FORT VALE®

Standard Range of Safeload Petroleum Handling Equipment

REV02-25.08.22

FORT VALE

CONTENTS

Safeload Petroleum Handling Equipment

Catalogue

Safeload Loading Arm System

Part No: 94/70XX/XXXX

Specification

Nominal size
DN100

Inlet/riser pipe connection
8 x 19mm holes on a 190.5mm PCD - 4" ANSI 150

Outlet/coupler swivel connection
8 x 11mm holes on a 149.2mm PCD - 4" TTMA

Configurations
Bottom loading: drop hose; A frame; low profile
Top loading: pantograph; long reach
Left hand or right hand

Operation
Balance adjustment is controlled by gas springs and protected by a limiter bolt

Swivel Properties
All have an internal earth system for electrical continuity

Options
Base swivel stop device to prevent collision from over-rotation

Materials
Base swivel: stainless steel
Balance mechanism: stainless steel
Intermediate swivel: stainless steel or aluminium
Coupler swivel: stainless steel or aluminium
Swivel primary seal: a range is available, refer to Seal Data
Swivel secondary seal: PTFE
Swivel tertiary seal: Fortyt

Component Parts

Description	Part No.
Complete balance mechanism ***Note**	94/7000XX
Base swivel only ***Note**	94/7015XX
Intermediate swivel ***Note**	94/7X25XX
Coupler swivel ***Note**	94/7X20XX

NOTE: The specification changes the Part No.

Related Parts

Description	Part No.
4" ASA 150 inlet gasket	5005-902
Loading arm assembly kit	94/7AK
Swivel grease nipple kit	94/7GNK
Swivel stop device:stop plate & stop bar	94/7079/XXA 94/7081

We supply a range of spools, drop hoses and API couplers. Please contact us to discuss your specification

Seal Data

Seal Material	Seal Temp Min/Max
Viton B	-13°C / 70°C
Viton GFLT-S	-23°C / 70°C
Ultra low temp. fluorocarbon	-40°C / 70°C
PTFE	-40°C / 70°C

Design Conditions

Design Pressure (MAWP):	16 Bar
Test Pressure:	24 Bar
Design Temperature Min:	-40°C (metal parts)
Design Temperature Max:	70°C (metal parts)

NOTE: The Design Conditions are for the specified part number only.

Design Codes
All components obey ATEX & PED

Safeload Semi-Automatic API Coupler

Part No: CE94/2500XX

Specification

Nominal size
DN100

Inlet connection
4" TTMA

Outlet connection
Compatible with API RP 1004

Properties
4 wrap-around triggers that connect with over 60% of the loading adaptor circumference

Materials
Contact parts: hard anodised aluminium & stainless steel
Main seal: A range is available, refer to Seal Data p3.

Design Conditions

Weight:	12.6 Kg
Design Pressure (MAWP):	6 Bar
Test Pressure:	10 Bar
Maximum Surge Pressure:	15 Bar
Design Temperature Min/Max:	Refer to Seal Data, p3

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Codes
The Safeload coupler obeys:
ATEX Group II, Cat 2
EN 13083
API RP1004 (2003)
Energy Institute Specification: Couplers for the bottom loading of petroleum road tankers

Range

Description	Part No.
With stainless steel handle ***Note**	CE94/2500XX
With aluminium handle ***Note**	CE94/2400XX

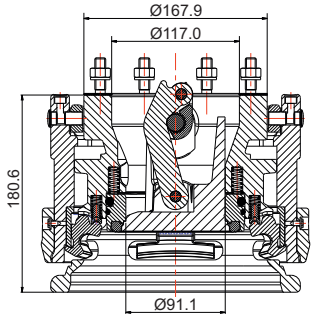
NOTE: The seal material changes the Part No.

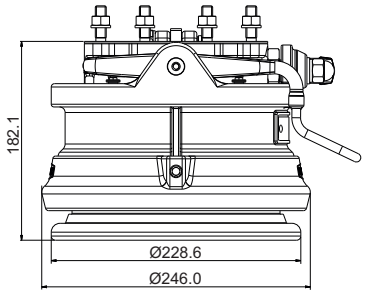
Related Parts

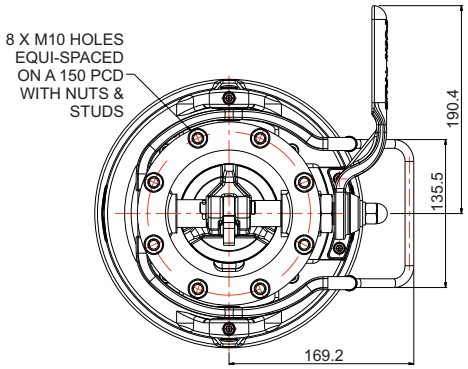
Description	Part No.
Loading adaptor wear gauge	94/2150
Coupler parking nose	94/25PC
Coupler seal replacement tool	400/9420
4" TTMA check valve ***Note**	94/3690XX/X

NOTE: The specification changes the Part No.

