

NS COOLING TOWERS KX Series

Heavy Duty • Higher Capacity • Space Saving





Nihon Spindle KX Series

Heavy Duty

The KX Series towers are specially designed for high performance and large capacity projects. The internal structures have been sized up significantly in order to ensure better solidity and rigidity.

Higher Capacity

The KX Series can deliver up to 750TR per cell which is 3 times more than our standard models. Such high capacity towers are suitable for very demanding projects such as district cooling, power stations, industrial plants etc.

Space Saving

The footprint per TR is very much smaller compared to standard models. These towers are purpose-built to achieve high thermal performance while maintaining minimum footprint.

Our cooling towers are designed for multi-cell construction, thus offering better flexibility in tower selection and operation.



Our Successful History



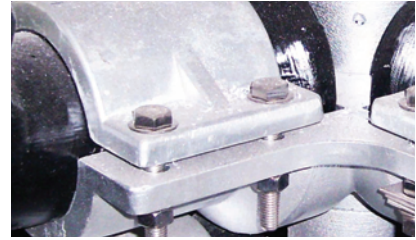
With over 40 years of experience in the development of cooling towers, Nihon Spindle continues to lead the Asian market today through R&D and innovation. It is an ingrained part of Nihon Spindle's culture to seek continuous improvement in order to supersede existing performance and quantity standards.

Uncompromising Performance



Our cooling towers are manufactured to JIS B8609 standards. This is a renowned high performance standard for cooling towers that is certified by the Japan Cooling Tower Institute. Our performance standard incorporates features such as minimised footprint for the corresponding capacity required, super low noise performance and uncompromised energy efficiencies.

Quality Material



Nihon Spindle cooling towers are produced using only the highest quality components and materials. We use stainless steel 304 grade nut and bolts and hot-dipped galvanised steel for the structure and steel parts. These will ensure longer-lasting product life under exposure to water and heat. Our FRP fan blade is lighter and more durable, and consumes less power to run and start up.

CTI Standard Test Facility



Diesel boilers to simulate heat load.



1100TR cooling tower CTI testing

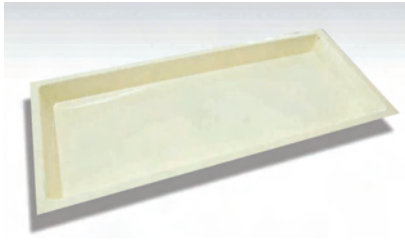
In order to maintain the highest standards of quality, our products undergo strict annual testing according to world-renowned CTI standards. A test facility was designed and built at our manufacturing plant in Penang, Malaysia, in accordance to the specifications by a qualified and certified CTI tester. This unique CTI test facility has a combined floor space of 15,000 sq ft and is capable of up to 1,000 tonnes heat rejection testing. Testing is accomplished to great accuracy by 4 massive diesel-boilers and numerous sensors embedded around the vicinity of the test platform. In addition, our plant also includes a Static Fan Balancing and Dynamic Fan Testing facility.

CTI certification offers assurances in performance and reliability to the end user. Performance capacity is the contributing factor to a successful certification.

Our Japanese team

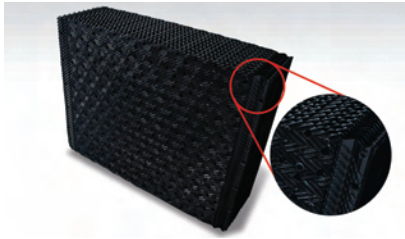


Manufacturing Control, Engineering Design, Quality Control and R&D led by qualified Japanese team from Nihon Spindle Manufacturing Co., Ltd., Osaka Japan.



Hot Water Distribution System

Our crossflow design uses hot water basin as the distribution system which eliminate the use of nozzle spray heads. This will lower the first cost in the pumping system and operating cost in the long run due to lower energy consumption.



Highly Efficient Infill

Our highly efficient infills incorporate a drift eliminators which significantly reduces drift loss to save precious water. This design is the result from years of Research & Development, led by Japanese engineers, to continuously improve the infill performance and efficiency.



Special Internal Walkway

The internal chambers of our Nihon Spindle cooling towers can be easily accessed through a special internal walkway that runs along the centre of the tower. This special feature provides better access to internal components and helps to simplify the maintenance process, thus reducing maintenance cost. It also allows internal inspections to be done easily and safely.



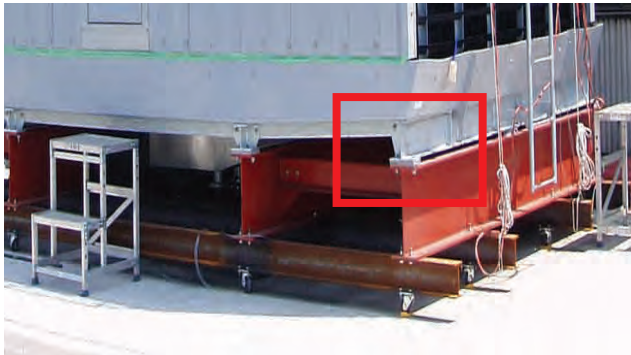
Certified CTI performance

The KX series of cooling towers has been thoroughly tested to verify performance compliance to the CTI criteria. As a result, Nihon Spindle was awarded CTI certification that reaffirms the world standards of quality and performance in the KX series.

