

PROJECT: YAZD SOLAR THERMAL POWER PLANT

Cooling Water System - Data Sheet

IN-HOUSE REVISIONS								DOCUMENT REVISIONS							
D								D							
C								C							
B								B	Acc. to MAPNA Letter No. 2204/151	Dehghan	05.07.2008	Rahnavard	05.07.2008	Sarjami	05.07.2008
A								A	Acc. to MAPNA Letter No. 2204-2134	Dehghan	02.03.2008	Rahnavard	02.03.2008	Sarjami	02.03.2008
0	First Issue	Dehghan	24.10.2007	Rahnavard	24.10.2007	Sarjami	24.10.2007	0	First Issue	Dehghan	24.10.2007	Rahnavard	24.10.2007	Sarjami	24.10.2007
Rev.	DESCRIPTION	PREP.	DATE	CHKD.	DATE	APPR.	DATE	Rev.	DESCRIPTION	PREP.	DATE	CHKD.	DATE	APPR.	DATE



Owner's Doc. No. : MP-YST-G1-08-VE0-456

Rev. B

MAPNA's Doc. No. : CCP/YZ-00/MC-G-11-PA0-356

Rev. B

Contract No.:

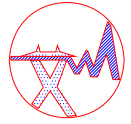
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TUGA NO.: YZ-DS-01-9Y000-A-356

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Page No.	Revisions							Remarks	Page No.	Revisions							Remarks	
	0	A	B	C	D	E	F			G	0	A	B	C	D	E		F
1	*								59	*								
2	*								60	*								
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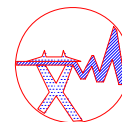
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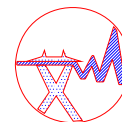
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INDEX

1.	Reference Document:	4
2.	Site Design Data Sheet	4
3.	Cooling Water Composition	4
4.	Air Cooler Data Sheet	5
5.	Pump Data Sheet	7
6.	Fan	10
6.1	Fan Data Sheet	10
6.2	Fan Motor Data Sheet	11
7.	Closed Cooling Water (C.C.W.) Expansion Tank Data Sheet	12
8.	Closed Cooling Water (C.C.W.) Instruments Data Sheet	14



1. Reference Document:

Generator and Lube Oil Cooling System - P & ID
 CCP/YZ-00/MC-I-02-PA3-364/ MP-YST-I1-02-VE0-464

Generator and Lube Oil Cooling System - System Description
 CCP/YZ-00/MC-I-04-PA3-364 / MP-YST-I1-04-VE0-464

2. Site design data

Design Condition	Value
Temp. abs. Max (°C)	45.6
Temp. abs. Min (°C)	-16
Temp. Design Value (Average Yearly) (°C)	19
Design Value Relative Humidity	32
Wind Velocity at 10 m Height for Process Design (m/sec)	3
Site Altitude (m)	1230
Wind Velocity Structural Design (Km/hr)	110
Design Seismic Horizontal Ground Acceleration (g)	0.25
Snow Load (Kg/m ²)	150
Minimum Live Load for Flat Roof	150

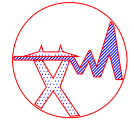
3. Cooling Water Composition

The following composition as to be considered for the cooling water:

PH average Value:	7 +/- 0.5
Conductibility:	0.2 micro S/cm
Silica (Si):	0.02 ppm
Sodium (Na):	0.015 ppm (maximum)

In addition will be added:

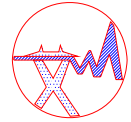
30% Ethylene Glycol in weight during the operation.



