
**Hydraulic fluid power — Mounting
dimensions for single rod cylinders,
25 MPa (250 bar) series**

*Transmissions hydrauliques — Dimensions d'interchangeabilité des
vérins 25 MPa (250 bar) à simple tige*



Reference number
ISO 6022:2006(E)

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6022 was prepared by Technical Committee ISO/TC 131, *Fluid power systems*, Subcommittee SC 3, *Cylinders*.

This second edition cancels and replaces the first edition (ISO 6022:1981 and ISO 8137:1986), which have been technically revised.

Introduction

In hydraulic fluid power systems, power is transmitted and controlled through a liquid under pressure within an enclosed circuit.

One component of such systems is the fluid power cylinder. This is a device that converts power into linear mechanical force and motion. It consists of a movable element, i.e. a piston and piston rod, operating within a cylindrical bore.

Hydraulic fluid power — Mounting dimensions for single rod cylinders, 25 MPa (250 bar) series

1 Scope

This International Standard establishes mounting dimensions for hydraulic cylinders for use at 25 MPa [250 bar¹⁾], as required for interchangeability of these cylinders.

NOTE This International Standard allows manufacturers of hydraulic equipment flexibility in the design of 25 MPa (250 bar) cylinders and does not restrict technical development; however, it does provide basic guidelines.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1179-1²⁾, *Connections for general use and fluid power — Ports and stud ends with ISO 228-1 threads with elastomeric or metal-to-metal sealing — Part 1: Threaded ports*

ISO 3320, *Fluid power systems and components — Cylinder bores and piston rod diameters — Metric series*

ISO 4395, *Fluid power systems and components — Cylinders — Piston rod thread dimensions and types*

ISO 5598³⁾, *Fluid power systems and components — Vocabulary*

ISO 6099, *Fluid power systems and components — Cylinders — Identification code for mounting dimensions and mounting types*

ISO 6149-1⁴⁾, *Connections for fluid power and general use — Ports and stud ends with ISO 261 threads and O-ring sealing — Part 1: Ports with O-ring seal in truncated housing*

ISO 6162-1, *Hydraulic fluid power — Flange connectors with split or one-piece flange clamps and metric or inch screws — Part 1: Flange connectors for use at pressures of 3,5 MPa (35 bar) to 35 MPa (350 bar), DN 13 to DN 127*

ISO 6162-2, *Hydraulic fluid power — Flange connectors with split or one-piece flange clamps and metric or inch screws — Part 2: Flange connectors for use at pressures of 35 MPa (350 bar) to 40 MPa (400 bar), DN 13 to DN 51*

1) 1 bar = 0,1 MPa = 10⁵ Pa; 1MPa = 1 N/mm²

2) To be published. (Revision of ISO 1179:1981)

3) To be published. (Revision of ISO 5598:1985)

4) To be published. (Revision of ISO 6149-1:1993)

ISO 6022:2006(E)

ISO 6164, *Hydraulic fluid power — Four-screw, one-piece square-flange connections for use at pressures of 25 MPa and 40 MPa (250 bar and 400 bar)*

ISO 8132⁵⁾, *Hydraulic fluid power — Single rod cylinders, 16 MPa (160 bar) medium and 25 MPa (250 bar) series — Mounting dimensions for accessories*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5598 apply.

4 Dimensions

4.1 Select mounting dimensions for cylinders manufactured in accordance with this International Standard from Figures 1 to 4 and Tables 1 to 4 inclusive.

4.2 Select dimensions for ports and flanges from Table 5 and the relevant International Standards cited therein.

4.3 All dimensions and mounting types in this International Standard are labelled with codes in accordance with ISO 6099.

5 Bore sizes

This International Standard covers the following bore sizes, in millimetres, in accordance with ISO 3320:

50 — 63 — 80 — 100 — 125 — 140 — 160 — 180 — 200 — 250 — 320

6 Mounting types

This International Standard includes the following mounting types:

- MF3: Head, circular flange (see Figure 2 and Table 2)
- MF4: Cap, circular flange (see Figure 2 and Table 2)
- MP3: Cap, fixed plain eye (see Figure 3 and Table 3)
- MP4: Cap, detachable plain eye (see Figure 3 and Table 3)
- MP5: Cap, fixed eye with spherical bearing (see Figure 3 and Table 3)
- MP6: Cap, detachable eye with spherical bearing (see Figure 3 and Table 3)
- MT4: Intermediate fixed or movable trunnion (male) (see Figure 4 and Table 4).

