

PROTEG®

Cross Flow Cooling Towers



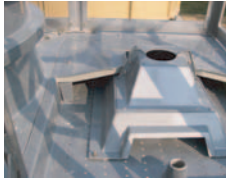
**FWS
Series
Cross
Flow
Cooling
Towers**



Cross Flow Design

Protec FWS Series cooling towers are factory or field assembled, cross flow cooling towers, designed to serve commercial, institutional and industrial loads. The range of cooling towers offered in the FWS Series is for single, double and multi-cell configurations. This heavy-duty cooling tower designed of non-corrosive materials is energy efficient and its cross flow design offers ease of maintenance. All major components of the Protec FWS Series: motors, axial fans, fan drive assembly and fill/media have been developed to ensure maximum efficiency with low energy consumption. The FWS Series's small footprint provides space savings, ensuring the cooling tower meets the limited space requirements of new construction projects as well as the strict space requirements of replacement projects.

Design Features



WATER DISTRIBUTION SYSTEM

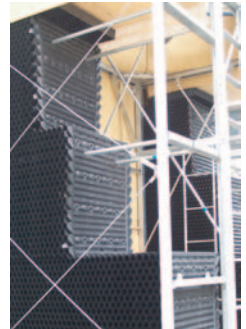
The FRP open type gravity flow hot water distribution system is non-corrosive and is designed for non-clogging operation and ease of inspection.

STEEL STRUCTURE & FASTENERS

All supporting steel members are available in stainless steel or galvanized. All fasteners are stainless steel.

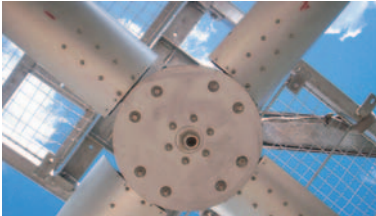
FILL/MEDIA

The special designed fill is vacuum formed of PVC film with chemical and distortion resistance and is suitable for operation with inlet water of 130 degrees F. The configuration of the filler incorporates the function of drift eliminator, louver and wet deck surface.



MOTOR & DRIVE

The fan motors are totally enclosed fan cooled (TEFC) foot mounting. Motors are available outside of the fanstack. The fans are belt driven and are located in the fan stack ensuring free, and smooth air discharge together with high efficiency and low energy consumption.



AXIAL FAN

Corrosion resistant fan blades are adjustable pitch for maximum utilization of rated horsepower and optimum performance. The aerodynamic shape together with tip speed ensure a lower noise level.

WARRANTY

Protec warrants that the Mechanical Equipment and accessories (whether factory or field installed) shall be free from defects in material or workmanship for a period of one (1) year from the date of shipment and agrees to repair or replace, at its option, any parts that fail during said one (1) year period due to any such defects which would not have occurred had reasonable care been taken, provided that such parts have been inspected by Protec and found defective and provided the mechanical equipment and accessories have been given normal and proper usage and all parts and controls remain unaltered. This warranty does not apply to accident, improper use, alterations or damage resulting from operation not conforming with Protec's maintenance instructions and standards of operation.

PROTEC MAKES NO WARRANTY OF MERCHANTABILITY OF PRODUCTS OR OF THEIR FITNESS FOR ANY PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY WHICH EXTENDS BEYOND THE LIMITED WARRANTY ABOVE. PROTEC'S LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM DEFECTS SHALL IN NO EVENT EXCEED THE COST OF REPAIR OR REPLACEMENT OF PARTS FOUND DEFECTIVE UPON EXAMINATION BY PROTEC. IN NO EVENT SHALL PROTEC BE LIABLE FOR INCIDENTAL INDIRECT OR CONSEQUENTIAL DAMAGES OR DAMAGES FOR INJURY TO PERSONS OR PROPERTY.

Protec shall not be responsible for freight to or from its plant in connection with the inspection, repair or replacement of parts under the terms of this limited warranty not for cost of removal or installation.



