

BFN-26

Table 10.6-1

REACTOR BUILDING CLOSED COOLING WATER SYSTEM  
AND EQUIPMENT DATA

RBCCWS Design Pressure/Temperature	Piping - 150 psig/230°F Equipment - 150 psig/200°F
Raw Cooling Water	
Type	River Water
Normal Design Inlet Temperature	90°F
Maximum Inlet Temperature	95°F
RBCCWS Heat Exchangers	
Number Provided	2/unit - 1 common spare
Materials	
Tubes	Admiralty - SS for RBCCW HX1A and HX1B only
Tube Sheets	Carbon Steel - SS for RBCCW HX1A and HX1B only
Shell	Carbon Steel
RBCCWS Pumps	
Number Provided	2/unit - 1 common spare
Materials	
Casing	Cast Steel
Impeller	Bronze
Shaft	Heat Treated High Carbon or Alloy Steel

Table 10.6-2

REACTOR BUILDING CLOSED COOLING WATER SYSTEM

HEAT EXCHANGER OPERATING CONDITIONS

Heat Transfer (Btu/hr X 10 <sup>6</sup> )/HX		Number of HX's in operation per unit
Normal	15.65 (Pre-uprated)	2
	16.33 (Uprated)	2
Startup	15.80 (Pre-uprated)	2
	16.04 (Uprated)	2
Cooldown	11.10	2
Shutdown	3.18 (Pre-uprated)	2
	3.31 (Uprated)	2

Normal Flow (GPM)

Shell Side	1685
Tube Side	2550

Fluid

Tube Side (river water)      Additives to minimize corrosion

Shell Side (demineralized water)

Additives to minimize corrosion

Seismic Coefficients

1.0g	horizontal
0.07g	vertical

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TABLE 10.6-3a  
 REACTOR BUILDING CLOSED COOLING WATER SYSTEM HEAT LOADS  
 (Pre-uprated)

MODE OF SERVICE	One Unit						AC POWER FAILURE								
	NORMAL OPERATION			COOLDOWN			SHUTDOWN			STARTUP					
	No. of Units	$\Delta P(\text{Pal})$ Total 10 <sup>6</sup> Btu/hr	$T_{in}^{\circ F} T_{out}^{\circ F}$ Total GPM	$\Delta P(\text{Pal})$ Total 10 <sup>6</sup> Btu/hr	$T_{in}^{\circ F} T_{out}^{\circ F}$ Total GPM	$\Delta P(\text{Pal})$ Total 10 <sup>6</sup> Btu/hr	$T_{in}^{\circ F} T_{out}^{\circ F}$ Total GPM	$\Delta P(\text{Pal})$ Total 10 <sup>6</sup> Btu/hr	$T_{in}^{\circ F} T_{out}^{\circ F}$ Total GPM	$\Delta P(\text{Pal})$ Total 10 <sup>6</sup> Btu/hr	$T_{in}^{\circ F} T_{out}^{\circ F}$ Total GPM				
System Equipment															
Fuel Pool Heat Exchange	2	9	100	112	100	0.1	112	100	112	9	100	100	112	-	-
		8.8	1500	1.0	167	1.0	167	167	1500	8.8	1500	1500	1500	-	-
Reactor Recirculation Pump and Motor	2	10	100	115	100	-	115	100	115	10	100	100	115	10	100
		0.9	120	0.9	120	-	120	-	120	0.9	120	120	120	0.9	120
Drywell Atmosphere Cooler	8*	16.8	100	110	100	16.8	110	100	110	16.8	100	100	107	15.0	100
		5.19	1038	6.4	1274	5.19	1038	1038	1038	3.62	1038	1038	1038	6.4	1274
Reactor Bldg. Equipment Drain Tank Cooler	1	1.5	100	125	100	1.5	125	-	125	1.5	100	100	125	-	-
		0.5	40	0.5	40	-	40	-	40	0.5	40	40	40	-	-
Drywell Equipment Drain Sump Cooler	1	1.5	100	125	100	1.5	125	-	125	1.5	100	100	125	1.5	100
		0.5	40	0.5	40	-	40	-	40	0.5	40	40	40	0.5	40
Sample Cooler	4	3	100	111	100	3	111	-	111	3	100	100	111	-	-
		0.04	6.5	0.04	6.5	-	6.5	-	6.5	0.04	6.5	6.5	6.5	-	-
Cleanup Recirculating Pump Cooler	2	10	100	120	100	10	120	100	120	10	100	100	120	-	-
		0.17	15	0.17	15	0.17	15	15	15	0.17	15	15	15	-	-
Cleanup System Nonregenerative Heat Exchanger	1	8	100	150	100	7.5	143	100	143	-	5	100	171	-	-
		15.1	610	12.7	587	-	587	-	587	17.1	482	482	482	-	-
Closed Cooling Water Heat Exchanger	2	4	90	102.3	90	0.75	110.2	90	104.2	4	90	90	102.4	0.1	90
Raw Cooling Water Loop - Tube Side		31.3	5100	22.2	2200	6.36	900	900	900	31.6	5100	5100	5100	7.8	900
Closed Cooling Water Heat Exchanger CCW Loop - Shell Side	2	12	118.5	100	5	118.9	100	1.5	110.4	10	119.4	100	100	2.1	110.9
		31.30	3369.5	22.2	2249.5	6.36	1220	1220	1220	31.6	3241.5	3241.5	3241.5	7.8	1434

\*This number of drywell atmosphere coolers is the total number in operation which must provide cooling for heat loads listed with a 25 percent standby capability (two coolers and fans not in operation). Spare fans may be placed in service at operator discretion to provide additional margin.  
 There is a total of ten drywell atmosphere coolers located in each unit's drywell.