5) To be published. (Revision of ISO 8132:1986, ISO 6981:1992 and ISO 6982:1992)

7 Piston rod characteristics

7.1 This International Standard covers piston rods having a shouldered male thread end (see Figure 1 and Table 1 for basic dimensions).

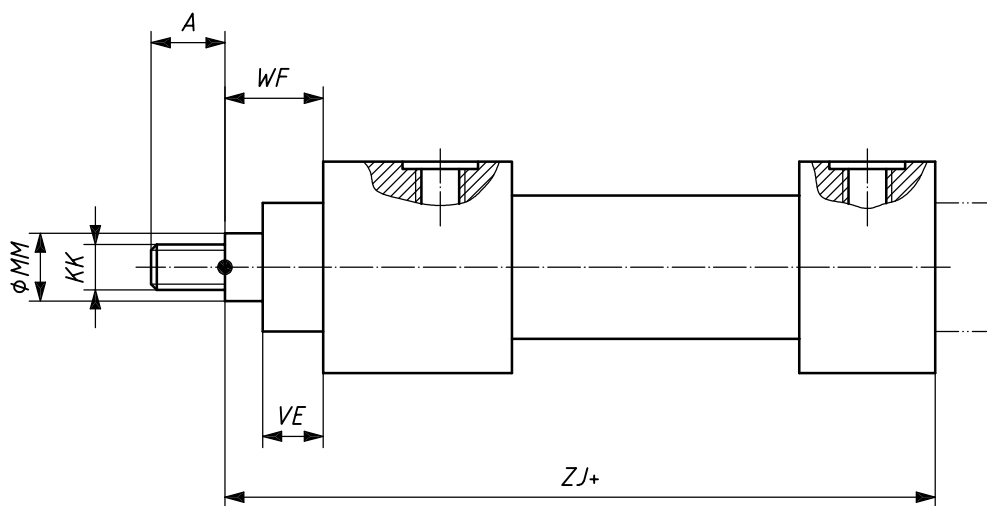
7.2 For rod end types, see ISO 4395.

7.3 Accessory mounting dimensions shall be selected in accordance with ISO 8132.

8 Identification statement (reference to this International Standard)

Use the following statement in test reports, catalogues and sales literature when electing to comply with this International Standard:

“Hydraulic single rod cylinders for use at 25 MPa (250 bar) selected in accordance with ISO 6022:2006, Hydraulic fluid power — Mounting dimensions for single rod cylinders, 25 MPa (250 bar) series.”



For rod end types, see ISO 4395.

