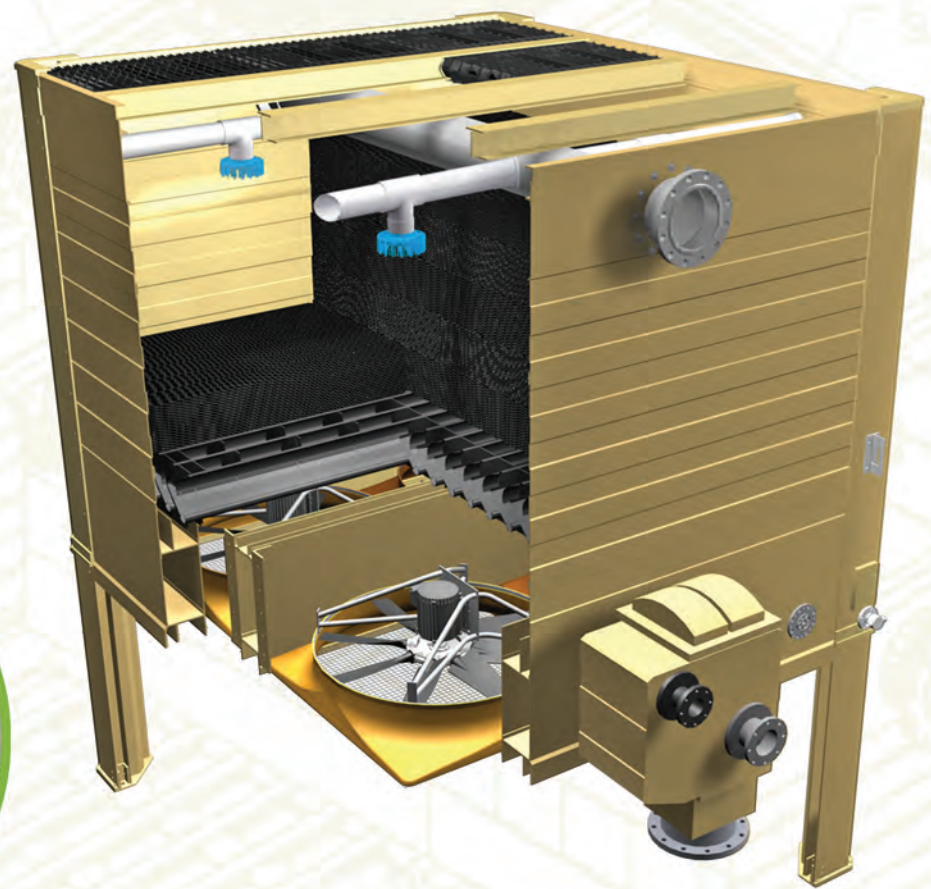




# TTXL SERIES

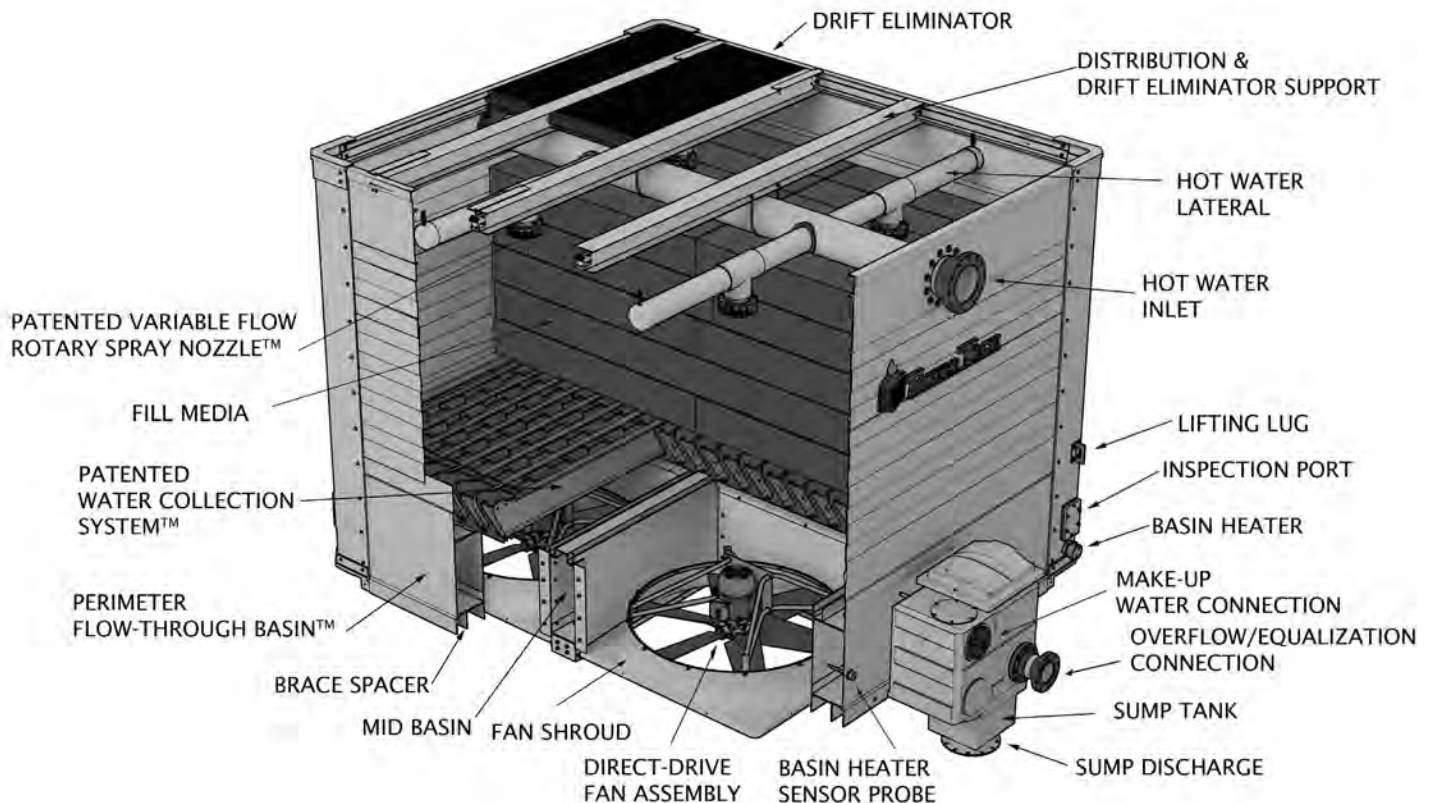
*Technical Reference Guide*



# TTXL SERIES

## FEATURES:

The TTXL Series forced-draft, counter-flow cooling tower delivers reliable thermal performance in both constant and variable heat load applications. Its modular design enables easy interconnectability to create virtually any size cooling tower and quickly accommodates future expansion of cooling tower capacity. The zinfrastructure cost and can be installed in less than an hour. The modular towers are the most maintenance friendly cooling tower in the world with all routine maintenance safely performed from ground level. The Tower Tech series modular towers offer the lowest drift rate; combined with the flow-through basin and enclosed tower design, water usage and chemical treatment cost are significantly reduced. Tower Tech modular towers provide the longest life span of any factory assembled cooling tower with an industry best 15 year limited warranty. Combine all of these advantages with the energy savings achieved by Tower Tech's design and you have the best cooling tower available today.

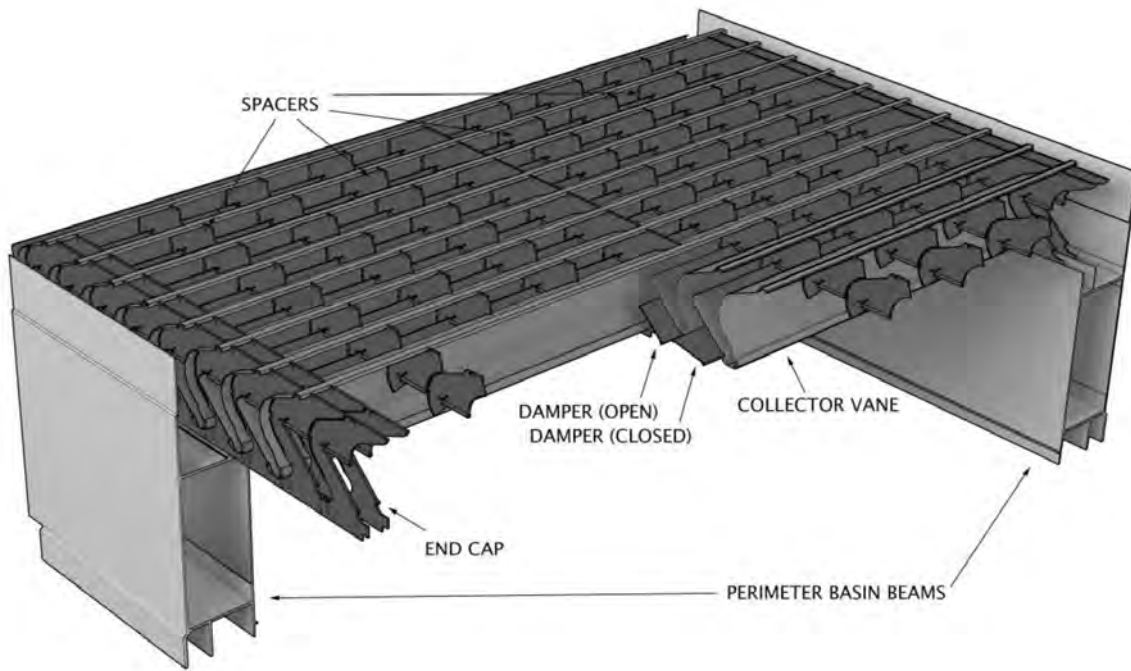


## Unique Design Features Include:

- Fully Enclosed Flow-Thru Basin
- Variable-Flow Rotary Spray Nozzle
- Water Collection System
- Bottom Mounted Fans
- Factory Assembled Modular Design
- Completely Non-Corrosive Materials

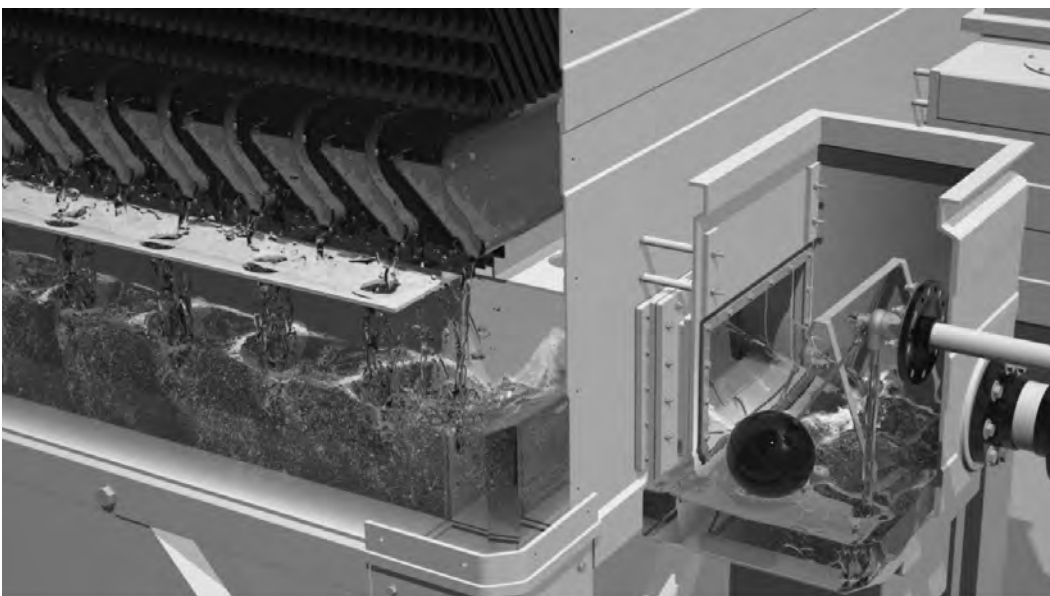
## Water Collection System™

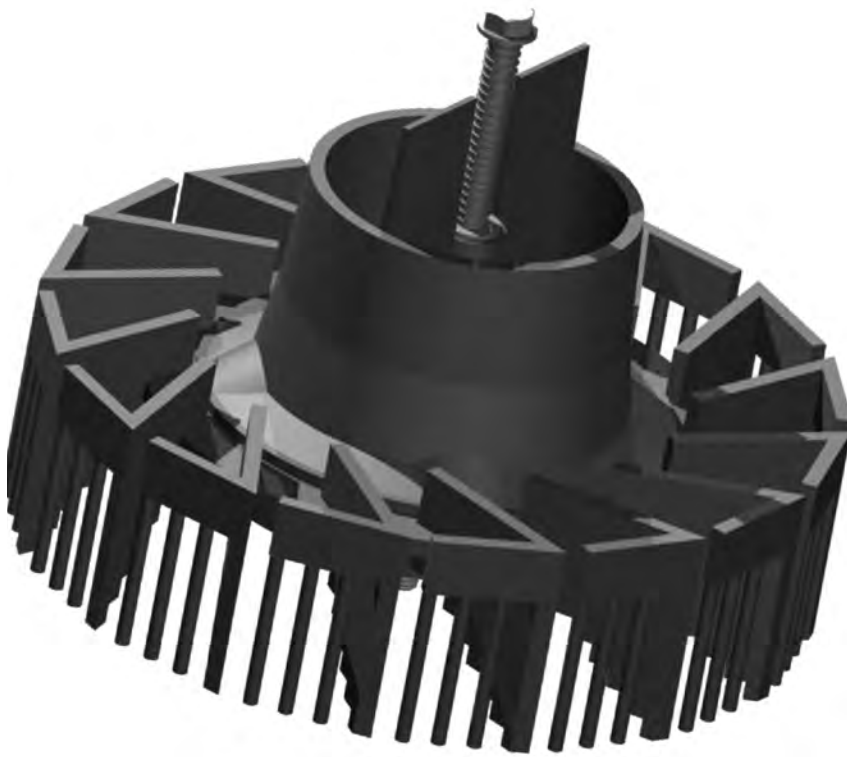
TTXL's patented Water Collection System serves as an efficient collection chamber and conduit for channeling waterflow into the tower's Flow-Thru Basin™. Its unique shape aerodynamically moves inlet air into the fill media while effectively providing a leak free barrier protecting tower mechanicals.



