Nihon Spindle

Leading Eco-Technology

UN Series

超低騒音形 〈工業会基準〉 JCI 日本冷却塔工業会 JAPAN COOLING TOWER INSTITUTE

推奨品 JCI

• ENERGY SAVING • HIGH PERFORMANCE
SECOND GENERATION

Open Circuit Induced Draft Crossflow Type Cooling Tower

www.spindle.com.my

NihonSpindle
Leading Eco-Technology

Contents

Nihon SpindleUN Series

Product Overview

- ✓ Open Circuit & Induced Draft
- ✓ Crossflow Technology & Maintenance Friendly
- ✓ Moduler System & Multiple Cell Configuration
- ✓ Gravity Flow & Nozzle Free Water Distribution System
- ✓ High Efficiency Fills with Low Drift Technology
- ✓ Energy Saving* line from as low as 0.0103kW per m^3/hour
- ✓ Design & Manufacturing Standards certified by Japan Cooling Tower Institute (JCI) in accordance to Japan Industrial Standards (JIS)

Note (1): Data based on inlet temperature 37.0°C, outlet temperature 32.0°C and ambient wetbulb temperature 27.0°C as per JCI Standard

A Trusted Global Brand

Nihon Spindle is one of the many accomplished brands acquired by Sumitomo Heavy Industries Limited, which forms part of the largest Japanese *keiretsu* famously known as Sumitomo Group.

Founded in 1918, Nihon Spindle excelled in the field of cooling tower developments for over 50 years and we continue to lead a new field of eco-technologies as a pioneer in high efficiency cooling towers. In-house research & development programs conducted at multiple test facilities in Nihon Spindle plants across Asia Pacific has contributed to the successful creation of a new breed of cooling towes that consume less energy with minimal water losses, the ideal eco-friendly solution for our end user.

A Successful History

1918	Nihon Spindle Manufacturing was founded in Osaka (Japan) as a limited partnership, producing spindles and key components for textile machines
1961	Nihon Spindle Manufacturing commenced full production and distribution of cooling towers
1972	Nihon Spindle Manufacturing developed its first FRP Cold Water Basin
1980	Nihon Spindle Manufacturing developed Low Noise technology in accordance to JCI standards
1983	The first cooling tower sold in Malaysia through Sumitomo Corporation
1985	Nihon Spindle Manufacturing developed Super Low Noise technology in accordance to JCI standards
1986	Distribution and manufacturing rights for UN series cooling towers granted to Linear Group Malaysia
1995	Dalian Spindle Cooling Towers Co. Ltd established in Dalian, China
2007	NS Cooling Towers Sdn Bhd established by Nihon Spindle Manufacturing as its third worldwide manufacturing plant in August as the main support hub for Malaysia and other worldwide markets except China and Japan
2008	Nihon Spindle Manufacturing launched WA & KX series cooling towers, thermal performance rated and certified by CTI
2009	NS Cooling Towers Sdn Bhd renamed to Nihon Spindle Cooling Towers Sdn Bhd in November
2012	Nihon Spindle Manufacturing launched JS series cooling towers, a new line of cooling towers with improved energy efficieny
2013	Nihon Spindle Manufacturing launched KG series cooling towers with premium energy efficiency, thermal performance rated and certified by CTI

Our Dedicated Team

With high-tech manufacturing plants at multiple locations across Asia Pacific, Nihon Spindle carefully deploys its team of expertise to ensure all manufacturing and quality standards are stringently adhered to at all times, both internally within Nihon Spindle plants and externally through its approved vendors for each plant. The highly competent professionals of Nihon Spindle Japan have been specifically appointed to manage important areas including manufacturing and assembly process, engineering and in-house R&D, material procurement, vendor audit, quality assurance and quality control. Working as a team with the local expertise of each plant, we are confidently proud of every Nihon Spindle product delivered worldwide.

Field Proven Quality & Reliability

Nihon Spindle products are certified by Japan Cooling Tower Institute (JCI) in accordance to Japanese Industrial Standards (JIS). These standards are strictly applied over a wide range of areas including product and component design, material selection and manufacturing process, test procedure and methodology, lifecycle and maintenance protocol, water quality standards. Nihon Spindle employs a team of in-house auditors at each plant as part of its quality control to strictly audit each Nihon Spindle plant and its corresponding approved vendors. Our in-house auditors shall ensure all components and supplies are manufactured to Japan Industrial Standards (JIS), subsequently ensuring a longer product lifespan and greater product reliability to our end users.

