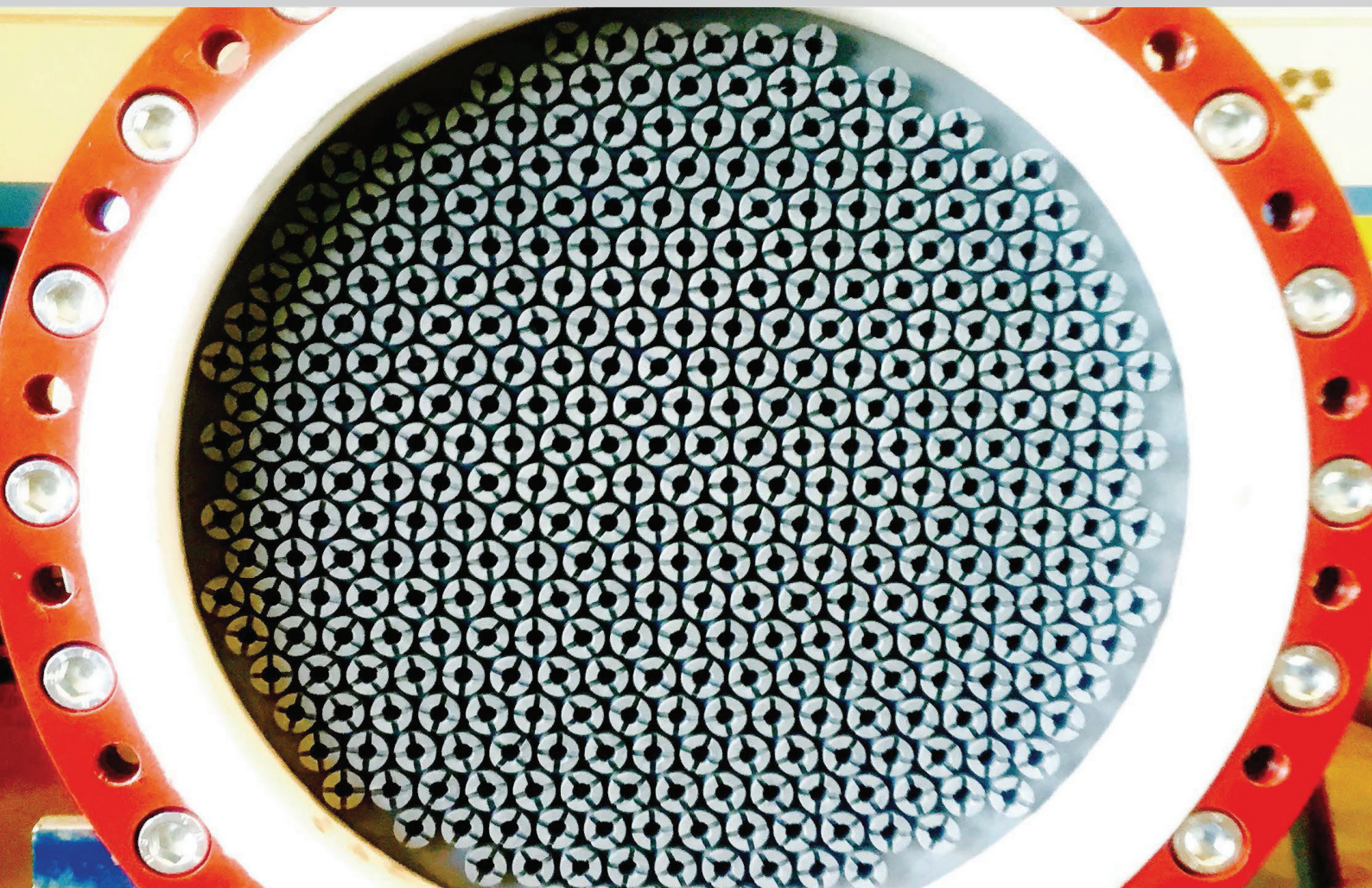




SILICON CARBIDE SHELL & TUBE HEAT EXCHANGERS



OVERVIEW PANORAMICA

SuperSiC® and BaSiC® heat exchangers with silicon carbide tubesheet and tubes are the top answer to severe corrosive applications. Ideal for heating, cooling and condensing chemically aggressive process streams. Typical applications include: bromine, sulphuric, hydrofluoric, nitric, hydrochloric and other acids; caustic and other alkalis; halogenated compounds; salt solutions, and organic compounds. All process-side parts are made of SiC and/or PTFE SiC-filled.

Gli scambiatori SuperSiC® e BaSiC® con piastre tubiere e tubi in carburo di silicio (SiC) sono progettati per operare in ambienti estremamente corrosivi. SuperSiC® e BaSiC® sono ideali per scaldare, raffreddare e condensare i fluidi più aggressivi. Le applicazioni più tipiche includono: bromo, acido solforico, fluoridrico, nitrico, tutti gli alcali, composti idrogenati, soluzioni saline e composti organici. Non si conosce sostanza in grado di intaccare la molecola.

SiC FEATURES

- Each tube is tested at 185 Bar before installation.
- CE, ATEX, ASME, FDA full compliance.
- Silicon carbide is unsurpassed in fighting corrosion.
- Inert to virtually every type of chemical, silicon carbide is an ideal material for handling corrosive media.
- Unlike graphite, Silicon Carbide contains no binders to leach out in corrosive solutions.
- The well-known non stick properties of silicon carbide help minimize fouling and scaling that would reduce heat transfer rates of metal and graphite.
- Silicon carbide material is resistant to damage resulting from thermal shock; outperforms glass and graphite.
- When necessary, units can be cleaned on-site chemically or mechanically with minimal downtime.
- Double TubeSheet Design: it is possible to separate the process fluid and the service fluid with a separation chamber, so that in case of o-ring leaking no mix will occur between the two fluids. This chamber can be pressurized at a higher pressure than the process one to avoid leaking in case of o-ring failure.