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QUICK SELECTION CHART

The capacities shown in this chart are for guidance purpose only and are the maximum each model can handle when 3 GPM of water per ton enter 95°F and leave 85°F. Please refer to the wet bulb of the area where the cooling tower will operate. For other values, please consult our local representative or our engineering department.

| Model | WET BULB °F | | | | | | | | | |
|-----------|-------------|------|------|------|------|------|------|------|------|------|
| | | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |
| 94-3.7 | TON | 163 | 156 | 148 | 139 | 131 | 122 | 113 | 104 | 94 |
| | GPM | 490 | 467 | 443 | 418 | 393 | 367 | 340 | 312 | 283 |
| 94-5.5 | TON | 186 | 178 | 168 | 159 | 149 | 140 | 129 | 119 | 108 |
| | GPM | 559 | 533 | 505 | 477 | 448 | 419 | 388 | 356 | 323 |
| 94-7.5 | TON | 207 | 197 | 187 | 176 | 166 | 155 | 144 | 132 | 120 |
| | GPM | 621 | 592 | 562 | 529 | 497 | 465 | 431 | 395 | 359 |
| 127-5.5 | TON | 222 | 211 | 200 | 189 | 177 | 166 | 154 | 141 | 128 |
| | GPM | 665 | 633 | 601 | 567 | 532 | 498 | 461 | 423 | 384 |
| 127-7.5 | TON | 246 | 234 | 222 | 209 | 197 | 184 | 171 | 157 | 142 |
| | GPM | 738 | 703 | 667 | 628 | 590 | 553 | 512 | 470 | 426 |
| 127-11 | TON | 279 | 266 | 252 | 238 | 224 | 209 | 194 | 178 | 161 |
| | GPM | 838 | 798 | 757 | 714 | 671 | 627 | 581 | 533 | 484 |
| 169-7.5 | TON | 294 | 280 | 266 | 250 | 235 | 220 | 203 | 186 | 169 |
| | GPM | 883 | 841 | 797 | 750 | 705 | 659 | 610 | 559 | 508 |
| 94-3.7-2 | TON | 327 | 311 | 295 | 279 | 262 | 245 | 227 | 208 | 189 |
| | GPM | 980 | 934 | 886 | 836 | 786 | 734 | 680 | 624 | 566 |
| 169-11 | TON | 334 | 318 | 302 | 284 | 267 | 250 | 231 | 212 | 192 |
| | GPM | 1003 | 955 | 906 | 852 | 801 | 749 | 693 | 635 | 577 |
| 169-15 | TON | 371 | 353 | 335 | 315 | 296 | 277 | 256 | 235 | 213 |
| | GPM | 1113 | 1060 | 1005 | 944 | 888 | 831 | 769 | 705 | 640 |
| 94-5.5-2 | TON | 373 | 355 | 337 | 318 | 299 | 279 | 259 | 237 | 215 |
| | GPM | 1118 | 1066 | 1010 | 954 | 896 | 838 | 776 | 712 | 646 |
| 94-7.5-2 | TON | 414 | 395 | 375 | 353 | 331 | 310 | 287 | 263 | 239 |
| | GPM | 1242 | 1184 | 1124 | 1058 | 994 | 930 | 862 | 790 | 718 |
| 127-5.5-2 | TON | 443 | 422 | 401 | 378 | 355 | 332 | 307 | 282 | 256 |
| | GPM | 1330 | 1266 | 1202 | 1134 | 1064 | 996 | 922 | 846 | 768 |
| 127-7.5-2 | TON | 492 | 469 | 445 | 419 | 393 | 369 | 341 | 313 | 284 |
