



CROMSTEEL

**Chrome bars and tubes**

for hydraulics and pneumatics

Machined parts



## Chrome bars and tubes for hydraulics and pneumatics

Cromsteel offers a vast range of products for applications in hydraulics and pneumatics.

Our chrome bars and tubes are available in several steel grades and surface treatments in order to meet the needs of cylinder manufacturers and producers of industrial equipment.

Prime quality products in stock, a long commercial experience on the Italian and worldwide markets, an in-house machining workshop with a powerful stack of CNC lathes, a strong attention towards the customer: these are the elements that make Cromsteel the ideal partner for the production of cylinders and other industrial components.

Cromsteel has built a fully equipped workshop to provide any kind of machining according to customer's drawing, e.g.:

cutting

axial drilling / tapping

radial drilling / tapping

flat milling

diameter reduction

hardened surface annealing

# Catalogue for hydraulics and pneumatics

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## General technical specifications

### Steel grade equivalents\*

Product	Euronorm	DIN	Werkstoff-Nr.	AFNOR	BS	JIS	ASTM
<b>BAC</b> <b>BATC</b>	<b>C45E</b> EN 10083-2	<b>Ck45</b> DIN 10083	<b>1.1191</b>	<b>XC45</b>	<b>080N45</b>	<b>S45C</b>	<b>1045</b>
<b>BACM</b> <b>BATCM</b>	—	<b>20MnV6</b>	<b>1.5217</b>	<b>E420</b>	<b>55M</b>	—	<b>A572</b>
<b>BACV</b> <b>BATCV</b>	<b>38MnVS6</b> EN 10267	<b>38MnVS5</b> DIN 10267	<b>1.1303</b>	<b>30MV6</b>	—	—	<b>1045V</b>
<b>BOC</b> <b>BOTC</b>	<b>42CrMo4</b> EN 10083-3	<b>42CrMo4</b> DIN 10083-3	<b>1.7225</b>	<b>42CD4</b>	<b>708M40</b>	<b>SCM440(H)</b>	<b>4140</b>
<b>BACI 304</b>	<b>X5CrNi18-10</b>	<b>X5CrNi18-10</b>	<b>1.4301</b>	<b>Z7CN18-09</b>	<b>304517</b>	<b>SUS304</b>	<b>304</b>
<b>BACI 316</b>	<b>X5CrNiMo17-12-2</b>	<b>X5CrNiMo17-12-2</b>	<b>1.4401</b>	<b>Z3CND-11-02</b>	<b>316S11</b>	—	<b>316</b>
<b>TUC</b> <b>TUL</b> <b>TUCL</b> <b>TTS</b>	<b>E355</b> EN 10305-1 EN 10305-2	<b>St52.3</b> DIN 2391 DIN 2393	<b>1.0580</b>	<b>E36-4</b>	<b>4360-50D</b>	<b>SM490A</b>	<b>1024</b>

\*) The above shown equivalents are purely indicative: steel grades manufactured according to different standards may not match

### Chemical composition\*

Steel grade	C	Si	Mn	P	S	Cr	Ni	Mo	V	N	Al
<b>C45E</b>	min	0,42	0,50								
	max	0,50	0,40	0,80	0,030	0,035	0,40	0,40	0,10		
<b>20MnV6</b>	min	0,15	0,10	1,20	0,020				0,08		
	max	0,22	0,80	1,70	0,035	0,060	0,30			0,20	0,10
<b>38MnVS6</b>	min	0,34	0,15	1,20	0,020				0,08		
	max	0,41	0,80	1,60	0,025	0,060	0,30	0,08		0,20	
<b>42CrMo4</b>	min	0,38	0,60				0,90	0,15			
	max	0,45	0,40	0,90	0,025	0,035	1,20	0,30			
<b>X5CrNi18-10</b> (AISI 304)	min					17,0	8,0				
	max	0,07	1,00	2,00	0,045	0,03	20,0	10,5			0,11
<b>X5CrNi17-12-2</b> (AISI 316)	min					16,5	10,0	2,0			
	max	0,07	1,00	2,00	0,045	0,03	18,5	13,0	2,5	0,11	
<b>E355</b>	min			0,015							
	max	0,22	0,55	1,60	0,025	0,040					

