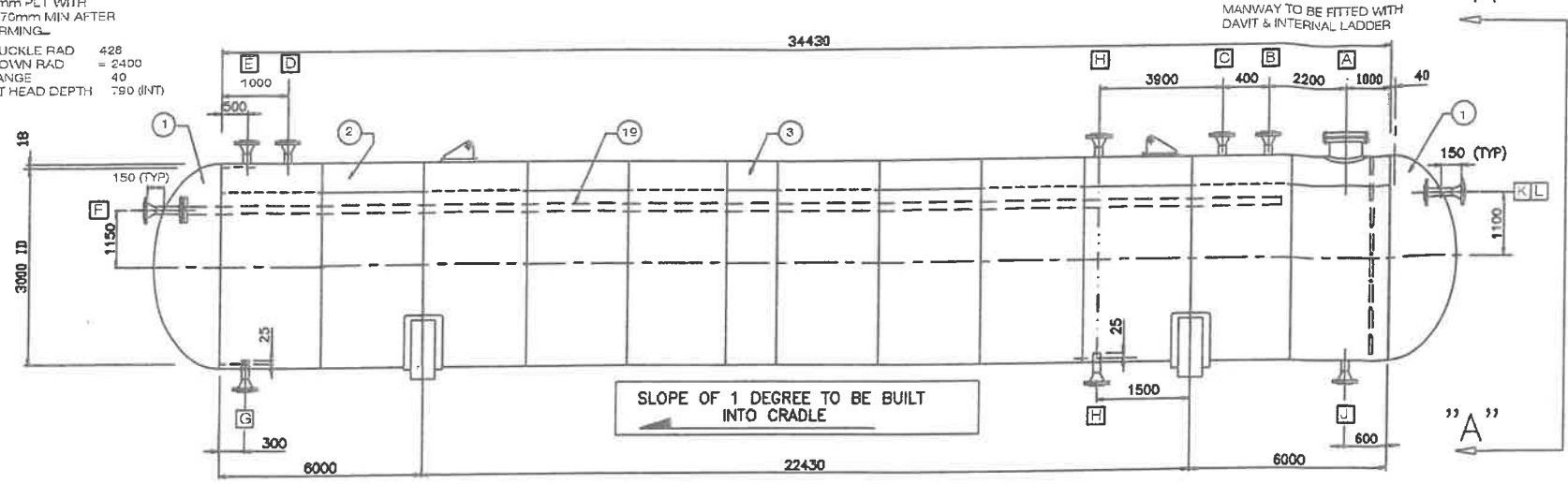


2 1 SEMI ELLIPSOIDAL
DISHED ENDS FROM
25mm PLT WITH
18,70mm MIN AFTER
FORMING.

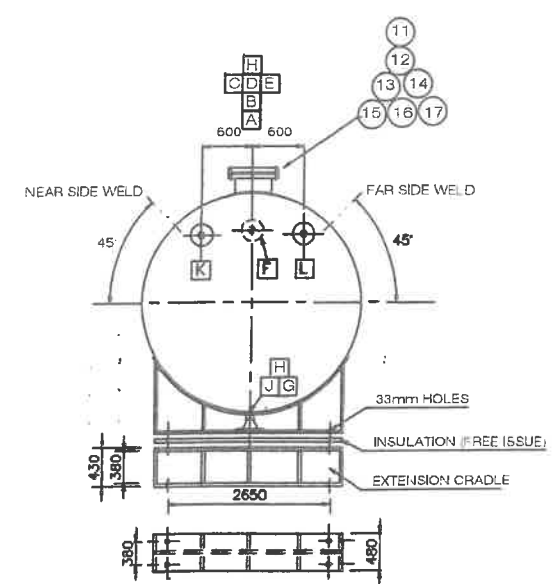
KNUCKLE RAD 428
CROWN RAD = 2400
FLANGE 40
TOT HEAD DEPTH 780 (INT)

WHEN IN DOUBT - ASK !!!

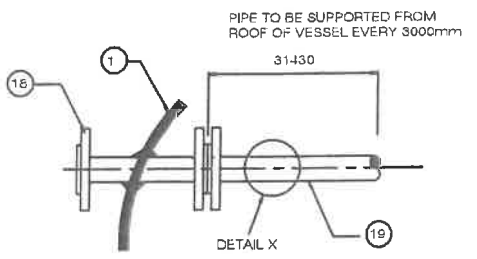


SLOPE OF 1 DEGREE TO BE BUILT INTO CRADLE

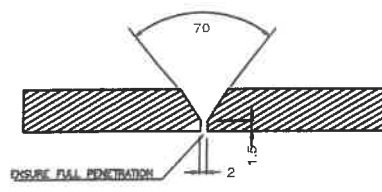
ELEVATION



VIEW "A-A"

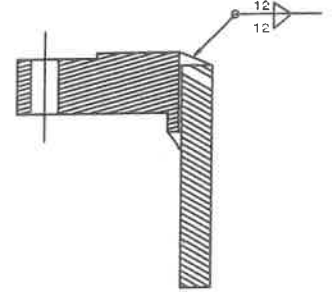


DETAILS OF NOZZLE F (INTERNAL HEADER PIPE)