CARATTERISTICHE DEL CARBURO DI SILICIO

- Ciascun tubo è testato a 185 Bar prima del montaggio.
- CE, ATEX, ASME, FDA.
- Il carburo di silicio è insuperabile nella resistenza alla corrosione.
- È inerte con qualsiasi fluido corrosivo conosciuto.
- A differenza della grafite, non contiene alcun legante.
- Le caratteristiche di non-aderenza del SiC minimizzano l'incrostazione che nel tempo peggiora lo scambio termico.
- Il carburo di silicio ha un'ottima resistenza agli shock termici.
- Se necessario gli scambiatori possono essere puliti in opera con qualsiasi composto chimico opportuno, oppure rimuovendo meccanicamente le incrostazioni tramite sabbiatura.
- Sistema a Doppia Piastra Tubiera: consente di effettuare una tenuta idraulica lato servizio, separata dal lato processo tramite una camera intermedia atta ad impedire che i due fluidi possano mischiarsi. È possibile pressurizzare con un gas inerte questa camera in modo da evitare la fuoriuscita dei fluidi anche in caso di cedimento di un o-ring.

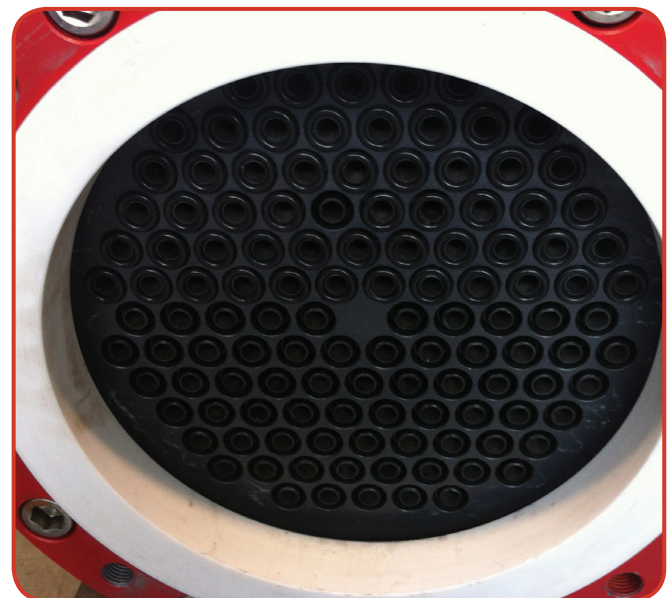
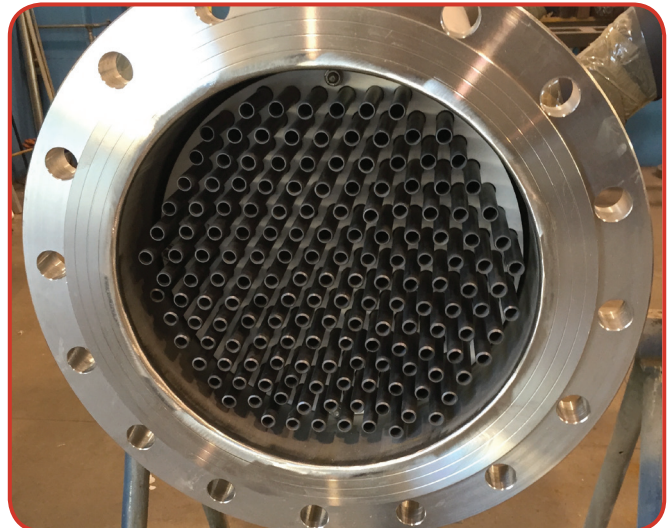
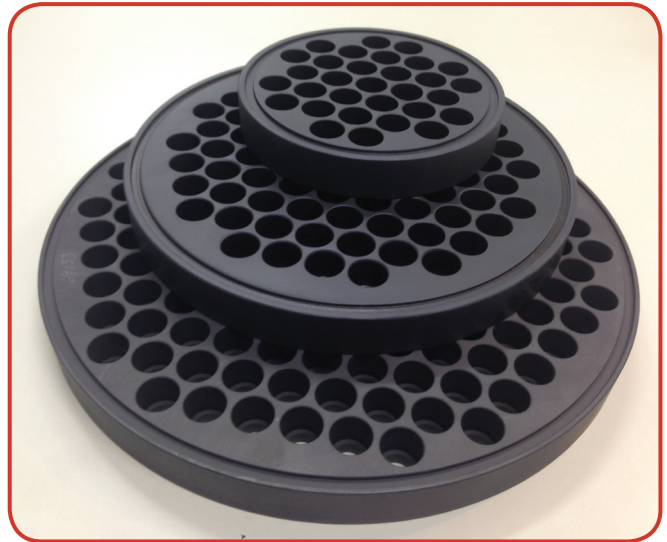


SUPERSIC®

STANDARD FEATURES

- each tube is tested at 185 Bar before installation
- shell diameters for standard units range from 4" to 20" (100 – 500 mm)
- shells are available in carbon steel, stainless steel, glass lined steel, PTFE lined steel, borosilicate glass
- nominal tube length is from 1000 to 6000 mm
- surfaces from 0,5 to 95 m²
- tubing diameter Ø 12,7 mm Ø 14 mm, Ø 19 mm
- single pass or multi pass design
- double Tubesheet design (GMP)
- horizontal or vertical installation
- temperature range from -30°C to +320°C
- pressure range from -1 Bar to +12 Bar
- Special features on request.
- CE, ATEX, ASME CODE, FDA full compliance.
- Double Tubesheet Design

It is possible to separate the process fluid and the service fluid with a separation chamber, so that in case of o-ring leaking no mix will occur between the two fluids. This chamber can be pressurized at a higher pressure than the process one to avoid leaking in case of o-ring failure.

