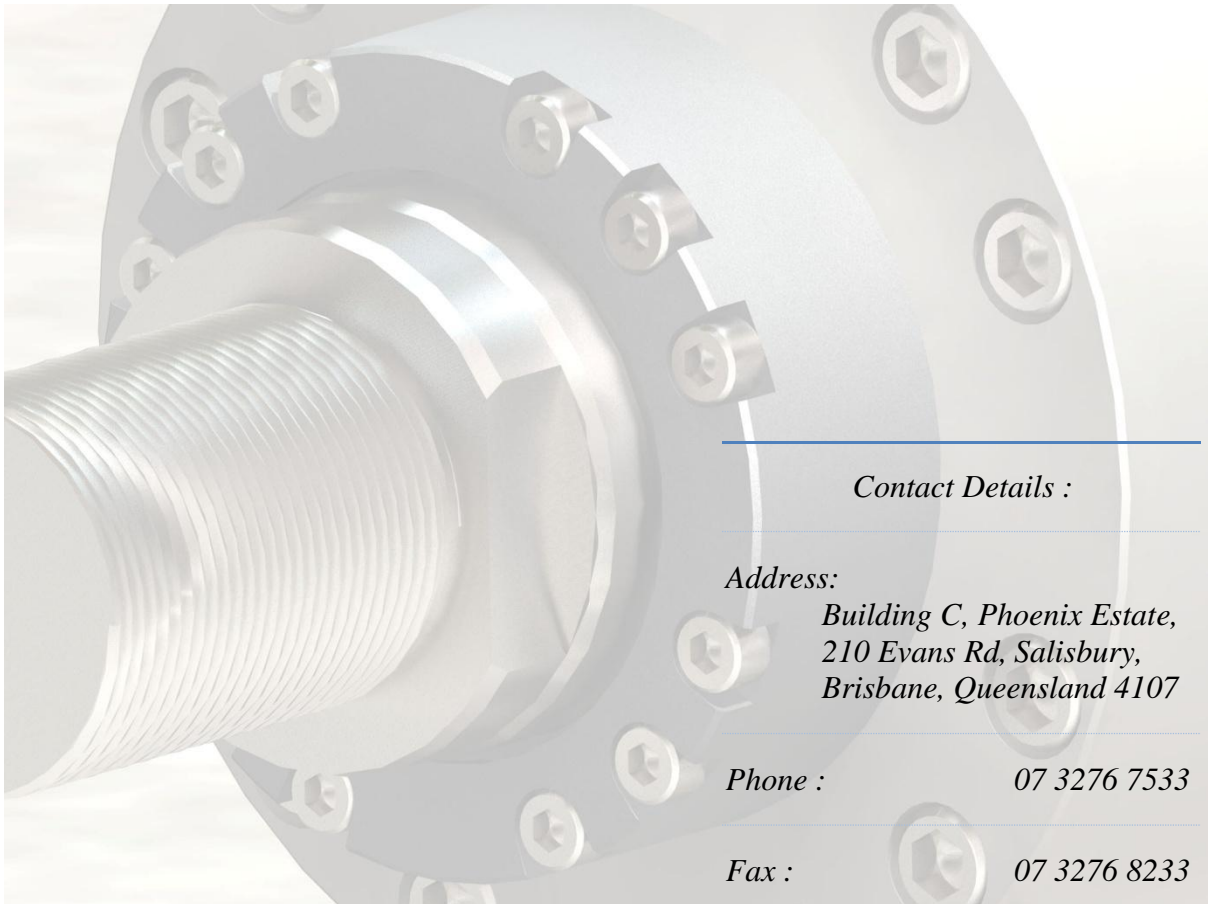




Queensland Hydraulics Pty Ltd
Your Local Source of Engineered Hydraulic Solutions

ISO6022 Cylinder Range

- Nominal Pressure 25MPa
- Bore Sizes 50 to 320mm as standard
- Rod Sizes 32 to 220mm as standard
- Mounting Dimensions to ISO6022
- Absolute position indication options
- End of stroke position indication options
- Large range of seal options
- Multiple piston rod materials and coatings





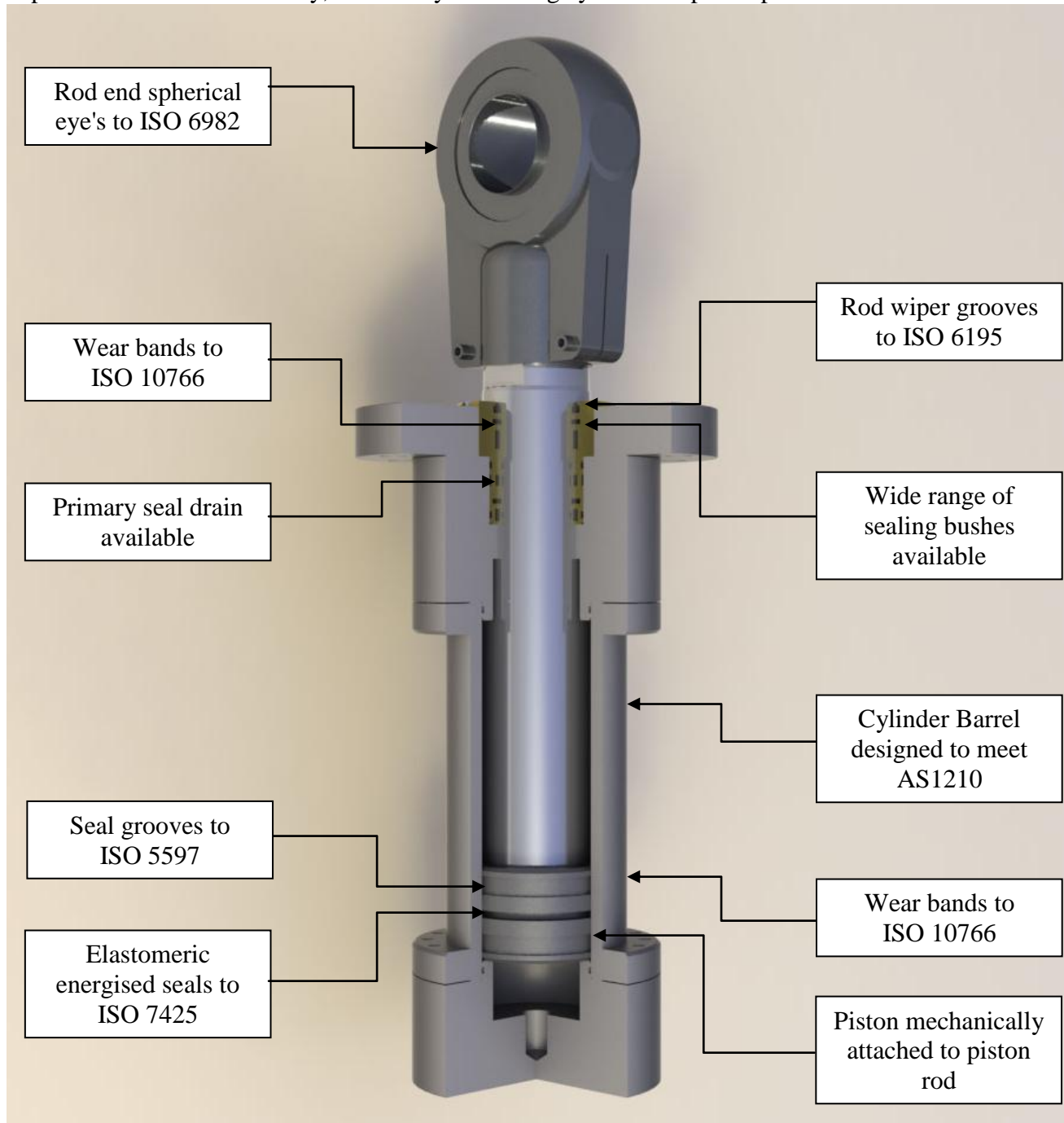
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While all due care has been taken in the preparation of this catalogue it is recommended that the end user verify any information given within. Before ordering any hydraulic cylinder it is recommended to consult Queensland Hydraulics Pty Ltd to confirm the hydraulic cylinder selected is fit for purpose.

1 Series Overview

The ISO6022 cylinder range has been developed for extreme industrial applications. Designed and factory tested in accordance with international standards, and incorporating over 30 years of experience within the industry, this is a cylinder range you can depend upon.



Hydraulic single rod cylinders for use at 25 MPa (250 bar) selected in accordance with ISO6022:2006, *Hydraulic fluid power – Mounting dimensions for single rod cylinders, 25MPa (250 bar) series.*” Cylinder rod and bore sizes in accordance with ISO3320.

All hydraulic cylinders are factory tested in accordance with ISO10100.



