****

**Twin City Fan & Blower Guide Specification
Tubeaxial HVAC Fans: Model ATAB, Belt Driven**

Twin City Fan & Blower Model ATAB Series, Axipal® Adjustable Pitch Airfoil Fans, allow for efficient operation at any point on the fan curve, while affording the ability to rebalance the fan delivery and maintain efficient operation by manually adjusting the pitch of the fan blades while the unit is not running. Model ATAB fans offer superior air and sound performance and the AMCA certified rating seal for air and sound.

Model ATAB is available in belt driven configurations. Model ATAB fans mount both vertically and horizontally, allowing for numerous applications with multiple mounting arrangements.

**Application**

The ATAB Adjustable Pitch Airfoil Axial Fan is designed for where it is advantageous to have the motor out of the airstream due to the presence of corrosive or hazardous fumes, or dirt-laden, hot, or moist air. Standard fan configuration is suitable for a maximum temperature of 200°F.

Sizes (propeller diameters): 16 to 49 inches (406 mm to 1,245 mm)

Airflow: Up to 65,100 CFM (110,605 m3/hour)

Static Pressure: Up to 2.5 inches wg (623 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).

Axipal® is a registered trademark of Twin City Fan & Blower

This document Copyright© 2015 Twin City Fan & Blower

SECTION 23 34 13.01 – TUBEAXIAL HVAC FANS

1. GENERAL
	* + 1. SUMMARY
				1. Section includes belt driven adjustable pitch airfoil axial fans.
			2. 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

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 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. ASTM International: [www.astm.org](http://www.astm.org):

ASTM A569 -  Standard Specification for Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip Commercial

* + - * 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 ANSI/AMCA Standard 210 (air performance) and ANSI/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 units 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
				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 tubeaxial 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. AXIAL FLOW FANS
				1. Description: Belt-driven adjustable pitch airfoil axial fans, configured for horizontal or vertical flow of relatively clean air for Heating, Ventilating, and Air-Conditioning (HVAC) applications, for air containing dirt, moisture, or hazardous fumes, or for air at elevated temperatures.

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

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

Specifier: Select steel option in following paragraph for all cases except spark-resistant construction.

* + - * 1. Fan Propeller: A319 alloy cast aluminum blades mounted in cast iron hub boss, bolted to stamped steel hub halves with electrodeposited coating finish.

Hub Attachment to Shaft:

Wheel Diameter up to 20 Inches (508 mm): Knurled, cup point set screws.

Wheel Diameter above 24 Inches (610 mm): Split, taper-lock bushing.

Maintain blade tip clearance within tolerance to conform to certified performance.

Provide individual blade pitch adjustment mechanism.

Statically and dynamically balance wheel when fabricated, and again after fan unit has been assembled.

Maximum Operating Temperature: 200 deg. F (93 deg. C).

* + - * 1. Fan Shaft: AISI 1045 steel, turned, ground, and polished steel. Select shaft diameter so that maximum operating speed is lower than 70 percent of First Critical Speed. Finish with manufacturer's standard paint.

Specifier: Retain the following subparagraph when the fan is handling dirty or wet air, or air carrying corrosive gases.

Provide elastomeric Viton shaft seal, including PTFE wear plate to protect shaft and bearings. Maximum Ambient Temperature: 250 deg. F (121 deg. C).

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

Minimum L-10 Bearing Life: 20,000 hours at maximum operating speed, in accordance with ABMA 9 for Ball Bearings, or ABMA 11 for Roller Bearings.

* + - * 1. Casing: Formed ASTM A569 low carbon hot rolled steel with continuously welded seams. Casing thickness:

Specifier: Select following paragraphs that apply, based on fan sizes required.

Wheel Diameter From 14 to 20 inches (356 to 508 mm): 12 Ga, 0.1046 inch (2.66 mm).

Wheel Diameter From 24 to 28 inches (610 to 711 mm): 10 Ga, 0.1345 inch (3.42 mm).

Wheel Diameter Above 30 Inches (762 mm): 7 Ga, 0.1783 inch (4.55 mm).

