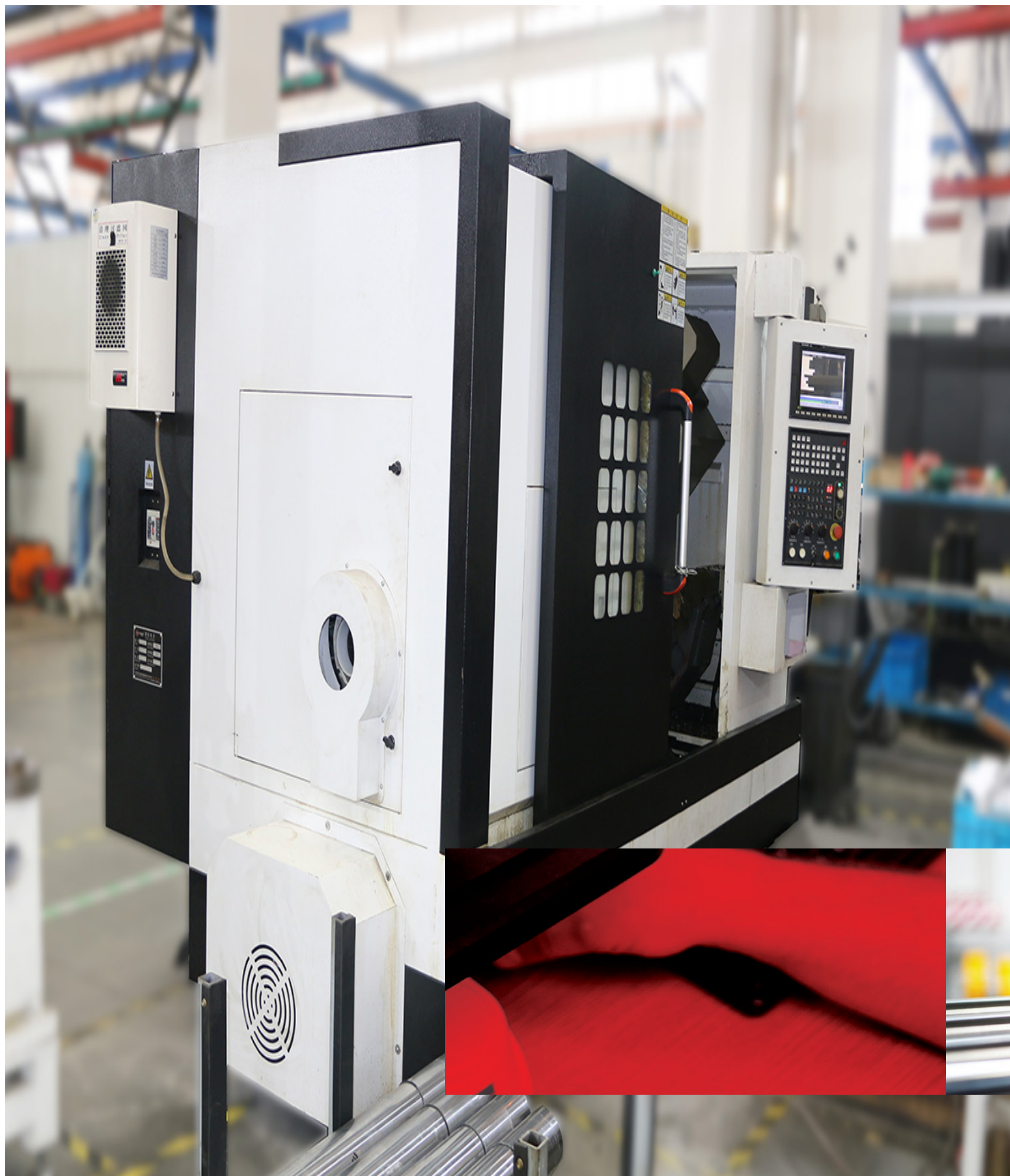
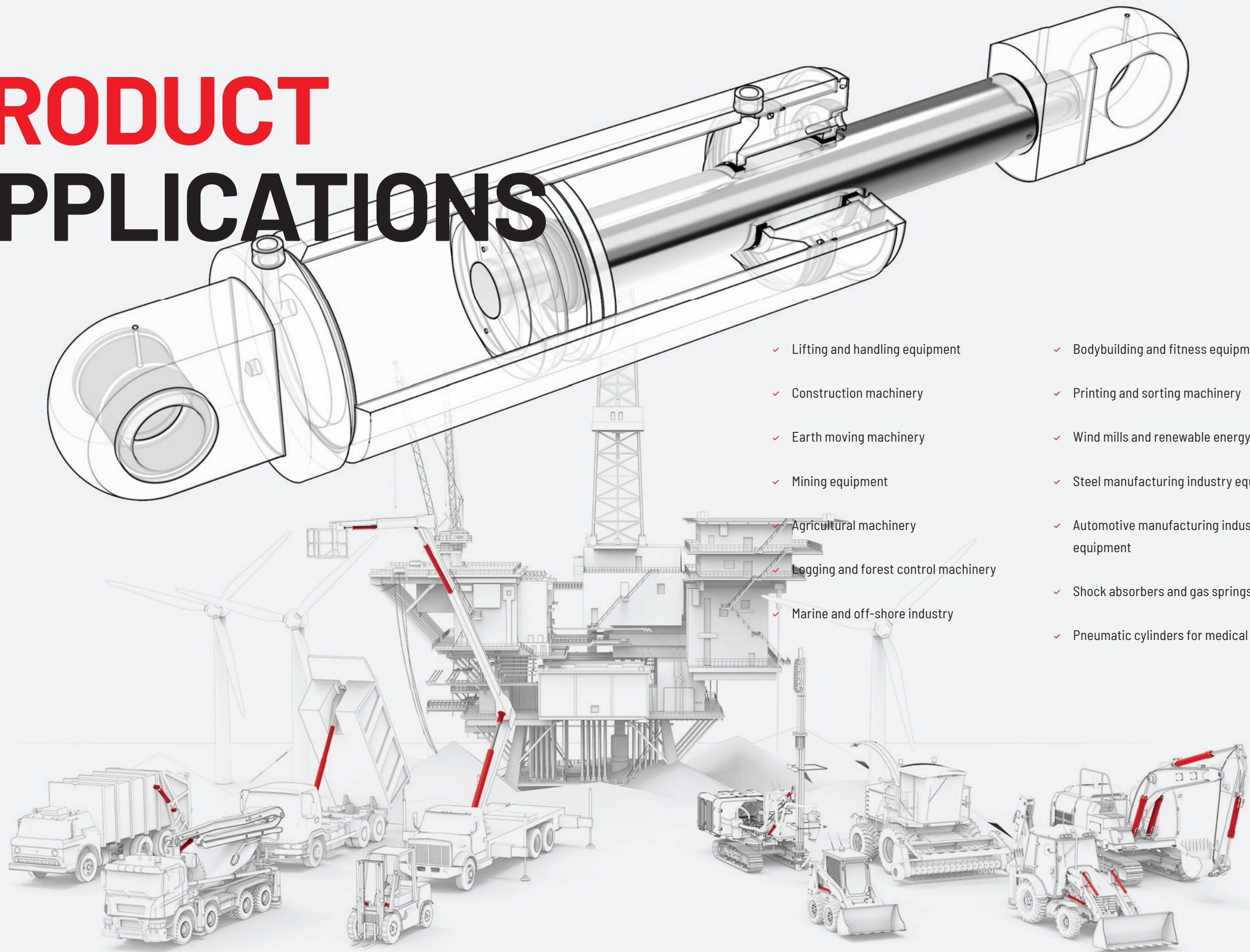