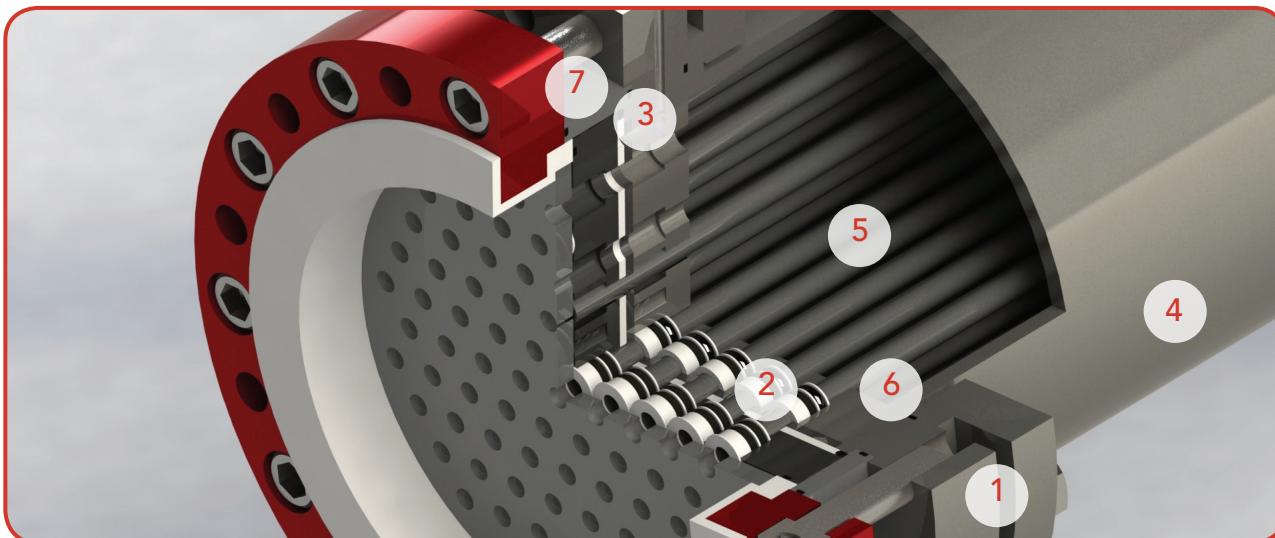


CARATTERISTICHE STANDARD

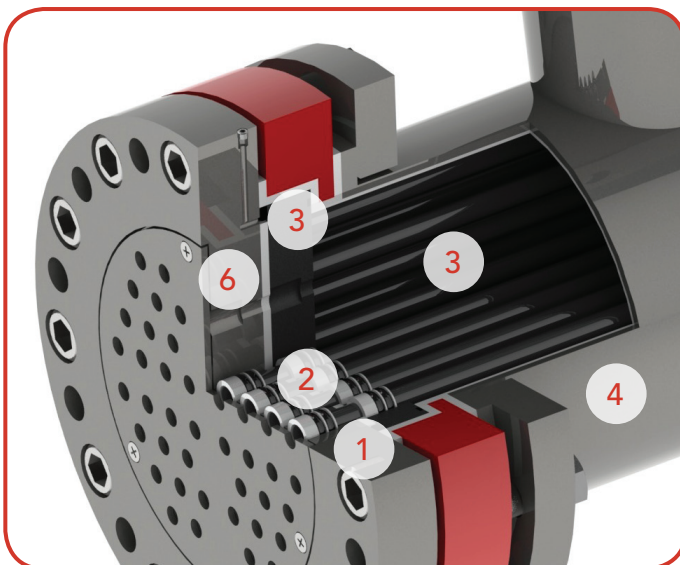
- *ciascun tubo è testato a 185 Bar prima del montaggio*
- *diametri disponibili: da DN 100 a DN 500*
- *materiali di costruzione del mantello: acciaio al carbonio, acciaio inossidabile, acciaio smaltato, acciaio rivestito PTFE, vetro borosilicato, materiali plastici*
- *lunghezze disponibili: da L=1000 a L=6000*
- *superfici: da 0,5 a 95 m²*
- *tubi in SiC da Ø 12,7 mm Ø14mm, Ø19mm*
- *lato tubi a passaggio singolo o multiplo*
- *doppia piastra tubiera (GMP)*
- *installazioni orizzontali o verticali*
- *campo termico di utilizzo: -30°C / +320°C*
- *campo di pressione di utilizzo -1 Bar / +12 Bar*
- *Sono possibili variazioni delle caratteristiche sopracitate secondo esigenze specifiche.*
- *Certificazioni: CE, ATEX, ASME, FDA.*
- *Il carburo di silicio è insuperabile nella resistenza alla corrosione*



SUPERSIC®

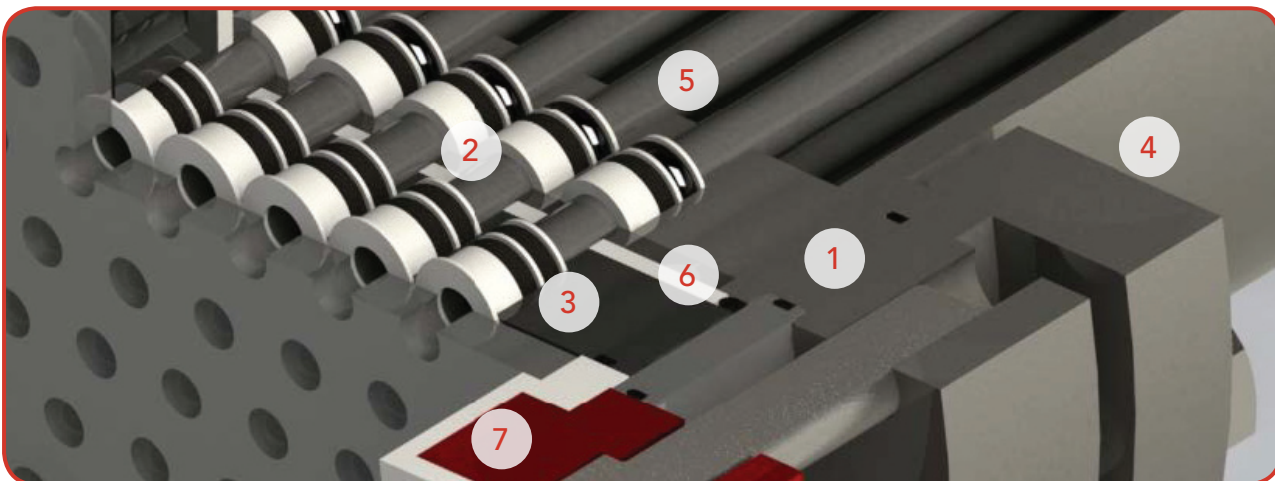


DOUBLE TUBESHEET DESIGN TUBE SIDE PROCESS STREAM
SISTEMA A DOPPIA PIASTRA TUBIERA PROCESSO LATO TUBI



- 1 SS Counter-tube-sheet
Contro piastra tubiera inox
- 2 FFKM O RING
O-Ring in perfluoroelastomeri
- 3 SiC Tube Plate
Piastra tubiera in SiC
- 4 Shell
Mantello
- 5 SiC Tube
Tubo in SiC
- 6 Safety Separation Chamber
Camera di Separazione
- 7 Bolting Ring for Secure Piping Connection
Anello di accoppiamento