| | GPM | 1476 | 1406 | 1334 | 1256 | 1180 | 1106 | 1024 | 940 | 852 |
| 127-11-2 | TON | 559 | 532 | 505 | 476 | 447 | 418 | 387 | 355 | 323 |
| | GPM | 1676 | 1596 | 1514 | 1428 | 1342 | 1254 | 1162 | 1066 | 968 |
| 169-7.5-2 | TON | 589 | 561 | 531 | 500 | 470 | 439 | 407 | 373 | 339 |
| | GPM | 1766 | 1682 | 1594 | 1500 | 1410 | 1318 | 1220 | 1118 | 1016 |
| 127-5.5-3 | TON | 665 | 633 | 601 | 567 | 532 | 498 | 461 | 423 | 384 |
| | GPM | 1995 | 1899 | 1803 | 1701 | 1596 | 1494 | 1383 | 1269 | 1152 |
| 169-11-2 | TON | 669 | 637 | 604 | 568 | 534 | 499 | 462 | 423 | 385 |
| | GPM | 2006 | 1910 | 1812 | 1704 | 1602 | 1498 | 1386 | 1270 | 1154 |
| 127-7.5-3 | TON | 738 | 703 | 667 | 628 | 590 | 553 | 512 | 470 | 426 |
| | GPM | 2214 | 2109 | 2001 | 1884 | 1770 | 1659 | 1536 | 1410 | 1278 |
| 169-15-2 | TON | 742 | 707 | 670 | 629 | 592 | 554 | 513 | 470 | 427 |
| | GPM | 2226 | 2120 | 2010 | 1888 | 1776 | 1662 | 1538 | 1410 | 1280 |
| 127-11-3 | TON | 838 | 798 | 757 | 714 | 671 | 627 | 581 | 533 | 484 |
| | GPM | 2514 | 2394 | 2271 | 2142 | 2013 | 1881 | 1743 | 1599 | 1452 |
| 169-7.5-3 | TON | 883 | 841 | 797 | 750 | 705 | 659 | 610 | 559 | 508 |
| | GPM | 2649 | 2523 | 2391 | 2250 | 2115 | 1977 | 1830 | 1677 | 1524 |
| 127-5.5-4 | TON | 887 | 844 | 801 | 756 | 709 | 664 | 615 | 564 | 512 |
| | GPM | 2660 | 2532 | 2404 | 2268 | 2128 | 1992 | 1844 | 1692 | 1536 |
| 127-7.5-4 | TON | 984 | 937 | 889 | 837 | 787 | 737 | 683 | 627 | 568 |
| | GPM | 2952 | 2812 | 2668 | 2512 | 2360 | 2212 | 2048 | 1880 | 1704 |
| 169-11-3 | TON | 1003 | 955 | 906 | 852 | 801 | 749 | 693 | 635 | 577 |
| | GPM | 3009 | 2865 | 2718 | 2556 | 2403 | 2247 | 2079 | 1905 | 1731 |
| 169-15-3 | TON | 1113 | 1060 | 1005 | 944 | 888 | 831 | 769 | 705 | 640 |
| | GPM | 3339 | 3180 | 3015 | 2832 | 2664 | 2493 | 2307 | 2115 | 1920 |
| 127-11-4 | TON | 1117 | 1064 | 1009 | 952 | 895 | 836 | 775 | 711 | 645 |
| | GPM | 3352 | 3192 | 3028 | 2856 | 2684 | 2508 | 2324 | 2132 | 1936 |
| 169-7.5-4 | TON | 1177 | 1121 | 1063 | 1000 | 940 | 879 | 813 | 745 | 677 |
| | GPM | 3532 | 3364 | 3188 | 3000 | 2820 | 2636 | 2440 | 2236 | 2032 |
| 169-11-4 | TON | 1337 | 1273 | 1208 | 1136 | 1068 | 999 | 924 | 847 | 769 |
| | GPM | 4012 | 3820 | 3624 | 3408 | 3204 | 2996 | 2772 | 2540 | 2308 |
| 169-15-4 | TON | 1484 | 1413 | 1340 | 1259 | 1184 | 1108 | 1025 | 940 | 853 |
| | GPM | 4452 | 4240 | 4020 | 3776 | 3552 | 3324 | 3076 | 2820 | 2560 |

