PROJECT : PPPE PILOT PLANT	Client: يىمى	مرکت ملی صنایع پتروش شرکت ملی صنایع پتروش
TITLE : Data Sheet for 1st G.P.R. gas cooler(E- 411)	وشيمى	شرکت پژوهش و فناوری پتر
Data Sheet for 1st (Document No.: 400-DAS-A4-EQ-0094	11) Rev.: 00
	Owner Job No.:	Type: DAS
		Page A

PROJECT: PPPE PILOT PLANT					Client:								
TITLE :Dat	ta Sheet	for 1st C	S.P.R. gas	s cooler(E- 411)						شرکت ملی صنایع پترو شرکت پژوهش و فناوری پ		
REV.		1	1			REV.		<u> </u>	I	1			
PAGE REV.	1	2	3	4	5	PAGE	1	2	3	4	5		
A													
В 1													
2													
3								†					
4													
								1					
		1						1					
								+					
								<u> </u>					
								<u> </u>					
4													
3								1					
2													
1		65/:-	/201:					1					
0		28/12	2/2011	Н	.R	Α.	Α.	H H	.R	A	FC		
Revisi	ion	Da	ate	Prepa	red By	Check	ed By	Appro	ved By	Sta	itus		
					Do	cument revis	sion						
						Document	No.: 400-D	AS-A4-EQ-0	094	Rev.: 00			
						Owner Job	No.:			Type: DA	s		
										Page B			



TITLE :Data Sheet for 1st G.P.R. gas cooler(E- 411)

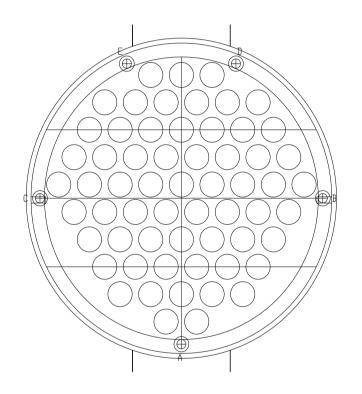
IIILE :Data Sneet	ior ist G.P.R. ga	as cooler(E- 411)			وشيمى	شرکت پژوهش و فناوری پتر
		Heat Exchai	nger Spec	ification Sheet		
Basell Polyolefins;Projec	t :Hostalen Pilot Plan		go. opco			
Company: NPC-RT;Loca						
Service of Unit: I GPR C						
Item No.: E-411	P&ID) No ·				
	Rev No.: 00				Quantity: 2	
Size	298.5/5200 mm	Type BEM	ver Conne	cted in	1 parallel	1 series
Surf/unit(eff.)	25.1 m2	Shells/Unit	1	Surf/shell (eff.)	25.	
ouri/uriit(eri.)	20.1 1112		RMANCE OF	. ,	25.	1 1112
Fluid allocation		PERFO			Tube	Side
Fluid allocation				shell side		
		l/a/h	CO	oling water 30000	·	ss gas 000
Fluid quantity, Total		kg/h		30000	14000	14000
Vapor (In/Out) Liquid		kg/h	30000	30000	14000	14000
·		kg/h	30000	30000		
Noncondensable		kg/h		1		1
T (((() () () () ()				22.22	22	05.00
Temperature (In/Out)		C		62.02	80	65.69
Dew / Bubble point		C		004.47	07	00.74
Density		kg/m3		984.47	27	28.74
Viscosity		ср	0.481	0.461	0.011	0.011
Molecular wt, Vap						
Molecular wt, NC		1 1771 -413	4.405	4.405	4.000	4.070
Specific heat		kJ/(kg*k)	4.185	4.185	1.909	1.872
Thermal conductivity		W/(m*k)	0.642	0.645	0.027	0.026
Latent heat		kJ/kg		297.3		
Pressure		bar	3.5		19	
Velocity		m/s		0.45	6.52	
Pressure drop, allow./cal	C.	bar	0.689	0.14	0.689	0.034
Fouling resist. (min)		m2*K//W		0,0002	0.000	5
Heat exchanged	1051	87 W		MTD	corrected	11.42 C
Transfer rate, Service	367.5	5 Dirty	367.3	Clear	n 52	0 W/(m ² *k)
	CONSTR	RUCTION OF ONE SHELL			Ske	etch
		Shell Side	T	ube Side		
Design/Test pressure	bar	29.42 / 44.13	29	.42 / 44.13		
Design temperature	С	180		180		
Number passes per shel		1		1		
Corrosion allowance	mm	0		0		
Connections	In	101.6 / 300 ANSI	152.4	/ 300 ANSI		
Size/rating	Out	101.6 / 300 ANSI	152.4	/ 300 ANSI		
mm/	Intermediate	/ 300 ANSI	=	/ 300 ANSI		
Tube No. 61	OD	25.4 Tks-avg 2.11	mm	Length 5200	mm Pitch	32 mm
Tube type	Plain	Material		SA-312 TP304	Tube pattern	30
Shell SS 304		Pipe 12", Sch80S		Shell cover		
Channel or bonnet		SS304		Channel cover		
Tubesheet-stationary		SS304		Tubesheet-floating		
Floating head cover				Impingement protect	ction	Circular Plate on bundel
Baffle-crossing	SA240-304	L Type single seg	Cut(%d)	31 vert	Spacing:c/	
Baffle-long		Seal type			Inlet	274.6 mn
Supports-tube		U-bend		Туре		
Bypass seal			Tube-tubesh	•	exp./seal wld	
Expansion joint			Туре	<u> </u>	·	
RhoV2-Inlet nozzle	1072	Bundle entrance	335		Bundle exit	335 kg/(m*s2)
Gaskets - Shell side		np. fiber Tube side		Comp. fiber	(m=2.75	y=3700 psi)
Floating head		·		· · · · · · · · · · · · · · · · · · ·	,	
Code requirements	ASM	E Code Sec VIII Div 1		TEMA class	R	
Fabricated Weight [kg]:1		mpty weight [kg]: 1183.3	Shop t	est weight [kg]: 1581		nt [kg]: 434.26
		: 45 , Moment[kg.m]: 25 ,	-			. 01
			OLIOIVIIO. L	oaulvaij. 40 , Moitle	nqng.mj. 20]]	
,	•	d be verified by vendor.				
Simulation with velocity in	n ped reactor: 0.5 m/s	S				
			Docu	ıment No.: 400-I	DAS-A4-EQ-0094	Rev.: 00
			Own	er Job No.:		Type: DAS
						Page 1 OF 4
						ŭ

Page 2 of 4

PROJECT: PPPE PILOT PLANT

TITLE : Data Sheet for 1st G.P.R. gas cooler(E- 411)

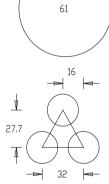




 Shell ID
 313.9 mm

 D.T.L.
 285.8 mm

 Baffle cut to C/69.3 mm



Document No.: 400-DAS-A4-EQ-0094	Rev.: 00
Owner Job No.:	Type: DAS
	Page 3of 4

PROJECT: PPPE PILOT PLANT	client:	<u>*</u>
TITLE : Data Sheet for 1st G.P.R. gas cooler(E- 411)		شرکت ملی صنایع پتروه شرکت پژوهش و فناوری پت
1- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM. 2- UNLESS OTHERWISE NOTED , OUTSIDE PROJECTION OF NOZZLES ARE ME WELDED EDGE OF NOZZLE.	ASURED FROM C.L./T.L. OF EXCHANGER TO THE EXTREME FACI	E OR BUTT
3-THE MECHANICAL DATA SPECIFIED ON DRAWINGS ARE MINUMUM PURCHA AND PROJECT SPECIFICATIONS IS MANUFACTURER'S RESPONSIBILITY. 4- LIFTING LUGS SHALL BE DESIGNED AND EXACT LOCATION DETERMINED B' 5- THE INDICATED WEIGHTS TO BE CONFIRMED /CHECKED BY MANUFACTURI	Y THE MANUFACTURER. ER.	N WITH APPLICABLE CODE
6- ALL FLANGE BOLT HOLES TO STRADDLE CENTER LINES EXCEPT AS SHOON 7- OUTSIDE EDGE OF ALL FLANGES / FORGINGS TO BE BEVELLED WITH 45 DE 8- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125 -250 9- DRILING AND TOLERANCES OF TUBESHEET SHALL BE PER TEMA STANDAR 10 - BOTH ENDS OF TIE RODS SHALL BE UNC THREADED ON 50 MM.	EGREE ANGLE IN 5 MM DISTANCE. MICROINCH AVERAGE ROUGHNESS.	
11- THREADED HOLES IN TUBESHEET MUST NOT BE COMPLETELY DRILLED. 13- DIAMETER OF HOLES FOR TIE RODS IN BAFFLE = TIE ROD DIA. + 0.5 MM. 14- ALL TAILED DIMENSIONS ARE MEASURED FROM BASE LINE. 15- EDGE OF HOLES IN BAFFLES SHALL BE ROUNDED (R=2MM)OR BEVELED.		
16- HANDLING LUGS FOR EXCHANGER COMPONENTS SHALL BE DESIGNED A 17- DIMENSIONS REFER TO BAFFLES OR TUBE SUPPORTS ARE MEASURED FI		
18- MANUFACURER SHALL PERFORM THE REQUIRED CHECKING /DESIGN OF WHERE EXPANSION JOINT IS REQUIRED, BLINDED LWN FLANGES FOR VENT 19 - IMPACT TEST REQUIREMENTS FOR ALL PARTS MATERIAL SHALL BE CHECAND THEN REFLECTED IN FABRICATION DRAWINGS. 20-ALL NOZZLES SHALL BE RADIUSED WITH THE CONTOUR OF THE SHELL, C	AND DRAIN ON EXPANSION JOINT SHALL BE CONSIDERER. CKED BY MANUFATURER RESULTS SHALL BE CONCLUDED IN CA	
R=2MM . INTERNAL 21-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED.		
21-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED. 22-SHELL / NOZZLE THICKNESS AT CONNECTION/ ATTACHMENT AREA SHALL 23-BASE LINE (B.L.)INDICATES THE GASKET FACE OF TUBESHEET.	BE VERIFIED BY LOCAL STRESS CALCULATION.	
	Document No.: 400-DAS-A4-EQ-0094	Rev.: 00
	Owner Job No.:	Type: DAS
		Page 4 of 4

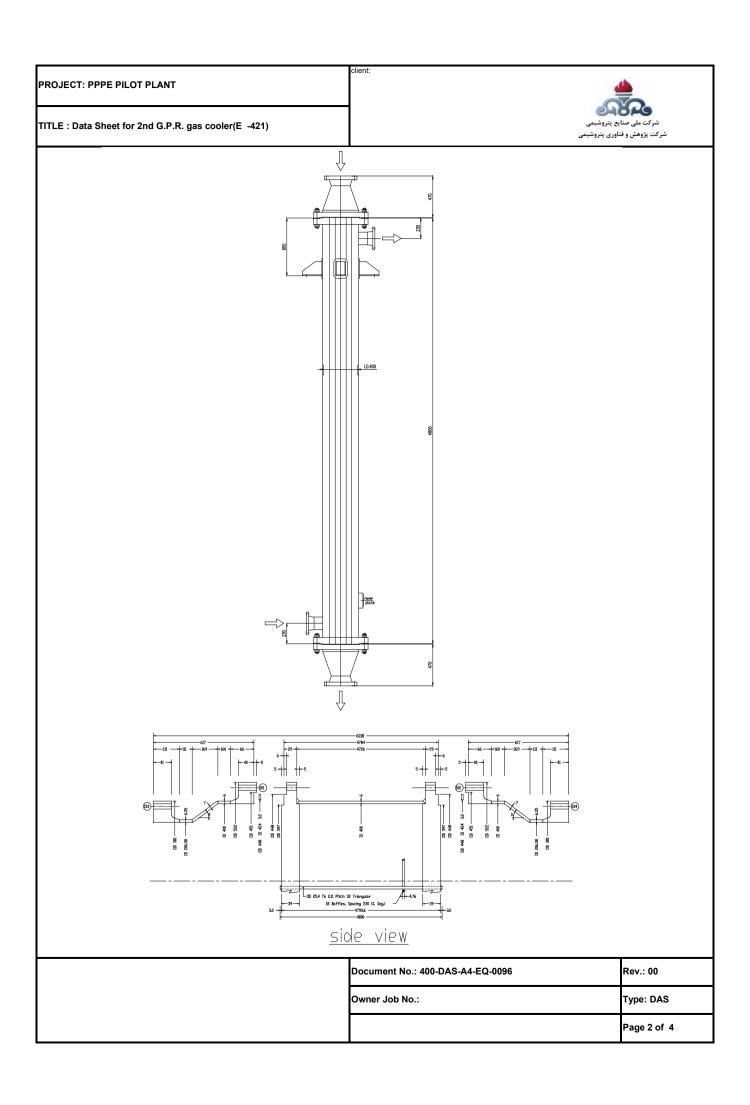
PROJECT : PPPE PILOT PLANT	client:	2 €
TITLE: Data Sheet for 2nd G.P.R. gas cooler(E -421)		شرکت ملی صنایع پتروش شرکت پژوهش و فناوری پتر
Data Sheet for 2nd	Document No.: 400-DAS-A4-EQ-0096	121)
	Owner Job No.:	Type: DAS
		Page A
		· uge A

PROJECT: PPPE PILOT PLANT					Client:						
TITLE :Data Sheet for 2nd G.P.R. gas cooler(E -421)					شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی						
		1						1	7	•	7
REV.	1	2	3	4	5	REV.	1	2	3	4	5
Α											
В											
1											
2											
3 4											
4											
			ļ							<u> </u>	
			 							<u> </u>	
4											
3											
1											
0		16/12	2/2011	H.	R	۸	.A	Ц	.R		FC
Revisi	on	Da	ate	Prepa	red By	Check	ed By	Appro	ved By	Sta	itus
					Doc	ument revis	sion				
						Document No.: 400-DAS-A4-EQ-0096			096	Rev.: 00	
						Owner Job	No.:			Type: DA	S
										Page B	
						-				-	



TITLE :Data Sheet for 2nd G.P.R. gas cooler(E- 421)

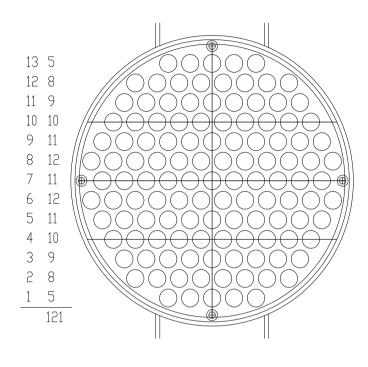
TITLE .Data Sileet	101 2110 0.1 .11. g	us cooler(2 421)			وشيمى	شرکت پژوهش و فناوری پتر
		Heat Exchar	nger Speci	fication Sheet		
Basell Polyolefins;Project	t :Hostalen Pilot Plan	t				
Company: NPC-RT;Loca		an				
Service of Unit: II GPR C						
Item No.: E-421).No.:				
	Rev No.: 00					
Size	400-4800 mm	71	ver Conne		1 parallel	1 series
Surf/unit(eff.)	45.8 m2		1	Surf/shell (eff.)	45.	8 m2
		PERFOR	RMANCE OF			
Fluid allocation				hell side		e Side
Fluid name			Co	oling water		ess gas
Fluid quantity, Total		kg/h		50000		0000
Vapor (In/Out)		kg/h	50000	50000	30000	30000
Liquid		kg/h	50000	50000		
Noncondensable		kg/h		_		1
Tamananatura (In/Out)			60.5	CE 45	75	00.00
Temperature (In/Out) Dew / Bubble point		C	62.5	65.15	75	66.82
Density		kg/m3	984.2	982.7	26.57	27.43
Viscosity		ср	0.457	0.44	0.011	0.01
Molecular wt, Vap		СР	0.401	0.44	0.011	0.01
Molecular wt, VAP				1		1
Specific heat		kJ/(kg*k)	4.185	4.185	2.279	2.256
Thermal conductivity		W/(m*k)	0.646	0.649	0.052	0.051
Latent heat		kJ/kg	,	1		
Pressure		bar	3.5	†	25	1
Velocity		m/s		0.49	7.25	5
Pressure drop, allow./cale	r.	bar	0.689	0.14	0.689	0.041
Fouling resist. (min)	<u>. </u>	m2*K//W		0,0002	0.000	
Heat exchanged	1543	46 W			corrected	6.71 C
Transfer rate, Service	431.9		431.8	Clea		
,		UCTION OF ONE SHELL				etch
		Shell Side	T	ube Side	_	
Design/Test pressure	bar	30/ /45		30/ /45		
Design temperature	С	180		180		
Number passes per shell		1		1		
Corrosion allowance	mm	0		0		
Connections	In	152.4 / 300 ANSI	203.2	/ 300 ANSI		
Size/rating	Out	152.4 / 300 ANSI	203.2	/ 300 ANSI		
mm/	Intermediate	/ 300 ANSI		/ 300 ANSI		
Tube No. 121	OD	25.4 Tks-avg 2.11	mm	Length 4800) mm Pitch	32 mm
Tube type	Plain	Material		SS304	Tube pattern	n 30
Shell SS304		Pipe 18", Sch80S		Shell cover		
Channel or bonnet		SS304		Channel cover		
Tubesheet-stationary		SS304		Tubesheet-floating		
Floating head cover				Impingement prote	ction	Circular Plate on bundel
Baffle-crossing	SS304	Type single seg	Cut(%d)	29 vert	Spacing:c	
Baffle-long		Seal type			Inlet	416.43 mr
Supports-tube		U-bend		Туре		
Bypass seal			Tube-tubesh	eet joint	exp./seal wld	
Expansion joint	=	B " :	Туре		D " "	
RhoV2-Inlet nozzle	590	Bundle entrance	330		Bundle exit	330 kg/(m*s2)
Gaskets - Shell side	Con	np. fiber Tube side		Comp. fiber	(m=2.75	y=3700 psi)
Floating head	ACM	E Code Sec VIII Div 1		TEMA class	D	
Code requirements		E Code Sec VIII Div 1	01	TEMA class	R Dundle wein	ht firm), OOC
Fabricated Weight [kg]:2		Empty weight [kg]: 2105	-	est weight [kg]: 2929		nr [kg]: 896
LOADS AT BASE (*): [SEISMIC: L	oad[kgf]: 45,Mome	ent[kg.m]: 25]]	
,	,	be verified by vendor.				
Simulation with velocity in	bed reactor: 0.5 m/s	S				
			Docu	ment No.: 400-l	DAS-A4-EQ-0096	Rev.: 00
			Owne	er Job No.:		Type: DAS
						Page 1 OF 4
			L			