DOUBLE TUBESHEET DESIGN SHELL SIDE PROCESS STREAM
SISTEMA A DOPPIA PIASTRA TUBIERA PROCESSO LATO MANTELLO

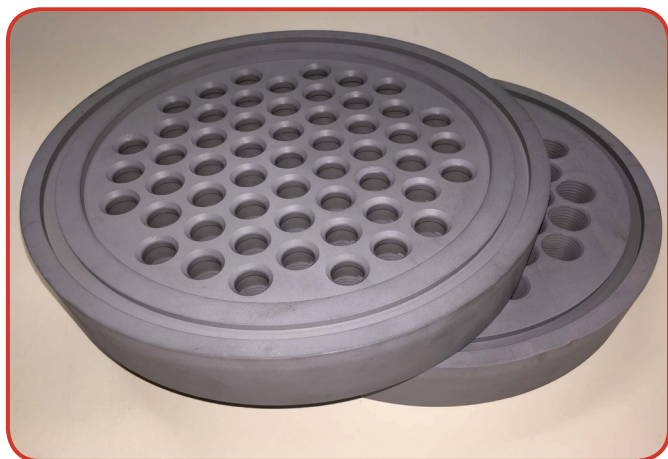


TUBESHEET DESIGN SEALING DETAILS



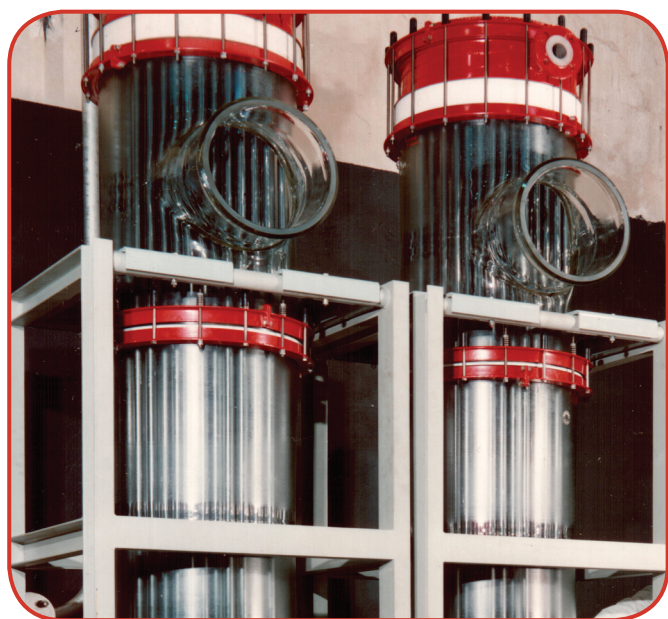
STANDARD FEATURES

- Tubesheet material: pure, vergin, PTFE 25% SiC filled
- each tube is tested at 185 Bar before installation
- shell diameters for standard units range from 4" to 20" (100 – 500 mm)
- shells are available in carbon steel, stainless steel, glass lined steel, PTFE lined steel, borosilicate glass
- nominal tube length is from 1000 to 6000 mm
- surfaces from 0,5 to 95 m²
- tubing diameter Ø 12,7 mm Ø 14 mm, Ø 19 mm
- single pass or multi pass design
- double Tubesheet design (GMP)
- horizontal or vertical installation
- temperature range from –30°C to +320°C
- pressure range from –1 Bar to +12 Bar
- Special features on request.
- CE, ATEX, ASME CODE, FDA full compliance.



