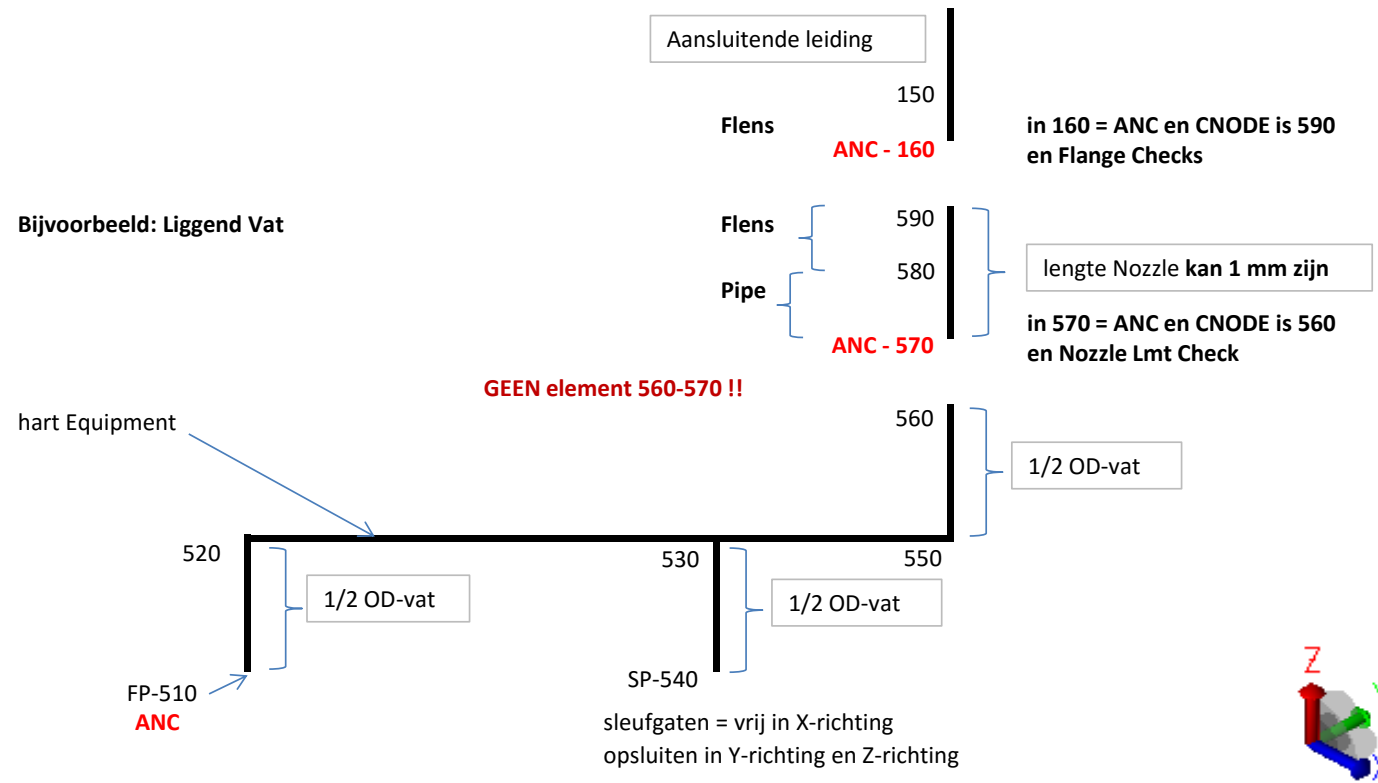
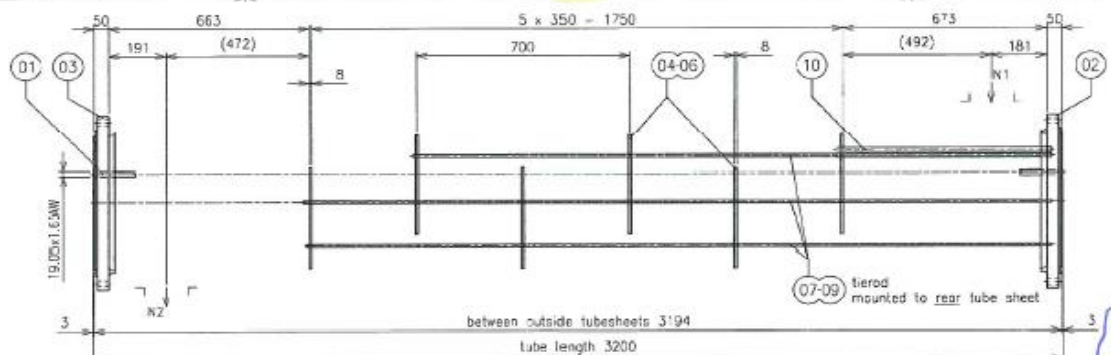
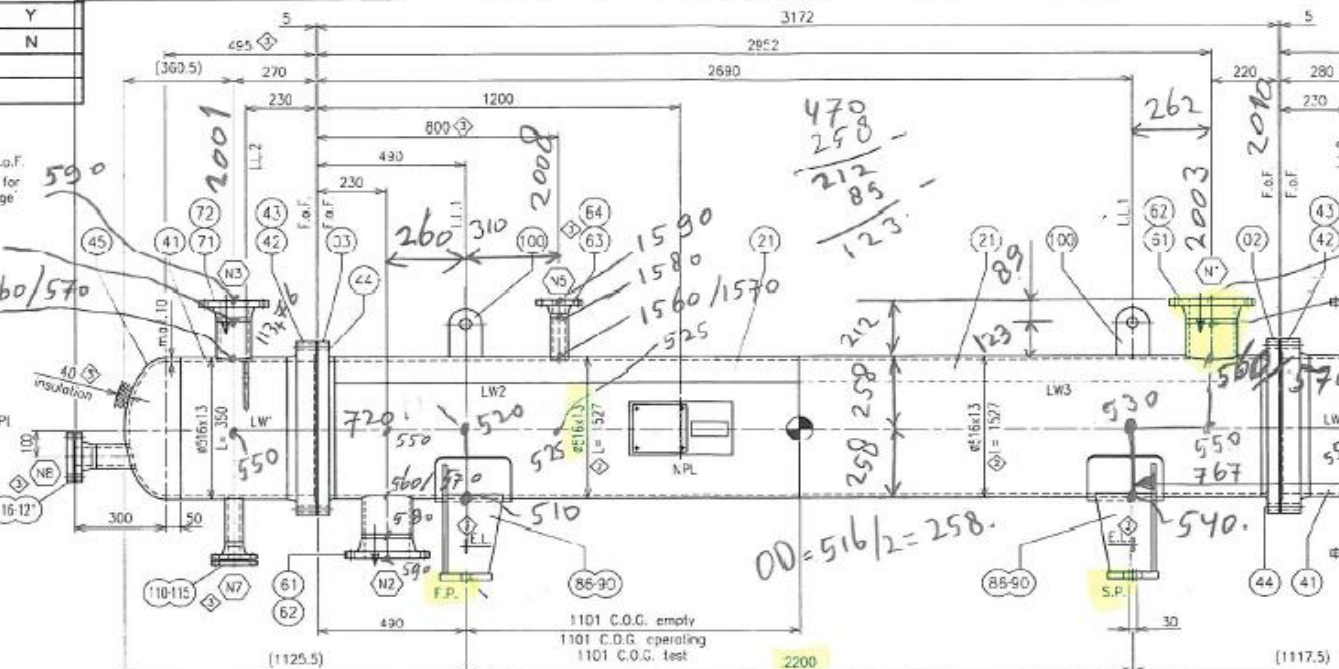