## Flow-Thru Basin™

Unlike the low velocity cold-water settling basins common to conventional cooling tower designs, the TTXL tower incorporates a patented perimeter box beam which uniquely serves as both the cold water reservoir and provides the base structural component of the module. High water velocities in the basin beams continually scrub the walls and floor of the basin to eliminate the build-up of sediment and potentially bio-hazardous material – a common problem in conventional designs. Four access ports are provided for easy inspection.





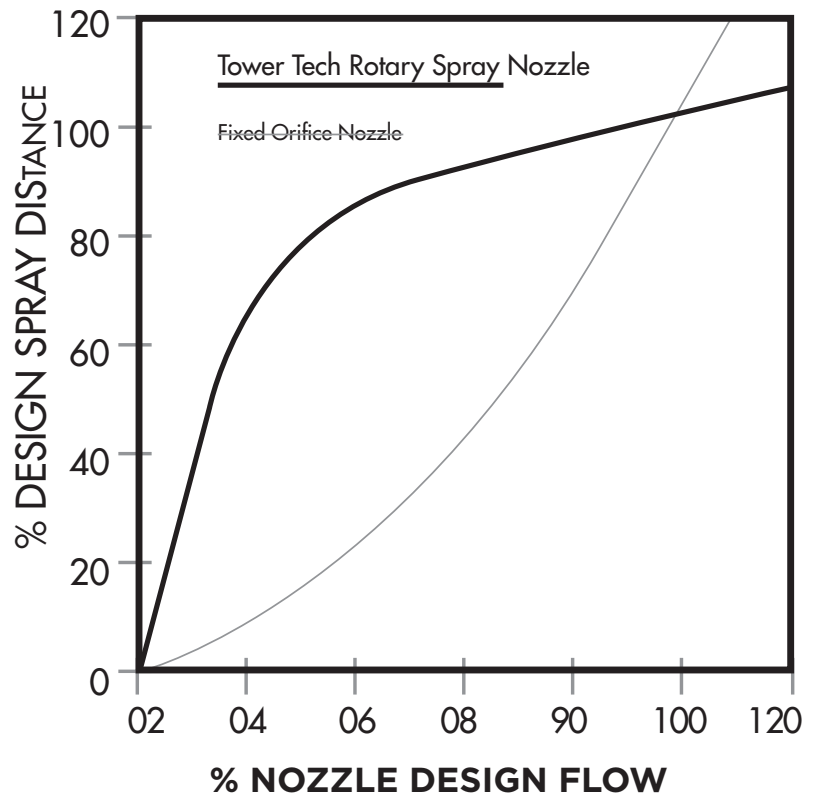
## Variable-Flow Rotary Spray Nozzle™

The patented Variable-Flow Rotary Spray Nozzle™ delivers even fill coverage across a broad range of system flows from 100 to 300 gpm per nozzle (6.5 to 19.5 lps) at low pressures from .5 to 1.5 psi (3.45 to 10.3 kPa). The nozzle requires less pressure to operate than a conventional nozzle, is virtually maintenance free, and dramatically improves tower performance. Use of a lateral spray pattern allows the nozzle to be positioned just one inch off the fill material, saving several feet of pump head. The nozzle's turbine-driven rotor spins on a water bearing that keeps the nozzle parts from

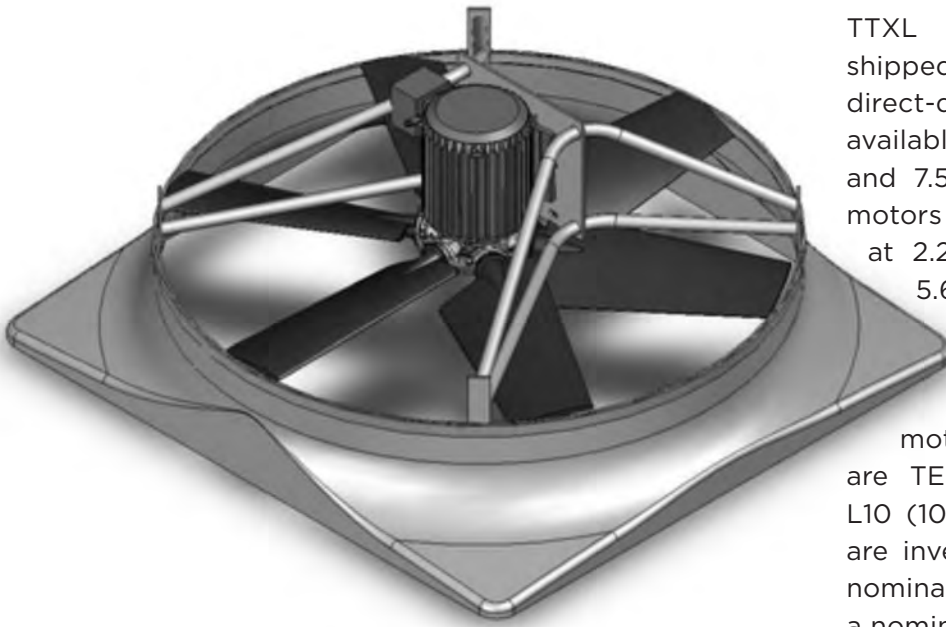
wearing, as well as provides the needed agitation to ensure virtually clog-free service. The rotary turbine produces a larger water droplet than conventional nozzles and thereby reduces drift loading on the drift eliminators for the lowest drift loss coefficient of any cooling tower.

The chart demonstrates the constancy in spray pattern coverage at varying flow rates using the Rotary Spray Nozzle™. The nozzle orifice is shaped to provide an even square spray pattern, thereby uniformly wetting the entire tower's fill. This improves tower performance and reduces the likelihood of scaling due to the occurrence of dry regions within the fill. Variable-flow capability stems from the unique spring-actuated orifice which allows the nozzle to automatically adjust its pattern to changes in the flow rate, significantly reducing the down turn in performance observed with conventional nozzle designs. While conventional towers require a reduction in cell usage when system flow decreases, TTXL technology permits this reduced flow to be evenly distributed over all available fill area. This results in maximizing cooling capacity and energy efficiency under partial load duties.

**NOZZLE SPRAY DISTANCE VERSUS FLOW**



## Motors / Fans / Shrouds



TTXL Series Modular Cooling Towers shipped after October 2010 have Baldor direct-drive motors. 60Hz 40oC motors are available in various voltages at 3.0HP, 5.0HP and 7.5HP. 60Hz 50oC and 50Hz 40oC motors are available in various voltages at 2.2kW (3.0HP), 3.7kW (5.0HP) and 5.6kW (7.5HP). 50Hz 50oC motors are available in various voltages at 2.9kW (4.0HP) and 4.5kW (6.0HP). All standard Baldor motors have a 210T Series size frame, are TEAO (Totally Enclosed Air Over), L10 (100,000 hour) sealed bearings, and are inverter ready. 60 Hz motors have a nominal RPM of 860. 50 Hz motors have a nominal RPM of 715.

All Baldor motors on TTXL Modular Cooling Towers shipped after October 2014 also meet IP55 and NEMA MG-1 Parts 30 and 31 requirements. Motor type and power level depends on tower model selected and required design conditions. Standard available motor types:

60Hz 40°C. Available in 3.0 HP, 5.0 HP, or 7.5 HP. Available at 200V, 230V, 460V and 575V.

60Hz 50°C. Available in 3.0 HP, 5.0 HP (2.9kW) or 7.5 HP. Available at 230V, 380V or 460V.

50Hz 40°C. Available in 2.2 kW, 3.7 kW, 4.8 kW or 5.6 kW. Available at 190V-208V, 220V, 380V-415V or 440V.

50Hz 50°C. Available in 2.9 kW or 4.5 kW. Available at 190V-208V and 380V-415V.

## Fill & Drift Eliminators

TTXL Series cooling towers are equipped with rigid cross-corrugated, high-efficiency PVC film fill media (10 mil thickness). This fill media is resistant to biological degradation and to most chemicals (inorganic alkalis or acids, as well as organics) common to cooling tower systems. Its high surface area to volume ratio provides optimum heat exchange efficiency. The TTXL tower shell may be equipped with configurations to meet any water quality demand – alternative thermal capacity ratings are available from your Tower Tech design engineer. In addition to PVC, TTXL Series towers may be optionally equipped with HPVC fill suitable for use in “hot water” applications within a working range of 130°F to 155°F (54.4°C to 60°C). Alternative 15 mil thickness material is also available as a specified option.

TTXL Series cooling towers are equipped with low-pressure sinusoidal-wave shaped PVC drift eliminators (15 mil finished thickness). These high-efficiency cells (drift loss guaranteed not to exceed 0.0004%) force the exiting airstream to make three distinct directional changes causing exiting moisture droplets to impinge and coalesce on its high surface areas. The PVC material used in the construction is virtually impervious to rot, decay, or biological attack. An ultraviolet inhibitor manufactured into the product extends the life expectancy.

# Materials of Construction

The Tower Tech TTXL Series cooling tower structure is factory-assembled and constructed entirely of fiberglass and stainless steel hardware, which together provide a rigid shell and framework for the tower that will resist deterioration and corrosion indefinitely. There are no galvanized or wood components which may leak potentially hazardous chemicals into the environment. Walls are joined together by tongue and groove joints and are sealed by a polyurethane sealant to prevent leaks. Stainless steel fasteners employing coated threads (in wetted areas) are used to bolt the walls together and ensure leak-free operation under pressurized operating conditions.

Component	Material
Fill Media	10 mil PVC (std.), 15 mil PVC (opt.)
Drift Eliminators	10 mil PVC (Thermoformed)
Rotary Spray Nozzle	HDPE & Stainless Steel
Water Distribution Header & Laterals	PVC
Water Collection System	ABS (Injection Molded & Extruded)
Header Inlet Flange	PVC (Injection Molded)
Hardware	304 Stainless Steel
Corner Enclosure	FRP (pultruded)

Component	Material
Shell/Casing	FRP (pultruded)
Sub-Structure Legs	FRP (Pultruded)
Wind Wall Partitions	ABS (Extruded)
Modular Base Support & Footpad	Nylon (Injection Molded)
Fan Shroud	Hand Lay-Up Fiberglass (Flame Retardant)
Sump Box	PP (Rotationally Molded)
Inspection Ports	Nylon (Injection Molded)
Motor Support	304 Stainless Steel

**Key:** FRP = Fiberglass Reinforced Plastic Pultrusion  
PVC = Poly-Vinyl Chloride (Self-Extinguishing)  
ABS = Acrylonitrile, 1,3-Butadiene, and Styrene Copolymer (Flame Retardant)  
PP = Polypropylene