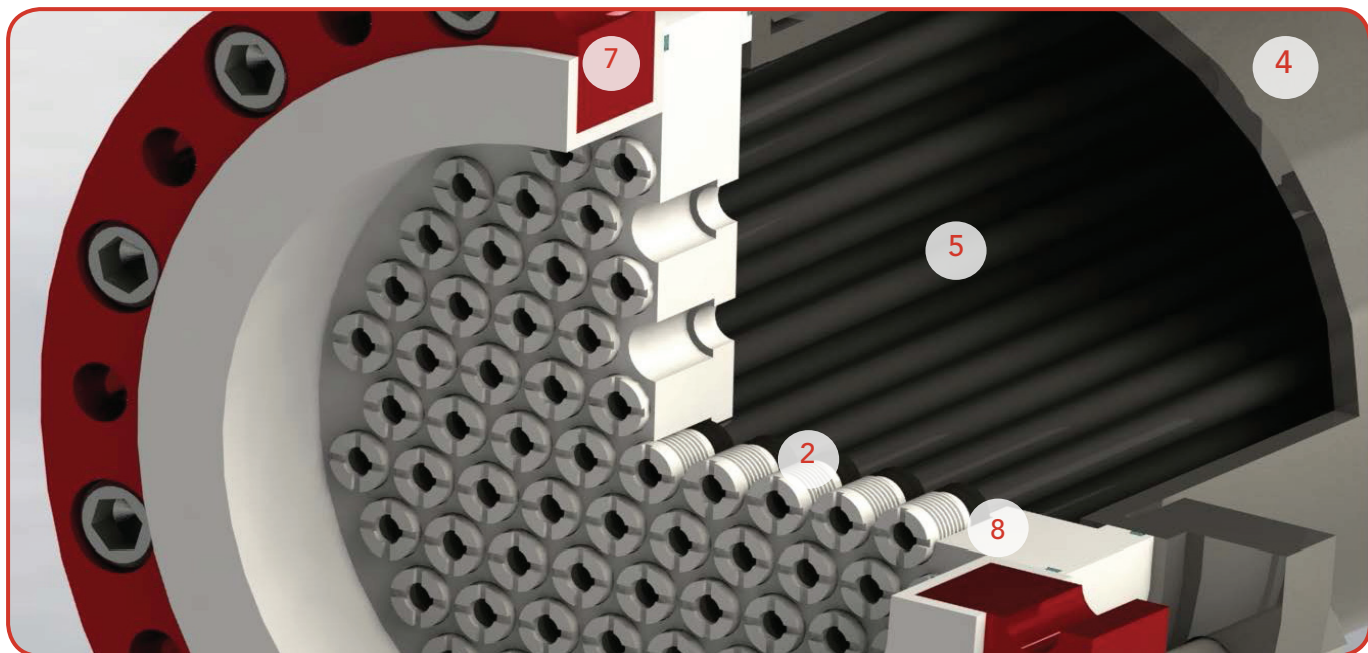
CARATTERISTICHE STANDARD

- *piastre tubiere: PTFE puro e vergine, caricato SiC 25%*
- *ciascun tubo è testato a 185 Bar prima del montaggio*
- *diametri disponibili: da DN 100 a DN 500*
- *materiali di costruzione del mantello: acciaio al carbonio, acciaio inossidabile, acciaio smaltato, acciaio rivestito PTFE, vetro borosilicato, materiali plastici*
- *lunghezze disponibili: da L=1000 a L=6000*
- *superfici: da 0,5 a 95 m²*
- *tubi in SiC da Ø 12,7 mm Ø14mm, Ø19mm*
- *lato tubi a passaggio singolo o multiplo*
- *doppia piastra tubiera (GMP)*
- *installazioni orizzontali o verticali*
- *campo termico di utilizzo: –30°C / +320°C*
- *campo di pressione di utilizzo –1 Bar / +12 Bar*
- *Sono possibili variazioni delle caratteristiche sopracitate secondo esigenze specifiche.*
- *Certificazioni: CE, ATEX, ASME, FDA.*
- *Tutte le parti a contatto con i fluidi di processo sono in SiC*

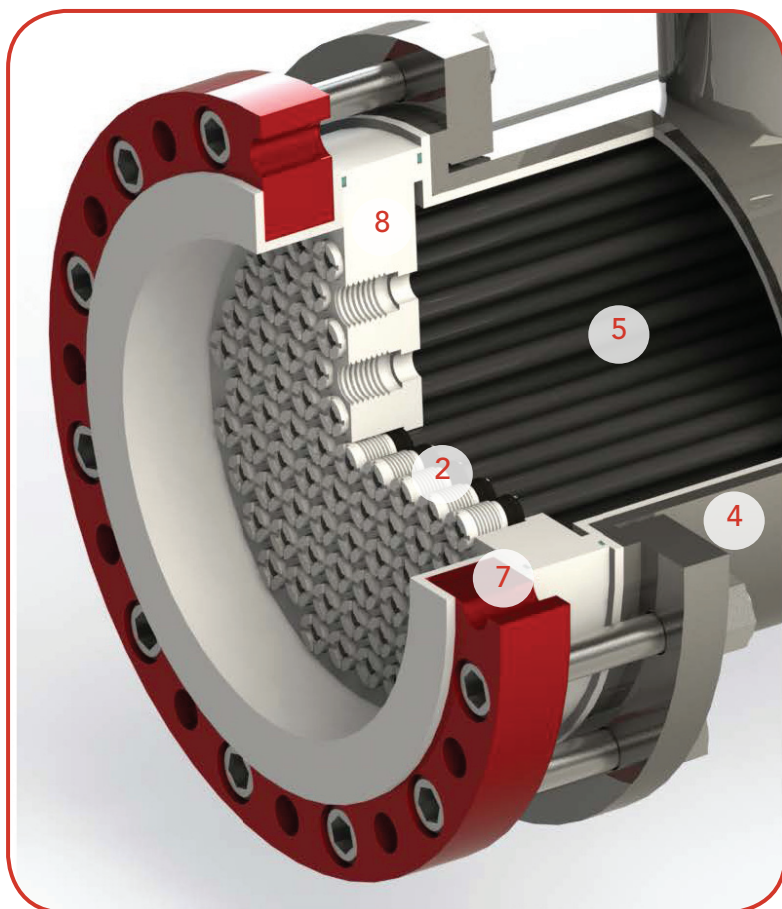


BASIC[®]

SINGLE TUBESHEET DESIGN SISTEMA A SINGOLA PIASTRA TUBIERA



TUBE SIDE PROCESS STREAM
PROCESSO LATO TUBI



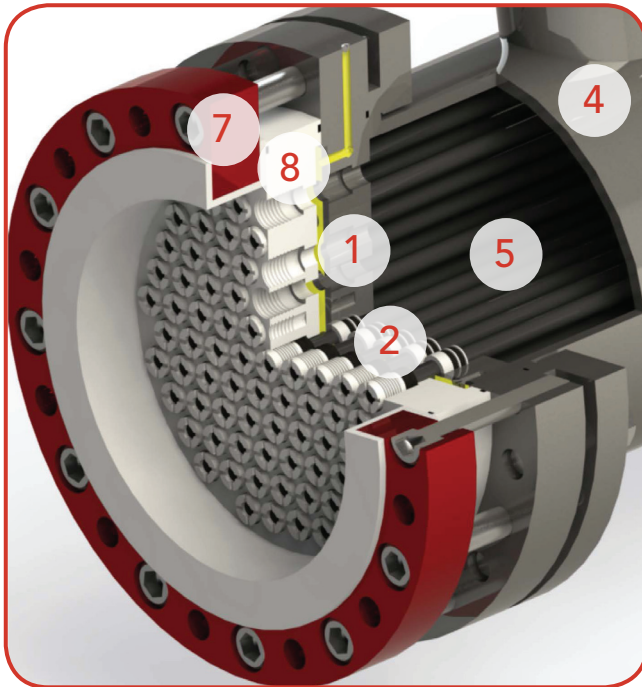
SHELL SIDE PROCESS STREAM
PROCESSO LATO MANTELLO

- 2 FFKM O RING
O Ring in perfluoroelastomeri
- 4 Shell
Mantello
- 5 SiC Tube
Tubo in SiC
- 6 Safety Separation Chamber
Camera di Separazione
- 7 Bolting Ring for Secure Piping Connection
Anello di accoppiamento
- 8 PTFE SiC-filled
Piastra tubiera in PTFE caricato SiC

