



R1 42 01 06 Tata Steel Technical Directive

Hydraulic directive for suppliers, assembly
companies, managers and users
Part 6: Selection cylinders and hydraulic motors

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Information and modifications:

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6. INTRODUCTION

Cylinders and hydraulic motors are the force-providing elements of a hydraulic drive. These are usually heavily taxed. Therefore they are standardized on industrial heavy duty cylinders of well known manufacturers. In their use possible pressure multiplication in the cylinder must be taken into account as a result of surface area differences and application of a discharge throttle. This gives us a predictable quality and life expectancy. If Deviated from this directive detailed design information is required to determine whether a comparable level of quality can be achieved..

6.1. Cylinders PN160

6.1.1. Scope and application

Double acting cylinders with a nominal pressure of 160 bar, with a flanged joint on the bottom side and rod side till 200mm (for larger sizes in consultation with the hydraulics project-engineer). The cylinders must be suitable for mineral oil and shall be provided with end position cushioning on both ends.

Cylinder ports in accordance to ISO 228/1 BSP female.

For installation (see section 6.1.3) the choice includes:

- oscillating suspension (eye-eye)
- trunnion mounting suspension

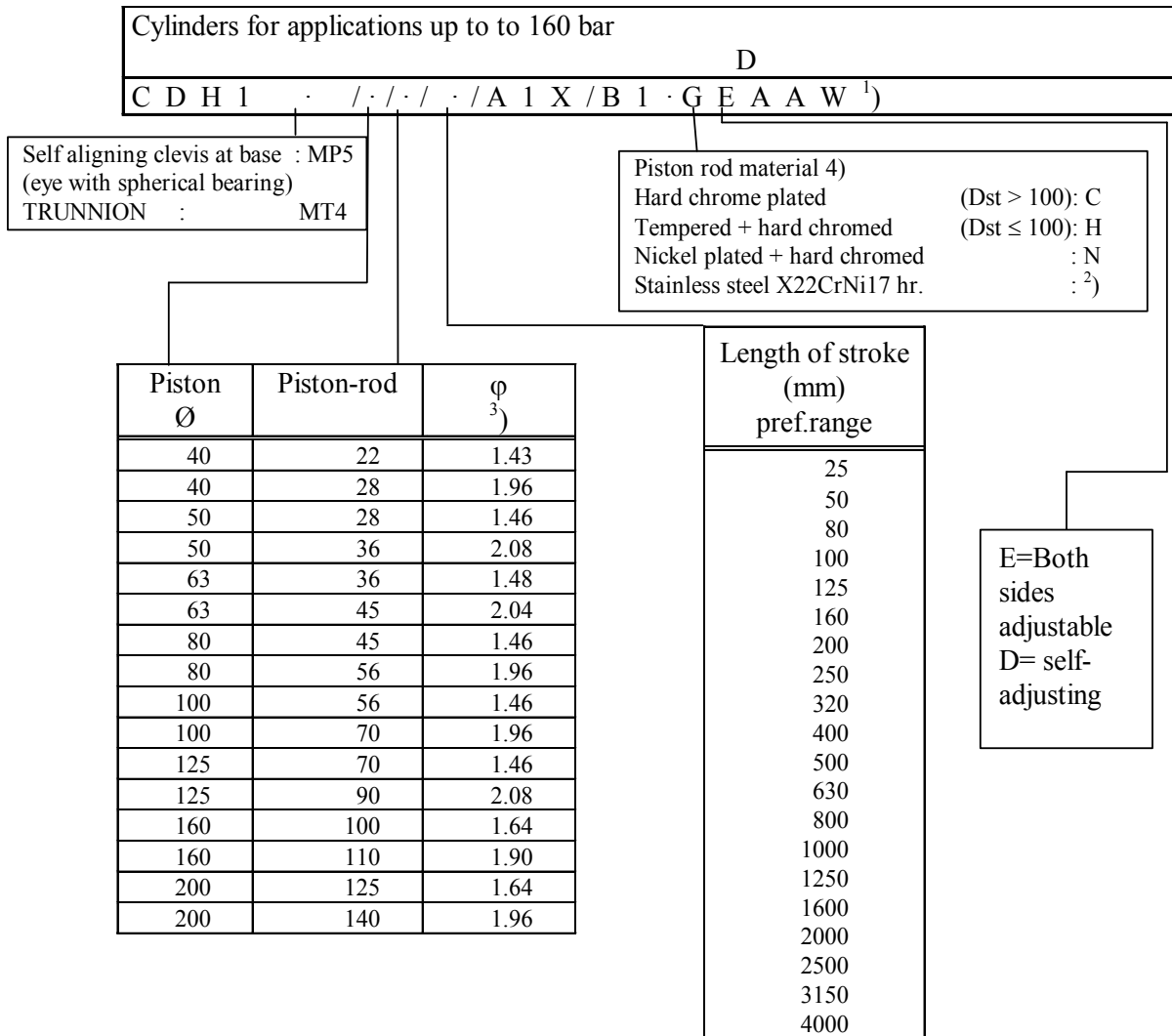
In Related to the extensive use of discharge throttles the cylinders **must not be taxed above 160 bar.**