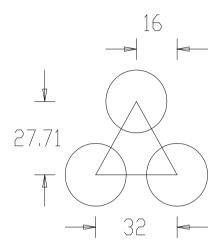


PROJECT: PPPE PILOT PLANT

TITLE : Data Sheet for 2nd G.P.R. gas cooler(E -421)







Shell ID 400 mm O.T.L. 387.3 mm Baffle cut to C/L83.1 mm

Document No.: 400-DAS-A4-EQ-0096	Rev.: 00
Owner Job No.:	Type: DAS
	Page 3 of 4

	Lean	
PROJECT: PPPE PILOT PLANT	client:	<u>*</u>
TITLE : Data Sheet for 2nd G.P.R. gas cooler(E -421)		شرکت ملی صنایع پترونا شرکت پژوهش و فناوری پت
GENERAL NOTES		
1- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM.		
2- UNLESS OTHERWISE SPECIFIED , OUTSIDE PROJECTION OF NOZZLES ARE ME WELDED EDGE OF NOZZLE.	ASURED FROM C.L./T.L. OF EXCHANGER TO THE EXTREME FACI	E OR BUTT
3-THE MECHANICAL DATA SPECIFIED ON DRAWINGS ARE MINUMUM PURCHA: AND PROJECT SPECIFICATIONS IS MANUFACTURER'S RESPONSIBILITY.	SER'S REQUIREMENTS ADQEUACY AND COMPLIANCE OF DESIGN	N WITH APPLICABLE CODE
4- LIFTING LUGS SHALL BE DESIGNED AND EXACT LOCATION DETERMINED BY 5- THE INDICATED WEIGHTS TO BE CONFIRMED /CHECKED BY MANUFACTURE 6- ALL FLANGE BOLT HOLES TO STRADDLE CENTER LINES EXCEPT AS SHOON	ER.	
7- OUTSIDE EDGE OF ALL FLANGES / FORGINGS TO BE BEVELLED WITH 45 DE		
8- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125 -250 9- DRILING AND TOLERANCES OF TUBESHEET SHALL BE PER TEMA STANDAR		
10 - BOTH ENDS OF TIE RODS SHALL BE UNC THREADED ON 50 MM.		
11- THREADED HOLES IN TUBESHEET MUST NOT BE COMPLETELY DRILLED.		
13- DIAMETER OF HOLES FOR TIE RODS IN BAFFLE = TIE ROD DIA. + 0.5 MM. 14- ALL TAILED DIMENSIONS ARE MEASURED FROM BASE LINE.		
15- EDGE OF HOLES IN BAFFLES SHALL BE ROUNDED (R=2MM)OR BEVELED.		
16- HANDLING LUGS FOR EXCHANGER COMPONENTS SHALL BE DESIGNED A	ND EXACT LOCATED BY MANUFACTURER.	
17- DIMENSIONS REFER TO BAFFLES OR TUBE SUPPORTS ARE MEASURED FI		
18- MANUFACURER SHALL PERFORM THE REQUIRED CHECKING /DESIGN OF WHERE EXPANSION JOINT IS REQUIRED, BLINDED LWN FLANGES FOR VENT.		
19 - IMPACT TEST REQUIREMENTS FOR ALL PARTS MATERIAL SHALL BE CHEC		LCULATIONS
AND THEN REFLECTED IN FABRICATION DRAWINGS.		
20-ALL NOZZLES SHALL BE RADIUSED WITH THE CONTOUR OF THE SHELL , C $R=2MM$. INTERNAL	HANNEL AND HEADS INNER WALLS AS FOLLOWS:ITEM R = 6 MM	, ALL THE OTHER ONES
21-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED.		
22-SHELL / NOZZLE THICKNESS AT CONNECTION/ ATTACHMENT AREA SHALL	BE VERIFIED BY LOCAL STRESS CALCULATION.	
23-BASE LINE (B.L.)INDICATES THE GASKET FACE OF TUBESHEET.		
	D	D 00
	Document No.: 400-DAS-A4-EQ-0096 Owner Job No.:	Rev.: 00 Type: DAS
	5 505 No	. 300. DAG
		Page 4 of 4

PROJECT : PP-PE PILOT PLANT TITLE : Data Sheet for Propane recovery condenser (E-351)	Client: یمی وشیمی	شرکت ملی صنایع پتروش شرکت بروهش و فناوری پتر
	ane recovery conden E -351)	
	Document No.: 300-DAS-A4-EQ-0172	Rev.: 01
	Owner Job No.:	Type: DAS
		Page A

						Client						
PROJECT	PROJECT: PP-PE PILOT PLANT					Client:						
TITLE : Da (E-351)	ta Sheet	for Prop	oane reco	overy co	ndenser					ت ملی صنایع پترو ژوهش و فناوری پ		
REV.	1	2	3	4	5	REV.	1	2	3	4	5	
A	Х											
В 1	X											
2	X X											
_												
5												
4												
3												
1		1399/	11/12	AA	.SH					A	FC	
Revisi	Revision Date Prepared By		Checl	ked By	Appro	ved By	Sta	atus				
					Doc	cument revi	sion			1		
LICENSOR:						Document No.: 300-DAS-A4-EQ-0172			172	Rev.: 01		
						Owner Job	No.:			Type: DA	ıs	
									Page B			



TITLE : Data Sheet for Propane recovery condenser

(E-351)	•			وشيمى	شرکت پژوهش و فناوری پترو	
	Heat Exchar	nger Spec	ification Sheet			
PP-PE Pilot Plant		<u> </u>				
Company: NPC-RT, Location:Arak; Country:	Iran					
Service of Unit: Propane tower condenser						
	D.No.:JS-300-PID-A1-FS-040	4				
Date: Rev No.: 01						
Size 307/1850 mm	71	Hor Conne		1 parallel	1 series	
Surf/unit(eff.) 11.8 m2	Shells/Unit	1	Surf/shell (eff.)	11.	.8 m2	
Florid all a satism	PERFOR	RMANCE OF		T. 1.	- 014-	
Fluid allocation Fluid name			Shell side bons Vapor (E & P)		e Side ng Water	
Fluid quantity, Total	kg/h	Tiyulocan	700		200	
Vapor (In/Out)	kg/h	700	100		1	
Liquid	kg/h		526	4200	4200	
Noncondensable	kg/h		75		•	
Temperature (In/Out)	С	53	40	27	37	
Dew / Bubble point	С	52	28			
Density	kg/m3	42	457	1000	1000	
Viscosity Molecular ut. Van	ср	0.01	0.09	0.9	0.7	
Molecular wt, Vap Molecular wt, NC						
Specific heat	kcal/(kg*C)	0.5	0.8	1	1	
Thermal conductivity	kcal/(h m C)	0.02	0.08	0.5	0.5	
Latent heat	kJ/kg	285	304			
Pressure	bar	20.5	20.4	4	3.8	
Velocity	m/s		20	3	•	
Pressure drop, allow./calc.	bar	0.1	0.1	0.2	0.2	
Fouling resist. (min)	m2*K//W					
Heat exchanged 49	kW		MTD	corrected	14.2 C	
Transfer rate, Service 292	Dirty	304	Clea		, ,	
CONSTR	RUCTION OF ONE SHELL			Sk	etch	
Davis (Tastanas and	Shell Side		Tube Side	1" [®]	PT ®	
Design/Test pressure bar Design temperature C	31 / Code -60~230	,	31 / Code -60~230	1" LT	1" PT 1" 👺	
Number passes per shell	1		2			
Corrosion allowance mm	0		0			
Connections In in	2" / 300#	1"	/ 300#		1"5	
Size/rating Out	1" / 300#	1"	/ 300#	1" б	1"@	
Intermediate	1" / 300#		/ 300#			
Tube No. 111 OD	19.05 Tks-avg 2.1	mm	Length 1850	1 1011	23.81 mm	
Tube type Plain	Material		S.S304L	Tube patterr	ו 30	
Shell & Channel S.S304L	Tks 10 mm		Shell cover			
Channel or bonnet	SA-312 TP304		Channel cover			
Tubesheet-stationary	SA-312 TP304		Tubesheet-floating	4:	Oincodes Diete en bourdel	
Floating head cover Baffle-crossing SA240-304	L Type single sea	Cut(%d)	Impingement protection 23 vert	Spacing:c	Circular Plate on bundel	
Baffle-long	L Type single seg Seal type	Jul /00)	23 vert	Inlet	/c 85 mm 121 mm	
Supports-tube	U-bend		Туре		:=:	
Bypass seal		Tube-tubesh		exp./seal wld		
Expansion joint		Туре				
RhoV2-Inlet nozzle	Bundle entrance			Bundle exit	kg/(m*s2)	
Gaskets - Shell side	Tube side					
Floating head	F.O. I. O. 1997 F.		TE144 :			
'	E Code Sec VIII Div 1		TEMA class	B		
Fabricated Weight [kg]: 515	Empty weight [kg]:	-	test weight [kg]:	Bundle weig	nt [kg]:	
LOADS AT BASE (*): [[WIND: 120 km/hr		: , SEISMI	IC: Load[kgf]: , Mo	ment[kg.m]:]]		
Remarks (*): These item should	d be verified by vendor.					
LICENSOR:		Docu	ument No.: 300-l	DAS-A4-EQ-0172	Rev.: 01	
		Own	er Job No.:		Type: DAS	
					Page 1 OF 2	

PROJECT: PP-PE PILOT PLANT	client:
TITLE : Data Sheet for Propane recovery condenser (E-351)	شر کت ملی صنایع پتروشیمی شر کت پژوهش و فناوری پتروشیمی

GENERAL NOTES

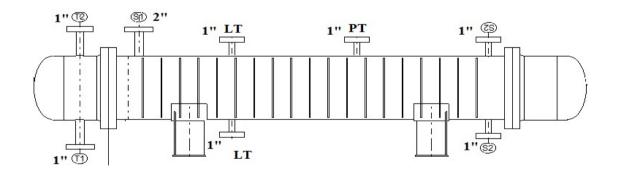
- 1- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM.
- 2- UNLESS OTHERWISE NOTED , OUTSIDE PROJECTION OF NOZZLES ARE MEASURED FROM C.L./T.L. OF EXCHANGER TO THE EXTREME FACE OR BUTT WELDED EDGE OF NOZZLE.
- 3-THE MECHANICAL DATA SPECIFIED ON DRAWINGS ARE MINUMUM PURCHASER'S REQUIREMENTS ADQEUACY AND COMPLIANCE OF DESIGN WITH APPLICABLE CODE AND PROJECT SPECIFICATIONS IS MANUFACTURER'S RESPONSIBILITY.
- 4- LIFTING LUGS SHALL BE DESIGNED AND EXACT LOCATION DETERMINED BY THE MANUFACTURER.
- 5- THE INDICATED WEIGHTS TO BE CONFIRMED /CHECKED BY MANUFACTURER.
- 6- ALL FLANGE BOLT HOLES TO STRADDLE CENTER LINES EXCEPT AS SHOOWN OTHERWISE.
- 7- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125 -250 MICROINCH AVERAGE ROUGHNESS.
- 8- DRILING AND TOLERANCES OF TUBESHEET SHALL BE PER TEMA STANDARD FIT.
- 9- THREADED HOLES IN TUBESHEET MUST NOT BE COMPLETELY DRILLED.
- 10- ALL TAILED DIMENSIONS ARE MEASURED FROM BASE LINE.
- 11- HANDLING LUGS FOR EXCHANGER COMPONENTS SHALL BE DESIGNED AND EXACT LOCATED BY MANUFACTURER.
- 12- DIMENSIONS REFER TO BAFFLES OR TUBE SUPPORTS ARE MEASURED FROM CENTER OF EACH ONE.
- 13- MANUFACURER SHALL PERFORM THE REQUIRED CHECKING /DESIGN OF SHELL EXPANSION JOINT.
- WHERE EXPANSION JOINT IS REQUIRED , BLINDED LWN FLANGES FOR VENT AND DRAIN ON EXPANSION JOINT SHALL BE CONSIDERER.
- 14 IMPACT TEST REQUIREMENTS FOR ALL PARTS MATERIAL SHALL BE CHECKED BY MANUFATURER RESULTS SHALL BE CONCLUDED IN CALCULATIONS

AND THEN REFLECTED IN FABRICATION DRAWINGS.

15-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED.

16-SHELL / NOZZLE THICKNESS AT CONNECTION/ ATTACHMENT AREA SHALL BE VERIFIED BY LOCAL STRESS CALCULATION.

17-BASE LINE (B.L.)INDICATES THE GASKET FACE OF TUBESHEET.



LICENSOR:	Document No.: 300-DAS-A4-EQ-0172	Rev.: 01
	Owner Job No.:	Type: DAS
		Page 2 of 2

	client:	
PROJECT : PP-PE PILOT PLANT	ichent.	<u>♣</u>
TITLE : Data Sheet for Reboiler Tower 351 (E-352)		شر <i>ک</i> ت ملی صنایع پتروش شر کت پژوهش و فناوری پتر
Data Sheet for Ret	Document No.: 300-DAS-A4-EQ-0179	5 2)
	Owner Job No.:	Type: DAS
		Page A

						Client:				4	
PROJECT: PP-PE PILOT PLANT					-				A PROPERTY OF THE PROPERTY OF		
TITLE : Da	ta Sheet	for Reb	oiler Tov	ver 351 (E	E-352)	ی صنایع پتروشیمی ش و فناوری پتروشیمی					
							1		_	_	T
REV.	1	2	3	4	5	PAGE	1	2	3	4	5
Α	Х										
В	Х										
1	Х										
2	Х										
			-					+			
		<u> </u>					<u>I</u>		1	1	1
5											
4											
3											
2											
1		1399,	/11/11	AA	.SH					A	FC
Revisi	on	D	ate	Prepa	red By	Check	ced By	Appro	oved By	Sta	atus
					Do	cument revi	sion				
LICENSOR: A	ASELL					Document	No.: 300-D	AS-A4-EQ-(0179	Rev.: 01	
						Owner Job	No.:			Type: DA	S
										Page B	