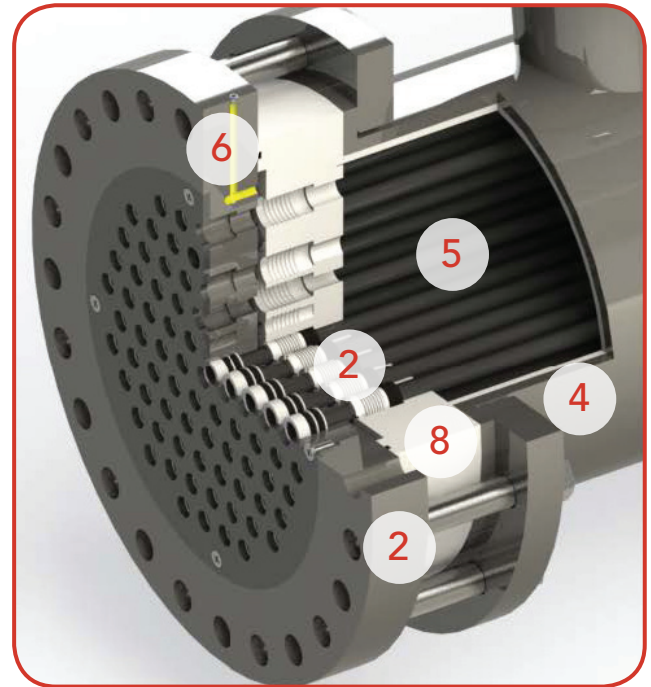


BASIC-S

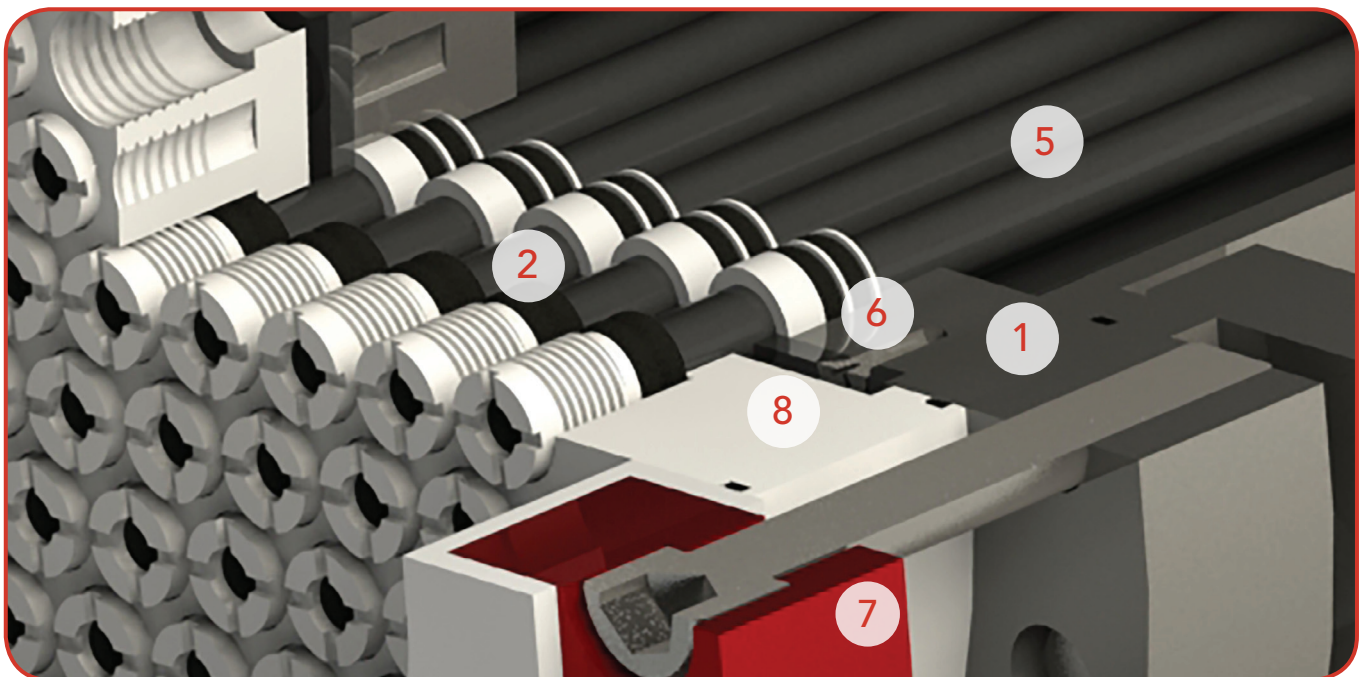
DOUBLE TUBESHEET DESIGN SISTEMA A DOPPIA PIASTRA TUBIERA



TUBE SIDE PROCESS STREAM
PROCESSO LATO TUBI



SHELL SIDE PROCESS STREAM
PROCESSO LATO MANTELLO



SEALING DETAILS

- | | |
|--|--|
| 1 SS Counter-tube-sheet
Contro piastra tubiera inox | 6 Safety Separation Chamber
Camera di Separazione |
| 2 FFKM O RING
O-Ring in perfluoroelastomeri | 7 Bolting Ring for Secure Piping Connection
Anello di accoppiamento |
| 4 Shell
Mantello | 8 PTFE SiC-filled
Piastra tubiera in PTFE caricato SiC |
| 5 SiC Tube
Tubo in SiC | |



SUPERSIC® AND BASIC®

NOMINAL AREAS OF EXCHANGE SUPERFICI NOMINALI DI SCAMBIO

		AREA IN SQUARE METRES PER 19,1 OD TUBES																							
SHELL DIAMETER	N° OF TUBES	1000	1250	1500	1750	2000	2250	2500	2750	3000	TUBE LENGHT in mm			3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000
DN 100	7	0,42	0,52	0,63	0,73	0,84	0,94	1,05	1,15	1,26	1,36	1,47	1,57	1,67	1,78	1,88	1,99	2,09	2,20	2,30	2,41	2,51	2,61	2,71	2,81
DN 150	13	0,78	0,97	1,17	1,36	1,56	1,75	1,94	2,14	2,33	2,53	2,72	2,92	3,11	3,30	3,50	3,69	3,89	4,08	4,28	4,47	4,67	4,87	5,07	5,27
DN 200	31	1,85	2,32	2,78	3,24	3,71	4,17	4,64	5,10	5,56	6,03	6,49	6,95	7,42	7,88	8,34	8,81	9,27	9,73	10,20	10,66	11,12	11,58	12,04	12,50
DN 250	43	2,57	3,21	3,86	4,50	5,14	5,79	6,43	7,07	7,72	8,36	9,00	9,64	10,29	10,93	11,57	12,22	12,86	13,50	14,15	14,79	15,43	16,07	16,71	17,35
DN 300	61	3,65	4,56	5,47	6,38	7,30	8,21	9,12	10,03	10,95	11,86	12,77	13,68	14,59	15,51	16,42	17,33	18,24	19,15	20,07	20,98	21,89	22,80	23,71	24,62
DN 350	85	5,08	6,35	7,63	8,90	10,17	11,44	12,71	13,98	15,25	16,52	17,79	19,06	20,34	21,61	22,88	24,15	25,42	26,69	27,96	29,23	30,50	31,77	33,04	34,31
DN 350	151	9,03	11,29	13,55	15,80	18,06	20,32	22,58	24,84	27,09	29,35	31,61	33,87	36,13	38,38	40,64	42,90	45,16	47,41	49,67	51,93	54,19	56,45	58,71	60,97
DN 400	151	9,03	11,29	13,55	15,80	18,06	20,32	22,58	24,84	27,09	29,35	31,61	33,87	36,13	38,38	40,64	42,90	45,16	47,41	49,67	51,93	54,19	56,45	58,71	60,97
DN 450	191	11,42	14,28	17,14	19,99	22,85	25,70	28,56	31,42	34,27	37,13	39,98	42,84	45,69	48,55	51,41	54,26	57,12	59,97	62,83	65,69	68,54	71,39	74,25	77,11
DN 500	241	14,41	18,02	21,62	25,22	28,83	32,43	36,04	39,64	43,24	46,85	50,45	54,05	57,66	61,26	64,86	68,47	72,07	75,67	79,28	82,88	86,49	90,09	93,69	97,29