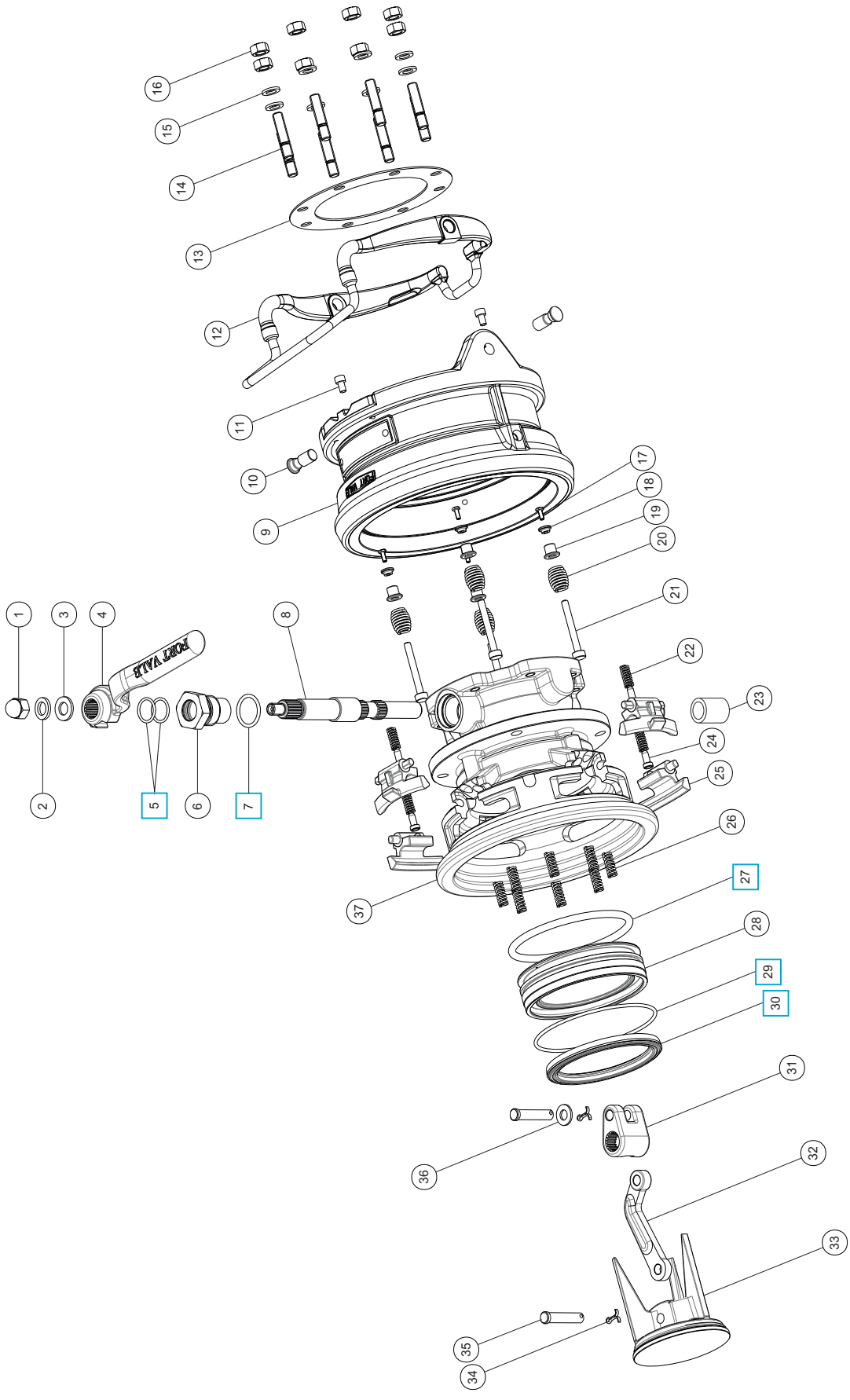
Section View







Parts Drawing



Safeload Semi-Automatic API Coupler

Part No: CE94/2500XX

Parts List

Item	Description	Part No.
1	M12 domed nut	5112-050
2	M12 spring washer	5113-010
3	M12 washer	5123-003
4	Splined handle	94/2575
5	Spindle O ring (2) ***Note**	5005-336XX ☐
6	Spindle lock bush	94/2513
7	Bush O ring ***Note**	5005-214XX ☐
8	Spindle	94/2511
9	Outer housing & ring assembly	94/2504
10	Release handle pivot pin (2)	94/2577
11	M6 capscrew (2)	5111-061
12	Release handle	94/3080
13	4" TTMA gasket	94/1044
14	Inlet flange stud (8)	94/1040
15	M10 flat spring washer (8)	5113-002
16	M10 full nut (8)	5112-002
17	M4 hex head set screw (4)	5111-064
18	Spring retainer washer (4)	94/2529
19	Guide bush (4)	94/2048
20	Spring (4)	10146
21	Spring retainer (4)	94/1016
22	Trigger spring (4)	94/2025
23	Spindle bush	94/2522
24	Trigger spring guide (4)	94/2026
25	Extended locking trigger (4)	94/2555CE
26	Energizing spring (8)	94/2024
27	Seal carrier O ring ***Note**	94/1034XX ☐
28	Seal carrier	94/2507
29	Wiper O ring ***Note**	5005-584XX ☐
30	Main seal ***Note**	94/1006XX ☐
31	Splined crank block	94/2528
32	Lever arm	94/1009A
33	Poppet	94/2518
34	Split pin (2)	5118-050
35	Pivot pin (2)	94/1054
36	M10 washer	5113-025
37	Inner housing	94/2501

NOTE: The specification changes the Part No.

Seal Data

Seal Material	Seal Temp. Min/Max	Seal Colour	Coupler Part No.
Viton B	-13°C/50°C	Black	CE94/2500
Viton GFLT-S	-23°C/50°C	Grey	CE94/2500GF
Ultra low temp. fluorocarbon	-40°C/50°C	Brown	CE94/2500MF
Perfluoroelastomer	-15°C/50°C	Green	CE94/2500PF

Seal Kit - All parts marked ☐ in the Parts List

Seal Material	Part No.
Viton B	94/25SK
Viton GFLT-S	94/25SKGF
ULT fluorocarbon	94/25SKMF
Perfluoroelastomer	94/25SKPF

Safeload Semi-Automatic High-Pressure API Coupler

Part No: CE94/3000XX

Specification

Nominal size
DN100

Inlet connection
4" TTMA

Outlet connection
Compatible with API RP 1004

Properties
4 wrap-around triggers that connect with over 50% of the loading adaptor circumference and interlock safety latch

Materials
Contact parts: hard anodised aluminium & stainless steel
Main seal: A range is available, refer to Seal Data p3.