CTA-KX3-N Energy Saving Low Noise Design

Specifications			Performance & Design								No. Of Cells	Basin Capacity (Litres)	Overall Dimensions					
Temperature	In	° F	100	100	100.4	98.6	97.5	97	97	95			Drift Loss %	Evaporation Loss %	Width(W) (mm)	Length(L) (mm)	Overall Height(H) (mm)	Fan Height(h) (mm)
	Out		90	90	91.4	89.6	87.4	87	87	85.1								
	WB		83	82	82.4	80.6	81	82	81	81								
	In	° C	37.8	37.8	38	37	36.4	36.1	36.1	35								
	Out		32.2	32.2	33	32	30.8	30.6	30.6	29.5								
	WB		28.3	27.8	28	27	27.2	27.8	27.2	27.2								
MODEL	HRT	Circulating Water Flowrate (m ³ /hr)								Less than 0.02%of circulating flowrate	Approximately 0.87% of total flow	1	2	3	4			
CTA-300KX3-N	300	190.5	203.9	246.0	234.0	169.2	146.8	163.8	124.9									
CTA-350KX3-N	350	222.3	237.9	287.0	273.0	197.4	171.3	191.0	145.7									
CTA-450KX3-N	450	285.8	305.9	369.0	351.0	253.7	220.3	245.6	187.3									
CTA-500KX3-N	500	317.5	339.9	410.0	390.0	281.9	244.7	272.9	208.1									
CTA-600KX3-N	600	381.0	407.9	491.9	468.0	338.3	293.7	327.5	249.7									
CTA-650KX3-N	650	412.8	441.8	532.9	507.0	366.5	318.1	354.8	270.6									
CTA-700KX3-N	700	444.5	475.8	573.9	546.0	394.7	342.6	382.1	291.4									
CTA-900KX3-N	900	571.5	611.8	737.9	702.0	507.5	440.5	491.3	374.6									
CTA-1000KX3-N	1000	635.0	679.8	819.9	780.0	563.9	489.4	545.9	416.2									
CTA-1200KX3-N	1200	762.0	815.7	983.9	936.0	676.7	587.3	655.0	499.5									
CTA-1300KX3-N	1300	825.5	883.7	1065.9	1014.0	733.0	636.3	709.6	541.1									
CTA-1350KX3-N	1350	857.3	917.7	1106.9	1053.0	761.2	660.8	736.9	561.9									
CTA-1500KX3-N	1500	952.5	1019.6	1229.9	1170.0	845.8	734.2	818.8	624.4									
CTA-1800KX3-N	1800	1143.0	1223.6	1475.8	1404.0	1015.0	881.0	982.5	749.2									
CTA-1950KX3-N	1950	1283.3	1325.5	1598.8	1521.0	1099.6	954.4	1064.4	811.7									
CTA-2000KX3-N	2000	1270.0	1359.5	1639.8	1560.0	1127.8	978.9	1091.7	832.5									
CTA-2400KX3-N	2400	1524.0	1631.4	1967.8	1872.0	1353.3	1174.7	1310.1	999.0									
CTA-2600KX3-N	2600	1651.0	1767.4	2131.7	2028.0	1466.1	1272.6	1419.2	1082.2									

HRT, nominal heat rejection ton is based on flowrate of 13L/min (0.78m³/hr) at 37°C inlet temperature, 32°C outlet temperature & 27°C wet bulb temperature condition.



Robust bottom structure support using I-beams.



KX3-N & KX3E-N design offer great savings in space by limiting the footprint of the tower.

	Fan Assembly						Common Piping Details							Weight			
	Fan				Motor		Hot Water Inlet(mm x q'ty)	Cold Water Outlet(mm x q'ty)	Drain(mm x q'ty)	Overflow(mm x q'ty)	Auto Make-Up Inlet(mm x q'ty)	Manual Make-Up Inlet(mm x q'ty)	Head Loss(m) Internal Of Cooling Tower	Dry Weight(kg)	Operating Weight(kg)		
	Drive System	Air Flowrate m³/min	Fan Speed (rpm)	No. Of Blades (per cell)	Type	Mounting Location										Power Supply	Rated Output (kw)
Diameter (mm)	Type	3Phase 415V 50Hz or 3Phase 200V 50/60Hz or 3Phase 380V 50Hz or 3Phase 460V 60Hz															
		Totally Enclosed Fan-Cooled, IP55															
		Outside Air-Stream															
		V-Belt And Pulley Drive															
2000	Axial Flow	478	1749														
2200		395	2040														
2500		325	2623														
2500		331	2915														
2800		314	3498														
2800		367	3789														
2200		395	4080														
2500		325	5246														
2500		331	5830														
2800		314	6996														
2800		367	7578														
2500		325	7869														
2500		331	8745														
2800		314	10494														
2800		367	11367														
2500		331	11660														
2800		314	13992														
2800		367	15156														



Intermediate HDG Steel infill supports in KX series.



Gear reducer as an optional item to belt drive system.

CTA-KX3E-N Space Saving Low Noise Design

Specifications			Performance & Design								No. Of Cells	Basin Capacity (Litres)	Overall Dimensions					
Temperature	In	° F	100	100	100.4	98.6	97.5	97	97	95			Drift Loss %	Evaporation Loss %	Width(W) (mm)	Length(L) (mm)	Overall Height(H) (mm)	Fan Height(h) (mm)
	Out		90	90	91.4	89.6	87.4	87	87	85.1								
	WB		83	82	82.4	80.6	81	82	81	81								
	In	° C	37.8	37.8	38	37	36.4	36.1	36.1	35								
	Out		32.2	32.2	33	32	30.8	30.6	30.6	29.5								
	WB		28.3	27.8	28	27	27.2	27.8	27.2	27.2								
MODEL		HRT	Circulating Water Flowrate (m ³ /hr)								Less than 0.02% of circulating flowrate	Approximately 0.87% of total flow	1	2	3	4		
CTA-350KX3E-N		350	222.3	237.9	287.0	273.0	197.4	171.3	191.0	145.7								
CTA-450KX3E-N		450	285.8	305.9	369.0	351.0	253.7	220.3	245.6	187.3								
CTA-550KX3E-N		550	349.3	373.9	450.9	429.0	310.1	269.2	300.2	228.9								
CTA-600KX3E-N		600	381.0	407.9	491.9	468.0	338.3	293.7	327.5	249.7								
CTA-700KX3E-N		700	444.5	475.8	573.9	546.0	394.7	342.6	382.1	291.4								
CTA-750KX3E-N		750	476.3	509.8	614.9	585.0	422.9	367.1	409.4	312.2								
CTA-900KX3E-N		900	571.5	611.8	737.9	702.0	507.5	440.5	491.3	374.6								
CTA-1100KX3E-N		1100	698.5	747.7	901.9	858.0	620.3	538.4	600.4	457.9								
CTA-1200KX3E-N		1200	762.0	815.7	983.9	936.0	676.7	587.3	655.0	499.5								
CTA-1400KX3E-N		1400	889.0	951.7	1147.9	1092.0	789.4	685.2	764.2	582.7								
CTA-1500KX3E-N		1500	952.5	1019.6	1229.9	1170.0	845.8	734.2	818.8	624.4								
CTA-1650KX3E-N		1650	1047.8	1121.6	1352.8	1287.0	930.4	807.6	900.7	686.8								
CTA-1800KX3E-N		1800	1143.0	1223.6	1475.8	1404.0	1015.0	881.0	982.5	749.2								
CTA-2100KX3E-N		2100	1333.5	1427.5	1721.8	1638.0	1184.1	1027.8	1146.3	874.1								
CTA-2250KX3E-N		2250	1428.8	1529.4	1844.8	1755.0	1268.7	1101.3	1228.2	936.5								
CTA-2400KX3E-N		2400	1524.0	1631.4	1967.8	1872.0	1353.3	1174.7	1310.1	999.0								
CTA-2800KX3E-N		2800	1778.0	1903.3	2295.7	2184.0	1578.9	1370.5	1528.4	1165.5								
CTA-3000KX3E-N		3000	1905.0	2039.3	2459.7	2340.0	1691.6	1468.3	1637.6	1248.7								

HRT, nominal heat rejection ton is based on flowrate of 13L/min (0.78m³/hr) at 37°C inlet temperature, 32°C outlet temperature & 27°C wet bulb temperature condition.