Figure 1 — General dimensions

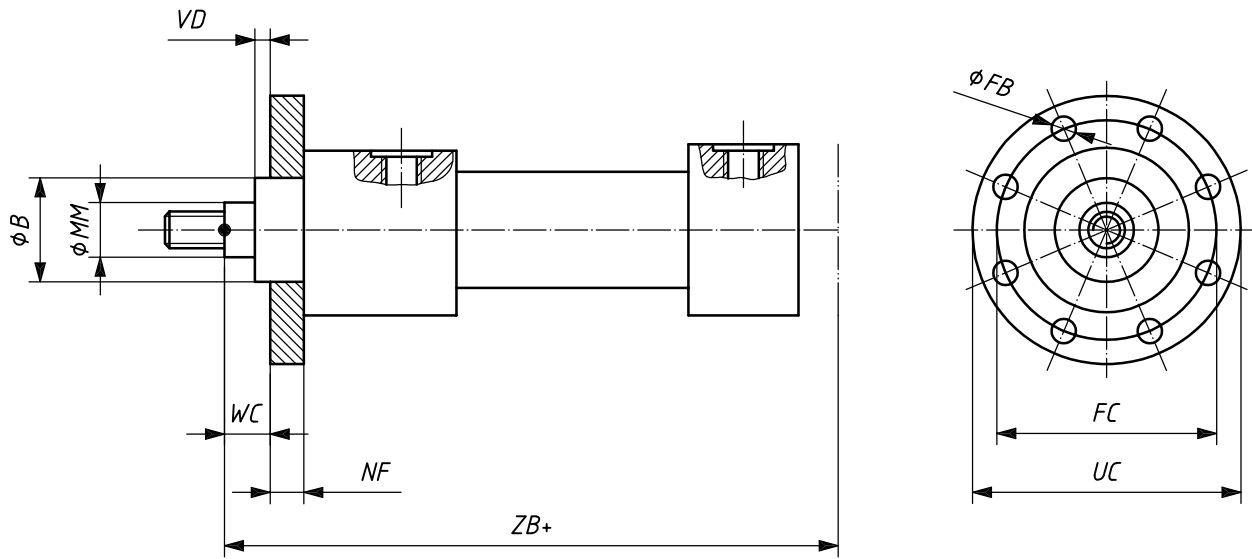
Table 1 — General dimensions

Dimensions in millimetres

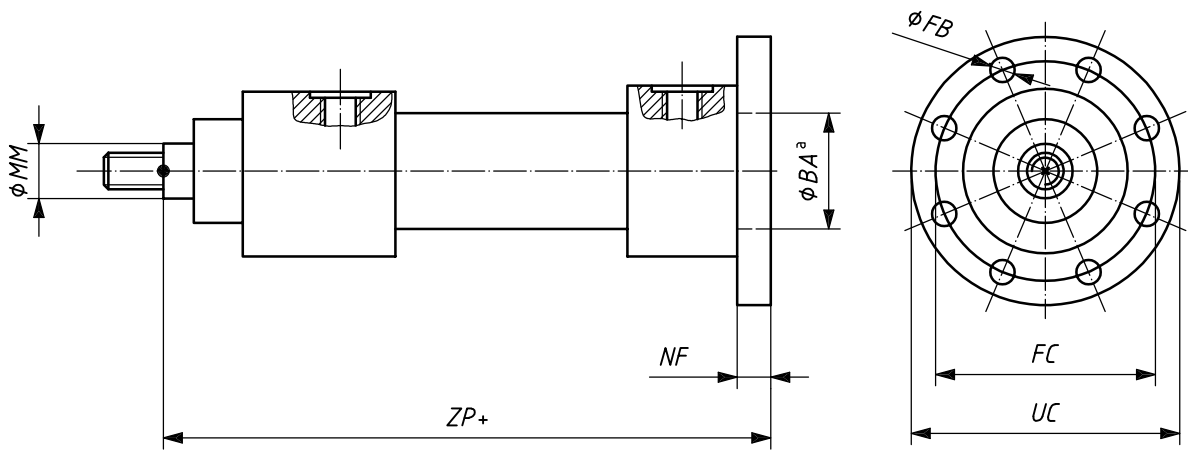
Bore	<i>MM</i> ^a	<i>ZJ</i> ^b	<i>KK</i> ^a 6g	<i>A</i> max.	<i>VE</i> max.	<i>WF</i> ^b
50	32	240	M27 × 2	36	29	47
	36					
63	40	270	M33 × 2	45	32	53
	45					
80	50	300	M42 × 2	56	36	60
	56					
100	63	335	M48 × 2	63	41	68
	70					
125	80	390	M64 × 3	85	45	76
	90					
140	90	425	M72 × 3	90	48	76
	100					
160	100	460	M80 × 3	95	50	85
	110					
180	110	497	M90 × 3	106	55	95
	125					
200	125	540	M100 × 3	112	61	101
	140					
250	160	640	M125 × 4	125	71	113
	180					
320	200	750	M160 × 4	160	88	136
	220					

^a If other piston rod diameters or other threads are required, use those identified in ISO 3320 and ISO 4395.

^b Tolerances for dimensions *ZJ* and *WF* are dependent on stroke; see Table 6.



a) Head mounting



b) Cap mounting

a Optional.