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6.1.2. Manufactures

Manufacturer Rexroth

Sizes in mm



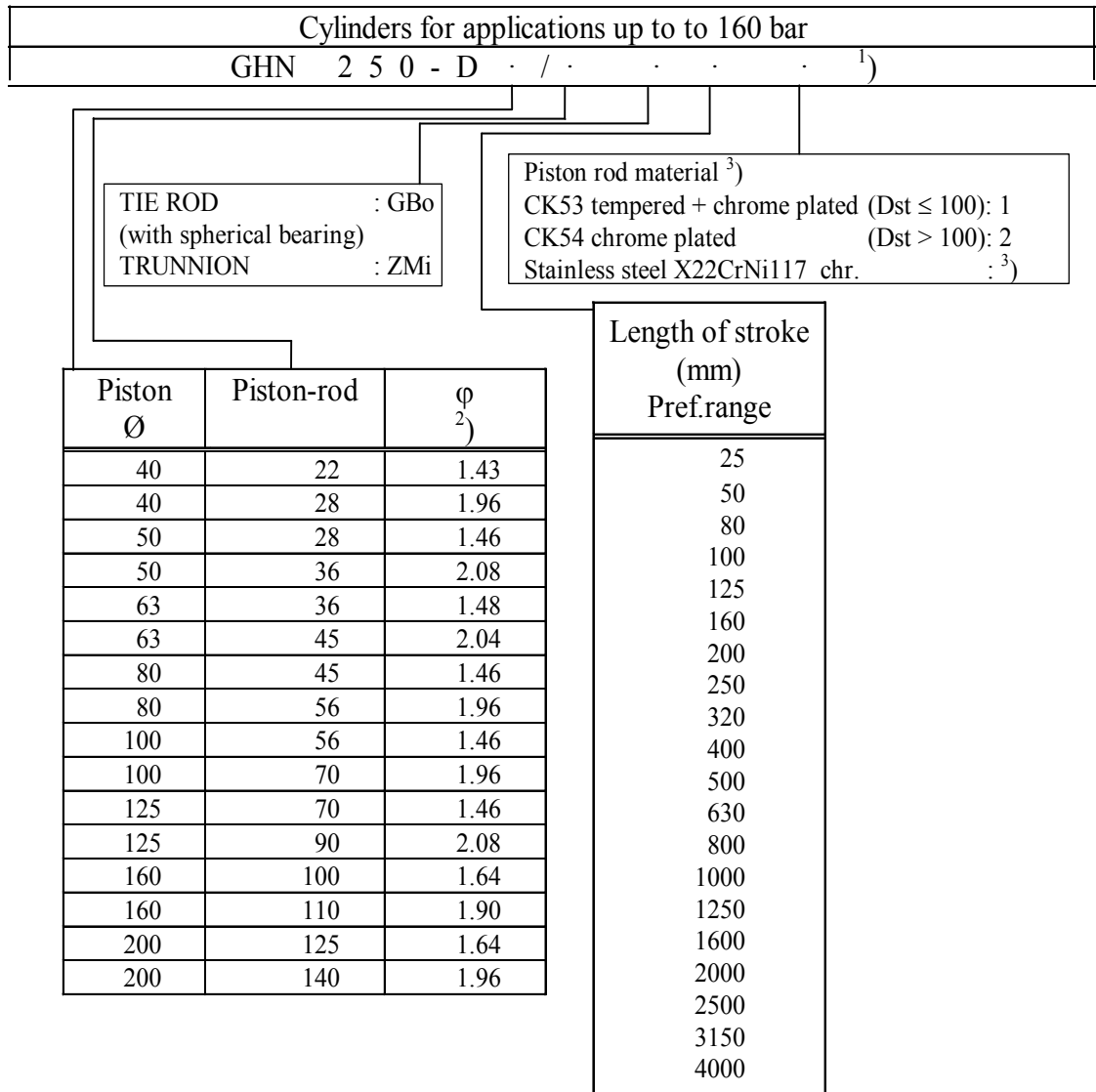
1. When implementing the MT4 Trunnion it is normally mounted at the centre of the cylinder. If this does not work, then the sizes XV are added and the W changed in V, for example. CDH1 V, XV = mm
2. When a stainless steel rod is required, the letter is for the rod material will be X, with "D46" at the end.
3. φ (Phi) represents Piston surface/ring surface.
4. Code C or H for low; N for average and X22CrNi17 for a high corrosive environment.
5. The code E stands for adjustable buffers on both sides. Only apply Self-adjusting buffers after consultation with a hydraulic expert.