Design Conditions

Weight:	12.9 Kg
Design Pressure 1* / 2** (MAWP):	10 Bar / 16 Bar
Test Pressure 1* / 2**:	15 Bar / 24 Bar
Design Temperature Min/Max:	Refer to Seal Data, p3

*1: Coupler Open Connected
**2: Coupler Closed Disconnected

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Codes
The Safeload coupler obeys:
ATEX Group II, Cat 2
EN 13083
API RP1004 (2003)
Energy Institute Specification: Couplers for the bottom loading of petroleum road tankers

Range

Description	Part No.
With stainless steel handle ***Note**	CE94/3000XX
With aluminium handle ***Note**	CE94/3100XX

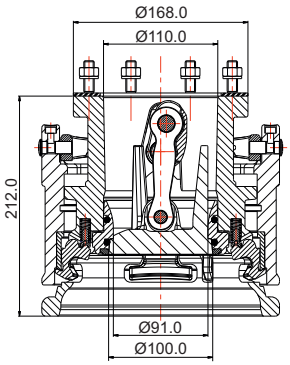
NOTE: The seal material changes the Part No.

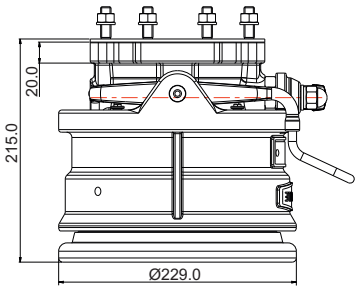
Related Parts

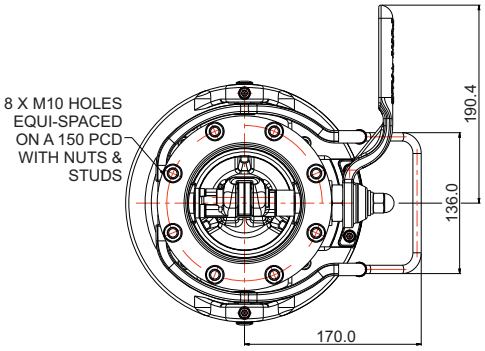
Description	Part No.
Loading adaptor wear gauge	94/2150
Coupler parking nose	94/25PC
Coupler seal replacement tool	400/9440
4" TTMA check valve ***Note**	94/3690XX/X

NOTE: The specification changes the Part No.