Research and Development Centre

As a testament to our long term commitment in the field of cooling tower development, Nihon Spindle contributes direct investment into each manufacturing plant across Asia Pacific. Our manufacturing plant in Malaysia include multiple test facilities that function as part of the quality control requirements, as well as to execute long term research and development programs for technological innovations. Our facility includes the first Cooling Tower Thermal Performance Test Platform in Malaysia, designed and built by then CTI tester Mr. Terry Watt in 1996. This test platform combined with a dedicated test office covers a total floor space of 15,000 square feet with digital thermocouple sensors embedded at multiple locations along the piping system, complex array of variable pumps and diesel boilers to simulate specific operating conditions and highly accurate data acquisition sensors such as in-line flow meters, motorized psychrometers and outdoor wind sensors. Other facilities built specifically for in-process quality controls include static fan balancing, dynamic fan balancing, multiple axis vibration test, motor test, basin leak tests etc.

Japan Cooling Tower Institute

The Japan Cooling Tower Institute (JCI) was established in 1963 for the purpose of improving the quality of cooling towers through vast research programs specifically in the field of technical and manufacturing aspects of cooling towers. The institute conveniently serves as a third party independent source to provide non-bias and up-to-date information to the public for over 5 decades.

Established over 50 years ago, the Japan Cooling Tower Institute produced numerous standards and test codes to ensure its participating members deliver the highest quality standards and product performance. Amongst the many publications released, the following standards and codes have been applied to cooling tower manufacturers.

Refrigeration Ton (RT) by the Japan Cooling Tower Institute (JCI)

RT is the standard unit of measurement associated with cooling tower capacity and is defined by the Japan Cooling Institute. 1RT is equivalent to specific heat rejection quantity necessary in order to reduce fluid temperature from 37°C to 32°C at a circulating fluid flowrate of 0.78 cubic meters per hour and ambient wet bulb temperature of 27°C. For more information, please visit *http://www.coolingtower.jp/*

Water Quality Standards by Japan Refrigeration and Air Conditioning Industry Association (JRAIA)

Water is one of the key elements present in all open circuit type cooling towers. This precious element flows through all intended heat transfer surfaces of a cooling tower. In other words, the construction and thermal efficiencies of a cooling tower can be affected in the presence of poor water quality.

The Japan Cooling Tower Institute identified the importance of good water quality and has specified the water quality standards by JRAIA to all its participating members.

For more information on JRAIA standards, please visit *http://www.jraia.or.jp/english/*

1964	Cooling Tower Terminology and Performance Standards for Cooling Towers for Air Conditioning
1966	Standards for Cooling Towers for Air Conditioning
1973	Sound Level Measurement Standards for Cooling Towers
1978	Sound Level Standards for Cooling Towers: Centrifugal Water Chillers-Low-Sound Type
1979	Sound Level Standards for Cooling Towers: Centrifugal Water Chillers-Ultra Low-Sound Type
1981	Seismic Resistance Design and Construction Standards
1984	Daily Checklist and Emergency Checklist for Cooling Towers
1989	Sound Level Standards for Cooling Towers: Double Effect Type Absorption Chillers-Low-Sound and Ultra Low-Sound Types
1991	Sound Level Standards for Cooling Towers: Centrifugal Water Chillers-Low-Sound and Ultra Low-Sound Types Revised Sound Level Standards for Cooling Towers: Double Effect Type Absorption Chillers-Low-Sound and Ultra Low-Sound Types
1994	Criteria and Testing of Corrosion Proof for Cooling Towers against Salty Air
2005	Basic Specifications for Vapor Plume Abatement Cooling Towers Cooling Tower Maintenance and Service Life
2008	Performance Tests for Mechanical Draft Cooling Towers: JIS B 8609
2010	Sound Level Standards for Closed Circuit Cooling Towers Revised Criteria of Corrosion Proof for Cooling Towers against Salty Air Thermal Performance Tests for Mechanical Draft Cooling Towers
2011	Revised Sound Level Standards for Open Circuit Cooling Towers Revised Sound Level Standards for Closed Circuit Cooling Towers

Optional Features

Vibration Isolator

Installed at specific points at the cooling tower base, this option provides an effective way to isolate vibrations generated from the cooling tower. Available at various deflection rates and color coded to the rated load.