\*) As % on weight



## General technical specifications

### Mechanical properties (bars)

Product code	Steel grade	Diameter	Tensile strength (Rm)	Yield strength (Rp <sub>0.2</sub> )	Elongation (A5)	Core hardness	Impact test KV at -20°C
			MPa	MPa	%	HB	J
BAC BATC	C45E	Ø ≤ 16	min. 710	min. 500	min. 5	min. 200	—
		16 < Ø ≤ 20	min. 650	min. 410	min. 7	min. 200	
		20 < Ø ≤ 100	min. 580	min. 305	min. 16	180 - 225	
		100 < Ø ≤ 200	min. 560	min. 275	min. 16	180 - 225	
BACM BATCM	20MnV6	Ø ≤ 19	min. 700	min. 620	min. 10	min. 200	min. 27
		19 < Ø ≤ 70	min. 550	min. 450	min. 18	163 - 200	
		70 < Ø ≤ 160	min. 550	min. 420	min. 18	163 - 220	
BACV BATCV	38MnVS6	Ø < 20	min. 850	min. 600	min. 6	min. 250	—
		20 ≤ Ø ≤ 200	min. 800	min. 520	min. 12	min. 230	
BOC BOTC	42CrMo4	Ø ≤ 16	1000 - 1200	min. 750	min. 8	298 - 359	—
		16 < Ø ≤ 40	1000 - 1200	min. 750	min. 11	298 - 359	
		40 < Ø ≤ 100	900 - 1100	min. 650	min. 12	271 - 331	
		100 < Ø ≤ 200	800 - 950	min. 550	min. 13	225 - 271	
BACI-AISI 304	X5CrNi18-10 (AISI 304)	20 ≤ Ø ≤ 40	600 - 850	min. 190	min. 30	—	
		40 < Ø ≤ 63	580 - 850	min. 190	min. 30		
		63 < Ø ≤ 160	500 - 700	min. 190	min. 45		
BACI-AISI 316	X5CrNi17-12-2 (AISI 316)	20 ≤ Ø ≤ 63	500 - 830	min. 200	min. 30	—	
		63 < Ø ≤ 160	500 - 700	min. 200	min. 40		

### Mechanical properties (tubes)

Product code	Steel grade	Norm	Heat treatment	Tensile strength (Rm)	Yield strength (Rp <sub>0.2</sub> )	Elongation (A5)	Impact test KV at -20°C
				MPa	MPa	%	J
TUC TUL TUCL	E355	EN 10305-1	+SR	min. 620	min. 520	min. 15	min. 27
TUC TUCL	E355	EN 10305-2	+SR	min. 620	min. 520	min. 15	min. 27
TTS	E355	EN 10305-2	+C	min. 620	min. 520	min. 7	—



## Tips for reading product sheets

Each product sheet contains all standard parameters for the given product, including the identification color used for marking the bar ends.

### Length tolerance for cut parts

The standard tolerance on the length of the cut parts (not machined):

diameters from 6 mm to 30 mm:  $\pm 1$  mm  
diameters above 30 mm:  $\pm 2$  mm

**Any request for special length tolerance of cut pieces will be evaluated case by case.**

### Packaging types

Standard packaging for chrome plated bars and tubes: plastic sleeve on each bar / tube (OD from 14 mm to 120 mm), plastic rings (diameters < 14 mm), cardboard tubes (diameters above 120 mm).

#### On request:

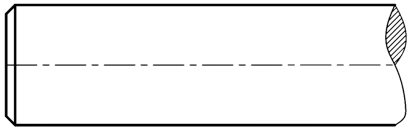
cardboard tubes on each bar / tube (diameter 16 mm and above)  
plastic rings  
sea freight: seaworthy vacuum aluminium bags  
other packaging types: wooden boxes, pallets, pallets with sides and cover etc.