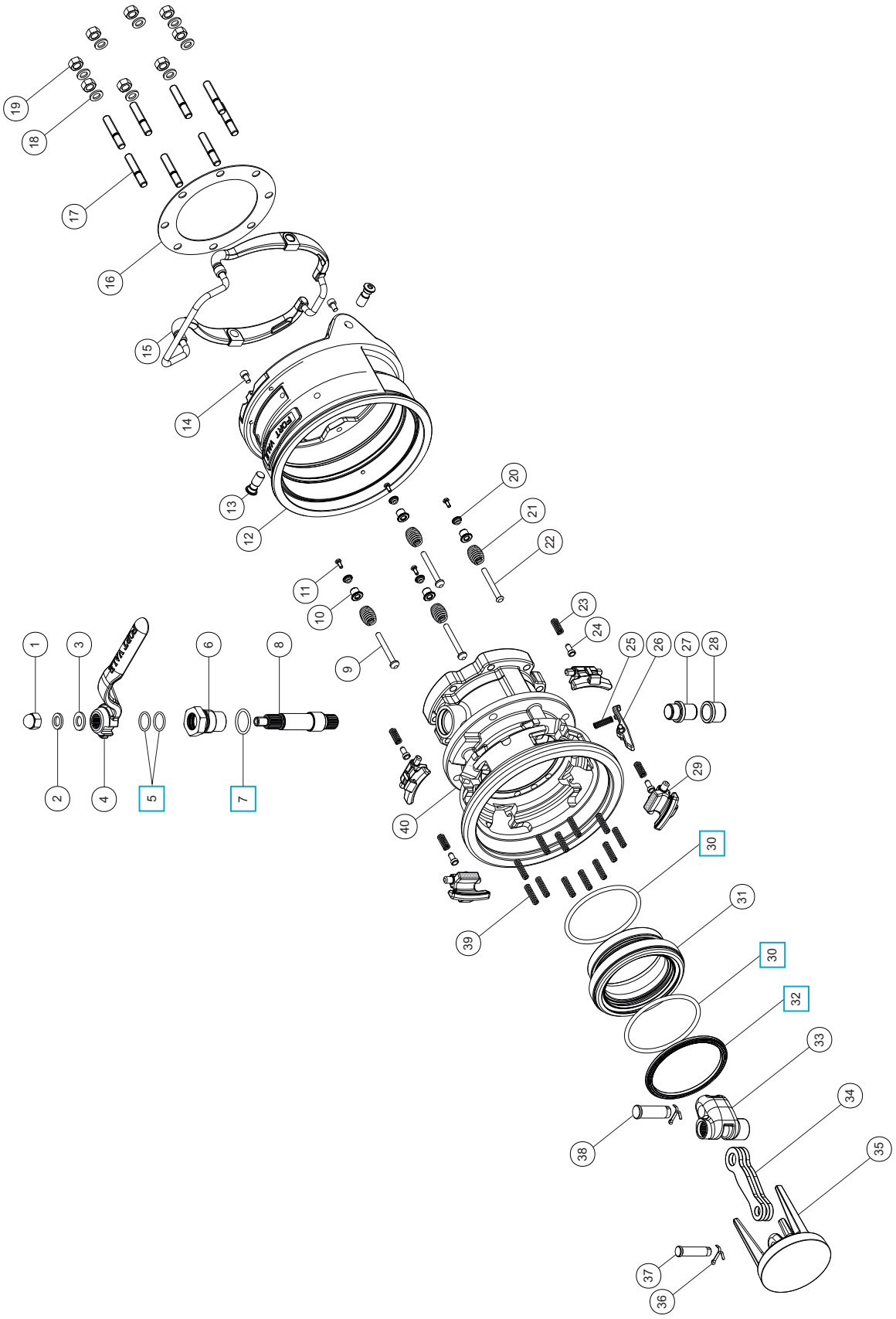
Section View







Parts Drawing



Safeload Semi-Automatic High-Pressure API Coupler

Part No: CE94/3000XX

Parts List

Item	Description	Part No.
1	M12 domed nut	5112-050
2	M12 spring washer	5113-010
3	M12 washer	5123-003
4	Splined handle	94/2575
5	Spindle O ring (2) ***Note**	5005-336XX ☐
6	Spindle lock bush	94/3013
7	Bush O ring ***Note**	5005-214XX ☐
8	Spindle	94/3011
9	Standard spring retainer (3)	94/1016
10	Spring retainer guide bush (4)	94/2048
11	M4 hex bolt (4)	5111-064
12	Actuating ring assembly	94/3004
13	Release handle pivot pin (2)	94/2577
14	M6 cap screw (2)	5111-061
15	Release handle assembly	94/3080
16	4" TTMA gasket	94/3044
17	Inlet flange stud (8)	94/3040
18	M10 washer (8)	5113-002
19	M10 full nut (8)	5112-002
20	Spring retainer washer (4)	94/2529
21	Anti-drain spring (4)	10146
22	Short spring retainer (1)	94/3016
23	Latch spring (4)	94/2025
24	Spring guide (4)	94/2026
25	Interlock spring	94/3026
26	Interlock latch	94/3005
27	Stub spindle	94/3012
28	Spindle bush	94/3022
29	Latch (4)	94/3055
30	Seal carrier O ring (2) ***Note**	94/3035XX ☐
31	Seal carrier	94/3007
32	Face seal ***Note**	94/3006XX ☐
33	Splined crank block	94/3028
34	Connecting rod (2)	94/3009
35	Poppet	94/3018
36	Split pin (2)	5220-008
37	Pivot pin	94/3053
38	Pivot pin	94/3054
39	Seat ring spring (12)	94/3024
40	Inner body housing	94/3001

NOTE: The specification changes the Part No.

Seal Data

Seal Material	Seal Temp. Min/Max	Seal Colour	Coupler Part No.
Viton B	-13°C/50°C	Black	CE94/3000
Viton GFLT-S	-23°C/50°C	Grey	CE94/3000GF
Ultra low temp. fluorocarbon	-40°C/50°C	Brown	CE94/3000MF
Perfluoroelastomer	-15°C/50°C	Green	CE94/3000PF

Seal Kit - All parts marked ☐ in the Parts List

Seal Material	Part No.
Viton B	94/30SK
Viton GFLT-S	94/30SKGF
ULT fluorocarbon	94/30SKMF
Perfluoroelastomer	94/30SKPF

Safeload Manual API Coupler

Part No: CE94/2700XX

Specification

Nominal size
DN100

Inlet connection
4" TTMA

Outlet connection
Compatible with API RP 1004

Properties
4 wrap-around triggers that connect with over 60% of the loading adaptor circumference

Materials
Contact parts: hard anodised aluminium & stainless steel
Main seal: A range is available, refer to Seal Data p3.

Design Conditions

Weight:	10.2 Kg
Design Pressure (MAWP):	6 Bar
Test Pressure:	10 Bar
Maximum Surge Pressure:	15 Bar
Design Temperature Min/Max:	Refer to Seal Data, p3

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

Design Codes
The Safeload coupler obeys:
ATEX Group II, Cat 2
EN 13083
API RP1004 (2003)
Energy Institute Specification: Couplers for the bottom loading of petroleum road tankers

Range

Description	Part No.
With stainless steel handle ***Note**	CE94/2700XX
With aluminium handle ***Note**	CE94/2800XX

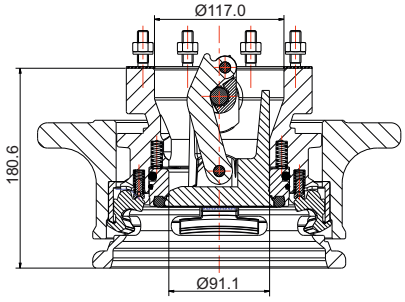
NOTE: The seal material changes the Part No.

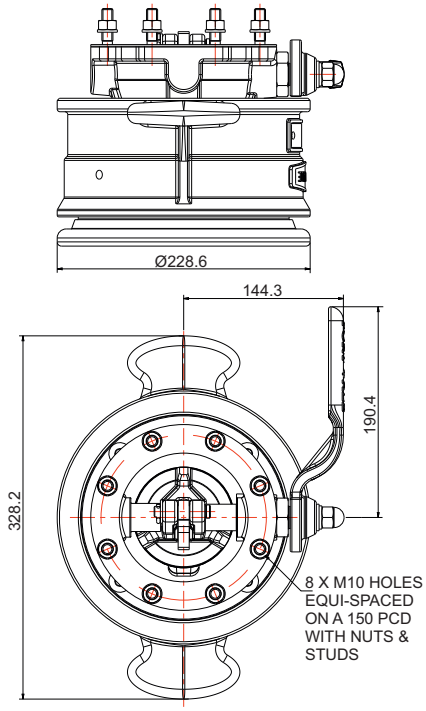
Related Parts

Description	Part No.
Loading adaptor wear gauge	94/2150
Coupler parking nose	94/25PC
Coupler seal replacement tool	400/9420
4" TTMA check valve ***Note**	94/3690XX/X