2 Size Combinations

The following size combinations are in accordance with ISO 6022:2006, sizes which are not covered by this standard are available on request.

Bore Ø mm	Rod Ø mm	Area		Force @ 25MPa			Oil Flow @10cm/s		
		Piston cm ²	Annulus cm ²	Ext kN	Ret kN	Regen kN	Ext L/min	Ret L/min	Regen L/min
50	32	19.6	11.6	49.1	29.0	20.1	11.8	7.0	4.8
	36		9.5		23.6	25.4		5.7	6.1
63	40	31.2	18.6	77.9	46.5	31.4	18.7	11.2	7.5
	45		15.3		38.2	39.8		9.2	9.5
80	50	50.3	30.6	125.7	76.6	49.1	30.2	18.4	11.8
	56		25.6		64.1	61.6		15.4	14.8
100	63	78.5	47.4	196.3	118.4	77.9	47.1	28.4	18.7
	70		40.1		100.1	96.2		24.0	23.1
125	80	122.7	72.5	306.8	181.1	125.7	73.6	43.5	30.2
	90		59.1		147.8	159.0		35.5	38.2
140	90	153.9	90.3	384.8	225.8	159.0	92.4	54.2	38.2
	100		75.4		188.5	196.3		45.2	47.1
160	100	201.1	122.5	502.7	306.3	196.3	120.6	73.5	47.1
	110		106.0		265.1	237.6		63.6	57.0
180	110	254.5	159.4	636.2	398.6	237.6	152.7	95.7	57.0
	125		131.8		329.4	306.8		79.1	73.6
200	125	314.2	191.4	785.4	478.6	306.8	188.5	114.9	73.6
	140		160.2		400.6	384.8		96.1	92.4
250	160	490.9	289.8	1,227.2	724.5	502.7	294.5	173.9	120.6
	180		236.4		591.0	636.2		141.8	152.7
320	200	804.2	490.1	2,010.6	1,225.2	785.4	482.5	294.1	188.5
	220		424.1		1060.3	950.3		254.5	228.1

3 Mounting Style Overview

ISO6022 style cylinders can be supplied with the following five mounting styles. Cylinder mounting styles can be custom tailored on request for those applications requiring a particular mounting.



Plain Cylinder Pg 6



MF3
Head Cap Circular Flange, Pg 7



MF4
End Cap Circular Flange, Pg 8



MT4
Intermediate Trunnion
(Fixed or Movable), Pg 10



MP5
End Cap Fixed Eye
with Spherical Bearing, Pg 9

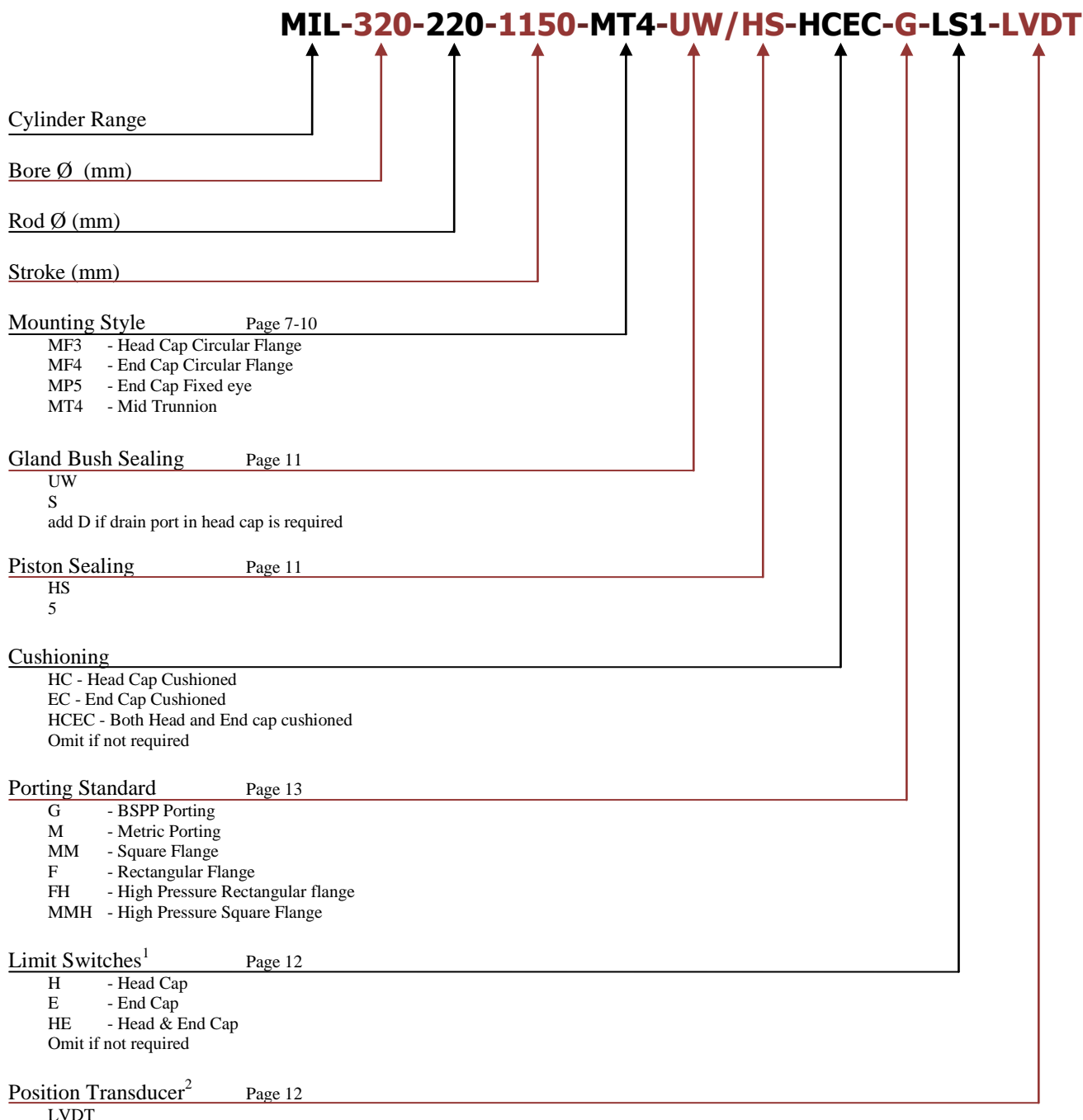
In addition to those shown above, double rod cylinders providing equal force in both retract and extension are available on request.



4 Ordering Information

When requesting a quote or ordering a hydraulic cylinder it is necessary to supply our staff with the below cylinder code. This will accelerate our quoting process and accurately define all aspects of the cylinder required. Custom cylinder requirements must be noted in full within quote requests or discussed with our staff.

Cylinder Ordering Code:

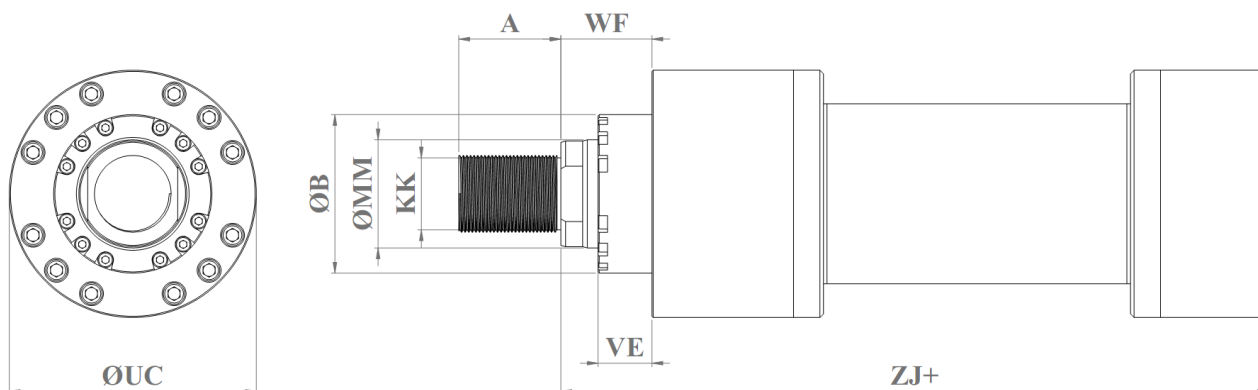


¹ Please Specify electrical operating requirements on order.

² Please Specify electrical operating requirements on order.