Vibration Switch

Design specifically to safeguard the drive system of each cooling tower. In the event of excessive vibrations detected at the motor or fan unit, this option automatically disrupts the power supply to the motor unit and prevents consequential damages to the tower.

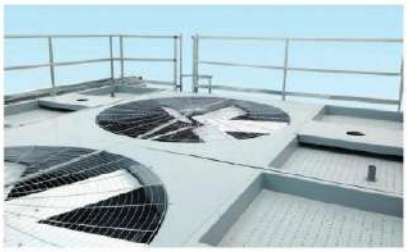
TEFC Motor

Totally Enclosed, Fan Cooled (TEFC) type motors are designed specifically for outdoor operations. Available in IE2 / EFF1 (High Efficiency) and IE3 (Premium Efficiency) rated to IEC 60034-30 & NEMA standards, custom voltage, frequency and ingress protection class.

Rust Protection

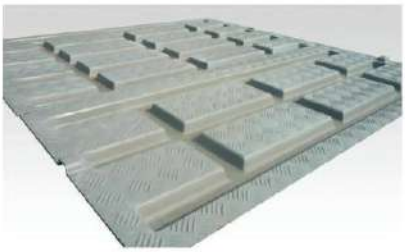
For installations that require additional protection against corrosion, epoxy powder coating can be applied onto the standard hot dipped galvanized steel (HDGS) parts as a secondary protection. Other optional materials include stainless steel 304 and 316 grades.

Safety Railing Set



Complete with hand, knee and toe guards along the upper perimeter, this option provides a safer workspace at high elevation of each cooling tower top deck. This option include caged ladder as added protection to the standard ladders.

Distribution Basin Cover



Constructed entirely of UV retardant Fibreglass Reinforced Polyester (FRP), this option provides excellent protection of the distribution basins against the harmful UV rays in sunlight. The tool-free and removable covers shall withstand up to a maximum load of 180kg/m2.

Extended Discharge Hood

This option provides an excellent and cost effective way to divert the discharge air wherever necessary. Constructed entirely of UV retardant Fibreglass Reinforced Polyester (FRP), this option is designed specifically for Nihon Spindle fan cylinders. Available at multiple height options, straight type or elbow type.

Direct Drive System

Direct drive systems are recommended for cooling towers subject to extended operational hours. This option delivers the best reliability and minimal downtime. This option provides direct coupling of motor shaft to the fan hub. In addition, motors are upgraded to Totally Enclosed, Air Over (TEAO) type.

Other

For a complete list of optional features, kindly contact your local representatives for further details.

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Technical Specification: High Performance and JCI Certificated Low Noise