PROJECT: PP-PE PILOT PLANT



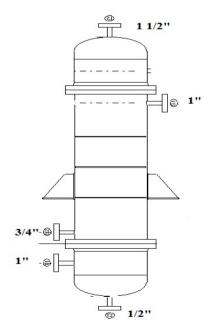


Surf/unit(eff.) 9.1 m2 Shells/unit 1 Surf/shell (eff.) 9.1 m2 PERFORMANCE OF ONE UNIT											
Performance of Net Unit Tube Side Tu	Size 330	/ 1000 mm		Type BE	M	Ver	Con	nected in	1 parallel	1	series
Fluid pame LPS Propaneri-Butene LPS LPS	Surf/unit(eff.)	9.1 m2		Shells/unit	1			Surf/shell (eff.)	9.1		m2
Fluid parentity, Total kgh 39 500 500				PERFOR	MANC	E OF O	NE UNIT	•			
Fluid quantity, Total kg/h 39	Fluid allocation						Shell Si	de			
Vapor (In/Out)	Fluid name						LPS		Propan	e/1-Bute	ene
Liquid Rg/h 0 39 500 0 0 Noncondensable Rg/h 0 0 0 0 0 0 0 0 0	Fluid quantity, Total			kg/h			39			500	
Noncondensable Kgh	Vapor (In/Out)			kg/h		39		0	0		500
Femperature (In/Out)	Liquid			kg/h		0		39	500		0
Dew Klubble point	Noncondensable			kg/h			0			0	
Dew Klubble point											
Density (Nap / Lip)	Temperature (In/Out)			С	:	120		120	100		110
Viscosity				С	;	120		120	103		97
18.02 53.21 53.21				kg/m3							1
Molecular wt. NC Specific heat Scali(kg*C) 0.4826	Viscosity			ср	0.013	3 /		/ 0.284	0.011 / 0.091	0.011	1
Specific heat	Molecular wt, Vap					18.02			53.21		53.21
Thermal conductivity	Molecular wt, NC										
Selection Sele	Specific heat										
Design Dirty Dir	Thermal conductivity			, ,						0.023	
Velocity	Latent heat			kcal/kg							
Pressure drop, allow/calc. kg/fcm2 0.264 0.006 0.51 0.011	Pressure			bar		2		1.99	20.9		20.8
Fouling resist. (min) m2*h*C/kcal 0.0001 0.0002 0.00024 Ao based deat exchanged 36 kW MTD corrected 18 C Transfer rate, Service 130 Dirty 133 Clean 133 kcal/(h*m2 CONSTRUCTION OF ONE SHELL Sketch Ske	Velocity						15			3	
Heat exchanged 36		alc.				0.264					
Transfer rate, Service	Fouling resist. (min)	<u> </u>					0.0001				
Construction of one Shell Sketch Shell Side Tube Side Design/Vac/Test pressure bar 31	Heat exchanged			kW						-	
Shell Side	Transfer rate, Service				,		133	Clear			cal/(h*m2*
Design Vac/Test pressure bar 31		CON	ISTRUCTI		IELL						
Design temperature				Shell Side			Tul	be Side	ئے	11/2"	
Design temperature C -60-230 -80-230			31	/ /		31	1	1			
Cornosion allowance							-6	0~230			
In								•			
Nominal Nom				-				~			
Nominal Intermediate				/ ;					1" e	T'	
Tube No. 161 OD 19.05 Tks- Avg 2.1 mm Length 1000 mm Pitch 23.81 mm Tube type Plain Material S.S304L Tube pattern 30 Shell&Channel S.S304L ID 330 Tks 10 mm Shell cover Channel or bonnet SA-312 TP304 Channel cover Tubesheet-stationary SA-312 TP304 Tubesheet-floating Floating head cover Impingement protection None Saffle-crossing S.S304L Type Single segmer Cut(%d) 33 V Spacing: c/c 15 Saffle-long - Seal type Inlet 15 Supports-tube U-bend Type Supports-tube U-bend Type Supports-tube Tube-tubesheet joint Exp. Expansion joint - Type Show Inlet 15 Saffle-lor O Bundle exit 0 kg/(m² Gaskets - Shell side Floating head Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr Supports-tube Asme Code Sec VIII Div 1 Tema class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS		_	3/4	/	300#		1/2	/ 300#		10 1/2"	
Tube type Plain Material S.S304L Tube pattern 30 Shell&Channel S.S304L ID 330 Tks 10 mm Shell cover - Channel or bonnet SA-312 TP304 Channel cover - Tubesheet-stationary SA-312 TP304 Tubesheet-floating - Impingement protection None Baffle-crossing S.S304L Type Single segmer Cut(%d) 33 V Spacing: c/c 15 Saffle-long - Seal type Inlet 15 Supports-tube U-bend Type Sypass seal Tube-tubesheet joint Exp. Expansion joint - Type Rhov2-Inlet nozzle Bundle entrance 0 Bundle exit 0 kg/(m² Saskets - Shell side Tube Side Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr Remarks Code Sec VIII Div 1 Tema Class B - chemical service Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS				/	-			/ -			
Shell&Channel S.S304L ID 330 Tks 10 mm Shell cover - Channel or bonnet SA-312 TP304 Channel cover - Tubesheet-stationary SA-312 TP304 Tubesheet-floating - Floating head cover - Baffle-crossing S.S304L Type Single segmer Cut(%d) 33 V Spacing: c/c 15 Baffle-long - Seal type Inlet 15 Supports-tube U-bend Type Supports-tube U-bend Type Sypass seal Tube-tubesheet joint Exp. Expansion joint - Type Gaskets - Shell side Tube Side Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr Remarks Wind velocity: 120 km/hr Remarks Wind velocity: 120 km/hr Remarks Vind velocity: 120 km/hr Remarks Rev.: 01 Document No.: 300-DAS-A4-EQ-0179 Rev.: 01			19.05	Tks- Avg			mm				
Channel or bonnet SA-312 TP304 Channel cover - Tubesheet-stationary SA-312 TP304 Tubesheet-floating - Floating head cover - Impingement protection None Baffle-crossing S.S304L Type Single segmer Cut(%d) 33 V Spacing: c/c 15 Baffle-long - Seal type Inlet 15 Bupports-tube U-bend Type Bypass seal Tube-tubesheet joint Exp. Expansion joint - Type RhoV2-Inlet nozzle Bundle entrance 0 Bundle exit 0 kg/(m² Gaskets - Shell side Tube Side Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr Remarks Wind velocity: 120 km/hr Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS										ittern	30
Tubesheet-stationary SA-312 TP304 Tubesheet-floating - Floating head cover - Impingement protection None Baffle-crossing S.S304L Type Single segmer Cut(%d) 33 V Spacing: c/c 15 Baffle-long - Seal type Inlet 15 Supports-tube U-bend Type Byparts-stube U-bend Type Bypars seal Tube-tubesheet joint Exp. Expansion joint - Type RhoV2-Inlet nozzle Bundle entrance 0 Bundle exit 0 kg/(m² Gaskets - Shell side Floating head - Tube Side Floating head - Tube Side Floating head - TEMA class B - chemical service Remarks Wind velocity: 120 km/hr Bundle vity Side Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr Bundle vity Side Side Floating head Sid		·L			S	10	mm				
Floating head cover - Impingement protection None Baffle-crossing S.S304L Type Single segmer Cut(%d) 33 V Spacing: c/c 15 Baffle-long - Seal type Inlet 15 Supports-tube U-bend Type Bypass seal Expansion joint - Type RhoV2-Inlet nozzle Bundle entrance 0 Bundle exit 0 kg/(m² Gaskets - Shell side Tube Side Floating head - Tema class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr Remarks Wind velocity: 120 km/hr South State of the protection None Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS											
Seaffle-crossing S.S304L Type Single segmer Cut(%d) 33 V Spacing: c/c 15 Baffle-long - Seal type Inlet 15 Supports-tube U-bend Type Bypass seal Tube-tubesheet joint Exp. Expansion joint - Type RhoV2-Inlet nozzle Bundle entrance 0 Bundle exit 0 kg/(m² Gaskets - Shell side Tube Side Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr Supports-tube U-bend Type Bundle entrance 0 Bundle exit 0 kg/(m² Gaskets - Shell side Tube Side Side Side Side Side Side Side Sid	,			P304					0		
Baffle-long - Seal type Inlet 15 Supports-tube	•		-				0 (0/ 1)				
Supports-tube U-bend Type Bypass seal Tube-tubesheet joint Exp. Expansion joint - Type RhoV2-Inlet nozzle Bundle entrance 0 Bundle exit 0 kg/(m² Gaskets - Shell side Tube Side Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr Semarks Wind velocity: 120 km/hr Semand Sylve Start				• • • • • • • • • • • • • • • • • • • •	-	gmei	Cut(%d)	33 V			
Tube-tubesheet joint Exp. Expansion joint - Type RhoV2-Inlet nozzle Bundle entrance 0 Bundle exit 0 kg/(m² Gaskets - Shell side Tube Side Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr Street Str	•	-						T		15	5 0
Expansion joint - Type RhoV2-Inlet nozzle Bundle entrance 0 Bundle exit 0 kg/(m² Gaskets - Shell side Tube Side Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr نازل خروجی مسیر تیوب (یک و نیم اینچ) در قسمت بالای کل بالا نصب و برای کپ پایین یک نازل نیم اینچ جهت تخلیه سیال تعبیه گردد. Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS				U-r		4	. 4 1 - 1 - 4	туре			
RhoV2-Inlet nozzle Bundle entrance 0 Bundle exit 0 kg/(m² Gaskets - Shell side Tube Side Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr الإلى مسير شار؛ بالإل يك اينج در فسمت بالاي شل نصب كردد. Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS	•					tubeshe	et joint		Exp.		
Gaskets - Shell side Tube Side Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr نازل خروجی مسیر تیوب (یک و نیم اینچ) در قسمت بالایی کپ بالین یک نازل نیم اینچ جهت تخلیه سیال تعبیه گرده. Pocument No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS		-		· ·	•				5 " "		1//*.
Floating head - Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr نازل خروجی مسیر تیوب (یک و نیم اینچ) در قسمت بالایی کپ بالین یک نازل نیم اینچ جهت تخلیه سیال تعبیه گرده. Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS				Bundle entrai		0:-1-	0		Bundle exit	0	kg/(m*s
Code requirements ASME Code Sec VIII Div 1 TEMA class B - chemical service Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr الإلى تو نيم اينج (قسمت بالايي كب بالا نصب و براى كب بايين يك نازل نيم اينج جهت تخليه سيال تعبيه گردد. الإلى مسير شل: نازل يك اينج در قسمت بالاي شل نصب كردد. Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS					Tube	Side					
Weight/Shell 350 Filled with water 450 Bundle 170 Remarks Wind velocity: 120 km/hr الزل خروجی مسیر تیوب (یک و نیم اینچ) در قسمت بالایی کپ بالا نصب و برای کپ پایین یک نازل نیم اینچ جهت تخلیه سیال تعبیه گردد. ### Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS		-	F 0- 4- 0	VIII D: : 4				TEMA -1	Б -1	-11-	
Remarks Wind velocity: 120 km/hr نازل خروجی مسیر تیوب (یک و نیم اینچ) در قسمت بالایی کپ بالا نصب و برای کپ بایین یک نازل نیم اینچ جهت تخلیه سیال تعبیه گردد. برای مسیر شل؛ نازل یک اینچ در قسمت بالای شل نصب کردد. Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS			∟ Code Se		L4-		450	I EIVIA Class			
نازل خروجی مسیر تیوب (یک و نیم اینچ) در قسمت بالایی کپ بالا نصب و برای کپ پایین یک نازل نیم اینچ جهت تخلیه سیال تعبیه گردد. Rev.: 01 Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS			_	Filled wit	n water		450		Bundle	170	
ارای مسیر شل: نازل یک اینچ در قسمت بالای شل نصب کردد. Document No.: 300-DAS-A4-EQ-0179 Rev.: 01 Owner Job No.: Type: DAS	Remarks Wind v	-			1: -		-: VII	.VI / ·	I :	2. 2. 1.	1:
Owner Job No.: Type: DAS		ال نعبیه دردد.	ہت ب ح بیہ سی					-		زل حروجی	
				Docu	ıment	t No.:	300-DA	S-A4-EQ-01	79	Rev.	.: 01
Page 1 OF 2						Owne	r Job I	No.:		Type:	DAS
										Page 1	OF 2

PROJECT:PP-PE PILOT PLANT	client:
TITLE : Data Sheet for Reboiler Tower 351 (E-352)	شرکت ملی صنایع پتروشیمی
	شرکت پژوهش و فناوری پتروشیمی

GENERAL NOTES

- 1- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM.
- 2- UNLESS OTHERWISE NOTED , OUTSIDE PROJECTION OF NOZZLES ARE MEASURED FROM C.L./T.L. OF EXCHANGER TO THE EXTREME FACE OR BUTT WELDED EDGE OF NOZZLE.
- 3-THE MECHANICAL DATA SPECIFIED ON DRAWINGS ARE MINUMUM PURCHASER'S REQUIREMENTS ADQEUACY AND COMPLIANCE OF DESIGN WITH APPLICABLE CODE AND PROJECT SPECIFICATIONS IS MANUFACTURER'S RESPONSIBILITY.
- 4- LIFTING LUGS SHALL BE DESIGNED AND EXACT LOCATION DETERMINED BY THE MANUFACTURER.
- 5- THE INDICATED WEIGHTS TO BE CONFIRMED /CHECKED BY MANUFACTURER.
- 6- ALL FLANGE BOLT HOLES TO STRADDLE CENTER LINES EXCEPT AS SHOOWN OTHERWISE.
- 7- OUTSIDE EDGE OF ALL FLANGES / FORGINGS TO BE BEVELLED WITH 45 DEGREE ANGLE IN 5 MM DISTANCE.
- 8- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125 -250 MICROINCH AVERAGE ROUGHNESS.
- 9- DRILING AND TOLERANCES OF TUBESHEET SHALL BE PER TEMA STANDARD FIT.
- 10 BOTH ENDS OF TIE RODS SHALL BE UNC THREADED ON 50 MM.
- 11- THREADED HOLES IN TUBESHEET MUST NOT BE COMPLETELY DRILLED.
- 13- DIAMETER OF HOLES FOR TIE RODS IN BAFFLE = TIE ROD DIA. + 0.5 MM.
- 14- ALL TAILED DIMENSIONS ARE MEASURED FROM BASE LINE
- 15- EDGE OF HOLES IN BAFFLES SHALL BE ROUNDED (R=2MM)OR BEVELED.
- 16- HANDLING LUGS FOR EXCHANGER COMPONENTS SHALL BE DESIGNED AND EXACT LOCATED BY MANUFACTURER.
- 17- DIMENSIONS REFER TO BAFFLES OR TUBE SUPPORTS ARE MEASURED FROM CENTER OF EACH ONE.
- 18- MANUFACURER SHALL PERFORM THE REQUIRED CHECKING /DESIGN OF SHELL EXPANSION JOINT.
- WHERE EXPANSION JOINT IS REQUIRED , BLINDED LWN FLANGES FOR VENT AND DRAIN ON EXPANSION JOINT SHALL BE CONSIDERER.
- 19 IMPACT TEST REQUIREMENTS FOR ALL PARTS MATERIAL SHALL BE CHECKED BY MANUFATURER RESULTS SHALL BE CONCLUDED IN CALCULATIONS AND THEN REFLECTED IN FABRICATION DRAWINGS.
- 20-ALL NOZZLES SHALL BE RADIUSED WITH THE CONTOUR OF THE SHELL , CHANNEL AND HEADS INNER WALLS AS FOLLOWS:ITEM R = 6 MM , ALL THE OTHER ONES R=2MM . INTERNAL
- 21-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED.
- 22-SHELL / NOZZLE THICKNESS AT CONNECTION/ ATTACHMENT AREA SHALL BE VERIFIED BY LOCAL STRESS CALCULATION. 23-BASE LINE (B.L.)INDICATES THE GASKET FACE OF TUBESHEET .



LICENSOR:	Document No.: 300-DAS-A4-EQ-0179	Rev.: 01
	Owner Job No.:	Type: DAS
		Page 2 of 2

PROJECT : PP PILOT PLANT TITLE : Data Sheet for Propane recovery condenser (E - 361)	client: يمى وشيمى	شرکت ملی صنایع پتروش شرکت پژوهش و فناوری پتر
	ane recovery conden E -361)	
	Document No.:	Rev.: 01
	Owner Job No.:	Type: DAS
		Page A

						Client:					1		
PROJECT:	PP PIL	OT PLAN	IT										
TITLE : Data Sheet for Propane recovery condenser (E -361)				شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی									
REV.	1	2	3	4	5	REV.	1	2	3	4	5		
Α	Х												
В	Х												
1	Х												
2	Х												
3	Х												
					1								
					ļ			ļ					
								1					
					 			 					
					1								
			-				•						
5													
4													
2								-					
1		2021	-11-27	V	.A	N /	l.N	^^	.SH	^	FC		
Revision	on	Da	ate	Prepa	red By	Check	ked By	Appro	ved By	ed By Status			
					Doo	ument revi	sion						
LICENSOR: B	ASELL					Document	No.:			Rev.: 01			
						Owner Job	No.:			Type: DA	S		
										Page B			

|--|

TITLE : Data Sheet for Propane recovery condenser (E -361)

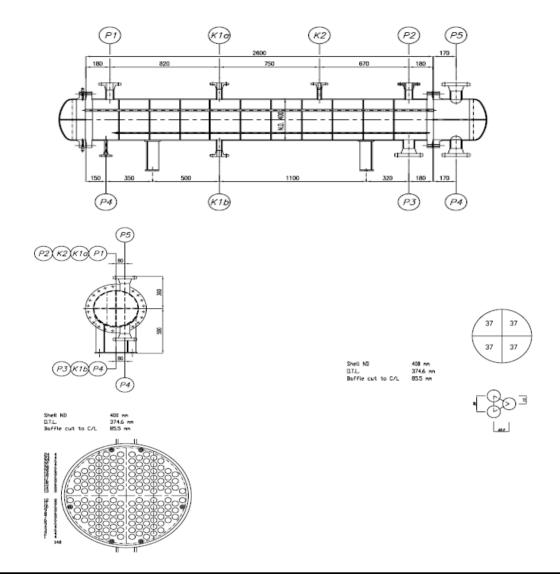


Page 1 OF 3

= -361) Heat Exchanger Specification

NDO DE Designato DD DE	Dilat Diant			Heat Excha	nger Spec	ification	Sheet				
NPC-RT;Project :PP-PE											
Company: NPC-RT;Loca			an								
Service of Unit: Propane	tower conder		. N								
Item No.: E-361	Na . 1	P&ID).No.:								
	ev No.: 1		T	DEM	h Campa	-4					
Size	386/2600 23.6	mm m2	Type Shells/U	BEM	hor Conne	cted in Surf/shell	(off.)	1	parallel 23.6		series m2
Surf/unit(eff.)	23.0	mz	SHEIIS/C		RMANCE OF		` '		23.0		mz
Fluid allocation				PERFO		Shell side		ı	Tube	Cido	
Fluid allocation						carbons Va	nor	-	Cooling To		ar .
Fluid quantity, Total				kg/h	Tiyato	1500	рог		230		21
Vapor (In/Out)				kg/h	1500	1000			200	1	
Liquid				kg/h		15	00	23	000		23000
Noncondensable				kg/h							
						1					
Temperature (In/Out)				С	48	4	0	3	30		34.97
Dew / Bubble point				C	47	46.					
Density				kg/m3	29.93	484	.69	99	7.25		996
Viscosity				ср		0.0	09	С	.8		0.72
Molecular wt, Vap											
Molecular wt, NC						•					
Specific heat				kJ/(kg*k)	1.813	3.0	77	4,	191		4,188
Thermal conductivity				W/(m*k)	0.024	0.0	94	0.0	808		0.613
Latent heat				kJ/kg	1	297	7.3				
Pressure				bar	19			4	.5		
Velocity				m/s		1.71			1.42		
Pressure drop, allow./ca	lc.			bar	0.138	0.0	19	0,68	3948		0.089
Fouling resist. (min)				m2*K//W		0,0002			0.0003	3	
Heat exchanged		1144	51 W				MTD	corrected		13.12	С
Transfer rate, Service		368.8		Dirty	526.6		Clea	n	812.9		(m2*k)
	C	ONSTR		F ONE SHELL					Ske	tch	
				ell Side		ube Side		_			
• •		bar	30 / Code -45~180		30 / Code -45~180			(;	()		()
Design temperature	ı	С	1		-45~180 4						
Number passes per she Corrosion allowance	II .	mm		0		0		1 1			
Connections	In	111111	2"	/ 300 ANSI	3'		ANSI	-			Лш
Size/rating	Out		2"	/ 300 ANSI	3'		ANSI	1 \ /	()		
mm/	Intermediat	е		/ 300 ANSI			ANSI	1			
Tube No. 148		OD	20	Tks-avg 2	mm	Length) mm	Pitch	26	mm
Tube type	Plain		Materia			SA-213 TI	P304L		Tube pattern		30
Shell SA312-TI			ID:Pipe 16"			Shell cove					
Channel or bonnet			SA312-TP3			Channel					
Tubesheet-stationary			SA182-F30			Tubeshee					
Floating head cover						Impingem	ent prote	ction		Circula	ar Plate on bundel
Baffle-crossing	SA2	40-304	L Type	single seg	Cut(%d)	34	vert		Spacing:c/c	;	mm
Baffle-long				Seal type					Inlet	208.9	mm
Supports-tube				U-bend			Туре)			
Bypass seal					Tube-tubesh	neet joint		exp./seal wld			
Expansion joint					Туре						
RhoV2-Inlet nozzle		1413	Bur	ndle entrance	12			Bundle exit		1	kg/(m*s2)
Gaskets - Shell side		Con	np. fiber	Tube side		Con	np. fiber		(m=2.75	y=3700	psi)
Floating head											
Code requirements		ASM	E Code Sec			TEMA cla			R		
Fabricated Weight [kg]: 8	312		Empty we	eight [kg]:	Shop t	est weight [[kg]:		Bundle weigh	t [kg]:	
LOADS AT BASE (*):	[[WIND: Lo	ad[kgf]	: , Moment	t[kg.m]: , SEIS	MIC: Load[l	kgf]: , Mom	nent[kg.m]:]]			
Remarks (*) : These item	should	be verified	by vendor.							
		_			Docu	ıment No).:			Rev.:	01
					Own	er Job No	0.:			Type:	DAS

client:



Document No.:	Rev.: 01	
Owner Job No.:	Type: DAS	
	Page 2 OF 3	

PROJECT: PP PILOT PLANT	client:	0.50°
TITLE : Data Sheet for Propane recovery condenser (E -361)		شرکت ملی صنایع پتروش شرکت پژوهش و فناوری پتر
GENERAL NOTES		
1- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM.		
2- UNLESS OTHERWISE NOTED , OUTSIDE PROJECTION OF NOZZLES ARE ME WELDED EDGE OF NOZZLE.	ASURED FROM C.L./T.L. OF EXCHANGER TO THE EXTREME FAC	E OR BUTT
3-THE MECHANICAL DATA SPECIFIED ON DRAWINGS ARE MINUMUM PURCHA- AND PROJECT SPECIFICATIONS IS MANUFACTURER'S RESPONSIBILITY.		N WITH APPLICABLE CODE
4- LIFTING LUGS SHALL BE DESIGNED AND EXACT LOCATION DETERMINED BY 5- THE INDICATED WEIGHTS TO BE CONFIRMED /CHECKED BY MANUFACTURE		
6- ALL FLANGE BOLT HOLES TO STRADDLE CENTER LINES EXCEPT AS SHOOL		
7- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125 -250		
8- DRILING AND TOLERANCES OF TUBESHEET SHALL BE PER TEMA STANDAR		
9- THREADED HOLES IN TUBESHEET MUST NOT BE COMPLETELY DRILLED.		
10- ALL TAILED DIMENSIONS ARE MEASURED FROM BASE LINE.		
11- HANDLING LUGS FOR EXCHANGER COMPONENTS SHALL BE DESIGNED A		
12- DIMENSIONS REFER TO BAFFLES OR TUBE SUPPORTS ARE MEASURED FI 13- MANUFACURER SHALL PERFORM THE REQUIRED CHECKING /DESIGN OF		
WHERE EXPANSION JOINT IS REQUIRED, BLINDED LWN FLANGES FOR VENT 14 - IMPACT TEST REQUIREMENTS FOR ALL PARTS MATERIAL SHALL BE CHECAND THEN REFLECTED IN FABRICATION DRAWINGS.	AND DRAIN ON EXPANSION JOINT SHALL BE CONSIDERER.	LCULATIONS
15-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED.		
16-SHELL / NOZZLE THICKNESS AT CONNECTION/ ATTACHMENT AREA SHALL 17-BASE LINE (B.L.)INDICATES THE GASKET FACE OF TUBESHEET .	BE VERIFIED BY LOCAL STRESS CALCULATION.	
	Document No.:	Rev.: 01
	Owner Job No.:	Type: DAS
		Page 3 of 3

	I read	
PROJECT : PP PILOT PLANT	client:	<u>→</u>
TITLE : Data Sheet for Reboiler tower 361(E -362)	یمی وشیمی	شرکت ملی صنایع پتروش شرکت پژوهش و فناوری پتر
Data Sheet for Rel	Document No.:	S2)
	Owner Job No.:	Type: DAS
		Page A
		- U

	PROJECT: PP PILOT PLANT TITLE: Data Sheet for Reboiler tower 361(E -362)						Client:						
TITLE : Da	ita Sheet	for Reb	oiler tow	er 361(E	-362)					ت ملی صنایع پتر ژوهش و فناوری			
REV.						REV.	I	I					
PAGE	1	2	3	4	5	PAGE	1	2	3	4	5		
A	Х												
В	Х												
2	X												
-	Х												
-	1			1		<u> </u>		1		I			
5 4													
3													
2													
1		2021	-11-27	К	.А	N	1.N	AA	.SH	А	FC		
Revis	ion	Da	ate	Prepa	red By	Chec	ked By	Appro	ved By	Sta	atus		
					Doo	cument revi	sion						
						Document	No.:			Rev.: 01			
						Owner Jok	No.:			Type: DA	S		
										Page B			

PROJECT: PP PILOT PLANT





شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی

Size	1000 mn	n Ty	rpe BEN	M F	Hor	Coni	nected in	•	allel ´	1	;	series
Surf/unit(eff.)	4 m2	Sh	nells/unit	1			Surf/shell (e	ff.)	4		ı	m2
*			PERFO	RMANC	E OF	ONE UN	NIT					
Fluid allocation						Shell Si	de		Τι	ıbe Side		
Fluid name												
Fluid quantity, Total			kg/h			7				300		
Vapor (In/Out)			kg/h		7		0	0			42	
Liquid			kg/h		0		7	300			258	
Noncondensable	Э		kg/h			0				0		
Temperature (In/Out)		С		151.1	8	150.02	45.55			45.55	
Dew / Bubble po	int		С		151.1	3	151.13					
Density (Vap / Liq)			kg/m3	2.5	/	861.91	/ ##	29.65 /	469	29.63	/	469.0
Viscosity			ср	0.0145	/	0.178	/ 0	0.0092 /	0.1	0.0092	/	0.062
Molecular wt, Vap					18.02	2		42.16			42.16	
Molecular wt, NC												
Specific heat			kcal/(kg*C)	0.457	/	1.2245	/ 1	0.3878 /	1	0.3878	/	0.99
Thermal conductivity	'		kcal/(h*m*C)		/	0.59	/ 1	0.017 /	0.1	0.017	1	0.078
Latent heat			kcal/kg		505.5	8		69.88			69.89	
Pressure			kgf/cm2		5		4.994	19			18.989	
Velocity			m/s			0.13			•	0.05		
Pressure drop, allow	./calc.		kgf/cm2		0.264		0.006	0.51			0.011	
Fouling resist. (min)			m2*h*C/kcal			0.0001	1	0.0002	000	0∶Ao bas	ed	
Heat exchanged	29	53 kc	al/h				1	MTD corrected		100.65		С
Transfer rate, Servic	e 6.4			Dirty		313.	6 (Cle	313.6		kcal/	(h*m2*
		CONSTRUCTION	OF ONE SHE	ELL					,	Sketch		
		Shell S	ide			Tı	ube Side					
Design/Vac/Test pre	s kgf/cm2	31 /	/	,	31	/	1	1				
Design temperature	С	-60~2	40			-	60~240	1				
Number passes per	shell	1					1	1				
Corrosion allowance	nm	1.59)				1.59	1				
Connections	In mm		1	-			/ -					
Size/rating	Out		1	-			/ -					
Nominal	Intermedia		1	-			/ -					
Tube Nc 60	OD	25.4	Tks- Avg	2.11		mm	Length 100	(mm	Pitch 3	33.75		mm
Tube type	Plain			Materia	al		S.S304L		Tube	p	;	30
Shell S.S304L		ID	OD	400		mm	Shell cover		-			
Channel or bonnet		S.S304L					Channel co		-			
Tubesheet-stationary	У	S.S304L					Tubesheet-		-			
Floating head cover		-					Impingemer			None		
Baffle-crossing	S.S304L	Ту		gle segr	menta	Cut(%	6d) 27.98 \	/ Spacing: c/c				n
Baffle-long	-		Sea	al t					Inlet			m
Supports-tube			U-b	end			-	Гуре				
Bypass seal				Tube-tu	ubesh	eet joint		Ехр.				
Expansion joint	-			Туре								
RhoV2-Inlet nozzle		Bu	ındle entrance	=		0		Bundle exit	(0		kg/(m*s
Gaskets - Shell side	Fla	t Metal Jacket Fibe		Tube S	Side		Fla	it Metal Jacket	t Fibe			
Floating head		<u>'</u>										
Code requirements	AS	ME Code Sec VIII D	Div 1				TEMA class	i	R - re	finery se	rvice	
Weight/Shell	423		Filled with	water		523.	4		Bunc '			
Remark												
						Docun	nent No.:				Rev.:	01
					(Owner	Job No.:			Ty	ype: [DAS
											ge 1 (
										'"	a	J. Z

PROJECT:PP PILOT PLANT	client:	
TITLE : Data Sheet for Reboiler tower 361(E -362)	وشیدی پتروشیمی	شرکت ملی صنایع پتر شرکت پژوهش و فناوری
GENERAL NOTES		
1- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM. 2- UNLESS OTHERWISE NOTED , OUTSIDE PROJECTION OF NOZZLES ARE ME. WELDED EDGE OF NOZZLE.	ASURED FROM C.L./T.L. OF EXCHANGER TO THE EXTREME FACE	OR BUTT
3-THE MECHANICAL DATA SPECIFIED ON DRAWINGS ARE MINUMUM PURCHAS CODE AND PROJECT SPECIFICATIONS IS MANUFACTURER'S RESPONSIBILITY. 4- LIFTING LUGS SHALL BE DESIGNED AND EXACT LOCATION DETERMINED BY		WITH APPLICABLE
5- THE INDICATED WEIGHTS TO BE CONFIRMED /CHECKED BY MANUFACTURE		
6- ALL FLANGE BOLT HOLES TO STRADDLE CENTER LINES EXCEPT AS SHOOV	WN OTHERWISE.	
7- OUTSIDE EDGE OF ALL FLANGES / FORGINGS TO BE BEVELLED WITH 45 DE		
8- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125 -250 9- DRILING AND TOLERANCES OF TUBESHEET SHALL BE PER TEMA STANDAR		
10 - BOTH ENDS OF TIE RODS SHALL BE UNC THREADED ON 50 MM.		
11- THREADED HOLES IN TUBESHEET MUST NOT BE COMPLETELY DRILLED.		
13- DIAMETER OF HOLES FOR TIE RODS IN BAFFLE = TIE ROD DIA. + 0.5 MM. 14- ALL TAILED DIMENSIONS ARE MEASURED FROM BASE LINE.		
15- EDGE OF HOLES IN BAFFLES SHALL BE ROUNDED (R=2MM)OR BEVELED.		
16- HANDLING LUGS FOR EXCHANGER COMPONENTS SHALL BE DESIGNED AN	ND EXACT LOCATED BY MANUFACTURER.	
17- DIMENSIONS REFER TO BAFFLES OR TUBE SUPPORTS ARE MEASURED FF		
18- MANUFACURER SHALL PERFORM THE REQUIRED CHECKING /DESIGN OF SWHERE EXPANSION JOINT IS REQUIRED, BLINDED LWN FLANGES FOR VENT. 19 - IMPACT TEST REQUIREMENTS FOR ALL PARTS MATERIAL SHALL BE CHECK	AND DRAIN ON EXPANSION JOINT SHALL BE CONSIDERER.	.CULATIONS
AND THEN REFLECTED IN FABRICATION DRAWINGS. 20-ALL NOZZLES SHALL BE RADIUSED WITH THE CONTOUR OF THE SHELL , C $R=2MM$. INTERNAL	HANNEL AND HEADS INNER WALLS AS FOLLOWS:ITEM R = 6 MM	, ALL THE OTHER ONES
21-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED.		
22-SHELL / NOZZLE THICKNESS AT CONNECTION/ ATTACHMENT AREA SHALL	BE VERIFIED BY LOCAL STRESS CALCULATION.	
23-BASE LINE (B.L.)INDICATES THE GASKET FACE OF TUBESHEET .		
	Document No.:	Rev.: 01
	Owner Job No.:	Type: DAS
		Page 2 of 2

PROJECT : PP PILOT PLANT TITLE : Data Sheet for T-361 CONDENSER (E -363)		شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی		
Data Sheet for	T-361 CONDENSER E -363)			
III. GIISUI . JJASEII	Document No.:	Rev.: 01		
	Owner Job No.:	Type: DAS		
		Page A		

PROJECT	PROJECT: PP PILOT PLANT						Client:							
TITLE : Da	ta Shee	t for T-36	61 COND	ENSER (E -363)	شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی								
REV.	1	2	3	4	5	REV.	1	2	3	4	5			
PAGE						PAGE								
A B	X X													
1	X													
2	×													
					<u> </u>			<u> </u>						
5		I						1						
4														
3														
2														
1		2021	-11-27	К	.A	M	.N	AA	.SH	A	FC			
Revisi	on	Da	ate	Prepa	red By	Check	ked By	Appro	ved By	Sta	itus			
					Doo	ument revi	sion							
LICENSOR: E	BASELL					Document	No.:		Rev.: 01					
						Owner Job No.:				Type: DA	s			
						Page B								

46			HEAT EXCHANGE	R SPEC	IFICATION SHE	ET	Page 1	
	يتروشيمي	شرکت ملی صنایع					SI Units	
		۔ کت پژوهش و فناور						
640H8	, , ,, , _U	, , , , , , , , , , , , , , , , , , ,			Job No.			
Customer	NPC-R	T			Reference No.			
Address					Proposal No.			
Plant Location	ARAK				Date	2021-12-01	Rev 01	
Service of Unit					Item No.	E-363		
Size	168.00	0 x 999.988 m	m Type BEM	Vert.	Connected In	1 Parallel	1 Series	
Surf/Unit (Gross/E			Shell/Unit	1	Surf/Shell (Gro	ss/Eff) 0.72 / 0.69 m2		
			PERFORMANCE	OF ON			 	
Fluid Allocation			Shell	Side		Tub	e Side	
Fluid Name			RWS			Propane		
Fluid Quantity, To	tal	kg/hr	300.	001		<u> </u>	0001	
Vapor (In/Out)	tui .	Ng/TII	000.	<u> </u>		3.0000	1	
Liquid			200.004		300.001	12.0001	15.0001	
Steam			300.001		300.001	12.0001	13.0001	
Water			1			<u> </u>	1	
Noncondensable								
Temperature (In/C	Out)	С	5.00		10.00	46.00	41.00	
Specific Gravity			1.0225		1.0225	0.4802	0.4802	
Viscosity		mN-s/m2	1.5010		1.5010	0.0137 V/L 0.0552	0.0552	
Molecular Weight,	Vapor							
Molecular Weight,		densables						
Specific Heat		kJ/kg-C	4.3211		4.3211	1.8540 V/L 1.837	1.8370	
Thermal Conducti	vitv	W/m-C	0.5781		0.5781	0.0219 V/L 0.100	0.0998	
Latent Heat		kJ/kg	232.590		232.590	293.767	293.767	
Inlet Pressure		kPa	401.			01.36		
Velocity		m/s	1.52				14e-3	
Pressure Drop, All	low/Calc		20.000	16-2	9.677	20.000	3.559e-4	
			20.000		9.077	20.000	3.3396-4	
Fouling Resistanc		m2-K/W		MTD (C	\ 	07.4.0		
Heat Exchanged		983.949	141/ 0.1/ 0.1	•	Corrected)	37.4 C	470.04 141/ 0.14	
Transfer Rate, Se	rvice		W/m2-K Clean		476.21 W/m2-K		476.21 W/m2-K	
		CONSTRUC	TION OF ONE SHELL		· · · · · · · · · · · · · · · · · · ·	Sketch (Bundle/I	Nozzle Orientation)	
			Shell Side		Tube Side	<u> </u>		
Design/Test Press		kPaG	700.010 /	2600.04				
Design Temperatu		С	160.00		130.00	」 →片 │		
No Passes per Sh	ell		1		1			
Corrosion Allowan	nce	mm				*		
Connections	In	mm	1 @ 26.645	1 @ 26	.645			
Size &	Out	mm	1 @ 26.645	1 @ 26		1		
Rating	Interme		@	@		1		
		19.050 mm	Thk(Avg) 2.413 mm		Length 1.000	m Pitch 24.000 r	nm Layout 30	
Tube Type	Z OB Plain					STAINLESS STEEL (18 C	•	
Shell		.000 mm	OD	mm	Shell Cover		, •,	
Channel or Bonne		.000 111111	OD	111111	Channel Cover			
Tubesheet-Station					Tubesheet-Floa	_		
Floating Head Cov	ver	+ ••	E 0 E 0 E 0 E 0 E 0 E 0 E 0 E 0 E 0 E 0		Impingement P		1 1 4 070 447	
Baffles-Cross		Type SINGL			/1 Spacing(c/c) 135.000	Inlet 278.445 mm	
Baffles-Long			Seal Typ	е				
Supports-Tube			U-Bend			Туре		
Bypass Seal Arrar	ngement		Tube-Tub	esheet .	Joint			
Expansion Joint			Туре					
Rho-V2-Inlet Nozz	zle	21.86 kg/m-	s2 Bundle E	ntrance	0.16	Bundle Exit 6.459e-2	kg/m-s2	
Gaskets-Shell Sid			Tube Sid				-	
-Floating Hea								
Code Requiremen						TEMA Class		
Weight/Shell 145			Filled with Water 177.3	1		Bundle 20.01	kg	
Remarks:	,, 10		TINGU WIGH VVALET 177.3			Darialo 20.01	n'y	
rverriarks.								

