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**Twin City Fan & Blower Guide Specification
Cast Iron Blowers: Model CIW Series, Direct or Belt Driven**

**Twin City Fan & Blower Model CIW Cast Iron Pressure Blowers** are the perfect choice for providing low volume, high pressure air for cooling, ventilating and exhaust systems which handle dust, materials or corrosive fumes. These direct drive or belt driven blowers feature heavy duty cast iron housings with cast aluminum wheels for extra-long life and trouble-free service.

**Application**

The CIW Radial Bladed Fan is designed for industrial process applications such as fume exhaust, drying, air pollution control, combustion air, raw material, waste, and fibers conveying, grinding and buffing exhaust, aeration, explosion-proof processes, and welding fume exhaust.

Sizes (wheel diameter): 6.75 to 14 inches (175 mm to 355 mm)

Airflow to 2,000 CFM (3,400 m3/hour)

Static pressure to 12 inches wg (2,980 Pa)

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 – INDUSTRIAL FANS

1. GENERAL
	* + 1. SUMMARY

Specifier: Select fan drive style in following paragraph.

* + - * 1. Section includes radial blade cast iron blowers, [belt] [direct] driven.
			1. REFERENCE STANDARDS
				1. American Bearing Manufacturers Association (ABMA): [www.americanbearings.org](http://www.americanbearings.org/):

ABMA 9 – Load Ratings and Fatigue Life for Ball 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 - 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.

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.

* + - 1. COORDINATION
				1. Coordinate sizes and locations of supports required for fan units.
			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 cast iron blowers from a single manufacturer.
			2. PERFORMANCE REQUIREMENTS
				1. Fan Performance Ratings: [Project site elevation- based] [Sea level-based].
				2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70.

Specifier: Select fan drive style in following paragraph.

* + - 1. CENTRIFUGAL INDUSTRIAL FANS
				1. Description: [Belt] [Direct] - Driven Cast Iron Blowers.

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

Specifier: Coordinate fan orientation with notations on drawings.

* + - * 1. Fan Capacities, Characteristics, and Configuration: Refer to Drawings schedule.

Specifier: Standard material is steel. Select aluminum option in the following paragraph when spark resistant construction is required.

* + - * 1. Fan Wheels: Cast aluminum, with radial-blades and backplate.

Statically and dynamically balance wheel.

Minimum Balance Quality Grade: G6.3, in accordance with AMCA Standard 204.

Specifier: Retain the following paragraphs for shafts and bearings for belt-driven fans only.

* + - * 1. Fan Shaft:

AISI C1045 hot-rolled steel.

Turn, grind, and polish shaft.

Size shaft for first critical speed minimum 1.43 times maximum speed for each fan class.

Apply petroleum based rust preventative coating.

Key shaft to wheel hub.

Include OSHA compliant [shaft] [shaft and bearing] guard.

Specifier: Retain the option in the following paragraph when extended grease lines are required.

* + - * 1. Bearings: Manufacturer's standard field-lubricated ball or roller bearings, based on fan size and mounting orientation[, with copper grease lines extended to outside fan housing].

Minimum L-50 Bearing Life: 200,000 hours at maximum operating speed, in accordance with ABMA 9 for Ball Bearings.

Specifier: Retain option in the following paragraph when it is required that the fan housing be rotatable in the field.

* + - * 1. Housing: One piece cast iron housing. Provide adjustable fan housings that can be field rotated to eight standard discharge positions.

Specifier: Retain the following paragraph when flanged duct connections are required. Select the pre-punched option if required.

Provide [pre-punched] flanges at [inlet] [outlet] connections.

Specifier: Retain the following paragraph and subparagraphs for belt-driven fans only.

* + - * 1. Direct Drive:

Specifier: Retain paragraph below for direct drive, Arrangement 4, 4HI, and 4VI fans only.

Mount fan wheel directly on motor shaft.

* + - * 1. Belt Drives:

Specifier: In the following paragraph, select variable pitch option for motors up to 10 hp. Select fixed pitch option for motors larger than 10 hp.

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

Specifier: Retain options in the following paragraph when required.