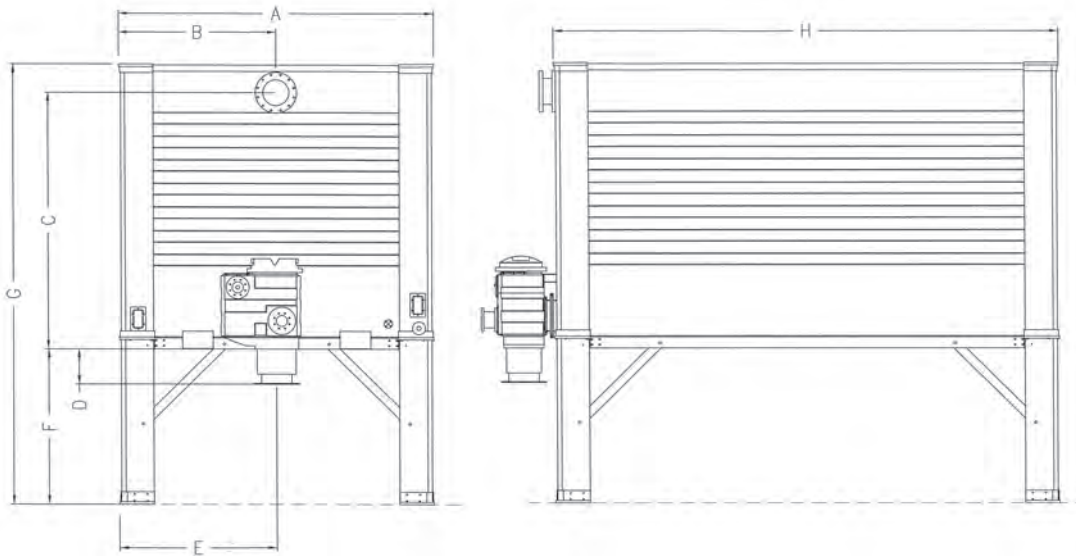
# Weights and Dimensions

TTXL Model	Weights in Lbs. (kg)		Dimensions per Illustration Below <sup>a</sup> (cm)							
	Shipping <sup>b</sup>	Operating	A	B	C	D	E	F	G	H
i219xx	4,360 (1,978)	9,470 (4,305)	7'-00" (213.4)	3'-06" (106.7)	10'-01" (307.3)	1'-04" (40.6)	4'-00" (121.9)	6'-00" (182.9)	17'-00" (518.2)	13'-06" (411.5)
i319xx	6,155 (2,792)	12,991 (5,905)	7'-00" (213.4)	3'-06" (106.7)	10'-01" (307.3)	1'-04" (40.6)	4'-00" (121.9)	6'-00" (182.9)	17'-00" (518.2)	19'-03" (586.7)
i419xx	7,950 (3,606)	16,503 (7,501)	7'-00" (213.4)	3'-06" (106.7)	10'-01" (307.3)	1'-04" (40.6)	4'-00" (121.9)	6'-00" (182.9)	17'-00" (518.2)	25'-00" (762.0)
0419xx	7,800 (3,538)	14,394 (6,543)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	6'-00" (182.9)	6'-00" (182.9)	17'-00" (518.2)	13'-06" (411.5)
i519xx	9,745 (4,420)	20,024 (9,102)	7'-00" (213.4)	3'-06" (106.7)	10'-01" (307.3)	1'-04" (40.6)	4'-00" (121.9)	6'-00" (182.9)	17'-00" (518.2)	30'-09" (937.3)
i619xx	11,540 (5,235)	23,553 (10,706)	7'-00" (213.4)	3'-06" (106.7)	10'-01" (307.3)	1'-04" (40.6)	4'-00" (121.9)	6'-00" (182.9)	17'-00" (518.2)	36'-06" (1,112.5)
0619xx	10,775 (4,887)	19,587 (8,903)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	6'-00" (182.9)	6'-00" (182.9)	17'-00" (518.2)	19'-03" (586.7)
0819xx	13,750 (6,237)	24,780 (11,264)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	6'-00" (182.9)	6'-00" (182.9)	17'-00" (518.2)	25'-00" (762.0)
1019xx	16,855 (7,645)	29,964 (13,620)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	6'-00" (182.9)	6'-00" (182.9)	17'-00" (518.2)	30'-09" (937.3)
1219xx <sup>c</sup>	19,700 (8,936)	31,655 (15,980)	12'-00" (365.8)	6'-00" (182.9)	9'-11" (302.3)	1'-04" (40.6)	6'-00" (182.9)	6'-00" (182.9)	17'-00" (518.2)	30'-09" (1,112.5)

<sup>a</sup> Dimensions are approximate and should not be used for construction purposes. Consult submittals for exact tower data. Dimension F may be 1'-00" (30.5 cm), 4'-00" (121.9 cm), 6'-00" (182.9 cm), 8'-00" (243.8 cm), 10'-00" (304.8 cm), or 12'-00" (365.8 cm) depending on project requirements. 12'-00" (365.8 cm) may be specified with prior approval of Tower Tech engineering manager only. Dimension F on drawing below is 6'-00" (182.9 cm).

<sup>b</sup> Tower weights may vary due to optional equipment, residual water from factory testing, rain, etc. Weights shown are guidelines only and do not include sump, substructure or other accessories not directly attached to the tower module during shipping.

<sup>c</sup> TTXL-1219xx requires two sumps. See TTXL-1219xx drawings on Tower Tech website.



Model		Fan Motors 3 Phase, 60 Hz, 40° C., 200V, 230V, 460V or 575V											Connections <sup>c</sup>				
TTXL	No. Fans	kW / Fan	kW / Module	HP / Fan	HP / Module	Volts	FLA / Fan	FLA / Module	SFA (MMC) / Fan <sup>a</sup>	SFA (MMC) / Module <sup>a</sup>	Eff'y <sup>b</sup>	RPM	S.F.	Inlet Dia.	Outlet Dia.	Makeup Dia.	Overflow Dia.
i21930		2.2	4.4	3.0	6.0	200	12.1	24.2	13.3	26.6	84.0%	865					
						230	11.2	22.4	12.2	24.3							
						460	5.6	11.2	6.2	12.3							
						575	4.5	9.0	5.2	10.4							
i21950	2	3.7	7.4	5.0	10.0	200	20.0	40.0	22.0	44.0	85.5%	855	1.15	6" (150mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
						230	16.6	33.2	18.3	36.5							
						460	8.3	16.6	9.2	18.4							
						575	6.7	13.4	7.7	15.4							
i21975		5.6	11.2	7.5	15.0	200	30.0	60.0	33.0	66.0	81.5%	850					
						230	24.6	49.2	27.7	55.3							
						460	12.3	24.6	13.8	27.5							
						575	10.3	20.6	11.4	22.8							
i31930		2.2	6.6	3.0	9.0	200	12.1	36.3	13.3	39.9	84.0%	865					
						230	11.2	33.6	12.2	36.5							
						460	5.6	16.8	6.2	18.3							
						575	4.5	13.5	5.2	15.5							
i31950	3	3.7	11.1	5.0	15.0	200	20.0	60.0	22.0	66.0	85.5%	855	1.15	8" (200mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
						230	16.6	49.8	18.3	54.8							
						460	8.3	24.9	9.2	27.6							
						575	6.7	20.1	7.7	23.1							
i31975		5.6	16.8	7.5	22.5	200	30.0	90.0	33.0	99.0	81.5%	850					
						230	24.6	73.8	27.7	82.9							
						460	12.3	36.9	13.8	41.3							
						575	10.3	30.9	11.4	34.2							
i41930		2.2	8.8	3.0	12.0	200	12.1	48.4	13.3	53.2	84.0%	865					
						230	11.2	44.8	12.2	48.6							
						460	5.6	22.4	6.2	24.6							
						575	4.5	18.0	5.2	20.7							
i41950	4	3.7	14.8	5.0	20.0	200	20.0	80.0	22.0	88.0	85.5%	855	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						230	16.6	66.4	18.3	73.0							
						460	8.3	33.2	9.2	36.7							
						575	6.7	26.8	7.7	30.8							
i41975		5.6	22.4	7.5	30.0	200	30.0	120.0	33.0	132.0	81.5%	850					
						230	24.6	98.4	27.7	110.5							
						460	12.3	49.2	13.8	55.1							
						575	10.3	41.2	11.4	45.6							
041930		2.2	8.8	3.0	12.0	200	12.1	48.4	13.3	53.2	84.0%	865					
						230	11.2	44.8	12.2	48.6							
						460	5.6	22.4	6.2	24.6							
						575	4.5	18.0	5.2	20.7							
041950	4	3.7	14.8	5.0	20.0	200	20.0	80.0	22.0	88.0	85.5%	855	1.15	10" (250mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						230	16.6	66.4	18.3	73.0							
						460	8.3	33.2	9.2	36.7							
						575	6.7	26.8	7.7	30.8							
041975		5.6	22.4	7.5	30.0	200	30.0	120.0	33.0	132.0	81.5%	850					
						230	24.6	98.4	27.7	110.5							
						460	12.3	49.2	13.8	55.1							
						575	10.3	41.2	11.4	45.6							
i51930		2.2	11	3.0	15.0	200	12.1	60.5	13.3	69.5	84.0%	865					
						230	11.2	56.0	12.2	60.8							
						460	5.6	28.0	6.2	31.9							
						575	4.5	22.5	5.2	25.0							
i51950	5	3.7	18.5	5.0	25.0	200	20.0	92.5	22.0	106.4	85.5%	855	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						230	16.6	83.0	18.3	91.3							
						460	8.3	41.5	9.2	45.4							
						575	6.7	33.5	7.7	38.5							
i51975		5.6	28	7.5	37.5	200	30.0	132.5	33.0	152.4	81.5%	850					
						230	24.6	123.0	27.7	138.1							
						460	12.3	61.5	13.8	68.8							
						575	10.3	51.5	11.4	57.0							

Engineering Data 60 Hz, 40° C. Continued on Page 9



Model		Fan Motors 3 Phase, 60 Hz, 40° C., 200V, 230V, 460V or 575V											Connections <sup>c</sup>				
TTXL	No. Fans	kW / Fan	kW / Module	HP / Fan	HP / Module	Volts	FLA / Fan	FLA / Module	SFA (MMC) / Fan <sup>a</sup>	SFA (MMC) / Module <sup>a</sup>	Eff'y <sup>b</sup>	RPM	S.F.	Inlet Dia.	Outlet Dia.	Makeup Dia.	Overflow Dia.
061930		2.2	13.2	3.0	18.0	200	12.1	72.6	13.3	79.9	84.0%	865					
						230	11.2	67.2	12.2	73.0							
						460	5.6	33.6	6.2	37.0							
						575	4.5	27.0	5.2	31.0							
061950	6	3.7	22.2	5.0	30.0	200	20.0	120.0	22.0	132.0	85.5%	855	1.15	10" (250mm)	12" (300mm)	2" FNPT (50mm)	6" (150mm)
						230	16.6	99.6	18.3	109.5							
						460	8.3	49.8	9.2	55.1							
						575	6.7	40.2	7.7	46.2							
061975		5.6	33.6	7.5	45.0	200	30.0	180.0	33.0	198.0	81.5%	850					
						230	24.6	147.6	27.7	165.8							
						460	12.3	73.8	13.8	82.1							
						575	10.3	61.8	11.4	68.4							
081930		2.2	17.6	3.0	24.0	200	12.1	96.8	13.3	106.5	84.0%	865					
						230	11.2	89.6	12.2	97.3							
						460	5.6	44.8	6.2	49.3							
						575	4.5	36.0	5.2	41.4							
081950	8	3.7	29.6	5.0	40.0	200	20.0	160.0	22.0	176.0	85.5%	855	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
						230	16.6	132.8	18.3	146.0							
						460	8.3	66.4	9.2	73.5							
						575	6.7	53.6	7.7	61.6							
081975		5.6	44.8	7.5	60.0	200	30.0	240.0	33.0	264.0	81.5%	850					
						230	24.6	196.8	27.7	221.0							
						460	12.3	98.4	13.8	110.1							
						575	10.3	82.4	11.4	91.2							
101930		2.2	22	3.0	30.0	200	12.1	121.0	13.3	133.1	84.0%	865					
						230	11.2	112.0	12.2	121.6							
						460	5.6	56.0	6.2	61.4							
						575	4.5	45.0	5.2	51.8							
101950	10	3.7	37	5.0	50.0	200	20.0	200.0	22.0	220.0	85.5%	855	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
						230	16.6	166.0	18.3	182.5							
						460	8.3	83.0	9.2	91.8							
						575	6.7	67.0	7.7	77.1							
101975		5.6	56	7.5	75.0	200	30.0	265.0	33.0	304.8	81.5%	850					
						230	24.6	246.0	27.7	276.3							
						460	12.3	123.0	13.8	137.6							
						575	10.3	103.0	11.4	114.0							
121930		2.2	26.4	3.0	36.0	200	12.1	145.2	13.3	167.0	84.0%	865					
						230	11.2	134.4	12.2	145.9							
						460	5.6	67.2	6.2	74.1							
						575	4.5	54.0	5.2	62.1							
121950	12	3.7	44.4	5.0	60.0	200	20.0	220.0	22.0	255.3	85.5%	855	1.15	12" (300mm)	12" x 2" <sup>d</sup> (300mm x 2)	2" FNPT (50mm)	6" (150mm)
						230	16.6	199.2	18.3	219.0							
						460	8.3	99.6	9.2	108.9							
						575	6.7	80.4	7.7	92.5							
121975		5.6	67.2	7.5	90.0	200	30.0	318.0	33.0	365.7	81.5%	850					
						230	24.6	295.2	27.7	331.5							
						460	12.3	147.6	13.8	165.2							
						575	10.3	123.6	11.4	136.8							

<sup>a</sup> Baldor motor data. SFA (MMC) refers to Service Factor Amps (Maximum Motor Current). VFD should be sized for SFA (MMC).

<sup>b</sup> Rating is NEMA nominal efficiency. Standard motors, TEAO severe duty, direct drive, with L<sub>10</sub> 100,000 hour sealed bearings, inverter ready, with quantum shield wiring, class "H" insulation (minimum).

<sup>c</sup> Metric dimensions approximate.

<sup>d</sup> TTXR-12 requires two sump containers. See TTXR-12 drawings for details.