4. Air Cooler Data Sheet

Customer / Purch.	MAPNA / TUGA		Item no.:	AE101 A/B	
plant location	YAZD				
Service	Water Cooler		No. Units:	2	
plot size(W,L) [m]	12.3 X 12.5		DRAFT	FORCED	
Surface / unit-Finned	16626	[m2]	Bare Tube	716	[m2]
Heat exchanged	2131	[KW]	MTD	5	[C]
Transf. rate-finned	25.65	[W/m2 ,k]	Bare Tube (C/D)	694.89/ 595.64	[W/m2k]
PRODUCT SIDE					
Fluid Name	DEMIN WATER +30% GL		IN	OUT	
	IN	OUT	Density (Liq)	0.990	0.990 [kg/m3]
Total Fluid [kg/h]	410000		Density (vap)		[kg/m3]
Temperature [C]	55.5	51	Spec.Heat (Liq)	4.100	4.080 [kJ/kg. k]
Vapor [kg/h]			Spec.Heat (vap)		[kJ/kg. k]
Liquid [kg/h]	410000	410000	Conduct. (Liq)	0.6450	0.641 [W/m. k]
N condensed [kgh]			Conduct. (vap)		[W/m. k]
Steam [kg/h]			Viscosity (Liq)	0.5050	0.539 [cp]
Water [kg/h]			Viscosity (Vap)		[cp]
Inlet pressure [bara]	3				
Fouling resist.[m2.k/w]	0.0002		Allo/Calc. Press.Drop	0.8/ 0.147	[bar]
AIR SIDE					
AirQuantity, Total	359.4	[m3/s]	Face Velocity:	2.5	[m/s]
AirQuant./Fan(act)	149.9	[m3/s]	Altit. / Min. Des.Amb.:	1230/ -16	[m]/[C]
Static pressure	92	[Pa]	Temp.In / Out :	45.6/ 50.5	[C]
DESIGN					
Design pressure	6	[Barg]	Code Requirements	ASME VIII DIV.1 ; API 661	
Design temperature	90	[C]	TUBE		
Test pressure	7.8	[Barg]	Material	A 179	
BAY width [m]	5.95		Outside Diameter	25.4	[mm]
Bundle Size	2.95 X12.5		Wall Thickness	2.108	[mm]
N .Bay	2		N ./Bundle	184	
N .Bundles / Bay	2		Length	12.192	[m]
N .Tube Rows	4		Pitch	63.5	[mm]
N .Passes	2		FIN		
Tube slope	0%		Type	Embedded	
HEADER			Material	ALUMINIUM	
Type	COVER		Outside Diameter	57.15	[mm]
Material	CARBON STEEL		Stock Thick.	0.35	[mm]
Header Design / SPLIT	D TYPE	NO	FPI	11	
Header tube sheet Material	A 516 GR. 60		MISCELLANEOUS		
Tube / flange Velocity	0.89 m/s / 0.785 kg/ m s2		Structural Mounting	STD	
Bolt / gasket material	A193 GRB7/Synthetic Rubber		Bundle Frame	H.D.G	
Corrosion Allowance	3		Louvers	NO	
Qty / Size nozzle IN/OUT	1X6" / 1X6"		Vibration switches	YES EXPLOSION PROOF	
Rating & Facing	150	RF	Steam Coil	NO	
TL/PI	YES/YES		Recirculation System	NO	
WALKWAY/LADDER	YES/YES		Tube / Tubesheet Connection.	EXPANDED	

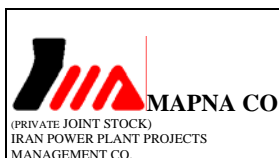
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		MECH. EQUIPMENT	
FAN		ELECTRIC MOTOR	
N ./Bay	2	N ./Bay	2
N autovariable/bay	0%	KW / Driver	37
rev / min	260	rev / min	1500
Diameter	14 FT	Enclosure	TEFC
N . Blades	4	Volt, Phase, Cycle	400/3/50
Material, Blade	ALUMINUM	SPEED REDUCER	
Material, Hub	Galvanized Carbon Steel	Type	TOOTHED BELT
KW / Fan, Absorb.	26.9	N .Bay	2
		Service Factor	1.8
SPL@ 1m beside. fan	<85 [dB(A)]	Ratio	5.23

Notes:

- | |
|---|
| 1) Aban Air cooler Co. confirm that the air cooler has been designed for 3 fan running + 1 fan stand by |
| 2) 33% OVER DESIGN HAS BEEN CONSIDERED ON SURFACE FOR 4 BUNDLES |



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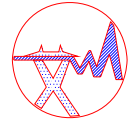
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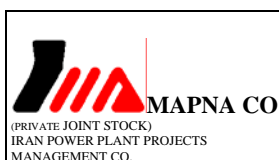
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5. Pump Data Sheet

GENERAL DATA				
Centrifugal Pump	Identification Code: 12/22 MPR11&12 AP	Quantity:	4	
		Function Description: Closed Cooling Water Pump		
Good Class: JB	Order No.	Supplier DICKOW PUMPEN KG		
No. of Unit Services/Stand By: 1/1(Each Unit)		Operations: Continuous		
Type: Horizontal	Supplier Model : DICKOW NCLis 200/320			
Performance Curve: According to Catalogue	Environmental Condition: Dusty. -22.8/+36.5 , 27/92%			
Installation : Horizontal	Applicable Standard: H.I/IS/ISO/Din			
Pumps To Operate In:				
OPERATING DATA				
Pumped Fluid: DemiWater+30 % Glycol		Operating Conditions: Design		
Temperature: [DEG]	49.9	Density: [Kg/m ³]	990	
Viscosity: [m ² /Sec]	0.55	Flow Rate: [m ³ /h]	410	
Head: [m]	28	Suction Pressure: [bar]	1.06	
Discharge Pressure: [bar]	3.77	NPSH Available at Floor Level: [m]	2.8	
NPSH Required at Floor Level: [m]	2	Efficiency: [%]	%75	
Absorbed Power: [Kw]	41.6			
Speed: [RPM]	1450			
Piping Inlet Class:	AA	Piping Outlet Class:	AA	
Piping Size Inlet: [mm]	300	Piping Size Outlet: [mm]	According to Catalogue	
NOZZLE	SIZE	RATING	CONNECTION	POSITION
Suction	10 [inch]	ANSI 150	Flanged RF.	End
Discharge	10 [inch]	ANSI 150	Flanged RF.	Top
MOTOR				
Motor Supply By:	Power: [Kw] 55	Speed: [RPM] 1450	Tyep: 250M	
Manufacturer:	Voltage: [V] 380~400	Frequency: [Hz] 50	Phases: 3	



