASHRAE 51 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating

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

* + - * 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. 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 sound power levels in eight octave bands and, A-weighted overall 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.

* + - 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.

* + - 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
				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 propeller fans from a single manufacturer.
			2. PERFORMANCE REQUIREMENTS
				1. Fan Performance Ratings: [Project site elevation-based] [Sea level elevation-based].
				2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70.
			3. PROPELLER WALL FANS
				1. Propeller Wall Fans: [Direct ] [Belt ]- Driven, heavy duty propeller wall fans for general-purpose ventilation

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

Permanently attach nameplate displaying serial number and unit information.

* + - * 1. Propeller: Fixed pitch cast aluminum blades and hub. Secure wheel to [fan] [motor] shaft with taper lock bushing.

Machine propeller to proper diameter.

Statically and dynamically balance propeller.

Specifier: Delete the following paragraph for direct-driven fans.

* + - * 1. Fan Shaft:

Hot-rolled steel.

Grind, polish and ring gauge shaft.

Key shaft to wheel hub.

Size shaft for first critical speed minimum 1.42 times maximum fan speed.

Specifier: Delete the following paragraph and subparagraphs for direct-driven fans.

* + - * 1. Bearings:

Heavy-duty, grease lubricated, anti-friction ball or roller type, self-aligning, mounted in pillow blocks.

Minimum Average Bearing Life: L-50 = 200,000 hours at the maximum fan RPM, in accordance with ABMA 9 for ball bearings and ABMA 11 for roller bearings.

Specifier: Delete the following paragraph for direct-driven fans.

* + - * 1. Belt Drive:

Specifier: Select belt drive rating based on motor size.

Drive Components: V-belt drive, rated for minimum [120] [150] percent of motor nameplate horsepower, with machined, cast-iron pulleys, and heat resistant, oil resistant, static-free V-belts.

Motor Pulley: Adjustable pitch for motors up to 15 HP.

Motor Pulley: Fixed pitch for motors 20 HP and larger.

* + - * 1. Motors: 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] rpm.

Motor - [Single Phase: Induction type, with split phase construction and capacitor start.] [Three Phase: Induction type. Provide heavy duty ball bearings.]

Specifier: Select motor enclosure type in following paragraph.

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

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: [208] [230] [460] [575] V; [1] [3] phase; 60 Hz.

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

Provide unfused disconnect switch, NEMA [1] [3R] [4X] [7/9], selected in accordance with Division 26 section "Enclosed Switches."

Ship disconnect switch loose for field mounting and wiring.

* + - * 1. Frame: Formed tube steel supports welded to steel panel with formed inlet venturi and pre-punched holes for mounting anchors. Motor mounting plate bolted to frame tubes.

Specifier: In the following paragraph, select manufacturer's standard finish, or write in the required optional finish choices.

* + - * 1. Finishes:

After fabrication, deburr, clean and chemically pretreat metal parts by phosphatization.

Apply two coats of following finish:

Specifier: The first paragraph below is manufacturer's standard finish. Those that follow are optional finishes. Select finish that is required.

If fans specified for the project have different finishes, include the finish for each fan on the Drawings and delete here.

Air dry enamel.

Carbocoat 30

Heresite VR506 Air Dry Phenolic.

Dupont ASA, 70 Gray polyester.

Air dried epoxy.

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

* + - * 1. Accessories:

Backdraft Damper, Automatic, parallel-blade type. Adjust backdraft damper to close when fan is not running. If velocity is less than 600 FPM a spring kit must be specified.

Motorized Damper, [End] [Center]-pivoted steel type. Suitable for 3/000 feet/minute (15.2 meter/second) air velocity.

Specifier: Retain the following paragraph for motorized backdraft dampers, and select required voltage for actuator power.

Damper actuator suitable for [24] [115] [208] [230] [460] [575] VAC, single phase. [Provide transformer for [460] [575] V actuator.]

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

Wall Box: Painted steel, sized to match dimensions of fan panel, with mounting flange and pre-punched mounting holes. Suitable for attachment of inlet screen, backdraft damper, weather hood, outlet screen, and disconnect switch.

Provide [bolt-on] [hinged] fan guard.

Wall Collar: Painted steel, sized to match dimensions of fan mounting plate.

Weather Hood: Painted steel hood to shield fan opening from snow and rain. Include bird screen of galvanized wire.

Wire Guards: Provide welded or woven type wire to enclose [motor] [fan] size of unit.

Reversible Construction: Allows for 100% airflow in both exhaust and supply directions.

* + - * 1. Fan Capacities and Characteristics: Refer to Drawing schedule.
			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 Standard 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. Duct Connections: Drawings indicate general arrangement of ducts and duct accessories. Where indicated on Drawings, [install factory-furnished companion flanges and] make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 section "Air Duct Accessories."
				2. 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 one option in following paragraph to determine need for outside testing agency. If Contractor will perform testing, delete paragraph..

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

Specifier: Retain option in following paragraph for belt driven units. Otherwise, delete option.

[Disconnect fan belt drive from motor.] Verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.

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