Model		Fan Motors 3 Phase, 60 Hz, 50° C., 380V or 460V											Connections <sup>c</sup>				
TTXL	No. Fans	kW / Fan	kW / Module	HP / Fan	HP / Module	Volts	FLA / Fan	FLA / Module	SFA (MMC) / Fan <sup>a</sup>	SFA (MMC) / Module <sup>a</sup>	Eff'y <sup>b</sup>	RPM	S.F.	Inlet Dia.	Outlet Dia.	Makeup Dia.	Overflow Dia.
i21930	2	2.2	4.4	3.0	6.0	380	6.7	13.4	7.3	14.6	84.0%	865	1.15	6" (150mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
						460	5.6	11.2	6.2	12.3							
i21950		3.7	7.4	5.0	10.0	380	10.1	20.2	11.3	22.6	85.5%	855					
						460	8.3	16.6	9.2	18.4							
i21975		5.6	11.2	7.5	15.0	380	15.0	30.0	16.7	33.4	81.5%	850					
						460	12.3	24.6	13.8	27.5							
i31930	3	2.2	6.6	3.0	9.0	380	6.7	20.1	7.3	21.9	84.0%	865	1.15	8" (200mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
						460	5.6	16.8	6.2	18.3							
i31950		3.7	11.1	5.0	15.0	380	10.1	30.3	11.3	33.9	85.5%	855					
						460	8.3	24.9	9.2	27.6							
i31975		5.6	16.8	7.5	22.5	380	15.0	45.0	16.7	50.1	81.5%	850					
						460	12.3	36.9	13.8	41.4							
i41930	4	2.2	8.8	3.0	12.0	380	6.7	26.8	7.3	29.2	84.0%	865	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						460	5.6	22.4	6.2	24.8							
i41950		3.7	14.8	5.0	20.0	380	10.1	40.4	11.3	45.2	85.5%	855					
						460	8.3	33.2	9.2	36.8							
i41975		5.6	22.4	7.5	30.0	380	15.0	60.0	16.7	66.8	81.5%	850					
						460	12.3	49.2	13.8	55.2							
041930	4	2.2	8.8	3.0	12.0	380	6.7	26.8	7.3	29.2	84.0%	865	1.15	10" (250mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						460	5.6	22.4	6.2	24.8							
041950		3.7	14.8	5.0	20.0	380	10.1	40.4	11.3	45.2	85.5%	855					
						460	8.3	33.2	9.2	36.8							
041975		5.6	22.4	7.5	30.0	380	15.0	60.0	16.7	66.8	81.5%	850					
						460	12.3	49.2	13.8	55.2							
i51930	5	2.2	11.0	3.0	15.0	380	6.7	33.5	7.3	36.5	84.0%	865	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						460	5.6	28.0	6.2	32.5							
i51950		3.7	18.5	5.0	25.0	380	10.1	50.5	11.3	56.5	85.5%	855					
						460	8.3	41.5	9.2	46							
i51975		5.6	28.0	7.5	37.5	380	15.0	75.0	16.7	83.5	81.5%	850					
						460	12.3	61.5	13.8	69.0							
061930	6	2.2	13.2	3.0	18.0	380	6.7	40.2	7.3	43.8	84.0%	865	1.15	10" (250mm)	12" (300mm)	2" FNPT (50mm)	6" (150mm)
						460	5.6	33.6	6.2	37.2							
061950		3.7	22.2	5.0	30.0	380	10.1	60.6	11.3	67.8	85.5%	855					
						460	8.3	49.8	9.2	55.2							
061975		5.6	33.6	7.5	45.0	380	15.0	90.0	16.7	100.2	81.5%	850					
						460	12.3	73.8	13.8	82.8							
081930	8	2.2	17.6	3.0	24.0	380	6.7	53.6	7.3	58.4	84.0%	865	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
						460	5.6	44.8	6.2	49.6							
081950		3.7	29.6	5.0	40.0	380	10.1	80.8	11.3	90.4	85.5%	855					
						460	8.3	66.4	9.2	73.6							
081975		5.6	44.8	7.5	60.0	380	15.0	120.0	16.7	133.6	81.5%	850					
						460	12.3	98.4	13.8	110.4							

Engineering Data 60 Hz, 50° C. Continued on Page 13

Model		Fan Motors 3 Phase, 60 Hz, 50° C., 380V or 460V											Connections <sup>c</sup>				
TTXL	No. Fans	kW / Fan	kW / Module	HP / Fan	HP / Module	Volts	FLA / Fan	FLA / Module	SFA (MMC) / Fan <sup>a</sup>	SFA (MMC) / Module <sup>a</sup>	Eff <sup>y</sup> <sup>b</sup>	RPM	S.F.	Inlet Dia.	Outlet Dia.	Makeup Dia.	Overflow Dia.
101930	10	2.2	22.0	3.0	30.0	380	6.7	67.0	7.3	73.0	84.0%	865	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
						460	5.6	56.0	6.2	62.0							
101950		3.7	37.0	5.0	50.0	380	10.1	101.0	11.3	113.0	85.5%	855					
						460	8.3	83.0	9.2	92.0							
101975		5.6	56.0	7.5	75.0	380	15.0	150.0	16.7	167.0	81.5%	850					
						460	12.3	123.0	13.8	138.0							
121930	12	2.2	26.4	3.0	36.0	380	6.7	80.4	7.3	87.6	84.0%	865	1.15	12" (300mm)	12" x 2 <sup>d</sup> (300mm x 2)	2" FNPT (50mm)	6" (150mm)
						460	5.6	67.2	6.2	74.4							
121950		3.7	44.4	5.0	60.0	380	10.1	121.2	11.3	135.6	85.5%	855					
						460	8.3	99.6	9.2	110.4							
121975		5.6	67.2	7.5	90.0	380	15.0	180.0	16.7	200.4	81.5%	850					
						460	12.3	147.6	13.8	165.6							

<sup>a</sup> Baldor motor data. SFA (MMC) refers to Service Factor Amps (Maximum Motor Current). VFD should be sized for SFA (MMC).

<sup>b</sup> Rating is NEMA nominal efficiency. Standard motors, TEAO severe duty, direct drive, with L<sub>10</sub> 100,000 hour sealed bearings, inverter ready, with quantum shield wiring, class "H" insulation (minimum).

<sup>c</sup> Metric dimensions approximate.

<sup>d</sup> TTXL-12 requires two sump containers. See TTXL-12 drawings for details.



Model		Fan Motors 3 Phase, 50 Hz, 40° C., 190V or 380V										Connections <sup>c</sup>					
TTXL	No. Fans	kW / Fan	kW / Module	HP / Fan	HP / Module	Volts	FLA / Fan	FLA / Module	SFA (MMC) / Fan <sup>a</sup>	SFA (MMC) / Module <sup>a</sup>	Eff <sup>y</sup> <sup>b</sup>	RPM	S.F.	Inlet Dia.	Outlet Dia.	Makeup Dia.	Overflow Dia.
i21922	2	2.2	4.4	3.0	6.0	190	12.4	24.8	13.6	27.2	84.0%	720	1.15	6" (150mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
380						6.2	12.4	6.8	13.6								
i21937		3.7	7.4	5.0	10.0	190	18.8	37.6	20.3	40.6	85.5%	700	1.10				
380						9.4	18.8	10.1	20.2								
i21956		5.6	11.2	7.5	15.0	190	28.6	57.2	33.6	67.2	81.5%	700	1.15				
380						14.3	28.6	16.3	32.6								
i31922	3	2.2	6.6	3.0	9.0	190	12.4	37.2	13.6	40.8	84.0%	720	1.15	8" (200mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
380						6.2	18.6	6.8	20.4								
i31937		3.7	11.1	5.0	15.0	190	18.8	56.4	20.3	60.9	85.5%	700	1.10				
380						9.4	28.2	10.1	30.3								
i31956		5.6	16.8	7.5	22.5	190	28.6	85.8	33.6	100.8	81.5%	700	1.15				
380						14.3	42.9	16.3	48.9								
i41922	4	2.2	8.8	3.0	12.0	190	12.4	49.6	13.6	54.4	84.0%	720	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
380						6.2	24.8	6.8	27.2								
i41937		3.7	14.8	5.0	20.0	190	18.8	75.2	20.3	81.2	85.5%	700	1.10				
380						9.4	37.6	10.1	40.4								
i41956		5.6	22.4	7.5	30.0	190	28.6	114.4	33.6	134.4	81.5%	700	1.15				
380						14.3	57.2	16.3	65.2								
041922	4	2.2	8.8	3.0	12.0	190	12.4	49.6	13.6	54.4	84.0%	720	1.15	10" (250mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
380						6.2	24.8	6.8	27.2								
041937		3.7	14.8	5.0	20.0	190	18.8	75.2	20.3	81.2	85.5%	700	1.10				
380						9.4	37.6	10.1	40.4								
041956		5.6	22.4	7.5	30.0	190	28.6	114.4	33.6	134.4	81.5%	700	1.15				
380						14.3	57.2	16.3	65.2								
i51922	5	2.2	11.0	3.0	15.0	190	12.4	62.0	13.6	68.0	84.0%	720	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
380						6.2	31.0	6.8	34.0								
i51937		3.7	18.5	5.0	25.0	190	18.8	94.0	20.3	101.5	85.5%	700	1.10				
380						9.4	47.0	10.1	50.5								
i51956		5.6	28.0	7.5	37.5	190	28.6	143.0	33.6	168.0	81.5%	700	1.15				
380						14.3	71.5	16.3	81.5								
061922	6	2.2	13.2	3.0	18.0	190	12.4	74.4	13.6	81.6	84.0%	720	1.15	10" (250mm)	12" (300mm)	2" FNPT (50mm)	6" (150mm)
380						6.2	37.2	6.8	40.8								
061937		3.7	22.2	5.0	30.0	190	18.8	112.8	20.3	121.8	85.5%	700	1.10				
380						9.4	56.4	10.1	60.6								
061956		5.6	33.6	7.5	45.0	190	28.6	171.6	33.6	201.6	81.5%	700	1.15				
380						14.3	85.8	16.3	97.8								
081922	8	2.2	17.6	3.0	24.0	190	12.4	99.2	13.6	108.8	84.0%	720	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
380						6.2	49.6	6.8	54.4								
081937		3.7	29.6	5.0	40.0	190	18.8	150.4	20.3	162.4	85.5%	700	1.10				
380						9.4	75.2	10.1	80.8								
081956		5.6	44.8	7.5	60.0	190	28.6	228.8	33.6	268.8	81.5%	700	1.15				
380						14.3	114.4	16.3	130.4								

Engineering Data 50 Hz, 40° C. Continued on Page 13

Model		Fan Motors 3 Phase, 50 Hz, 40° C., 190V or 380V										Connections <sup>c</sup>					
TTXL	No. Fans	kW / Fan	kW / Module	HP / Fan	HP / Module	Volts	FLA / Fan	FLA / Module	SFA (MMC) / Fan <sup>a</sup>	SFA (MMC) / Module <sup>a</sup>	Effy <sup>b</sup>	RPM	S.F.	Inlet Dia.	Outlet Dia.	Makeup Dia.	Overflow Dia.
101922	10	2.2	22.0	3.0	30.0	190	12.4	124.0	13.6	136.0	84.0%	720	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
						380	6.2	62.0	6.8	68.0							
101937		190	18.8	188.0	20.3	203.0	85.5%	700	1.10								
										380	9.4	94.0	10.1				
101956		190	28.6	286.0	33.6	336.0	81.5%	700	1.15								
										380	14.3	143.0	16.3				
121922	12	2.2	26.4	3.0	36.0	190	12.4	148.8	13.6	163.2	84.0%	720	1.15	12" (300mm)	12" x 2" <sup>d</sup> (300mm x 2)	2" FNPT (50mm)	6" (150mm)
						380	6.2	74.4	6.8	81.6							
121937		190	18.8	225.6	20.3	243.6	85.5%	700	1.10								
										380	9.4	112.8	10.1				
121956		190	28.6	343.2	33.6	403.2	81.5%	700	1.15								
										380	14.3	171.6	16.3				

<sup>a</sup> Baldor motor data. SFA (MMC) refers to Service Factor Amps (Maximum Motor Current). VFD should be sized for SFA (MMC).

<sup>b</sup> Rating is NEMA nominal efficiency. Standard motors, TEAO severe duty, direct drive, with L<sub>10</sub> 100,000 hour sealed bearings, inverter ready, with quantum shield wiring, class "H" insulation (minimum).

<sup>c</sup> Metric dimensions approximate.

<sup>d</sup> TTXL-12 requires two sump containers. See TTXL-12 drawings for details.



The thermal performance of the TTXL Series cooling towers is certified by the Cooling Technology Institute in accordance with its standard STD-201 and has been assigned CTI certification validation number 08-17-06. This certification is your assurance that the proposed capacities accurately reflect actual cooling tower performance. CTI certification under STD-201 is limited to thermal operating conditions with entering wet bulbs between 55°F and 90°F (12.8°C and 32.2°C), a maximum process fluid temperature of 125°F (51.7°C), a cooling range of 4°F (2.2°C) or greater, and a cooling approach of 5°F (2.8°C) or greater.

Model	Fan Motors 3 Phase, 50 Hz, 50° C., 190V or 380V										Connections <sup>c</sup>						
	TTXL	No. Fans	kW / Fan	kW / Module	HP / Fan	HP / Module	Volts	FLA / Fan	FLA / Module	SFA (MMC) / Fan <sup>a</sup>	SFA (MMC) / Module <sup>a</sup>	Eff <sup>y</sup> <sup>b</sup>	RPM	S.F.	Inlet Dia.	Outlet Dia.	Makeup Dia.
i21929	2	2.9	5.8	4.0	8.0	190	16.2	32.4	17.8	35.6	85.5%	710	1.15	6" (150mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
						380	8.1	16.2	8.9	17.8							
i21945	2	4.5	9.0	6.0	12.0	190	24.0	48.0	26.9	53.8	81.5%	715	1.15	6" (150mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
						380	12.0	24.0	13.4	26.8							
i31929	3	2.9	8.7	4.0	12.0	190	16.2	48.6	17.8	53.4	85.5%	710	1.15	8" (200mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
						380	8.1	24.3	8.9	26.7							
i31945	3	4.5	13.5	6.0	18.0	190	24.0	72.0	26.9	80.7	81.5%	715	1.15	8" (200mm)	8" (200mm)	1" FNPT (25mm)	4" (100mm)
						380	12.0	36.0	13.4	40.2							
i41929	4	2.9	11.6	4.0	16.0	190	16.2	64.8	17.8	71.2	85.5%	710	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						380	8.1	32.4	8.9	35.6							
i41945	4	4.5	18.0	6.0	24.0	190	24.0	96.0	26.9	107.6	81.5%	715	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						380	12.0	48.0	13.4	53.6							
041929	4	2.9	11.6	4.0	16.0	190	16.2	64.8	17.8	71.2	85.5%	710	1.15	10" (250mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						380	8.1	32.4	8.9	35.6							
041945	4	4.5	18.0	6.0	24.0	190	24.0	96.0	26.9	107.6	81.5%	715	1.15	10" (250mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						380	12.0	48.0	13.4	53.6							
i51929	5	2.9	14.5	4.0	20.0	190	16.2	81.0	17.8	89.0	85.5%	710	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						380	8.1	40.5	8.9	44.5							
i51945	5	4.5	22.5	6.0	30.0	190	24.0	120.0	26.9	134.5	81.5%	715	1.15	8" (200mm)	10" (250mm)	2" FNPT (50mm)	6" (150mm)
						380	12.0	60.0	13.4	67.0							
061929	6	2.9	17.4	4.0	24.0	190	16.2	97.2	17.8	106.8	85.5%	710	1.15	10" (250mm)	12" (300mm)	2" FNPT (50mm)	6" (150mm)
						380	8.1	48.6	8.9	53.4							
061945	6	4.5	27.0	6.0	36.0	190	24.0	144.0	26.9	161.4	81.5%	715	1.15	10" (250mm)	12" (300mm)	2" FNPT (50mm)	6" (150mm)
						380	12.0	72.0	13.4	80.4							
081929	8	2.9	23.2	4.0	32.0	190	16.2	129.6	17.8	142.4	85.5%	710	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
						380	8.1	64.8	8.9	71.2							
081945	8	4.5	36.0	6.0	48.0	190	24.0	192.0	26.9	215.2	81.5%	715	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
						380	12.0	96.0	13.4	107.2							
101929	10	2.9	29.0	4.0	40.0	190	16.2	162.0	17.8	178.0	85.5%	710	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
						380	8.1	81.0	8.9	89.0							
101945	10	4.5	45.0	6.0	60.0	190	24.0	240.0	26.9	269.0	81.5%	715	1.15	12" (300mm)	14" (350mm)	2" FNPT (50mm)	6" (150mm)
						380	12.0	120.0	13.4	134.0							
121929	12	2.9	34.8	4.0	48.0	190	16.2	194.4	17.8	213.6	85.5%	710	1.15	12" (300mm)	12" x 2" <sup>d</sup> (300mm x 2)	2" FNPT (50mm)	6" (150mm)
						380	8.1	97.2	8.9	106.8							
121945	12	4.5	54.0	6.0	72.0	190	24.0	288.0	26.9	322.8	81.5%	715	1.15	12" (300mm)	12" x 2" <sup>d</sup> (300mm x 2)	2" FNPT (50mm)	6" (150mm)
						380	12.0	144.0	13.4	160.8							