5 Dimensions

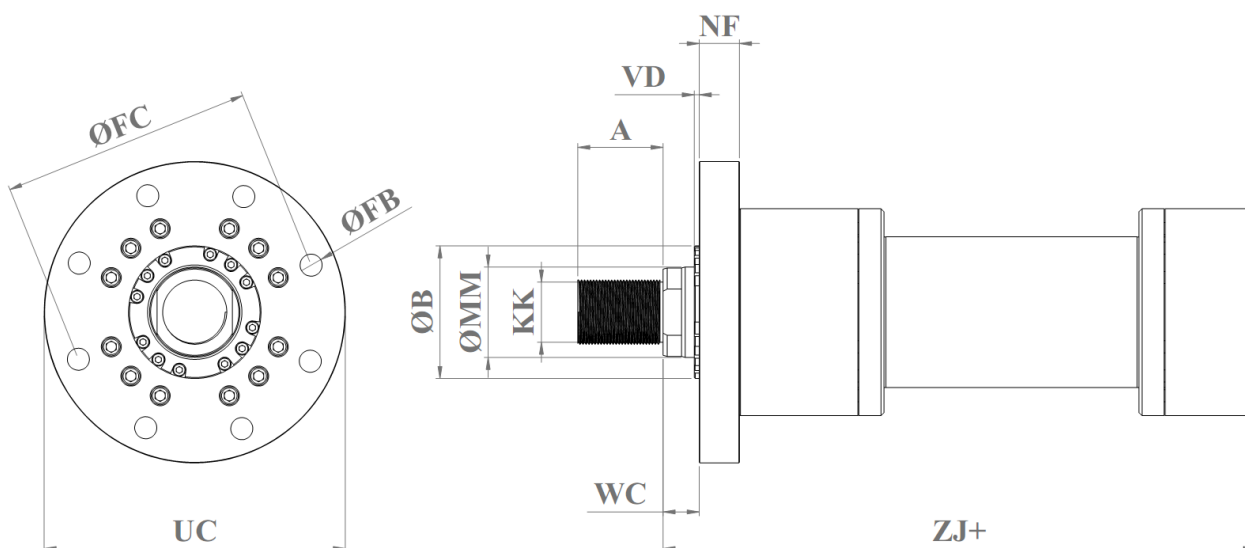
5.1 General Dimensions



Cylinder Bore \varnothing	Rod \varnothing MM	A	B H8	KK 6g	UC	VE	WF ₃	ZJ+ ₃
50	32	36	63	M27x2	102	29	47	240
	36							
63	40	45	75	M33x2	120	32	53	270
	45							
80	50	56	90	M42x2	145	36	60	300
	56							
100	63	63	110	M48x2	170	41	68	335
	70							
125	80	85	132	M64x3	206	45	76	390
	90							
140	90	90	145	M72x3	226	48	76	425
	100							
160	100	95	160	M80x3	265	50	85	460
	110							
180	110	106	185	M90x3	292	55	95	497
	125							
200	125	112	200	M100x3	306	61	101	540
	140							
250	160	125	250	M125x4	395	71	113	640
	180							
320	200	160	320	M160x4	490	88	136	750
	220							

³ Tolerance is stroke dependant, see table I on page 15.

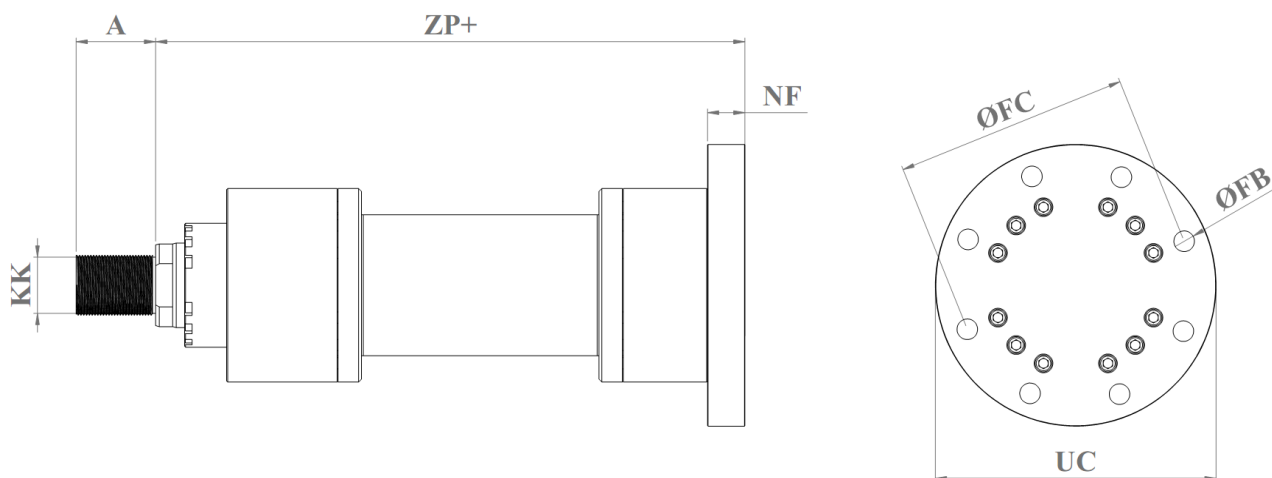
5.2 MF3 - Head Cap Circular Flange



Cylinder Bore Ø	Rod Ø MM	A	B H8	FB	FC	KK 6g	NF	UC	VD	WC ₄	ZJ+ ₄
50	32	36	63	8 x Ø13.5	132	M27x2	25	160	4	22	240
	36										
63	40	45	75	8 x Ø13.5	150	M33x2	28	180	4	25	270
	45										
80	50	56	90	8 x Ø17.5	180	M42x2	32	215	4	28	300
	56										
100	63	63	110	8 x Ø22	212	M48x2	36	260	5	32	335
	70										
125	80	85	132	8 x Ø22	250	M64x3	40	300	5	36	390
	90										
140	90	90	145	8 x Ø26	285	M72x3	40	340	5	36	425
	100										
160	100	95	160	8 x Ø26	315	M80x3	45	370	5	40	460
	110										
180	110	106	185	8 x Ø33	355	M90x3	50	425	5	45	497
	125										
200	125	112	200	8 x Ø33	385	M100x3	56	455	5	45	540
	140										
250	160	125	250	8 x Ø39	475	M125x4	63	545	8	50	640
	180										
320	200	160	320	8 x Ø45	600	M160x4	80	680	8	56	750
	220										

⁴ Tolerance is stroke dependant, see table I on page 15.

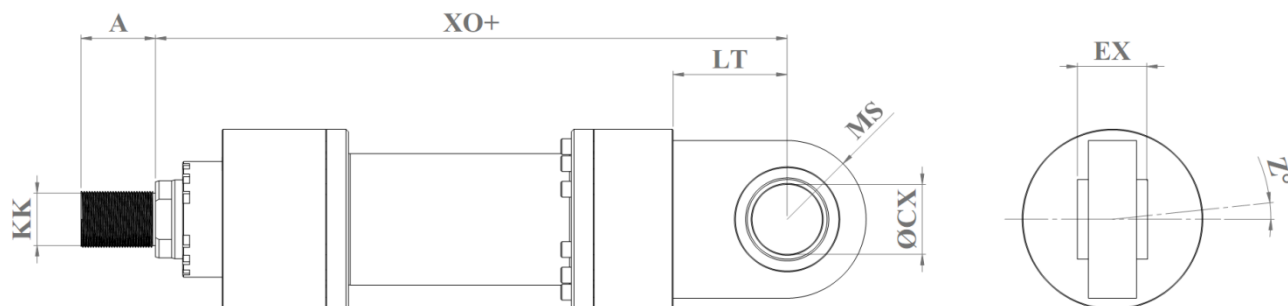
5.3 MF4 - End Cap Circular Flange.



Cylinder Bore Ø	Rod Ø MM	A	FB	FC	KK _{6g}	NF	UC	ZP+ ⁵
50	32	36	8 x Ø13.5	132	M27x2	25	160	265
	36							
63	40	45	8 x Ø13.5	150	M33x2	28	180	298
	45							
80	50	56	8 x Ø17.5	180	M42x2	32	215	332
	56							
100	63	63	8 x Ø22	212	M48x2	36	260	371
	70							
125	80	85	8 x Ø22	250	M64x3	40	300	430
	90							
140	90	90	8 x Ø26	285	M72x3	40	340	465
	100							
160	100	95	8 x Ø26	315	M80x3	45	370	505
	110							
180	110	106	8 x Ø33	355	M90x3	50	425	550
	125							
200	125	112	8 x Ø33	385	M100x3	56	455	596
	140							
250	160	125	8 x Ø39	475	M125x4	63	545	703
	180							
320	200	160	8 x Ø45	600	M160x4	80	680	830
	220							

⁵ Tolerance is stroke dependant, see table I on page 15.