Manufacturer Glückauf

Details:

- chevron seals
- order number is without eye rod
- Adjustable end cushioning

Ordering details with a choice out of the appropriate tables



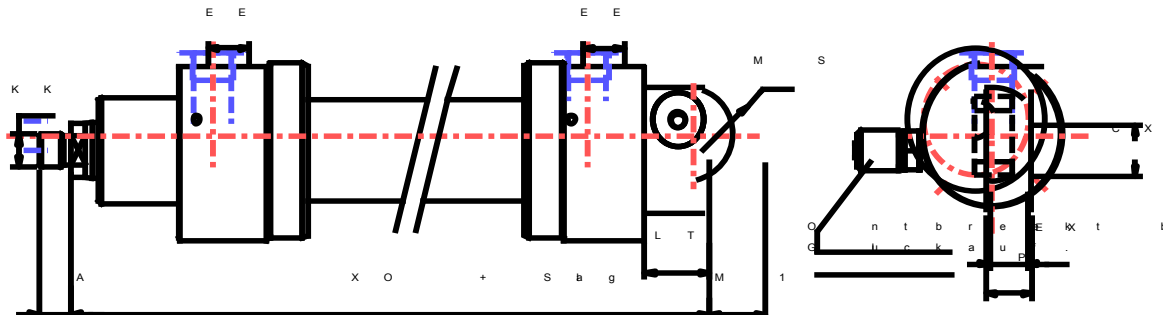
- 1) When implementing ZMI the size L9 should be added after the order number, eg. 250-D, L9 = mm (see dimensions).
- 2) φ (Phi) represents Piston surface/ring surface.
- 3) Code 1 or 2 for low and 3 for a high corrosive environment.

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6.1.3. Design /dimensions

Oscillating cylinder with eye at base

Figure 6.1



(Figure 6.1 Ontbreekt bij Gluckauf = missing in Gluckauf)

Table 6.1 Manufacturer Rexroth

Sizes in mm

Dz ø	XO	LT	M1	A	KK	EP)	EX)	CX)**)	MS	EE BSP
40	252	32.5	28	16	M16 x1.5	23	20	25	31	1/2"
50	265	37.5	32.5	22	M22 x 1.5	28	22	30	36	1/2"
63	302	45	40	28	M28 x 1.5	30	25	35	42	3/4"
80	330	50	50	35	M35 x 1.5	35	28	40	52	3/4"
100	385	60	62.5	45	M45 x 1.5	40	35	50	65	1 "
125	447	70	70	58	M58 x 1.5	50	44	60	70	1 1/4"
160	550	85	95	80	M80 x 2	60	55	80	95	1 1/2"
200	645	115	125	110	M110 x 2	70	70	100	125	1 1/2"

*) Tolerances according to manufacturer's documentation.

**) Shaft tolerance m6.

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Table 6.2 Manufacturer Glückauf