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TABLE 10.6-3b  
 REACTOR BUILDING CLOSED COOLING WATER SYSTEM HEAT LOADS  
 (Updated)

MODE OF SERVICE	One Unit						SHUTDOWN		STARTUP		AC POWER FAILURE	
	NORMAL OPERATION			COOLDOWN			T <sub>in</sub> °F T <sub>out</sub> °F		T <sub>in</sub> °F T <sub>out</sub> °F		T <sub>in</sub> °F T <sub>out</sub> °F	
	No. of Units	ΔP(Pal) Total 10 <sup>6</sup> Btu/hr	T <sub>in</sub> °F T <sub>out</sub> °F Total GPM	ΔP(Pal) Total 10 <sup>6</sup> Btu/hr	T <sub>in</sub> °F T <sub>out</sub> °F Total GPM	ΔP(Pal) Total 10 <sup>6</sup> Btu/hr	T <sub>in</sub> °F T <sub>out</sub> °F Total GPM	ΔP(Pal) Total 10 <sup>6</sup> Btu/hr	T <sub>in</sub> °F T <sub>out</sub> °F Total GPM	ΔP(Pal) Total 10 <sup>6</sup> Btu/hr	T <sub>in</sub> °F T <sub>out</sub> °F Total GPM	
System Equipment												
Fuel Pool Heat Exchanger	2	9.24	100 112 1500	0.1 0.1 1.0	100 112 167	9 9.24	100 112 1500	- - -	100 112 112	- - -	100 112 112	- - -
Reactor Recirculation Pump and Motor	2	0.9	100 115 120	10 0.9	100 115 120	10 0.9	100 115 120	- - -	100 115 120	10 0.9	100 115 120	- - -
Drywell Atmosphere Cooler	8*	16.8 5.45	100 110 1038	15.0 6.4 16.8 5.45	100 110 1274 1038	16.8 3.62	100 110 1038	16.8 3.62	100 107 1038	15.0 6.4	100 110 1274	16.8 3.62
Reactor Bldg. Equipment Drain Tank Cooler	1	1.5 0.5	100 125 40	1.5 0.5	100 125 40	1.5 0.5	100 125 40	- - -	100 125 40	1.5 0.5	100 125 40	- - -
Drywell Equipment Drain Sump Cooler	1	1.5 0.5	100 125 40	1.5 0.5	100 125 40	1.5 0.5	100 125 40	- - -	100 125 40	1.5 0.5	100 125 40	- - -
Sample Cooler	4	0.04	100 111 6.5	3 0.04	100 111 6.5	3 0.04	100 111 6.5	- - -	100 111 6.5	3 0.04	100 111 6.5	- - -
Cleanup Recirculating Pump Cooler	2	0.17	100 120 15	0.17 0.17	100 120 15	0.17 0.17	100 120 15	- - -	100 120 15	0.17 0.17	100 120 15	- - -
Cleanup System Nonregenerative Heat Exchanger	1	15.86**	100 150 610	7.5 12.7**	100 143 587	5 17.1**	100 171 482	- - -	100 171 482	5 17.1**	100 171 482	- - -
Closed Cooling Water Heat Exchanger Raw Cooling Water Loop - Tube Side	2	32.66	90 103.3 5100	0.75 22.2	90 110.2 2200	4 32.07	90 104.2 5100	4 32.07	90 102.4 5100	4 32.07	90 107.3 5100	4 32.07
Closed Cooling Water Heat Exchanger CCW Loop - Shell Side	2	32.66	118.5 100 3369.5	5 22.2	118.9 100 2249.5	10 32.07	110.4 100 1220	10 32.07	119.4 100 3241.5	2.1 7.8	110.9 100 1434	2.1 7.8

\*This number of drywell atmosphere coolers is the total number in operation which must provide cooling for heat loads listed with a 25 percent standby capability (two coolers and fans not in operation). Spare fans may be placed in service at operator discretion to provide additional margin. There is a total of ten drywell atmosphere coolers located in each unit's drywell.

\*\*Heat transfer rate corresponds to an RWCU flow of 270 gpm. Increasing the flow up to the maximum of 340 gpm results in an additional heat load of 7x10<sup>6</sup> Btu/hr. Operation of RWCU above 270 gpm depends upon the ability of RBCCW to accommodate the added heat load.