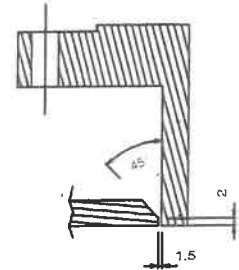
TYPICAL LONG & CIRC WELD DETAILS

WPS No : 530



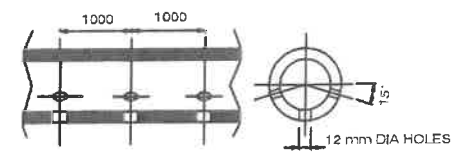
TYPICAL FLANGE TO PIPE WELD DETAIL (SLIP ON)

WPS No : 610

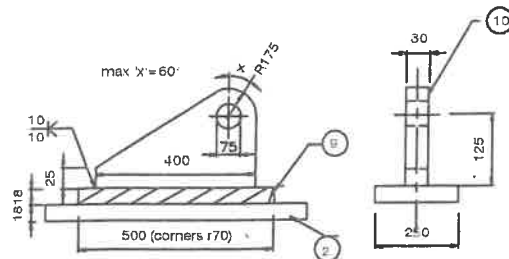


TYPICAL LONG WELD NECK TO SHELL/END WELD

WPS No : 610

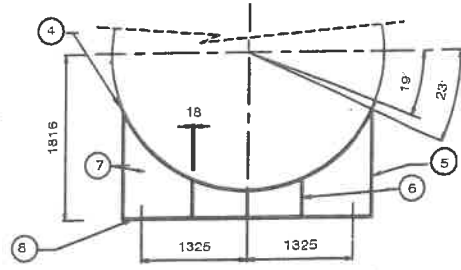
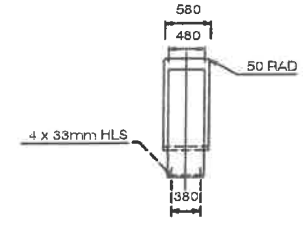


DETAIL X



LIFTING LUG DETAIL (4 OFF REQUIRED)

WPS No : 610



SUPPORT DETAILS

WPS No :



STIFFENING RING IN PLANE OF SADDLE

WPS No : 116

DESIGN CRITERIA

ITEM No.	9876
MANUFACTURING CODE	BS 5500 - 1994 CAT1
INSPECTION AUTHORITY	MIGS
MAX WORKING PRESSURE	KPa(g) 2100
MIN WORKING PRESSURE	KPa(g) 0
DESIGN PRESSURE	KPa(g) 2100
HYDRAULIC TEST PRESSURE	KPa(g) 2825
RELIEF VALVE SET PRESSURE	KPa(g)
WORKING TEMPERATURE	°C -50 C to -50 C
DESIGN TEMPERATURE	°C -50 C to -50 C
FLUID MEDIUM	CO2
FLUID SPECIFIC GRAVITY	Kg/l
CORROSION ALLOWANCE SHELL	mm 1.5
CORROSION ALLOWANCE HEAD	mm 1.5
JOINT EFFICIENCY SHELL	N/A
HEADS	N/A
NOZZLE (FLT)	N/A
WELDING PROCEDURE	SEE DRAWING
HEAT TREATMENT	FULL STRESS RELIEF
RADIOGRAPHY	100%
TEST PROCEDURE	DHH-FCM-02
CUBIC CAPACITY	m ³ 250
EMPTY MASS	Kg 60000
FULL OF WATER	Kg 310000
FULL OF OPERATING MEDIUM	Kg 310000

APPLICABLE NON DESTRUCTIVE EXAMINATION

BEFORE & AFTER STRESS RELIEF	RADIOGRAPHY	LIQUID PENETRANT	MAG PARTICLE	ULTRASONIC	BRINELL HARDNESS
SHELL WELD METAL					
HEAD WELD METAL					
FORGINGS/ PIPE TO FLANGE					
NOZZLE NECKS AND PIPES					
HEAT AFFECTED ZONE					

MATERIAL SPECIFICATION

SHELL : BS1501-224-490A LT50 HEADS : BS1501-224-490A LT50
 PIPE : ASTM A333 GR 6 FAB PIPE : BS1501-224-490A LT50
 FLANGES : ASTM A350 LF2 FAB FLGS : BS1501-224-490A LT50
 COMPENSATION PLATES : BS1501-224-490A LT50
 INTERNAL S : BS1501-151-430A
 EXTERNAL CLIFS : BS1501-151-430A
 EXTERNAL BOLTING : ASTM A193-B7 & ASTM A194-2H
 INTERNAL BOLTING : N/A
 GASKETS : FLAT SPIRAL WOUND ASBESTOS FILLED S/STEEL
 LEG/BASEPLATE/SUPPORT : BS1501-151-430A
 TRAYS : N/A