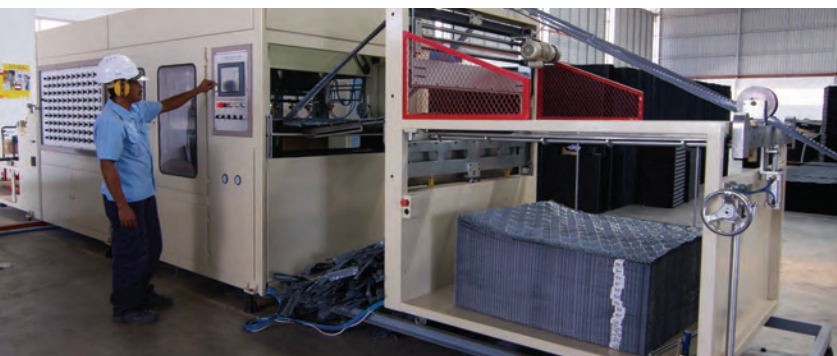


Trained staff conducting stringent quality control on every product.



Production floor space: 60,000 sq. ft.

	Fan Assembly							Common Piping Details							Weight			
	Fan				Motor			Hot Water Inlet(mm×ft)	Cold Water Outlet(mm×ft)	Drain(mm×ft)	Overflow(mm×ft)	Auto Make-Up Inlet(mm×ft)	Manual Make-Up Inlet(mm×ft)		Dry Weight(kg)	Operating Weight(kg)		
	Drive System	Air Flowrate m³/min	Fan Speed (rpm)	No. Of Blades (per cell)	Diameter (mm)	Type	Mounting Location										Power Supply	Rated Output (kw)
Totally Enclosed Fan-Cooled, IP55																Outside Air-Stream		
3Phase 415V 50Hz or 3Phase 200V 50/60Hz or 3Phase 380V 50Hz or 3Phase 460V 60Hz																		
V-Belt And Pulley Drive																		
Axial Flow																		
	2000	4	443	2040				11 X 1	190x2	250x1	80x1	80x1	40x1	40x1	0	2470	5120	
	2200		390	2623				15 X 1	240x2	250x1	80x1	80x1	40x1	40x1	0	2710	5740	
	2500		324	3206				15 X 1	240x2	250x1	80x1	80x1	40x1	40x1	0	3200	6690	
	2500		373	3498				18.5 X 1	240x2	300x1	80x1	80x1	40x1	40x1	0	3540	7500	
	2800		333	4080				22 X 1	240x2	300x1	80x1	80x1	50x1	50x1	0	4240	8950	
	2800		351	4372				22 X 1	240x2	300x1	80x1	80x1	50x1	50x1	0	4470	9590	
	2200		390	5246				15 X 2	240x4	250x2	80x2	80x2	40x2	40x2	0	5000	11090	
	2500		324	6412				15 X 2	240x4	250x2	80x2	80x2	40x2	40x2	0	5970	12960	
	2500		373	6996				18.5 X 2	240x4	300x2	80x2	80x2	40x2	40x2	0	6630	14570	
	2800		333	8160				22 X 2	240x4	300x2	80x2	80x2	50x2	50x2	0	7980	17410	
	2800		351	8744				22 X 2	240x4	300x2	80x2	80x2	50x2	50x2	0	8470	18720	
	2500		324	9618				15 X 3	240x6	300x3	80x3	80x3	40x3	40x3	0	8780	19260	
	2500		373	10494				18.5 X 3	240x6	300x3	80x3	80x3	40x3	40x3	0	9750	21660	
	2800		333	12240				22 X 3	240x6	300x3	80x3	80x3	50x3	50x3	0	11670	25820	
	2800		351	13116				22 X 3	240x6	300x3	80x3	80x3	50x3	50x3	0	12410	27780	
	2500		373	13992				18.5 X 4	240x8	300x4	80x4	80x4	40x4	40x4	0	12760	28600	
	2800		333	16320				22 X 4	240x8	300x4	80x4	80x4	50x4	50x4	0	15290	34130	
	2800		351	17488				22 X 4	240x8	300x4	80x4	80x4	50x4	50x4	0	16290	36600	



Automated Vacuum Forming Machine to produce high efficiency infills.



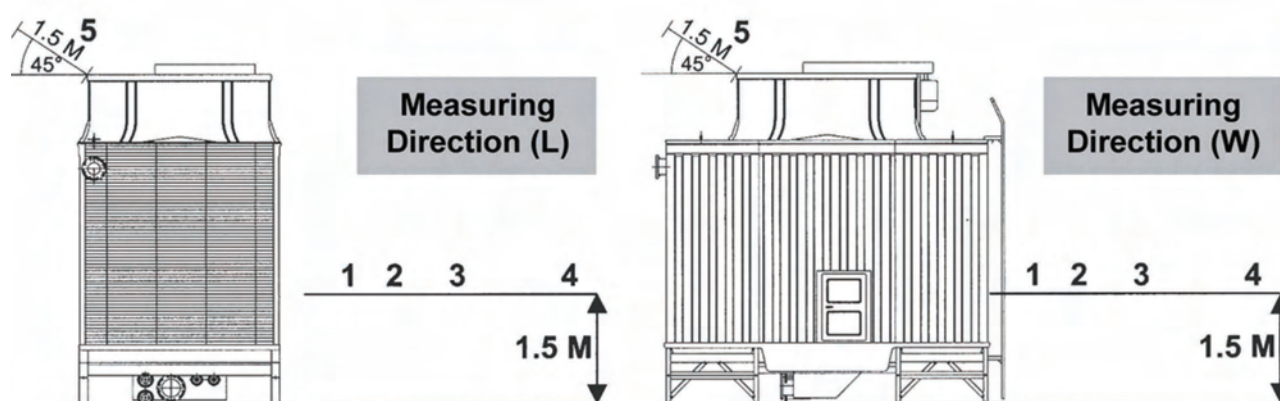
Highly skilled assembly workers.