New Model	Old Model	FAN (mm)		Dimension (mm)					Motor	
		cell	dia	Width	Length	Body	Height	Fan	kw	pole
UNHL R2BU1	CTA 100UN	1	1,300	1,500	3,560	2,075	3,285	550	2.2	4P
UNHL R2CU1	CTA 125UN	1	1,300	1,500	3,560	2,075	3,285	550	3.7	4P
UNHL S2CU1	CTA 150UN	1	1,500	1,800	3,760	2,075	3,285	550	3.7	4P
UNHL S2DU1	CTA 175UN	1	1,500	1,800	3,760	2,075	3,285	550	5.5	4P
UNHL M2DU1	CTA 200UN	1	1,700	2,100	3,960	2,075	3,605	870	5.5	4P
UNHL L2DU1	CTA 225UN	1	2,000	2,450	4,260	2,075	3,655	920	5.5	4P
UNHL L2EU1	CTA 250UN	1	2,000	2,450	4,260	2,075	3,655	920	7.5	4P
UNHL L2FU1	CTA 280UNS	1	2,000	2,450	4,260	2,075	3,655	920	11	4P
UNHL L3FU1	CTA 322UNS	1	2,000	2,450	4,260	3,110	4,690	920	11	4P
UNHL S2CU2	CTA 300UN	2	1,500	3,550	3,760	2,075	3,285	550	3.7	4P
UNHL S2DU2	CTA 350UN	2	1,500	3,550	3,760	2,075	3,285	550	5.5	4P
UNHL M2DU2	CTA 400UN	2	1,700	4,150	3,960	2,075	3,605	870	5.5	4P
UNHL L2DU2	CTA 450UN	2	2,000	4,850	4,260	2,075	3,655	920	5.5	4P
UNHL L2EU2	CTA 500UN	2	2,000	4,850	4,260	2,075	3,655	920	7.5	4P
UNHL L2FU2	CTA 560UNS	2	2,000	4,850	4,260	2,075	3,655	920	11	4P
UNHL L3FU2	CTA 644UNS	2	2,000	4,850	4,260	3,110	4,690	920	11	4P
UNHL M2DU3	CTA 600UN	3	1,700	6,200	3,960	2,075	3,605	870	5.5	4P
UNHL L2DU3	CTA 700UN	3	2,000	7,250	4,260	2,075	3,655	920	5.5	4P
UNHL L2FU3	CTA 840UNS	3	2,000	7,250	4,260	2,075	3,655	920	11	4P
UNHL L3FU3	CTA 966UNS	3	2,000	7,250	4,260	3,110	4,690	920	11	4P
UNHL M2DU4	CTA 800UN	4	1,700	8,250	3,960	2,075	3,605	870	5.5	4P
UNHL L2DU4	CTA 900UN	4	2,000	9,650	4,260	2,075	3,655	920	5.5	4P
UNHL L2EU4	CTA 1000UN	4	2,000	9,650	4,260	2,075	3,655	920	7.5	4P
UNHL L2FU4	CTA 1120UNS	4	2,000	9,650	4,260	2,075	3,655	920	11	4P
UNHL L3FU4	CTA 1288UNS	4	2,000	9,650	4,260	3,110	4,690	920	11.0	4P

Note (1): others Multiple cell configurations available but not listed

Note (2): more Piping details refer to submitted layout drawings

Aerofoil Axial Flow Type Fan:
FRP Blade for Selected UNHL Series

Internal Maintenance Walkway:
(Optional Items)

Air Seal with Scattering Bar:
Improve overall performance

Technical Specification: Standard Space Saving

New Model	Old Model	FAN (mm)		Dimension (mm)					Motor	
		cell	dia	Width	Length	Body	Height	Fan	kw	pole
UNHN R2BB1	CTA 100UN	1	1,300	1,500	3,560	2,075	3,285	550	2.2	4P
UNHN R2CB1	CTA 125UN	1	1,300	1,500	3,560	2,075	3,285	550	3.7	4P
UNHN S2CB1	CTA 150UN	1	1,500	1,800	3,760	2,075	3,285	550	3.7	4P
UNHN S2DB1	CTA 175UN	1	1,500	1,800	3,760	2,075	3,285	550	5.5	4P
UNHN M2DB1	CTA 200UN	1	1,700	2,100	3,960	2,075	3,385	650	5.5	4P
UNHN L2DB1	CTA 225UN	1	2,000	2,450	4,260	2,075	3,375	640	5.5	4P
UNHN L2EB1	CTA 250UN	1	2,000	2,450	4,260	2,075	3,375	640	7.5	4P
UNHN L2FB1	CTA 280UNS	1	2,000	2,450	4,260	2,075	3,655	920	11	4P
UNHN L3FB1	CTA 322UNS	1	2,000	2,450	4,260	3,110	4,690	920	11	4P
UNHN S2CB2	CTA 300UN	2	1,500	3,550	3,760	2,075	3,285	550	3.7	4P
UNHN S2DB2	CTA 350UN	2	1,500	3,550	3,760	2,075	3,285	550	5.5	4P
UNHN M2DB2	CTA 400UN	2	1,700	4,150	3,960	2,075	3,385	650	5.5	4P
UNHN L2DB2	CTA 450UN	2	2,000	4,850	4,260	2,075	3,375	640	5.5	4P
UNHN L2EB2	CTA 500UN	2	2,000	4,850	4,260	2,075	3,375	640	7.5	4P
UNHN L2FB2	CTA 560UNS	2	2,000	4,850	4,260	2,075	3,655	920	11	4P
UNHN L3FB2	CTA 644UNS	2	2,000	4,850	4,260	3,110	4,690	920	11	4P
UNHN M2DB3	CTA 600UN	3	1,700	6,200	3,960	2,075	3,385	650	5.5	4P
UNHN L2DB3	CTA 700UN	3	2,000	7,250	4,260	2,075	3,375	640	5,5	4P
UNHN L2FB3	CTA 840UNS	3	2,000	7,250	4,260	2,075	3,655	920	11	4P
UNHN L3FB3	CTA 966UNS	3	2,000	7,250	4,260	3,110	4,690	920	11	4P
UNHN M2DB4	CTA 800UN	4	1,700	8,250	3,960	2,075	3,385	650	5.5	4P
UNHN L2DB4	CTA 900UN	4	2,000	9,650	4,260	2,075	3,375	640	5.5	4P
UNHN L2EB4	CTA 1000UN	4	2,000	9,650	4,260	2,075	3,375	640	7.5	4P
UNHN L2FB4	CTA 1120UNS	4	2,000	9,650	4,260	2,075	3,655	920	11	4P
UNHN L3FB4	CTA 1288UNS	4	2,000	9,650	4,260	3,110	4,690	920	11.0	4P