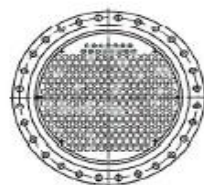
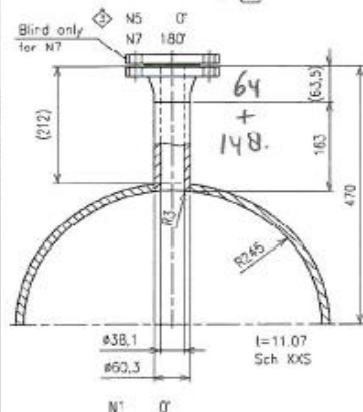
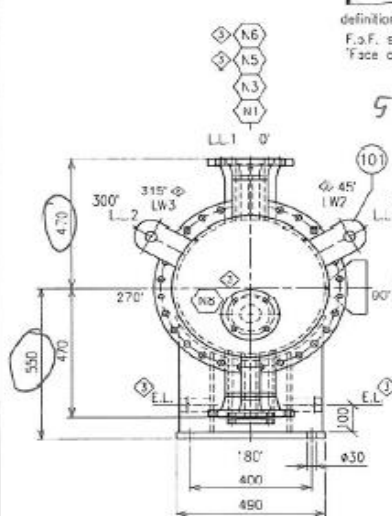