KX3-N Sound Data

MODEL	Measuring Direction	1	2	3	4	5
		2m	5m	10m	20m	45° Upper 1.5m
CTA-300KX3-N	W	69.5	65.5	60	52.5	74
	L	66.5	62.5	57	49.5	
CTA-350KX3-N	W	70.5	66.5	61	53.5	75
	L	67.5	63.5	58	50.5	
CTA-450KX3-N	W	72	68	62.5	55	76.5
	L	69	65	59.5	52	
CTA-500KX3-N	W	72	68	62.5	55	76.5
	L	69	65	59.5	52	
CTA-600KX3-N	W	73.5	69.5	64	56.5	78
	L	70.5	66.5	61	53.5	
CTA-650KX3-N	W	74	70	64.5	57	78.5
	L	71	67	61.5	54	
CTA-700KX3-N	W	73.5	68.5	64	56.5	78
	L	70.5	66.5	61	53.5	
CTA-900KX3-N	W	75	70	65.5	58	79.5
	L	72	68	62.5	55	
CTA-1000KX3-N	W	75	70	65.5	58	79.5
	L	72	68	62.5	55	

* All units are measured in dB. ± 3 dB tolerance is applicable in comparison with standard levels.

1. The noise levels are measured in conformity with JIS B8609 (Performance test for forced draft cooling towers)
2. Noise levels are based on normal operating conditions, other factors are excluded.
3. Noise levels are measured based on A scale.

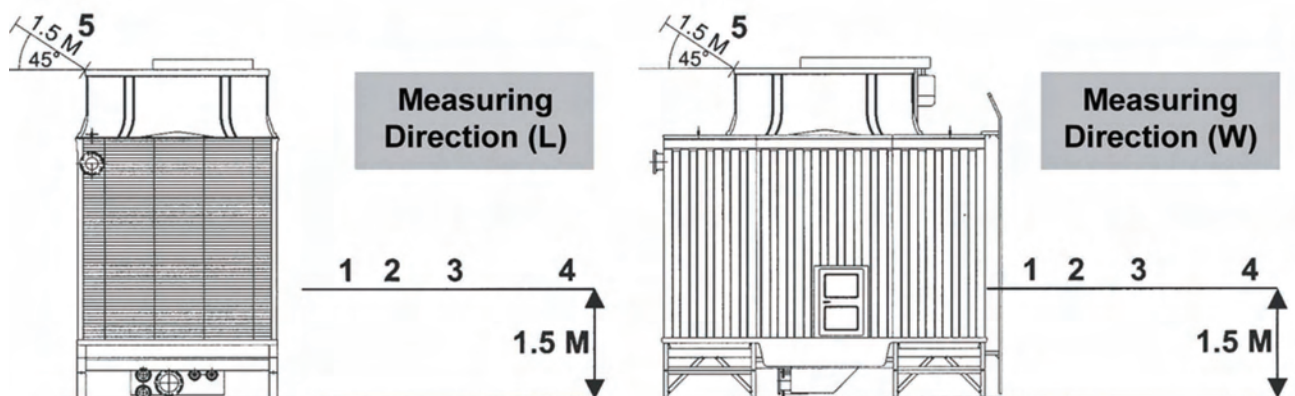


KX3-N Sound Data

MODEL	Measuring Direction	1	2	3	4	5
		2m	5m	10m	20m	45° Upper 1.5m
CTA-1200KX3-N	W	76.5	71.5	67	59.5	81
	L	73.5	69.5	64	56.5	
CTA-1300KX3-N	W	77	72	67.5	60	81
	L	74	70	64.5	57	
CTA-1350KX3-N	W	77	72	67	60	80.5
	L	74	70	64.5	57	
CTA-1500KX3-N	W	77	72	67	60	80.5
	L	74	70	64.5	57	
CTA-1800KX3-N	W	78.5	73.5	68.5	61.5	82
	L	75.5	71.5	66	58.5	
CTA-1950KX3-N	W	79	74	69	62	82.5
	L	76	72	66.5	59	
CTA-2000KX3-N	W	78	73	68	61	80.5
	L	75	71	65.5	58	
CTA-2400KX3-N	W	79.5	74.5	69.5	62.5	82
	L	76.5	72.5	67	59.5	
CTA-2600KX3-N	W	80	75	70	63	82.5
	L	77	73	67.5	60	

* All units are measured in dB. ± 3 dB tolerance is applicable in comparison with standard levels.

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2. Noise levels are based on normal operating conditions, other factors are excluded.
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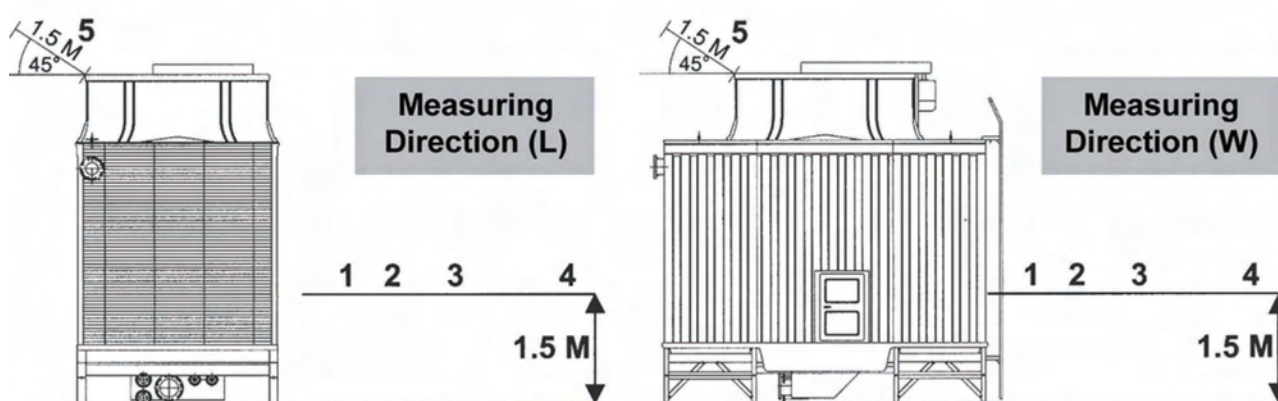


KX3E-N Sound Data

MODEL	Measuring Direction	1	2	3	4	5
		2m	5m	10m	20m	45° Upper 1.5m
CTA-350KX3E-N	W	70.5	66.5	61	53.5	75
	L	67.5	63.5	58	50.5	
CTA-450KX3E-N	W	73.5	69.5	64	57.5	78
	L	70.5	66.5	61	53.5	
CTA-550KX3E-N	W	75	71	65.5	58	79.5
	L	72	68	62.5	55	
CTA-600KX3E-N	W	77	73	67.5	60	81.5
	L	74	70	64.5	57	
CTA-700KX3E-N	W	76.5	72.5	67	59.5	81
	L	73.5	69.5	64	56.5	
CTA-750KX3E-N	W	76	72	66.5	59	80.5
	L	73	69	63.5	56	
CTA-900KX3E-N	W	76.5	71.5	67	59.5	81
	L	73.5	69.5	64	56.5	
CTA-1100KX3E-N	W	78	73	68.5	61	82.5
	L	75	71	65.5	58	
CTA-1200KX3E-N	W	80	75	70.5	63	84.5
	L	77	73	67.5	60	

* All units are measured in dB. ± 3 dB tolerance is applicable in comparison with standard levels.