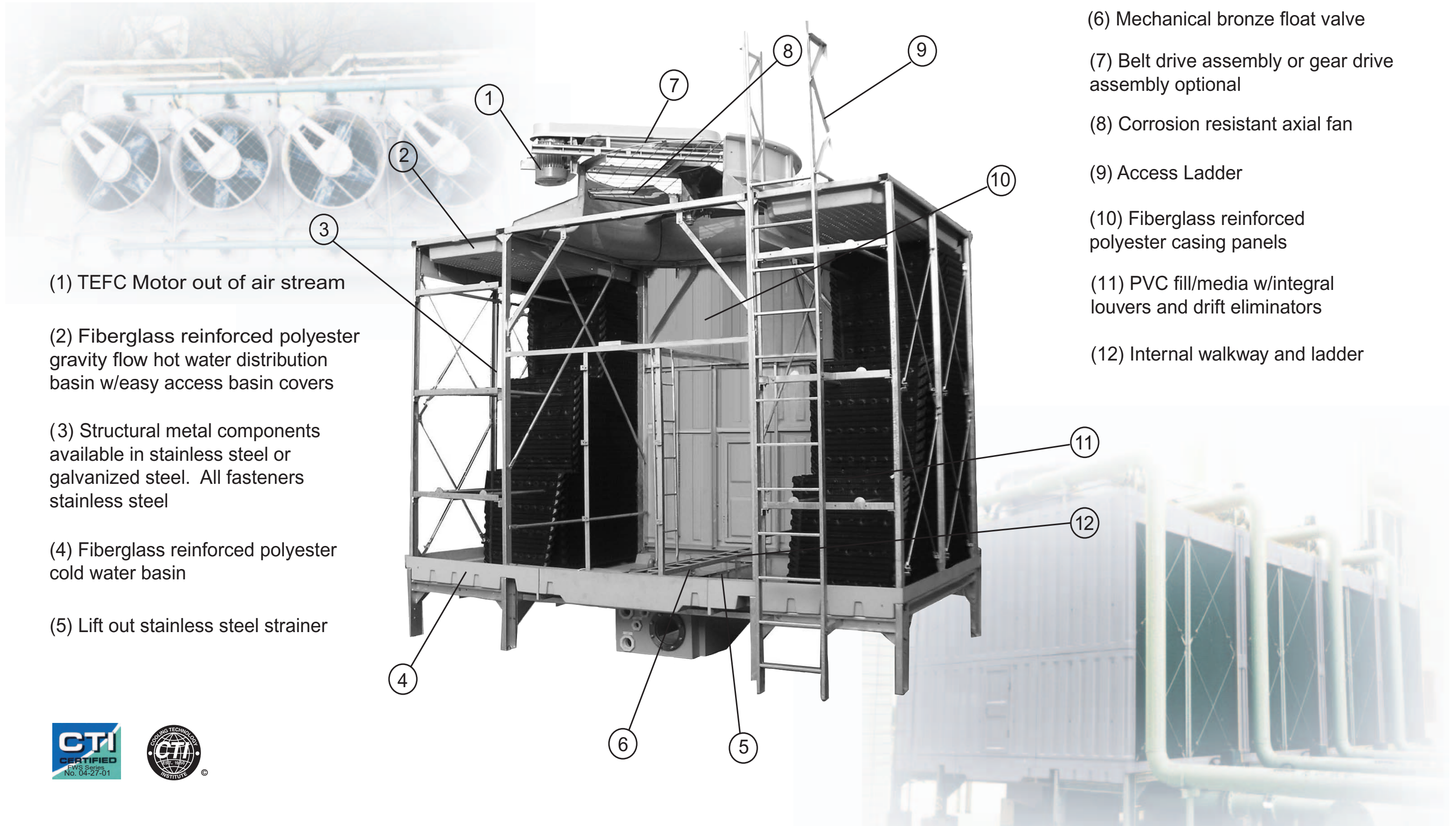
1. Designation FWS-XXX-XX-X



No. of cells
Motor KW
Model No.