Reprinted with Permission (v6)

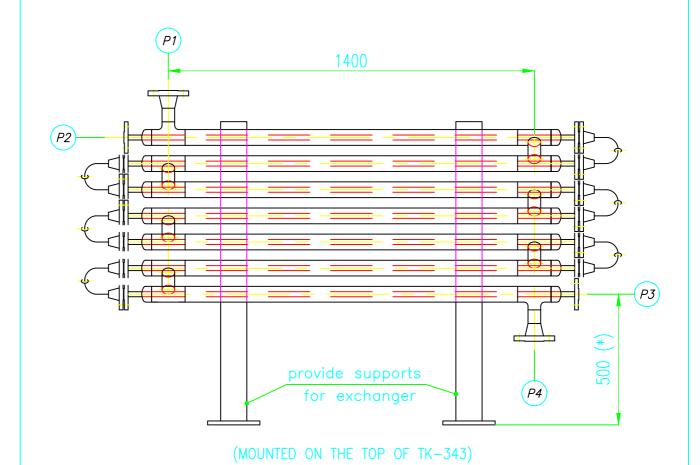
PROJECT: PP PILOT PLANT	client:	
TITLE : Data Sheet for T-361 CONDENSER (E -363)		شرکت ملی صنایع پتروش شرکت پژوهش و فناوری پتر
GENERAL NOTES		
1- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM. 2- UNLESS OTHERWISE NOTED , OUTSIDE PROJECTION OF NOZZLES ARE I	MEASURED FROM CIL/TIL OF EXCHANGER TO THE EXTREME	FACE OR BUTT
WELDED EDGE OF NOZZLE.	MEAGONED FROM C.E./F.E. OF EXOFIXINGEN TO THE EXTREME	TAGE GIVEGIT
3-THE MECHANICAL DATA SPECIFIED ON DRAWINGS ARE MINUMUM PURCI CODE AND PROJECT SPECIFICATIONS IS MANUFACTURER'S RESPONSIBILI		ESIGN WITH APPLICABLE
4- LIFTING LUGS SHALL BE DESIGNED AND EXACT LOCATION DETERMINED	BY THE MANUFACTURER.	
5- THE INDICATED WEIGHTS TO BE CONFIRMED /CHECKED BY MANUFACTU 6- ALL FLANGE BOLT HOLES TO STRADDLE CENTER LINES EXCEPT AS SHO		
7- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125 -2		
8- DRILING AND TOLERANCES OF TUBESHEET SHALL BE PER TEMA STAND 9- THREADED HOLES IN TUBESHEET MUST NOT BE COMPLETELY DRILLED.		
10- ALL TAILED DIMENSIONS ARE MEASURED FROM BASE LINE.	•	
11- HANDLING LUGS FOR EXCHANGER COMPONENTS SHALL BE DESIGNED		
12- DIMENSIONS REFER TO BAFFLES OR TUBE SUPPORTS ARE MEASURED 13- MANUFACURER SHALL PERFORM THE REQUIRED CHECKING /DESIGN O		
WHERE EXPANSION JOINT IS REQUIRED , BLINDED LWN FLANGES FOR VEI 14 - IMPACT TEST REQUIREMENTS FOR ALL PARTS MATERIAL SHALL BE CH AND THEN REFLECTED IN FABRICATION DRAWINGS.		N CALCULATIONS
15-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED.		
16-SHELL / NOZZLE THICKNESS AT CONNECTION/ ATTACHMENT AREA SHA 17-BASE LINE (B.L.)INDICATES THE GASKET FACE OF TUBESHEET .	ILL BE VERIFIED BY LOCAL STRESS CALCULATION.	
	Document No.:	Rev.: 01
	Owner Job No.:	Type: DAS
		Page 2 of 2

PROJECT:PP-PE PILOT PLANT TITLE:Data Sheet for HEXANE vapor cooler E-343		شرکت ملی صنایع شرکت پژوهش و فناو
	heet for HEXANE apor cooler E-343	Rev.: 00
	Owner Job No.:	Type: DAS
		Page : A

							w-						
PROJECT:P	P-PE PIL	OT PLAN	NT				Client:				S	₩.	
TITLE:Data \$	Sheet for	HEXANI	E vapor c	ooler	E-343	شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی							
REV.					 		REV.						
PAGE	0	1	2	3	4	5	PAGE	0	1	2	3	4	5
A	X					<u> </u>	1					1	
В	X					<u> </u>	1					1	
1	X						1		-			-	
2	Х												
3	Х											1	
												1	
												1	
							+		<u> </u>	ļ		<u> </u>	
							1		-			-	
							1		-			-	
							1		ļ	ļ		<u> </u>	
							1					1	
						<u> </u>	1					1	
							1					1	
							+					1	
							+						
							+					1	
							+					1	
						-	+		 	-		+	
						-	+		 	-		+	
							1					1	
							+					+	
												+	
												+	
							+					 	
						 	†					1	
									<u> </u>			+	
							†						
							1						
							1		<u> </u>	1		1	
	•	•			•	•		•	•	•			•
5													
4													
3													
2							-		-		-		
1													
0		202	21-11-27		K.A		M.N	1		AA.SH		AFC	;
Revisi	on		Date		Prepare	d By	Checke	d By	Арр	roved B	y	Status	
						Docum	ent No.:					Rev. : 00)
						Owner	Job No.:					Type: D	AS
												Page : B	3

		Data Sheet				Project:	PP	-PE PILOT	Country	Country: IRAN				
		Exchanger Abbreviation: E			Company: Location:				Docum	ient	n°	Page		
Tv#	De: Double pipe		nufacturer:			Belongs to: TK			2.4.2					
	n No.: E 363						P&ID-No.:		343					
Item No.: E 363 No. Required: 1 P&ID-No.: Name/description: Hexane Vapour Cooler Area: 300														
Service/mode of operation:														
	Quantity (operation/stand			1		naoao	25	Calculated	Surface	m ⁻	2	Λ	. 25	
	Orientation (1)	<i>5 y y</i>	✓ horizo	ontal		vertical		Selected S		m ²			.5	
	Туре		✓ tube		☐ F	olate	27			9,			50	
	Arranged	☐ parallel	✓ serial			stand by		Number of			十		7	
9			Tube	side	S	hell side	29	Tube leng	th	m	n	14	400	
	Process fluid:	Process fluid:		cold hexane		nitrogen		Tube oute	m	mm 50		50		
11					and	d hexane		Tube inlet	diameter	m	n	1	19	
12							32				_			
	pH-Value	0/						number of	fins		4	1	12	
	Solid content	%					34	<u> </u>		harizant.		٦.,,	ertical	
	Particle size Design temperature	μm °C	-30/-	⊥10∩		30/+180		fins height of f	in	✓ horizonta				
	Design pressure	barg	10/		-	6/-1	_	Baffles sp		m m	-	12	2.7	
	Log. temperature difference		107			07 1		Number of		1111	+			
	Material:		low t	emp ca	rbo	n steel	39		л раззез		+			
	Surface treatment			-				Medium p	rocess side		+			
21							_	toxic		explodable 🔽	cor	nbus	tible	
	Corrosion allo., process re	eq. mm					42	Medium se	ervice side		Т			
	Insulation	•					43	toxic		explodable 🔽	cor	nbus	tible	
24	Gaskets						44				\Box			
	Operation conditions pe	er unit			.1.4	Tube side		41 - 4	:1	Shell sid		41 -		
46 47			kg/h		nlet 60		96	tlet	inle 22			outle	д	
	Vapour / Gas		kg/h		00			30	14			1.1		
	Steam		kg/h											
	Inerts		kg/h						8			8		
	Liquid		kg/h	9	60		96	60			1	12.9	9	
52	Water		kg/h											
	Operating temperature		°C	_	15		-1	12	4 (-10		
	Operating pressure		barg						0.3	10	C	0.08	3	
55														
	Liquid / Vapour		1 / 3		0.0			30		2		7 1 1		
	Density (vap./liq.) Molar mass		kg/m³		80 5.2			.2	2.	3		2.15)	
	Specific heat (vap./liq.)		kg/kmol kJ/kgK		.18			18	1.4	4.6	1 1	1/2,	17	
	Thermal conductivity (vap	/lig)	W/mK		135		0.1		0.0				,135	
	Dynamic viscosity (vap./lic	. ,	cP		.5			.5	0.0				0,5	
62		-1-7									<u> </u>			
63														
64														
65														
66														
	Velocity (mean)		m/s	1	. 4		1.	. 4	1.			1		
	Press. drop, max. admissi	ible / calcul.	bar			0.5				0.05				
	Heat transfer coefficient		W/m²K											
	Fouling factor	ference	m²K/W °C					20)					
	Corrected mean temp. difference °C (Overall) Heat transfer rate W/m²K				340									
	Heat duty kW				1.7									
74														
	(1) sloped for drain	ning the cor	ndensate	<u> </u>										
76														
77														

			Dat	a Shee	t	Projec	t: PP-PE F	PILOT PLANT	Country: IRA	N
				t Exchanger		Comp	any NPC-RT		Document n°	Page
				al Abbreviatio			on: ARAK			2
Тур	e: Do	ouble pipe	1	Manufacturer	:	-		ongs to: TK 343		
	n No.∶ E			No. Required	: 1		P&	ID-No.:		
	me/desc	•	e Vapour Coole			_	Are	a: 300		
Ser	vice/mo	de of operation:		continuo continuo	us	disco	ntinuous			
5				N	lozzle	Details				
6		Designation		DN	PN	Facing	Flange	Length of no	zzle Comm	ents
7	P1	vapour outle	t	1 1/2"	300#	RF	WN			
8	P2	cold hexane	inlet	3/4"	300#	RF	WN			
9	P3	cold hexane	outlet	3/4"	300#	RF	WN			
10	P4	vapour/liquio	d inlet	1 1/2"	300#	RF	WN			
11				<u> </u>	1	<u> </u>	<u> </u>			
12	- All	nozzle details	s will be det	ermined d			engineerin	ıg		
13					Comr	nents				
14	- All	data have to k	oe checked du	ring deta	il eng	ineering	9			
15										
16					Ske	tch				
17			_							
	Sketch	available:	yes; see at	tachment						
19										
20 21										
22										
23										
24										
25										
26										
27										
28										
29 30										
31										
32										
33										
34										
35										
36										
37										
38 39										
39 40										
41										
42										
43										
44										
45										
46										
47										
48 49										
50										
51										
52										
53										
54										
56										
57										



*) - To be define

						U.E.	DRAWING N.	SH N.
						FE		3
						U.D.	PLANT	CT
			FIDET ICCUE		0004 44 6	IR	PP-PE	
		U	FIRST ISSUE		2021-11-2	J	CREATION DATE	SCL
This drawing contains CONFIDENTIAL information by BASELL Polyolefins. This		Pro	ject: PF	PE PILOT PLA	2	021-11-2	7	
to be used, or disclosed to anyone outside of BASELL Polyolefins and its subsidiaries, except pursuant to a written agreement with BASELL Polyolefins.			HEXA	NE VAPOUR C	- Rese	DWG Issued by: BASELL Polyalefins Italia S.p.A. Scale - Reserch Centre "Giulio Notto" - P.le Donegoni, 12 - 44100 Ferrara (Italy)		
File name	ITEM	Com	pany	Location	Country	Drav	wn Checked	Approved
.DWG	E-343		NPC-RT	ARAK	IRAN	K.A	M.N	AA.SH

PROJECT: PP PILOT PLANT TITLE: Data Sheet for Heat excenger N2 to Dryer (E-621)	client: يمى وشيمى	شرکت ملی صنایع پتروش شرکت پژوهش و فناوری پتر
	at excenger N2 to Dry E -621)	er Rev.: 01
	Owner Job No.:	Type: DAS
		Page A

PROJECT				er N2 to	Dryer (E-								
621)						شر <i>ک</i> ت پژوهش و فناوری پتروشیمی							
REV.	1	2	3	4	5	REV.	1	2	3	4	5		
A	Х												
В	x												
1	Х												
2	Х												
			-				-						
5				1		1				I			
4													
3													
2													
1		2021	-11-27	К	A	M	1.N	AA	.SH	Α	FC		
Revis	ion	Da	ate	Prepa	red By	Checl	ked By	Appro	ved By	Sta	itus		
					Doc	cument revi	sion						
LICENSOR: E	BASELL					Document	No.:			Rev.: 01			
						Owner Job	No.:			Type: DA	S		
										Page B			

PROJECT: PP PILOT F	PLANT			client:			<u> </u>
TITLE : Data Sheet for (E -041)	Refrigeration Unit	Exchanger	-			شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری	
		Heat Exch	anger Specifi	cation She	eet		
Company: NPC R&T			<u> </u>				
Location: NPC R&T - ARAK -	- IRAN						
Service of Unit: Heat excenge							
Item No.: E-621		rence: PP-PE PILOT F	PLANT				
Date: 2021/11/28	Rev No.: 00						
Size	214/ 2500 mm	Type BEM vert	Connected in	1 para	ıllel 1	series	
Surf/unit(eff.) 5,7 m2	Shells/unit 1	Surf/shell (eff.) 5,7	m2				
		PERF	ORMANCE OF O	NE UNIT			
Fluid allocation				Shell Side	e	Tu	beSide
Fluid name				Steam		Ni	itrogen
Fluid quantity, Total	kg/h			25			700
Vapor (In/Out)	kg/h		25			700	700
Liquid	kg/h				25		
Noncondensable	kg/s						
			-				
Temperature (In/Out)	С		162,17	7	114,54	35	112,81
Dew / Bubble point	С		162,17	7	162,17		
Density		kg/m3	3,34		939,33	1,42	1,13
Viscosity		ср	0,015	,	0,273	0,018	0,022
Molecular wt, Vap							
Molecular wt, NC							
Specific heat		kcal/(kg*C)	0,5897		1,0119	0,2483	0,2497
Thermal conductivity		kcal/(h*m*C)	0,027		0,567	0,022	0,026
Latent heat		kcal/kg	494,13	3	525,79		
Pressure		bar	6,5			1,3	
Velocity		m/s		0,17			13,59
Pressure drop, allow./calc.		kgf/cm2	0,141		0	0,53	0,005
Fouling resist. (min)		m2*h*C/kcal		0,0003			,0003
Heat exchanged	13555	kcal/h				orrected	70,01 C
Transfer rate, Service	34,2		Dirty	44,8	Clean	46,1	kcal/(h*m2*C
CONSTRUCTION OF ONE S	SHELL					S	ketch

			Shell Sid	le			Tube	Side					
Design/Test pressure		bar	6	/	code			6 /	code				_
Design temperature		С		180				180					
Number passes per shell				1				1					
Corrosion allowance		mm											
Connections	In		25,4	1	300 AN	SI	152	,4 /	150 AN	ISI			
Size/rating	Fuori		25,4	1	300 AN	SI	152	,4 /	150 AN	ISI			
mm	Intermediate			1	300 AN	SI		/	150 AN	ISI			
Tube No. 29	OD 25,4			1,6		mm	Length	2500	mm	P	itch 32		mm
Tube type				Mater	ial		SS304			Tube patte	'n	30	
Shell SS304	ID		OD	220		mm	Shell cover						
Channel or bonnet	SS304						Channel cov	er					
Tubesheet-stationary	SS304						Tubesheet-fl	oating					
Floating head cover							Impingemen	t protecti	on		piastra	d'urto s	sul fascio
Baffle-crossing SS304		Туре	single s	eg	Cut(%d)	37	vert					mm
Baffle-long			Seal typ	ре						Inlet	279.4		mm
Supports-tube			U-bend					Туре					
Bypass seal				Tube-	tubesheet	t joint			exp./se	al wld			
Expansion joint				Tipo									
RhoV2-Inlet nozzle 56		Bundle	entrance			0			Bundle	exit	0	ŀ	(g/(m*s2)
Gaskets - Shell side				Tube	Side								
Floating head													
Code requirements	ASME Sez VIII	Div 1					TEMA class			R			
Weight/Shell 257,4			Filled with water	r		363,3				Bundle	99,5		kg
Remarks	Over design ar	ea ~50%	0										

Document No.:	Rev.: 01
Owner Job No.:	Type: DAS
	Page 1 OF 2

PROJECT: PP PILOT PLANT	client:	<u>**</u>
TITLE : Data Sheet for Heat excenger N2 to Dryer (E-621)		شر کت ملی صنایع پتروش شر کت پژوهش و فناوری پتر
GENERAL NOTES		
1- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM.		
2- UNLESS OTHERWISE NOTED , OUTSIDE PROJECTION OF NOZZLES ARE ME WELDED EDGE OF NOZZLE.	ASURED FROM C.L./T.L. OF EXCHANGER TO THE EXTREME FAC	E OR BUTT
3-THE MECHANICAL DATA SPECIFIED ON DRAWINGS ARE MINUMUM PURCHA: AND PROJECT SPECIFICATIONS IS MANUFACTURER'S RESPONSIBILITY.	SER'S REQUIREMENTS ADQEUACY AND COMPLIANCE OF DESIG	N WITH APPLICABLE CODE
4- LIFTING LUGS SHALL BE DESIGNED AND EXACT LOCATION DETERMINED BY	Y THE MANUFACTURER.	
5- THE INDICATED WEIGHTS TO BE CONFIRMED /CHECKED BY MANUFACTURE		
6- ALL FLANGE BOLT HOLES TO STRADDLE CENTER LINES EXCEPT AS SHOON 7- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125 -250		
7- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125-250 8- DRILING AND TOLERANCES OF TUBESHEET SHALL BE PER TEMA STANDAR		
9- THREADED HOLES IN TUBESHEET MUST NOT BE COMPLETELY DRILLED.		
10- ALL TAILED DIMENSIONS ARE MEASURED FROM BASE LINE.		
11- HANDLING LUGS FOR EXCHANGER COMPONENTS SHALL BE DESIGNED A		
12- DIMENSIONS REFER TO BAFFLES OR TUBE SUPPORTS ARE MEASURED FI 13- MANUFACURER SHALL PERFORM THE REQUIRED CHECKING /DESIGN OF		
WHERE EXPANSION JOINT IS REQUIRED, BLINDED LWN FLANGES FOR VENT 14 - IMPACT TEST REQUIREMENTS FOR ALL PARTS MATERIAL SHALL BE CHECAND THEN REFLECTED IN FABRICATION DRAWINGS.	AND DRAIN ON EXPANSION JOINT SHALL BE CONSIDERER.	LCULATIONS
15-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED.		
16-SHELL / NOZZLE THICKNESS AT CONNECTION/ ATTACHMENT AREA SHALL 17-BASE LINE (B.L.)INDICATES THE GASKET FACE OF TUBESHEET .	BE VERIFIED BY LOCAL STRESS CALCULATION.	
	Document No.:	Rev.: 01
	Owner Job No.:	Type: DAS
		Page 2 of 2