Sizes in mm

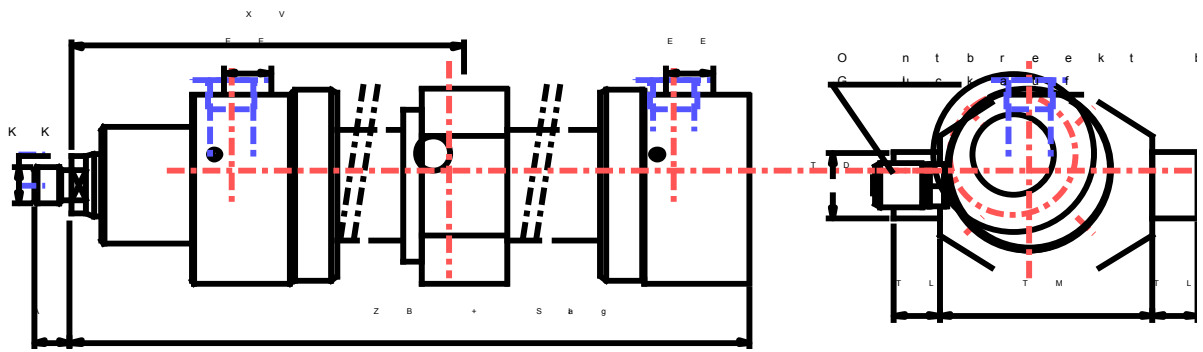
Dz ø	XO	LT	M1	A	KK	EP)	EX)	CX ***)	MS	EE BSP
40	249	30	27.5	16	M16 x 1.5	23	20	25	27.5	1/2"
50	263	35	32.5	22	M22 x 1.5	28	22	30	32.5	1/2"
63	302	45	41.5	28	M28 x 1.5	30	25	35	41.5	3/4"
80	325	50	50	35	M35 x 1.5	35	28	40	50	3/4"
100	380	60	61.5	45	M45 x 1.5	40	35	50	61.5	1 "
125	447	70	70	58	M58 x 1.5	50	44	60	65	1 1/4"
160	550	85	95	80	M80 x 2	60	55	80	88	1 1/2"
200	645	115	125	110	M110 x 2	70	70	100	115	1 1/2"

***) Shaft tolerance j6.

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Cylinder with trunnion

Figure 6.2



(Figure 6.2 Ontbreekt bij Gluckauf = missing in Gluckauf)

Table 6.3 Manufacturer Rexroth

Sizes in mm

Dz ø	ZB	XV *)			KK	A	TM h13	TL jsl6	TD e8	EE BSP
		a	b	c						
40	226	139	150	136	M16 x1.5	16	95	20	30	1/2"
50	234	147	163	140	M22 x 1.5	22	115	20	30	1/2"
63	262	166.5	190	155	M28 x 1.5	28	130	20	35	3/4"
80	280	177	206	160	M35 x 1.5	35	145	25	40	3/4"
100	330	209.5	249	185	M45 x 1.5	45	175	30	50	1 "
125	382	237.5	283	207	M58 x 1.5	58	210	40	60	1 1/4"
160	475	305	376	254	M80 x 2	80	275	52.5	75	1 1/2"
200	535	344	441	267	M110 x 2	110	320	55	90	1 1/2"

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Table 6.4 Manufacturer Glückauf

Sizes in mm

Dz ø	ZB	XV *)			KK	A	TM	TL	TD e8	EE BSP
		a	b	c						
40	227	136	150	123	M16 x 1.5	16	95	20	30	1/2"
50	238	143.5	154	132	M22 x 1.5	22	115	20	30	1/2"
63	269	162	175	149	M28 x 1.5	28	130	20	35	3/4"
80	287	170	190	150	M35 x 1.5	35	145	25	40	3/4"
100	336	201	225	180	M45 x 1.5	45	175	30	50	1 "
125	397	237	265	209	M58 x 1.5	58	210	40	60	1 1/4"
160	492	292.5	325	260	M80 x 2	80	275	52.5	75	1 1/2"
200	560	332.5	365	300	M110 x 2	110	320	55	90	1 1/2"

*) XV (L9 by Glückauf):

XV/L9 normal = a + half stroke

XV/L9 minimal = b

XV/L9 maximum = c + full stroke.

In case of deviation from size XV normal (a + half stroke) the correct size must be taken into account for XV minimum and maximum and to be specified.

With Glückauf the size L9 should always be indicated!

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Rod eye with spherical plain bearing