Element	Afmeting		Omschrijving	Retrains	Constructie-element	Diameter / Wallth / Materiaal
510-520	258	mm	1/2*OD van vat	510 ANC	RIGID met gewicht = 0	van VAT
520-530	2200	mm			RIGID met gewicht = 0	van VAT
530-540	258	mm	1/2*OD van vat	540 Y en Z	RIGID met gewicht = 0	van VAT
530-550	262	mm			RIGID met gewicht = 0	van VAT
550-560	258	mm	1/2*OD van vat			van VAT
560-570	-	-	OVERSLAAN	-	-	-
570-580	123	mm	pipe van nozzle			van NOZZLE
580-590	89	mm	flens van nozzle			van NOZZLE
150-160	89	mm	flens op leiding			van aansluitende PIPE / FLENS

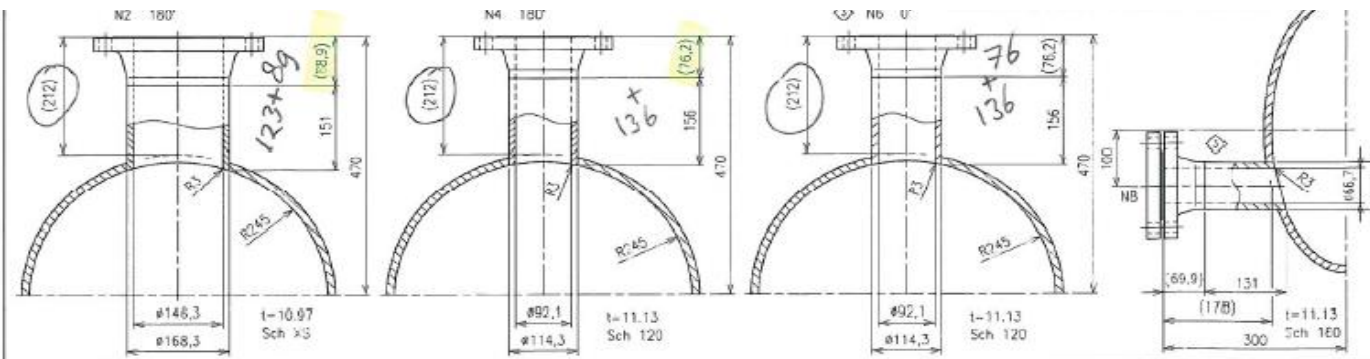
Route	Discipline	Checked	Date	Comments (Y/N)
	Sales / Project Eng / Eng. Man			
1	Process	RLe	15-05	Y
2	Mechanical	SvdL	15-05-15	N
	Electrical & Instrumentation			
	QC Inspection			