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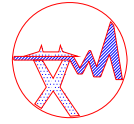
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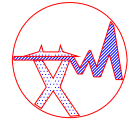
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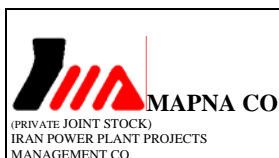
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CONSTRUCTION DATA				
Casing Mounting:	Foot	Casing Split:	Radial	
Impeller Type:	Closed	Stage No.:	1	
Impeller Dia./Rated: 310	Max. 330 Min. 270	Casing Type:	Single Volute	
Double Suction:	---	Rotation(View From Motor Side)	C.C.W.	
PD2:	---	Suction Design Pressure: [barg]		
Suction Design Temperature: [DEG]	80	Discharge Design Pressure: [barg]		
Discharge Design Temperature: [DEG]	80	Pump with bare shaft weight: [kg]	310	
Total Weight (Complete Unit) [Kg]	~1000			
Shaft Seal Type:	Mechanical	Manufacture/Model:	Dickow N6i	
Coupling Type:	Flexible with Spacer	Manufacture/Model:	FLENDER / H160/180	
Radial Bearing Type:	Ball	Thrust Bearing Type:	Ball	
COOLING				
Cooling Water	Flow[m ³]	Temperature[°C]	Pressure[bar]	Pressure Drop[bar]
Seal Cooling	---	---	---	---
Seal Sealing	---	---	---	---
Bearings	---	---	---	---
LUBRICATION				
Lubrication	Type	Flow[m ³ /s]	Pressure[bar]	
Radial Bearing	FDA H1	---	---	
Thrust Bearing	---	---	---	
Note: Electro motors are equipped with Space Heater				



GENERAL DATA			
MOTORS	Identification Code: 12/22 MPR11&12 AP001	Quantity:	4
	Function Description: Close Cooling Water Pumps Motors	Weight: [Kg]	
Good Class: OA	Order No.:	Supplier: DICKOW PUMPEN KG	
Manufacturer:		DICKOW PUMPEN KG	
FUNCTIONAL DATA			
Applicable Standard: IS/IEC/NEMA		Rated Standard: [KV]	400
Rated Power: [KW]	55	Frequency: [HZ]	50
Driven Machine Absorbed Power: [KW]		55	
R.P.M.: [G/1]	1450		
Standard Current: [PU]		---	
Insulation Class:	F	No. of Start in Cold Condition:	5
No. of Start in Hot Condition	3	Service Type(see note):	CS
Standard Torque: [PU]		---	
Thermal Constant: [Sec.]		---	
Driven Machine Type: Centrifugal Pump		Driven Machine Standard Torque Diagram No.: ---	
Starting Time(at rated condition): [Sec]		Minimum Starting Voltage: [KV]	
ENVIROMENTAL AND CONSTRUCTIONAL DATA			
Altitude A.S.I.: [m]		+1313	
Reference Temperature: [°C]		36.5	
Motor Size:		250	
Degree of Protection(IEC 34-7):		IP 55	
Terminal Box Degree of Protection(IEC 34-7):		IP55	
Cooling Type(IEC 34-7):		TEFC	
Water Flow: [m ³ /h]		---	
Water Temperature: [°C]		---	
Dimensions (L*W*H): [mm]		---	
Noise Level: [dB(A)]		---	
Vibration:		---	
Rotation (Viewed D.E.):		C.W.	
Coupling Type:		Flexible	
Axial Trust:		---	
Painting RAL:		---	
Bearing Type		heavy duty	
Bearing Lubrication Grease:		Yes	
Oil Pressure: [bar]		---	
Consumption: [l/m]		---	
AUXILIARY EQUIPMENTS			
RTD			
Winding No.		Type:	
CT'S			
No.		Ratio	
		Burden	
		Class	
No.		Ratio	
		Burden	
		Class	
Water Flow Switch:		Dial Thermometers:	
		Leakage Water Detection:	
Note: Electro motors are equipped with SPACE HEATER			
DS: Discontinuous SEL-CS: Continuous SEF-SS: Standard by SERV-IS: Intermittent Service Other Characteristic in the Technical Specification.			



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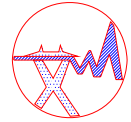
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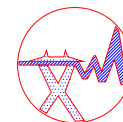
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6. Fan

