

Hoja de Datos
Torres de Refrigeración

Nº units required:	2
Item Nº:	EJ-E01/2/3/4A/B
Service:	EJ System. Engineered Safeguards Service Water Cooling Tower.

DESIGN DATA (per unit)	DESIGN CONDITIONS	Type of Cooling Tower	Mechanical induced draught cells			
		Type of Water	See Water Quality			
		DESIGN SCENARIOS (See Note 1)		LOCA	NORMAL SHUTDOWN	NORMAL OPERATION
		Cooling Duty:	MW	42.00	43.52	23.66
		Design Water Flow Rate (Inlet):	gpm (m³/h)	11400 (2590)	15058 (3420)	15058 (3420)
		Maximum Water Flow Rate (Inlet):	gpm (m³/h)	15058 (3420) (See Note 2)		
		Abnormal Water Flow Rate (Inlet) (See Note 3)	gpm (m³/h)	10300 (2340)	-	-
		Water Temperature (Inlet):	°F (°C)	(47.2)	(48.4)	(32.5)
		Water Temperature (outlet):	°F (°C)	(33.3)	(27.5)	(26.6)
		Wet Bulb Temperature (Design):	°F (°C)	+86.0 (30.0)	+76.1 (24.5)	+76.1 (24.5)
		Dry Bulb Temperature (Design):	°F (°C)	+88.7 (31.5)	+81.0 (27.2)	+81.0 (27.2)
		Number of FANS / CELLS		3/4	4/4	4/4
	Design Wind Speed	m/s	56.7 m/s			
	PERFORMANCE	Min. Water Flow	m³/h	2590 with 4 cells in operation		
		Evaporation Loss (Max.)	%	0.89 (normal operation)		
		Drift Loss (Max.)	%	0.01		
		Blow-down Flow	m³/h	15		
		Make-up Water Flow	m³/h	46		
		Make-up Water Temperature	°C	By others		
		Inlet Water Pressure (at level of inlet nozzles)	w.c.m.	0.75	1.25	1.25
Noise Level		dB (A)	< 85 (1 m)			

CONSTRUCTION DATA (per unit)	GENERAL	Number of Cells	unit	2x2 (4 in normal operation)				
		Layout / Type of Ventilation		Back-to-back	Induced draught			
		Cell Dimensions: Length / Width	m	Cell array must fit into a single area of 22 m x 24 m				
		Overall Tower Dimensions: Length / Width / Height	m	24.0	22.0	9.8		
		Height Basin Curb to Fan Deck	m	8.0				
		Height of Fan Cilinder	m	1.8				
		COMPONENTS	Water Distrib. (Note 4)	Riser pipe		Out of scope		
	Riser connection: Diameter / Type			inches /	14"	ANSI B16.5 flange, 150#, RF		
	Type / Rating				External Flume			
	Distribution tubes: Diameter / Flange type ★			Inches /	6" Sch 10s	DIN 2576-C PN10		
	Sprays: Manufacturer / Type / Model							
	Sprays: Number		unit	480				
	Filling		Manufacturer / Type / Model					
			Number of layers	unit	3			
			Spacing: Horizontal / Vertical	mm	20			
			Life time	years	15			
	Drift Elimin.	Support type		Concrete beams				
		Manufacturer / Type / Model						
		Number of layers	unit	1				
	FAN	Support type		Concrete beams				
		Number of Fans per Cell	unit	1				
		Total Number of Fans	unit	4				
		Manufacturer / Type / Model						
		Impeller Diameter	mm	6706				
		Number of Blades per Fan	unit	4				
		Fan RPM	rpm	148				
		Blade Tip Speed, Maximum / Actual	m/s	61 / 52				
Power		kW	34.3					
Design Capacity per Fan		m³/s	215.4					
Adjustable Pitch Device			Manual adjustment at standstill, if required					
Reversible			No					
Static Pressure / Total Pressure	Pa	102.2 / 122.5						

WATER QUALITY	Fluid:	--	Osmotized Water		
	Basic Chemistry:		Initial	Extreme (*)	
	pH:	--	7.3 - 9.7	8.0 - 8.5	
	Alkalinity:	ppm CaCO ₃	14 - 30	x5 Minimum	

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	Conductivity:	µS/cm	65 – 175
	Chloride Content:	ppm	7 - 38
	Calcium Content:	ppm	2 - 7

(*) Worst Case scenario, corresponding to 30 days after LOCA. Basin gradually concentrates until "Extreme" is reached (day 30).

NOZZLES (per unit)	ITEM	Description	QTY.	DN (")	Schedule	Rating	Fitting
		Water Inlet	4	14	STD	150#	Flange
		Water Outlet	By others				
		Overflow	By others				
		Drain / Purge	By others				
		Make - Up	By others				

MOTOR (Note 6)	Manufacturer / Type			
	AC Motor: U (V) / f (Hz) / rpm / Nom. Power (kW)	380	50	1500
	Insulation class / Temperature rise class	H		B
	Protection Type	IP 55		
	Motor Position	Horizontal		
	Accessories	Motor heaters for moisture protection, wired to terminal box.		