DESIGN BOLT TORQUE TIGHTENING			
POS. NR.	BOLT SIZE	TORQUE REQUIRED Nm ($f=0.12$)	GASKET POS. NR.
44	3/4"	79	43

NOTE: TIGHTEN BY TORQUEWRENCH WITH ... Nm
EACH BOLT IN 4 STEPS OF 70%-90%-100%-100%

Acceleration table	X-acceleration (longitudinal)	Y-acceleration (transversal)	Z
Design Condition	0g	0.35g	
Survival Condition	0g	0.43g	
Transition Condition	0g	0.64g	
Flood Extreme	0.11g	0.6g	
Flood Combined	0.06g	0.68g	



For complete overview of all load cases see page 7+8 of document!

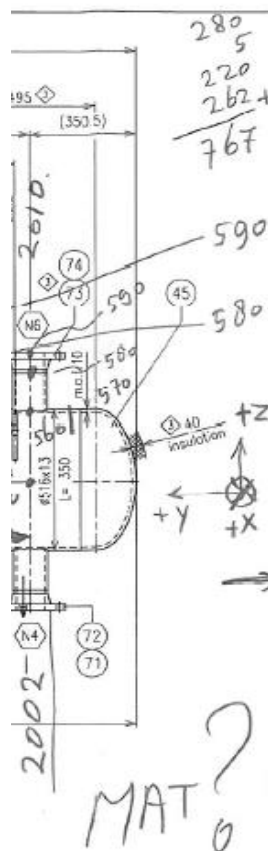
MARK	ALLOWABLE N		
	Fa kN	Fc kN	Fi kN
N1	9	6.75	9
N2	9	6.75	9
N3	6	4.5	6
N4	6	4.5	6

Nozzle loads occ. Frames spec.

FPS-PM-VES-0001

REFERENCE DOCUMENTS			
Design	Draw name	FPS Doc Number	Page
NO-100900 101	General Arrangement	P100179-PM-SAE-20H002-001	100
NO-100900 101	Fabrication Drawings	P100179-PM-SAE-20H002-001	100
NO-100900 102	Fabrication Drawings	P100179-PM-SAE-20H002-012	100
NO-100900 101	Fabrication Drawings	P100179-PM-SAE-20H002-003	100
NO-100900 101	Plan of	P100179-PM-SAE-20H002-001	100
NO-100900 102	Mechanical Calculation	P100179-PM-SAE-20H002-001	100

no 2216 = 177



Update process data according latest EDS

STEEL: 383
MAT CII = 382

Construction/TEMA type	BEU
Wind Code/Wind Speed	acc. 10000-12-N-90-RM-20001-001
Medium	Cooling water/Produced water
Number of Passes	1
Surface	54 m ²
Capacity	330 400 m ³
Weight Empty	2100 kg
Front Channel	190 kg
Rear Channel	190 kg
Internals	1000 kg
Filled with Water	2830 kg
Operational	2830 kg
Flow max.	128848 51304 kg/h
Design duty	3026 kW
Working Press.	3.05 (3.0) 4.58 (4.5) kg/cm ² (g) (barg)
Working Temp. in/Out	35/55 130/28/80 °C
Design Pressure	12.24 (12.2) 12.24 (12.0) kg/cm ² (g) (barg)
Design Temperature	-15/+80 -15 (+80) °C
Ambient Temperature	11.3 ... 33 °C
MAWP	14.8 (14.6) 14.8 (14.6) kg/cm ² (g) (barg)
MAP	20.0 (19.6) 20.0 (19.6) kg/cm ² (g) (barg)
Test Pressure (MR-13)	22.2 (21.8) 22.2 (21.8) kg/cm ² (g) (barg)
Test Pressure (MAP)	26.0 (25.5) 26.0 (25.5) kg/cm ² (g) (barg)
MR-13 classification	D - S - V D - S - V
Joint Efficiency	0.85 0.85
Corrosion Allowance	3 6 mm
PW Heat Treatment	No No
ND Examination	Spot Spot
Preservation Internal	No No
External	System 13a System 13a
Insulation (by others)	N/A 40 mm
Number of Vessels	
Manufact. Serial Number	31269