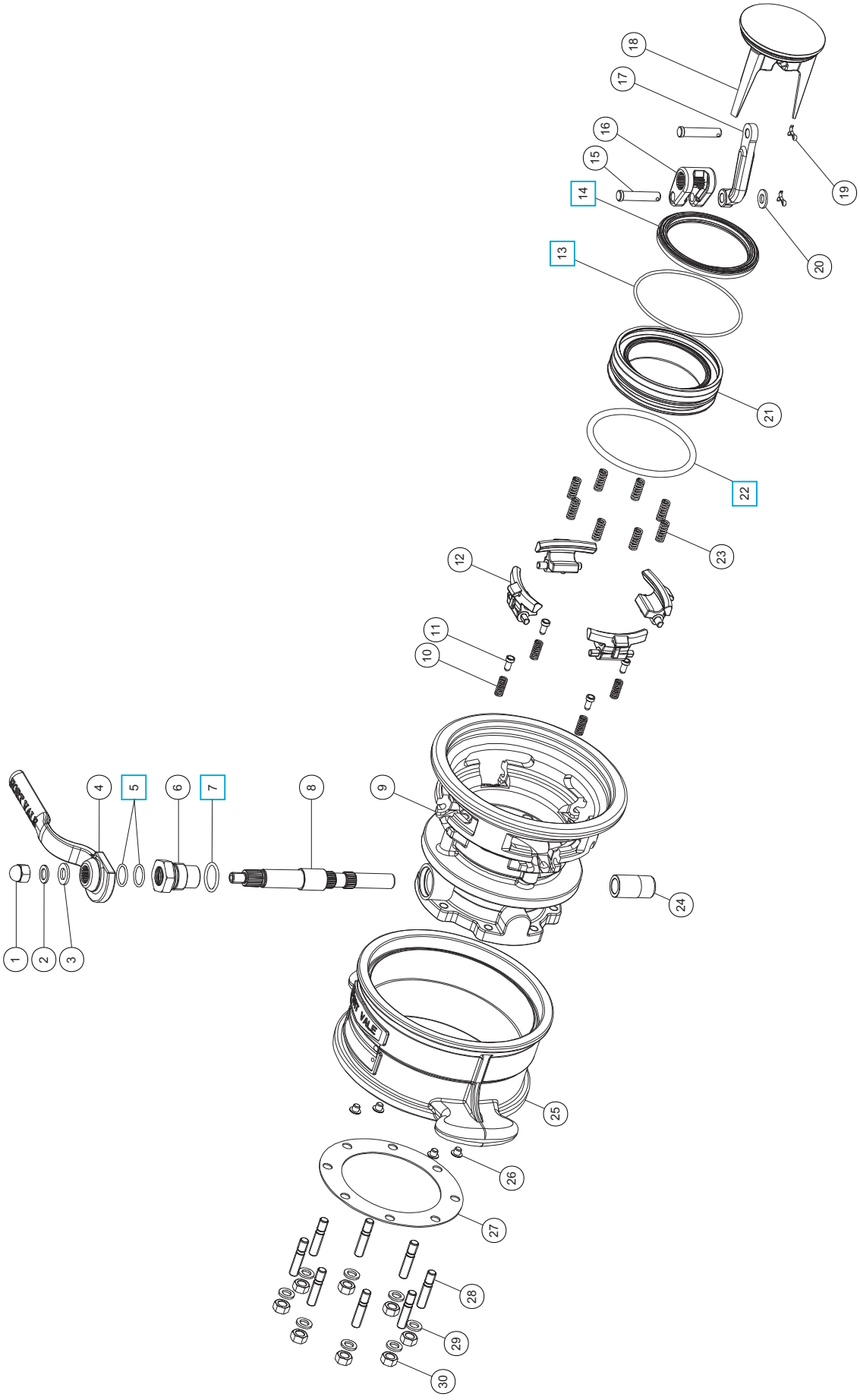
NOTE: The specification changes the Part No.

Section View





Parts Drawing



Safeload Manual API Coupler

Part No: CE94/2700XX

Parts List

Item	Description	Part No.
1	M12 domed nut	5112-050
2	M12 spring washer	5113-010
3	M12 washer	5123-003
4	Splined handle	94/2775
5	Spindle O ring (2) ***Note**	5005-336XX ☐
6	Spindle lock bush	94/2513
7	Bush O ring ***Note**	5005-214XX ☐
8	Spindle	94/2511
9	Inner housing	94/2501
10	Trigger spring (4)	94/2025
11	Brass spring guide (4)	94/2026
12	Locking trigger (4)	94/2555
13	Wiper O ring ***Note**	5005-584XX ☐
14	Main seal ***Note**	94/1006XX ☐
15	Pivot pin (2)	94/1054
16	Splined crank block	94/2528
17	Lever arm	94/1009A
18	Poppet	94/2518
19	Split pin (2)	5118-050
20	M10 stainless steel washer	5113-025
21	Seal carrier	94/2507
22	Seal carrier O ring ***Note**	94/1034XX ☐
23	Seat ring spring (8)	94/2024
24	Spindle bush	94/2522
25	Outer body assembly	94/2704
26	Plastic plug (4)	5028-094
27	4" TTMA gasket	94/1044
28	M10 stud (8)	94/1040
29	M10 spring washer (8)	5113-002
30	M10 full nut (8)	5112-002

NOTE: The specification changes the Part No.

Seal Data

Seal Material	Seal Temp. Min/Max	Seal Colour	Coupler Part No.
Viton B	-13°C/50°C	Black	CE94/2700
Viton GFLT-S	-23°C/50°C	Grey	CE94/2700GF
Ultra low temp. fluorocarbon	-40°C/50°C	Brown	CE94/2700MF
Perfluoroelastomer	-15°C/50°C	Green	CE94/2700PF

Seal Kit - All parts marked ☐ in the Parts List

Seal Material	Part No.
Viton B	94/25SK
Viton GFLT-S	94/25SKGF
ULT fluorocarbon	94/25SKMF
Perfluoroelastomer	94/25SKPF

4" TTMA Check Valve

Part No: 94/36X0XX/X

Specification

Nominal size
DN100

Inlet/hose connection
Flanged: 8 x M10 holes on a 149.2mm PCD - 4" TTMA

Outlet/coupler connection
Flanged: 8 x 11mm holes on a 149.2mm PCD - 4" TTMA

Spring pressure
0.13 Bar, 0.2 Bar, 0.3 Bar, 0.4 Bar

Options
Poppet with fluid transfer hole or poppet with check valve

Materials
Contact parts: aluminium & stainless steel
Main seal: A range is available, refer to Seal Data

Design Conditions

Weight:	2.7 Kg
Design Pressure (MAWP):	6 Bar
Test Pressure:	9 Bar
Design Temperature Max:	Refer to Seal Data

Seal Data

Seal Material	Seal Temp Min/Max
Viton B	-13°C / 50°C
Viton GFLT-S	-23°C / 50°C
Ultra low temp. fluorocarbon	-40°C / 50°C

NOTE: The Design Conditions and Section View dimensions are for the specified part number only.