2. CTI Certification applies to operation with the wet bulb temp. between 60°F and 85°F, max. entering water temp. of 125°F, min. temp. range of 5°F, min. temp. approach of 5°F

PROTEG[®]



(1) TEFC Motor out of air stream

(2) Fiberglass reinforced polyester gravity flow hot water distribution basin w/easy access basin covers

(3) Structural metal components available in stainless steel or galvanized steel. All fasteners stainless steel

(4) Fiberglass reinforced polyester cold water basin

(5) Lift out stainless steel strainer

(6) Mechanical bronze float valve

(7) Belt drive assembly or gear drive assembly optional

(8) Corrosion resistant axial fan

(9) Access Ladder

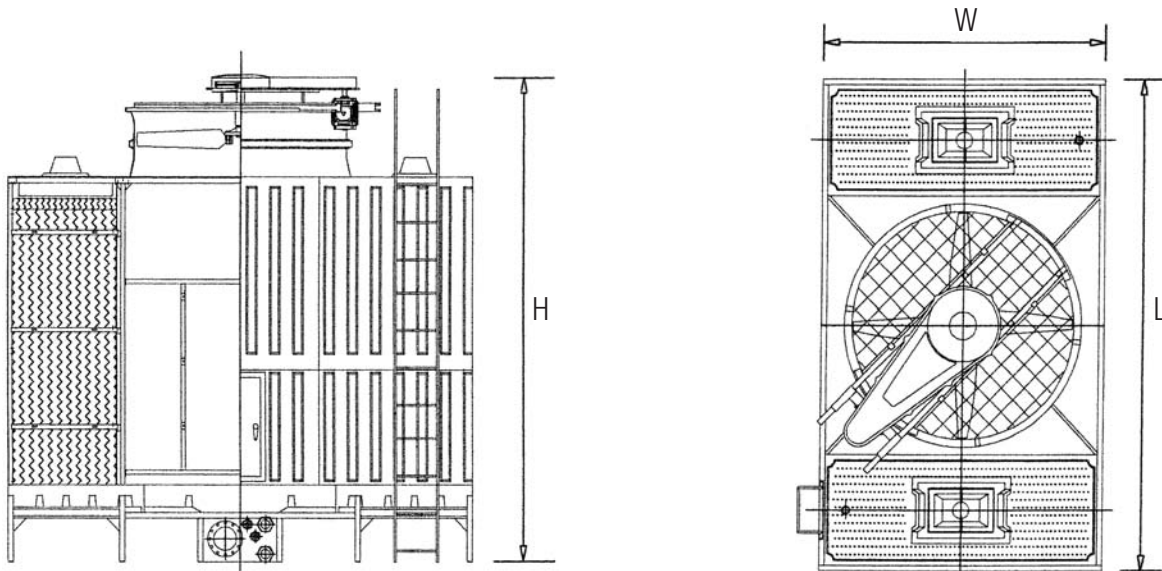
(10) Fiberglass reinforced polyester casing panels