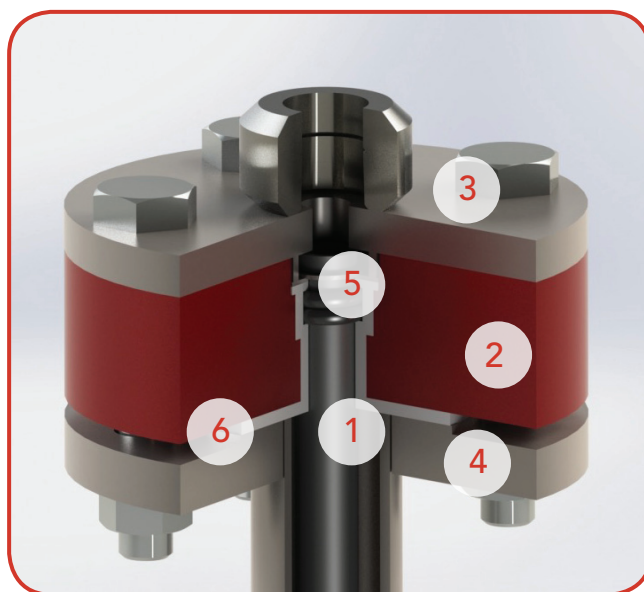
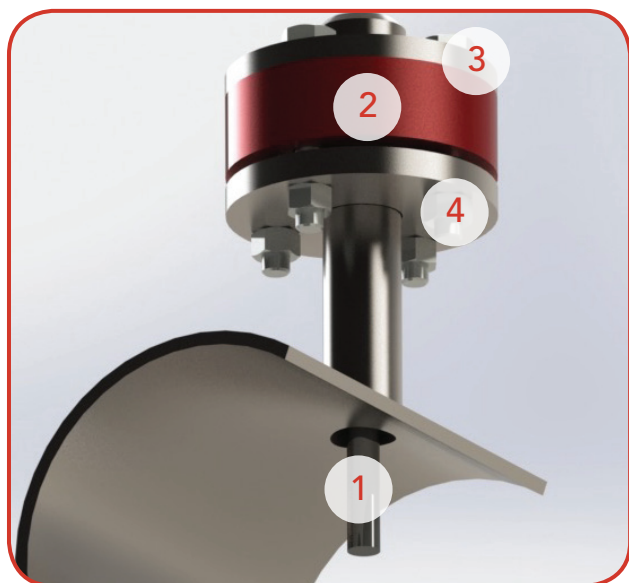
		AREA IN SQUARE METRES PER 12,7 OD TUBES																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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						AREA IN SQUARE METRES PER 14 OD TUBES																					
C.S. SHELL DIAMETER	N° OF TUBES	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500	3750	4000	4250	4500	4750	5000	5250	5500	5750	6000					
DN 100	13	0,57	0,71	0,86	1,00	1,14	1,29	1,43	1,57	1,71	1,86	2,00	2,14	2,29	2,43	2,57	2,71	2,86	3,00	3,14	3,29	3,43					
DN 125	19	0,84	1,04	1,25	1,46	1,67	1,88	2,09	2,30	2,51	2,71	2,92	3,13	3,34	3,55	3,76	3,97	4,18	4,39	4,59	4,80	5,01					
DN 150	31	1,36	1,70	2,04	2,38	2,73	3,07	3,41	3,75	4,09	4,43	4,77	5,11	5,45	5,79	6,13	6,47	6,81	7,15	7,50	7,84	8,18					
DN 200	55	2,42	3,02	3,63	4,23	4,84	5,44	6,04	6,65	7,25	7,86	8,46	9,07	9,67	10,28	10,88	11,48	12,09	12,69	13,30	13,90	14,51					
DN 225	61	2,68	3,35	4,02	4,69	5,36	6,03	6,70	7,37	8,04	8,72	9,39	10,06	10,73	11,40	12,07	12,74	13,41	14,08	14,75	15,42	16,09					
DN 250	85	3,74	4,67	5,60	6,54	7,47	8,41	9,34	10,28	11,21	12,14	13,08	14,01	14,95	15,88	16,81	17,75	18,68	19,62	20,55	21,49	22,42					
DN 300	121	5,32	6,65	7,98	9,31	10,64	11,97	13,30	14,63	15,96	17,29	18,62	19,95	21,28	22,61	23,94	25,27	26,60	27,93	29,26	30,59	31,91					
DN 350	163	7,17	8,96	10,75	12,54	14,33	16,12	17,91	19,71	21,50	23,29	25,08	26,87	28,66	30,45	32,24	34,04	35,83	37,62	39,41	41,20	42,99					
DN 400	211	9,28	11,59	13,91	16,23	18,55	20,87	23,19	25,51	27,83	30,15	32,46	34,78	37,10	39,42	41,74	44,06	46,38	48,70	51,02	53,33	55,65					
DN 450	278	12,22	15,28	18,33	21,39	24,44	27,50	30,55	33,61	36,66	39,72	42,77	45,83	48,88	51,94	54,99	58,05	61,10	64,16	67,21	70,27	73,33					
DN 500	361	15,87	19,84	23,80	27,77	31,74	35,71	39,67	43,64	47,61	51,58	55,54	59,51	63,48	67,45	71,41	75,38	79,35	83,32	87,28	91,25	95,22					