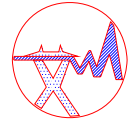
6.1 Fan Data Sheet

Input data			
Application	: Air cooler (ACHE)	Installation type	: Forced Draught
Air flow	: 149.9 [m ³ /s]	Mounting orientation	: vertical shaft; hub at inlet
Static pressure	: 92.0 [Pa]	Fan inlet shape	: Bell, L/D = 0.15
Inlet temperature	: 45.6 [°C]	Forced draught installation; no diffusor present	
Air humidity	: 0 [%]	No obstacles present	
Altitude correction	: 1230.0 [m]		
Fan diameter	: 14 [ft]		
Fan blade type	: KNF		
Blade number	: 4		
Fan speed	: 260 [R/min]		
Fan clearance	: 0.01 (2S/FanDia)		
Crosswind	: 0.0 [m/s]		
Selection result: 14 KNF 4 fan model			
Calculated air density	: 0.972 [kg/m ³]	Sound power spectrum	
Blade tip speed	: 58.1 [m/s]	Octave	PWL PWL(A) Tolerance
Fan speed	: 260.0 [R/min]	[Hz]	[dB] [dB(A)] [dB]
Blade tip angle	: 18.9 [°]	63	104.2 78.0 5
Static efficiency	: 45.6 [%]	125	103.6 87.5 3
Total efficiency	: 76.9 [%]	250	98.9 90.3 2
Fan shaft power	: 24.5 [kW]	500	93.1 89.9 2
Pressure margin [%]	: 59.4 ¹ / 100.4 ²	1000	89.1 89.1 2
Air flow margin [%]	: 26.2 ¹ / -40.0 ²	2000	85.0 86.2 2
¹ according to API		4000	82.3 83.3 2
² at selected blade angle		8000	77.6 76.5 2
Impeller Sound Power Level	: 96.2 [dB(A)]	SPL 1m beside inlet	: 73.2 [dB(A)]
Sound due to blade angle	: 0.1 [dB(A)]	SPL 1m below inlet at 45°	: 76.2 [dB(A)]
Sound due to inlet shape	: 0.0 [dB(A)]	SPL 1m below inlet	: 83.2 [dB(A)]
Sound due to inlet obstacles	: 0.0 [dB(A)]	SPL 1m above cooler unit	: 80.2 [dB(A)]
Sound due to outlet obstacles	: 0.0 [dB(A)]	<i>Reflections not considered!</i>	
Total Sound Power Level	: 96.2 [dB(A)]		
<i>Tolerance on sound level values ± 2 [dB].</i>			
<i>! SPL levels for guidance only !</i>			
<i>See Howden Cooling Fans Manual for explanation of SPL calculations; norm 03-07.334.</i>			
Inlet pressure loss	: 0.0 [Pa]	Max. allowed tip speed	: 61.0 [m/s]
Inlet obstacle pressure loss	: 0.0 [Pa]	Max. allowed blade angle	: 30.0 [°]
Fan clearance pressure loss	: 0.0 [Pa]	Max. allowed blade temp.	: 120.0 [°C]
ACHE pressure recovery	: -17.5 [Pa]	Impeller mass	: 82 [kg]
Outlet obstacle pressure loss	: 0.0 [Pa]	Impeller moment of inertia	: 58 [kg.m ²]
Crosswind pressure loss	: 0.0 [Pa]	Axial thrust	: 1824 [N]
Corrected Fan Static Pressure	: 74.5 [Pa]	Force due to loss of 1 blade(s)	: 8713 [N]
Dynamical pressure	: 51.3 [Pa]	Residual imbalance force (G6.3)	: 14 [N]
Dimensionless flow Cf	: 0.180 [-]	Blade natural frequency	: 1.5 [Hz]
Dimensionless pressure Cp	: 0.045 [-]	Blade operating natural frequency	: 4.8 [Hz]
		Operating frequency	: 4.3 [Hz]
		Blade passing frequency	: 17.3 [Hz]



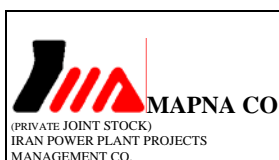
6.2 Fan Motor Data Sheet

1	VOLTAGE : 400V PHASE : 3 HERTZ: 50
2	NAME PLATE RATING KW : 37
3	COLOR: RAL.: 7010
4	TOT. POWER OF DRIVEN EQUIPMENT : 37 KW
5	PERFORMANCE DUTY : S1
6	SERVICE FACTOR : 1/0
7	INSULATION CLASS : F
8	TEMPERATURE RISE : CLASS B 70K
9	WINDING CONNECTION : DELTA
10	LOCKED ROTOR CURRENT AT $U_n/0.8 U_n$ 436/349
11	CURRENT AT: FULL LOAD 67
	POWER FACTOR AT: RATED LOAD 0.86 ,NO LOAD 0.085
13	EFFICIENCY AT:RATED LOAD 92.7
	FULL LOAD 92.5 $\frac{3}{4}$ LOAD : 91.5
14	SPEED: SYNCHRONOUS 1500 ^{RPM} FULL LOAD 1470 ^{RPM}
	ROTOR INERTIA (J): 0.275
15	COS.φ : 0.86
	BEARING SEAL TYPE: 6313 C3/6312 C3
16	TYPE : K21R 225S 4 TWS HW - VEM
	ENCLOSURE AND DEGREE OF PROTECTION
	CAST IRON FRAME
	IP55
17	TEFC IC411 CLF
18	SPACE HEATER : 230 V ,1 PHASE
19	CABLE ENTRYS AUX: 1 X M20
20	NUMBER OF POLE: 4
21	WEIGHT ...270.....Kg
22	STARTING WINDING CONNECTION: DELTA
23	DRIVEN EQUIPMENT : FAN
24	DIRECTION OF ROTATION (FACING MOTOR END): CCW/ CW
25	MOUNTING METHOD IMV6
26	SOUND PRESS. LEVEL AT 1 METER 73 dB
27	FRAME SIZE; 225M
28	TERMINAL BOX: ON TOP
	DEGREE OF PROTECTION IP55
	ARRANGEMENT MOUNTING IMV6
27	LUBRICATION SYSTEM LIFE
28	CABLE ENTRYS MOTOR 2 X M50
29	ALLOWABLE LOCK ROTOR TIME AT $U_n/0.8 U_n$: 32/51CO