Figure 6.3

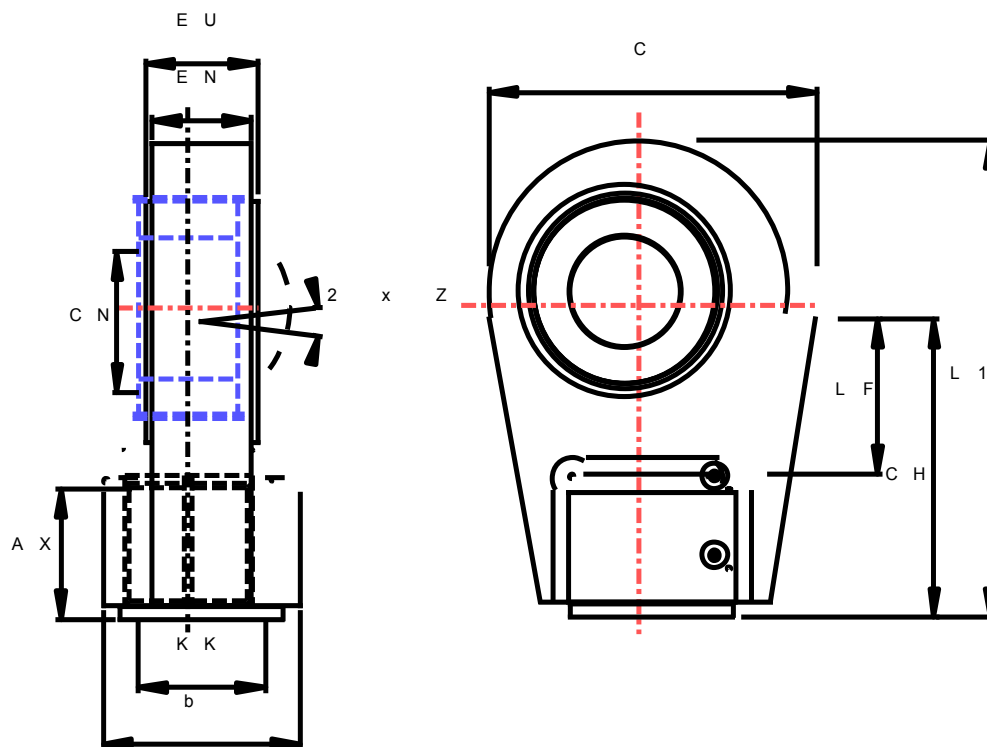


Table 6.5

Sizes in mm

Dz ø	EU -0.4	EN **)	b ø	KK	CN*) ø**)	CH	LF	L1	C	AX	z ø
40	23	20	28	M16 x 1.5	25	50	25	80	56	17	8
50	28	22	34	M22 x 1.5	30	60	30	94	64	23	7
63	30	25	44	M28 x 1.5	35	70	40	112	78	29	7
80	35	28	55	M35 x 1.5	40	85	45	135	94	36	7
100	40	35	70	M45 x 1.5	50	105	55	168	116	46	7
125	50	44	87	M58 x 1.5	60	130	65	200	130	59	7
160	60	55	125	M80 x 2	80	170	80	265	176	81	6
200	70	70	153	M110 x 2	100	235	105	360	230	111	7

*) Shaft tolerance m6.

***) Tolerances according to manufacturer's documentation.

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Table 6.6

Dz. \varnothing	Type Rexroth	Type Glückauf
40	CGAK 16	GA 16 K
50	CGAK 22	GA 22 K
63	CGAK 28	GA 28 K
80	CGAK 35	GA 35 K
100	CGAK 45	GA 45 K
125	CGAK 58	GA 58 K
160	CGAK 80	GA 80 K
200	CGAK 110	GA 110 K

Note: These rod ends are fitted with a grease nipple in accordance with DIN 71412 Form A.

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6.2. Cylinders PN 250

6.2.1. *Scope and application*

Double acting cylinders with flange mounts to bottom and rod side and piston diameters up to 200 mm, (larger diameters only in consultation with the hydraulics project-engineer). The cylinders must be suitable for mineral oil and shall be provided with end position cushioning on both ends.

For installation (See section 6.2.3) the choices include:

- oscillating model (eye-eye)
- trunnion mounting.

In connection with the frequent application of discharge throttle the cylinders **should not be taxed higher than 250 bar.**