### Recommendations for proper storage and handling

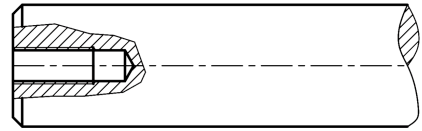
- stock the bars / tubes in warehouses with controlled humidity
- avoid direct sunlight
- avoid direct contact with floors
- the bars / tubes must lay on supporting surfaces padded with rubber or wood
- whenever possible, use a crane for loading/unloading operations; if a forklift must be used, be sure to pad any contact surface with wood, plastic or rubber
- upon handling, lift the bundles with plastic or tissue belts (never use metal belts)
- always lift the bars / tubes from two points: lifting them from one point (e.g. in the middle of the length) may damage their straightness and create dangerous situations
- beware the risk of corrosion when stocking the bars / tubes; environments with high pollution or with high salt concentration are very corrosive

# Machining examples

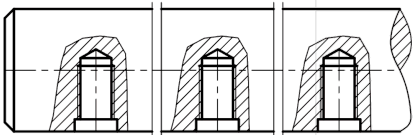
Cutting and deburring



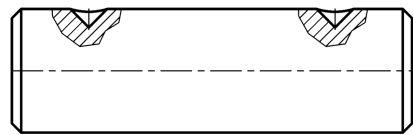
Axial drilling and tapping



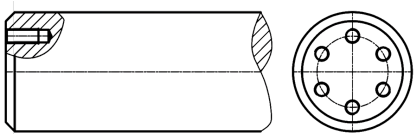
Radial drilling and tapping



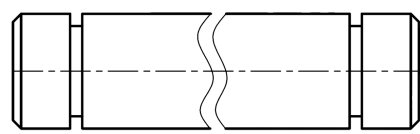
Screw seats



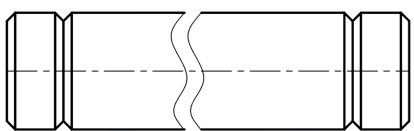
Pitch circle drilling and tapping



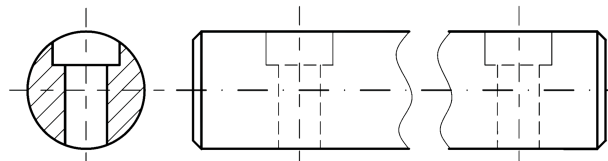
Snap ring grooves



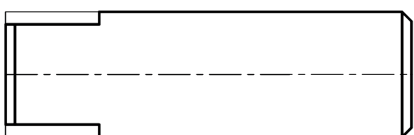
Circumference grooves



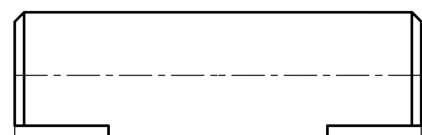
Radial passthrough bores



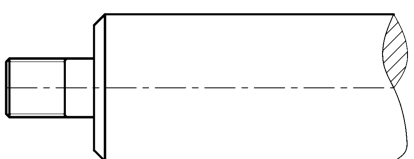
Plain milling for keys



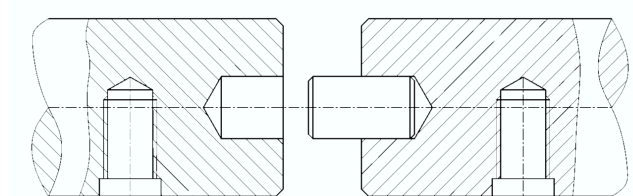
Plain milling



Threaded reduced diameters



Shaft coupling



# C45E (1.1191)

**BAC**



**CHROME PLATED BARS**

## Standard parameters

### Diameter range (metric)

5 - 200 mm

### Diameter range (imperial)

1/4" - 8"