1. The noise levels are measured in conformity with JIS B8609 (Performance test for forced draft cooling towers)
2. Noise levels are based on normal operating conditions, other factors are excluded.
3. Noise levels are measured based on A scale.

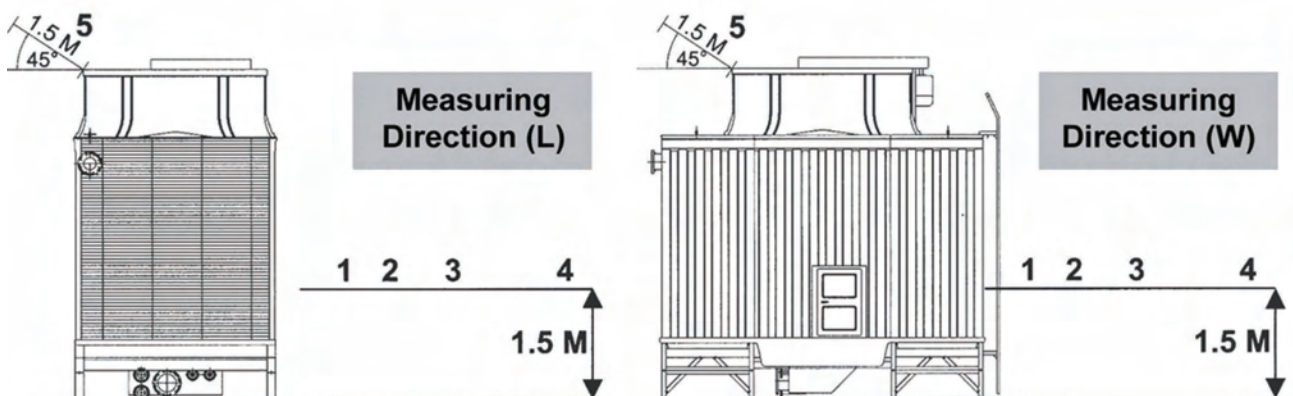


KX3E-N Sound Data

MODEL	Measuring Direction	1	2	3	4	5
		2m	5m	10m	20m	45° Upper 1.5m
CTA-1400KX3E-N	W	79.5	74.5	70	62.5	84
	L	76.5	72.5	67	59.5	
CTA-1500KX3E-N	W	79	74	69.5	62	83
	L	76	72	66.5	59	
CTA-1650KX3E-N	W	80	75	70	63	83.5
	L	77	73	67.5	60	
CTA-1800KX3E-N	W	82	77	72	65	85.5
	L	79	75	69.5	62	
CTA-2100KX3E-N	W	81.5	76.5	71.5	64.5	85
	L	78.5	74.5	69	61.5	
CTA-2250KX3E-N	W	81	76	71	64	84.5
	L	78	74	68.5	61	
CTA-2400KX3E-N	W	83	78	73	66	85.5
	L	80	76	70.5	63	
CTA-2800KX3E-N	W	82.5	77.5	72.5	65.5	85
	L	79.5	75.5	70	62.5	
CTA-3000KX3E-N	W	82	77	72	65	84.5
	L	79	75	69.5	62	

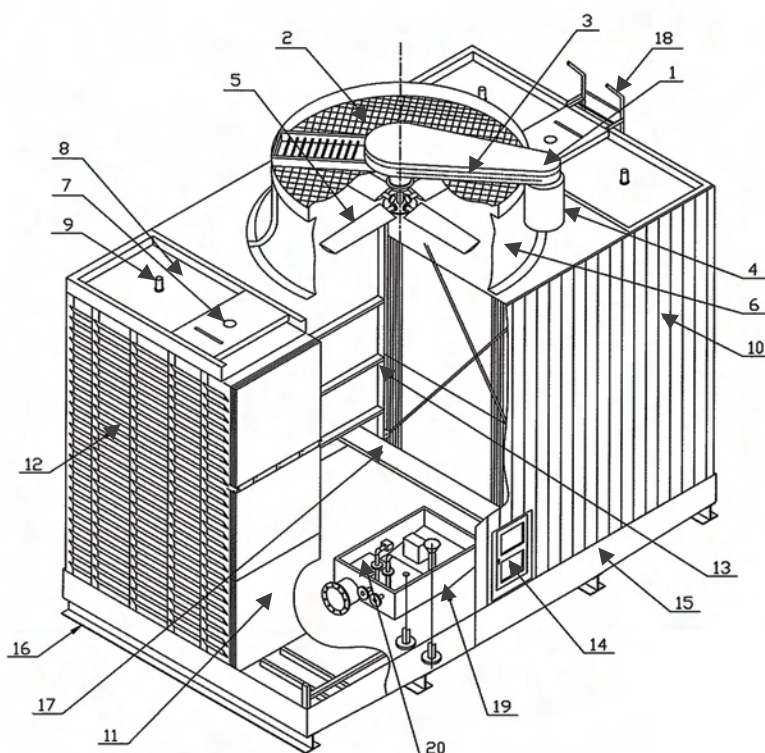
* All units are measured in dB. ± 3 dB tolerance is applicable in comparison with standard levels.

1. The noise levels are measured in conformity with JIS B8609 (Performance test for forced draft cooling towers)
2. Noise levels are based on normal operating conditions, other factors are excluded.
3. Noise levels are measured based on A scale.