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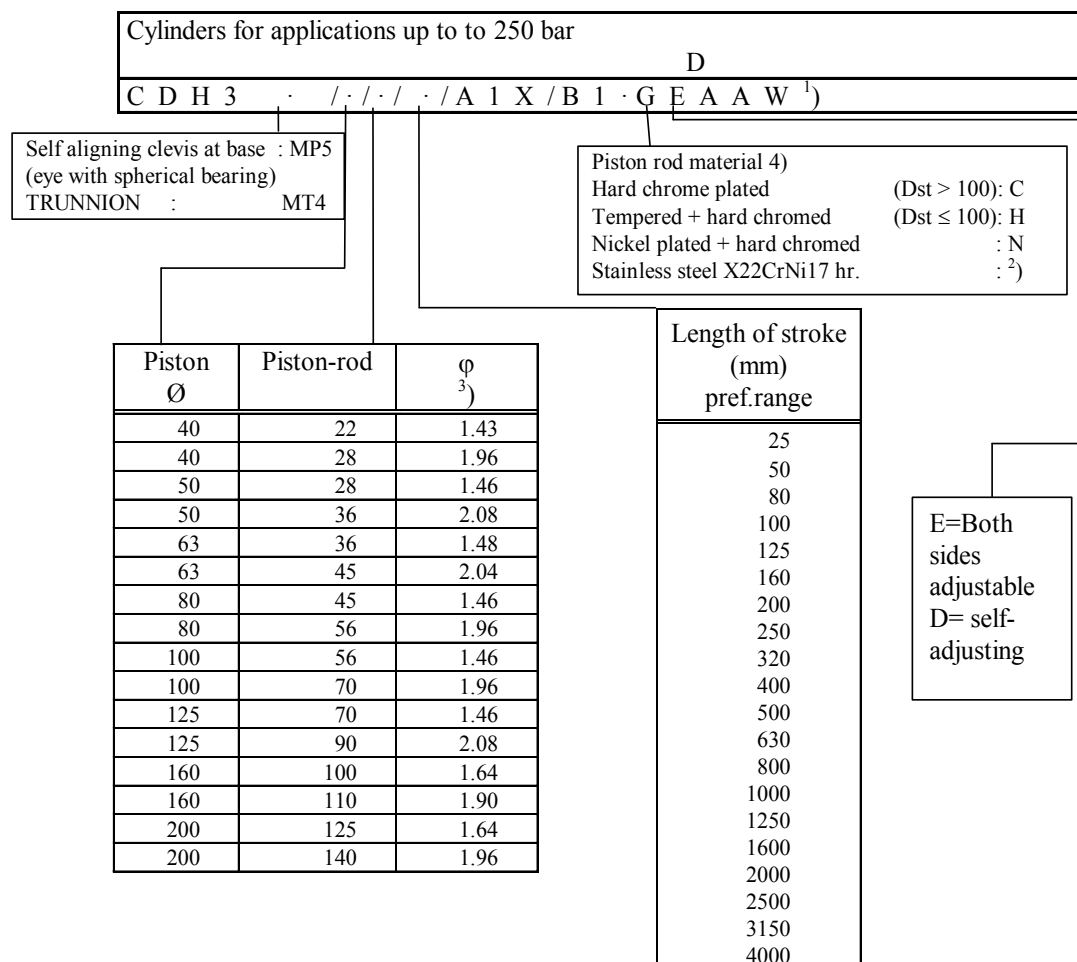
6.2.2. Manufactures

Manufacture Rexroth

Details:

- de-aeration test points on both sides
- chevron seals
- ordering number is without rod head
- self adjusting cushioning.

Ordering specifications according to the following tables.



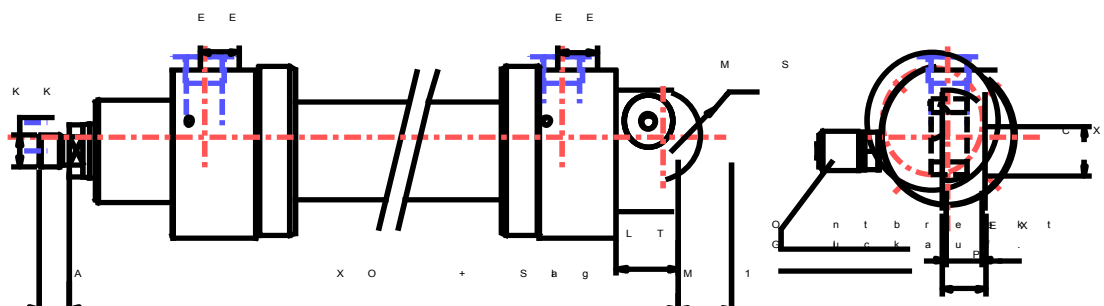
- 1) When implementing the MT4 Trunnion it is normally mounted at the centre of the cylinder. If this does not work, then the sizes XV are added and the W changed in V, for example. CDH3 V, XV = mm
- 2) When a stainless steel rod is required, the letter is for the rod material will be X, with "D46" at the end.
- 3) φ (Phi) represents Piston surface/ring surface.
- 4) Code C or H for low; N for average and X22CrNi17 for a high corrosive environment.