### Diameter tolerance (EN ISO 286-2)

standard: f7; on request: h7

### Roundness

max. 1/2 of diameter tolerance

### Standard length

Ø < 60 mm: 5500 - 6200 mm

Ø ≥ 60 mm: 5500 - 7200 mm

### Surface roughness

Ra max. 0,20 µm

## Corrosion resistance

### Standard

Ø < 20 mm: Rating 9 after 120 h in NSS

Ø ≥ 20 mm: Rating 9 after 200 h in NSS

### On request

Ø ≥ 20 mm: Rating 9 after 500 h in NSS

## Packaging

**Standard:** plastic sleeve

**On request:** cardboard tube, wooden box, seaworthy packaging, Branorost, Lamiflex

## ISO tolerances by diameter range

Ø	>3 mm ≤6 mm	>6 mm ≤10 mm	>10 mm ≤18 mm	>18 mm ≤30 mm	>30 mm ≤50 mm	>50 mm ≤80 mm	>80 mm ≤120 mm	>120 mm ≤180 mm	>180 mm ≤200 mm
<b>f7</b>	-10 µm -22 µm	-13 µm -28 µm	-16 µm -34 µm	-20 µm -41 µm	-25 µm -50 µm	-30 µm -60 µm	-36 µm -71 µm	-43 µm -83 µm	-50 µm -96 µm
<b>h7</b>	0 µm -12 µm	0 µm -15 µm	0 µm -18 µm	0 µm -21 µm	0 µm -25 µm	0 µm -30 µm	0 µm -35 µm	0 µm -40 µm	0 µm -46 µm

**BATC**



**CHROME PLATED AND INDUCTION HARDENED BARS**

### Chrome layer thickness

Ø < 20 mm: min. 15 µm

Ø ≥ 20 mm: min. 20 µm

### Chrome layer hardness

min. 900 HV<sub>(0.1)</sub>

### Straightness

Ø < 20 mm: max. 0,3:1000 mm

Ø ≥ 20 mm: max. 0,2:1000 mm

### Residual magnetism

max. 50 Gauss

### Surface hardness (only for BATC)

min. 55 HRC

## Hardening depth (only for BATC)

Ø mm	SHD* mm	Ø mm	SHD* mm
6	0,5 - 0,8	25	1,5 - 1,7
8	0,6 - 0,9	28	1,5 - 1,8
10	0,7 - 1,0	30 - 38	1,5 - 1,9
12 - 14	0,8 - 1,2	40 - 45	1,6 - 2,0
14	0,9 - 1,3	50 - 85	2,2 - 2,6
15	1,0 - 1,4	90 - 100	2,2 - 3,2
16 - 18	1,1 - 1,5	105 - 140	2,4 - 3,3
20 - 22	1,2 - 1,5	150 - 203,5	2,5 - 3,5
24	1,4 - 1,6		

\*) SHD hardening depth according to EN ISO 15787





# 20MnV6 (1.5217)

**BACM**



**CHROME PLATED BARS**

## Standard parameters

**Diameter range (metric)**

5 - 200 mm

**Diameter range (imperial)**

1/4" - 8"

**Diameter tolerance (EN ISO 286-2)**

standard: f7; on request: h7

**Roundness**

max. 1/2 of diameter tolerance

**Standard length**

Ø < 60 mm: 5500 - 6200 mm

Ø ≥ 60 mm: 5500 - 7200 mm

**Surface roughness**

Ra max. 0,20 µm

## Corrosion resistance

**Standard**

Ø < 20 mm: Rating 9 after 120 h in NSS

Ø ≥ 20 mm: Rating 9 after 200 h in NSS

**On request**

Ø ≥ 20 mm: Rating 9 after 500 h in NSS

## Packaging

**Standard:** plastic sleeve

**On request:** cardboard tube, wooden box, seaworthy packaging, Branorost, Lamiflex

## ISO tolerances by diameter range

Ø	>3 mm ≤6 mm	>6 mm ≤10 mm	>10 mm ≤18 mm	>18 mm ≤30 mm	>30 mm ≤50 mm	>50 mm ≤80 mm	>80 mm ≤120 mm	>120 mm ≤180 mm	>180 mm ≤200 mm
<b>f7</b>	-10 µm -22 µm	-13 µm -28 µm	-16 µm -34 µm	-20 µm -41 µm	-25 µm -50 µm	-30 µm -60 µm	-36 µm -71 µm	-43 µm -83 µm	-50 µm -96 µm
<b>h7</b>	0 µm -12 µm	0 µm -15 µm	0 µm -18 µm	0 µm -21 µm	0 µm -25 µm	0 µm -30 µm	0 µm -35 µm	0 µm -40 µm	0 µm -46 µm

