RADIAL TIP FANS

MODEL RTF
Model RTF

Model RTF radial tip fans are of a heavy duty, rugged design, suitable for applications involving large volumes of gas streams at moderate to high pressure. Designed to handle clean or dirty airstreams, they are widely used to exhaust gases from bag-type collectors, precipitators, scrubbers, cyclones, and other industrial applications. This type of fan is also used for induced draft on boilers, incinerators, and kiln exhaust. Steel, air pollution, dryer, petrochemical, cement, furnaces and ovens, solvent recovery, sewage sludge and solid waste incineration industries have found the Model RTF radial tip design particularly suitable for their applications.

Capabilities
• Heavy-duty construction with choice of speed range:
  Class 18 — Suitable to 91 m/s tip speed
  Pressures to 5960 Pa
  Class 23 — Suitable to 117 m/s tip speed
  Pressures to 8950 Pa
  Class 23 Impellers are equipped with wear pads on the blades. Consult factory for higher tip speed designs.
• Volume flow to 106 m³/sec.
• Standard fan suitable to 148°C.

Features
• High efficiency, for lower operating costs.
• AMCA licensed air performance on sizes 270 through 800, pages 11 to 22.
• Self-cleaning impeller design.
• Statically and dynamically balanced rotor assembly.
• Heavy duty, self-aligning, grease lubricated, anti-friction, pillow block bearings.
• Heavy-gauge reinforced housing and bearings pedestal for vibration-free service.

Twin City Fan & Blower certifies that the RTF Radial Tip Fans Sizes 270 through 800 shown on pages 11 to 22 are licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.
**Inlet Boxes**
Integral or detached type, generously designed to minimise pressure drop. Specify inlet box position to AMCA Standard 2405-66 shown on page 4. Detached inlet boxes include support legs and flanges on both inlet and outlet. Free-standing designs are also available to allow a flexible connector between box and fan. Standard detached inlet box will not support stack weight. All inlet box designs include drain and access door.

**Inlet Box Dampers**
Pre-spin design, heavy duty construction. The damper will spin the air in the direction of impeller rotation resulting in a savings in horsepower at reduced loads.

**Outlet Dampers**
Double surface airfoil blades are available in either parallel or opposed blade design.

**Abrasion and Corrosion Resistant Alloys and Coatings**
Optional construction includes an abrasion resistant steel blade, backplate, scroll and side or cheek liners. Construction materials include Corten, stainless steel, Monel, aluminium, Hastelloy, and other alloys. Construction from heavier than standard gauges is available. Special corrosion resistant coatings of various types are available.

**Temperature and Vibration Detectors**
Thermocouples or RTDs can be installed on the bearings. Various types of vibration switches are available.

**Evasé**
Usually fabricated by customer as a part of the ductwork. Fan outlet must be expanded to equal evasé area shown in the catalogue to obtain rated performance. Construction is of the same gauge as fan housing when purchased from the factory.

**High Temperature Construction**
149 to 260°C: Requires addition of shaft cooler and high temperature grease bearings.
261 to 315°F: Above modifications plus high temperature aluminium paint.
316 to 426°F: Above modifications plus modified pedestal design.

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**Arrangement 1**
The usual choice for many V-belt drive applications. Impeller is overhung. Steel bearing pedestal to size 730. Size 800 requires concrete pedestal. Consult factory for V-belt drive applications larger than 200 kW.

**Arrangement 3SI**
SWSI fan with integral inlet box and independent bearing pedestals. The impeller is supported between two bearings.

**Arrangement 7SI**
Direct coupled with a flexible coupling. A single-width, single-inlet fan with an integral inlet box and independent bearing pedestal and bearing/motor pedestal installed on a common base. The impeller is supported between two bearings.

**Arrangement 8**
Direct coupled with a flexible coupling. The motor pedestal can be custom fabricated out of steel for up to 250 kW. On larger kW units, use of standard Arr. 1 fan with a concrete pedestal for the motor is advisable.