5.4 MP5 - End Cap Fixed Eye With Spherical Bearing

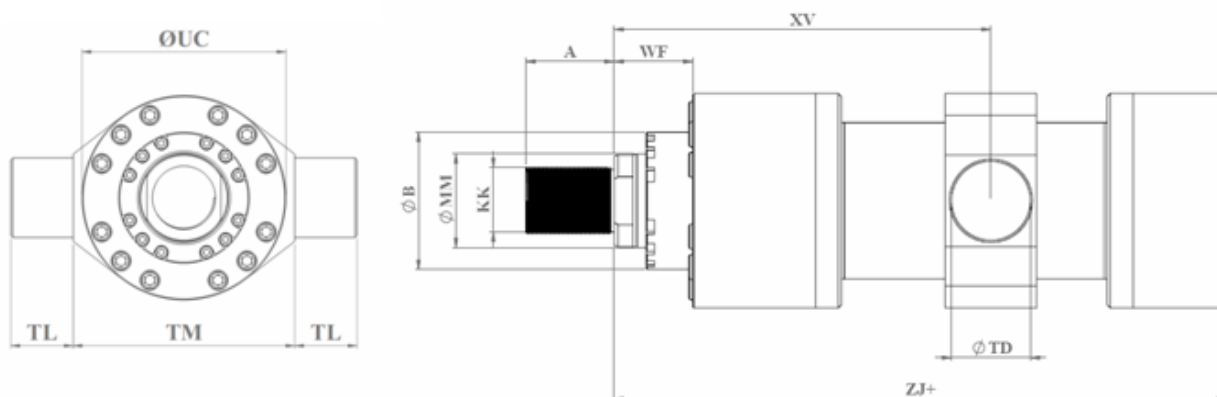


Cylinder Bore Ø	Rod Ø MM	A	CX	EX	KK _{6g}	LT	MS	Z°	XO+ ⁶
50	32	36	32	32	M27x2	65	40	4°	305
	36								
63	40	45	40	40	M33x2	78	50	4°	348
	45								
80	50	56	50	50	M42x2	95	63	4°	395
	56								
100	63	63	63	63	M48x2	107	71	4°	442
	70								
125	80	85	80	80	M64x3	103	90	4°	520
	90								
140	90	90	90	90	M72x3	155	105	4°	580
	100								
160	100	95	100	100	M80x3	157	110	4°	617
	110								
180	110	106	110	110	M90x3	193	135	4°	690
	125								
200	125	112	125	125	M100x3	216	145	4°	756
	140								
250	160	125	160	160	M125x4	263	170	4°	903
	180								
320	200	160	200	200	M160x4	330	200	4°	1080
	220								

⁶ Tolerance is stroke dependant, see table I on page 15.



5.5 MT4 - Mid Trunnion (Fixed or Movable)

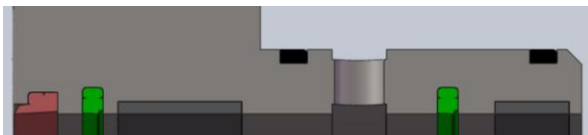




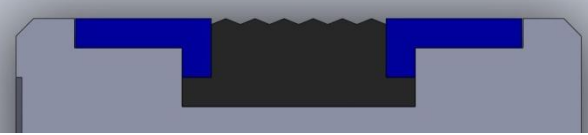


Cylinder Bore Ø	Rod Ø MM	A	B H8	KK 6g	TD	TL	TM	UC	VE	WF 7	ZJ+ 7
50	32	36	63	M27x2	32	25	112	102	29	47	240
	36										
63	40	45	75	M33x2	40	32	125	120	32	53	270
	45										
80	50	56	90	M42x2	50	40	150	145	36	60	300
	56										
100	63	63	110	M48x2	63	50	180	170	41	68	335
	70										
125	80	85	132	M64x3	80	63	224	206	45	76	390
	90										
140	90	90	145	M72x3	90	70	265	226	48	76	425
	100										
160	100	95	160	M80x3	100	80	280	265	50	85	460
	110										
180	110	106	185	M90x3	110	90	320	292	55	95	497
	125										
200	125	112	200	M100x3	125	100	335	306	61	101	540
	140										
250	160	125	250	M125x4	160	125	425	395	71	113	640
	180										
320	200	160	320	M160x4	200	160	530	490	88	136	750
	220										
XV ⁷ — to be specified by customer											

⁷ Tolerance is stroke dependant, see table I on page 15.

6 Sealing Alternatives

Appropriate sealing methodology is imperative to a long-lasting and maintainable hydraulic cylinder. All cylinders within this range contain removable gland bushes which allow all rod seals to be removed without disassembly of the main cylinder barrel. These cartridge style gland bushes are able to be supplied with a myriad of seal types and materials to suit individual applications. Standard sealing methods are shown below, non-standard sealing arrangements in addition to exotic sealing materials are available on request.

Description	Application	General Arrangement	Ordering Code
Dual Single acting seals with oil drain.	Hydraulic fluid sensitive environments with no external fluid pressure.		SD
Single acting primary seal with double acting secondary seal with oil drain.	Hydraulic fluid sensitive environments with external fluid pressure.		UWD
Dual Single acting seals.	Non-sensitive environment with no external fluid pressure.		S
Single acting primary seal with double acting secondary seal.	Non- sensitive environments with external fluid pressure.		UW
Single O-Ring energised seal with two independent wear strips.	High speed long life applications.		HS
Integrated 5 piece piston seal with wear strips	Standard applications		5



7 Piston Rod Materials

In order to combat the varied physical and environmental conditions of each application the correct piston rod material must be selected. The following table outlines the most common materials available and their strength and typical applications

Material	Yield Strength (MPa)	Description
Gr4140 Alloy Steel	~480-925	High tensile mild steel with little corrosion resistance and low abrasion resistance.
Gr4140, Chrome Plated	~480-925	Chrome plated (.025-.05mm thickness) Gr4140 bar. High abrasion resistance and increased corrosion resistance over standard Gr4140 bar.
Gr4140, Chrome Plated & Ceramic Densified	~480-925	Ceramic densification of the porous chrome microstructure increases the corrosion resistance to above that of 3 series stainless steels while maintaining high impact resistance and core strength. Economical alternative to super-stainless steel grades (Gr2130 etc).
Gr431 Stainless Steel	~600	High tensile heat treatable martensitic stainless steel.
Gr630 Stainless Steel (17/4 PH)	~590-1170	High tensile precipitation hardened stainless steel, corrosion resistance similar to Gr304 stainless steel.
Gr2205 Stainless steel	~450	High tensile strength with excellent corrosion resistance.

8 Position Monitoring

The broad range of position monitoring options available make incorporating an ISO6022 cylinder into your process a simple plug and play affair. With both physical and induction style limit switches in addition to both visual and absolute measurement systems, knowing exactly the state of your machinery is assured. Available position monitoring methods are tabulated below.

Method	Attributes	Electrical options
Visual indication	Simplest method of position monitoring.	None
Physical Limit switches	Cost effective solution however performance is susceptible to impact and debris.	110VDC-110VAC
Induction Limit switches	Robust and Accurate position indication with no adjustability. IP68 rated switches when combined with our fabricated enclosures allow full submersion in aggressive environments.	10-30VDC
Full stroke Magnetorestrictive transducers	Provides absolute measurement of stroke with the correct equipment velocity and acceleration. Available with IP68 rated enclosure. provides the maximum level of control with the highest capital cost.	Analogue : 0-10VDC, +5 to -5VDC, 4-20mA, 0-20mA. Digital : Start/Stop, PWM, CANopen, Profibus DP, Quadrature.

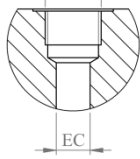
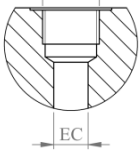
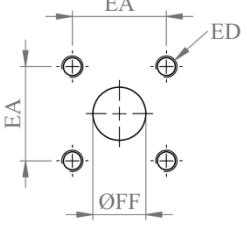
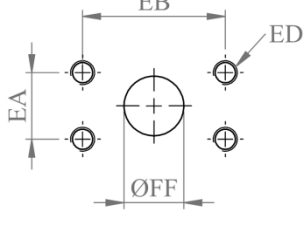
Any combination of the above methods can be selected to ensure complete compatibility with existing control philosophies.



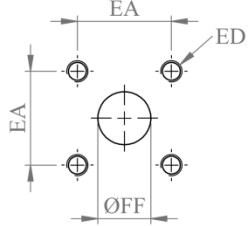
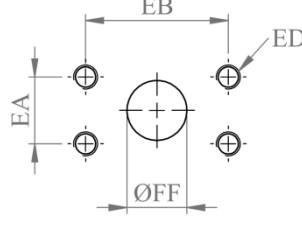
9 Port Styles

Recommended port sizes are outlined in the table below.