**BATCM**



**CHROME PLATED AND INDUCTION HARDENED BARS**

**Chrome layer thickness**

Ø < 20 mm: min. 15 µm

Ø ≥ 20 mm: min. 20 µm

**Chrome layer hardness**

min. 900 HV<sub>(0.1)</sub>

**Straightness**

Ø < 20 mm: max. 0,3:1000 mm

Ø ≥ 20 mm: max. 0,2:1000 mm

**Residual magnetism**

max. 50 Gauss

**Surface hardness (only for BATCM)**

min. 42 HRC

## Hardening depth (only for BATCM)

Ø mm	SHD* mm	Ø mm	SHD* mm
6	0,5 - 0,8	25	1,5 - 1,7
8	0,6 - 0,9	28	1,5 - 1,8
10	0,7 - 1,0	30 - 38	1,5 - 1,9
12 - 14	0,8 - 1,2	40 - 45	1,6 - 2,0
14	0,9 - 1,3	50 - 85	2,2 - 2,6
15	1,0 - 1,4	90 - 100	2,2 - 3,2
16 - 18	1,1 - 1,5	105 - 140	2,4 - 3,3
20 - 22	1,2 - 1,5	150 - 203,5	2,5 - 3,5
24	1,4 - 1,6		

\*) SHD hardening depth according to EN ISO 15787



# 38MnVS6 (1.1303)

## BACV



### CHROME PLATED BARS

#### Standard parameters

##### Diameter range (metric)

20 - 115 mm

##### Diameter range (imperial)

1" - 4" 1/4

##### Diameter tolerance (EN ISO 286-2)

standard: f7; on request: h7

##### Roundness

max. 1/2 of diameter tolerance

##### Standard length

Ø < 60 mm: 5500 - 6200 mm

Ø ≥ 60 mm: 5500 - 7200 mm

##### Surface roughness

Ra max. 0,20 µm

#### Corrosion resistance

##### Standard

Rating 9 after 200 h in NSS

##### On request

Rating 9 after 500 h in NSS

#### Packaging

**Standard:** plastic sleeve

**On request:** cardboard tube, wooden box, seaworthy packaging, Branorost, Lamiflex

#### ISO tolerances by diameter range

Ø	>18 mm ≤30 mm	>30 mm ≤50 mm	>50 mm ≤80 mm	>80 mm ≤120 mm
f7	-20 µm -41 µm	-25 µm -50 µm	-30 µm -60 µm	-36 µm -71 µm
h7	0 µm -21 µm	0 µm -25 µm	0 µm -30 µm	0 µm -35 µm

## BATCV



### CHROME PLATED AND INDUCTION HARDENED BARS

##### Chrome layer thickness

Ø < 20 mm: min. 15 µm

Ø ≥ 20 mm: min. 20 µm

##### Chrome layer hardness

min. 900 HV<sub>(0.1)</sub>

##### Straightness

Ø < 20 mm: max. 0,3:1000 mm

Ø ≥ 20 mm: max. 0,2:1000 mm

##### Residual magnetism

max. 50 Gauss

##### Surface hardness (only for BATCV)

min. 55 HRC

#### Hardening depth (only for BATCV)

Ø mm	SHD* mm	Ø mm	SHD* mm
6	0,5 - 0,8	24	1,4 - 1,6
8	0,6 - 0,9	25	1,5 - 1,7
10	0,7 - 1,0	28	1,5 - 1,8
12 - 14	0,8 - 1,2	30 - 38	1,5 - 1,9
14	0,9 - 1,3	40 - 45	1,6 - 2,0
15	1,0 - 1,4	50 - 85	2,2 - 2,6
16 - 18	1,1 - 1,5	90 - 100	2,2 - 3,2
20 - 22	1,2 - 1,5	105 - 140	2,4 - 3,3

\*) SHD hardening depth according to EN ISO 15787



# 42CrMo4 +QT (1.7225)

**BOC**



**CHROME PLATED BARS**

## Standard parameters

### Diameter range (metric)

20 - 200 mm

### Diameter range (imperial)

1/4" - 8"