**Arrangement 9F**
Floor mount. Similar to Arrangement 1 with the fan base extended to mount motor in a horizontal position.
**Typical Inlet Box Dimensions**

**Inlet Box Positions for Centrifugal Fans**

Reference line is the Top Vertical Axis through center of fan shaft. Position of inlet box and air entry to inlet box is determined from drive side of fan. Position of inlet box is designated in degrees clockwise from Top Vertical Axis as shown. Positions 135° to 225° in some cases interfere seriously with floor structure.

**INLET BOX POSITIONS AND DESCRIPTIONS**

- 45 — Angular Down Intake
- 90 — Horizontal Right Intake
- 135 — Angular Up Intake
- 180 — Bottom Up Intake
- 225 — Angular Up Intake
- 270 — Horizontal Left Intake
- 315 — Angular Down Intake
- 360 — Top Down Intake

Dimensions are not to be used for construction. Dimensions are in mm unless otherwise noted.

**Arrangement 1 fan with detached inlet box. Can be supplied in Arrangement 8.**

**Arrangement 1 fan with attached or integral inlet box. Can be supplied in Arrangement 8.**

**Arrangement 3SI fan with integral inlet box, centrally supported impeller, independent bearings pedestals to be installed on concrete pedestals.**

**Arrangement 7SI — Similar to Arrangement 3SI except bearings pedestals and motor installed on a steel common base.**
Table 1. Material and Mechanical Specifications

<table>
<thead>
<tr>
<th>FAN SIZE</th>
<th>DESIGN RTF</th>
<th>SHAFT DIA.</th>
<th>MAX. kW V-BELT DRIVE</th>
<th>MIN. SHAVEE DIA.¹</th>
<th>MAX. kW DIRECT DRIVE</th>
<th>MAX. RPM ²</th>
<th>WHEEL WT. (kg)</th>
<th>WHEEL WR² (kg-m²)</th>
<th>HOUSING</th>
<th>ARR. 1 FAN WT. (kg)</th>
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</thead>
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</tbody>
</table>

¹ Minimum fan diameter when using maximum kW motor. Check with the factory on applications over 250 kW.
² Maximum RPM shown are for 20°C. For higher temperatures use Table 2 on page 6 to derate RPM.
³ Size 800 RTF is not supplied with conventional bearings pedestal. Instead we supply channel sub-bases. The sub-base is to be mounted on concrete pedestal with steel sole plate in the field. Fan weights include weight of channel sub-base.

Dimensions are in millimeters unless otherwise noted.
Performance Correction for Temperature and Altitude

The performance curves in this catalogue are based on fans handling standard air at a density of 1.2014 kilograms per cubic meter. This is equivalent to 20°C at sea level (759.968 mm Hg barometric pressure). When specified performance is at a density different than standard, it must be converted to the equivalent standard conditions before entering the performance curves. The equivalent conditions can be calculated by using the “Temperature and Altitude Density Ratios” table below.

Table 3. Temperature and Altitude Density Ratios

<table>
<thead>
<tr>
<th>AIR TEMP °C</th>
<th>0</th>
<th>300</th>
<th>600</th>
<th>900</th>
<th>1200</th>
<th>1500</th>
<th>2000</th>
<th>2500</th>
<th>3000</th>
<th>3500</th>
<th>4000</th>
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<tr>
<td></td>
<td>759.96</td>
<td>733.34</td>
<td>707.46</td>
<td>682.33</td>
<td>657.88</td>
<td>634.18</td>
<td>614.98</td>
<td>596.22</td>
<td>560.17</td>
<td>525.87</td>
<td>493.24</td>
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<td>BAROMETRIC PRESSURE IN kPA</td>
<td>101.32</td>
<td>97.77</td>
<td>94.32</td>
<td>90.97</td>
<td>87.71</td>
<td>84.55</td>
<td>81.99</td>
<td>79.49</td>
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<td>70.11</td>
<td>65.76</td>
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<td>ALTITUDE IN METRES ABOVE SEA LEVEL</td>
<td>-40</td>
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<td>1.213</td>
<td>1.170</td>
<td>1.129</td>
<td>1.088</td>
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<td>0.773</td>
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<td>0.719</td>
<td>0.693</td>
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<td>0.651</td>
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<td>0.543</td>
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<td>0.600</td>
<td>0.578</td>
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<tr>
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<td>0.529</td>
<td>0.513</td>
<td>0.485</td>
<td>0.453</td>
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<tr>
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<td>0.577</td>
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<td>0.522</td>
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<td>0.459</td>
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<td>0.338</td>
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<td>0.280</td>
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</table>