<sup>a</sup> Baldor motor data. SFA (MMC) refers to Service Factor Amps (Maximum Motor Current). VFD should be sized for SFA (MMC).  
<sup>b</sup> Rating is NEMA nominal efficiency. Standard motors, TEAO severe duty, direct drive, with L<sub>10</sub> 100,000 hour sealed bearings, inverter ready, with quantum shield wiring, class "H" insulation (minimum).  
<sup>c</sup> Metric dimensions approximate.  
<sup>d</sup> TTXL-12 requires two sump containers. See TTXL-12 drawings for details.

The thermal performance of the TTXL Series cooling towers is certified by the Cooling Technology Institute in accordance with its standard STD-201 and has been assigned CTI certification validation number 08-17-06. This certification is your assurance that the proposed capacities accurately reflect actual cooling tower performance. CTI certification under STD-201 is limited to thermal operating conditions with entering wet bulbs between 55°F and 90°F (12.8°C and 32.2°C), a maximum process fluid temperature of 125°F (51.7°C), a cooling range of 4°F (2.2°C) or greater, and a cooling approach of 5°F (2.8°C) or greater.



**60 Hz, 40°C., 200V, 230V, 460V or 575V**

TTXL Model	Fan Power		Cooling Capacity at Indicated Operating Conditions GPM (m <sup>3</sup> /hr)							
			HWT (°C)	80 (26.67)	85 (29.44)	90 (32.22)	92 (33.33)	95 (35.00)	107 (41.67)	112 (44.44)
	No. of Fans	Total Power HP	CWT (°C)	70 (21.11)	75 (23.89)	80 (26.67)	82 (27.78)	85 (29.44)	92 (33.33)	97 (36.11)
			WBT (°C)	60 (15.56)	65 (18.33)	70 (21.11)	75 (23.89)	78 (25.56)	80 (26.67)	90 (32.22)
i21930	2	6	<b>295</b> (67.00)	<b>342</b> (77.68)	<b>396</b> (89.94)	<b>323</b> (73.36)	<b>355</b> (80.63)	<b>477</b> (108.34)	<b>393</b> (89.26)	
i21950	2	10	<b>411</b> (93.35)	<b>475</b> (107.88)	<b>550</b> (124.92)	<b>450</b> (102.21)	<b>493</b> (111.97)	<b>600</b> (136.27)	<b>545</b> (123.78)	
i21975	2	15	<b>498</b> (113.11)	<b>575</b> (130.60)	<b>600</b> (136.27)	<b>545</b> (123.78)	<b>596</b> (135.37)	<b>600</b> (136.27)	<b>600</b> (136.27)	
i31930	3	9	<b>431</b> (97.89)	<b>499</b> (113.33)	<b>578</b> (131.28)	<b>472</b> (107.20)	<b>517</b> (117.42)	<b>696</b> (158.08)	<b>573</b> (130.14)	
i31950	3	15	<b>599</b> (136.05)	<b>692</b> (157.17)	<b>800</b> (181.70)	<b>655</b> (148.77)	<b>718</b> (163.07)	<b>900</b> (204.41)	<b>794</b> (180.34)	
i31975	3	22.5	<b>724</b> (164.44)	<b>836</b> (189.87)	<b>900</b> (204.41)	<b>792</b> (179.88)	<b>867</b> (196.92)	<b>900</b> (204.41)	<b>900</b> (204.41)	
i41930	4	12	<b>566</b> (128.55)	<b>656</b> (148.99)	<b>760</b> (172.61)	<b>620</b> (140.82)	<b>680</b> (154.44)	<b>915</b> (207.82)	<b>753</b> (171.02)	
i41950	4	20	<b>786</b> (178.52)	<b>909</b> (206.45)	<b>1051</b> (238.71)	<b>859</b> (195.10)	<b>942</b> (213.95)	<b>1200</b> (272.55)	<b>1042</b> (236.66)	
i41975	4	30	<b>950</b> (215.77)	<b>1097</b> (249.15)	<b>1200</b> (272.55)	<b>1039</b> (235.98)	<b>1137</b> (258.24)	<b>1200</b> (272.55)	<b>1200</b> (272.55)	
041930	4	12	<b>538</b> (122.19)	<b>624</b> (141.72)	<b>724</b> (164.44)	<b>589</b> (133.78)	<b>647</b> (146.95)	<b>871</b> (197.82)	<b>716</b> (162.62)	
041950	4	20	<b>745</b> (169.21)	<b>862</b> (195.78)	<b>997</b> (226.44)	<b>815</b> (185.11)	<b>893</b> (202.82)	<b>1197</b> (271.87)	<b>987</b> (224.17)	
041975	4	30	<b>900</b> (204.41)	<b>1039</b> (235.98)	<b>1200</b> (272.55)	<b>984</b> (223.49)	<b>1077</b> (244.61)	<b>1200</b> (272.55)	<b>1191</b> (270.50)	
i51930	5	15	<b>701</b> (159.21)	<b>812</b> (184.42)	<b>942</b> (213.95)	<b>768</b> (174.43)	<b>843</b> (191.46)	<b>1134</b> (257.56)	<b>933</b> (211.91)	
i51950	5	25	<b>973</b> (220.99)	<b>1125</b> (255.51)	<b>1301</b> (295.49)	<b>1064</b> (241.66)	<b>1166</b> (264.83)	<b>1500</b> (340.68)	<b>1290</b> (292.99)	
i51975	5	37.5	<b>1176</b> (267.10)	<b>1358</b> (308.43)	<b>1500</b> (340.68)	<b>1286</b> (292.08)	<b>1408</b> (319.79)	<b>1500</b> (340.68)	<b>1500</b> (340.68)	
061930	6	18	<b>781</b> (177.38)	<b>905</b> (205.55)	<b>1050</b> (238.48)	<b>855</b> (194.19)	<b>939</b> (213.27)	<b>1264</b> (287.08)	<b>1039</b> (235.98)	
061950	6	30	<b>1078</b> (244.84)	<b>1247</b> (283.22)	<b>1443</b> (327.74)	<b>1179</b> (267.78)	<b>1293</b> (293.67)	<b>1733</b> (393.60)	<b>1430</b> (324.79)	
061975	6	45	<b>1301</b> (295.49)	<b>1502</b> (341.14)	<b>1736</b> (394.29)	<b>1421</b> (322.74)	<b>1557</b> (353.63)	<b>1800</b> (408.82)	<b>1721</b> (390.88)	
081930	8	24	<b>1022</b> (232.12)	<b>1185</b> (269.14)	<b>1375</b> (312.29)	<b>1119</b> (254.15)	<b>1228</b> (278.91)	<b>1655</b> (375.89)	<b>1359</b> (308.66)	
081950	8	40	<b>1410</b> (320.24)	<b>1631</b> (370.44)	<b>1887</b> (428.58)	<b>1541</b> (350.00)	<b>1690</b> (383.84)	<b>2266</b> (514.66)	<b>1869</b> (424.49)	
081975	8	60	<b>1700</b> (386.11)	<b>1964</b> (446.07)	<b>2269</b> (515.34)	<b>1858</b> (421.99)	<b>2034</b> (461.97)	<b>2400</b> (545.10)	<b>2249</b> (510.80)	
101930	10	30	<b>1263</b> (286.86)	<b>1464</b> (332.51)	<b>1698</b> (385.65)	<b>1382</b> (313.88)	<b>1518</b> (344.77)	<b>2045</b> (464.47)	<b>1679</b> (381.34)	
101950	10	50	<b>1740</b> (395.19)	<b>2014</b> (457.43)	<b>2330</b> (529.20)	<b>1902</b> (431.99)	<b>2086</b> (473.78)	<b>2799</b> (635.72)	<b>2307</b> (523.97)	
101975	10	75	<b>2098</b> (476.50)	<b>2424</b> (550.55)	<b>2801</b> (636.17)	<b>2291</b> (520.34)	<b>2510</b> (570.08)	<b>3000</b> (681.37)	<b>2775</b> (630.27)	
121930	12	36	<b>1502</b> (341.14)	<b>1742</b> (395.65)	<b>2021</b> (459.02)	<b>1644</b> (373.39)	<b>1805</b> (409.96)	<b>2433</b> (552.59)	<b>1998</b> (453.79)	
121950	12	60	<b>2069</b> (469.92)	<b>2395</b> (543.96)	<b>2773</b> (629.81)	<b>2263</b> (513.98)	<b>2482</b> (563.72)	<b>3328</b> (755.87)	<b>2744</b> (623.23)	
121975	12	90	<b>2494</b> (566.44)	<b>2882</b> (654.57)	<b>3330</b> (756.32)	<b>2726</b> (619.14)	<b>2986</b> (678.19)	<b>3600</b> (817.64)	<b>3300</b> (749.51)	