### Diameter tolerance (EN ISO 286-2)

standard: f7; on request: h7

### Roundness

max. 1/2 of diameter tolerance

### Standard length

Ø < 60 mm: 5500 - 6200 mm

Ø ≥ 60 mm: 5500 - 7200 mm

### Surface roughness

Ra max. 0,20 µm

## Corrosion resistance

### Standard

Ø < 20 mm: Rating 9 after 120 h in NSS

Ø ≥ 20 mm: Rating 9 after 200 h in NSS

### On request

Ø ≥ 20 mm: Rating 9 after 500 h in NSS

## Packaging

**Standard:** plastic sleeve

**On request:** cardboard tube, wooden box, seaworthy packaging, Branorost, Lamiflex

## ISO tolerances by diameter range

Ø	>18 mm ≤30 mm	>30 mm ≤50 mm	>50 mm ≤80 mm	>80 mm ≤120 mm	>120 mm ≤180 mm	>180 mm ≤200 mm
<b>f7</b>	-20 µm -41 µm	-25 µm -50 µm	-30 µm -60 µm	-36 µm -71 µm	-43 µm -83 µm	-50 µm -96 µm
<b>h7</b>	0 µm -21 µm	0 µm -25 µm	0 µm -30 µm	0 µm -35 µm	0 µm -40 µm	0 µm -46 µm

**BOTC**



**CHROME PLATED AND INDUCTION HARDENED BARS**

### Chrome layer thickness

Ø < 20 mm: min. 15 µm

Ø ≥ 20 mm: min. 20 µm

### Chrome layer hardness

min. 900 HV<sub>(0.1)</sub>

### Straightness

Ø < 20 mm: max. 0,3:1000 mm

Ø ≥ 20 mm: max. 0,2:1000 mm

### Residual magnetism

max. 50 Gauss

### Surface hardness (only for BOTC)

min. 55 HRC

## Hardening depth (only for BOTC)

Ø mm	SHD* mm	Ø mm	SHD* mm
6	0,5 - 0,8	25	1,5 - 1,7
8	0,6 - 0,9	28	1,5 - 1,8
10	0,7 - 1,0	30 - 38	1,5 - 1,9
12 - 14	0,8 - 1,2	40 - 45	1,6 - 2,0
14	0,9 - 1,3	50 - 85	2,2 - 2,6
15	1,0 - 1,4	90 - 100	2,2 - 3,2
16 - 18	1,1 - 1,5	105 - 140	2,4 - 3,3
20 - 22	1,2 - 1,5	150 - 203,5	2,5 - 3,5
24	1,4 - 1,6		

\*) SHD hardening depth according to EN ISO 15787



## AISI 304 (1.4301)

**BACI 304**



STAINLESS STEEL  
CHROME PLATED BARS

### Standard parameters

#### Diameter range

8 - 60 mm

#### Diameter tolerance (EN ISO 286-2)

standard: f7; on request: h7

#### Roundness

max. 1/2 of diameter tolerance

#### Standard length

Ø < 60 mm: 5500 - 6200 mm

Ø ≥ 60 mm: 5500 - 7200 mm

#### Surface roughness

Ra max. 0,20 µm

## AISI 316 (1.4401)

**BACI 316**



STAINLESS STEEL  
CHROME PLATED BARS

#### Chrome layer thickness

Ø < 20 mm: min. 15 µm

Ø ≥ 20 mm: min. 20 µm

#### Chrome layer hardness

min. 900 HV<sub>(0.1)</sub>

#### Straightness

Ø < 20 mm: max. 0,3:1000 mm

Ø ≥ 20 mm: max. 0,2:1000 mm

#### Residual magnetism

max. 50 Gauss

### Corrosion resistance\*

#### Standard

BACI 304: Rating 9 after 1200 h in NSS

BACI 316: Rating 9 after 1440 h in NSS

\*) corrosion resistance parameters for stainless steel chrome plated bars is approximate and is provided as solely indicative

### Packaging

**Standard:** plastic sleeve

**On request:** cardboard tube, wooden box, seaworthy packaging, Branorost, Lamiflex

### ISO tolerances by diameter range

Ø	>3 mm ≤6 mm	>6 mm ≤10 mm	>10 mm ≤18 mm	>18 mm ≤30 mm	>30 mm ≤50 mm	>50 mm ≤80 mm
f7	-10 µm -22 µm	-13 µm -28 µm	-16 µm -34 µm	-20 µm -41 µm	-25 µm -50 µm	-30 µm -60 µm
h7	0 µm -12 µm	0 µm -15 µm	0 µm -18 µm	0 µm -21 µm	0 µm -25 µm	0 µm -30 µm