BILL OF MATERIALS

No	SIZE	REQ	DESCRIPTION	MATERIAL
1	3000 ID	2	2 1 SEMI ELLIP DENDS	25mm BS1501-224-490A
2	3000 ID	11	SHELL STRAKES x 3000W	18mm BS1501-224-490A
3	3000 ID	1	SHELL STRAKE x 1430W	18mm BS1501-224-490A
4	3800 LG	2	DOUBLING PLATES x 580W	18mm BS1501-224-490A
5		4	STIFFENER x 480W	16mm BS1501-151-430A
6		12	STIFFENERS	18mm BS1501-151-430A
7		2	WEB PLATES	18mm BS1501-151-430A
8	480 W	2	BASE PLATES	25mm BS1501-151-430A
9	250x500	2	DOUBLING PLATES	18mm BS1501-224-490A
10	400x300	2	LIFTING LUGS	25mm BS1501-224-490A
11	500 NB	1	MANWAY FLANGE	ASTM A350 LF2
12	500 NB	1	MANWAY COVER	ASTM A350 LF2
13	500 NB	1	MANWAY NECK	18mm BS1501-224-490A
14	760 OD	1	COMPENSATION PLATE	18mm BS1501-224-490A
15	584 OD	1	GASKET	3mm S/S SPIRAL WOUND
16	1 1/4"	24	STUDS (UNC)	A193-B7
17	1 1/4"	48	NUTS	A194-2H
18	100 NB	10	FLANGES - COVERS LWNRF	ASTM A350 LF2
19	100 NB	1	PIPE x SCH 40 x 31430 LONG	ASTM A106 Gr B
20	3/4" UNC	80	STUDS	ASTM A193-B7
21	3/4" UNC	160	NUTS	ASTM A194-2H
22	157 OD	10	GASKETS	3mm C,A,F
23	50 NB	2	FLANGES LWNRF	ASTM A350 LF2

NOZZLE SCHEDULE

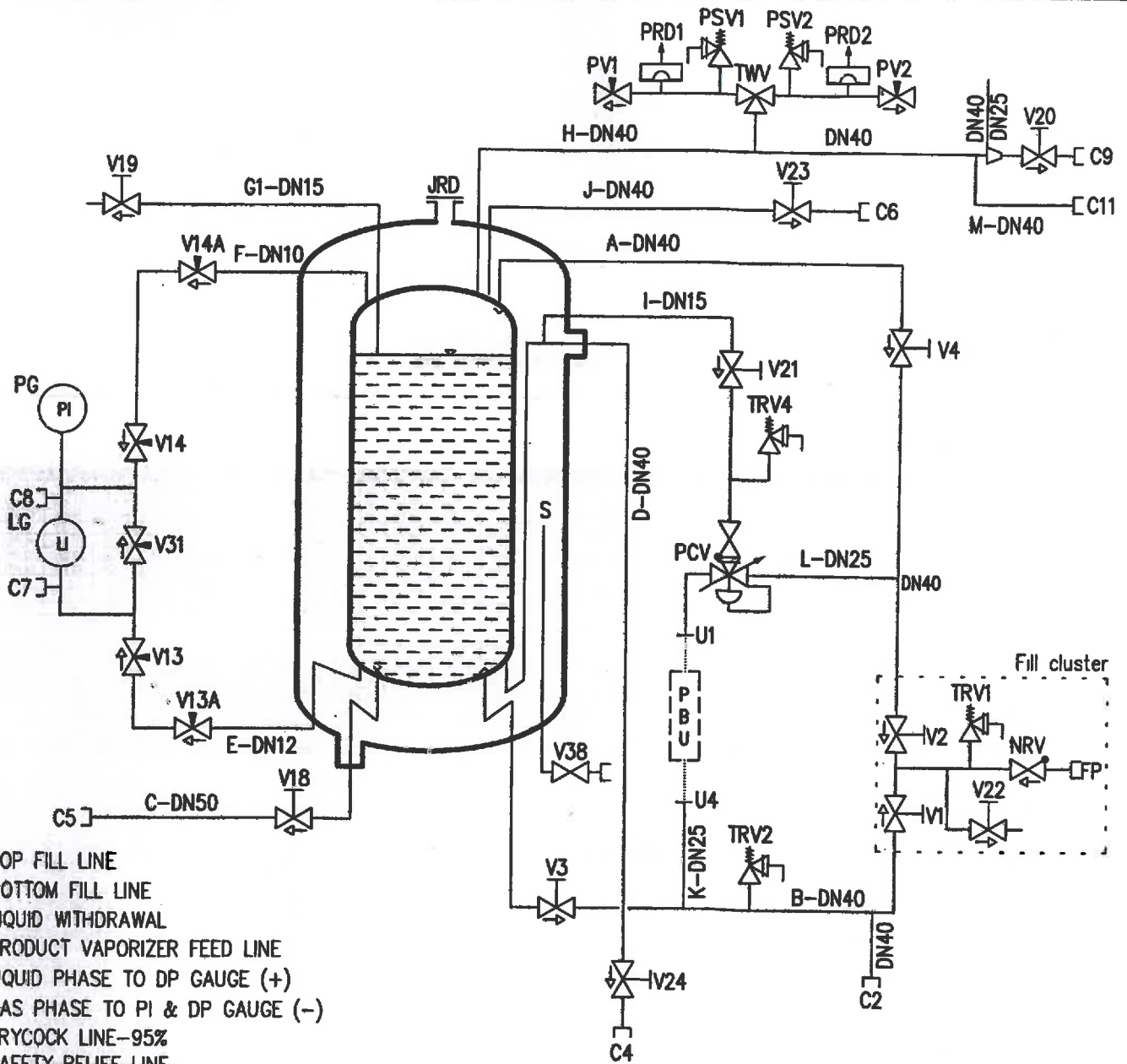
No	QTY	SIZE	RATING	SCH	W/T	DESCRIPTION	PROJECTION	COMP PLTS
							from side of saddle	DIA THK
A	1	500	300# RF 50	FL	-	MANWAY g/w COVER	400	760od 18
B	1	100	300# RF WN	80	8.6	PRESSURE CONTROL	200	-
C	1	100	300# RF WN	80	8.6	PRESSURE CONTROL	200	-
D	1	100	300# RF WN	80	8.6	PRESSURE RELIEF	200	-
E	1	100	300# RF WN	80	8.6	PRESSURE RELIEF	200	-
F	1	100	300# RF WN	80	8.6	FILLING TUBE	200	-
G	1	100	300# RF WN	80	8.6	LIQUID TAKE OFF	200	-
H	2	50	300# RF WN	50	8.6	INSTRUMENTATION	200	-
K	1	100	300# RF WN	80	8.6	LIQUID TAKE OFF	200	-
L	1	100	300# RF WN	80	8.6	COOLING TUBE	200	-