If a particular application requires a porting arrangement not listed here please consult us as to the suitability of your requested porting. (eg. UN O'Ring threads)

Bore	G		M		F				MM				
	ISO 1179-1 port 		ISO 6149-1 port 		ISO 6164 Square flange ⁸ 				ISO 6162-1 Rectangular flange 				
	EE 6g	EC min	EE 6g	EC min	DN Nominal size	FF	EA	ED	DN Nominal size	FF	EA	EB	ED
50	G 1/2	14	M22x1.5	14	-	-	-	-	-	-	-	-	-
63 80	G 3/4	18	M27x2	18	13	15	29.7	M8	13	12.7	17.5	38.1	M8
100 125	G 1	23	M33x2	23	19	20	35.4	M8	19	19.1	22.3	47.6	M10
140 160 180 200	G 1¼	30	M42x2	30	25	25	43.8	M10	25	25.4	26.2	52.4	M10
250 320	G 1½	32	M60x2	32	32	32	51.6	M12	32	31.8	30.2	58.7	M10

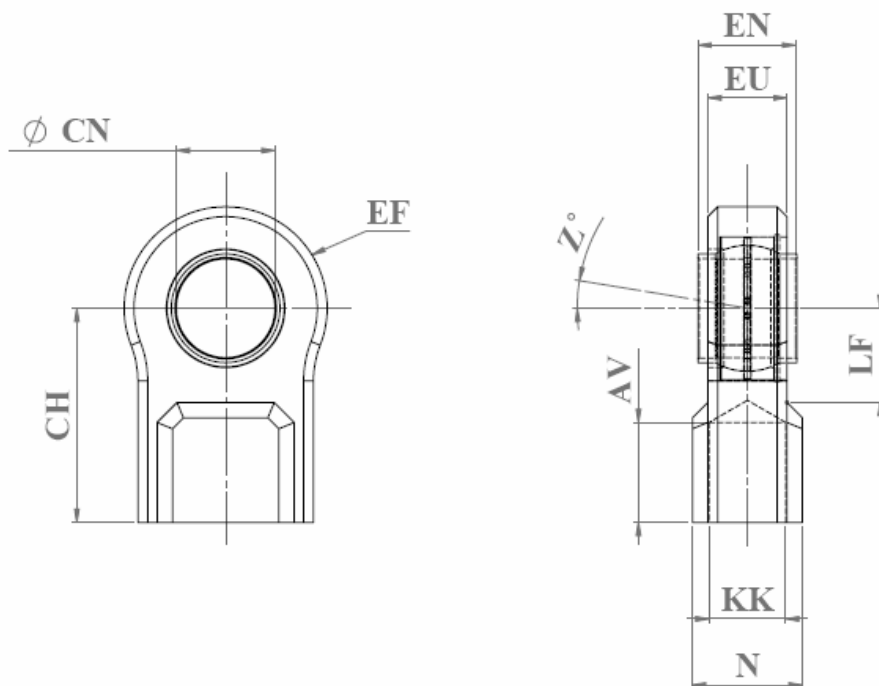
High pressure flange tables

Bore	FH				MMH				
	ISO 6164 Square flange 				ISO 6162-2 Rectangular flange 				
	DN Nominal size	FF	EA	ED	DN Nominal size	FF	EA	EB	ED
50	-	-	-	-	-	-	-	-	-
63 80	13	15	29.7	M8	13	12.7	18.2	40.5	M8
100 125	19	20	35.4	M8	19	19.1	23.8	50.8	M10
140 160 180 200	25	25	43.8	M10	25	25.4	27.8	57.2	M10
250 320	32	32	51.6	M12	32	31.8	31.2	66.7	M10

⁸ In circumstances where pressure intensification can occur within the cylinder, flanges with 400BAR Pressure rating must be selected from FH.

10 Spherical Bearing Rod Ends

Spherical rod ends provide maximum misalignment control of all the mounting types available. Standard configurations contain spherical bearings requiring maintenance, however maintenance free bearings can be provided on request.



Cylinder Bore Ø	Rod Ø MM	AV	CH	CN	EF	EN	EU	KK	LF	N	Z°
50	32	37	80	32	35	32	27	M27x2	35	38	4
	36										
63	40	46	97	40	44.5	40	32	M33x2	40	47	4
	45										
80	50	57	120	50	54	50	40	M42x2	51	58	4
	56										
100	63	64	140	63	66	63	52	M48x2	63	70	4
	70										
125	80	86	180	80	84	80	66	M64x3	76	90	4
	90										
140	90	91	195	90	92.5	90	72	M72x3	85	100	4
	100										
160	100	96	210	100	105	100	84	M80x3	94	110	4
	110										
180	110	106	235	110	117.5	110	88	M90x3	107	125	4
	125										
200	125	113	260	125	131	125	102	M100x3	124	135	4
	140										
250	160	126	310	160	163	160	126	M125x4	158	165	4
	180										
320	200	161	390	200	209	200	162	M160x4	196	215	4



11 Technical Reference Data

11.1 Tolerances

Table I: Tolerances for mounting dimensions that are dependent on stroke

Code for mounting dimension	ZJ ⁹	WF	WC	ZP ⁹	XO ⁹	XV
Nominal stroke	Tolerances (in mm)					
≤ 1250	± 1.5	± 2	± 2	± 1.5	± 1.5	± 2
> 1250 ≤ 3150	± 3	± 4	± 4	± 3	± 3	± 4
≤ 6000	± 5	± 8	± 8	± 5	± 5	± 8

Table II: Tolerances on piston stroke

Nominal stroke	Tolerances (in mm)
≤ 1250	+2 0
> 1250 ≤ 3150	+5 0
≤ 6000	+8 0

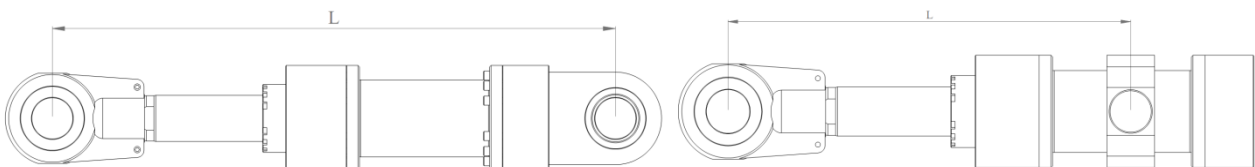
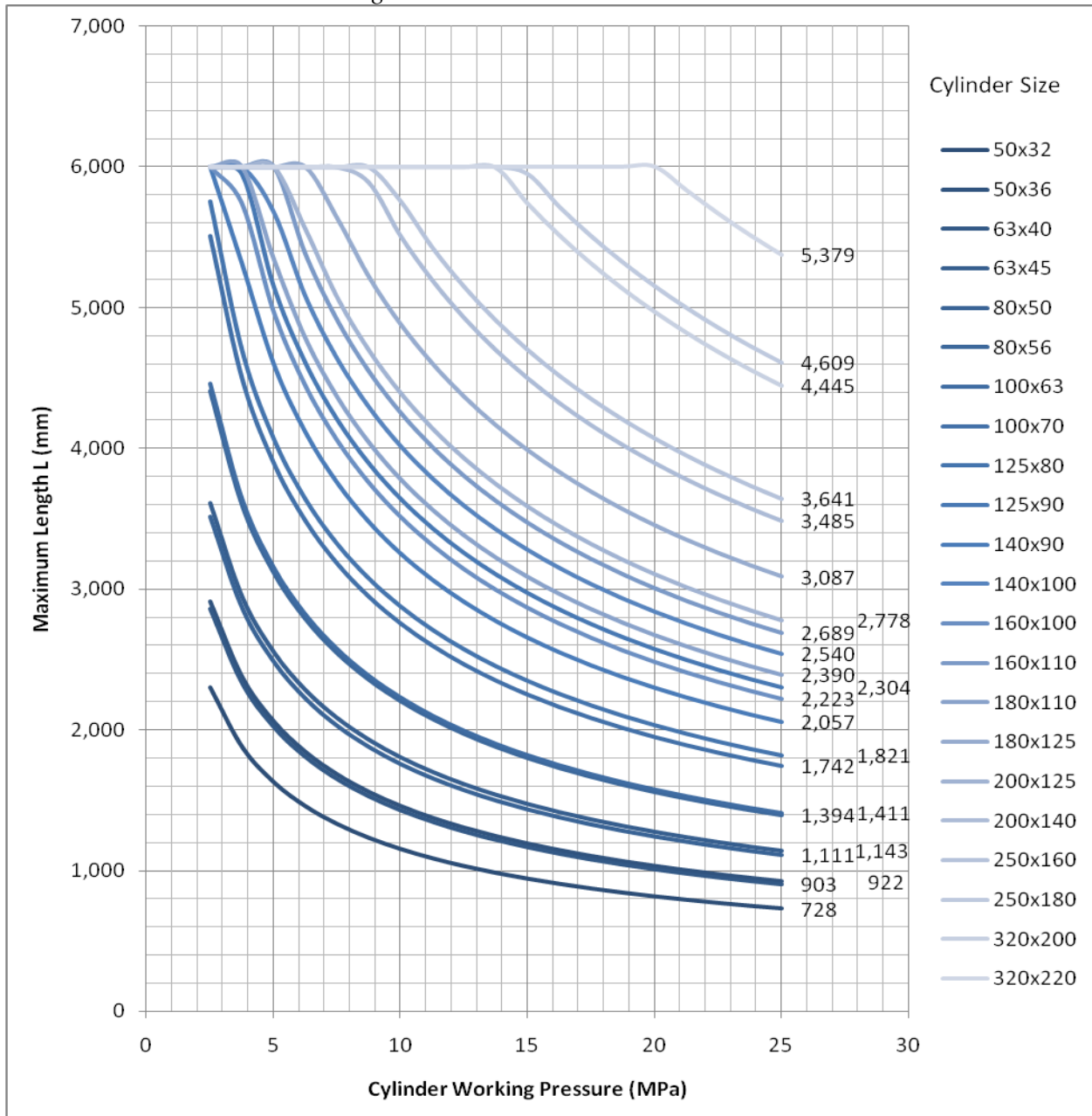
11.2 Buckling

