

108981

### HEAT EXCHANGER DATA SHEET

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Application:	CIP Heater
Tag:	E810
PID	P220
Service Description:	Maximum (Design) Duty: Heating up CIP Solution and system metal mass from ambient to 60 deg C. Minimum Duty: Maintaining solution temperature during Clean-in-Place operation.
Application type	Batch heating
Equipment type	Plate heat exchanger
Manufacturer, model:	By Vendor

Duty	
System Heat-up Time, min	30
Initial System Temperature, deg C	15
Final System Temperature, deg C	60
System Liquid Inventory, kg	1536
Liquid Specific Heat, kcal/kg K	0.974
Liquid Sensible Duty, kcal	67,300
System Metal Mass, kg	1200
Metal Specific Heat, kcal/kg K	0.12
Metal Sensible Duty, kcal	6,500
Average Duty, kcal/hr	147,600
Maximum (Design) Duty, kcal/hr	157,000
Minimum Duty, kcal/hr	15,700

Accounts for higher heat transfer rate at start of heating cycle  
Represents maximum turndown requirement

Fluid Properties		Cold Side		Hot Side	
Fluid	CIP Solution - Water with 1-3 wt% sodium hydroxide or citric acid.			Steam	
Flow, kg/hr	6,867		307		
	Inlet	Outlet	Inlet	Outlet	
Temperature, deg C	15	38.5 (Note 4)	143.7		
Pressure, barg	3.5	By Vendor	3.0		
Density, g/ml	1.024	1.017	0.00214		
Specific Heat, kcal/kg K	0.975	0.972	0.456		
Thermal Conductivity, W/m K	0.60	0.64	0.0292		
Viscosity, cp	1.29	0.77	0.0135		
Latent Heat, kcal/kg	--	--	511		
Molecular Weight	18.22	18.22	18.015		
Undissolved Solids, %	0	0	N/A		

Design Data		Cold Side		Hot Side	
Max Allowable Pressure Drop, bar	0.70		0.70		
Fouling Factor, W/m <sup>2</sup> C	By Vendor		By Vendor		
Design Pressure, barg	10		10		
Test Pressure, barg	14.9		14.9		
Design Temperature, deg C	175		175		
Heat Transfer Area, m <sup>2</sup>	By Vendor		By Vendor		
Overall Heat Transfer Coefficient	By Vendor		By Vendor		
Number of Plates	By Vendor		By Vendor		
Overdesign Factor, %	10% Minimum		10% Minimum		
Weight - Empty, kg	By Vendor		By Vendor		
Additional Plate Capability, %	15% Minimum		15% Minimum		

Materials of Construction	
Plates	AISI 304 or 304L Stainless Steel
Frame	Carbon Steel - Note 1
Guide Bars	AISI 304 or 304L Stainless Steel
Carrying Bars	AISI 304 or 304L Stainless Steel
End Plates	Carbon Steel - Note 1
Connections	AISI 304 or 304L Stainless Steel - Note 2
Shroud	AISI 304 or 304L Stainless Steel
Plate Gaskets	EPDM - Note 3
Nuts/Bolts	304SS

- Notes**
- Carbon steel components shall be painted with Vendor Standard coating system.
  - Connections shall be 150# Flanged or 150# Stud.
  - Vendor shall confirm that EPDM is suitable at exchanger design temperature.
  - Inlet / Outlet temperatures shown correspond to maximum duty case at the beginning of the heating cycle. Temperature profile will change as system heats up.

- Other Requirements**
- Heat exchanger shall be designed and fabricated according to ASME code and shall be National Board stamped.
  - The vendor shall propose an optional splash resistant insulation cover for the heat exchanger.

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**Attachments**  
 The following files are part of this Equipment Data Sheet and are to be included as attachments:  
 Vendor Doc Requirements

**SYSTEM SKETCH**