DRAWING NO.		DESCRIPTION		BY	DATE	REVISION	APPRD	THIS DRAWING IS THE PROPERTY OF D.H.HARRIS (PTY) LTD AND IS NOT TO BE REPRODUCED OR EITHER WHOLLY OR PART WITHOUT THE WRITTEN PERMISSION OF THE AUTHOR.	INSPECTION AUTHORITY APPROVAL STAMP	APPROVAL		D.H.HARRIS (PTY) LIMITED 250 m3 HORIZONTAL CO2 STORAGE VESSEL (SINGLE SKIN) FOR AIR PRODUCTS (vdBIJLPARK)			
										AIR PRODUCTS					



FLOW DIAGRAM – AIR PRODUCTS SA VT80/9,5, VT98/9, VT108/9

Belongs to:	
FT000770	
Sheets:	Sheet:
1	1



- A – TOP FILL LINE
- B – BOTTOM FILL LINE
- C – LIQUID WITHDRAWAL
- D – PRODUCT VAPORIZER FEED LINE
- E – LIQUID PHASE TO DP GAUGE (+)
- F – GAS PHASE TO PI & DP GAUGE (-)
- G1 – TRYCOCK LINE-95%
- H – SAFETY RELIEF LINE
- I – ECONOMIZER LINE
- J – GAS WITHDRAWAL
- K – PBU FEED LINE
- L – PBU OUTLET LINE
- M – GAS BALANCE/AUXILIARY VENT
- S – EVACUATION PORT

DN MARKING	TUBE
	mm
DN50	60.3 x 2.77
DN40	48.3 x 2.77
DN25	33.4 x 2.77
DN15	21.3 x 2.11
DN12	15 x 1.5
DN10	12 x 1.5

3					
2					
1	Original issue				
Rev.No.	Revisions	Date	Drawn	Checked	Approved

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Drawing No.:

FQ031747_R1



Project / Customer:
Destination:
Type:

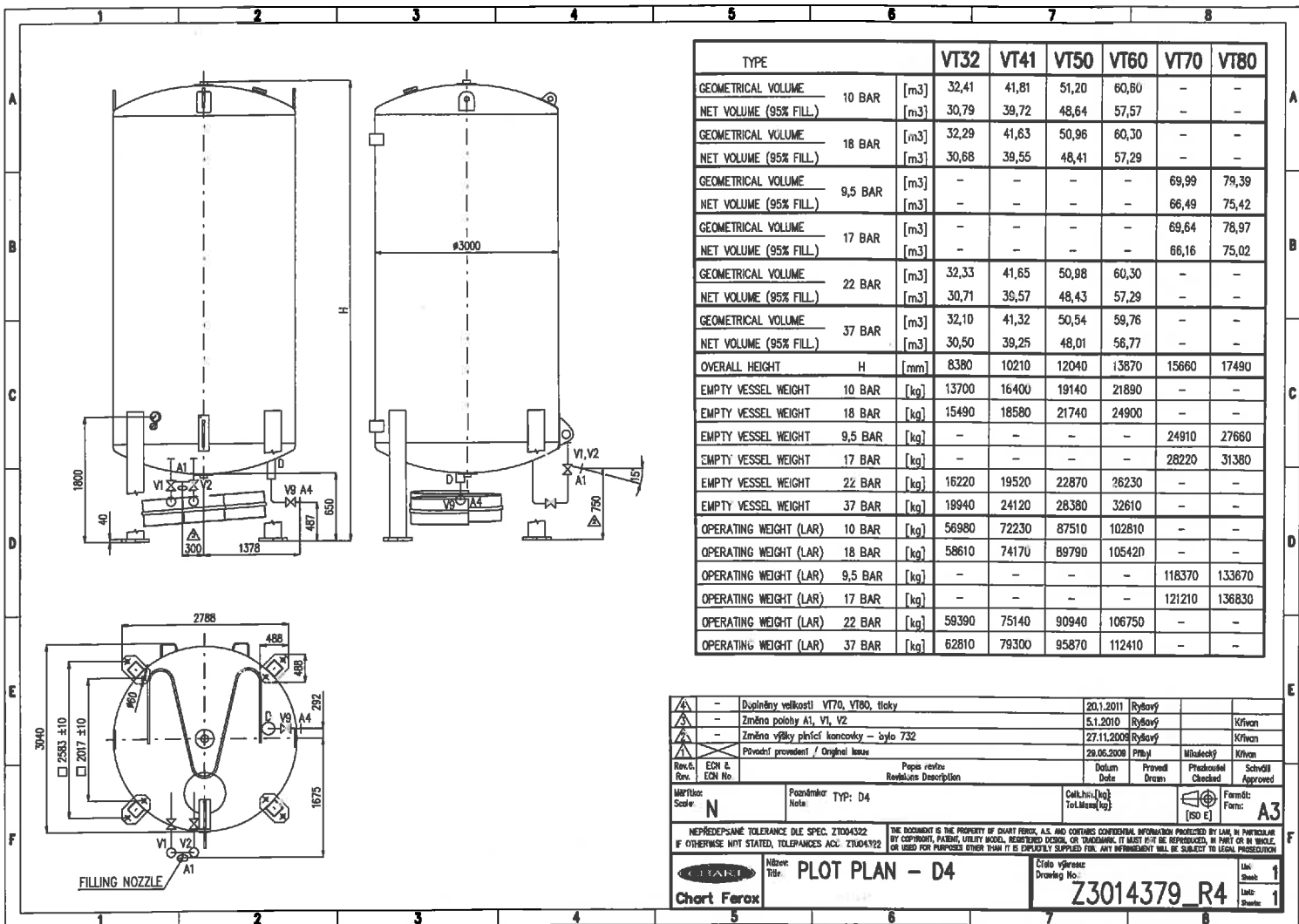
SPECIFICATION OF ACCESSORIES
AIR PRODUCTS SOUTH AFRICA
VT 80 / 37, VT98/9, VT108/9

Belongs to:
FQ031747

5								
4								
3								
2								
1	Original Issue	09.07.2019	T.Hnizdil	T.Hnizdil				
Rev.	Revisions	Date:	By:	Checked:	Approved:			