PROJECT : PP PILOT PLANT TITLE : Data Sheet for Refrigeration Unit Exchanger (E-041)	client: يمى وشيمى	شرکت ملی صنایع پتروش شرکت پژوهش و فناوری پتر
	ane recovery conden E -041)	
100113011.2005.	Document No.:	Rev.: 01
	Owner Job No.:	Type: DAS
		Page A

PROJECT	PP PIL	OT PLAN	IT			Client:							
TITLE : Da (E-041)	ta Shee	t for Refi	rigeratior	Unit Ex	changer					ت ملی صنایع پتر ژوهش و فناوری			
REV.	1	2	3	4	5	REV.	1	2	3	4	5		
Α	Х												
В	Х												
1	Х												
2	Х												
3	Х												
						1		I		•			
5													
3													
2													
1		2021-	-11-27	К	.A	M	.N	AA	.SH	А	FC		
Revisi	on	Da	ate	Prepa	red By	Check	ced By	Appro	ved By	Sta	ntus		
					Doc	ument revi	sion						
LICENSOR: E	BASELL					Document	No.:			Rev.: 01			
						Owner Job	No.:			Type: DA	ıs		
					Page B								

PROJECT: PP PILOT PLANT

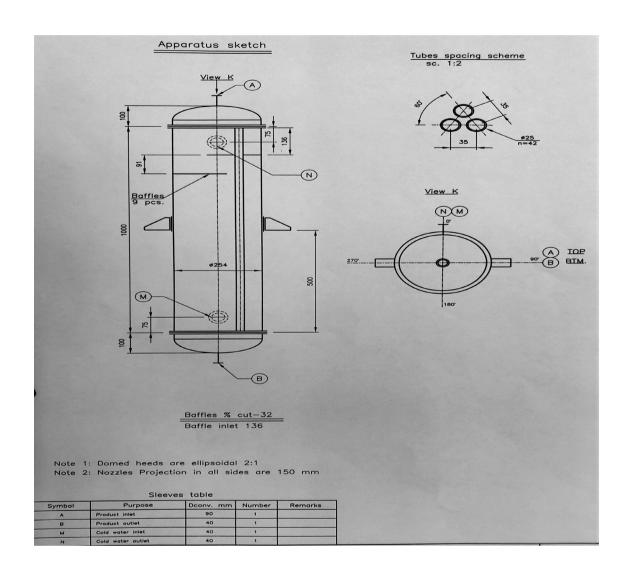
TITLE: Data Sheet for Refrigeration Unit Exchanger



Page 1 OF 3

شرکت پژوهش و فناوری پتروشیمی (E -041) **Heat Exchanger Specification Sheet** NPC-RT;Project :PP-PE Pilot Plant Company: NPC-RT;Location:Arak;Country:Iran Service of Unit: Refrigeration Unit Exchanger Location: Indoors TEMA type:AEL Item No.: E-041 P&ID.No.:00 Date:27/11/2021 Rev No.: 1 Size 254/1000 Connected in mm Type Vertical 1 parallel 1 series Surf/unit(eff.) 3.3/3.1 m2 Shells/Unit Surf/shell (eff.) 3.3/3.1 m2 PERFORMANCE OF ONE UNIT Fluid allocation Shell side Tube Side ln ln Out Hexane Chilled Fluid name Water+Glycol Fluid quantity, Total kg/h 300 26.93 26.93 Vapor Quantity ka/h Liquid Quantity 300 300 26.93 kg/h Noncondensable kg/h Specific Gravity(Water=1,Air=1.@T=25 C,P=1bar 0.9983 0.9983 0.0056 0.606 Operating Temperature С 15 23 50 30 Dew / Bubble point С kg/m3 680 Density /iscosity ср 1.102 1.102 0.4846 0.4846 Molecular wt, Vapor Kg/Kmole 18 18 86 86 Molecular wt, Liguid 72 Ka/Kmole Specific heat Kj/(kg*C) 4.318 4.318 1.932 1.932 0.586 0.586 0.1264 0.1264 Thermal conductivity W/(m*k _atent heat 2 2 Operating Pressure bar 3 3 Velocity 0.072 m/s 0 11 Pressure drop, allow./calc. bar 0.2/0.15 0.05/0.009 Fouling Factor m2*K//W 0.00035 Heat exchanged 2449.7 W LMTD Overall heat Transfer Coef. 67.9 W/(m2*C) Service Clean 69.6 ON OF ONE SHELL Sketch Shell Side Tube Side Design/Test pressure bar 4.5 / 6.75 3/45 С 100 100 Desian temperature Number passes per shell 1 Corrosion allowance mm 1 Size/Rating/Facting Size/Rating/Facting 1 1/2"/150/R.F 2 1/2"/150/R.F Connections 1 1/2"/150/R.F 2 1/2"/150/R.F Size/rating Out 32 Intermediate Pitch mm/ mm Tks-avg Tube pattern Tube No. OD mm Length 1000 mm 60 Material Tube type Seamless SS304 BWG 15 Shell SS304 ID: 254mm Shell cover Bonnet Channel cover stationary Tubesheet-floating 91 Impingement protection Spacing:c/c mm Baffle-crossing Cut(%d) 136 Type SSEG single seg Inlet mm vert Baffle-long Seal type No. of Baffles 9 Supports-tube U-bend Type exp./seal wld Expanded Bypass seal Tube-tubesheet joint Bundle exit Expansion joint Type ka/(m*s2) Bundle entrance V-Inlet nozzle 4.4 Gaskets - Shell side P.T.F.E Tube side Floating head Code requirements ASME Code Sec VIII Div 1 TEMA class R Bundle weight [kg]: Fabricated Weight [kg]: Empty weight [kg]: Shop test weight [kg]: SEISMIC: LOADS AT BASE (*): [[WIND: Load[kgf]: , Moment[kg.m]: , Load[kgf]: , Moment[kg.m]:]] Remarks (*): These item should be verified by vendor. **Document No.:** Rev.: 01 Owner Job No.: Type: DAS

client:



Document No.:	Rev.: 01
Owner Job No.:	Type: DAS
	Page 2 OF 3

PROJECT: PP PILOT PLANT	client:	<u>**</u>
TITLE : Data Sheet for Refrigeration Unit Exchanger (E-041)		شرکت ملی صنایع پتروش شرکت پژوهش و فناوری پت
GENERAL NOTES		
1- UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS ARE IN MM.		
2- UNLESS OTHERWISE NOTED , OUTSIDE PROJECTION OF NOZZLES ARE MEWELDED EDGE OF NOZZLE.	ASURED FROM C.L./T.L. OF EXCHANGER TO THE EXTREME FAC	E OR BUTT
3-THE MECHANICAL DATA SPECIFIED ON DRAWINGS ARE MINUMUM PURCHA: AND PROJECT SPECIFICATIONS IS MANUFACTURER'S RESPONSIBILITY.		N WITH APPLICABLE CODE
4- LIFTING LUGS SHALL BE DESIGNED AND EXACT LOCATION DETERMINED BY 5- THE INDICATED WEIGHTS TO BE CONFIRMED /CHECKED BY MANUFACTURE	ER.	
6- ALL FLANGE BOLT HOLES TO STRADDLE CENTER LINES EXCEPT AS SHOON		
7- NOZZLE /GIRTH FLANGE FACE FINISHING SHALL BE SMOOTH WITH 125 -250 8- DRILING AND TOLERANCES OF TUBESHEET SHALL BE PER TEMA STANDAR 9- THREADED HOLES IN TUBESHEET MUST NOT BE COMPLETELY DRILLED.		
10- ALL TAILED DIMENSIONS ARE MEASURED FROM BASE LINE.		
11- HANDLING LUGS FOR EXCHANGER COMPONENTS SHALL BE DESIGNED AI 12- DIMENSIONS REFER TO BAFFLES OR TUBE SUPPORTS ARE MEASURED FI		
13- MANUFACURER SHALL PERFORM THE REQUIRED CHECKING /DESIGN OF		
WHERE EXPANSION JOINT IS REQUIRED, BLINDED LWN FLANGES FOR VENT 14 - IMPACT TEST REQUIREMENTS FOR ALL PARTS MATERIAL SHALL BE CHECAND THEN REFLECTED IN FABRICATION DRAWINGS.		LCULATIONS
15-ALL SHELL INTERNAL WELDS SHALL BE SMOOTH GRINDED.		
16-SHELL / NOZZLE THICKNESS AT CONNECTION/ ATTACHMENT AREA SHALL 17-BASE LINE (B.L.)INDICATES THE GASKET FACE OF TUBESHEET .	BE VERIFIED BY LOCAL STRESS CALCULATION.	
	Document No.:	Rev.: 01
	Owner Job No.:	Type: DAS
		Page 3 of 3

DDO JECT.DD DE DIJ OT DI ANT	Client:	4
PROJECT:PP-PE PILOT PLANT		28 Co
TITLE:Data Sheet for CONVEYING GAS COOLER (E-53	1,E-532)	شر کت ملی صنایع پتروشیمی شر کت پژوهش و فناوری پتروشیمی
CONVEY	ata Sheet for (ING GAS COOLEF (E-531,E-532)	Rev. : 01
	Owner Job No.:	Type: DAS
		Page : A

PROJECT:PI	P-PE PILO	OT PLAN	IT				Client:							
TITLE:Data S	sheet for	CONVE	YING GAS	S COOL	ER (E-531	1,E-532)	١				ى		کت ملی صنایع پژوهش و فناو	
REV.	0	1	2	3	4	5	PAGE	REV.	0	1	2	3	4	5
А	Х													
В	Х													
1	Χ													
2	Χ						<u> </u>							
3	Х													
							+							
							+							
							+							
							<u> </u>							
							-							
							+							
							+							
							+							
							+							
	-											<u> </u>		
5							+-							
4							+							
2														
1		202	21-11-27		K.A		Τ	M.N	J		AA.SH	1	AFC	
0		202	-1 1121		13.73		+	191.1	•		, , ,		AFC	•
	Revision Date Prepare					d By		Checke	d By	Арр	roved By	У	Statu	s
						Docum	ent N	0.:					Rev. : 01	_
						Owner	Job N	lo.:					Type: D	AS
							Page : B							



شركت ملى صنايع پتروشيمي شرکت پژوهش و فناوری پتروشیمی Customer's Jobname

Data sheet

E-531,E-532

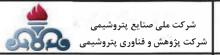
	Description	Conve	ying Gas Cooler		Quantity	2			
	Manufacturer			1	Type designation		BEM (C	200-302-6-1	1 pas
		Inst	allation data/	4ml	pient conditions				
	Installation				Environmental condition	ons	Min.	Max.	
	Country		Iran	- 1	Ambient temperature		-28	44 ℃	;
	Installation location	Out	door, without roof		Relative humidity		46 %	% - 86 %	
_	Climatic condition		domestic	14	Altitude over a normal ze			1889 m	
	Ambient condition	corre	osive atmosphere		Hazardous area classi	fication			
					Zone Gas		zone 2		
					Dust		none		
_	Comments Heat Exchanger will be	exposed to s	•		ace temperature = 83 °C				
			Proce	SS					
_	Exchanger chamber		side	_	exchanger chamber (util			shel	ll sid
_	Data of Medium/	Process		1_		of Medium			
		(Conveying		1	Medium		coolin	g water	
_	Medium code letter		NIC %	1	Medium code letter			CW	
_	Relative gas humidity			-	A			200 000 1	12
	Average density		1.251 kg/m³	_	Average density			999.800 kg	
_	With condition	0%/	1013 mbar (abs)	-	With condition Specific thermal capacity		0%/	/ 1013 mbar	
	specific thermal capacity heat transfer coefficient	- 1	1.05 kJ/(kg*K) 49.61 W/(m²*K)	-	Heat transfer coefficient			4.18 kJ 3249.30 W	
_				+	rical transfer coefficient				/(1112
_	Viscosity 20.1	Normal	Max. 21.9 Pa*s	-	Viscosity	Min. 816.7	Normal	Max. 859.4 Pa	1*c
_	Comments		21.0105	+	Comments	010.7		000.4 178	
_	Inlet		Nozzle N1	+	I.C.	let		Nozzle I	N3
		10 40. 400		+	in		Marco - 174		10
_	Operating volume flow 191		Max. 209.5 m³/h	01	Operating volume flow	Min. 1.06	1.06	Max. 1.06 m ³	3/h
_	Operating wording now 204		225 kg/h	01	Operating wording now	1.00	1051	kg.	
-	Operating mass now 234		460 mbar (g)	+	Operating mass now Operating pressure (in)		5.5	6 ba	
_	operating temperature 90		125 °C	+	Operating temperature (in)	27	℃	
	Comments			1	-portaining terriportations (,	=/		
=	Outlet		Nozzle N2	1	Ou	tlet		Nozzle 1	N4
	Min.	Normal,	Max.	1	- 00	Min.,	Normal,	Max.	
)1	Operating pressure (out) 316		437 mbar (g)	1	Operating pressure (out)		2.5		r (g)
Ť	Operating temperature (out) 80		80 °C		Operating temperature (37 ℃	
	Comments			\vdash	. 5 ,	,			
	Allow. temperature difference		℃		Allow. temperature differ	ence		10 ℃	
	Allow. pressure differeseure loss)		40 mbar (g)		Allow. pressure difference			bar ((g)
			Operation R	equ	irements				
	Exchange surface		0.38 m ²		Operation manner 8000	h/year		yes	
	heat amount		2963 W						
	heat transfer coefficient		W/(m*K)						
	process side				coolant (utility)				
	velocity (process side)		36.76 m/s		velocity (utility side)			0.20 m/s	
	fouling factor (process side)	0.0	00000 m²℃/W		fouling factor (utility side		Q4 32 5	00033 m²℃	C/W
					coolant analysis present		\square		
	Comments								
			Technic	al					
_	Design		h = 1 1			sign guide	iines		A C P 4 '
	Type		horizontal fixed tube bundle	-	Design based on				ASMI
	Design type				Production based on			manufa	cure
	Material	S.S 304	Housing /	SIL	Number of routes (shell s	side)			
11	Material number	0.0 304			Sealing material	side)			
	Allowable pressure min/ max	0.00 /	10.00 bar (g)		Corrosion allowance			0 mr	n
	Allowable temperature min/ max	-28 /	120 °C		5511651611 allowance			0 1111	
				also	c "cooling water analysis") i			
			Pipe b			,-			
	Comments Material resistance to			Juil	Number of routes (pipe s	side)			
		S.S 304	i ipe k		(pipe a	,			
	Material, tube bundle	S.S 304	T Ipe I		Number of inner pipes				
)1		S.S 304			Number of inner pipes Pipe diameter			mn	n
1	Material, tube bundle Material number, tube bundles	S.S 304	10.00 bar (g) 120 ℃					mn 0 mn	
)1	Material, tube bundle Material number, tube bundles Allowable pressure, tube bundle Allowable temperature, tube bundle		10.00 bar (g) 120 ℃		Pipe diameter Corrosion allowance)!			
)1	Material, tube bundle Material number, tube bundles Allowable pressure, tube bundle Allowable temperature, tube bundle Comments Material resistance to be		10.00 bar (g) 120 ℃		Pipe diameter)!	rele		
)1 ev.	Material, tube bundle Material number, tube bundles Allowable pressure, tube bundle Allowable temperature, tube bundle Comments Material resistance to be		10.00 bar (g) 120 ℃ d by supplier (see		Pipe diameter Corrosion allowance o"cooling water analysis"		rele	0 mn	
ev. 00	Material, tube bundle Material number, tube bundles Allowable pressure, tube bundle Allowable temperature, tube bundle Comments Material resistance to be Remark		10.00 bar (g) 120 ℃ d by supplier (see		Pipe diameter Corrosion allowance o"cooling water analysis"		rele	0 mn	
D1	Material, tube bundle Material number, tube bundles Allowable pressure, tube bundle Allowable temperature, tube bundle Comments Material resistance to be Remark		10.00 bar (g) 120 ℃ d by supplier (see		Pipe diameter Corrosion allowance o"cooling water analysis"		rele	0 mn	
ev. 00	Material, tube bundle Material number, tube bundles Allowable pressure, tube bundle Allowable temperature, tube bundle Comments Material resistance to be Remark		10.00 bar (g) 120 ℃ d by supplier (see	als	Pipe diameter Corrosion allowance p "cooling water analysis") prawn			0 mn	
ev. 00	Material, tube bundle Material number, tube bundles Allowable pressure, tube bundle Allowable temperature, tube bundle Comments Material resistance to be Remark		10.00 bar (g) 120 ℃ d by supplier (see	als	Pipe diameter Corrosion allowance p "cooling water analysis") prawn	checked		0 mn	
ev. 00	Material, tube bundle Material number, tube bundles Allowable pressure, tube bundle Allowable temperature, tube bundle Comments Material resistance to be Remark		10.00 bar (g) 120 ℃ d by supplier (see	als	Pipe diameter Corrosion allowance p "cooling water analysis") prawn	checked	nbly	0 mn	



