

THE G. C. BROACH COMPANY

WASTE HEAT RECOVERY PROCESS & MECHANICAL SUMMARY

CUSTOMER	BP Exploration Alaska	DATE	April 14, 2008	Rev. 3
PROJECT		CUSTOMER REF.		
		BROACH REF.	Job 20071233	
		BROACH DRAWINGS	See Drawing List	
SERVICE	60/40 Tri-Ethylene Glycol + H2O			

PROCESS DESIGN DATA ¹

Data	COIL / TUBE SIDE		FLUE GAS SIDE	
Charge	Tri-Ethylene Glycol		Combustion Gas Turbine Exhaust	
Capacity, Lbs./Hr.	1,204,004 /1\		891,360	
Duty, BTU/Hr.	100,000,000		-40° Ambient Day, Coil Set Case	
Flow Conditions	INLET	OUTLET	INLET	OUTLET
Liquid, Lbs./Hr.	1,204,004 /1\	1,204,004 /1\	0	0
Vapor, Lbs./Hr.	0	0	891,360	891,360
Liquid Sp. Gr. @ Temp	1.02	0.965	0	0
Mol Wt, Vapor	N/A	N/A	28.74	28.74
Specific Heat, BTU/Lb•°F, Liquid	0.841	0.906	-	-
Viscosity, cp, Liquid	0.828	0.265	-	-
Thermal k, BTU/Hr•Ft•°F, Liquid	0.190	0.181	-	-
Temperature, °F	240	340	734	291
Pressure, PSIA	470 /3\	430.5 /3\	+11.70" H2O	Atmospheric

COIL SPECIFICATIONS

Design Temp. @ Pressure	480°F @ 600 PSIG /3\	1,000°F / 20" H2O /2\
Tube Size, O.D., in.	4.50	
No. of Tubes	252	
Tube Wall, Ave., in.	.237	
Tube Length, ft.	28'-0"	
Tube Effective Length, ft.	26'-3"	
Tube Material	Seamless Carbon Steel	
Tube Spec., ASTM	SA-333, Gr. 6	
Fitting Type	Wrought Carbon Steel	
Fitting Spec., ASTM	SA-420, WPL6	
Fitting Wall, Ave., in.	.237"	
Corrosion Allowance, in.	0.125"	
Fouling, Inside / Outside	0.0 / 0.0 per spec.	
Terminal Connections	Inlet: 12" RF WNF; Outlet: 12" 300# RF WNF	
Code Stamp	ASME Section VIII, Div 1, NB	

OPERATING DATA

Flow	Tri-Ethylene Glycol	Turbine Exhaust Gas
Calculated Pres. Drop	39.50	11.7 Inches H2O
Temp. Entering/Leaving WHRU, °F	240 / 340	734 / 291 on -40°F Day
Surface, Sq. Ft.		
Bare	7,792	
Extended	96,289	
Total	104,081	
Transfer Rates, BTU/Hr•Ft ²	960.80	

MISCELLANEOUS DATA & MECHANICAL SPECIFICATIONS

No. of Tube Supports	Ends and One Intermediate
General Specifications	Broach 101
Fuel	Not Applicable
Burners	Not Applicable
Stack	Exhaust = 10'-0" OD, Bypass = 8'-6" OD, both to 80' above module base steel
Damper Plate Material	304 Stainless Steel, Multi Blade
Design Wind Load, MPH	110 MPH on Shore
Transportation Loads /3\	Per Letter "Revised Barge Accelerations, Rev. 0, Dated 11/8/07"

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NOTES: 1. See Performance.