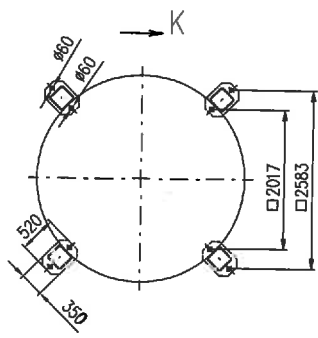
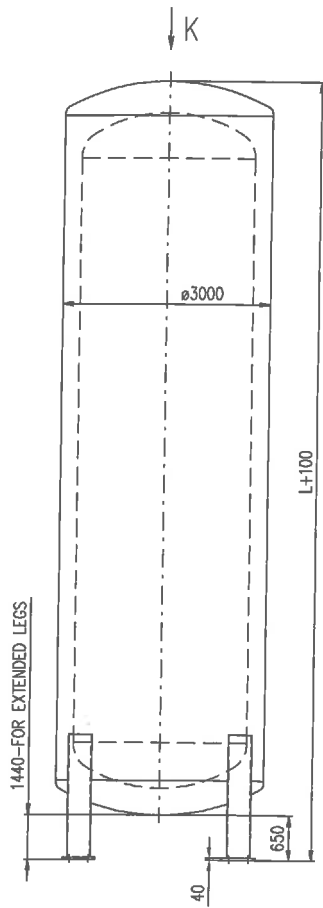
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No.	Name	Wheel colour	Marking	ATEX	DN/PN DN/Set.pr. Range	Identification	Producer	Code	Rev.
1	FILL CLUSTER		V1, V2, V22, NRV, FP		40/50	07013.4048.5121	HEROSE	0512489	2
2	GLOBE VALVE	Black	V3		40/50	01321.4048.7021	HEROSE	0510015B	
3	GLOBE VALVE	Black	V4		40/50	01321.4048.7021	HEROSE	0510015B	
4	GLOBE VALVE	Black	V18		50/50	01321.5060.7021	HEROSE	0510016B	
5	GLOBE VALVE	Black	V19		15/50	01321.1521.7021	HEROSE	0510091B	
6	GLOBE VALVE	Black	V20		25/50	01321.2533.7021	HEROSE	0510013B	
7	GLOBE VALVE	Black	V21		15/50	01321.1521.7011	HEROSE	0510011B	
8	GLOBE VALVE	Black	V23		40/50	01321.4048.7021	HEROSE	0510015B	
9	GLOBE VALVE	Black	V24		40/50	01321.4048.7021	HEROSE	0510015B	
10									
11	RELIEF VALVE		PSV1		10/xx	06-388.1006.0000 (3/4"x1")	HEROSE	0528342	
12	RELIEF VALVE		PSV2		10/xx	06-388.1006.0000 (3/4"x1")	HEROSE	0528342	
13	BURSTING DISC		PRD1		22/xx	Q4A-25B-MNI-SLO- 6BF6BM (BE-70350003) 1"x1"	ELFAB	0100367	
14	BURSTING DISC		PRD2		22/xx	Q4A-25B-MNI-SLO- 6BF6BM (BE-70350003) 1"x1"	ELFAB	0100367	
15	DIVERTOR PLUG VALVE		TWV		25/50	DIV0025STBRCN000	BLACKHALL	0526218	
16	THERMAL RELIEF		TRV1		8/50	CRVP3-375B-K-720	GENERANT	0528219	
17	THERMAL RELIEF		TRV2		8/50	CRVP3-375B-K-720	GENERANT	0528219	
18	THERMAL RELIEF		TRV4		8/50	CRVP3-375B-K-720	GENERANT	0528219	
19	PRESSURE REGULATOR		PCV		25 + 40 bar	2357-3	SAMSON	0102517	
20	CHECK VALVE					RSE	SAMSON	0500235	
21	PRESSURE GAUGE		PG		0 + 4000 kPa				
22	DIFF. PRESS. GAUGE		LG		(0 + 143,5 kPa)	712.15.160	WIKA	0528235	
23	NEEDLE VALVES		V14, V31, V13						
24	CONNECTION LT		C7			G 1/4" => 1/4" NPT M	FEROX		
25	CONNECTION PT		C8			G 1/4" => 1/4" NPT M	FEROX		
26	SCALE - LAR, LOX, LIN				[kg]		WIKA		
27	NEEDLE VALVE		PV1		8/50	FNV-Q-10-X	GENERANT	0512886	
28	NEEDLE VALVE		PV2		8/50	FNV-Q-10-X	GENERANT	0512886	
29	NEEDLE VALVE		V13A		6/200	FNV-Q-10-X	GENERANT	0475352	2
30	NEEDLE VALVE		V14A		6/200	FNV-Q-10-X	GENERANT	0475352	2
31	VACUUM RELIEF VALVE		JRD			S3NV5776	FEROX		
32	VACUUM PUMP DOWN		V38			S3NV5783	FEROX		
33	PLASTIC PLUG		FP			1 1/2" BSPTF	FEROX		
34	CONNECTION+PLASTIC PLUG		C2			1 1/2" BSPTF	FEROX		2
35									
36	CONNECTION+PLASTIC PLUG		C4			1 1/2" BSPTF	FEROX		
37	CONNECTION + BRASS PLUG VENTED		C5			2" BSPTF	FEROX		
38	CONNECTION+BRASS PLUG		C6			1 1/2" BSPTF	FEROX		
39	CONNECTION+PLASTIC PLUG		C9			1" BSPTF	FEROX		
40	CONNECTION+PLASTIC PLUG		C11			1 1/2" BSPTF	FEROX		2
41	UNION		U1			1" BSPTF	FEROX		
42	UNION		U4			1" BSPTF	FEROX		
43	VAPORIZER		PR (PBU)			7 rows star fin	FEROX	ZZ200918	
44									
45	PRESSURE REGULATOR		PCV		40/10+25 bar	CK3010101017200	BESTOBELL	0100339	6
46									6
47									