Materials of Construction Options (KX3-N, KX3E-N)

Area	Part	Standard Construction	Wetted Parts SS Construction	All SS Construction
Tower Structure	Bottom Basin Frame	HDG Steel	HDG Steel	Stainless Steel
	Upper Structural Frame	HDG Steel	Stainless Steel	Stainless Steel
	Ladder	HDG Steel	HDG Steel	Stainless Steel
	Bolt & Nut	Stainless Steel	Stainless Steel	Stainless Steel
	Infill Support	HDG Steel	Stainless Steel	Stainless Steel
	Fan Guard	HDG Steel	Stainless Steel	Stainless Steel
Basin	Outlet Sump	HDG Steel	Stainless Steel	Stainless Steel
	Cold Water Basin	FRP		
	Hot Water Basin	HDG Steel	Stainless Steel	Stainless Steel
Perimeter Structure	Casing	FRP		
	Access Door	FRP		
	Internal Partition w/door	FRP		
	Louver	PVC		
	Fan Stack	FRP		
Fan Assembly	Fan	FRP		
	Fan Belt	Wedge Belt		
	Motor	Aluminum/Cast Iron		
	Pulley Cover	FRP		
	Fan Holder	HDG Steel	Stainless Steel	Stainless Steel



Legend

1	Belt Protection Cover
2	Fan Guard
3	Fan Belt
4	Motor
5	Fan Blade
6	Fan Stack
7	Hot Water Inlet Hole
8	Hot Water Distribution Basin
9	Over Flow Pipe
10	Casing
11	Fill
12	Louvers
13	Upper Structure Frame
14	Access Door
15	Cold Water Basin
16	Basin Frame
17	Basin Internal Walkway
18	Ladder
19	Outlet Sump
20	Strainer

Optional Accessories

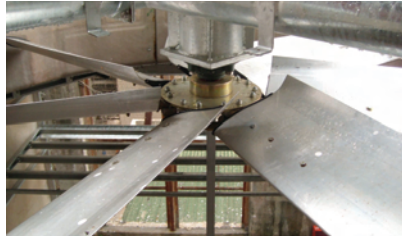
Vibration Isolators



Mounted at the feet of the cooling tower, vibration isolators provide an effective way of isolating any vibration from the tower to the concrete floors.

Single-spring and double-spring design are generally sufficient to meet the requirements of the range of Nihon Spindle cooling towers. Selection of the right sizes depending on rated load and rated deflection.

Aluminium Alloy Blade



Aluminium alloy blades are available as an optional item to our standard FRP blades. These blades are recommended for use in highly corrosive environments.

Gear Reducer



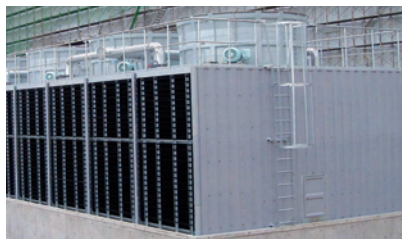
As an alternative to wedge belt drive system, gear reducer option is available. The motor is located outside the air stream.

Vibration Switch



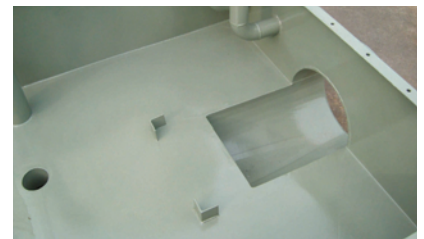
Vibration switch is mounted on the cooling tower fan deck where if there is any excessive vibration, it will cut off power supply to fan motor.

Handrail & Caged Ladder



Handrail and caged ladder can be supplied as an optional item for added safety when the fan deck is relatively high above ground.

Epoxy Fusion Coating



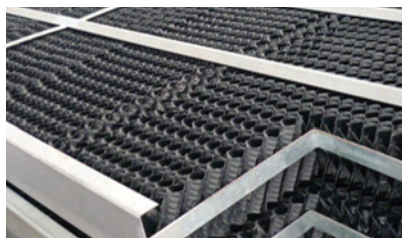
Wherever extra corrosion protection is needed over the standard hot dipped galvanized steel parts, epoxy fusion coating is available as option.

Extended Discharge Hood (Angle/ Straight)



Wherever the discharge of air is necessary to be diverted towards a certain direction, FRP extended discharge hood can be easily installed onto the standard fan cylinder.

Additional Drift Eliminators



Additional drift eliminators can be supplied when very low drift loss is to be achieved. Additional drift eliminators can further reduce drift loss to as low as 0.002% of the circulating water flowrate.

Hot Water Basin Cover



The hot water basin cover is available as an added protection to the hot water basin from gathering dirt, foreign particles and objects that can clog the basin.

Water Treatment & Filtration

Water Quality

The open recirculating cooling tower system has the greatest potential for problems associated with fouling, corrosion and microbiological organisms. Even the highest quality water contains some amount of dissolved solids that become concentrated over time, posing potential threat to corrosion and fouling. This is further enhanced by the effects of air pollution and make-up water contamination.

The degree to which dissolved solids and other impurities build up in recirculating water may be defined as the cycles of concentration which is the ratio of dissolved

solids in the circulating water to be dissolved solids in the make-up water. This should be determined and monitored frequently through water treatment.

The annexed table lists the water quality standards for use with refrigeration and air-conditioning equipment. For maximum heat transfer efficiency and maximum equipment life, these guidelines should be followed.

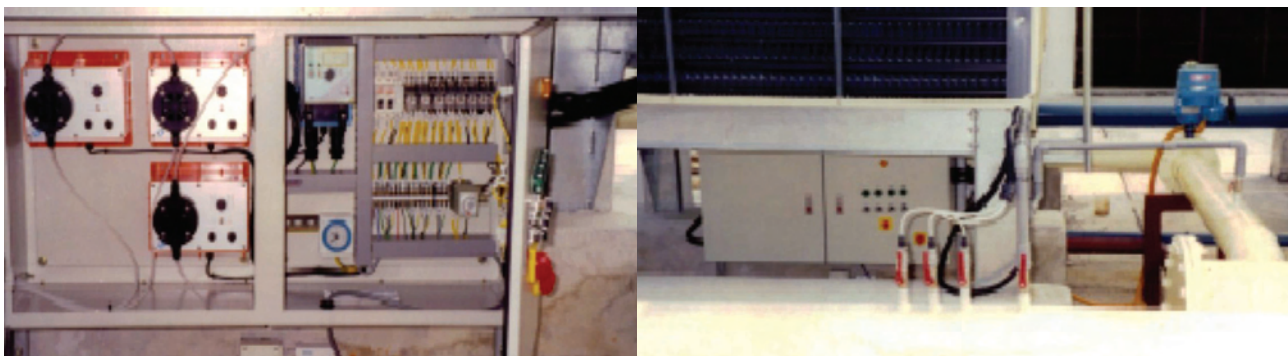
Item	HDG Steel	Stainless Steel
Ph	7-9	6.5-9
Hardness as CaCO ₃	500 ppm max	500 ppm max
Alkalinity as CaCO ₃	500 ppm max	500 ppm max
Total Dissolved Solids	1500 ppm max	2000 ppm max
Total Suspended Solids	25 ppm	25 ppm
Chlorides as NaCl	750 ppm max	1500 ppm max
Sulphates	500 ppm max	750 ppm max
Silica as SiO ₂	150 ppm	150 ppm

Water Treatment

In addition to blowdown which serves as a mean to control scale build-up and corrosion, some extensive form of water treatment is necessary in order to maintain the quality of water within the guidelines and for the control of biological contamination. The growth of microorganisms must be checked in order to prevent the presence of any potential harmful bacteria including the possible outbreak of the Legionnaire disease.