Derating Factors For High Temperature

When elevated temperatures are encountered, the maximum RPM allowable as shown in Table 1 on page 5 must be derated according to the derating factors from Table 2. Standard steel construction is suitable for use in gas temperatures to 426°C. Aluminium impellers are suitable for temperatures to 120°C only.

Table 2. Temperature Derating Factors

<table>
<thead>
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<th>TEMP. (°C)</th>
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<th>STAINLESS STEEL</th>
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<td>1.000</td>
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<td>93</td>
<td>0.990</td>
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<td>149</td>
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<tr>
<td>427</td>
<td>0.837</td>
<td>0.754</td>
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Notes:
1. Performance certified is for Installation Type B & D: Free or ducted inlet, ducted outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type B: Free inlet, ducted outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type B & D: Free or ducted inlet, ducted outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LWA sound power levels for Installation Type B: Free inlet, ducted outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.

Fan Efficiency Grade = FEG 80
Notes:
1. Performance certified is for Installation Type B & D: Free or ducted inlet, ducted outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type B: Free inlet, ducted outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.

Fan Efficiency Grade = FEG 75
Notes:
1. Performance certified is for Installation Type B & D: Free or ducted inlet, ducted outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type B: Free inlet, ducted outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type B & D: Free or ducted inlet, ducted outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type B: Free inlet, ducted outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type B & D: Free or ducted inlet, ducted outlet.
2. Power rating (kW) does not include transmission losses.
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Fan Efficiency Grade = FEG 80
Notes:
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2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
4. The sound power level ratings shown are in decibels, referred to 10 E-12 watts calculated per AMCA Standard 301.
5. Values shown are for inlet LwA sound power levels for Installation Type B: Free inlet, ducted outlet.
6. Ratings do not include the effects of duct end correction.
7. The A-weighted sound ratings shown have been calculated per AMCA Standard 301.
Notes:
1. Performance certified is for Installation Type B & D: Free or ducted inlet, ducted outlet.
2. Power rating (kW) does not include transmission losses.
3. Performance ratings do not include the effects of appurtenances (accessories).
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Notes:
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Inlet Flange

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NOTES:
1. CW rotation shown. CCW rotation is similar but opposite.
2. Standard accessories: bolted access door, housing drain, shaft seal, punched inlet & outlet flanges.
3. These holes are in Size 270, 300 & 330 Only.

DIMENSIONS ARE NOT TO BE USED FOR CONSTRUCTION. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.
Arrangement 1, SWSI

NOTES:
1. CW rotation shown, CCW rotation is similar but opposite.
2. Size 800 will be supplied with channel sub-base to be mounted on concrete pedestal in the field.
3. Standard accessories: bolted access door, housing drain, pie split housing, shaft seal, punched inlet & outlet flanges.

BC39886G

DIMENSIONS ARE NOT TO BE USED FOR CONSTRUCTION. CERTIFIED DRAWINGS AVAILABLE UPON REQUEST.

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25
Fans shall be Model RTF Radial Tip Fans as manufactured by Twin City Fan & Blower, Minneapolis, Minnesota.

**PERFORMANCE** — Performance ratings shall conform to AMCA Standard 205 (fan efficiency grade) and 211 (air performance). Fans shall be tested in accordance with ANSI/AMCA Standard 210 (air performance) and 300 (sound performance) in an AMCA accredited laboratory. Fans shall be licensed to bear the AMCA certified ratings seal for air and fan efficiency grade (FEG).