TYPE	VT32	VT41	VT50	VT60	VT70	VT80
GEOMETRICAL VOLUME 10 BAR [m ³]	32,41	41,81	51,20	60,60	-	-
NET VOLUME (95% FILL) [m ³]	30,79	39,72	48,64	57,57	-	-
GEOMETRICAL VOLUME 18 BAR [m ³]	32,29	41,63	50,96	60,30	-	-
NET VOLUME (95% FILL) [m ³]	30,68	39,55	48,41	57,29	-	-
GEOMETRICAL VOLUME 9,5 BAR [m ³]	-	-	-	-	69,99	79,39
NET VOLUME (95% FILL) [m ³]	-	-	-	-	66,49	75,42
GEOMETRICAL VOLUME 17 BAR [m ³]	-	-	-	-	69,64	78,97
NET VOLUME (95% FILL) [m ³]	-	-	-	-	66,16	75,02
GEOMETRICAL VOLUME 22 BAR [m ³]	32,33	41,65	50,98	60,30	-	-
NET VOLUME (95% FILL) [m ³]	30,71	39,57	48,43	57,29	-	-
GEOMETRICAL VOLUME 37 BAR [m ³]	32,10	41,32	50,54	59,76	-	-
NET VOLUME (95% FILL) [m ³]	30,50	39,25	48,01	56,77	-	-
OVERALL HEIGHT H [mm]	8380	10210	12040	13870	15660	17490
EMPTY VESSEL WEIGHT 10 BAR [kg]	13700	16400	19140	21890	-	-
EMPTY VESSEL WEIGHT 18 BAR [kg]	15490	18580	21740	24900	-	-
EMPTY VESSEL WEIGHT 9,5 BAR [kg]	-	-	-	-	24910	27660
EMPTY VESSEL WEIGHT 17 BAR [kg]	-	-	-	-	28220	31380
EMPTY VESSEL WEIGHT 22 BAR [kg]	16220	19520	22870	26230	-	-
EMPTY VESSEL WEIGHT 37 BAR [kg]	19940	24120	28380	32610	-	-
OPERATING WEIGHT (LAR) 10 BAR [kg]	56980	72230	87510	102810	-	-
OPERATING WEIGHT (LAR) 18 BAR [kg]	58610	74170	89790	105420	-	-
OPERATING WEIGHT (LAR) 9,5 BAR [kg]	-	-	-	-	118370	133670
OPERATING WEIGHT (LAR) 17 BAR [kg]	-	-	-	-	121210	136830
OPERATING WEIGHT (LAR) 22 BAR [kg]	58390	75140	90940	106750	-	-
OPERATING WEIGHT (LAR) 37 BAR [kg]	62810	79300	95870	112410	-	-

Δ	-	Doplňný velikosti VT70, VT80, tlaky	20.1.2011	Ryšový			
Δ	-	Změna portů A1, V1, V2	5.1.2010	Ryšový			Křivan
Δ	-	Změna výšky pleťové koncovky - bylo 732	27.11.2008	Ryšový			Křivan
Δ	-	Převést proceduru / Original issue	29.06.2008	Průj.	Mikulecký	Křivan	
Rev. E	ECN & ECN No	Popis revize / Revision Description	Datum / Date	Průjeda / Drawn	Průjeda / Checked	Schválil / Approved	
Mřížka / Scale	N	Podmínky / Notes	TYP: D4	Číslo / No. [kg]	Totální / Total [kg]	Formát / Format	A3
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Chart Ferox		Název / Title: PLOT PLAN - D4		Číslo výkresu / Drawing No.: Z3014379_R4		Lístek / Sheet: 1	