(11) PVC fill/media w/integral louvers and drift eliminators

(12) Internal walkway and ladder



Dimensions

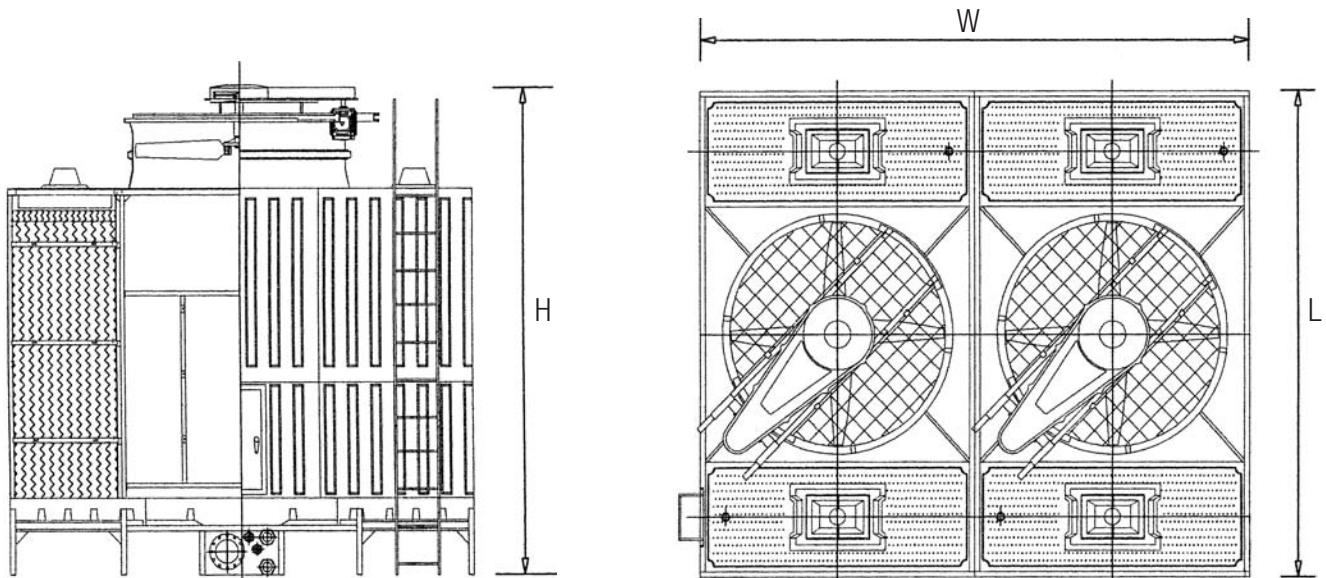


| Model | FWS-94-3.7 | FWS-94-5.5 | FWS-94-7.5 | FWS-127-5.5 | FWS-127-7.5 | FWS-127-11 | FWS-169-7.5 | FWS-169-11 | FWS-169-15 |
|------------------|------------|------------|------------|-------------|-------------|------------|-------------|------------|------------|
| Nominal Tons | 113 | 129 | 144 | 154 | 171 | 194 | 203 | 231 | 256 |
| Length | 157-1/2" | 157-1/2" | 157-1/2" | 173-1/4" | 173-1/4" | 173-1/4" | 173-1/4" | 173-1/4" | 173-1/4" |
| Width | 78-3/4" | 78-3/4" | 78-3/4" | 90-1/2" | 90-1/2" | 90-1/2" | 102-3/8" | 102-3/8" | 102-3/8" |
| Height (4) | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" |
| Height (5) | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" |
| Inlet | 5"x2 | 5"x2 | 5"x2 | 5"x2 | 5"x2 | 5"x2 | 5"x2 | 5"x2 | 5"x2 |
| Outlet | 6" | 8" | 8" | 8" | 8" | 8" | 8" | 8" | 8" |
| Fan Diameter | 63" | 63" | 63" | 70-3/4" | 70-3/4" | 70-3/4" | 78-3/4" | 78-3/4" | 78-3/4" |
| Qty. of Fans | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Motor H.P. | 5 | 7.5 | 10 | 7.5 | 10 | 15 | 10 | 15 | 20 |
| Qty. of Motors | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Dry Weight | 3370 | 3400 | 3410 | 3760 | 3780 | 3880 | 4440 | 4550 | 4580 |
| Operating Weight | 6440 | 6470 | 6490 | 7520 | 7540 | 7630 | 8710 | 8820 | 8850 |

NOTES:

1. Nominal tons are based upon 95°F Hot Water - 85°F Cold Water - 78°F Wet Bulb and 3 GPM/Ton
2. For foundation dimensions and weight distribution, consult factory.
3. Continuing engineering research results in steady improvements. Therefore, these specifications and data are subject to change without notice. Consult with factory for current certified dimensions.
4. Height with the cooling tower motor out of the airstream.
5. Height with the cooling tower motor in the airstream.