7. Closed Cooling Water (C.C.W.) Expansion Tank Data Sheet

ATMOSPHERIC TANK/PRESSURE VESSEL	IDENTIFICATION CODE 1XXMPR10BB001 (°)	Quantity:
GENERAL DATA		
Object code:	Function description: CCWS Expansion Tank	
Goods class:	Order No.: 864006	Supplier: ABAN
P&ID:	Supplier DWG. NO.: GT3-AD-14GD-23-PAD-301	
Axis: Horizontal: * Vertical:	Size: 938	ID 2280 L
Application code: ASME SEC.VIII DIV. ED.98+ADD 99	Environmental condition:	
Painting: HOT DIP GALVANIZED	Insulation (Y/N): NO	
ISPESL Test (Y/N):	Cladding (Y/N): NO	
Type:	Q.A. Classification:	
Location: YAZD SOLAR THERMAL POWER PLANT.		
PROCESS DATA	CONSTRUCTION DATA	
Operating pressure: [bar]. ATM	Hydrostatic test pressure: [bar] ATM	
Design Pressure: [bar] ATM	Shell thickness: [mm] 6	
Vacuum: -----	Bottom thickness: [mm] -----	
Operating Temperature :[Deg] 46 ° C	Head thickness: [mm] 6	
Design temperature: [Deg] 80 ° C	Roof thickness: [mm] -----	
Normal level capacity: [m3]	Bottom type: -----	
Total capacity: [m ³] 1.5	Head type: ELLIP HEAD 2:1	
Fluid: TREATED DEMI WATER	Roof type: -----	
Density: [kg/m3] ≈ 1000	Corrosion allowance: [mm] 1.6	
	Internal coating(Y/N): YES – HOT DIP GALVANIZED	
	Walkway(Y/N): YES	
	Staircase style:	
	Joint efficiency: 0.85	
MATERIALS	Radiographic exam. : TOT: SPOT: *	
	Empty weight: [kg] 490	
Shell: SA 516 - 60	Flooded weight: [kg] 1990	
Bottom: -----		
Head: SA 516 - 60		
Roof: -----		
Nozzles and Fittings: SA 106 – B , SA - 105		
Flanges: SA 105		
Support: SA 285 Gr.C		
Walkway: ST 37 - 2		
Staircase: ST 37 - 2		



Owner's Doc. No. : MP-YST-G1-08-VE0-456

Rev. B

MAPNA's Doc. No. : CCP/YZ-00/MC-G-11-PA0-356

Rev. B

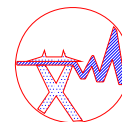
Contract No.:

File No.:

TUGA NO.: YZ-DS-01-9Y000-A-356

SE Code :

MF Code : ---



ACCESSORIES

Heating coil(Y/N): NO	Level floating valve(Y/N): YES
Suction heater(Y/N): NO	Stand pipe(Y/N): NO
FLAME ARRESTER(Y/N): NO	Mixing device(Y/N): NO
Level class(Y/N): YES	Floating level indicator (y/n): NO
Heating fluid type: ----- NO	Heating fluid flow: [Kg/Sec] ----- NO

NOZZLES

	Dimension(ND)	Type	Rating	Quantity
Manhole	400	-	-	1
Inlet	1 1/2"	WN.RF	150	2
Outlet	2"	S.W HALF COUPLING	3000 #	1
Back flow	-			
Free vent	2"	S.W HALF COUPLING	3000 #	1
Over flow	2"	S.W HALF COUPLING	3000 #	1
Drain	1"	S.W HALF COUPLING	3000 #	1
Demi-water make up inlet	-			
Safety valve	-			
Stand pipe	-			
Level indicator LI	1/2"	S.W HALF COUPLING	3000 #	2
Chemical charge hopper	-			
Level transmitter [H/L]	-			
Level switch[LL] (S)	YES			

NOTES:

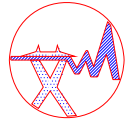


Owner's Doc. No. : MP-YST-G1-08-VE0-456 Rev. B



MAPNA's Doc. No. : CCP/YZ-00/MC-G-11-PA0-356 Rev. B

Contract No.: File No.:

TUGA NO.: YZ-DS-01-9Y000-A-356 SE Code : MF Code : ---



8. Closed Cooling Water (C.C.W.) Instruments Data Sheet

 <small>(PRIVATE JOINT STOCK) IRAN POWER PLANT PROJECTS MANAGEMENT CO.</small>	 <small>MAPNA TURBINE ENGINEERING & MANUFACTURING (TUGA)</small>	Owner's Doc. No. : MP-YST-G1-08-VE0-456	Rev. B
		MAPNA's Doc. No. : CCP/YZ-00/MC-G-11-PA0-356	Rev. B
		Contract No.:	File No.:
TUGA NO.: YZ-DS-01-9Y000-A-356	SE Code :	MF Code : ---	

