



## HEAT EXCHANGER PROCESS SPECIFICATION

<b>CUSTOMER'S NAME:</b> TAMOIL RAFFINAZIONE					<b>PROJECT No.:</b> 1-BD-0328A						
<b>LOCATION:</b> CREMONA (ITALY)					<b>UNIT No.:</b> 9-2000						
<b>SERVICE:</b> DISTRICT HEATING EXCHANGER					<b>ITEM No.:</b> 9-E-2001A/B		<b>No. REQD:</b> 2				
					<b>DOCUMENT No.:</b> BD0328A-9E2001						
<b>REV</b>	<b>F00</b>	<b>F01</b>	<b>F02</b>	<b>F03</b>	Connected in      Parallel <input checked="" type="checkbox"/> Series <input type="checkbox"/>						
<b>DATE</b>	01/31/2007										
<b>ORIG. BY</b>	MB										
<b>CHECK. BY</b>	AB										
<b>APP. BY</b>	AB										
<b>PREFERRED TYPE:</b> <input checked="" type="checkbox"/> Shell and Tube <input checked="" type="checkbox"/> Double Pipe <input type="checkbox"/> Plate <input type="checkbox"/> Other <input type="checkbox"/> No Preference											
<b>MOUNTING:</b> <input checked="" type="checkbox"/> Horizontal <input type="checkbox"/> Vertical <input type="checkbox"/> No Preference <input type="checkbox"/> Sloped											
<b>TOTAL PERFORMANCE OF EACH ITEM</b>											
		(2)	IN	HOT SIDE			OUT	IN	COLD SIDE		OUT
Fluid Name			LP STEAM				DISTRICT HEATING WATER (3)				
Corrosion/erosion/fouling by			—				—				
TOTAL Fluid Flowrate		kg/h	68 920		68 920		857 000		857 000		
Vapour	kg/h	MW									
Liquid	kg/h						857 000		857 000		
Steam	kg/h		68 920								
Non Condensables	kg/h	MW									
Steam Condensed	kg/h				68 920						
Temperature	°C		151		151		65		105		
Inlet Pressure barg	/ Allow ΔP bar		3.9		/ 0.2		11.0		/ 0.6 (9)		
DESIGN DATA @ Flowing Conditions			Vap.	Liq.	Vap.	Liq.	Vap.	Liq.	Vap.	Liq.	
Enthalpy / Specific Heat	kJ/kg°C		-		-		4.185		4.219		
Viscosity	cP eSt		0.014		0.181		0.434		0.268		
Thermal Conductivity	W/m°C		0.032		0.682		0.660		0.681		
Liquid Sp.Gr.					0.916		0.981		0.955		
Vapour Compressibility Factor			0.956		—		—		—		
Liquid Surface Tension	N/m										
Critical Press/Temp.	bar abs/°C		/		/		/		/		
Pour Point/Freezing Point	°C		/		/		/		/		
Dew Point/Bubble Point	°C (4)		/		/		/		/		
Latent Heat	kJ/kg										
Heat Curve attached			No		No		No		No		
Velocity Allowable	m/s										
Fouling Factor	(W/m <sup>2</sup> .°C) <sup>-1</sup>		0.0001		0.00017		0.00017		0.00017		
Heat Exchanged	kW		40000 (6)		Margin required on Flow / Surface :		0		%		
<b>MECHANICAL DESIGN</b>											
Design Pressure/Temperature		12.3 bar g @ 180 °C			16 bar g @ 138 °C						
Short Term Max. Temperature/pressure		°C & bar g h/yr			°C & bar g h/yr						
Min. Temperature during atmos. venting		°C			°C						
Mechanical Cleaning Requirement		<del>Yes</del> / No			<del>Yes</del> / No			<del>Yes</del> / No			
Cyclic Service		<del>Yes</del> / No			<del>Yes</del> / No			<del>Yes</del> / No			
CODES TEMA "B" "C" "R"		ASME			ISPEL/ANCC						
<b>MATERIALS OF CONSTRUCTION (5)</b>											
Primary Materials Selection		C.S.			C.S.						
Corrosion Allowance		mm		3			3				
Stress Relief(Process Reasons)				-			-				
<b>MISCELLANEA</b>											
Nozzles Size In / Out		inches		20" / 10"		16" / 16"					
Insulation Required		Yes, Heat Conservation			Yes, Heat Conservation						
NOTES    1. See sheet 2 for equipment details. 2. Hot fluid flows on <del>SHELL</del> / TUBE side 3. Refer to sheet 2 for fluid composition. 4. Refer to sheet 2 for dew pt/bubble pt properties. 5. Material of construction by Technical Department 6. Net Heat exchanged, including also 1% of margin due to heat loss.Vendor to confirm.											
					<b>ITEM No.</b> 9-E-2001A/B		<b>SHEET</b> 1 <b>OF</b> 2				



**HEAT EXCHANGER  
PROCESS SPECIFICATION**

<b>CUSTOMER'S NAME:</b>	TAMOIL RAFFINAZIONE	<b>PROJECT No.:</b>	1-BD-0328A
<b>LOCATION:</b>	CREMONA (ITALY)	<b>UNIT No.:</b>	9-2000
<b>SERVICE:</b>	DISTRICT HEATING EXCHANGER	<b>ITEM No.:</b>	9-E-2001A/B <b>No. REQD:</b> 2
		<b>DOCUMENT No:</b>	BD0328A-9E2001

<b>REV</b>	<b>F00</b>	<b>F01</b>	<b>F02</b>	<b>F03</b>	
<b>DATE</b>	01/31/2007				
<b>ORIG. BY</b>	MB				
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Connected in      Parallel          Series   

<b>EQUIPMENT SELECTION</b> (7)			
EXCHANGER SIZE/TYPE	Shell and Tube	TOTAL SURFACE REQD	m <sup>2</sup>
No. OF SHELLS/CASINGS PER ITEM		SURFACE PER SHELL/CASING	m <sup>2</sup>
LMTD (Corrected) (Weighted)	°C	Transfer Rate (service)	W/m <sup>2</sup> C
		(clean)	W/m <sup>2</sup> C

SHELL & TUBE	TUBES: Material	CS	No. off	Length	m	O.D.	mm	THK	14 BWG	PITCH	mm	90	30	45
	TUBESHEET	Material:		CHANNEL	Material:									
	SHELL: I.D.	mm	Material	TUBE WELDING:		Seal/Strength/none								
	BAFFLE: Materials	Type												
PLATE	PLATE	Materials:		No. off	Dimensions									
	GASKET	Material:												
OTHER														

Fluid composition: Cold Side: District Heating Water.  
 It is assumed that corrosion inhibitors injection is foreseen to make fluid non corrosive to CS.  
 Flowing condition (specific heat, viscosity, thermal conductivity) shall be confirmed by Tamoil.

PED classification	fluid group:	Shell	Tube
		2nd	2nd
	fluid phase:	LIQUID	GAS
Liquid Vapour Pressure > 0.5 barg:		No	Yes

Dew point/bubble point properties:      Not applicable

NOTES  
 7. by Technical Departem

SKETCH (if required)  
  
 Not Required