****

**Twin City Fan & Blower Guide Specification  
Backward Inclined Centrifugal Fans: Model TCBI, Direct Drive**

**Twin City Fan & Blower Model TCBI Series**, backward inclined centrifugal fans feature a high-efficiency, non-overloading impeller suitable for handling a relatively clean airstream. The impeller mounts directly to the motor. The TCBI is offered in two (2) distinct series of sizes to accommodate 50 Hertz or 60 Hertz duty cycle applications while providing similar power and static pressure operating points.

**Application**

Model TCBI is specifically designed for mounting to the clean-side of a cartridge or bag-style dust collector.

Sizes (wheel diameters): 14.19 to 22.56 inches (360 mm to 575 mm)

Airflow: Up to 14,400 CFM (24,470 m3/hour)

Static Pressure: Up to 18 inches wg (4,500 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](mailto:tcf_sales@tcf.com); [www.tcf.com](http://www.tcf.com).

This document Copyright© 2015 Twin City Fan & Blower

SECTION 23 34 16.02 – BACKWARD INCLINED CENTRIFUGAL FANS

1. GENERAL
   * + 1. SUMMARY
          1. Section includes inline backward inclined centrifugal 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 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 equipment supports, and building 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. GENERAL
   * + 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](mailto:tcf_sales@tcf.com); website: [www.tcf.com](http://www.tcf.com).
          2. Source Limitations: Obtain backward inclined centrifugal 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. BACKWARD INCLINED CENTRIFUGAL FANS
          1. Description: Direct - Driven, Backward Inclined Centrifugal Fans: Centrifugal fan, Single Width Single Inlet, configured for horizontal or vertical intake and discharge of relatively clean air for [industrial dust collector] [\_\_\_\_\_] applications.

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

Specifier: Because this fan is typically associated with dust collector equipment, its requirements may be shown on the equipment schedule in the contract documents. Coordinate with contract documents and select one option in the following paragraph.

* + - * 1. Fan Capacities, Characteristics, and Configuration: Refer to [fan] [equipment] schedule.

Specifier: In the following paragraph, aluminum wheel construction is standard for fan sizes 15 and larger, but available for all sizes. Steel wheel construction is available for all fan sizes.

* + - * 1. Fan Wheel: Fabricate wheel inlet rim, backward inclined blades, and hub backplate from [steel] [aluminum], using flat single thickness blades, continuously welded to rim and backplate. Partially welded blades are not acceptable. Hub to be keyed to shaft.

Statically and dynamically balance wheel.

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

* + - * 1. Housing: Continuously welded steel, reinforced with rigid bracing. Includes aerodynamically spun inlet cone.

Housings with lock seams or partially welded construction are not acceptable.

Provide bracing to minimize vibration or pulsation.

Specifier: A sealing mechanism is standard for all fan sizes. 60 Hz applications utilize the standard shaft seal. 50 Hz applications utilize a C-Face motor connection to the housing. Select applicable sealing method based on fan or equipment schedule.

Shaft Seal:

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

Provide C-face motor mounting pattern on housing for direct motor mounting to seal airstream from exterior of fan.

* + - * 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."

Specifier: TCBI fans are designed with specific fan size and horsepower combinations. Motor sizes shall be selected based on the fan size defined by the fan / equipment schedule. Consult TCF for recommended options based upon Project requirements.

Motor Sizes: Size as indicated for the fan size selected for the application

Specifier: TCBI fans are designed for 2-pole motors operating at synchronous speeds. Select motor speed per based on fan / equipment schedule or available electrical service.

Motor Speed: [3600 RPM] [3000 RPM]

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.

* + - * 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.

Specifier: Accessory availability is based on 60- or 50-hertz applications. See specific accessory for variances.

Access Door - Bolted flush with interior, located on the housing scroll, opposite the discharge.

Drain: 3/4 inch NPT with plug, located on the housing inlet side, opposite the discharge.

Specifier: TCBI fans are provided with a flush inlet mount as standard. 60-Hertz fans are available with either round or rectangular inlet flanges. 50-Hertz fans are available with round inlet flanges. Select inlet mounting based on fan size defined by the fan / equipment schedule.

[Rectangular] [Round] Inlet Flanges: Provide weld-on flanges with pre-punched bolt-hole pattern [to match equipment on which fan is mounted].

Outlet Flange: Provide weld-on flanges with pre-punched bolt-hole pattern.

Safety Screen: Provide safety screen at fan outlet.

Specifier: If discharge damper is required, select bolt-on type or built-in type based on Project requirements. Bolt-on type requires outlet flange.

Outlet Damper: Provide [bolt-on] [built-in]-type, parallel blade, with steel blades and shafts. Provide actuating arm for manual adjustment with locking setscrew].

Specifier: Outlet Silencer requires outlet flange.

Provide outlet silencer designed to minimize noise levels emanating from fan outlet.

* + - 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. GENERAL
   * + 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, 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, make final duct connections with flexible connectors. Duct connections 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.

* + - * 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 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