Data sheet

E-531,E-532

		ne			Gustonie	er`s Jobnumber				Gu	stomer`s Docu	mentnumo	,61			
						Paint/surf	ace	pr	ocessing							
		eparation inside							Coat						n	
	Surface pr	eparation outsid	le						Layer thick		4- DAI					μm
	Comments	S .							Top coat p	aint acc.	to HAL					_
						In	sula	atic	n							
	Insulation			CC		lation by custom			Insulation 1	thickness					7	0 mm
		clips for insulation		ha aan		ustomer guidelii	nes									
	Comments	s insulation	i clips ic	be con	Main dimensions											
	Nominal volu	ıme (gross volume)				m ³	ullii		Length			765 mn				5 mm
		(3	Min.	Normal	Max.			Width/dian	neter	ter 89 r				9 mm		
	Work volume	e (net volume)		m ³			Height (tot				39	0 mm				
							Veig	hts	S	- 1-4					00	0.1
01	Operating	woight		Min.	Normal	Max. 40 kg	-		Empty wei						33.	0 kg
01	Operating	weight				1	cess			ce weight						kg
					ancho	ring/fastening	mate	eria	to be deli	vered als	30					
	Fastening r						no		Grounding	clip		nozzle	and for	r equip	ment	earthi
	Design typ	e					ı.a.		Transport							
	Dollutant f	iltor			Acc	essories in Sub		dor								
	Pollutant fi Condensa						า.a. า.a.		safety valv		int side)					
-	Jonuelisa	o draffi		_			a.		Manufactu				_			
						type										
	Comments	HIGHT C	OF SUPP	PORTS	OF HEA	AT EXCHANGE	RTO	BE	ADAPTED	ACC. TO	O CUSTON	/IERS F	REQUIR	REME	NT!!!	
						Table	of	No	zzles	-						
ev.	Item	Description Gas Inlet				ction Type			Standard O PN10	Remarks		non to	ANGIT	D16 E	150 1	200
	N1 N2	Gas Outlet	3"		flanged				O PN10		o be drilled o be drilled					
-	N3	Cooling Water Inlet			flanged				O PN10		o be drilled					
	N4	Cooling Water Outlet	1 1/2"		flanged				O PN10		be drilled					
ev. O	0						Date		drawn		Checke	o. / Assem	nbly	release	d	



Data sheet

F-531 F-532

Custo	omer`s Jobname	Customer's Jobnumber	002	Customer's Docume	ntaumher
Cusi	one s costano				THE TAIN OF
		Applicable I	Document	S	
	Documentation request/ -schedule				
	in the second territory and SM				
	THE STATE OF STREET				
	_				
		Increation	no/Took		
믝	QC plan at supplier ye	Inspection es	Tests wi	th customer participation	inform customer + certificate
	Test guidelines	manufacturer	10010 111	in oddiomer participation	morm castomer + certificati
H	Country specific test regulations				
	Certification				
	Manufacturing certificates				
	Material certificates				_
	Pressure equipment directive PED				-
	pressure equipment directive				
	PED fluid group				
	PED category				
	PED module				
	Comments				
Н	Attach Caparian namenlata	Rema	arks	ge for labels/nameplates	english
	Attach Coperion nameplate Attach customer's nameplate	yes no	Languag	ge warning and directive	
Н	Item no. on stainless steel label	yes	Languag	je warning and directive	abels erigiisi
	Comments	yes			
	Document no. CWA				
	Seller to check all data and correct or a	add applicable.	_		
		.,			
		,			
ш					
Rev.	Remark	Date	dra	awn checked	released
00		- 11			
01	1				
	No.	Jobnun	nber	Unit-No. /	Assembly
					For Rev. Sheet 3
					011

PROJECT:PP-PE PILOT PLANT	Client: پروشیمی	المجافقة الم
RETURN	a Sheet for I GAS COOLER (E-533)	شرکت پژوهش و فناو
l Do	ocument No.:	Rev. : 01
 		Rev. : 01

PROJECT:P	P-PE PIL	OT PLAN	NT				Client:				5	₩.)
TITLE:Data	Sheet for	RETUR	N GAS CC	OLER	(E-533)					٧		کت ملی صنایع پژوهش و فناور	
REV.	0	1	2	3	4	5	REV.	0	1	2	3	4	5
A		X					17.62						
В		X											
1		Х											
2		Х											
3		Х											
						<u> </u>							
	<u> </u>	<u> </u>			+								
						1							
	<u> </u>	<u> </u>			_	-						1	<u> </u>
						ļ							
						<u> </u>							
5													
4													
3													
2		201	21-11-27		K.A		1.M	NI.		AA.SH		AFC	
0		202	21-11-21	_	Ν.Λ	1	IVI.I	V		АА.ЗП		AFC	,
					Prepare	d By	Checke	ed By	Арр	roved B	у	Statu	ıs
		<u> </u>					ı		<u> </u>				
						Docum	ent No.:					Rev. : 0'	1
						Owner	Job No.:					Type: D	AS
												Page : E	3



شركت ملى صنايع پتروشيمي

Data sheet

Unit-No. / Assembly

Sheet

3

PP-PE PILOT PLANT شرکت پژوهش و فناوری پتروشیمی E-533 Customer's Documentnumber Customer's Jobnumbe Description Quantity Return Gas Cooler Type designation BEM (C200-503-6-1pass) Manufacturer Installation data/ Ambient conditions Installation **Environmental conditions** Ambient temperature 44 ℃ Country Installation location Outdoor, without roof Relative humidity 46 % - 86 % Climatic condition domestic Altitude over a normal zero 1889 m Ambient condition corrosive atmosphere Hazardous area classification Zone Gas zone 2 Dust none Heat Exchanger will be exposed to sunlight ==> max. surface temperature = 83 ℃ Comments Process data exchanger chamber (utility side) Exchanger chamber tube side shell side Data of Medium/ Process Data of Medium/ Utility Nitrogen (Return Gas) Medium **Cooling Water** Medium code letter Medium code letter CW Relative gas humidity Average density 1.251 kg/m³ Average density 999.800 kg/m³ With condition 0 °C / 1013 mbar (abs) With condition 0°C / 1013 mbar (abs) 1.05 kJ/(kg*K) Specific thermal capacity specific thermal capacity 4.18 kJ/(kg*K heat transfer coefficient 141.01 W/(m²*K) Heat transfer coefficient 4804.69 W/(m²*K 20.7 Pa*s 859.4 807 Pa*s Viscosity 18.4 Viscosity Comments Comments Nozzle N1 Nozzle N3 Inlet Inlet Min Operating volume flow 229 628 664.5 m³/h 01 Operating volume flow 2.5 2.51 m³/h 2.5 Operating mass flow 188 520 542 kg/h Operating mass flow 2493 kg/h 80 mbar (g) 70 50 Operating pressure (in) Operating pressure 5.5 6 bar (g) operating temperature 80 85 95 ℃ Operating temperature (in) 27 Comments Nozzle N2 Nozzle N4 Outlet Outlet Min. 20 Normal Max Norma 30 Operating pressure (out) 40 mbar (g) Operating pressure (out) bar (g) Operating temperature (out) 40 40 ℃ Operating temperature (out) 37 ℃ Comments Allow. temperature difference Allow. temperature difference 10 °C Allow. pressure diff@Resoure loss) 40 mbar (a) Allow. pressure differessure loss) bar (g) **Operation Requirements** Operation manner 8000 h/year Exchange surface 2.87 m² ves 8694 W heat amount heat transfer coefficient W/(m*K) process side coolant (utility) 0.28 m/s velocity (process side) 37.50 m/s velocity (utility side) 0.00000 m² ℃/W fouling factor (utility side) 0.00033 m²℃/W fouling factor (process side) coolant analysis present Comments Technical datas Design design guidelines ASME horizontal Design based on Type fixed tube bundle Design type Production based on manufacturer Housing / shell side S.S 304 01 Material Number of routes (shell side) 01 Material number Sealing material Allowable pressure 10.00 bar (g) Corrosion allowance 0 mm 0.00 / min/ max 120 ℃ Allowable temperature min/ max -28 Comments Material resistance to be confirmed by supplier (see cooling water Analysis) Pipe bundle Number of routes (pipe side) Material, tube bundle S.S 304 Material number, tube bundles Number of inner pipes Pipe diameter Allowable pressure, tube bundle 10.00 bar (g) mm Allowable temperature, tube bundle 120 ℃ Corrosion allowance 0 mm Material resistance to be confirmed by supplier (see cocling water Analysis) Comments checked Remark drawn released 00 01



شرکت ملی صنایع پتروشیمی شرکت پژوهش و فناوری پتروشیمی

Data sheet

E-533

Plant Label

PP-PE PILOT PLANT

Customer's Jobname

Customer's Jobnumber

Customer's Documentnumber

_						B.1.11					_			
	Surface pr	eparation inside				Paint/surfa	ce p	r ocessing Coat	g					no
-		eparation outside		-				Layer thick	kness		_			μm
								Top coat p		cc. to RAL			n	.a.
	Comments													
	Inquiation			00	old (incul	Ins ation by custome	ulatio	Insulation	thiokne	000				70 mm
	Insulation	clips for insulation	on	CC		ustomer guideline		Insulation	UIICKIIE	622				70 111111
	Comments			be con		ustomer guideline	,3							
						Main d	imen	sions						
	Nominal volu	me (gross volume)				m³		Length					10	70 mm
				Min.	Normal	Max.		Width/dian						40 mm
	Work volume	(net volume)				m³		Height (tot	tal)				4	!50 mm
							eight	S Empty wei	abt					0.0 1.0
01	Operating	weight		Min.	Normal	Max. 85 kg	01	Maintenan		ight				0.0 kg kg
UI	Operating	weigin					essor		ice wei	igrit				Ng
					ancho	ring/fastening m	ateria	l to be deli	ivered	also				
	Fastening n	naterial			no Grounding clip									none
	Design typ	е				n.		Transport						no
	Deller . "				Acce			or's Scope of Supply safety valve (coolant side)						
	Pollutant fi					n.:	-							-
	Condensa	e uraili				n.:	a.	safety valve Manufacturer						no
					type									
	Comments	HIGHT C	F SUP	PORTS	OF HEA							REQUIF	REMENT!	!!
				4-		Table (of No	zzles						
Rev.	Item	Description	Diameter				lange	Standard	Rema		- 4-	ANGLE	10 5 150	The a
	N1 N2	Gas Inlet Gas Outlet	5" 5"		flanged					e to be drilled ac e to be drilled ac				
_	N3	Cooling Water Inlet		1	flanged					e to be drilled ac				
	N4	Cooling Water Outlet			flanged					e to be drilled ac				
Rev. 0	0					Dat	te	drawr	1	checked			released	
_						Joh	number			Unit-No.	/ Asse	mbly		
						John				JIII-140.	030			
											For	Rev.	Sheet	2



Data sheet

E-533

	ner`s Jobname	Customer's Jobnumber		Customer's Documentnumber	
		Applicable D	ocuments		
	ocumentation request/ -schedule				
		Inspection	ne/ Toet		
C	C plan at supplier ye	es Inspection	Tests with custo	omer participation inform of	customer + certificate
T	est guidelines	manufacturer			
C	Country specific test regulations				
C	ertification				
N	lanufacturing certificates				
	laterial certificates				
P	ressure equipment directive PED				
P	ressure equipment directive				
P	ED fluid group				
L P	ED category				
-	Comments	Domo	ulca		
Δ	ttach Coperion nameplate	Rema yes	I anguage for la	bels/nameplates	englist
A	ttach customer's nameplate	no		ing and directive labels	english
It.	em no. on stainless steel label	yes	Language warn	ing and directive labels	Crigiioi
	comments	,			
	ocument no. CWA				
	Seller to check all data and correct or a	add applicable.			
					,
Rev.	Remark	Date	drawn	checked	released
00					
	-				
01				Alait No. / Accords	
		Jobnumb	Dei	Unit-No. / Assembly	
				F-4 In	I Chart 3
				Fort Re v.	Sheet 3

<u></u>	SAZ CATALYST PLANT	DOCUMENT NUMBER					
National Petrochemical Company Petrochemical Research & Technology Company	PROCESS DATA SHEET	SHEET N. 1	OF 5		ISSUE 0		
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53	EXCHANGER 70	11 A					
MBER							
REVISED DATA BOSSI BO	DESCRIPTION	DRAWN UP	VERIFIE	APROVED	DATE		

		*		Δ2	Z CATAL\	/ςτ DI ΔΝ	IT	DOCUMENT NUMBER					
	e	282		-			4 1						
Na: Petro	tional . chemi	Petrochemical Col ical Research & Te Company	mpany chnology	F	PROCESS DA			SHEET N.	2 OF 5		ISSUE 0		
1 1	CEI	RVICE	LIEVANIE	CONDENSOR	E-701	I A		QUANTITY	1				
2		STALLATION	HEXAINE	CONDENSOR	SERVICE TYPE			PLANT UN					
3		PE	BEM	HORIZONTAL	TEMA CLASS	R - ref	inery service	INCLUDED					
4		OF UNITS		SHELL / UNIT	PARALLEL / SEI		1	SURF. PER SHE		6.3	m ²		
5						data of on	E UNIT						
6						SHELL SIDE			TUBE SIDE				
7		UID NAME/		HAZARDOUSNESS		HEXANE			COOLING WA	ATER			
8		TAL FLOWRA		kg/h		1500		1811.53	13000				
9		QUID [Kg/		GAS AND VAPOURS			OUTLET	INLET		OUT	TLET		
10) VA	POR	[Kg/h]		1500								
12	ו וור	QUID	[Kg/h]		1		1500	13000	<u> </u>	130	200		
13		2010	[Kg/TI]				1000	13000		130	,		
14													
15					INLET	AVERAGE	OUTLET	INLET	AVERAGE		OUTLET		
16	O P	PERATING TE		RE °C	68	53.00	38	20	25.5		31		
17		PERATING PRI	ESSURE	bar(g)	0	-0.04	-0.08	5	4.95		4.9		
18		DENSITY		kg/m³			619	998			994		
19		VISCOSITY		mPa s			0.3512	0.4881			0.5904		
20		SPECIFIC HE		kJ/kg K		_	0.207	1			0.72		
21	IJĬ	THERMAL C SURFACE TE		VITY W/m K mN/M			0.1054	0.6			0.62		
23	2	BOILING PO		°C		+							
24		MOLECULAI			3.16	+							
25		DENSITY		kg/m³	0.0075								
26	5	VISCOSITY		mPa s	1.976								
27	VAPOR	SPECIFIC HE		kJ/kg K	0.0173								
28	3 5		ONDUCTI										
29	2	DT / DP	N.T.	°C/MPa									
30 31		DEW POINT	-	kJ/kg °C	68.44	_							
32		LOCITY		m/S	5		14.7	0.8			0.9		
		MAX. ALLOW	VED / ACT	UAL bar	0.1	/	0.07	0.5	/		0.09		
		ULING FACTO		°C m²/w									
35	٥V	/ER DES. ON D	OUTY AND	FLOW	%								
36	HE	AT EXCHANG	ED		170 KW	LMTD (CORR	.,	TRANSF. RATE	DIRTY 955 W	//(m ² -K)			
37		S. PRESS. 1 / 2	2 / E V DE	O.ID h(-)	_	UCTION OF	ONE SHELL	4					
		S. TEMP. 1 / 2					@ @	70		@			
		DMT	@	START-UP TEMP.	103	@		70	@	C			
41	CO	RROSION ALL	OWANCE										
		JMBER OF PA			1			1					
		BES N.	43			/ -	/ 1.65		LENGTH	mm	2500		
		ELL I.D./OD	213.54	1 / 219.08	KETTLE I.D.		LAYO	UT / PITCH	30	/	23.81		
	CR		TYPE			N.		SEALING S					
		FFLES	CUT %	40			TUDECU IOINI	INLET SPAC	CING				
47		NG. BAFFLE T BE WALL TMI		DIDTV	/ INLET DEVICE		TUBESH. JOIN' SHELL / TUBE						
49	10	SHFII	CLEAN /	SS 304	FRONT		SITELL / TUBE	CHANNEL	SS 30)4			
50	∑ ≦	SHELL TUBES FIX. TUBESH CROSS BAFF		SS 304	REAR E			CH.COVER					
51	ATE	FIX. TUBESH	HEET	SS 304		TUBESHEET		FL.HEAD C	OV.	_			
52	<u>≥</u>	CROSS BAFF	LES	CHELL / TUDE	LONG.	BAFFLES		F. 6	4.0				
53		SKETS		SHELL / TUBE		/	N // A I N I T I A N I	FLOAT. HE	AD				
54	╁		IVIAIN FLA	ANGES SHELLSIDE			IVIAIN FLAN	IGES TUBESIDE			Ī		
			1						$oldsymbol{+}$		1		
D DATA									 				
āΙ⊃ֿ			1						l l		1		

APROVED

DATE

DRAWNUP

VERIFIE

DESCRIPTION

ISSUE

		4		SAZ CATALYST	-	DOCUMENT NUMBER			
	N/-4	च्युर	5						
	Petroc	ional Petrochemical hemical Research & Company	Company Technology	PROCESS DATA S E-7011 A	HEET		SHEET N.	3 OF 5	ISSUE 2
	1	SERVICE	HEXANE (CONDENSOR			QUANTITY	1	
	2						PLANT UNI	T 700	
	<u>3</u>			NO	OZZLE				
	5			140	JEELL				
	6	POS.	N.	SERVICE	DN	RATING	FLANGE	FINISHING	NOTE
	7	N1		SHELL IN	4"	150#	SORF		
	8	N2		SHELL OUT	1"	150#	SORF		
	9 10	N3 N4		SHELL OUT TUBE IN	1" 1½"	150# 150#	SORF SORF		
	11	N5		TUBE OUT	2"	150#	SORF		
	12								
	13								
	14		-			<u> </u>			-
	15 16								+
	17								
	18								
	19								
	20				-				_
	21 22								
	23					1			1
	24								
	25								
	<u>26</u> 27								_
	28					1			+
	29								
	30								_
	31 32					1			1
	33								
	34								
	35								
	36 37								_
	38					1			+
	39				-				
	40								
	41 42								_
	42								_
	44								1
	45								
	46								
	47 48								-
	49								
l	50								
	51								_
	52 53					1			-
	55				-				
ATA	BER								
VISED DATA	OW NUMBER								
⋚	≥								

*	SAZ CATALYST PLANT	DOCU	JMENT NUMBER
tional Petrochemical Company		CHEET N. C.	
chemical Research & Technology Company	PROCESS DATA SHEET E-7011 A	SHEET N. 4 OF	5 ISSUE
ERVICE HEXANE CO	ONDENSOR	QUANTITY PLANT UNIT	1 700
	CI/FTOLL	I LAWY OWN	700
	SKETCH		
 	3110 Overall		
173 1 8 1	2240		-
11 82	Ш	Ш	ш
(T1) (S2)	1500		
2220			