All Buckling calculations are based on a 4:1 safety factor on the critical buckling force. The standard maximum length for this cylinder range is 6000mm and as such any figures above this value are limited in the following tables.

⁹ Length including stroke. Stroke tolerances from Table 2 shall not be added to the tolerances in table I.

11.2.1 Pinned Connections Both Ends

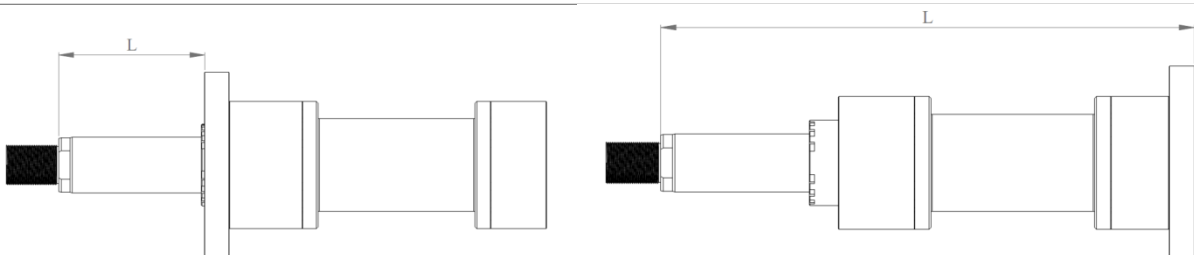
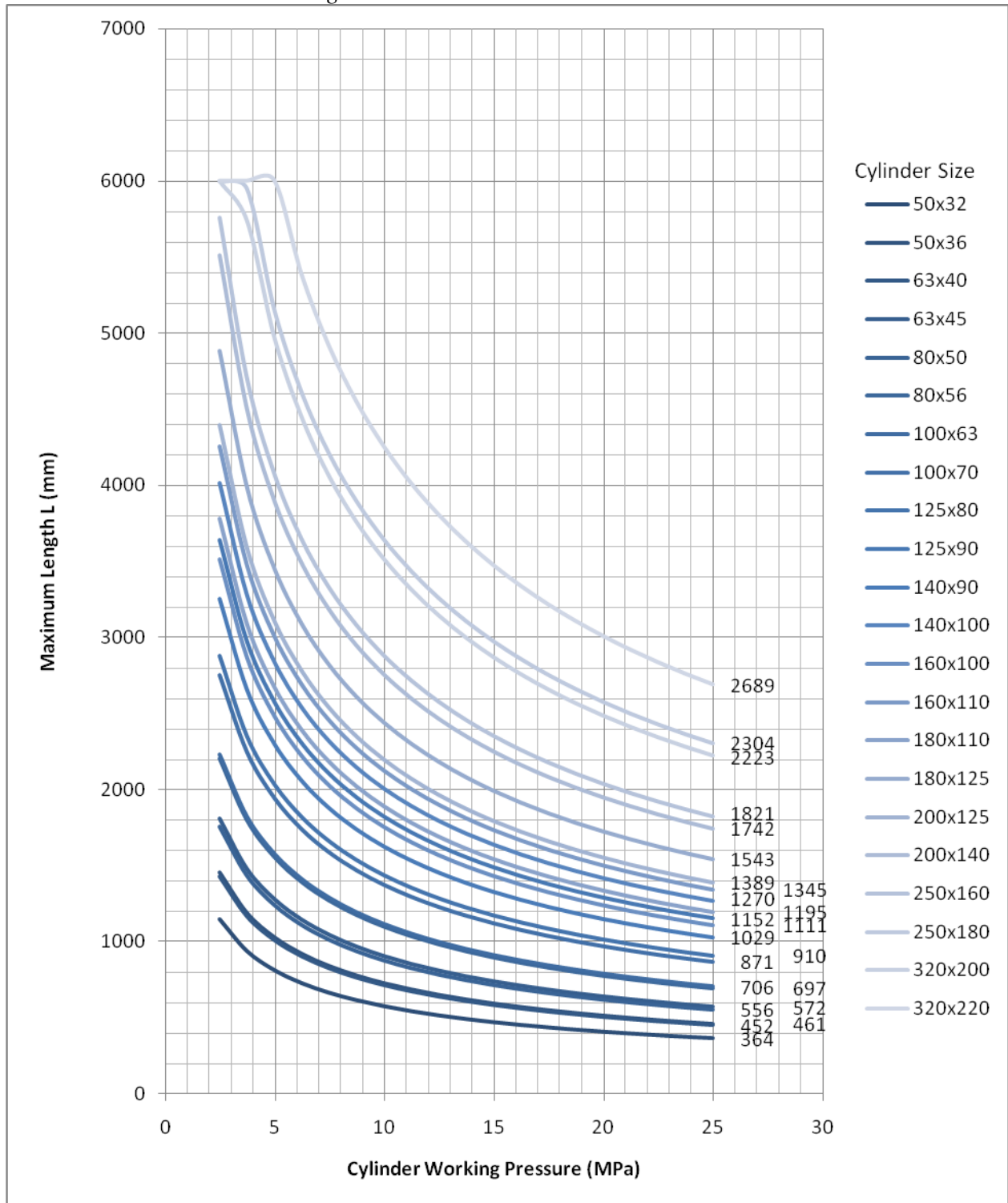
Figure I : Pinned connections both ends