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6.2.3. Design /dimensions

Oscillating cylinder with eye at base

Figure 6.4



(Figure 6.4 Ontbreekt bij Gluckauf= missing in Gluckauf)

Table 6.7 Manufacture Rexroth

Sizes in mm

Dz ø	XO	LT	M1	A	KK	EP*)	EX*)	CX **)	MS	EE BSP
63	330	50	50	35	M35 x 1.5	35	28	40	50	3/4"
80	355	55	62.5	45	M45 x 1.5	40	35	50	55	3/4"
100	390	65	70	58	M58 x 1.5	50	44	60	65	1 "
125	495	75	82	65	M65 x 1.5	55	49	70	75	1 1/4"
160	600	90	113	100	M100 x 2	65	60	90	90	1 1/2"
200	710	115	142.5	120	M120 x 3	80	70	110	115	1 1/2"

Table 6.8 Manufacture Glückauf

Sizes in mm

Dz ø	XO	LT	M1	A	KK	EP*)	EX*)	CX ***)	MS	EE BSP
63	330	50	50	35	M35 x 1.5	35	28	40	47	3/4"
80	355	55	63	45	M45 x 1.5	40	35	50	58	3/4"
100	390	65	70	58	M58 x 1.5	50	44	60	65	1 "
125	495	75	82	65	M65 x 1.5	55	49	70	77	1 1/4"
160	600	90	113	100	M100 x 2	65	60	90	103	1 1/2"
200	710	115	142.5	120	M120 x 3	80	70	110	132.5	1 1/2"

*) Tolerances according to manufacturer's documentation.

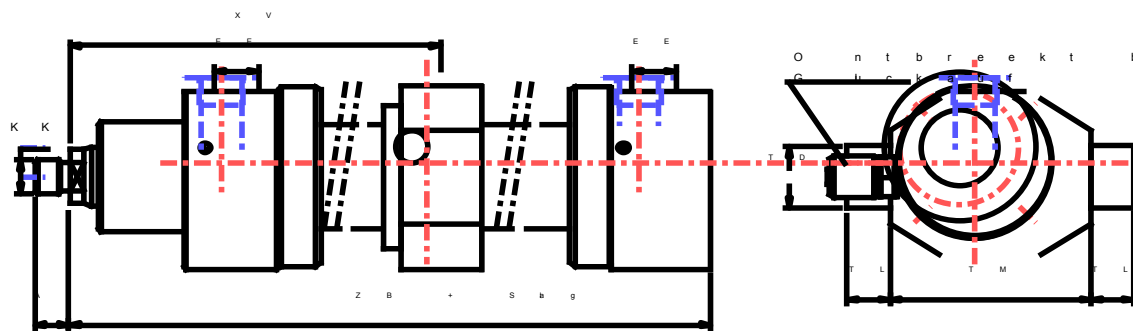
**) Shaft tolerance m6.

***) Shaft tolerance j6.

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Cylinder with trunnion mounting

Figure 6.5



(Figure 6.5 Ontbreekt bij Gluckauf = missing in Gluckauf)

Table 6.9 Manufacturer Rexroth

Sizes in mm

Dz ø	ZB	XV *)			KK	A	TM h13	TL jsl6	TD e8	EE BSP
		a	b	c						
63	285	183.5	215	163.5	M35 x 1.5	35	150	35	45	3/4"
80	305	197	238	168	M45 x 1.5	45	160	50	55	3/4"
100	330	204.5	259	165	M58 x 1.5	58	200	55	60	1 "
125	425	272.5	338	222	M65 x 1.5	65	245	60	75	1 1/4"
160	515	330	423	257	M100 x 2	100	300	80	95	1 1/2"
200	600	401	515	307	M120 x 3	120	360	100	125	1 1/2"

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Table 6.10 Manufacturer Glückauf

Sizes in mm

Dz ø	ZB	XV *)			KK	A	TM	TL	TD	EE BSP
		a	b	c						
63	296	172.5	215	130	M35 x 1.5	35	150	35	45	3/4"
80	316	187.5	245	130	M45 x 1.5	45	160	50	55	3/4"
100	345	202	260	145	M58 x 1.5	58	200	55	60	1 "
125	444	260	325	195	M65 x 1.5	65	245	60	75	1 1/4"
160	537	320	385	255	M100 x 2	100	300	80	95	1 1/2"
200	628	375	450	300	M120 x 3	120	360	100	125	1 1/2"

*) XV (L9) by Glückauf:

XV/L9 normal = a + half stroke

XV/L9 minimal = b

XV/L9 maximal = c + full stroke

In case of deviation from size XV normal (a + half stroke) the correct size must be taken into account for XV minimum and maximum and to be specified.