The water treatment system should minimally consist of a chemical dosage system and a conductivity control system. In its automatic mode during operation, chemicals are dosed at a predetermined amount and duration. The conductivity control also has a pre-set range, where about its limit, blowdown will automatically take place and stop when its lower limit reached.

Lastly, the chemicals must be compatible with the materials of construction of the cooling parts in contact with the recirculated water.



Fully automatic chemical dosing system with conductivity controller and pumps.

Overview of installation at site.

Water Treatment & Filtration

Water Losses

In cooling towers, recirculating water loss is attributed to evaporation loss, drift loss and blow-down loss

Evaporation Loss

The cooling towers evaporates a part of the recirculating water in order to bring down its temperature. The amount of evaporation is the water loss which can be estimated as follows:

Amount of evaporation:	$E (\%) = \frac{\Delta t}{R} \times 100$	where,
		Δt : Difference in inlet and outlet temperature (°C)
	$E (\text{kg/h}) = \frac{\Delta t \times L}{R}$	L : Amount of circulation water (kg/h)
		R : Water's latent heat of evaporation (kcal/kg) 575 (kcal/kg) at 37°C

Drift Loss

There is the undesired loss which can be controlled through drift eliminators but not totally eliminated. Drift loss occurs due to the carry-over of tiny water droplets together with the air discharge.

Amount of drift loss:
 $C\%$ = Approx.0.02% of the amount circulation water

Blow-down Loss

To maintain the limits on cycles of concentration in order to meet the water quality guidelines, it is necessary to bleed or blowdown a certain portion of the recirculated water. The amount of blowdown can be calculated as follows:

Amount of blowdown:	$B (\%) = \frac{E}{N-1} - C$	where,
		N : Concentration multiple (generally, N = around 3)

Total Loss

The amount of make-up water is the total sum of the three type of losses stated above.

Amount of make-up water:

$M (\%) = E + C + B$	Example,
$M (\text{kg/h}) = L \times (E + C + B)$	Amount of evaporation water: $E = 0.87\%$
	Amount of loss due to drift loss: $C = 0.02\%$
	Extent of blow-down : $B = 0.3\%$

Hence,

$$M - 0.87 + 0.02 + 0.3 = 1.19 (\%)$$

Engineering Specification

Cooling Tower

Each cooling tower is manufactured to cool litres per second of water from ____°C (HW) entering water temperature to ____°C (CW) leaving water temperature at ____°C (WB) entering wet bulb temperature.

The cooling towers are guaranteed to perform in accordance with the conditions specified without any modifications.

Structure

The cooling tower structure shall be constructed from HDG Steel. All HDG (Hot Dipped Galvanized) are carried out in accordance to ISO 1461:1999. The cooling tower casing shall be constructed from FRP (Fibreglass Reinforced Polyester).

Basin

The basin sump shall be constructed from HDG Steel. The basin shall be made of FRP and equipped with drain outlet for ease of cleaning.

Air Inlet Louvers

Air inlet louvers shall be made from PVC (Polyvinyl Chloride), designed to prevent water splash-out and to minimise sunlight from entering the cooling tower interior. Louvers are designed to be easily removable intended for easy access to cleaning.

Infill

Infill shall be of ultra-violet ray treated PVC (Polyvinyl Chloride). The PVC infill shall be vacuum-formed with patented intricate design to facilitate a good spread of water over the surface area of crossflow induced draft of air. It also incorporate a built in drift eliminator.

Water Distribution System

The hot water distribution shall be of open gravity type basin. It shall be constructed of HDG Steel designed with multiple array of turret-punched holes to facilitate even distribution of stable water sprinkling effect.

Specification & Data are correct at the time of publication; validation should be made at the time of purchase.

The MANUFACTURER reserves the right to change without prior notice.

SAFETY PRECAUTION SHOULD BE ABIDE AT ALL TIME TO PREVENT ACCIDENT.

Operation, Maintenance and Repair of this equipment should only be carried out by qualified personal.

WARRANTIES: Please refer to the Limitation of Warranties applicable to and in effect at the time of purchase.

Mechanical Equipment (Fan Section)

Fans shall be axial flow type with FRP blades or aluminium alloy. The fans shall be designed to provide necessary air flow for heat transfer. Fan blades shall be assembled, balanced and pitched. The fan shall operate within a FRP fan cylinder, which provides a streamlined air entry and minimum tip clearance for maximum fan efficiency.

Motor

The fan motor(s) shall be to IP55 standard with Class F insulation, specifically designed for cooling tower service. The motor shall be located adjacent to the fan cylinder for ease of maintenance and increased motor life expectancy. The motor shall be fully outside of the moist discharge air stream.

Mechanical Support

The mechanical support shall be of HDG Steel and bolted to the top of fan cylinder. HDG Steel fan guard shall be bolted to the top of mechanical support for safety measure. Extended lubrication lines shall be provided to the bearings with grease nipples located outside for ease of schedule maintenance.

Wedge-Belt Drive System

The wedge-belt shall be fabric impregnated type. Belt tensioning adjustment shall be provided. Entire drive arrangement shall be protected by a FRP cover.

Access

A FRP inspection door shall be provided to facilitate entry into the cooling tower for inspection and maintenance. A HDG Steel access ladder shall be installed on the cooling tower.

Bolts & Nuts

All bolts & nuts shall be 304 stainless steel.