Belt Guard: Steel, ventilated, OSHA compliant [quick access designed with hinged front and rubber latches]. [Paint belt guard yellow.]

* + - * 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: Based upon performance requirements and application.

Specifier: If factory disconnect is required, select NEMA enclosure rating in following paragraph, and select one subparagraph below to specify factory or field mounting. Retain second subparagraph when NEMA 7/9 (explosion proof) option is selected.

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

Factory mount and wire disconnect switch.

Ship disconnect switch loose for field mounting and wiring.

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] [460] [575] [\_\_\_\_\_] V; [1] [3] phase; 60 Hz.

Voltage: [190] [380] [\_\_\_\_\_] V; [1] [3] phase; 50 Hz.

Specifier: Select motor enclosure type in first following subparagraph.

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

Specifier: For motors located in hazardous locations, select one or the other of the following. If motor is not located in hazardous location, delete subparagraph. Consult TCF for hazardous location classification availability.

[Explosion Proof] [ATEX].

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: Retain the following paragraph for belt-driven fans only.

* + - * 1. Motor Mounting Platform: Heavy-duty motor mounting platform that allows adjustment of drive belt tension. Motor location per drawing schedule.

Specifier: Retain paragraph and subparagraph below, and coordinate options with project design.

* + - * 1. Vibration Isolation:

Provide isolation of fan from connected piping, duct work and foundation in accordance with fan manufacturer's requirements, and Division 23, Section "Vibration and Seismic Controls for HVAC Piping and Equipment."

Specifier: Retain subparagraph below for Arrangement 9F fans only.

For fans mounted directly to foundation, provide [spring vibration isolators with 1 inch (25.4 mm) deflection] [neoprene-in-shear vibration isolators].

 Specifier: Retain the following paragraphs for Arrangement 4, 9, and 10 fans only.

For fans mounted directly to foundation, provide equipment rail type [spring vibration isolators with 1 inch (25.4 mm) deflection] [neoprene-in-shear vibration isolators].

* + - * 1. Coatings:

Specifier: Retain paragraph 1 or 2 based on application requirements. Delete remaining paragraph.

Standard Coating: All carbon steel components shall be cleaned and chemically treated by a phosphatizing process. Fan shall then be coated with blue enamel.

Special Coating: [\_\_\_\_\_].

* + - * 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.

Drain: 3/4 inch NPT [with plug].

Specifier: Retain following paragraph only for Arrangement 10 outdoor fans, when required.

Weather Cover: Provide steel weather cover to shield motor from weather. Fabricate with rainproof ventilation slots. [Paint weather cover yellow.]

Specifier: When connecting flanges are required, retain following paragraph. Select option for factory punched holes, when required.

Provide slip-on companion flanges [with factory punched bolt holes] for making connections to ductwork.

Specifier: Retain paragraph below when shaft seal is required. Standard shaft seal is provided on fans with high-temperature packages.

Shaft Seal: Provide housing seal consisting of woven fibrous material sandwiched between the fan housing and aluminum cover plate.

Specifier: Retain following paragraph if safety screens are required. Select options to designate screen locations.

Safety Screens:

Provide screens at fan [inlet] [outlet]. Welded wire safety screens fabricated for easy installation and removal.

Specifier: Retain following paragraph when spark-resistant construction is required.

Spark Resistant Construction: Mount bearings outside flow airstream.

AMCA Type B: Provide non-ferrous fan wheel impeller and aluminum rub ring where shaft penetrates fan housing. Maximum operating temperature: 250 deg. F (121 deg. C).

* + - 1. SOURCE QUALITY CONTROL
				1. Factory Run Test: 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. Test run assembled fan units prior to shipment at specified operating speed or maximum RPM allowed. Obtain balance readings by electronic equipment in the axial, vertical, and horizontal directions on each set of bearings.
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.

Retain option for companion flanges when required.

* + - * 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."

Install connecting ducts with adequate clearances for service and maintenance.

* + - * 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.

Specifier: When only direct drive fans are required, delete references to belts in the following paragraph and subparagraphs.

* + - * 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.

Specifier: Retain options 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 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