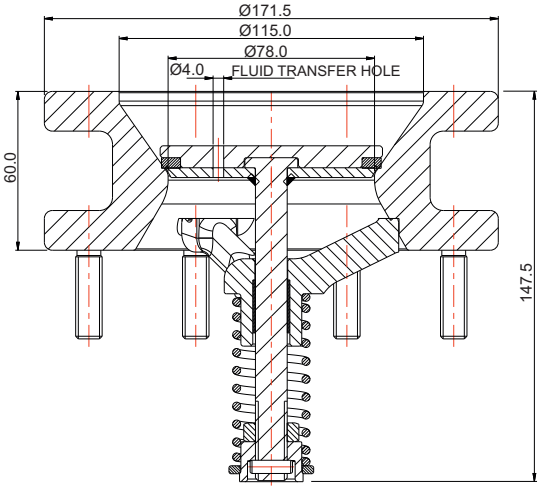
Range

Description	Part No.
Poppet with fluid transfer hole ***Note**	94/3690XX/X
Poppet with check valve ***Note**	94/3660XX/X

NOTE: The valve specification changes the Part No.

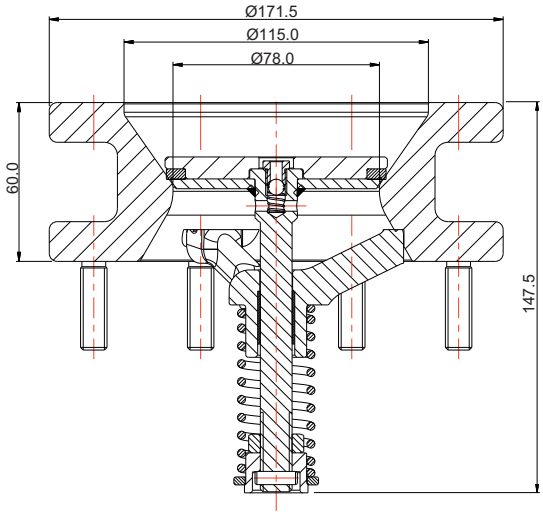
Section View

Part No. 94/3690XX/X



Section View

Part No. 94/3660XX/X

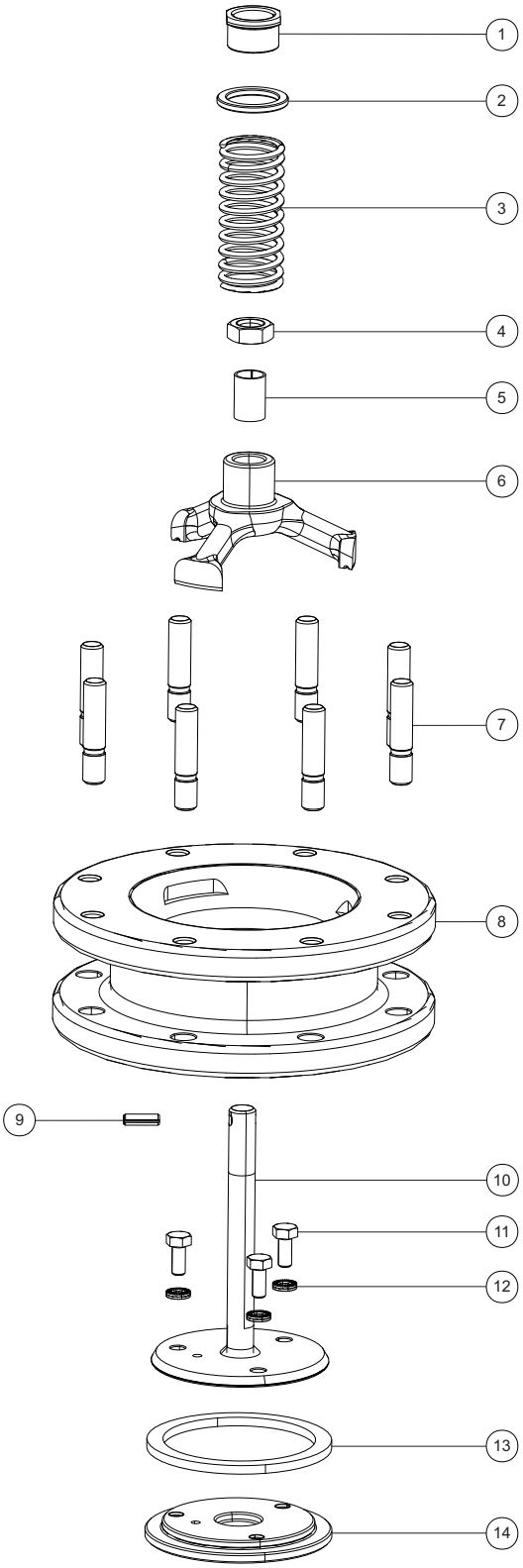


4" TTMA Check Valve

Part No: 94/36X0XX/X

Parts Drawing

Part No. 94/3690XX/X ONLY



Parts List

Part No. 94/3690XX/X ONLY

Item	Description	Part No.
1	Spindle stop collar	94/3684
2	Spindle spring washer	94/3681
3	Poppet spring ***Note**	94/3674/X
4	M12 half nut	5112-017
5	Spider bearing	94/3688
6	Spider	94/3687
7	M10 stud (8)	94/1040
8	Body	94/3693
9	5mm roll pin	5128-122
10	Poppet	94/37XX
11	M6 hex bolt (3)	5111-190
12	M6 Nord Lock washer pair (3)	5113-180
13	Poppet seal ***Note**	94/3696X
14	Poppet base plate	94/3710

NOTE: The valve specification changes the Part No.