THERMOWELL SOCKET

TASCHE TERMOMETRICHE

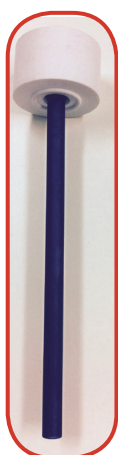
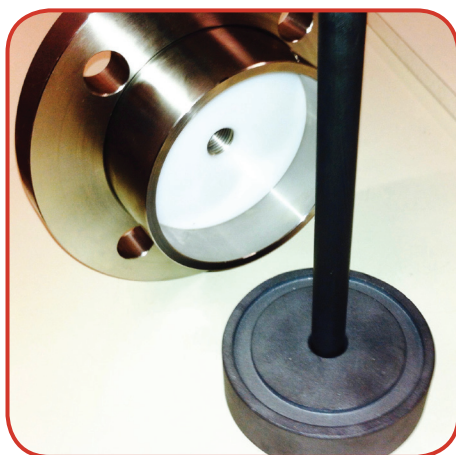


Made with a single tube, plugged at one end, fitting any nozzle diameter, sporting the following features:

- 1 SiC Socket
- 2 SiC or CS/SS PTFE/PFA lined plate
- 3 Top cover
- 4 Process nozzle
- 5 O-Ring set
- 6 Sealings

Interamente costituito in SiC senza saldature, chiuso ad un'estremità, si adatta a qualsiasi diametro di bocchello e presenta le seguenti caratteristiche:

- 1 Tasca termometrica in SiC
- 2 Piastra guida in SiC oppure in CS/SS PTFE/PFA
- 3 Coperchio
- 4 Bocchello di processo
- 5 O-Ring set
- 6 Guarnizioni



Custom Length-L (+/- 3,17 mm)	OD	ID	Tolerance
Up to	9,5	6,4	0,4
	15,9	9,5	0,6
	19,0	14,0	0,6
680 mm	19,1	12,7	0,6
	25,4	12,7	0,7
	27,0	17,0	0,7
	31,8	19,1	1
	31,8	23,4	1
	34,0	24,0	1
	38,1	25,4	1

Design conditions $T = -30^{\circ} / + 320^{\circ}$ $P = -1 / +6$ Bar

Condizioni di progetto $T = -30^{\circ} / + 320^{\circ}$ $P = -1 / +6$ Bar





Work n.	
Date	
Item n.	

HEAT EXCHANGER SPECIFICATION SHEET

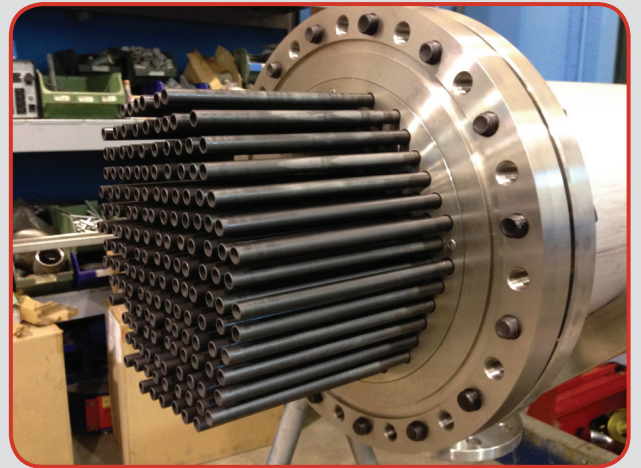
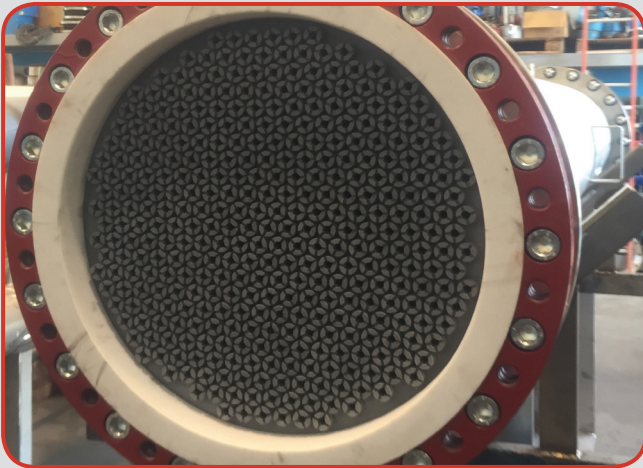
Description:			
Type:			
Surface: M2		SHELL SIDE	
TUBE SIDE			
1	Fluid name		
2	Fluid quantity, total	Kg/h	
3	Vapor (in/out)	Kg/h	
4	Liquid	Kg/h	
5	Noncondensable	Kg/h	
6	Temperature (in/out)	°C	
7	Dew point/bubble point	°C	
8	Density	Kg/m ³	
9	Viscosity	cp	
10	Molecular weight, vapor		
11	Molecular weight, noncondensable		
12	Specific heat	Kcal/(Kg*°C)	
13	Thermal conductivity	Kcal/(Kg*°C)	
14	Latent heat	Kcal/Kg	
15	Inlet pressure	Kg/cm ²	
16	Velocity	m/s	
17	Pressure drop, allow./calc.	Kg/cm ²	
18	Fouling resist. (min.)	M ² *h*°C/Kcal	
19	Heat exchanged	Kcal/h	MTD corrected °C
20	Transfer rate, service	dirty	clean Kcal/(m ² *h*°C)

CONSTRUCTION OF ONE SHELL

		Sketch	
		SHELL SIDE	
		TUBE SIDE	
1	Design/test pressure	Kg/cm ²	
2	Design temperature	°C	
3	No. Passes per shell		
4	Corrosion allowance	mm	
5	Connections in DN	mm	
6	Size/rating out DN	mm	
7		/	
8	Tube no. od mm ; thk-avg mm; lenght mm; pitch mm		
9	Tube type : plain	Material: SiC	
10	Shell: carbon steel	Nom. Dia.: mm	Shell cover
11	Channel or bonnet: none		Channel cover
12	Tubesheets: PTFE glass filled 25%		
13	Baffles: PTFE		Spacing: mm
14	Gaskets-shell side:		Tube side:
15	Tube to tubesheet O-Ring seal:		
16	Code requirements:		
17	Weight/shell	Filled with water	Bundle Kg
18	Remarks:		



CASE HISTORIES





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