Figure 2 — MF3 — Head, circular flange and MF 4 — Cap, circular flange

Table 2 — Dimensions of circular flange mountings MF3 and MF4

Dimensions in millimetres

Bore	<i>FB</i> H13	<i>FC</i> js13	<i>VD</i> min.	<i>WC</i> ^a	<i>ZP</i> ^a	<i>ZB</i> max.	<i>B, BA</i> H8 / f8	<i>UC</i> max.	<i>NF</i> js13
50	8 × Ø13,5	132	4	22	265	244	63	160	25
63	8 × Ø13,5	150	4	25	298	274	75	180	28
80	8 × Ø17,5	180	4	28	332	305	90	215	32
100	8 × Ø22	212	5	32	371	340	110	260	36
125	8 × Ø22	250	5	36	430	396	132	300	40
140	8 × Ø26	285	5	36	465	430	145	340	40
160	8 × Ø26	315	5	40	505	467	160	370	45
180	8 × Ø33	355	5	45	550	505	185	425	50
200	8 × Ø33	385	5	45	596	550	200	455	56
250	8 × Ø39	475	8	50	703	652	250	545	63
320	8 × Ø45	600	8	56	830	764	320	680	80

^a Tolerances for dimensions *WC* and *ZP* are dependent on stroke; see Table 6.

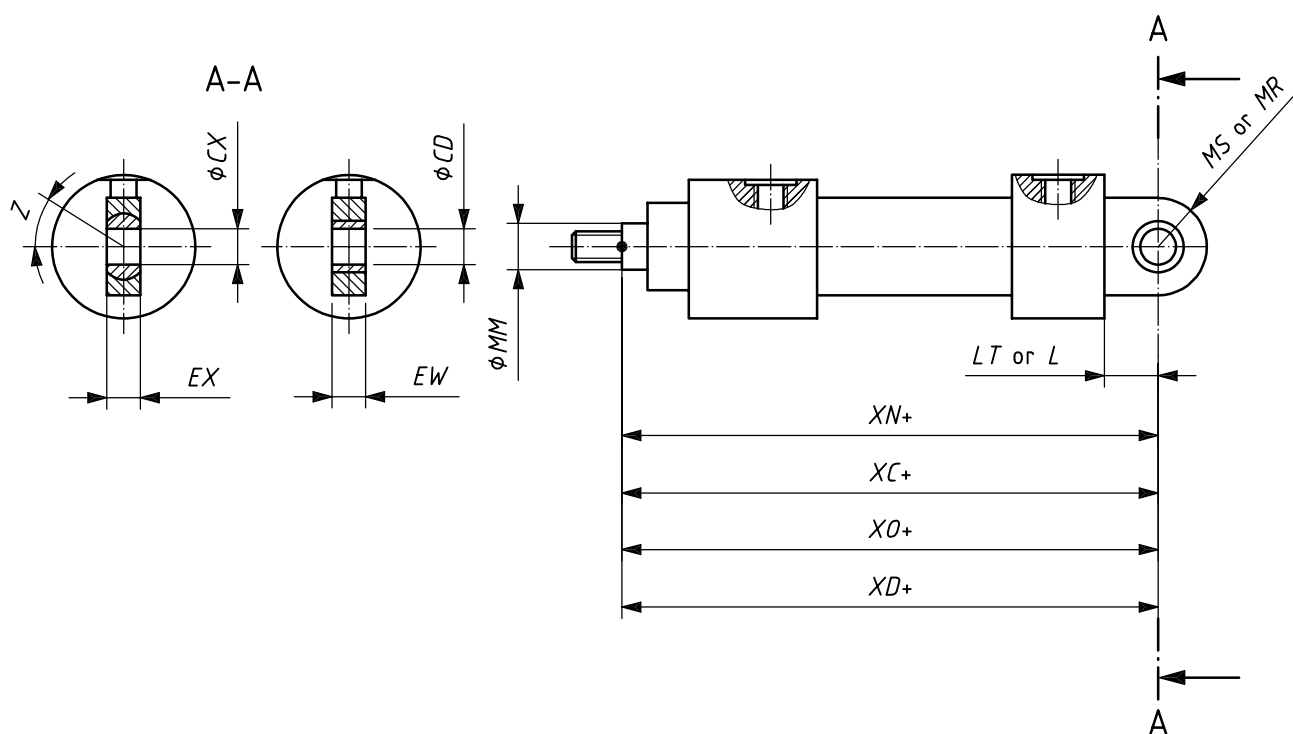


Figure 3 — MP3 — Cap, fixed plain eye, MP4 — Cap, detachable plain eye, MP5 — Cap, fixed eye with spherical bearing and MP6 — Cap, detachable eye with spherical bearing