11.2.2 Fixed Base With Free End

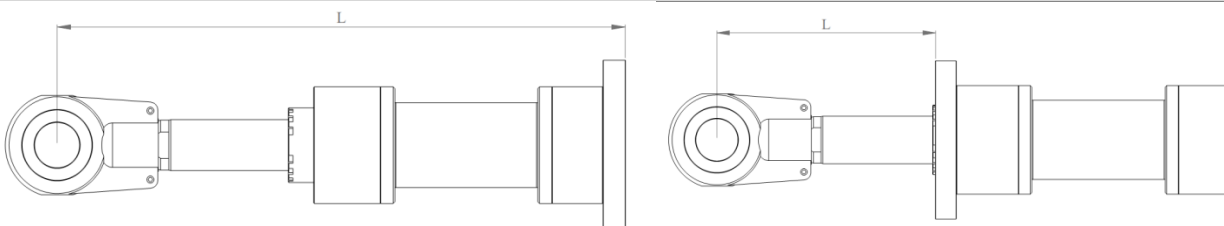
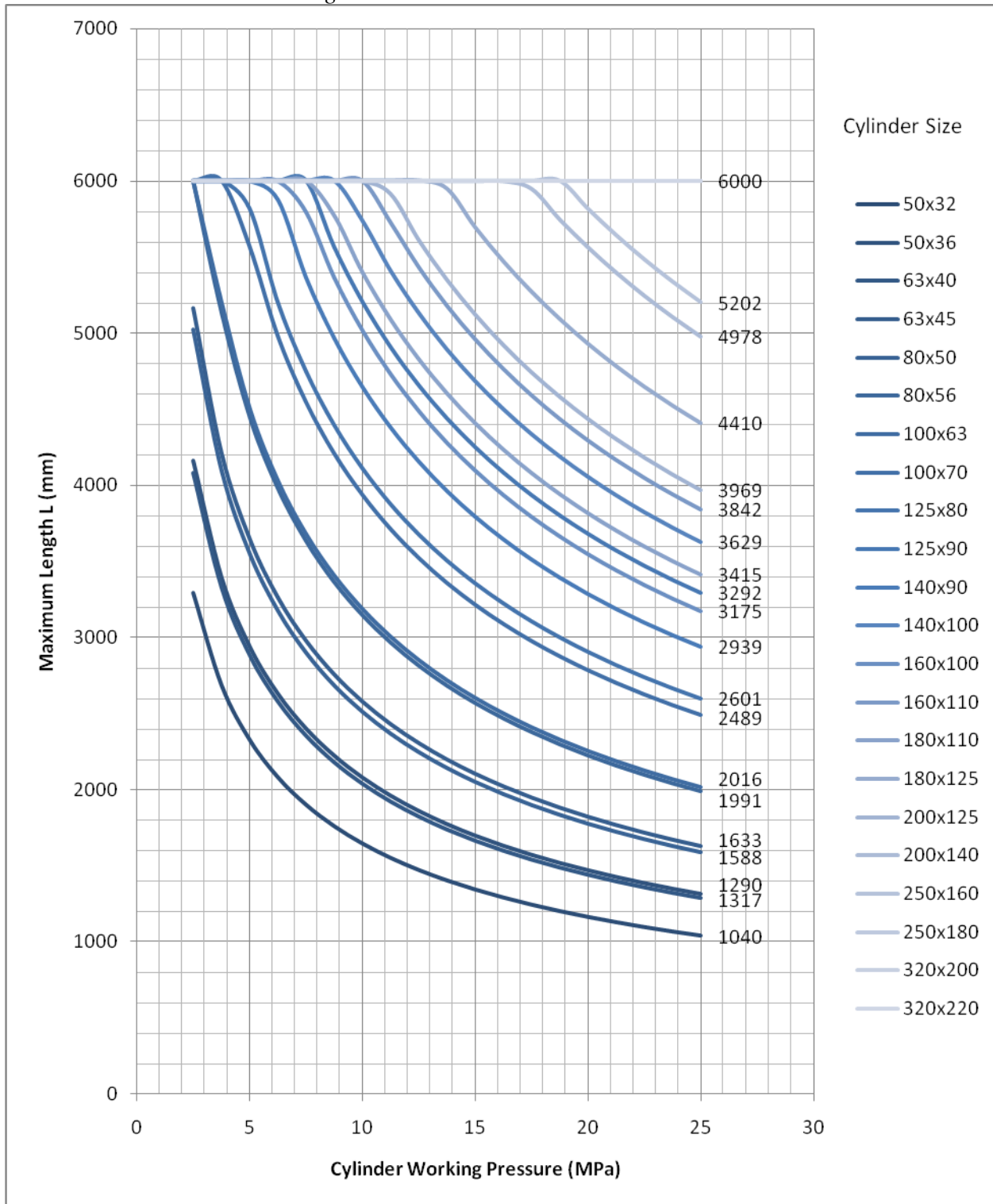
Figure II : Fixed at base with Free End





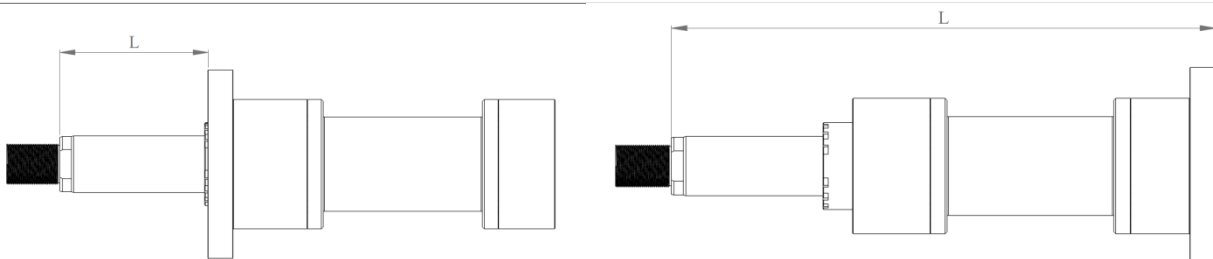
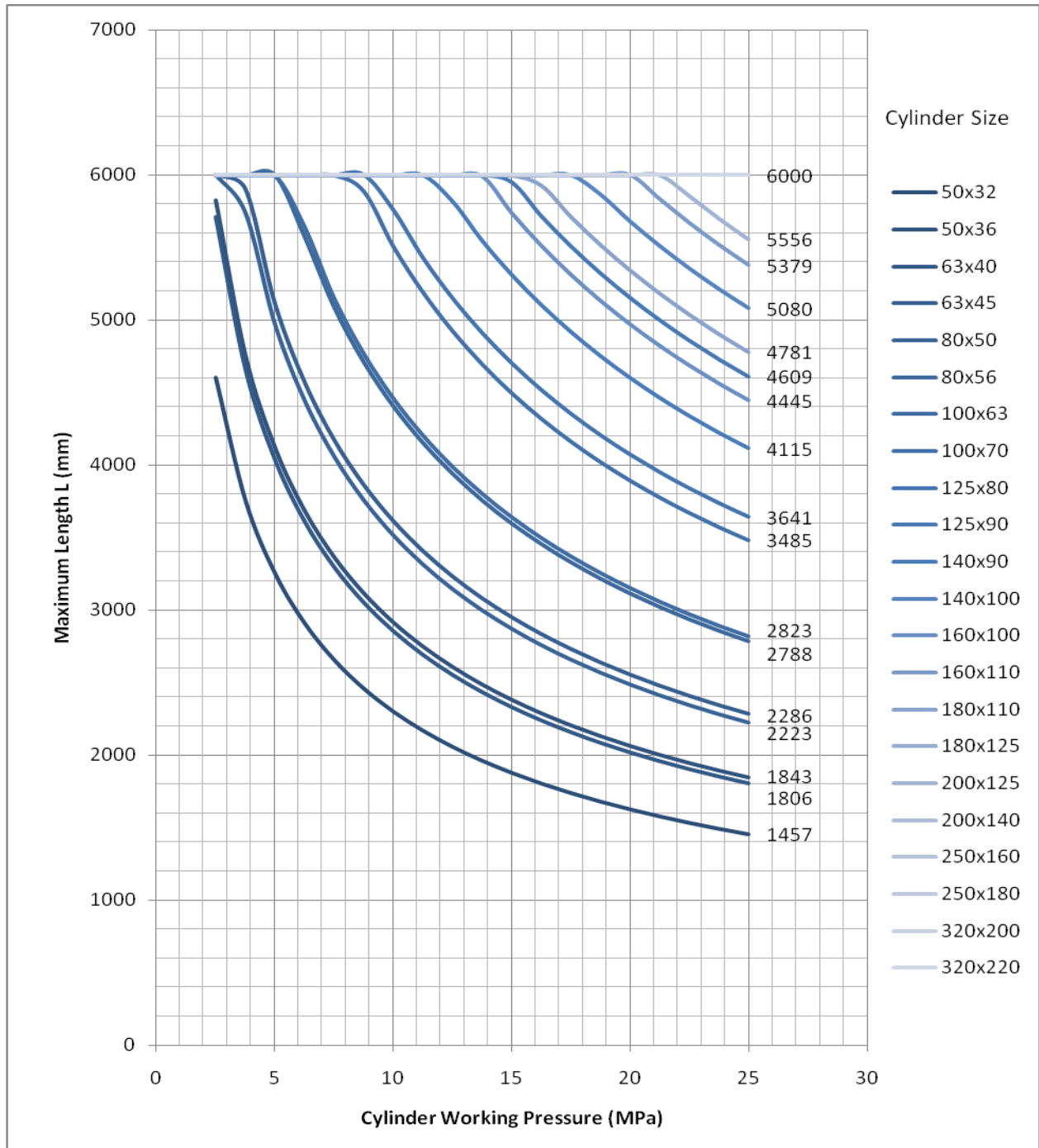
11.2.3 Fixed Base With Pinned End