# 50 Hz - 40°C

TTXL Model	Fan Power		Cooling Capacity at Indicated Operating Conditions GPM (m³/hr)							
			HWT (°F)	26.67 (80)	29.44 (85)	32.22 (90)	33.33 (92)	35.00 (95)	41.67 (107)	44.44 (112)
	No. of Fans	Total Power kW	CWT (°F)	21.11 (70)	23.89 (75)	26.67 (80)	27.78 (82)	29.44 (85)	33.33 (92)	36.11 (97)
			WBT (°F)	15.56 (60)	18.33 (65)	21.11 (70)	23.89 (75)	25.56 (78)	26.67 (80)	32.22 (90)
i21922	2	4.5	<b>67.00</b> (295)	<b>77.68</b> (342)	<b>89.94</b> (396)	<b>73.36</b> (323)	<b>80.63</b> (355)	<b>108.34</b> (477)	<b>89.26</b> (393)	
i21937	2	7.5	<b>93.35</b> (411)	<b>107.88</b> (475)	<b>124.92</b> (550)	<b>102.21</b> (450)	<b>111.97</b> (493)	<b>136.27</b> (600)	<b>123.78</b> (545)	
i21956	2	11.2	<b>113.11</b> (498)	<b>130.60</b> (575)	<b>136.27</b> (600)	<b>123.78</b> (545)	<b>135.37</b> (596)	<b>136.27</b> (600)	<b>136.27</b> (600)	
i31922	3	6.7	<b>97.89</b> (431)	<b>113.33</b> (499)	<b>131.28</b> (578)	<b>107.20</b> (472)	<b>117.42</b> (517)	<b>158.08</b> (696)	<b>130.14</b> (573)	
i31937	3	11.2	<b>136.05</b> (599)	<b>157.17</b> (692)	<b>181.70</b> (800)	<b>148.77</b> (655)	<b>163.07</b> (718)	<b>204.41</b> (900)	<b>180.34</b> (794)	
i31956	3	16.8	<b>164.44</b> (724)	<b>189.87</b> (836)	<b>204.41</b> (900)	<b>179.88</b> (792)	<b>196.92</b> (867)	<b>204.41</b> (900)	<b>204.41</b> (900)	
i41922	4	9.0	<b>128.55</b> (566)	<b>148.99</b> (656)	<b>172.61</b> (760)	<b>140.82</b> (620)	<b>154.44</b> (680)	<b>207.82</b> (915)	<b>171.02</b> (753)	
i41937	4	14.9	<b>178.52</b> (786)	<b>206.45</b> (909)	<b>238.71</b> (1051)	<b>195.10</b> (859)	<b>213.95</b> (942)	<b>272.55</b> (1200)	<b>236.66</b> (1042)	
i41956	4	22.4	<b>215.77</b> (950)	<b>249.15</b> (1097)	<b>272.55</b> (1200)	<b>235.98</b> (1039)	<b>258.24</b> (1137)	<b>272.55</b> (1200)	<b>272.55</b> (1200)	
041922	4	9.0	<b>122.19</b> (538)	<b>141.72</b> (624)	<b>164.44</b> (724)	<b>133.78</b> (589)	<b>146.95</b> (647)	<b>197.82</b> (871)	<b>162.62</b> (716)	
041937	4	14.9	<b>169.21</b> (745)	<b>195.78</b> (862)	<b>226.44</b> (997)	<b>185.11</b> (815)	<b>202.82</b> (893)	<b>271.87</b> (1197)	<b>224.17</b> (987)	
041956	4	22.4	<b>204.41</b> (900)	<b>235.98</b> (1039)	<b>272.55</b> (1200)	<b>223.49</b> (984)	<b>244.61</b> (1077)	<b>272.55</b> (1200)	<b>270.50</b> (1191)	
i51922	5	11.2	<b>159.21</b> (701)	<b>184.42</b> (812)	<b>213.95</b> (942)	<b>174.43</b> (768)	<b>191.46</b> (843)	<b>257.56</b> (1134)	<b>211.91</b> (933)	
i51937	5	18.7	<b>220.99</b> (973)	<b>255.51</b> (1125)	<b>295.49</b> (1301)	<b>241.66</b> (1064)	<b>264.83</b> (1166)	<b>340.68</b> (1500)	<b>292.99</b> (1290)	
i51956	5	28.0	<b>267.10</b> (1176)	<b>308.43</b> (1358)	<b>340.68</b> (1500)	<b>292.08</b> (1286)	<b>319.79</b> (1408)	<b>340.68</b> (1500)	<b>340.68</b> (1500)	
061922	6	13.4	<b>177.38</b> (781)	<b>205.55</b> (905)	<b>238.48</b> (1050)	<b>194.19</b> (855)	<b>213.27</b> (939)	<b>287.08</b> (1264)	<b>235.98</b> (1039)	
061937	6	22.4	<b>244.84</b> (1078)	<b>283.22</b> (1247)	<b>327.74</b> (1443)	<b>267.78</b> (1179)	<b>293.67</b> (1293)	<b>393.60</b> (1733)	<b>324.79</b> (1430)	
061956	6	33.6	<b>295.49</b> (1301)	<b>341.14</b> (1502)	<b>394.29</b> (1736)	<b>322.74</b> (1421)	<b>353.63</b> (1557)	<b>408.82</b> (1800)	<b>390.88</b> (1721)	
081922	8	17.9	<b>232.12</b> (1022)	<b>269.14</b> (1185)	<b>312.29</b> (1375)	<b>254.15</b> (1119)	<b>278.91</b> (1228)	<b>375.89</b> (1655)	<b>308.66</b> (1359)	
081937	8	29.8	<b>320.24</b> (1410)	<b>370.44</b> (1631)	<b>428.58</b> (1887)	<b>350.00</b> (1541)	<b>383.84</b> (1690)	<b>514.66</b> (2266)	<b>424.49</b> (1869)	
081956	8	44.8	<b>386.11</b> (1700)	<b>446.07</b> (1964)	<b>515.34</b> (2269)	<b>421.99</b> (1858)	<b>461.97</b> (2034)	<b>545.10</b> (2400)	<b>510.80</b> (2249)	
101922	10	22.4	<b>286.86</b> (1263)	<b>332.51</b> (1464)	<b>385.65</b> (1698)	<b>313.88</b> (1382)	<b>344.77</b> (1518)	<b>464.47</b> (2045)	<b>381.34</b> (1679)	
101937	10	37.3	<b>395.19</b> (1740)	<b>457.43</b> (2014)	<b>529.20</b> (2330)	<b>431.99</b> (1902)	<b>473.78</b> (2086)	<b>635.72</b> (2799)	<b>523.97</b> (2307)	
101956	10	56.0	<b>476.50</b> (2098)	<b>550.55</b> (2424)	<b>636.17</b> (2801)	<b>520.34</b> (2291)	<b>570.08</b> (2510)	<b>681.37</b> (3000)	<b>630.27</b> (2775)	
121922	12	26.9	<b>341.14</b> (1502)	<b>395.65</b> (1742)	<b>459.02</b> (2021)	<b>373.39</b> (1644)	<b>409.96</b> (1805)	<b>552.59</b> (2433)	<b>453.79</b> (1998)	
121937	12	44.8	<b>469.92</b> (2069)	<b>543.96</b> (2395)	<b>629.81</b> (2773)	<b>513.98</b> (2263)	<b>563.72</b> (2482)	<b>755.87</b> (3328)	<b>623.23</b> (2744)	
121956	12	67.1	<b>566.44</b> (2494)	<b>654.57</b> (2882)	<b>756.32</b> (3330)	<b>619.14</b> (2726)	<b>678.19</b> (2986)	<b>817.64</b> (3600)	<b>749.51</b> (3300)	



# 50 Hz - 50°C

TTXL Model	Fan Power		Cooling Capacity at Indicated Operating Conditions GPM (m³/hr)							
			HWT (°F)	26.67 (80)	29.44 (85)	32.22 (90)	33.33 (92)	35.00 (95)	41.67 (107)	44.44 (112)
	No. of Fans	Total Power kW	CWT (°F)	21.11 (70)	23.89 (75)	26.67 (80)	27.78 (82)	29.44 (85)	33.33 (92)	36.11 (97)
			WBT (°F)	15.56 (60)	18.33 (65)	21.11 (70)	23.89 (75)	25.56 (78)	26.67 (80)	32.22 (90)
i21929	2	5.8	<b>81.04</b> (357)	<b>93.78</b> (413)	<b>108.54</b> (478)	<b>88.70</b> (391)	<b>97.31</b> (428)	<b>130.50</b> (575)	<b>107.71</b> (474)	
i21945	2	9.0	<b>100.73</b> (443)	<b>116.39</b> (512)	<b>134.50</b> (592)	<b>110.09</b> (485)	<b>120.67</b> (531)	<b>136.26</b> (600)	<b>133.52</b> (588)	
i31929	3	8.7	<b>118.19</b> (520)	<b>136.73</b> (602)	<b>158.22</b> (697)	<b>129.28</b> (569)	<b>141.80</b> (624)	<b>190.22</b> (838)	<b>156.96</b> (691)	
i31945	3	13.5	<b>146.52</b> (645)	<b>169.34</b> (746)	<b>195.70</b> (862)	<b>160.24</b> (705)	<b>175.54</b> (773)	<b>312.41</b> (1375)	<b>194.29</b> (855)	
i41929	4	11.6	<b>155.16</b> (683)	<b>179.57</b> (791)	<b>207.97</b> (916)	<b>169.81</b> (748)	<b>186.23</b> (820)	<b>249.84</b> (1100)	<b>206.10</b> (907)	
i41945	4	18.0	<b>192.35</b> (847)	<b>222.23</b> (978)	<b>256.82</b> (1131)	<b>210.28</b> (926)	<b>230.47</b> (1015)	<b>272.56</b> (1200)	<b>254.99</b> (1123)	
041929	4	11.6	<b>147.35</b> (649)	<b>170.60</b> (751)	<b>197.50</b> (870)	<b>161.21</b> (710)	<b>176.83</b> (779)	<b>237.42</b> (1045)	<b>195.62</b> (861)	
0419545	4	18.0	<b>182.30</b> (803)	<b>210.71</b> (928)	<b>243.61</b> (1073)	<b>199.26</b> (877)	<b>218.41</b> (962)	<b>272.56</b> (1200)	<b>241.49</b> (1063)	
i51929	5	14.5	<b>192.17</b> (846)	<b>222.44</b> (979)	<b>257.51</b> (1134)	<b>210.28</b> (926)	<b>230.65</b> (1016)	<b>309.42</b> (1362)	<b>255.28</b> (1124)	
i51945	5	22.5	<b>238.10</b> (1048)	<b>275.15</b> (1211)	<b>318.06</b> (1400)	<b>260.39</b> (1146)	<b>285.23</b> (1256)	<b>340.70</b> (1500)	<b>315.61</b> (1390)	
061929	6	17.4	<b>213.44</b> (940)	<b>247.25</b> (1089)	<b>286.24</b> (1260)	<b>233.53</b> (1028)	<b>256.18</b> (1128)	<b>344.12</b> (1515)	<b>283.46</b> (1248)	
061945	6	27.0	<b>263.77</b> (1161)	<b>305.03</b> (1343)	<b>352.66</b> (1553)	<b>288.25</b> (1269)	<b>315.94</b> (1391)	<b>408.82</b> (1800)	<b>349.45</b> (1539)	
081929	8	23.2	<b>279.29</b> (1230)	<b>323.46</b> (1424)	<b>374.58</b> (1649)	<b>305.53</b> (1345)	<b>335.02</b> (1475)	<b>450.32</b> (1983)	<b>370.66</b> (1632)	
081945	8	36.0	<b>344.77</b> (1518)	<b>398.52</b> (1755)	<b>460.98</b> (2030)	<b>376.88</b> (1659)	<b>413.06</b> (1819)	<b>545.11</b> (2400)	<b>456.73</b> (2011)	
101929	10	29.0	<b>344.88</b> (1518)	<b>399.46</b> (1759)	<b>462.67</b> (2037)	<b>377.06</b> (1660)	<b>413.64</b> (1821)	<b>556.06</b> (2448)	<b>457.56</b> (2015)	
101945	10	45.0	<b>425.41</b> (1873)	<b>491.94</b> (2166)	<b>569.12</b> (2506)	<b>465.12</b> (2048)	<b>509.69</b> (2244)	<b>681.37</b> (3000)	<b>563.58</b> (2481)	
121929	12	34.8	<b>410.15</b> (1806)	<b>475.09</b> (2092)	<b>550.40</b> (2423)	<b>448.74</b> (1976)	<b>492.12</b> (2167)	<b>661.64</b> (2913)	<b>544.54</b> (2398)	
121945	12	54.0	<b>506.23</b> (2229)	<b>585.29</b> (2577)	<b>676.84</b> (2980)	<b>553.07</b> (2435)	<b>606.31</b> (2670)	<b>812.30</b> (3576)	<b>670.18</b> (2951)	

**60 Hz, 50°C., 230V, 380V, 460V**

TTXL Model	Fan Power		WBT °C	13	18	21	24	27	28	32.2
	No. of Fans	Total Power kW	(°F)	(55.4)	(64.4)	(69.8)	(75.2)	(80.6)	(82.4)	(90.0)
			HWT °C	25	30	31	34	37	37	44.2
			(°F)	(77.0)	(86.0)	(87.8)	(93.2)	(98.6)	(98.6)	(111.6)
CWT °C	19	24	25	28	31	32	36.2			
(°F)	(66.2)	(75.2)	(77.0)	(82.4)	(87.8)	(89.6)	(97.2)			
Cooling Capacity at Indicated Operating Conditions										
m³/hr (GPM)										
i21922	2	4.4		58.4 (257)	77.3 (341)	59.8 (263)	72.1 (317)	86.1 (379)	104.6 (460)	98.0 (431)
i21937	2	7.4		72.1 (317)	94.9 (418)	73.8 (325)	88.8 (391)	106.3 (468)	128.3 (565)	120.4 (530)
i21956	2	11.2		81.7 (360)	107.7 (474)	83.5 (368)	100.2 (441)	120.4 (530)	136.3 (600)	136.2 (600)
i31922	3	6.6		84.8 (373)	112.5 (495)	87.0 (383)	104.6 (460)	125.7 (553)	152.1 (669)	142.4 (627)
i31937	3	11.1		104.6 (460)	138.0 (608)	107.2 (472)	128.3 (565)	153.8 (677)	186.3 (820)	174.9 (770)
i31956	3	16.8		118.2 (520)	156.4 (689)	121.3 (534)	145.0 (639)	174.0 (766)	210.9 (929)	196.9 (867)
i41922	4	8.8		111.2 (490)	147.7 (650)	114.3 (503)	137.1 (604)	164.4 (724)	198.6 (875)	186.3 (820)
i41937	4	14.8		137.1 (604)	181.1 (797)	140.6 (619)	168.8 (743)	202.1 (890)	244.3 (1076)	228.5 (1006)
i41956	4	22.4		154.7 (681)	204.8 (902)	159.1 (700)	189.8 (836)	228.5 (1006)	277.7 (1223)	258.4 (1138)
i51922	5	11.0		137.1 (604)	181.9 (801)	140.6 (619)	168.8 (743)	203.0 (894)	246.1 (1084)	230.3 (1014)
i51937	5	18.5		169.6 (747)	224.1 (987)	174.0 (766)	208.3 (917)	249.6 (1099)	302.3 (1331)	283.0 (1246)
i51956	5	28.0		191.6 (844)	253.1 (1114)	196.9 (867)	235.5 (1037)	281.3 (1238)	341.0 (1501)	319.9 (1409)
i61922	6	13.2		163.5 (720)	217.1 (956)	168.8 (743)	202.1 (890)	242.6 (1068)	293.6 (1292)	274.2 (1207)
i61937	6	22.2		202.1 (890)	267.2 (1176)	207.4 (913)	247.9 (1091)	297.1 (1308)	362.1 (1594)	337.5 (1486)
i61956	6	33.6		228.5 (1006)	302.3 (1331)	233.8 (1029)	281.3 (1238)	335.7 (1478)	407.8 (1796)	381.4 (1679)
041922	4	8.8		121.3 (534)	158.2 (697)	124.8 (549)	148.5 (654)	177.5 (782)	212.7 (936)	201.3 (886)
041937	4	14.8		149.4 (658)	195.1 (859)	153.8 (677)	182.8 (805)	217.1 (956)	260.2 (1145)	246.1 (1084)
041956	4	22.4		168.8 (743)	219.7 (967)	174.0 (766)	206.5 (909)	246.1 (1084)	272.5 (1200)	277.7 (1223)
061922	6	13.2		175.8 (774)	230.3 (1014)	181.1 (797)	216.2 (952)	256.6 (1130)	307.6 (1354)	291.8 (1285)
061937	6	22.2		216.2 (952)	283.0 (1246)	223.2 (983)	265.4 (1169)	314.6 (1385)	376.2 (1656)	358.6 (1579)
061956	6	33.6		244.3 (1076)	319.9 (1409)	251.4 (1107)	298.8 (1316)	355.1 (1563)	408.8 (1800)	404.3 (1780)
081922	8	17.6		230.3 (1014)	302.3 (1331)	237.3 (1045)	283.0 (1246)	337.5 (1486)	404.3 (1780)	383.2 (1687)
081937	8	29.6		283.0 (1246)	369.1 (1625)	291.8 (1285)	348.0 (1532)	413.1 (1819)	495.7 (2183)	467.6 (2059)
081956	8	44.8		319.9 (1409)	418.4 (1842)	330.5 (1455)	392.0 (1726)	467.6 (2059)	559.0 (2461)	527.3 (2322)
101922	10	22.0		284.8 (1254)	372.7 (1641)	295.3 (1300)	349.8 (1540)	416.6 (1834)	499.2 (2198)	474.6 (2090)
101937	10	37.0		351.6 (1548)	457.0 (2012)	362.1 (1594)	428.9 (1888)	509.8 (2244)	611.7 (2693)	580.1 (2554)
101956	10	56.0		397.3 (1749)	516.8 (2275)	407.8 (1796)	485.2 (2136)	576.6 (2539)	689.1 (3034)	653.9 (2879)
121922	12	26.4		341.0 (1501)	444.7 (1958)	351.6 (1548)	418.4 (1842)	495.7 (2183)	594.1 (2616)	562.5 (2477)
121937	12	44.4		418.4 (1842)	544.9 (2399)	430.7 (1896)	513.3 (2260)	608.2 (2678)	727.7 (3204)	689.1 (3034)
121956	12	67.2		471.1 (2074)	615.2 (2709)	485.2 (2136)	576.6 (2539)	685.5 (3018)	822.7 (3622)	780.5 (3436)