Pressure Transmitter					
P & ID NO. :		YZ-PI-01-9Y141-A-364			
Service : WATER			tag number (kks code) MPR 20CP101		
signal to				location	
				Tank n. / - / BR001-CWS-10" -AA-P line n.	
safety class		essential component		accuracy <±0.05% /FS	
seismic category		humidity		drift	
quality group		ambience		repeatability	
q.a. category		radioactivity level		hysteresis	
electrical classification		environmental conditions		dead band	
operating conditions					
Fluid :DEMIN WATER 30%GL			CLOSED COOLING WATER		
corrosive compounds		darting		NO NO	
Condition			operatin g		design
Pressure			3		6
Temperature			55.2		90
specifications					
measuring element type			pressure transmitter		
materials		measuring element			
		movement amplifier		case	
required range			0-35bar (RE RATE 0-6bar BY FACTORY)		
Filling fluids			Silicon oil		
Seale :			Up to 40 bar fkm		
output			Intrinsic safety(II 1G Eex ia IIC T4) 4...20ma /2-wire		
Terminal clamp			Yes		
Design and el. connection			Aluminum die cast case		
Standard pressure connection			1/2" NPT Diaphragm ss316 L		
special version			Standard		
supply voltage			10-30V DC		
Seal material			FKM		
Protection degree			IP67		
Media temperature			-40° to + 70° C		
manufacturer IMPRESS SENSORS & SYSTEMS		Catalog n.		model 51A-3502-AN-I-1-AKO-N00-1-1-1-000	
				weight	

Differential Pressure Gauges

P & ID YZ-PI-01-9Y141-A-364					
service GENERATOR COOLER 1 IN / OUT DIFF. PRESSURE		tag number MPR20CP501~4			
signal to		location		LOCAL	
		Tank n. / line n.		BR001-CW-150-AA-P	
safety class		essential component		accuracy	
seismic category		Humidity		drift	
quality group		Ambience		repeatability	
q.a. category		radioactivity level		hysteresis	
electrical classification		enviromental conditions		dead band	
operating conditions					
Fluid			CLOSED COOLING WATER		
corrosive compounds		SOLIDI IN SOSPENSIONE Dirting		NO NO	
Condition			operating		design
Pressure : barg			2,32 / 1,58		6
Temperature : (° C)			49,9 / 55		80
differential pressure			0,74		
specifications					
measuring element type			DIAPHRAGM		
materials		measuring element	connection	Stainless Steel	Stainless Steel
		movement amplifier	case	Stainless Steel	Stainless Steel
required range : barg			0 – 1600		
zero adjustment			REQUIRED		
nominal diameter : mm			160		
dial			BLACK CHARACTERS and GRADUATION on WHITE BACKGROUND		
pointer			BLACK		
max. static and one side overload pressure			25		
safety discharge			CASE BACK		
window		casing		SAFETY GLASS	IP 45
process connection			RADIAL ½" NPT – F		
mounting			2" PIPE		
accessories			Stainless steel YOKE (for 2" pipe mounting)		
special execution			glycerin filled		
Manufacturer: ROTOTHERM		catalog n.		Model: 200DPG	weight

TEMPERATURE INDICATOR					
P & ID NO. : YZ-PI-01-9Y141-A-364					
Service : WATER			tag number MPR20CT501~5 MPR30CT501~5 MPR31CT501~2 MPR32CT501~2		
signal to				location GENERATOR COOLER	
				Tank n. / line n. - / BR014-CWS-6" -AA-P	
safety class		essential component		accuracy +/- 0.01 FS	
seismic category		humidity		drift	
quality group		ambience		repeatability	
q.a. category		radioactivity level		hysteresis	
electrical classification		environmental conditions		dead band	
operating conditions					
Fluid : DEMIN WATER 30%GL			CLOSED COOLING WATER		
corrosive compounds		darting		NO NO	
Condition			operating		design
Pressure			3		6
Temperature			55.2		90
specifications					
measuring element type			TEMPERATURE INDICATOR		
materials		measuring element	connection	316 SS	316 SS
		movement amplifier	case	316 SS	304 SS
required range			0 TO 80 deg C		
External zero adjustment			FITTED AS STANDARD		
nominal diameter					
dial			6" / 150 mm		
stem			316 ss, 6.0 mm DIAMETER		
Over range			130 % FS		
Stem length			100 mm		
window		casing		Instrument glass IP65	
thermowell			INCLUDED		
connection			1/2 NPT F		
mounting			BOTTOM ENTRY		
manufacturer ROTOTHERM			catalog n.		model BH 262
supplier		order n.		weight	
Remark :					