Table 3 — Dimensions of cap eye mountings MP3, MP4, MP5 and MP6

Dimensions in millimetres

Bore	<i>CD</i> ^a	<i>CX</i> ^b	<i>EW</i> ^a or <i>EX</i> ^b	<i>L</i> ^a or <i>LT</i> ^b	<i>MR</i> ^a or <i>MS</i> ^b	<i>XC, XD, XO</i> or <i>XN</i> ^{c,d}	Tilting angle <i>Z</i>
	H9	H7	h12	min.	max.		min.
50	32	32	32	40	40	305	4°
63	40	40	40	50	50	348	4°
80	50	50	50	63	63	395	4°
100	63	63	63	71	71	442	4°
125	80	80	80	90	90	520	4°
140	90	90	90	113	113	580	4°
160	100	100	100	112	112	617	4°
180	110	110	110	135	135	690	4°
200	125	125	125	160	160	756	4°
250	160	160	160	200	200	903	4°
320	200	200	200	250	250	1080	4°

^a The dimensions *CD*, *EW*, *L* and *MR* are valid for mounting types MP3 and MP4.

^b The dimensions *CX*, *EX*, *LT* and *MS* are valid for mounting types MP5 and MP6.

^c Tolerances for dimensions *XC*, *XD*, *XO* or *XN* are dependent on stroke; see Table 6.

^d The dimension *XC* is valid for mounting type MP3, the dimension *XD* is valid for mounting type MP4, the dimension *XO* is valid for mounting type MP5 and the dimension *XN* is valid for mounting type MP6.

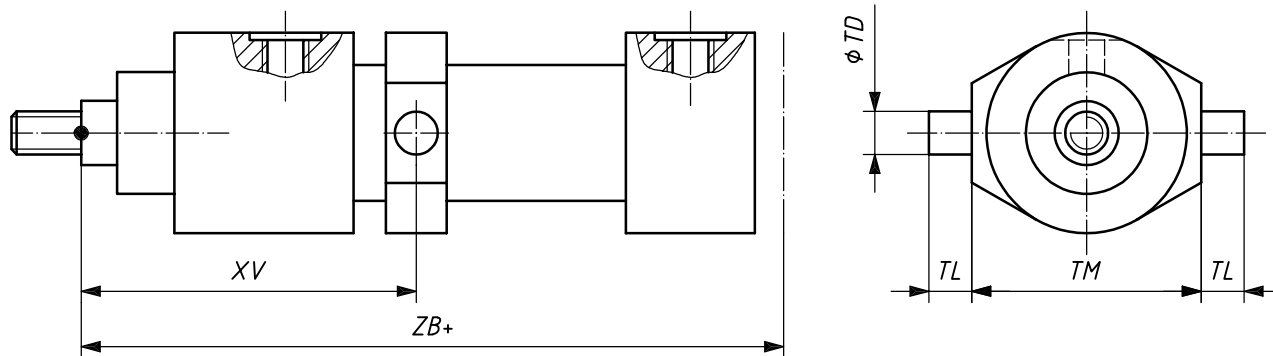


Figure 4 — MT4 — Intermediate fixed or movable trunnion (male)

Table 4 — Dimensions of intermediate male trunnion mounting MT4

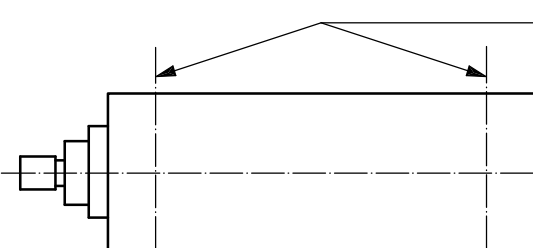
Dimensions in millimetres

Bore	<i>TD</i> f8	<i>TL</i> js13	<i>TM</i> h12	<i>XV</i> ^a	<i>ZB</i> max.
50	32	25	112	Variable. Users should consult the manufacturer for minimum and maximum values	244
63	40	32	125		274
80	50	40	150		305
100	63	50	180		340
125	80	63	224		396
140	90	70	265		430
160	100	80	280		467
180	110	90	320		502
200	125	100	335		550
250	160	125	425		652
320	200	160	530		764