## Sub-Structure/Multiple Modules % Capability Correction (3 HP / 2.2 kW Models)

Inlet Ht (ft)	% Capability Correction									
	1	2	3	4	5	6	7	8	9	10
<b>i21930</b>										
4	0.998	0.993	0.988	0.984	0.981	0.978	0.976	0.973	0.972	0.970
6	1.000	0.998	0.996	0.994	0.993	0.991	0.990	0.990	0.989	0.988
8	1.000	1.000	0.998	0.997	0.997	0.996	0.995	0.995	0.994	0.994
10	1.001	1.001	0.999	0.999	0.998	0.998	0.998	0.997	0.997	0.997
12	1.002	1.001	1.001	1.000	0.999	0.999	0.999	0.999	0.998	0.998
<b>i31930</b>										
4	0.998	0.991	0.985	0.978	0.973	0.967	0.972	0.959	0.956	0.953
6	1.000	0.997	0.994	0.992	0.989	0.986	0.985	0.983	0.981	0.980
8	1.000	0.999	0.997	0.995	0.995	0.993	0.992	0.991	0.990	0.990
10	1.001	1.000	0.999	0.998	0.997	0.996	0.995	0.995	0.994	0.994
12	1.001	1.001	0.999	0.999	0.998	0.998	0.997	0.997	0.997	0.996
<b>i41930</b>										
4	0.997	0.991	0.987	0.985	0.983	0.982	0.981	0.980	0.979	0.978
6	1.000	0.998	0.996	0.995	0.994	0.993	0.993	0.992	0.992	0.992
8	1.001	1.000	0.999	0.998	0.998	0.998	0.997	0.997	0.997	0.997
10	1.002	1.001	1.001	1.000	0.999	0.999	0.999	0.999	0.999	0.999
12	1.002	1.002	1.001	1.001	1.001	1.001	1.001	1.001	1.000	1.000
<b>041930</b>										
4	0.997	0.991	0.987	0.985	0.983	0.982	0.981	0.980	0.979	0.978
6	1.000	0.998	0.996	0.995	0.994	0.993	0.993	0.992	0.992	0.992
8	1.001	1.000	0.999	0.998	0.998	0.998	0.997	0.997	0.997	0.997
10	1.002	1.001	1.001	1.000	0.999	0.999	0.999	0.999	0.999	0.999
12	1.002	1.002	1.001	1.001	1.001	1.001	1.001	1.001	1.000	1.000
<b>i51930</b>										
4	0.998	0.989	0.978	0.968	0.958	0.948	0.947	0.932	0.926	0.919
6	1.000	0.996	0.992	0.987	0.982	0.978	0.974	0.970	0.966	0.964
8	1.001	0.999	0.996	0.998	0.991	0.988	0.986	0.984	0.982	0.980
10	1.002	1.000	0.998	0.996	0.995	0.993	0.992	0.991	0.989	0.988
12	1.002	1.000	1.000	0.998	0.997	0.996	0.995	0.994	0.993	0.992
<b>061930</b>										
4	0.996	0.987	0.980	0.975	0.971	0.968	0.966	0.964	0.962	0.961
6	1.000	0.996	0.993	0.991	0.989	0.988	0.987	0.986	0.985	0.984
8	1.001	0.999	0.997	0.996	0.996	0.995	0.994	0.994	0.993	0.993
10	1.002	1.001	1.000	0.999	0.998	0.998	0.998	0.997	0.997	0.997
12	1.003	1.002	1.001	1.001	1.000	0.999	0.999	0.999	0.999	0.999
<b>081930</b>										
4	0.995	0.983	0.974	0.966	0.960	0.955	0.951	0.947	0.944	0.942
6	1.000	0.994	0.990	0.986	0.984	0.981	0.979	0.978	0.976	0.975
8	1.002	0.998	0.996	0.994	0.992	0.991	0.990	0.989	0.988	0.987
10	1.002	1.001	0.999	0.998	0.996	0.996	0.995	0.994	0.994	0.994
12	1.003	1.002	1.001	0.999	0.999	0.998	0.998	0.997	0.997	0.996
<b>101930</b>										
4	0.995	0.981	0.968	0.958	0.949	0.942	0.936	0.931	0.927	0.923
6	1.000	0.994	0.988	0.983	0.979	0.975	0.973	0.970	0.968	0.966
8	1.002	0.998	0.995	0.992	0.990	0.988	0.986	0.985	0.983	0.982
10	1.003	1.001	0.998	0.996	0.995	0.993	0.992	0.992	0.990	0.990
12	1.004	1.002	1.000	0.999	0.998	0.997	0.996	0.995	0.995	0.994
<b>121930</b>										
4	0.994	0.978	0.962	0.949	0.938	0.929	0.821	0.915	0.909	0.904
6	1.000	0.992	0.985	0.979	0.973	0.969	0.965	0.961	0.959	0.956
8	1.002	0.998	0.994	0.990	0.987	0.984	0.982	0.980	0.979	0.976
10	1.003	1.000	0.997	0.995	0.993	0.991	0.990	0.988	0.987	0.986
12	1.003	1.001	0.999	0.998	0.996	0.995	0.994	0.993	0.992	0.992

## Sub-Structure/Multiple Modules % Capability Correction (4 & 5 HP / 2.9 & 3.7 kW Models)

Inlet Ht (ft)	% Capability Correction									
	1	2	3	4	5	6	7	8	9	10
<b>i21950</b>										
4	0.998	0.993	0.989	0.985	0.981	0.979	0.976	0.974	0.973	0.971
6	1.000	0.998	0.996	0.994	0.993	0.992	0.991	0.990	0.989	0.989
8	1.001	0.999	0.998	0.998	0.997	0.996	0.995	0.995	0.995	0.994
10	1.001	1.000	1.000	0.999	0.999	0.998	0.998	0.997	0.997	0.997
12	1.001	1.001	1.000	1.000	1.000	0.999	0.999	0.999	0.999	0.999
<b>i31950</b>										
4	0.998	0.992	0.985	0.979	0.973	0.969	0.965	0.961	0.958	0.954
6	1.000	0.997	0.994	0.992	0.989	0.987	0.985	0.984	0.982	0.981
8	1.000	0.999	0.997	0.996	0.995	0.993	0.992	0.992	0.991	0.990
10	1.001	1.000	0.999	0.998	0.997	0.996	0.996	0.995	0.995	0.994
12	1.001	1.001	1.000	1.000	0.999	0.998	0.998	0.997	0.997	0.997
<b>i41950</b>										
4	0.997	0.991	0.988	0.985	0.983	0.982	0.981	0.980	0.979	0.979
6	1.000	0.998	0.996	0.995	0.994	0.993	0.993	0.993	0.992	0.992
8	1.001	1.000	0.999	0.998	0.998	0.998	0.997	0.997	0.997	0.997
10	1.002	1.001	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.999
12	1.002	1.001	1.001	1.001	1.001	1.000	1.000	1.000	1.000	1.000
<b>041950</b>										
4	0.997	0.991	0.988	0.985	0.983	0.982	0.981	0.980	0.979	0.979
6	1.000	0.998	0.996	0.995	0.994	0.993	0.993	0.993	0.992	0.992
8	1.001	1.000	0.999	0.998	0.998	0.998	0.997	0.997	0.997	0.997
10	1.002	1.001	1.000	1.000	1.000	1.000	1.000	1.000	0.999	0.999
12	1.002	1.001	1.001	1.001	1.001	1.000	1.000	1.000	1.000	1.000
<b>i51950</b>										
4	0.998	0.989	0.979	0.969	0.959	0.950	0.942	0.934	0.928	0.922
6	1.000	0.996	0.991	0.987	0.983	0.978	0.974	0.971	0.968	0.965
8	1.001	0.999	0.996	0.994	0.991	0.989	0.987	0.984	0.983	0.981
10	1.002	1.000	0.998	0.996	0.995	0.993	0.992	0.991	0.989	0.988
12	1.002	1.000	1.000	0.998	0.997	0.996	0.995	0.994	0.993	0.992
<b>061950</b>										
4	0.996	0.988	0.981	0.976	0.972	0.969	0.967	0.965	0.963	0.963
6	1.000	0.996	0.994	0.991	0.989	0.988	0.987	0.986	0.985	0.985
8	1.001	1.000	0.998	0.996	0.995	0.994	0.994	0.994	0.993	0.993
10	1.003	1.001	1.000	0.999	0.998	0.998	0.997	0.997	0.997	0.997
12	1.003	1.002	1.001	1.001	1.000	1.000	0.999	0.999	0.999	0.999
<b>081950</b>										
4	0.996	0.984	0.975	0.967	0.961	0.956	0.952	0.949	0.946	0.944
6	1.000	0.995	0.990	0.987	0.984	0.982	0.980	0.979	0.977	0.976
8	1.002	0.999	0.996	0.994	0.993	0.991	0.990	0.989	0.989	0.988
10	1.003	1.001	0.999	0.997	0.996	0.996	0.995	0.994	0.994	0.994
12	1.003	1.002	1.001	0.999	0.999	0.998	0.998	0.997	0.997	0.997
<b>101950</b>										
4	0.996	0.981	0.969	0.959	0.950	0.944	0.938	0.933	0.929	0.926
6	1.000	0.994	0.989	0.984	0.980	0.976	0.973	0.971	0.969	0.967
8	1.002	0.998	0.996	0.992	0.990	0.989	0.987	0.985	0.984	0.983
10	1.003	1.001	0.998	0.996	0.995	0.993	0.992	0.992	0.991	0.990
12	1.003	1.002	1.000	0.998	0.997	0.997	0.996	0.995	0.995	0.994
<b>121950</b>										
4	0.994	0.978	0.963	0.950	0.938	0.930	0.922	0.915	0.910	0.905
6	1.000	0.992	0.985	0.979	0.974	0.969	0.965	0.962	0.959	0.956
8	1.002	0.997	0.994	0.990	0.987	0.984	0.981	0.979	0.978	0.976
10	1.003	1.000	0.997	0.995	0.993	0.991	0.990	0.988	0.987	0.986
12	1.003	1.001	0.999	0.998	0.996	0.995	0.994	0.993	0.992	0.992