**HOUSING** — Housings shall be made of plate steel with continuously welded construction and braced with structural shapes to eliminate any resonant vibration and to provide smooth operation. Size 360 and larger housings shall have a pie-shaped split for easy impeller and shaft removal without disturbing inlet and outlet ductwork. The housing split must be fully gasketed and bolted together to prevent any leaks. Flanged inlet and outlet, inspection door, shaft seal and drain shall be provided as standard equipment. Bearing support members shall be fabricated of heavy steel shapes or made of concrete to insure maximum rigidity.

**IMPELLER** — Blade design shall be curved forward at the entering edge to meet air at the correct angle of entry for high efficiency and radial at the tip of the leaving edge to provide a self-cleaning characteristic. Blades shall be formed from high strength low alloy material for strength and accuracy of contour and continuously welded to the inlet shroud and backplate. A heavy fabricated steel hub shall be provided. Impellers shall be shrunk fit on the shafts and hubs must include puller holes for use in event of impeller removal. All impellers shall be statically and dynamically balanced on precision electronic machines, as well as trim balanced during the factory test run.

**SHAFT** — Shafts shall be AISI 1040 or 1045 hot rolled steel, accurately turned, ground, polished, and ring gauged for accuracy. Shafts shall be sized for the first critical speed of at least 1.43 times the maximum speed.

**BEARINGS** — Fans shall be supplied with heavy duty, self-aligning, grease lubricated, anti-friction, pillow block type bearings selected for a minimum average bearing life (AFBMA L-50) in excess of 200,000 hours at the maximum fan RPM. Bearings may be ball or roller with non-split pillow block or spherical roller bearings with split pillow block housing (bearing races not split). Where required, sleeve bearings may be used with appropriate cooling method for high carrying loads.

**DRIVE** — Motor sheaves shall be cast iron, variable pitch on applications 15 kW and smaller, and fixed pitch on 18.5 kW and larger. Drives and belts shall be located external to the fan casing and rated for 150% of the required motor kW.

**FINISH AND COATING** — The entire fan assembly, excluding the shaft, shall be thoroughly degreased and deburred before application of a rust-preventative primer. After the fan is completely assembled, a finish coat of paint shall be applied to the entire assembly. The fan shaft shall be coated with a petroleum-based rust protectant. Aluminium components shall be unpainted.

**ACCESSORIES** — When specified, accessories shall be provided by Twin City Fan & Blower to maintain one source responsibility.

**FACTORY RUN TEST** — All fans prior to shipment shall be completely assembled and test run as a unit at the specified operating speed or maximum RPM allowed for the particular construction type. Each impeller shall be statically and dynamically balanced in accordance with ANSI/AMCA 204-96 *“Balance Quality and Vibration Levels for Fans”* to Fan Application Category BV-3, Balance Quality Grade G6.3. Balance readings shall be taken by electronic type equipment in the axial, vertical, and horizontal directions on each of the bearings. Records shall be maintained and a written copy shall be available upon request.

**GUARANTEE** — The manufacturer shall guarantee the workmanship and materials for at least one (1) year from start-up or eighteen (18) months from shipment, whichever occurs first.
INDUSTRIAL PROCESS AND COMMERCIAL VENTILATION SYSTEMS

CENTRIFUGAL FANS | UTILITY SETS | PLENUM & PLUG FANS | INLINE CENTRIFUGAL FANS
MIXED FLOW FANS | TUBEAXIAL & VANEAXIAL FANS | PROPELLER WALL FANS | PROPELLER ROOF VENTILATORS
CENTRIFUGAL ROOF & WALL EXHAUSTERS | CEILING VENTILATORS | GRAVITY VENTILATORS | DUCT BLOWERS
RADIAL BLADED FANS | RADIAL TIP FANS | HIGH EFFICIENCY INDUSTRIAL FANS | PRESSURE BLOWERS
LABORATORY EXHAUST FANS | FILTERED SUPPLY FANS | MANCOOLERS | FIBERGLASS FANS | CUSTOM FANS

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