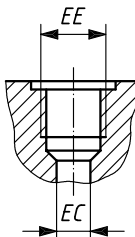
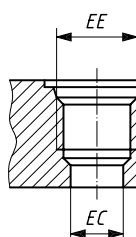
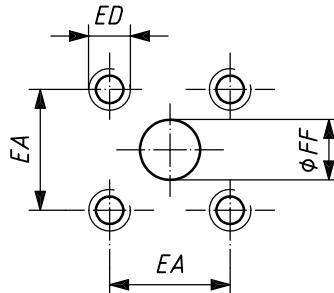
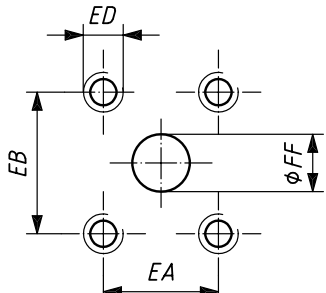
^a Tolerances for dimensions *XV* are dependent on stroke; see Table 6.

Table 5 — Port and flange sizes

Dimensions in millimetres



G — ISO 6162-1, type 1
 M — ISO 6164 [25 MPa (250 bar)]
 F — ISO 6149-1
 MM — ISO 1179-1

Bore	ISO 1179-1 port		ISO 6149-1 port		ISO 6164 Square flange				ISO 6162-1 Rectangular flange				
													
	G		M		F				MM				
	EE	EC	EE	EC	Nominal flange size DN	FF	EA	ED	Nominal flange size DN	FF	EA	EB	ED
	6g	min.	6g	min.		0 - 1,5	± 0,25	6g		0 - 1,5	± 0,2 5	± 0,25	6g
50	G 1/2	14	M22 × 1,5	14	—	—	—	—	—	—	—	—	—
63 80	G 3/4	18	M27 × 2	18	13	15	29,7	M8	13	12,7	17,5	38,1	M8
100 125	G 1	23	M33 × 2	23	19	20	35,4	M8	19	19,1	22,3	47,6	M10
140 160 180 200	G 1 1/4	30	M42 × 2	30	25	25	43,8	M10	25	25,4	26,2	52,4	M10
250 320	G 1 1/2	32	M60 × 2	32	32	32	51,6	M12	32	31,8	30,2	58,7	M10

CAUTION — When selecting the largest diameter piston rod in a given bore size in connection with hydraulic systems where pull loads and/or pressure intensification effects may be generated, the pressure in the piston rod cavity of the cylinder can be two or more times the working pressure of the hydraulic system. In these cases, flange ports in accordance with ISO 6162-1 or ISO 6164, as shown in this table, may not have sufficient pressure ratings. When flange ports with a higher pressure rating are needed, they can be selected from the higher pressure series in ISO 6162-2 and ISO 6164.

Table 6 — Tolerances for mounting dimensions that are dependent on stroke

Dimensions in millimetres

Code for mounting dimension	ZJ ^a	WF	WC	ZP ^a	XC, XD, XO or XN ^a	XV
Nominal stroke	Tolerances					
≤ 1 250	± 1,5	± 2	± 2	± 1,5	± 1,5	± 2
> 1 250 ≤ 3 150	± 3	± 4	± 4	± 3	± 3	± 4
> 3 150 ≤ 8 000	± 5	± 8	± 8	± 5	± 5	± 8

^a Length including stroke. Stroke tolerances from Table 7 shall not be added to the tolerances in this table.

Table 7 — Tolerances on piston stroke

Dimensions in millimetres

Nominal stroke	Tolerance
≤ 1 250	$\begin{matrix} +2 \\ 0 \end{matrix}$
> 1 250 ≤ 3 150	$\begin{matrix} +5 \\ 0 \end{matrix}$
> 3 150 ≤ 8 000	$\begin{matrix} +8 \\ 0 \end{matrix}$

Bibliography

- [1] ISO 273, *Fasteners — Clearance holes for bolts and screws*
- [2] ISO 286-2, *ISO system of limits and fits — Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts*
- [3] ISO 4393, *Fluid power systems and components — Cylinders — Basic series of piston strokes*

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