Differential Pressure Gauge with Alarm Switches					
P & ID NO. :		YZ-PI-01-9Y141-A-364			
Service: WATER			tag number MPR11CP001/CP501 MPR12CP001/CP501		
signal to				location	
				Tank n. / line n. -/BR001-CWS-12"-AA-P	
safety class		essential component		accuracy	± 2 %
seismic category		humidity		drift	
quality group		ambience		repeatability	
q.a. category		radioactivity level		hysteresis	
electrical classification		environmental conditions		dead band	
operating conditions					
Fluid : DEMIN WATER 30%GL			CLOSED COOLING WATER		
corrosive compounds		dirting		NO	NO
Condition				operating	design
Pressure				3	6
Temperature				55.2	90
specifications					
measuring element type			Differential Pressure Gauge with Alarm Switches		
materials	measuring element		connection		
	movement amplifier		case		
Diff. Press. Range			0 to 1600 mbar		
dial			Aluminum, white with black letters		
nominal diameter			6", 150mm		
Alarm Contact:			SPDT Factory set at 350 mbarg		
Connection:			DIN plug & socket		
max. overload pressure			200 bar		
window	casing		Standard glass	Bezel: 304 SS	
Protection			IP65		
connection			1/4" NPT female, bottom entry		
mounting			VERTICAL		
accessories			NO		
special execution			NO		
manufacturer British Rototherm		Catalog n.	model	200 DPG	weight
supplier		order n.	notes		
Remark :					

level switches					
P & ID : YZ-PI-01-9Y141-A-364					
service : CLOSED COOLING WATER SURGE TANK LEVEL LL			tag number MPR40CL001		
signal to		location		LOCAL	
		tank n. / line n.		BR002-CW-50-AA-P	
safety class		essential component		accuracy	+ / - 5 mm
seismic category		humidity			
quality group		ambience		repeatability	
q.a. category		radioactivity level		hysteresis	
electrical classification		environmental conditions		dead band	
operating conditions					
Upper fluid			AIR		
Lower fluid			CLOSED COOLING WATER		
corrosive compounds		dirting		NO	NO
condition				operating	design
pressure : barg				0,33	6
Temperature : (° C)				49,9	80
specifications					
element					
element type		trasmission		FLOAT	MAGNETIC
dimensions		material			AISI 316
extension		wetted parts material		NOT REQUIRED	AISI 316
CORPO - body					
type		material		EXTERNAL CHAMBER	AISI 304
rating			ANSI 150		
process connections			FLANGED 1" 150 RF		
location of connections		center to center line mm		SIDE - SIDE	178
switch					
type			MICROSWITCH		
contact number		type of contact		2 SPDT	Dry Contacts
setting	first contact	second contact		A reference line, outside the chamber, shall be provided indicating the switch failing point (LL level)	
differential (fixed , adjustable)			FIXED		
operating on increase or decrease			DECREASE		
contact electrical rating			0,5 A / 125 V DC		
casing material		degree of protection		Aluminum	IP 65
cable entry		terminal board		½" – 14 NPT - F	SCREW TYPE
earthing screw			REQUIRED		
accessories			- Counter flanges, studs, nuts, gaskets,		
Manufacturer: OFFICINE OROBICHE		catalog n.	Model: 62.I.2.2M2.WP	weight	

Vibration Switches	
P & ID : GT3-AD-14GD-02-PA0-301	tag number MPR31CY001~2 MPR32CY001~2
1	APPLICABLE CODE : VBSCB56DP -VDC -SAMI
2	MANUAL RESET (LOCAL)
3	HAZARDOUS AREA : EXPLOSION PROOF EEXD CENELEC IIC T5/T6
4	PROTECTION : IP 65 + CE MARK
5	SWITCH CONTACTS :DPDT (5A @ 24 VDC) WITH REMOTE RESET COIL
6	FULL SCALE RANGE : 0~5 g
7	WIRING ENTRY : ¾ " NPT-F
8	MOUNTING : STANDARD BRACKET WITH 4 HOLES - HORIZONTAL
9	AMBIENT TEMPERATURE : -20° C / +55° C
10	PACKING IN SUITABLE CARTON BOX
11	ENCLOSURE : CAST ALUMINIUM

RTD				
P & ID NO. : YZ-PI-01-9Y141-A-364				
Service: WATER		tag number MPR20CT101 MPR30CT101~5		
signal to		location		
		Tank n. / line n.		/BR007-CWS-10"-AA-P
safety class		essential component		accuracy
seismic category		humidity		drift
quality group		ambience		repeatability
q.a. category		radioactivity level		hysteresis
electrical classification		environmental conditions		dead band
operating conditions				
Fluid: demon water +30%gl			CLOSED COOLING WATER	
corrosive compounds		darting		NO NO
Condition			operating	design
Pressure			3	6
Temperature			55.2	90
specifications				
measuring element type			RTD	
materials	Sheath material	connection	316 stainless steel	
	movement amplifier	case		
2rtd sensor, connection head type DAN-V IP65 Pe16				
316L stainless steel protective sheathing				
Hart transmitter type LC 5335A				
Interchangeable element type TS 26-3,2x3 wires				
Mounting class A				
Drilled thermo well, stub connection =1"NPT (MALE)				
Instrument connection= 3/4" NPT (Female)				
Length under threading = 100mm				
manufacturer PYRO CONTROLE		catalog n.	model 9025198090	weight