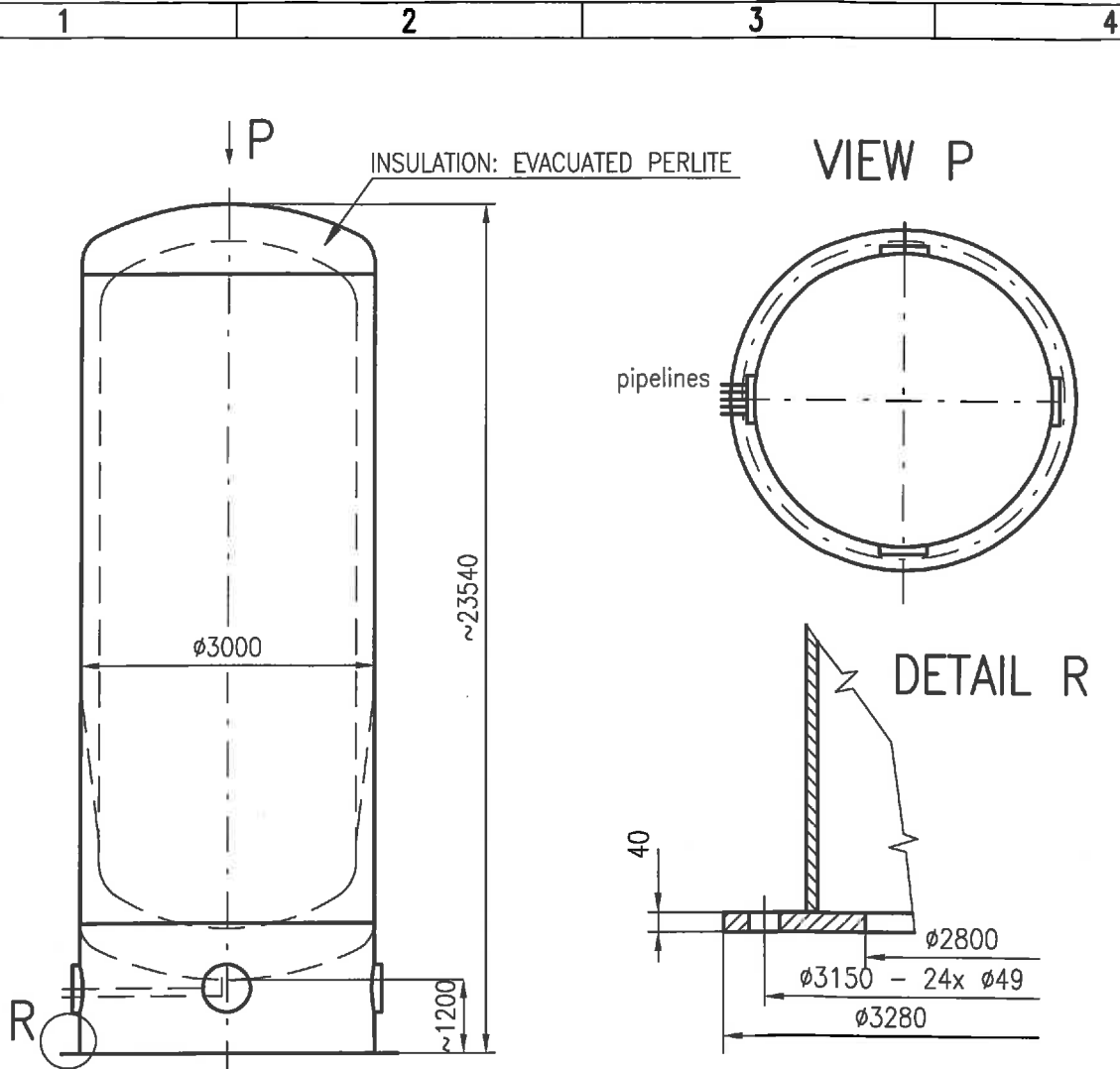


TANK	VT89/11	VT98/11	VT108/11
MAX. ALLOWABLE PRESSURE	bar	11,0	11,0
GEOMETRICAL VOLUME	m ³	88,78	98,18
NET VOLUME - 90%	m ³	79,90	88,36
OVERALL LENGTH	m	19320	21150
TANK EMPTY WEIGHT	kg	32060	34820
OPERATING WEIGHT - LNG	kg	69820	76380
OVERALL LENGTH	m	20110	21940
TANK EMPTY WEIGHT	kg	32640	35400
OPERATING WEIGHT - LNG	kg	70200	76940

NOTE:
 1) REAL VOLUMES CAN BE IN TOLERANCE OF $\pm 4\%$
 2) EXTENDED LEGS - FOR TANKS WITH THERMOSIPHON

DESIGN REGULATION : DIRECTIVE 2014/68/EU
 DESIGN CODE : EN 13458
 MATERIAL OF INNER VESSEL : 1.4301 (X5CrNi1810) - PRESSURE STRENGTHENED
 MATERIAL OF OUTER JACKET : S235J0 (1.0114)
 MIN./MAX. ALL. TEMPERATURE : -196 / +50°C (INNER VESSEL)
 MIN./MAX. ALL. TEMPERATURE : -40 / +50°C (OUTER JACKET)
 WIND LOAD : 56 m/s per EN 1991-2-4 (and UBC 97)
 SEISMIC LOAD : ZONE 3 PER UBC 97 (seismic coeff. 0,409)

Rev.:	ECN & EDN No.	Prilodni provodni / Original issue	02.02.2011	Mischeck-p	Chit	Statok
Rev.:	ECN & EDN No.	People revise	Defina	Proradl	Prishkolat	Sch-dil
Rev.:	ECN & EDN No.	Revisions Description	Date	Drawn	Checked	Approved
Scale:	1:50	Form:	Calc. Am. (kg)	Tot. Mass (kg)	Form:	A3
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Chart Ferox	Name: VT89; VT98; VT108 / 11 Title: LNG	Date of issue: H3017414_R1 Drawing No.:	Lst. Sheet: 1 Last. Sheet: 1			



DESIGN REGULATION : DIRECTIVE 2014/68/EU
 DESIGN CODE : EN 13458-2
 MATERIAL OF INNER VESSEL : 1.4301 - STRENGTHENED VESSEL
 MATERIAL OF OUTER JACKET : S235J0
 FLUID : LIQUID NITROGEN, OXYGEN, ARGON
 MAX. ALL. PRESSURE : 9 bar
 MIN./MAX. ALL. TEMPERATURE INNER VESSEL : -196 / +50°C
 MIN./MAX. ALL. TEMPERATURE OUTER JACKET : -40 / +50°C
 GEOM.VOLUME OF INNER VESSEL : 109 m³ (REAL VOLUME CAN BE IN TOLERANCE ±4%)
 NET VOLUME (95% FILL) : 103 m³ (REAL VOLUME CAN BE IN TOLERANCE ±4%)
 WEIGHT EMPTY TANK : 40 500 kg
 OPERATING WEIGHT : 123 100 kg - LIN
 : 157 300 kg - LOX
 : 184 200 kg - LAR

△						
△						
△						
1		Původní provedení / Original Issue	23.12.2016	Stašek	Příbyl	Špinka
Rev.č. Rev.	ECN č. ECN No.	Popis revize Revisions Description	Datum Date	Provedl Drawn	Přezkoušel Checked	Schválil Approved

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	Název: Title:	TANK VT 108/9	Číslo výkresu: Drawing No.:	H4054821_R1	List: Sheet:	1
					Listů: Sheets:	1