* + - * 1. Belt Drives:

Drive Components: V-belt drive, rated for minimum 150 percent of motor nameplate horsepower, with machined, cast-iron pulleys, and heat resistant, oil resistant, conductive, static-free V-belts. Provide belt guard or motor cover to shield drives.

Motor 5 HP and Smaller: Adjustable pitch.

Motor Larger than 5 HP: Fixed pitch.

Motor and Drive Assembly: Resiliently mounted on rubber isolators.

Provide belt shield tubes to isolate drive components from airstream.

Specifier: Retain first following subparagraph for indoor fans. Retain second following subparagraph for outdoor fans, if required.

Belt Guard: Steel, totally enclosed and sealed.

Outdoor Weather Cover: Provide steel weather cover to shield motor and belt-drive from weather. Fabricate with rainproof ventilation slots.

* + - * 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."

Manufactured in accordance with current applicable standards of IEEE and NEMA.

Foot-mounted, NEMA standard, rated for continuous duty with Class “B” insulation.

Provide ball bearings with external grease fittings.

ABMA Minimum L-10 Life: 40,000 hours.

ABMA Minimum L-50 Life: 200,000 hours.

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.

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: 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] [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.

Electrical Data:

Voltage: [208] [230] [460] [575] [\_\_\_\_\_] V; [1] [3] phase, 60 Hz.

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

Specifier: Standard motor has ODP enclosure. Select other options as required for the project.

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

Specifier: Retain following paragraph when fan will be controlled by a VFD, or when premium efficiency is required. Consider this paragraph for projects seeking LEED certification.

Provide premium efficiency motor, suitable for inverter duty.

* + - * 1. Motor Mounting Platform: Heavy-duty motor mounting platform with a single jackscrew and slides to allow adjustment of drive belt tension. Provide eight standard locations around fan unit circumference for placement of motor mounting platform.
				2. Vibration Isolation:

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

Provide [spring] [neoprene-in-shear] vibration isolators, 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) 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.

Retain first paragraph below for roof mounted units only.

Roof Curb Base: Welded steel, one-piece, weather-tight construction, to adapt from square roof curb to round fan inlet. Fabricate from steel and include pre-punched flange to mate with fan unit inlet flange.

Shaft Seal: Elastomeric Viton rotary seal and Teflon wear plate bolted to fan housing.

Maximum Ambient Temperature: 250 deg. F (121 deg. C).

Motor Cover: Provide vented steel motor cover with bolt-on construction in place of standard belt guard. Include manufacturer's standard painted finish.

Stack Cap: Provide steel stack cap with gravity operated butterfly dampers at fan discharge. Include gasket and pre-punched flange holes to enable bolted connection to fan outlet. Finish with manufacturer's standard paint.

Velocity: 1,800 to 3,000 feet/min (9.1 to 15.2 m/s).

Inlet Bell: Provide spun steel inlet bell with pre-punched flange holes to enable bolted connection to fan inlet. Finish with manufacturer's standard paint.

Companion Flanges: For ease of installation of adjacent ductwork, companion flanges are rolled angle rings drilled to match the fan’s inlet or outlet flange.

Access Section: Bolts to the fan discharge, allowing access to fan wheel for blade adjustment without removing the ductwork.

Bolted Inspection Door: For inspection of the internal sections of the fan only. Not to be used for maintenance.

Belt Guard: The belt guard encloses the motor sheaves and V-belt drive assembly. The guard is easily removable for inspection and maintenance.

Safety Screens: Provided on the fan flange, inlet bell (large end), inlet or outlet cone (large end) — whichever may apply depending on the accessories provided with the fan.

Inlet/Outlet Cones: Cones adapt from the fan diameter to the adjacent duct diameter.

* + - * 1. Finishes:

After fabrication, 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. Retain finish required for application.

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

Hot Dip Galvanizing.

Plasite 4310 Vinyl Ester

Plasite 9500

Plasite 7122L Air Dry Phenolic

Plasite 3070

Heresite VR506 Air Dry Phenolic.

Dupont ASA, 70 Gray polyester.

Finish as indicated on Drawings.

* + - 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. 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.

* + - * 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.

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