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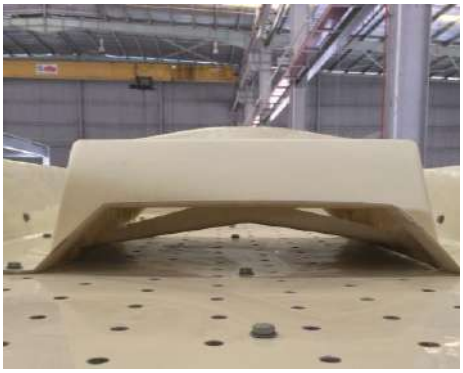
Aerofoil Axial Flow Type Fan:
FRP Blade for Selected UNHN Series



Distribution Header with Internal Pan

Galvanised Bearing Box Assembly

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Engineering Specification

Operating Conditions

Each cooling tower is manufactured to cool _____ liters per second of circulating water (flowrate) from _____ °C entering water temperature (hot water) to _____ °C leaving water temperature (cold water) at _____ °C entering ambient wet bulb temperature. The cooling towers are guaranteed to perform under the specified conditions without modification

Structure

The cooling tower structure shall be constructed from hot dipped zinc galvanized steel (HDGS). All galvanizing process shall be carried out in accordance to ISO1461:1999 standards. The cooling tower casing shall be constructed from FRP (UV-retardant Fiberglass Reinforced Polyester).

Cold Water Basin

The cold water basin shall be single-piece construction and made entirely from UV retardant Fibreglass Reinforced Polyester (FRP). The cold water basin shall contain sloping profile and equipped with a drain outlet for ease of cleaning.

Drive System

The drive system shall comprise of pulleys and V-belts. V-belts shall be fabric-impregnated and tensioned according to manufacturer recommendations.

Fills

Constructed entirely from UV-treated polyvinyl chloride (UPVC) and thermo-vacumm formed patented intricate patterns shall facilitate for an even spread of water over the heat transfer surface with cross flow induced draft of air. Drift eliminators and water stoppers shall be an integral part of the film type fills. Fills shall be bonded by adhesives into block forms according to manufacturer recommendations.

Motor

Fan motor shall be of totally enclosed, fan cooled (TEFC) type capable of withstanding up to IP55 and Class F insulation, designed specifically for cooling tower service. Motor shall be located adjacent to the fan cylinder for ease of maintenance and installed externally away from the moist discharge air stream.

Mechanical Skid

The mechanical skid shall be constructed of hot dipped zinc galvanized steel (HDGS) and bolted directly on top of the fan cylinder. Hot dipped zinc galvanised steel (HDGS) fan guard shall be installed onto the mechanical skid for added protection to the fan unit. Lubrication lines shall be extended from fan bearing assembly an external location away from the fan cylinder to facilitate for top-up of grease.