44		DOCUI	MENT NUMBER
280°	SAZ CATALYST PLANT		
National Petrochemical Company	DDOCECC DATA CHEET	CHEET N. F. OF .	ICCLIE O
National Petrochemical Company Petrochemical Research & Technology Company	PROCESS DATA SHEET E-7011 A	SHEET N. 5 OF	5 ISSUE 0
1 SERVICE HEXANE	CONDENSOR	QUANTITY	1
2		PLANT UNIT	700
3	NOTE		
5	NOTE		
6 NOZZLE DATA SHEET N	OTES		
7			
8			
9			
10			
12			
13			
14			
15 16			
17			
18			
19			
20			
22			
23			
24			
26			
27			
28			
29			
31			
32			
33			
34			
36			
37			
38			
40			
18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 50 51 52 53			
42			
43			
44			
46			
47			
48 49			
50			
51			
5 <u>2</u> 53			
33			
BER			
W NUMBER			
NIS M			

<u> </u>	SAZ CATALYST PLANT	DOCUMENT NUMBER			
National Petrochemical Company Petrochemical Research & Technology	PROCESS DATA SHEET	SHEET N. 1	OF 5		ISSUE 0
Company	E-7021 A				
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 50 50 50 50 50 50 50 50 50	EXCHANGER 702	21 A			
MBER MBER					
REVISED DATA ADVISED DATA ADVISED DATA ADVISED DATA ADVISED DATA					
A SI	DESCRIPTION	DRAWN UP	VERIFIE	APROVED	DATE

				SA	Z CATALY	'ST PI AN	Т		DOCUMENT N	NUMBER	
Α.	atlar	nal Petrochemical Co									
Petr	oche	emical Research & Te Company	mpany chnology	μ μ	ROCESS DA E-702			SHEET N.	2 OF 5		ISSUE 0
7	1 4	SERVICE	HEXANE	CONDENSOR	E-702	I A		QUANTITY	' 1		
		INSTALLATION	TILAANE		SERVICE TYPE			PLANT UN			
	3	TYPE	BEM	HORIZONTAL	TEMA CLASS	R - refi	nery service	INCLUDED	IN		
4		N. OF UNITS		SHELL / UNIT	PARALLEL / SER		1	SURF. PER SHE	ELL / UNIT	6.3 m	1 ²
ŗ	5				D	OATA OF ON	E UNIT				
6	ó					SHELL SIDE			TUBE SIDE		
		FLUID NAME/		HAZARDOUSNESS		HEXANE			COOLING WA	TER	
[]	_	TOTAL FLOWRA		kg/h	INIT	1500		INU ES	13000		_
1		LIQUID [Kg/	-	GAS AND VAPOURS	1500	(DUTLET	INLE	!	OUTLE	I
1	<u>U</u>	VAPOR	[Kg/h]		1500						
1	<u>1</u>	LIQUID	[Kg/h]				1500	1300	n	13000)
	3	LIQUID	[Kg/TI]				1500	1300	-	13000	,
_	4							-			
	5			· ·	INLET	AVERAGE	OUTLET	INLET	AVERAGE	OU	TLET
		OPERATING TE	MPERATU	RE °c	68	53.00	38	20	25.5	3	31
1	7	OPERATING PR	ESSURE	bar(g)	0	-0.04	-0.08	5	4.95	4	1.9
1	8	DENSITY		kg/m³			619	998		9	94
1	9	VISCOSITY		mPa s			0.3512	0.4881			5904
2	0	SPECIFIC HE THERMAL C		kJ/kg K			0.207	1			.72
12	1	SUBFACE TO					0.1054	0.6		0.	.62
듬	4	SURFACE TE BOILING PO		mN/M °C							
2	<u>ی</u>	MOLECULA			3.16						
5	5	DENSITY	N WLIGITI	kg/m³	0.0075						
5	6	VISCOSITY		mPa s	1.976						
2	7	ජි SPECIFIC HE	AT	kJ/kg K	0.0173						
2	8	SPECIFIC HE	ONDUCTI	VITY W/m K							
2	9	DT / DP		°C/MPa							
	0	LATENT HEA	ΑT	kJ/kg							
3		DEW POINT VELOCITY		°C	68.44		10.1	4			4
	_	DP MAX. ALLOV	/FD / ACT	m/S UAL bar	5.7 0.1	/	18.1 0.07	0.5	/		.09
	_	FOULING FACTO		°C m²/w	0.1		0.07	0.5		- 0.	.07
		OVER DES. ON D			%			•			
3	6	HEAT EXCHANG	ED			LMTD (CORR.) 37	TRANSF. RATE	DIRTY 726 W/	'(m²-K)	
3						UCTION OF					
		DES. PRESS. 1 /			3		YES	4			
		DES. TEMP. 1/2			105		@	70		@	
		MDMT	@	START-UP TEMP.		@			@		
		CORROSION ALL		mm	1			1			
		Number of Pa Tubes N.	55ES 43	B OD / ID / TH	1 IK 19.05	/ -	/ 1.65	<u>'</u>	LENGTH	mm 2	500
		SHELL I.D./OD	213.54		KETTLE I.D.	, -		UT / PITCH	30		3.81
		CROSS	TYPE	. , 217.00	NETTEL I.D.	N.	LATO		TRIP PAIRS	, 2.	J.U I
		BAFFLES	CUT %	40	SPACIN			INLET SPA			
	40 SPACING 205 INLET SPACING 47 LONG. BAFFLE TYPE INLET DEVICE TUBE-TUBESH. JOINT										
4	8	TUBE WALL TM	P CLEAN /	DIRTY	1	INSULATION			1		
4	9	9 Z SHELL SS 304			FRONT			CHANNEL	SS 30-	4	
5	50 E TUBES SS 304			REAR EI			CH.COVER				
5	1	FIX. TUBESH	IEE I	SS 304		TUBESHEET BAFFLES		FL.HEAD C	.UV.		
<u> </u>	<u>ረ</u> የ	GASKETS	NOZZLES	SHELL / TUBE	LUNG. I	/		FLOAT. HE	AD		
5		•		ANGES SHELLSIDE			MAIN FLAN	GES TUBESIDE			
۲	†						41 4				
<u>م</u> ۵	, [
ED DATA											
	4			-							

APROVED

DATE

DRAWNUP VERIFIE

DESCRIPTION

ISSUE

	446			DOCUMENT NUMBER					
	-00		SAZ CATALYST I	PLANT					
Nat	ional Petrochemical C	ompany	DDUCESS DATA SHEET			SHEET N.	3 OF 5	ISSUE 2	
Petroc	chemical Research & To Company	echnology	PROCESS DATA S E-7021 A	NELI		SMEET IN.	3 Ur 5	ISSUL 2	
1	SERVICE	HEXANE (CONDENSOR			QUANTITY	1		
2						PLANT UNIT 700			
3			No	771 -					
<u>4</u> 5	<u> </u>		INC	OZZLE					
6	POS.	N.	SERVICE	DN	RATING	FLANGE	FINISHING	NOTE	
7	N1		SHELL IN	4"	150#	SORF		HOIL	
8	N2		SHELL OUT	1"	150#	SORF			
9	N3		SHELL OUT	1"	150#	SORF			
10	N4		TUBE IN	1½"	150#	SORF			
11 12	N5	1	TUBE OUT	2"	150#	SORF		-	
13								+	
14									
15									
16									
17		1							
18 19	<u> </u>	1						-	
20									
21									
22									
23								4	
24 25		1						1	
26		1						1	
27									
28									
29 30									
31									
32									
33									
34									
35	<u> </u>	1						-	
37									
38									
36 37 38 39									
40 41								1	
42		1						1	
43								1	
44									
45									
46								_	
47 48	 							1	
48 49									
50									
51									
51 52 53	<u> </u>								
33									
TA ŒR									
VISED DATA									
.VISE	i								

	CA7 CATALVOT DI ANIT	DOCUMENT NUMBER			
TAN-	SAZ CATALYST PLANT				
National Petrochemical Company Petrochemical Research & Technology	PROCESS DATA SHEET E-7021 A	SHEET N. 4 OF	5 ISSUE 0		
Company 1 SERVICE HEXANE C	E-7021 A ONDENSOR	QUANTITY	1		
2		PLANT UNIT	700		
3 4	SKETCH				
5	3.2731				
6 7					
8					
9					
11					
12					
14					
15 16	3110 Overall		*		
17	2440 2240				
18		_	(a)		
20		_			
21					
23					
24		4			
26	1500				
27 28					
<u>29</u>					
31					
32					
34					
<u>35</u>					
37					
38					
40					
41					
43					
44					
46					
47					
49					
51					
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 50 51 52 53 50 50 50 50 50 50 50 50 50 50					
33					
7 8					
W NUMBER					
V N					

44		DOCUI	MENT NUMBER
280°	SAZ CATALYST PLANT		
National Petrochemical Company	DDOCECC DATA CHEET	CLIFET N. F. OF	ICCLIE O
National Petrochemical Company Petrochemical Research & Technology Company	PROCESS DATA SHEET E-7021 A	SHEET N. 5 OF	5 ISSUE 0
1 SERVICE HEXANE	CONDENSOR	QUANTITY	1
2		PLANT UNIT	700
3	NOTE		
5	NOTE		
6 NOZZLE DATA SHEET N	OTES		
7			
8			
10			
11			
12			
13			
14 15			
16			
17			
18			
19			
21			
22			
23			
2 <u>4</u> 25			
26			
27			
28			
30			
31			
32			
34			
35			
36			
37			
39			
40			
41			
43			
44			
45			
46			
48			
49			
50 51			
18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 50 51 52 53			
53			
۵ ۵			
WW NUMBER			
W NUMBER			

<u>∞</u>	SAZ CATALYST PLANT	D	OCUMEN	II NOMBE	<u> </u>
National Petrochemical Company Petrochemical Research & Technology	PROCESS DATA SHEET E-8023	SHEET N. 1	OF 5		ISSUE 0
Company	E-8023				
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 50 50 50 50 50 50 50 50 50	EXCHANGER 80	023			
BER					
REVISED DATA BUSSI ADMINISTRATION BUSSI BUSSI					
SO RE NIE	DESCRIPTION	DRAWN UP	VERIFIE	APROVED	DATE

SA				Z CATALYST PLANT					DOCUMENT NUMBER			
Nat	ional	Petrochemical Con	nnany						•			
Petroc	hemi	cal Research & Ted Company	chnology		<u> </u>	ROCESS DA E-80		<u>: I </u>		SHEET N.	2 OF 5	ISSUE 0
1	SEF	RVICE	HEXANE	REBOILER		L 00	23			QUANTITY	/ 1	
2		STALLATION				SERVICE TYPE				PLANT UN	IIT 700	
3	TY		BEM	VERTICAL		TEMA CLASS		refin	ery service	INCLUDED		2
4	N.	OF UNITS		SHELL / UNI	T	PARALLEL / SE	ries Data of (ONE		SURF. PER SHI	ELL / UNIT	7 m ²
<u>5</u>	┢					L	SHELL SID	_	UNII		TUBE SIDI	=
7	FIL	JID NAME/		HAZARDOU	SNESS		STEAM	_			HEXANE	-
8		TAL FLOWRA	TE	TITLETTICO	kg/h		112				700	
	LIC	ΩUID [Kg/	h]	GAS AND V		INLET		0	UTLET	INLE	Т	OUTLET
10	VA	POR	[Kg/h]			112						700
11	<u>. </u>											
12		QUID	[Kg/h]						112	700)	
13 14	-									•		
15						INLET	AVERA	GF	OUTLET	INLET	AVERAGE	OUTLET
	-	ERATING TEN	ИРЕRATU	RE	°C	170	169.7		169.5	81.97	82	82.03
17		ERATING PRE			bar(g)	7.8	7.8		7.8	1.523	1.51	1.5
18		DENSITY			kg/m³				898	601.31		
19		VISCOSITY			mPa s				0.16	0.18		
20	LIQUID	SPECIFIC HE			kJ/kg K				4.4	2.5	1	
21	, ≤	THERMAL CONTROL TE		VITY	W/m K				0.67	0.099	<u> </u>	1
22	-	BOILING PO			mN/M °C						+	+
24	┢	MOLECULAR			_	18.02						86.18
25	1	DENSITY			kg/m³	4.07						4.6
26		VISCOSITY			mPa s	0.0147						0.0078
27	VAPOR	SPECIFIC HE			kJ/kg K	2.46						1.9
28	1		ONDUCTI	VITY	W/m K	0.0347						0.0185
30		DT / DP LATENT HEA	т		°C/MPa kJ/kg						1	
31		DEW POINT	VI.		KJ/Kg °C							
32		LOCITY			m/S							1
33		MAX. ALLOW		UAL	bar	0.26	/		1.84	1.34	/	2.65
		ULING FACTO			°C m²/w							
35	OV	ER DES. ON D	UTY AND	FLOW		%	LATE (O	200 \	07.0			2.0
37		AT EXCHANG	ED				LMTD (CO		87.3 NE SHELL	TRANSF. RATE	DIRTY 104.4 W	//(m²-K)
		S. PRESS. 1 / 2	2 / F.V. RE	O.'D	bar(g)	9	OCTION	<i>3</i> 1 C	YES	3		
		S. TEMP. 1 / 2			°C				@			@
		DMT	@		-UP TEMP.		@				@	
		RROSION ALL			mm	_						
		IMBER OF PAS		00	/ ID / TI	1 10.05	,		/ 1/5	1	LENCTU	1F00
		BES N. ELL I.D./OD	257.45		/ ID / TH 73.05	KETTLE I.D.	/ -		/ 1.65	JT / PITCH	LENGTH 30	mm 1500 / 23.81
			TYPE) / 2	.73.03	KLIILL I.D.	N.		LATO		STRIP PAIRS	/ 23.01
	45 CROSS TYPE 46 BAFFLES CUT % 18				SPACIN)		INLET SPA			
		NG. BAFFLE T				INLET DEVICE			JBESH. JOINT			
48	48 TUBE WALL TMP CLEAN / DIRTY			/	INSULATI		HELL / TUBE		/			
49	49 ₹ SHELL CS			FRONT				CHANNEL		4		
50 E1	ER	LIX TITELON	FFT	SS 304 SS 304		REAR E	:ND .TUBESHEET	-		CH.COVEF FL.HEAD (
52	ĭ¥	CROSS BAFF	LES	CS			BAFFLES			I L.I ILAD (,	
53	GAS	SKETS	NOZZLES	SHELL / TUBI			1			FLOAT. HE	EAD	
54	_		MAIN FL	ANGES SHELL	SIDE	· · · · · · · · · · · · · · · · · · ·			MAIN FLAN	GES TUBESIDE		
D DATA UMBER	1											
ď I ≅	L		.									

DESCRIPTION

APROVED

DATE

DRAWNUP

VERIFIE

ISSUE

		*		SAZ CATALYST PLANT				DOCUMENT NUMBER	
	Nati Petroc	onal Petrochemical C hemical Research & T	ompany echnology	PROCESS DATA :			SHEET N.	3 OF 5	ISSUE 2
	4	Company	LIEVANIE	E-8023 CONDENSOR			0114417171		
	2	SERVICE	HEXANE	CONDENSOR			QUANTITY PLANT UNI	1 T 700	
	3						FLAIVI OIVI	1 700	
	4			N	OZZLE				
	5								
	6	POS.	N.	SERVICE	DN	RATING	FLANGE	FINISHING	NOTE
	7	N1		SHELL IN	1	150#	SORF		
	8	N2		SHELL OUT	1/2	150#	SORF		
	9	N3		TUBE IN	1	150#	SORF		
	10	N4		TUBE OUT	3	150#	SORF		
	11 12								
	13		1		-	-	1		-
	14		1		-		1		
	15								
	16		1				1		
	17		1						
	18								
	19								
	20								
	21		1						
	22 23		1		-	-	1		-
	24								
	25								
	26		1				1		
	27		1						
	28								
	29								
	<u>30</u> 31		1		-	.	ł		
	32								
	33								
	34								
	35								
	36								
	37 38								
	38		1						
	39 40		1				1		
	41		1		1		l		
	42								
	43								
	44								
	45								
	46								
	47 48				1		1		
	48		1		1		1		
	50		1		l l				
	51								
	52 53								
	53								
EVISED DATA	OW NUMBER								

	SAZ CATALYST PLANT	DOCUMENT NUI	MBER
National Petrochemical Company		SHEET N. 4 OF 5	ISSUE 0
Petrochemical Research & Technology Company	PROCESS DATA SHEET E-8023		.0002 0
2	CONDENSOR	QUANTITY 1 PLANT UNIT 700	
3	SKETCH		
5			
<u>6</u> 7			
8			
8 9 10 11			
12			
12 13 14 15			
15	42		
17			
18 19			
20			
<u>21</u> <u>22</u>			
23 24			
25 26			
27	1335		
28 29 30 30 21	7 2		
30			
<u>32</u>		4	
34			
35 36		450	
37 38		4	
39 40			
40		*	
42	317	317	
44			
46		Y	
47	738	970 Puling Length	
50		<u> </u>	
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 50 50 50 50 50 50 50 50 50 50 50 50	<u> </u>		
53			
W NUMBER			
OW NI			

4		DOCU	MENT NUMBER
<u> </u>	SAZ CATALYST PLANT		
National Petrochemical Company	DDOCESS DATA SHEET	SHEET N. 5 OF 5	5 ISSUE 0
Petrochemical Research & Technology Company	PROCESS DATA SHEET E-8023	SHEET N. 5 OF 5) I220F 0
1 SERVICE HEXANE	CONDENSOR	QUANTITY	1
2		PLANT UNIT	700
3	NOTE		
5	NOTE		
6 NOZZLE DATA SHEET N	OTES		
7			
8			
10			
11			
12			
13			
14			
15 16			
17			
18			
19			
20			
22			
23			
24			
26			
27			
28			
30			
31			
32			
33			
35			
36			
37			
38			
40			
41			
42			
44			
45			
46			
18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 50 51 52 53			
49			
50			
51 52			
53			
ABER ABER			
W NUMBER			
> ≳			