NOZZLE DATA				
MARK	NOM. BER	NOM. SIZE	SERVICE	FLANGE
N1	1	6"	Inlet	WN, RF, 150 # s.t. ASME B16.5
N2	1	6"	Outlet	WN, RF, 150 # s.t. ASME B16.5
N3	1	4"	Inlet	WN, RF, 150 # s.t. ASME B16.5
N4	1	4"	Outlet	WN, RF, 150 # s.t. ASME B16.5
N5	1	2"	Relief Outlet	WN, RF, 150 # s.t. ASME B16.5
N6	1	4"	Water Outlet	WN, RF, 150 # s.t. ASME B16.5
N7	1	2"	Drain	WN, RF, 150 # s.t. ASME B16.5
N8	1	3"	Utility	WN, RF, 150 # s.t. ASME B16.5

- Notes:
1. Tube to tubesheet connection is double grooved and expanded. Tubes expanded upto max. 3 mm of shellside face of tubesheet. Expansion percentage 3-5%.
 2. Tolerance in acc. with design code unless otherwise noted.
 3. All sharp corners shall be ground finish radius 2-3 mm.
 4. The exchanger shall be hydrostatically tested with water. The shell side and tube side are to be tested separately in such a manner that leaks at the tube joints can be detected from at least one side.
 5. All open flanges shall be provided with soft rubber gaskets, 6 mm thick metal protection plates from material of the same nominal material composition as the host, equipment bolted with a minimum of 4 - M12 galvanized bolts.
 6. Painting/Coating acc. P100779-PM-COP-001
 7. Insulation acc. P100779-PM-IPS-001
 8. Load cases acc. 10000-12-N-90-RM-12C101-001

1	Revised acc. comments client, see ②	16	10-04-16	UML	20-04-16
2	Revised acc. comments client, see ②	16	03-05-16	UML	05-05-16

Revision 3:
-Revised acc. comments client, see ②
-Added nozzle NE/N6/N7/N8

20HA002

acceleration (vertical)
0.22g
0.27g
0.51g
Dg
0.22g

WD-100900-32

NOZZLE LOADS

Mc kNm	ML kNm	MI kNm
2.7	4.05	3.51
2.7	4.05	3.51
1.2	1.8	1.56
1.2	1.8	1.56

REV	REVISION
01	INITIAL
02	REVISION
03	REVISION
04	REVISION
05	REVISION
06	REVISION
07	REVISION
08	REVISION
09	REVISION
10	REVISION

1. Original issue		16	16-01-16	16	16-01-16
revision		description	drawn	date	checked date
			drawing number	group	version
			WD-100900	101	3
Rev	Reason For Issue	Date	Eng. No.	Drawn	Chk.
01	CLASH EQUIPMENT	16.04.16	HE	HE	MM
02	ORIGINAL ISSUE FOR REVIEW	28.01.16	HE	HE	MM
Project Name: PETROBRAS I - Quatro Galvão - Atlanta Equipment Name: 20-HA-002 GENERAL ARRANGEMENT EQUIPMENT Produced Water Pre-Cooler					
Equipment No.	10000-11-M-20-XD-110021-001	Sheet	1	Total	
Quantity	1	Scale	NA	2+1	
Rev. No. 01	20-HA-002	Equipment Name	FRAMES	11	
Scale 28.01.16	20-HA-002	Equipment Name	P100772-PA-GAE-20HA002-001	11	
Rev. No.	Rev. Supplier Company Name	Rev. No.	Rev. Supplier Company Name	Rev. No.	
Date	Date	Rev. Supplier Company Name	Rev. Supplier Company Name	Rev. Supplier Company Name	