Water Distribution System

The hot water distribution shall be of open gravity flow and basin shall be constructed from UV retardant Fiberglass Reinforced Polyester (FRP) without spray nozzles or grommets. Complex arrays of distribution holes shall evenly sprinkle water under natural gravity flow. U-channel bars shall be installed beneath each basin to facilitate the scattering effects of water evenly onto the fill section.

Fan Section

Fans shall be axial flow type with aerofoil fan blades designed to provide the necessary airflow for heat transfer. Fan blades shall be of aluminium or FRP material, balanced and pitched. The fan shall operate inside a fan cylinder, which provides a streamlined air entry and minimum tip clearance for maximum fan efficiency.

Access

Access door constructed of UV retardant Fiberglass Reinforced Polyester (FRP) shall facilitate instant and tool-free entry into the inner sections of the cooling tower for inspection and maintenance works. A maintenance walkway constructed of hot dipped zinc galvanized steel (HDGS) shall be installed above the cold water basin and water level, this walkway shall span between end walls inside the cooling tower. External access ladder constructed of hot dipped zinc galvanized steel (HDGS) shall be installed on the cooling tower exterior to facilitate direct access to the top deck section.

SAFETY PRECAUTIONS MUST BE PRACTICED AT ALL TIMES TO AVOID ACCIDENTS & DAMAGES

Operation, Maintenance and Repair of this equipment must only be executed by qualified personnel
WARRANTY: refer to *Certificate of Warranty* for complete details

NihonSpindle

WARRANTY

Certificate of Warranty

Warranties: Seller warrants that the equipment products sold under this contract shall be free of defects in material and workmanship for a period of a twelve (12) months from the date of equipment startup or eighteen (18) months from the date of shipment, or whichever occurs first. Replacement parts provided by seller under its original equipment warranty obligations are warranted against defects in material and workmanship for a period of twelve (12) months from the date of shipment or until expiration of their original warranty, or whichever is the first to occur. Parts purchased after expiration are warranted against defects in material and workmanship for a period of twelve (12) months from dates of shipment. Written notice of any defects shall be given to Seller immediately upon discovery by Buyer, and shall fully describe the claim defect. Defective parts shall be repaired or replace F.O.B. point of shipment, not provided that inspection by Seller verities the claimed defect (s). This shall be the Buyer's exclusive remedy.

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Since 1918

This warranty does not cover the cost of removing, shipping or reinstalling the equipment. Repairs made without the prior written approval of Seller shall be void all warranties covering material and workmanship. Any descriptions of the product (s) in the contract are for the sole purpose of identification and do not constitute a warranty. In the interest of product improvement, Seller reserves the right to change specification and product design without incurring any liability therefore. The foregoing express warranties or those set forth elsewhere on this document are the only warranties of Seller applicable to the product (s) sold under contract. Seller's warranties do not apply to defects in product (s) for which payment in full has not been received by Seller, and said warranties do not cover normal wear and tear or the erosion, corrosion and / or deterioration of the product (s) from unusual causes. No warranties by Seller shall apply to accessories manufactured by others, in as much as they warranted separately by their respective manufacturers, except as stated above. Buyers assumes liability for and shall bear the costs of compliance with all laws, regulation, codes, standards or ordinances applicable to the location, operation and maintenance of the product (s) and air-conditioning system duct intakes, etc. no representative or agent of Seller is authorized to enlarge upon the express warranties of seller.

Liability / Indemnification: Seller shall not be liable for any damages caused by delay in delivery of the products. Buyer shall not hold harmless and indemnify against Seller from and against all liability, claim losses, damages and expenses (including attorney's fees) for personal injury and property damage arising out of Buyer's improper unloading, handling or use of the product subject to this order, and for Buyer's infringement of another's property rights. The Seller maximum liability from any causes whatsoever, whether in breach of contract, tort (including negligence), strict liability, or otherwise, shall not exceed the contract price. Neither Buyer or Seller shall in any event be liable to the other, whether such liability arises out of breach of contract, tort (including negligence) strict liability or any other cause or form of action, for any consequential, special, indirect or incidental damages, including but not limited to loss of actual or anticipated profits or loss of use arising out of this contract, other than such damages resulting from the willful misconduct of Buyer or Seller.

95th Anniversary
Since 1918

NihonSpindle

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