With Glückauf the size L9 should always be indicated!

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Rod end with spherical bearing

Figure 6.6

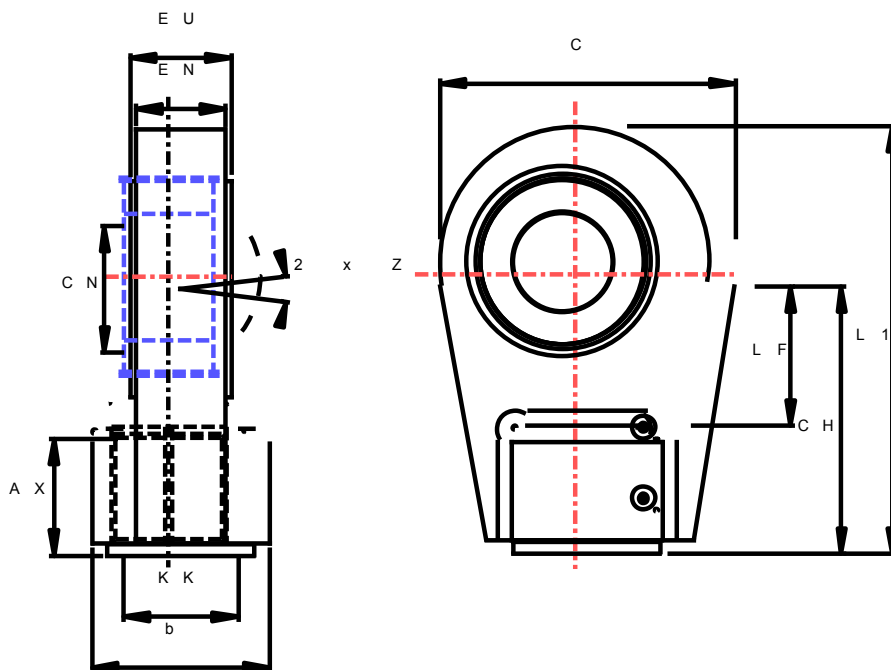


Table 6.11

Sizes in mm

Dz ø	EU -0.4	EN **)	b ø	CN*) ø**)	KK	CH	LF	L1	C	AX	Z ø
63	35	28	55	40	M35 x 1.5	85	45	135	94	36	7
80	40	35	70	50	M45 x 1.5	105	55	168	116	46	7
100	50	44	87	60	M58 x 1.5	130	65	200	130	59	7
125	60	49	93	70	M65 x 1.5	150	75	232	144	66	7
160	70	60	143	90	M100 x 2	210	90	323	206	101	7
200	80	70	176	110	M120 x 3	265	115	407.5	265	125	7

*) Shaft tolerance m6

**) Tolerances according to manufacturer's documentation

Table 6.12

Dz ø	Type Rexroth	Type Glückauf
63	CGAK 35	GA 35 K
80	CGAK 45	GA 45 K
100	CGAK 58	GA 58 K
125	CGAK 65	GA 65 K
160	CGAK 100	GA 100 K
200	CGAK 120	GA 120 K

Remark:

These rod ends are fitted with a grease nipple in accordance with DIN 71412 Form. A.

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6.3. Hydro Motors, scope and application

For the application of hydraulic motors, efficiency, break out torque ratio, radial load, and dynamic properties are more important than catalogue values with regard to torque moment, pressure, and rotational speed. The selection should therefore always take place by mutual agreement between the supplier and the involved hydraulic engineer.

The following manufactures are already in use at Tata Steel and are therefore preferable:

- Vane motors: ATE
- Gear motors (gerotor principle): Danfoss
- Axial piston motors: Rexroth Hydromatik
- Radial piston motors: Hägglunds, Düsterloh

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6.4. References

References in this Technical Directive to DIN 71412 Form A.

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6.5. Explanation

Version 1.0:

This document is part of the Hydraulics directive for suppliers, installers, administrators and users and consists of 10 parts.

This document replaces the old HO-standard Hydraulics in the series 42.00

Version 2.0:

Various editorial and layout modifications.

Version 2.1:

Several minor modifications.

Version 3.0:

Completely revised

Version 3.1;

Coding in CDH1 and CDH 3 changed to manual adjustable buffers.

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