Figure III : Fixed at base with Pinned End



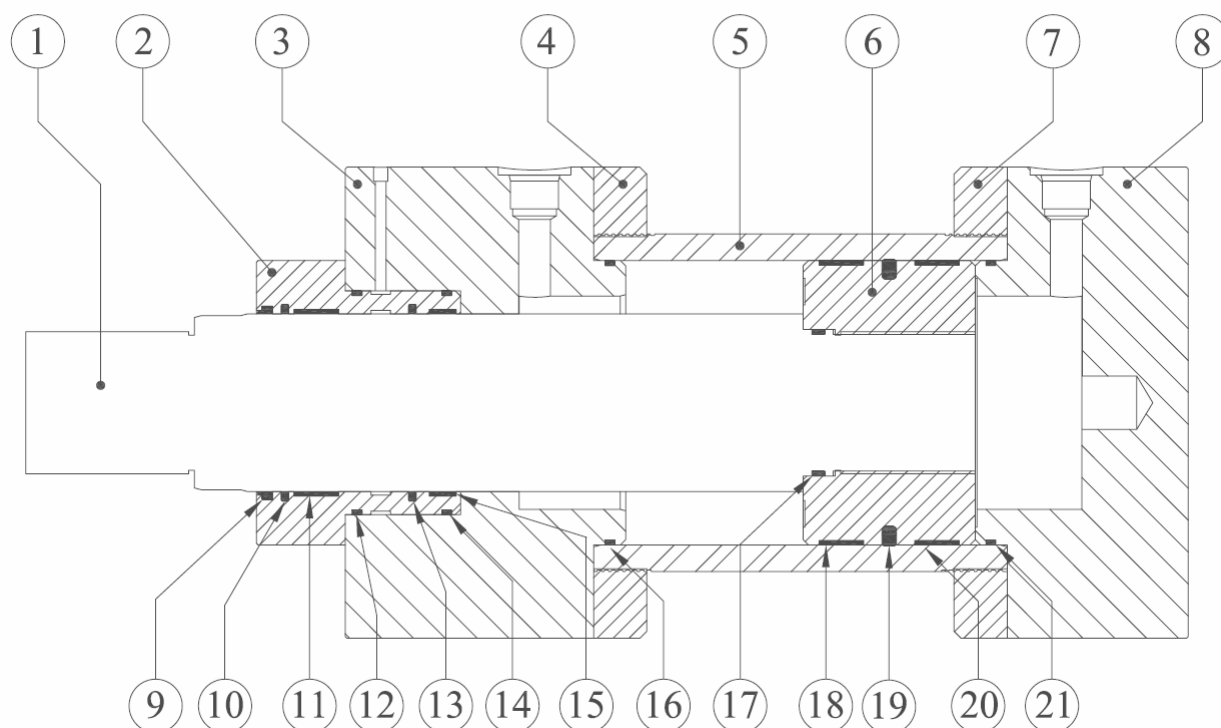
11.2.4 Fixed Base With Fixed End

Figure IV : Fixed at base with Fixed End



12 Maintenance Data

Typical plain cylinder section



Item	Description	Material	Item	Description	Material
1	Piston rod	Steel / Stainless steel	12	“O” ring seal	Nitrile
2	Rod guide ring bush cartridge	Cast iron	13	Rod seal	PTFE / Nitrile
3	Head cap	Steel	14	“O” ring seal	Nitrile
4	Barrel ring	Steel	15	Guide ring	PTFE
5	Barrel	Steel	16	“O” ring seal	Nitrile
6	Piston	Steel	17	“O” ring seal	Nitrile
7	Barrel ring	Steel	18	Wear strip	PTFE
8	End cap	Steel	19	Piston seal	Polyurethane / Nitrile
9	Wiper	Nitrile + PTFE	20	Wear strip	PTFE
10	Rod seal	Nitrile	21	“O” ring seal	Nitrile
11	Guide ring	PTFE			



12.1 Cylinder Maintenance

12.1.1 General Considerations

- Disassemble the cylinder in a clean location
- Dismantled parts should be cleaned and covered in a protected area.
- Avoid using installation tools with sharp edges and burrs.
- Parts should be lubricated prior to assembly
- Extra cautions should be taken when seal is forced over sharp edges, slots and undercuts.

12.1.2 Replacement of Rod Cartridge Seals

- Put the cylinder in a fully retracted position.
- Release any oil pressure in the cylinder.
- Remove the socket head screws from the rod guide ring bush cartridge (ITEM 2), slowly remove the rod guide ring bush cartridge.
- Clean all the cartridge recesses in the rod guide ring bush cartridge. Fit new rod seals, wiper, “O” ring seals and guide rings.
- Lubricate the inside of the rod cartridge and the outside of the new cartridge prior to assembly.
- Replace the socket head screws and tighten it to the specified torque¹⁰ according to the cylinder size.

¹⁰ Refer to table III on page 23 for bolt torque values.

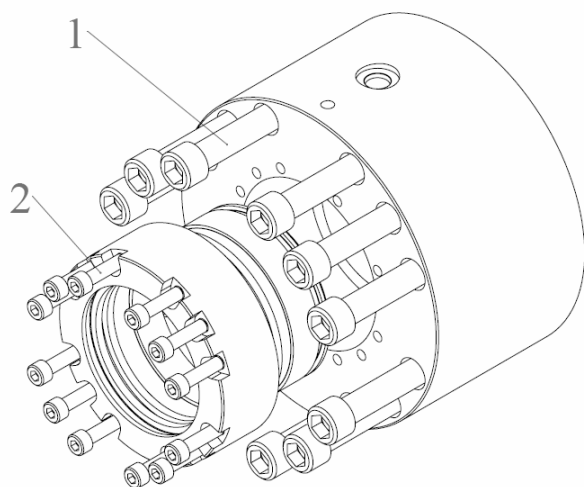


12.1.3 Replacement of Tube Seals

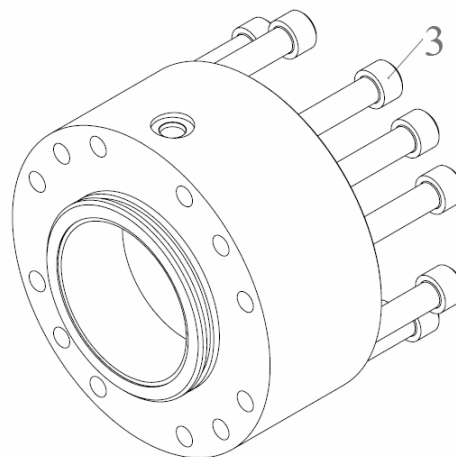
- Put the cylinder in a fully retracted position
- Release any oil pressure in the cylinder
- Remove the socket head screws from the rod guide ring bush cartridge (ITEM 2), slowly remove the rod guide ring bush cartridge
- Remove the socket head screws from the head cap (ITEM 3), slowly remove the head cap
- Remove piston rod (ITEM 1) from the tube.
- Remove the socket head screws from the end cap (ITEM 8), slowly remove the end cap
- Discard used seals and clean all parts thoroughly, including inside of tube and grooves in head and cap.
- Fit new seals, wear strips and “O” ring seals.
- Lubricate the inside of the rod cartridge and the outside of the new cartridge prior to assembly.
- Replace all the socket head screws and tighten it to the specified torque¹¹ according to the cylinder size.

¹¹ Refer to table III on page 23 for bolt torque values.

12.2 Bolt torque



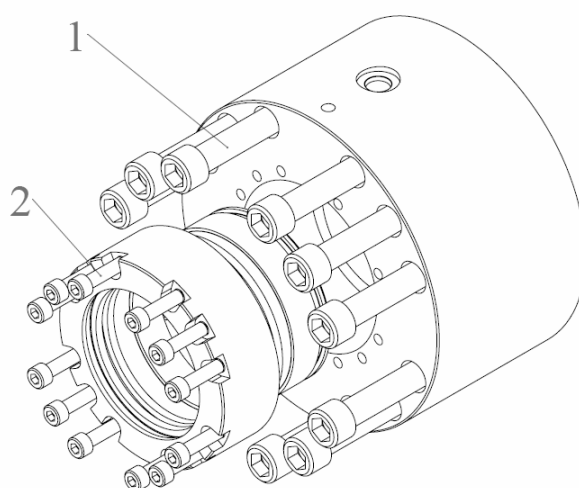
Head cap and rod guide ring bush cartridge
(Item 2 and item 3)



End cap (Item 8)

Bolt positions 1 and 3

Cylinder Bore Ø	Rod Ø MM	Screw	Quantity	Tightening torque
50	32	M6	8	16 Nm
	36			
63	40	M8	8	39 Nm
	45			
80	50	M10	8	77 Nm
	56			
100	63	M10	12	77 Nm
	70			
125	80	M12	12	135 Nm
	90			
140	90	M12	12	135 Nm
	100			
160	100	M16	12	330 Nm
	110			
180	110	M16	16	330 Nm
	125			
200	125	M20	12	650 Nm
	140			
250	160	M24	12	1109 Nm
	180			
320	200	M30	12	2250 Nm
	220			



Head cap and rod guide ring bush cartridge
(Item 2 and item 3)

Bolt position 2

Cylinder Bore Ø	Rod Ø MM	Screw	Quantity	Tightening torque
50	32	M5	8	9.5 Nm
	36			
63	40	M5	12	9.5 Nm
	45			
80	50	M6	12	16 Nm
	56			
100	63	M8	8	39 Nm
	70			
125	80	M8	12	39 Nm
	90			
140	90	M10	12	77 Nm
	100			
160	100	M10	12	77 Nm
	110			
180	110	M12	12	135 Nm
	125			
200	125	M12	12	135 Nm
	140			
250	160	M16	12	330 Nm
	180			
320	200	M20	12	650 Nm
	220			