We supply a range of special tools and kits to do scheduled maintenance and repair procedures to our Safeload range of equipment.

We recommend that you use the correct special tools and only genuine spare parts. These will help you do maintenance and repairs quickly and easily without causing damage.

A selection of step-by-step maintenance instruction manuals is also available, please contact us.

CAUTION: To do maintenance, you must have experience and qualifications related to equipment installation on pressure vessels and systems.

Wear Gauge for API Loading Adaptor

Part No: 94/2150

The wear gauge lets you check the wear of both the outside diameter and the contact face of the loading adaptor that the Safeload coupler latches onto.

The gauge will show:

- if the loading adaptor is under-size on diameter.
- if there is wear to the rear latching face.
- if the loading adaptor is over-size (caused by de-lamination of the band on the rear latching face).

Design Codes
The gauge engages in a central position on a unit that obeys the dimensions and tolerances of EN 13083 and API RP1004.

The gauge became mandatory in the UK in 2006 under section B.12.2 of the industry standard “Safe Loading Pass for Trailers and Tank Equipment”.

Related Document: Operating Instructions OPIN32

Safeload Coupler Seal Replacement Tool

Part No: 400/94X0

The Safeload coupler seal replacement tool lets you latch the coupler in the correct position to give access to replace the seals.

The tool has two different faces, one to let you replace the main seal and seal carrier O rings and the other to let you replace the spindle O rings.

Range

Description	Part No.
Compatible with standard semi-automatic & manual coupler	400/9420
Compatible with high-pressure coupler	400/9440

Seal Kits

We supply seal kits in a range of seal materials for our Safeload couplers, please refer to the coupler data sheet for more information.

Safeload Accessory Kits

Description	Part No.
Seal kit for MK2 Safeload coupler, part no. 94/2000 (pre-2007)	94/20SK
Loading arm assembly kit	94/7AK
Loading arm swivel grease nipple kit	94/7GNK
Loading arm base swivel stop device: stop plate & stop bar	94/7079/XXA 94/7081

Related Parts

We also recommend our range of compatible accessories:

- API coupler parking nose
- Loading arm spools
- Drop hoses

Please contact us for more information about these parts.

FORT VALE

APPENDIX

Catalogue

Flange Bolting

CAUTION: Weld-distortion and too much tightening force will cause damage to a flange.

It is important not to cause damage to weld-in flanges and mating flanges. If a flange is damaged it will not give a satisfactory seal when a gasket and secondary mating flange is installed.

Bolt-stress can decrease after initial tightening. The cause can be deformation of the gasket material, particularly with soft materials such as a CNAF/PTFE envelope gasket.

Best procedure recommends that, after initial bolting, the flange joint is tightened again after a period of time. Most gasket manufacturers advise a period of 24 hours. ASME PCC-1-2000 GUIDELINES FOR PRESSURE BOUNDARY BOLTED FLANGE JOINT ASSEMBLY advises a minimum period of 4 hours.

Bolt torque calculations are based on a flat flange to within 0.15mm.

Recommended bolt torque values will be reduced if a lubrication is used.

Bolt Torque

Bolt Torque Values

Fort Vale bolt torque values are given as a reference guide only and are based on:

- The use of a CNAF/PTFE gasket.
- Unlubricated fasteners.
- A flange flat to within 0.15mm.

CAUTION: If you use a different gasket material, a lubricant, a flange with distortion, you must re-calculate the torque value.

Bolt Torque Procedure

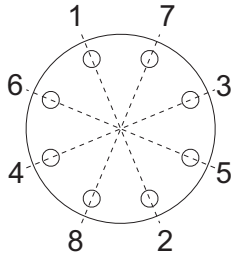
To install flanged parts correctly:

- Examine the mating flange of the part.
- If the flange is marked with a torque value, obey that torque value.
- If there is no torque value marked on the mating flange, obey the bolt torque values given in Table BT1.
- Tighten the bolts evenly in sequence. See Figure BT1.
- Obey the Step Loading Procedure (ASME PCC-1-2000). See next page.

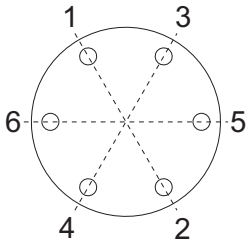
Table BT1

Thread	Torque Value
M10	30 Nm (22 lbf.ft)
M12	65 Nm (48 lbf.ft)
M16	81 Nm (60 lbf.ft)

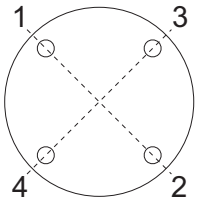
Figure BT1



8 HOLE PATTERN



6 HOLE PATTERN



4 HOLE PATTERN

Step Loading Procedure

To install flanged parts correctly, obey the Step Loading Procedure extract from ASME PCC-1-2000:

Install

Hand tighten, then “snug up” to 15 Nm (10 lbf.ft) to 30 Nm (20 lbf.ft) (not to exceed 20% of Target Torque).
Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

Round 1

Tighten to 20% to 30% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

Round 2

Tighten to 50% to 70% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

Round 3

Tighten to 100% of Target Torque. Check flange gap around circumference for uniformity. If the gap around the circumference is not reasonably uniform, make the appropriate adjustments by selective tightening before proceeding.

Round 4

Continue tightening the bolts, but on a rotational clockwise pattern until no further nut rotation occurs at the Round 3 Target Torque value. For indicator bolting, tighten bolts until the indicator rod retraction readings for all bolts are within the specified range.

Round 5

Time permitting, wait a minimum of 4 hr and repeat Round 4; this will restore the short-term creep relaxation/embedment losses. If the flange is subjected to a subsequent test pressure higher than its rating, it may be desirable to repeat this round after the test is completed.