Our Past Project Portfolio



Vista Tower, Intermark Mall and Doubletree Hotel by Hilton, Kuala Lumpur, Malaysia



Sentosa Integrated Resort, Singapore



University Malaysia Sarawak, Malaysia



Dubai Water Front

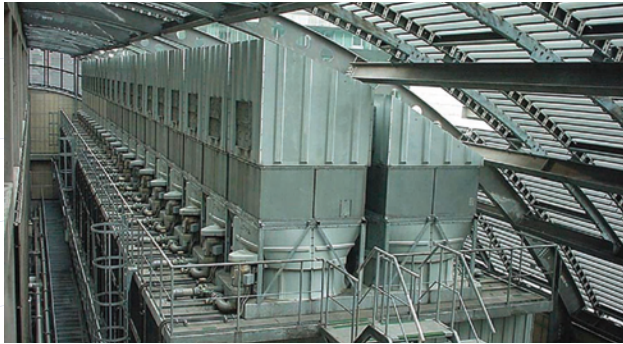


Menara PNB, Kuala Lumpur, Malaysia.



Wisma Perkeso Johor, Malaysia

References from Nihon Spindle Japan and China



District Cooling Plant, Japan



District Cooling Plant in China



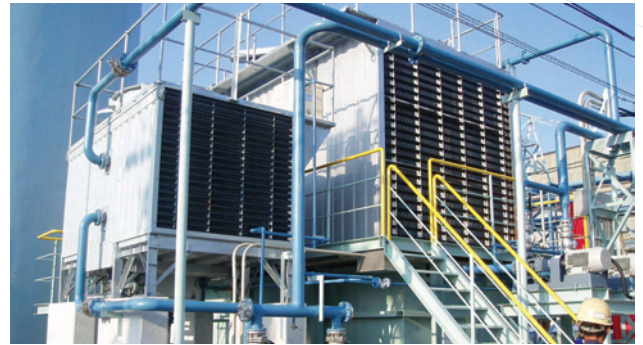
700KX tower, Japan



350KX tower, Japan



1250KX3 tower, Japan



300KX30 tower, Japan



COOLING TECHNOLOGY INSTITUTE

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May 26, 2008
(Revision 0)

Nihon Spindle Manufacturing Company, Ltd.
Air Conditioning Systems Division
Sioe 4-2-30, Amagasaki-shi
Hyogo, 661-0976 Japan

Subject: CTI Cooling Tower Certification for the
Nihon Spindle Manufacturing Company, Ltd.
CTA-KX Series of Cooling Towers

Gentlemen:

The Nihon Spindle Manufacturing Company, Ltd., line of CTA-KX Series induced-draft, cross-flow cooling towers, as described in your original application and subsequent revisions through May 14, 2008, has satisfactorily fulfilled the requirements for certification of thermal performance by the Cooling Technology Institute (CTI), as set forth in the CTI Certification Standard STD-201(04). A listing of the thirty-four (34) primary models that are in the line of CTA-KX Series cooling towers presently encompassed by this certification is included with this letter for reference. The listing also includes the three groups that will be used for distribution of the models in different markets.

The Nihon Spindle Manufacturing Company, Ltd., line of CTA-KX Series cooling towers has been assigned and should use CTI Certification Validation Number 08-33-01. You are hereby authorized and encouraged to display the CTI Certification Logo in all pertinent literature and are required to affix the CTI Certification Label on all towers comprising the line, as provided in the Certification Standard.

Very truly yours,

Thomas E. Weast, P.E.
CTI Certification Administrator



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Nihon Spindle Manufacturing Company, Ltd.
CTA-KX Series of CTI Certified Cooling Towers
CTI Certification Validation Number 08-33-01
May 26, 2008 (Revision 0)

<u>STANDARD MODEL SERIES</u>		<u>ENTIRE MODEL SERIES</u>		<u>N MODEL SERIES</u>	
<u>CTA-KX3</u>	<u>CTA-KX30</u>	<u>CTA-KX3</u>	<u>CTA-KX30</u>	<u>CTA-KX3-N</u>	<u>CTA-KX30-N</u>
CTA-200KX3	CTA-200KX30	CTA-200KX3L CTA-225KX3M	CTA-200KX30L CTA-225KX30M	CTA-300KX3-N	CTA-300KX30-N
CTA-250KX3E	CTA-250KX30E	CTA-250KX3S	CTA-250KX30S	CTA-350KX3E-N	CTA-350KX30E-N
CTA-250KX3	CTA-250KX30	CTA-250KX3L CTA-290KX3M	CTA-250KX30L CTA-290KX30M	CTA-350KX3-N	CTA-350KX30-N
CTA-310KX3E	CTA-310KX30E	CTA-310KX3S	CTA-310KX30S	CTA-450KX3E-N	CTA-450KX30E-N
CTA-300KX3	CTA-300KX30	CTA-300KX3L CTA-335KX3M	CTA-300KX30L CTA-335KX30M	CTA-450KX3-N	CTA-450KX30-N
CTA-370KX3E	CTA-370KX30E	CTA-370KX3S	CTA-370KX30S	CTA-550KX3E-N	CTA-550KX30E-N
CTA-350KX3	CTA-350KX30	CTA-350KX3L CTA-390KX3M	CTA-350KX30L CTA-390KX30M	CTA-500KX3-N	CTA-500KX30-N
CTA-415KX3E	CTA-415KX30E	CTA-415KX3S	CTA-415KX30S	CTA-600KX3E-N	CTA-605KX30E-N
CTA-400KX3	CTA-400KX30	CTA-400KX3L CTA-450KX3M	CTA-400KX30L CTA-450KX30M	CTA-600KX3-N	CTA-600KX30-N
CTA-475KX3E	CTA-475KX30E	CTA-475KX3S	CTA-475KX30S	CTA-700KX3E-N	CTA-700KX30E-N
CTA-450KX3	CTA-450KX30	CTA-450KX3L	CTA-450KX30L	CTA-650KX3-N	CTA-650KX30-N
CTA-500KX3E	CTA-500KX30E	CTA-500KX3M	CTA-500KX30M	CTA-750KX3E-N	CTA-750KX30E-N

Footnotes:

- Standard Model Series are 1.00 m³/h/RT @ 37°C-32°C-28°C for distribution in Japanese market.
Entire Model Series are 1.00 m³/h/RT @ 37°C-32°C-28°C for distribution in markets except Japan.
N Model Series are 0.78 m³/h/RT @ 37°C-32°C-27°C for distribution in markets except Japan.
- CTA-KX3 Models include an integral cold water basin.
CTA-KX30 Models do not include an integral cold water basin.
- Multiple cell models of the single cell models above are also available but not listed.

Thomas E. Weast

Thomas E. Weast, P.E.
CTI Certification Administrator

www.spindle.com.my

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