Dimensions



| Model | FWS-94-3.7-2 | FWS-94-5.5-2 | FWS-94-7.5-2 | FWS-127-5.5-2 | FWS-127-7.5-2 | FWS-127-11-2 | FWS-169-7.5-2 | FWS-169-11-2 | FWS-169-15-2 |
|------------------|--------------|--------------|--------------|---------------|---------------|--------------|---------------|--------------|--------------|
| Nominal Tons | 227 | 259 | 287 | 307 | 341 | 387 | 407 | 462 | 513 |
| Length | 157-1/2" | 157-1/2" | 157-1/2" | 173-1/4" | 173-1/4" | 173-1/4" | 173-1/4" | 173-1/4" | 173-1/4" |
| Width | 157-1/2" | 157-1/2" | 157-1/2" | 181" | 181" | 181" | 204-3/4" | 204-3/4" | 204-3/4" |
| Height (5) | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" | 174-1/2" |
| Height (6) | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" | 181-3/4" |
| Inlet | 5"x4" | 5"x4" | 5"x4" | 5"x4" | 5"x4" | 5"x4" | 5"x4" | 5"x4" | 5"x4" |
| Outlet | 8" | 8" | 8" | 10" | 10" | 10" | 10" | 10" | 10" |
| Fan Diameter | 63" | 63" | 63" | 70-3/4" | 70-3/4" | 70-3/4" | 78-3/4" | 78-3/4" | 78-3/4" |
| Qty. of Fans | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Motor H.P. | 5 | 7.5 | 10 | 7.5 | 10 | 15 | 10 | 15 | 20 |
| Qty. of Motors | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Dry Weight | 6740 | 6800 | 6820 | 7520 | 7560 | 7760 | 8880 | 9100 | 9160 |
| Operating Weight | 12880 | 12940 | 12980 | 15040 | 15080 | 15260 | 17420 | 17640 | 17700 |

NOTES:

1. Nominal tons are based upon 95°F Hot Water - 85°F Cold Water - 78°F Wet Bulb and 3 GPM/Ton
2. For foundation dimensions and weight distribution, consult factory.
3. Continuing engineering research results in steady improvements. Therefore, these specifications and data are subject to change without notice. Consult with factory for current certified dimensions.
4. Consult with factory for dimensions of models with 3 cells or greater. eg. 169-15-4.
5. Height with the cooling tower motor out of the airstream.
6. Height with the cooling tower motor in the airstream.

COOLING TOWER SPECIFICATIONS

- A. Provide and install a cross flow induced draft vertical discharge cooling tower PROTEC Series FWS, flow rates, capacities and design temperatures shall be as indicated on the drawings.
- B. Tower manufacturer must be a member of the Cooling Technology Institute (CTI) and cooling tower shall be certified as per CTI Std. 201. Cooling tower manufacturer shall also guarantee capacities.
- C. Structural framework shall be bolted with stainless steel fasteners. Casing and basin shall be molded of corrosion-resistant fiberglass reinforced polyester (FRP) material.
- D. The fill/media shall be film-type polyvinyl chloride (PVC). The fill shall have integral louvers and drift eliminators. The fill shall be able to withstand operating temperatures up to 130 degrees F. Fill shall be hung from longitudinal support tubes.
- E. Hot water basin shall be molded of corrosion-resistant fiberglass reinforced polyester (FRP) material of the open gravity type. Standard inlet connection for customer piping shall be through a support attached to the splash boxes. A water diverter is to be provided on the hot water basin floor under the splash box to break the velocity of water and distribute it evenly throughout the hot water basin floor.

Mechanical Equipment:

- F. Fan shall be belt driven multi-blade adjustable pitch axial type, corrosion resistant construction. Motors shall be single speed, TEFC, 1.15 service factor with class F insulation, 1800 RPM and suitable for the electrical rating shown on the drawings.
- G. Fan cylinder shall be constructed of corrosion-resistant fiberglass reinforced polyester (FRP) multi-segment type bolted together at vertical joints. A welded steel fan guard shall be furnished with all models.
- H. A ladder to allow inspection and accessibility to the fan motor and upper portion of the tower cell shall be provided for all models. Each tower cell shall have an internal ladder and walkway.
- I. All fiberglass reinforced polyester (FRP) materials shall contain UV (Ultraviolet) inhibitors and an exterior gel coat.
- J. All fasteners shall be stainless steel and the rest of the structural steel components shall be (1) _____

Note: (1) Stainless steel or galvanized