REDUCTION GEAR	Manufacturer / Type / Model			
	Min. Service Factor (AGMA)	2.0		
	Reduction Factor	10		
	Minimum B-10 Bearing Life	100.000 hours		
	Recommended Lubricant	HP220 (CEPSA)		
	Gear Position	Horizontal		
	Accessories	Vibration transmitter in reduction gear baseplate		

	Component	Material	Material Certification
MATERIALS	Structure	Reinforced concrete (by others)	---
	Fan Roof	Reinforced concrete (by others)	---
	Basin	Reinforced concrete (by others)	---
	Filling and Drift Eliminators/Supports	Reinforced concrete (by others)	---
	Walkways, Ladders and Handrails	Hot dip galvanized carbon steel	CoC
	Filling	PVC	3.1 Certification according to EN-10204.
	Drift Eliminators	PVC / PP	3.1 Certification according to EN-10204.
	Water Distributor System		
	Riser connecting fitting: Tube /Sup.Ring Reduction / Flange	SA-106 Gr.B / SA-516 Gr70 SA-234 WPB / SA-105	CMTR (Certificate Material Test Report) acc/ ASME III
	Piping	SA-312 Tp AISI 316L	CMTR acc/ ASME III
	Supports: Plate / Stud	SA-240 Tp 316L / SA-453 Gr.660	CMTR acc/ ASME III
	Sprays / Nozzles	ULTRADUR B 4306 G 4 / PP	Certification acc/ NF L 00-015C
	Fan Blades	GRP	Glass Fiber: 2.1 acc/ EN-10204 Polyester Resin: Test certificate
	Fan Coupling	Hot dip galvanized carbon steel	3.1 Certification according to EN-10204.
	Fan Shell	GRP	Glass Fiber: 2.1 acc/ EN-10204 Polyester Resin: Test certificate
	Coupling Shaft		
	Spacer pipe	Composite CFK	3.1 Certification according to EN-10204.
	Flange hub	1.4305 (AISI 303)	3.1 Certification according to EN-10204.
Mechanical Drive Baseplates	Hot dip galvanized carbon steel	3.1 Certification according to EN-10204.	
Bolts and Nuts			
Safety related	SA-193 B8 / SA-194 8M	3.1 Certification according to EN-10204.	
Non safety related:	TBD by supplier	CoC	
PAINTING & LINING	Motor:	Reliance Electric Standard Priming Paint Specification (4824-7-B) Reliance Electric Standard Finish Paint Specification (4824-7-K) (Finish Paint Specification 4824-3 APX, two component epoxy) Additional layer To Be Defined by manufacturer	
	Reduction Gear	Hansen E4 Painting System plus Polyurethane additional finish layer (50 µm)	
	Fan: Coupling	Inmetusa Instruction Nr. 99115 Rev.0	
	Water Distributor System	None	

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Riser connecting fitting	General compliance with SPRING-ANAV spec; EU-03/15, briefly described as follows: - 1 x 65 µm priming epoxy layer (UNE-48271) - 1 x 90 µm intermediate epoxy layer (UNE-48272) - 2x 35-40 µm finish layer (UNE-48274)
Coupling Shaft:	None
Reduction Gear Baseplate	General compliance with SPRING-ANAV spec; ZE-01/20, briefly described as follows: - 1 x 85 µm zinc coating (Hot dip galvanized) - 1 x 30-35 µm priming epoxy layer - 1x 80-85 µm finish layer
Walkways, Ladders and Handrails	None
Other:	Without particular requirements
<i>Testing:</i>	- Thickness testing (see SPRING-ANAV for specific details). - Adhesion testing, according to ASTM D-1002 or UNE-EN ISO 4624
<i>Certifications:</i>	ASTM D3911 certification is valued but not mandatory.

CODES	Mechanical design, Material, Fabrication, Examination and Testing	CTI, Cooling Tower Institute Standards and Codes ASME, Section III, Class 3 (2001 edition and 2003 Addendas)
	Electrical design, Material, Fabrication, Examination and Testing	IEEE (Class 1E), IEC
	Stamps	Incorporation Certificate According to 98/37/EC

ENVIRONMENTAL & SAFETY DATA	Location:	Outdoor	Active / Passive Safety:	Active			
	Temperature:	From +0.6 to +31.1°C (See Note 7)	Quality Group (RG 1.26):	C			
	Relative Humidity:	From 40 to 95%	Safety Class:	3			
	Special conditions:	Outdoor service implies mild maritime environment (200 m from coastline)	Seismic Category (RG 1.29):	1			
	Accumulated Radiation:	<table border="1" style="width: 100%;"> <tr> <td style="text-align: center;"><u>Accidental</u></td> <td style="text-align: center;">740 rad</td> </tr> <tr> <td style="text-align: center;"><u>40 years dose</u></td> <td style="text-align: center;">180 rad</td> </tr> </table>	<u>Accidental</u>	740 rad	<u>40 years dose</u>	180 rad	Response spectra:
<u>Accidental</u>	740 rad						
<u>40 years dose</u>	180 rad						

TESTS	Performance Test	According to CTI standard ATC-105
	Penetrant liquids / X-rays / Hydrostatic	According to ASME III ND-6000, where required

Notes:

- (1) The tower will be designed for the most restrictive of these scenarios. The supplier will give the Cooling Tower Performance Curves of the tower (cold water temperature vs. wet bulb temperature) as a function of the number of operating cells (from none to maximum).
- (2) The supplier must guarantee that the tower is able to ensure the cooling duty for the 3 scenarios with the maximum water flow rate.
- (3) In abnormal flow conditions, the cooling power should be as close as possible to nominal cooling duty. The supplier will give the expected cooling power (cold water temperature) with this reduced flow.
- (4) Water distributors must be independent for each cell.
- (5) Maximum consumption of electrical power must be below 165 kW during LOCA scenario operation (stand-by cell does not add up to power consumption).
- (6) For further details see the corresponding electric motor data sheet.
- (7) The equipment must be prepared to operate from -2.0 to +41.0 °C (dry bulb).
- (8) Indicates modification in relation to previous revision.