Compatibility

Make sure that the function and technical specification of the valve/accessory is compatible with the vessel service conditions and the cargo. This includes, but is not limited to:

- dimensions
- pressure/vacuum setting
- air/gas/liquid flow capacity
- maximum allowable working pressure
- test pressure
- minimum/maximum design temperatures
- materials of construction.

Maintenance

Fort Vale valves and accessories have a long life if you use them correctly in compatible service conditions. It is not necessary to lubricate the parts, but we recommend that you obey the precautions that follow:

Visual checks at regular intervals:

1. Examine the valve to make sure there is no damage, wear or corrosion.
2. Examine the valve and adjacent area to make sure there is no leakage of cargo.
3. Examine the fasteners to make sure they are not loose.
4. Make sure the valve operates correctly.

CAUTION: If you operate the valve with very corrosive cargo, or near its temperature and/or pressure limit (very high or very low temperature and/or pressure), do the visual checks more frequently.

As well as the visual checks, schedule suitable maintenance intervals for the valve based on how frequently the valve is used, the type of cargo and the service conditions.

After 2½ years of service, do the checks that follow:

1. Examine the valve to make sure there is no damage, wear or corrosion.
2. Make sure the valve operates correctly.
3. Do a pressure test on the valve.

After 5 years of service, do the checks that follow:

1. Disassemble and clean the valve.
2. Replace all the valve seals.

Replacement Parts

Do not adapt or change the valve. If you install a replacement part, it must be a genuine Fort Vale part.

WARNING: If you install a part that is not a genuine Fort Vale part, there is a risk of:

- injury to personnel
- permanent damage to the valve
- permanent damage to the vessel
- valve malfunction.

External Fire

If the valve is installed in an area where there is a risk of external fire, you must install compatible accessories to prevent damage to the valve.

Compatibility of Accessories

Accessory components must cause no interference with the valve function. Accessories must be made from compatible materials that will cause no damage to the valve materials. Do not install an accessory that will cause an increased load on the valve, i.e. mechanical, static, dynamic, thermal.

Mis-use

Obey the instructions and recommended procedures in the installation and operating instructions. Obey the pressure and temperature markings on the valve and on the drawing. Use the valve/accessory for its correct function only. Fort Vale accept no liability or responsibility for incorrect use of the valve/accessory.

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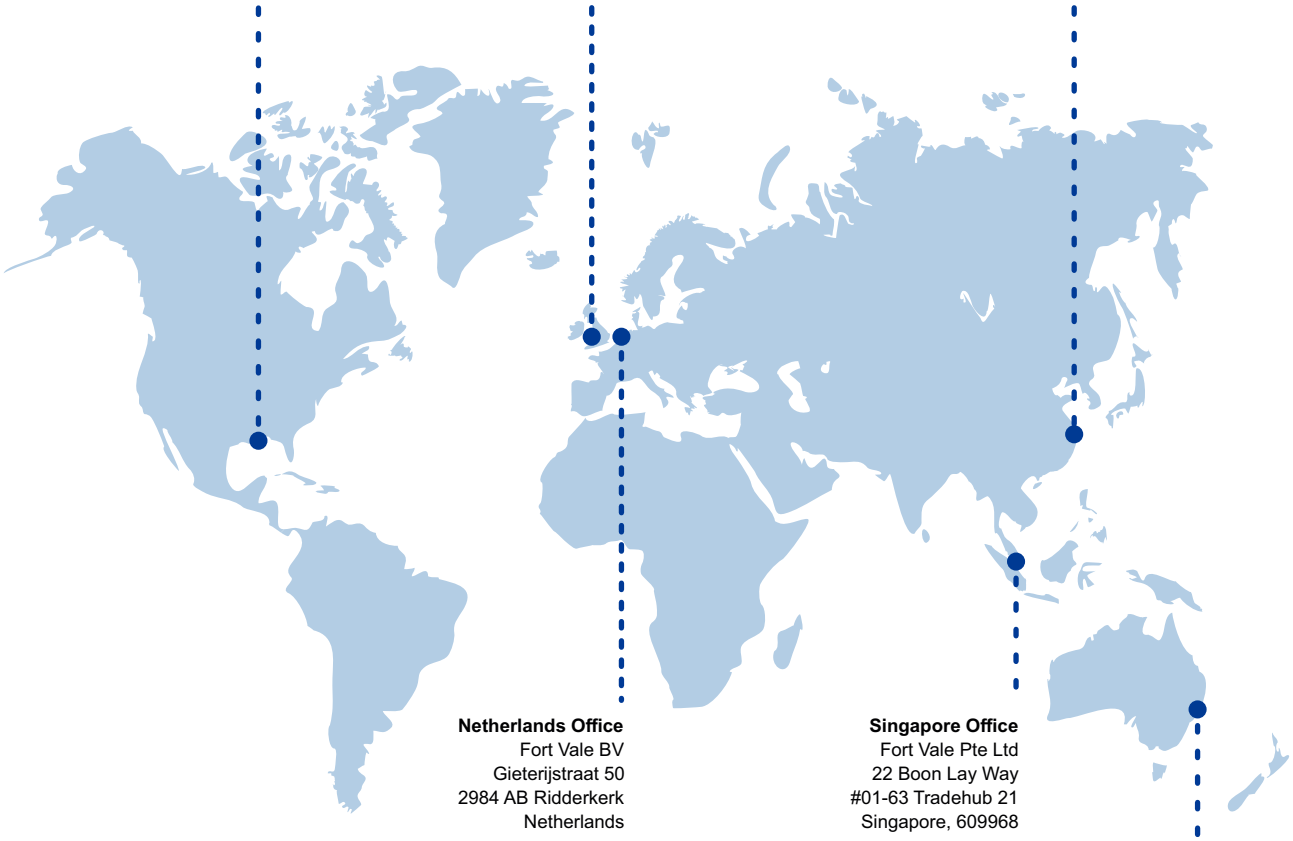

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