# E355 +SR (1.0580)

EN 10305-1/2

## TUC

### OUTSIDE CHROME PLATED TUBES

#### Standard parameters

**Diameter range**

12 - 200 mm

**Diameter tolerance (EN ISO 286-2)**

f7

**Roundness**

max. 1/2 of OD tolerance

**Standard length**

5500 - 7000 mm

**Surface roughness**

Ra max. 0,20 µm

**Chrome layer thickness**

Ø < 20 mm: min. 15 µm

Ø ≥ 20 mm: min. 20 µm

**Chrome layer hardness**

min. 900 HV<sub>(0.1)</sub>

**Straightness**

Ø < 20 mm: max. 0,3:1000 mm

Ø ≥ 20 mm: max. 0,2:1000 mm

**Residual magnetism**

max. 50 Gauss

#### Corrosion resistance

**Standard**

Ø < 20 mm: Rating 9 after 120 h in NSS

Ø ≥ 20 mm: Rating 9 after 200 h in NSS

**On request**

Ø ≥ 20 mm: Rating 9 after 500 h in NSS

#### Packaging

**Standard:** plastic sleeve

**On request:** cardboard tube, wooden box, seaworthy packaging, Branorost, Lamiflex

#### ISO tolerances by diameter range

Ø	>10 mm ≤18 mm	>18 mm ≤30 mm	>30 mm ≤50 mm	>50 mm ≤80 mm	>80 mm ≤120 mm	>120 mm ≤180 mm	>180 mm ≤200 mm
f7	-16 µm -34 µm	-20 µm -41 µm	-25 µm -50 µm	-30 µm -60 µm	-36 µm -71 µm	-43 µm -83 µm	-50 µm -96 µm



# E355 +SR (1.0580)

EN 10305-1/2

## TUCL

OUTSIDE CHROME PLATED  
INSIDE SKIVED AND ROLLER BURNISHED TUBES

### Standard parameters

#### Diameter range (outside diameter)

40 - 200 mm

#### Chrome layer thickness

min. 20  $\mu\text{m}$

#### Diameter tolerance (EN ISO 286-2)

OD: f7

ID: H8/H9, depending on wall thickness

#### Chrome layer hardness

min. 900 HV<sub>(0,1)</sub>

#### Roundness

OD: max. 1/2 of diameter tolerance

ID: within diameter tolerance

#### Straightness

$\varnothing > 40$  mm: max. 0,2:1000 mm

#### Standard length

5000 - 7000 mm

#### Residual magnetism

max. 50 Gauss

#### Surface roughness

OD: Ra max. 0,20  $\mu\text{m}$

ID: Ra max. 0,40  $\mu\text{m}$

#### Eccentricity

EN 10305-1: max. 10% of wall thickness

EN 10305-2: max. 3% of wall thickness

### Corrosion resistance

#### Standard

$\varnothing < 20$  mm: Rating 9 after 120 h in NSS

$\varnothing \geq 20$  mm: Rating 9 after 200 h in NSS

#### On request

$\varnothing \geq 20$  mm: Rating 9 after 500 h in NSS

### Packaging

**Standard:** plastic sleeve

**On request:** cardboard tube, wooden box, seaworthy packaging, Branorost, Lamiflex

### ISO tolerances by diameter range (OD)

$\varnothing$	>30 mm ≤50 mm	>50 mm ≤80 mm	>80 mm ≤120 mm	>120 mm ≤180 mm	>180 mm ≤200 mm
<b>f7</b>	-25 $\mu\text{m}$ -50 $\mu\text{m}$	-30 $\mu\text{m}$ -60 $\mu\text{m}$	-36 $\mu\text{m}$ -71 $\mu\text{m}$	-43 $\mu\text{m}$ -83 $\mu\text{m}$	-50 $\mu\text{m}$ -96 $\mu\text{m}$
<b>h7</b>	0 $\mu\text{m}$ -25 $\mu\text{m}$	0 $\mu\text{m}$ -30 $\mu\text{m}$	0 $\mu\text{m}$ -35 $\mu\text{m}$	0 $\mu\text{m}$ -40 $\mu\text{m}$	0 $\mu\text{m}$ -46 $\mu\text{m}$