## Sub-Structure/Multiple Modules % Capability Correction (6 & 7.5 HP / 4.5 & 5.6 kW Models)

Inlet Ht (ft)	% Capability Correction									
	1	2	3	4	5	6	7	8	9	10
<b>i21975</b>										
4	0.998	0.994	0.989	0.985	0.982	0.979	0.977	0.974	0.973	0.972
6	1.000	0.998	0.996	0.994	0.993	0.992	0.991	0.990	0.989	0.989
8	1.000	1.000	0.998	0.998	0.997	0.996	0.996	0.995	0.995	0.994
10	1.001	1.000	0.999	0.999	0.998	0.998	0.998	0.998	0.997	0.997
12	1.001	1.001	1.000	1.000	0.999	0.999	0.999	0.999	0.998	0.998
<b>i31975</b>										
4	0.998	0.992	0.985	0.979	0.974	0.969	0.965	0.961	0.958	0.956
6	1.000	0.998	0.995	0.992	0.990	0.988	0.985	0.984	0.983	0.981
8	1.000	0.999	0.998	0.996	0.995	0.994	0.993	0.991	0.991	0.990
10	1.001	1.000	0.999	0.998	0.997	0.997	0.996	0.995	0.995	0.995
12	1.001	1.000	1.000	0.999	0.999	0.998	0.998	0.997	0.997	0.997
<b>i41975</b>										
4	0.997	0.991	0.988	0.986	0.984	0.983	0.981	0.980	0.980	0.979
6	1.000	0.998	0.996	0.995	0.994	0.994	0.993	0.993	0.993	0.992
8	1.001	1.000	0.999	0.998	0.998	0.997	0.997	0.997	0.997	0.997
10	1.002	1.001	1.000	1.000	1.000	1.000	0.857	0.999	0.999	0.999
12	1.002	1.002	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.000
<b>041975</b>										
4	0.997	0.991	0.988	0.986	0.984	0.983	0.981	0.980	0.980	0.979
6	1.000	0.998	0.996	0.995	0.994	0.994	0.993	0.993	0.993	0.992
8	1.001	1.000	0.999	0.998	0.998	0.997	0.997	0.997	0.997	0.997
10	1.002	1.001	1.000	1.000	1.000	1.000	0.857	0.999	0.999	0.999
12	1.002	1.002	1.001	1.001	1.001	1.001	1.001	1.000	1.000	1.000
<b>i51975</b>										
4	0.998	0.989	0.979	0.969	0.960	0.951	0.942	0.935	0.929	0.923
6	1.000	0.996	0.992	0.987	0.983	0.979	0.975	0.972	0.968	0.965
8	1.001	0.999	0.996	0.993	0.991	0.989	0.987	0.985	0.983	0.981
10	1.002	1.000	0.998	0.996	0.995	0.993	0.992	0.991	0.989	0.988
12	1.002	1.000	1.000	0.998	0.997	0.996	0.995	0.994	0.993	0.992
<b>061975</b>										
4	0.996	0.988	0.981	0.977	0.973	0.971	0.968	0.966	0.964	0.964
6	1.000	0.997	0.994	0.991	0.990	0.988	0.988	0.987	0.986	0.985
8	1.002	1.000	0.998	0.997	0.996	0.995	0.995	0.994	0.994	0.993
10	1.002	1.001	1.000	0.999	0.998	0.998	0.997	0.997	0.997	0.997
12	1.003	1.002	1.001	1.000	1.000	1.000	0.999	0.999	0.999	0.999
<b>081975</b>										
4	0.995	0.984	0.975	0.968	0.962	0.957	0.953	0.950	0.947	0.945
6	1.000	0.995	0.991	0.987	0.984	0.982	0.980	0.979	0.977	0.976
8	1.002	0.998	0.996	0.995	0.993	0.991	0.991	0.989	0.989	0.988
10	1.002	1.000	0.999	0.998	0.997	0.996	0.995	0.994	0.994	0.994
12	1.003	1.001	1.000	1.000	0.999	0.998	0.998	0.998	0.997	0.997
<b>101975</b>										
4	0.995	0.982	0.970	0.960	0.952	0.944	0.939	0.934	0.930	0.927
6	1.000	0.994	0.988	0.983	0.979	0.976	0.973	0.971	0.969	0.967
8	1.002	0.998	0.995	0.992	0.990	0.988	0.987	0.985	0.984	0.983
10	1.003	1.000	0.999	0.997	0.995	0.994	0.993	0.992	0.991	0.991
12	1.003	1.002	1.000	0.999	0.998	0.997	0.996	0.996	0.995	0.995
<b>121975</b>										
4	0.995	0.979	0.964	0.951	0.940	0.932	0.924	0.918	0.913	0.908
6	1.000	0.993	0.986	0.980	0.974	0.970	0.966	0.963	0.960	0.958
8	1.002	0.998	0.994	0.990	0.987	0.984	0.982	0.980	0.970	0.977
10	1.003	1.000	0.997	0.995	0.993	0.991	0.990	0.988	0.987	0.986
12	1.003	1.001	0.999	0.998	0.996	0.995	0.994	0.993	0.992	0.992

## OPTIONAL EQUIPMENT

### Motor Pre-Wire

TTXL Series Modular Cooling Towers™ are shipped with motors factory pre-wired to a central junction box (NEMA-4X). Motors can be factory pre-wired to individual “lock-out/tag-out” rotary disconnect switches. Motors can also be pre-wired to a pre-mounted Motor Protection Panel (see description below). Motor wiring used is Alpha brand shielded 12-4 AWG (10-4 AWG used where Maximum Motor Current is 30 amps or higher), VFD compatible, liquid tight flexible cable.

### Sub-Structure Kits

Each Modular Cooling Tower has a 1-foot (30.5 cm) high stub leg kit for mounting on customer furnished support structure. As an option, towers can be furnished with leg kits from 4 feet to 12 feet (121.9 cm to 365.8 cm) in height. The most common configuration uses 6-foot (182.88 cm) high legs to allow convenient access to the fan inlet of the tower for inspections and maintenance. Sub-structure kits include FRP legs with integrated footpads (Nylon), angle braces (FRP), and stainless steel assembly hardware; and are shipped loose for installation at the time of delivery and tower installation.

### Motor Protection Panel

Motor Protection Panel (MPP) is a UL-Rated NEMA 4X (FRP) and is designed for single point connection. The NEMA 4X panel includes power distribution to individual motor protectors with lockout disconnect, magnetic overload protection, and solid-state adjustable thermal overload protection. Each manual motor protector has an auxiliary relay to monitor the fault status of each motor. The NEMA 4X panel also provides a main non-fused disconnect with through the door operator handle. The MPP is pre-wired to the motors and pre-mounted on the cooling tower.

### Control Panels

Panels are high quality, UL rated, NEMA 4 enclosures (epoxy painted steel) equipped for single-point wiring to a manual disconnect. Each control panel includes power distribution to individual motor starters with lockout disconnect, magnetic overload protection, and solid-state adjustable thermal overload protection. Each manual motor protector has an auxiliary relay to monitor the fault status of each motor. A solid-state PLC is provided for supply water temperature control with a door-mounted operator interface through a touchscreen display panel. An RTD temperature sensor is provided for remote mounting in the customer’s tower discharge piping.

Standard water temperature control is done with fan staging through the pre-programmed PLC.

### Variable Frequency Drives

Optional water temperature control can be done with a remote mounted variable frequency drive (VFD) suitable for multiple motor operation. The VFD output is wired to the control panel disconnect switch. The output frequency of the VFD can be controlled through the pre-programmed PLC by means of a 4-20 ma or 0-24V analog output. If the VFD is bypassed for any reason, the PLC returns to fan staging control.

Operating Tower Tech cooling tower fans through a VFD provides the tightest temperature control possible at the very lowest energy consumption. When operated with variable water flow, the combination of the VFD and the variable flow Rotary Spray Nozzle™ provide energy saving opportunities that no other cooling tower can match. Contact your Tower Tech sales representative for details on a Performance and Competitive Evaluation (PACE) report.

### Basin Heaters

Stainless steel electric immersion heaters are recommended when operating in low ambient temperature conditions in order to protect against basin freezing when the tower is shut down. A NEMA 4X control panel is provided to control up to four individual elements (6 kW each). A remote temperature sensor is provided for mounting in the tower basin and the controller is preset to 45°F (7.2°C). All heating elements must be located within the same tower water basin as the sensing element. Threaded flanges are installed in the tower’s cold water basin for mounting each heating element and the temperature sensor. The control panel must be field mounted and wired to each heating element and the temperature sensor. A power source separate from the cooling tower fans is recommended.

### Level Control

When water level control is needed in the TTXL tower module, the standard level controller is a mechanical valve actuated through a float mounted on a short rod located in the external sump container which is attached to the terminal end of each tower module. To function correctly, the mechanical float valve requires inlet water pressure of 25 psi (or less) applied at the valve inlet. The use of a pressure reducing valve is necessary when the inlet water supply exceeds 25 psi.

If a non-contact water level control is desired, a pre-engineered, self-contained ultrasonic liquid level control package is optionally available. The package consists of a continuous measuring ultrasonic device combined with a controlling relay, an LCD screen, and a stilling well mounting pipe. The stilling well pipe is mounted in the tower’s equalization/overflow piping. The ultrasonic device operates on an analog 4-20ma circuit to the relay/LCD which sends command signals to the solenoid valve (solenoid valve not supplied). The LCD screen shows the water level and the indicator lights show whether the solenoid valve is commanded ON or OFF.

# Seawater Applications

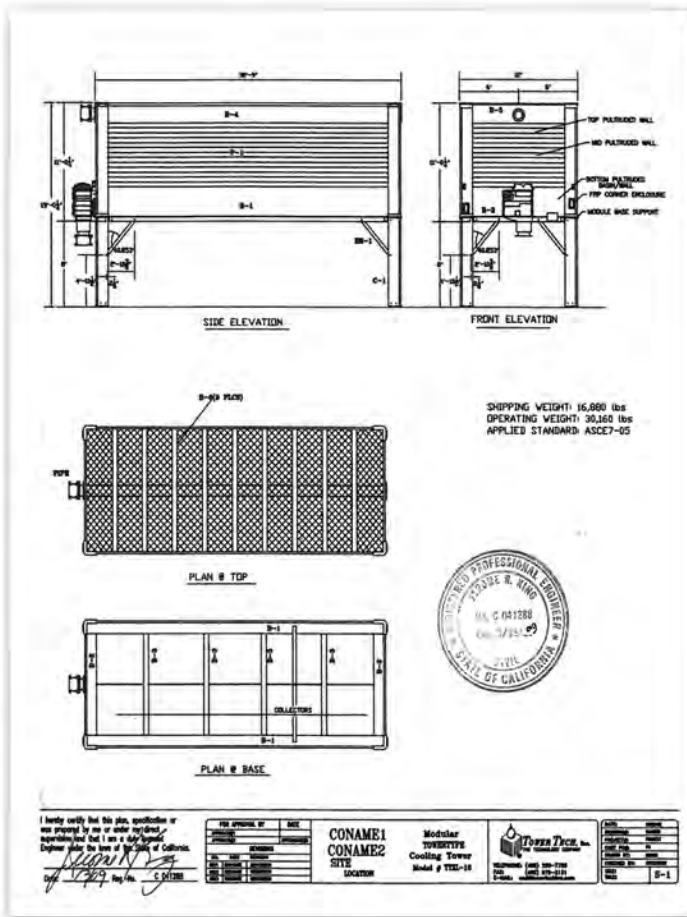
Tower Tech modules are the best solution available for cooling with seawater. All of the structural and internal components are inert in the presence of seawater. Even 304 Stainless Steel is aggressively attacked and corroded by the chlorides in seawater. Tower Tech offers a wide selection of fouling resistant fills and a 316 Stainless Steel hardware option to assure long life and low maintenance for your operations. There will be a 5-15% thermal capacity (gpm/lps) derate depending on the salinity content of the cooling water. Contact your Tower Tech representative for solutions to match your specific application.

# Engineering Certifications

Certified calculations are available for all models with substructures up to 8 feet (243.8 cm) for seismic and wind loading in accordance with the International Building Code's most severe requirements. Wind, seismic and gravity loadings are applied. The illustrated tower shell and substructure is designed to withstand a wind pressure of 91.6 psf. (ASCE7-10 200 mph wind, exposure C) and a seismic force factor: SDC E,  $S_s = 3$ ,  $S_1 = 2$ , soil class D.

Tower Tech has received preapproval from OSHPD for Special Seismic Certification under approval number OSP-0289-10. The TTXL Series Cooling Tower Product Line (on 1ft legs and 4ft, 6ft, and 8ft braced support legs) meets the requirements for Special Seismic Certification by seismic testing according to CBC-2010 Section 1708A.4 and IBC 2009 Section 1708.4 for ground level ( $SDS = 2.30$  for 1ft legs and  $SDS = 2.0$  for 4ft, 6ft, & 8ft braced legs) and rooftop ( $SDS = 1.35$  for 1ft legs and  $SDS = 1.25$  for 4ft, 6ft, & 8ft braced legs) installation for  $Ip=1.5$ . The product line was qualified by time history shake table testing of three towers on varied support legs according to the procedures outlined in ICC-ES AC156.

Tower Tech has performed extensive acoustic testing in accordance with CTI Standard ATC-128 using licensed Acoustical Engineers. Sound data for all Tower Tech models is available. Computer simulated site specific 3D sound modeling is also available through your Tower Tech representative.



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**Title:**  
Fiberglass modular cooling tower –TTXL -10

**Purpose:**  
Analyze and design the components of the fiberglass cooling tower.

- References:**
1. AISC, Steel Construction Manual, 8th edition
  2. Structural Engineering Hand book, 2nd edition  
By Gaylord & Gaylord, 1973 McGraw-Hill
  3. Aluminum Structures, 2nd edition  
By J. Randolph Kissell & Robert Ferry
  4. Risa3d – Rapid interactive structural analysis, three dimensional, computer software

- Specifications:**
1. Tower Tech tests and material properties data
  2. Creative Pultrusions, Inc. material properties data

**Design Requirements**  
The design loads shall be in accordance with the IBC (International Building Code). Wind, seismic and gravity loadings are applied. The illustrated tower shell and substructure is designed to withstand a wind pressure of 91.6 psf. (ASCE7-10 200 mph wind, exposure C) and a seismic force factor: SDC E,  $S_s = 3$ ,  $S_1 = 2$ , soil class D.

**Procedures:**  
Procedures are the methodologies indicated in the listed references, as specifically presented within the calculations. To use the AISC equations and Built-in sections within risa3d, the fiberglass properties have been put in place of the steel; the printouts that have "Steel" headings are calculated as fiberglass and should be interpreted as such. The properties of the fill material or based on actual in – House tests. Safety factors are calculated and compared to those for steel, aluminum, and wood.

**Conclusions:**  
The analysis and design of the subject cooling tower and their appurtenances have been completed satisfactorily.

Our vision is to be the most customer-driven cooling tower company in the world -- the standard by which all other cooling tower companies are measured.

We are committed to preserving and protecting the environment by leading our industry in water and energy conservation and environmental responsibility.



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