Pressure Gauges					
P & ID NO. : YZ-PI-01-9Y141-A-364					
Service : WATER			tag number MPR11CP502 MPR12CP502		
signal to				location PUMP	
				Tank n. / line n. - / BR001-CWS-12" -AA-P	
safety class	S1 to EN 837	essential component		accuracy	+/- 0.01 FSD
seismic category		humidity		drift	
quality group		ambience		repeatability	
q.a. category		radioactivity level		hysteresis	
electrical classification		environmental conditions		dead band	
operating conditions					
Fluid :DEMIN WATER 30%GL			CLOSED COOLING WATER		
corrosive compounds		darting		NO	NO
Condition				operating	design
Pressure				3	6
Temperature				55.2	90
specifications					
measuring element type			PRESSURE GAUGE		
materials	measuring element		connection		316 SS
	movement amplifier		case		316 SS
required range			(-1) – (+2)		
zero adjustment			CALIBRATED @ 20 degC		
nominal diameter			1		
dial			6" / 150 mm		
pointer					
max. overload pressure			130 % FSD		
safety discharge					
window		casing		INSTRUMENTGLASS	IP65
			Glycerin filling		
process connection			1/2 NPT male 316 SS		
mounting			LOCAL DIRECT		
accessories			NONE		
special execution			NONE		
manufacturer ROTOTHERM		Catalog n.		model RPG 150/A-SS-04-Q-N	weight

Pressure Gauges					
P & ID NO. : YZ-PI-01-9Y141-A-364					
Service : WATER			tag number MPR 11CP503 MPR 12CP503		
signal to		location		PUMP	
		Tank n. / line n.		- / BR008-CWS-10" -AA-P	
safety class	S1 to EN 837	essential component		accuracy	+/- 0.01 FSD
seismic category		humidity		drift	
quality group		ambience		repeatability	
q.a. category		radioactivity level		hysteresis	
electrical classification		environmental conditions		dead band	
operating conditions					
Fluid : DEMIN WATER 30%GL			CLOSED COOLING WATER		
corrosive compounds		darting		NO	NO
Condition				operating	design
Pressure				3	6
Temperature				55.2	90
specifications					
measuring element type			PRESSURE GAUGE		
materials	measuring element		connection		316 SS
	movement amplifier		case		316 SS
required range			0 – 6 BARG		
zero adjustment			CALIBRATED @ 20 degC		
nominal diameter					
dial			6" / 150 mm		
pointer					
max. overload pressure			130 % FSD		
safety discharge					
window		casing		INSTRUMENTGLASS	IP65
Gauge Head fill			Glycerin filling		
process connection			1/2 NPT male 316 SS		
mounting			LOCAL DIRECT		
accessories			Snubber		
special execution			NONE		
manufacturer ROTOTHERM		catalog n.		Model: RPG 150/A-SS-04-Q-N	weight

Level Transmitter [ΔP type]					
P & ID: YZ-PI-01-9Y141-A-364					
service TANK LEVEL		CLOSED COOLING WATER SURGE		tag number MPR10CL101	
signal to				location LOCAL	
				tank n. / line n. MPR10BB001	
safety class		essential component		accuracy < 0,35 %	
seismic category		humidity		drift	
quality group		ambience		repeatability	
q.a. category		radioactivity level		hysteresis	
electrical classification		environmental conditions		dead band	
operating conditions					
fluid			CLOSED COOLING WATER		
corrosive compounds		dirting		NO NO	
condition			operating		design
Pressure : barg			Atmosph.		1
Temperature : (° C)			49,9		80
Level			min 0		600
specifications					
measuring element type			DIAPHRAGM		
material	measuring element		connections		AISI 316L
	body				AISI 316L
required range : barg		calibrated range		0 – 16000 0 - 1500	
zero adjustment		span adjustment		0 – 90 % 10 – 100 %	
zero elevation			REQUIRED		
Max. static and one-side overload pressure			250		
supply			24 VDC (two wire technique)		
output signal		max .load impedance		4 – 20 (*) 600	
casing		degree of protection		Aluminum alloy IP 65	
process connection			½”-14 NPT-F		
cable entry		terminal board		½”-14 NPT-F SCREW TYPE	
Earthing screw			REQUIRED		
mounting			2” PIPE		
accessories			- LOCAL INDICATION (Analog meter linear scale 0 – 1500 mm H2O) - YOKE (for 2” pipe mounting)		
Manufacturer: ABB		Catalog n.		Model: 264BS.L.K.A.6.A.1.B1.C1	
				weight	

Thermowells					
P & ID: YZ-PI-01-9Y141-A-364					
			tag number	Thermowell for MPRxxCTxxx	
			location	LOCAL	
			tank n. / line n.		
safety class		essential component		accuracy	
seismic category		humidity		drift	
quality group		ambience		repeatability	
q.a. category		radioactivity level		hysteresis	
electrical classification		environmental conditions		dead band	
operating conditions					
fluid			CLOSED COOLING WATER		
corrosive compounds		dirtying		NO	NO
condition				operating	design
Pressure : barg					6
Temperature : (° C)					80
flow					
speed				SUPPLIER	
specifications					
Line / component size		ND	150		
schedule					
Line / component material		mm			
stub height		mm			
Insulation thickness		mm			
Thermowell type			DRILLED BAR STOCK		
manufacture and dimensioning					
total length		mm	150		
underthread / underflange length		mm	100		
bore diameter		mm	6.2		
material			AISI 316		
Instrument connection			1/2" NPT - F		
stub connection			1" NPT - M		
test					
accessories					
Manufacturer Pyro Controle		catalog n.	Model : L403012-100		weight