### ISO tolerances by diameter range (ID)

$\varnothing$	>30 mm ≤50 mm	>50 mm ≤80 mm	>80 mm ≤120 mm	>120 mm ≤180 mm	>180 mm ≤200 mm
<b>H8</b>	+39 $\mu\text{m}$ 0 $\mu\text{m}$	+46 $\mu\text{m}$ 0 $\mu\text{m}$	+54 $\mu\text{m}$ 0 $\mu\text{m}$	+63 $\mu\text{m}$ 0 $\mu\text{m}$	+72 $\mu\text{m}$ 0 $\mu\text{m}$
<b>H9</b>	+62 $\mu\text{m}$ 0 $\mu\text{m}$	+74 $\mu\text{m}$ 0 $\mu\text{m}$	+87 $\mu\text{m}$ 0 $\mu\text{m}$	+100 $\mu\text{m}$ 0 $\mu\text{m}$	+115 $\mu\text{m}$ 0 $\mu\text{m}$



# E355 +SR (1.0580)

EN 10305-1

## TUL

### SKIVED AND ROLLER BURNISHED TUBES

#### Standard parameters

**Diameter range (outside diameter)**

40 - 300 mm

**Straightness**

max. 1,0:1000 mm

**Diameter tolerance (EN ISO 286-2)**

ID: H8

**Total deviation**

tubes with  $L \leq 6$  m: max. 3,5:6000 mm

tubes with  $L \leq 7$  m: max. 4,0:7000 mm

tubes with  $L \leq 8$  m: max. 4,5:8000 mm

**Roundness**

ID: within diameter tolerance

**Standard length**

5000 - 8000 mm

**Eccentricity**

max. 10% of wall thickness

**Surface roughness**

ID: Ra max. 0,40  $\mu\text{m}$

#### Packaging

**Standard:** protective oil on ID, bundles

**On request:** seaworthy packaging, wooden boxes, pallets

#### ISO tolerances by diameter range (ID)

$\emptyset$	>30 mm $\leq 50$ mm	>50 mm $\leq 80$ mm	>80 mm $\leq 120$ mm	>120 mm $\leq 180$ mm	>180 mm $\leq 200$ mm
H8	+39 $\mu\text{m}$ 0 $\mu\text{m}$	+46 $\mu\text{m}$ 0 $\mu\text{m}$	+54 $\mu\text{m}$ 0 $\mu\text{m}$	+63 $\mu\text{m}$ 0 $\mu\text{m}$	+72 $\mu\text{m}$ 0 $\mu\text{m}$
H9	+62 $\mu\text{m}$ 0 $\mu\text{m}$	+74 $\mu\text{m}$ 0 $\mu\text{m}$	+87 $\mu\text{m}$ 0 $\mu\text{m}$	+100 $\mu\text{m}$ 0 $\mu\text{m}$	+115 $\mu\text{m}$ 0 $\mu\text{m}$



# E355 +C (1.0580)

EN 10305-2

## TTS

WELDED READY TO USE TUBES

### Standard parameters

**Diameter range (outside diameter)**

30 - 150 mm

**Straightness**

max. 1,0:1000 mm

**Diameter tolerance (EN ISO 286-2)**

ID: H9

**Eccentricity**

max. 3% of wall thickness

**Roundness**

ID: within diameter tolerance

**Standard length**

5000 - 7000 mm

**Surface roughness**

ID: Ra max. 0,80 µm

### Packaging

**Standard:** protective oil on ID, bundles

**On request:** seaworthy packaging, wooden boxes, pallets

### ISO tolerances by diameter range (ID)

Ø	>18 mm ≤30 mm	>30 mm ≤50 mm	>50 mm ≤80 mm	>80 mm ≤120 mm	>120 mm ≤180 mm
H9	+52 µm 0 µm	+62 µm 0 µm	+74 µm 0 µm	+87 µm 0 µm	+100 µm 0 µm









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**HYDRAULICS-PNEUMATICS**

**CATALOGUE  
2022**

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