QUALITY ASSURANCE

- ✓ Engineering and design in accordance with our customers' requirements.
- ✓ Control of surface hardness, Vickers micro hardness, metallography and structural characteristics of the hardened layer, measurements of chrome layer (thickness, number of micro cracks, chrome micro hardness) in our own laboratory.
- ✓ Corrosion testing: NSS test, AASS test, CASS test according to ISO 9227 standard or its equivalents and evaluated according to ISO 10289. Possibility of simultaneous tests by using the spray chambers with automatic setting of testing cycle.
- ✓ Control of chemical composition with portable spectrometer.
- ✓ In line testing of the hardness parameters with Magnatest.

PRODUCT APPLICATIONS



- ✓ Lifting and handling equipment
- ✓ Construction machinery
- ✓ Earth moving machinery
- ✓ Mining equipment
- ✓ Agricultural machinery
- ✓ Logging and forest control machinery
- ✓ Marine and off-shore industry
- ✓ Bodybuilding and fitness equipment
- ✓ Printing and sorting machinery
- ✓ Wind mills and renewable energy systems
- ✓ Steel manufacturing industry equipment
- ✓ Automotive manufacturing industry equipment
- ✓ Shock absorbers and gas springs
- ✓ Pneumatic cylinders for medical equipment

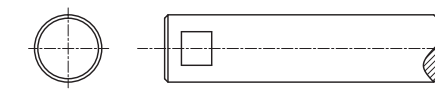


CUSTOMIZED MACHINING

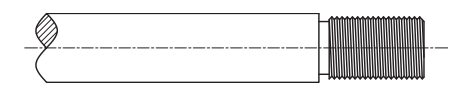
CUSTOMIZED MACHINING

On request we can perform customized cutting and machining according to drawing. We work with the latest technology and our CNC machines can perform high quality turning, milling, threading and drilling.

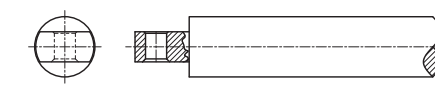
CROSSWISE GROOVE



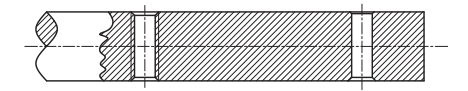
OUTSIDE DIAMETER THREAD



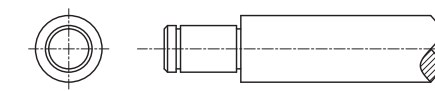
END FOR MOUNT WITH CLEVIS CLAMP



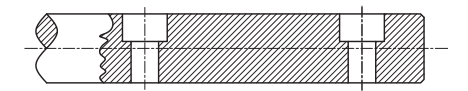
TAPPED OR DRILLED HOLES RADIALLY THROUGH SHAFT



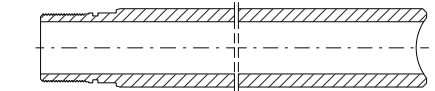
GROOVES FOR SNAP RING



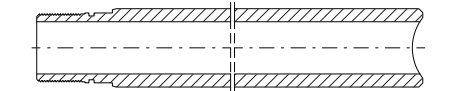
RADIAL DRILLING HOLES, BORED



CHROMED TUBE WITH EXTERNAL THREAD AND THE OTHER END PREPARED FOR WELDING



CHROMED TUBE WITH EXTERNAL THREAD AND THE OTHER END PREPARED FOR WELDING



CHROME PLATED STEEL BARS

CB

CHROME PLATED
STEEL BARS

ICB

INDUCTION HARDENED AND
CHROME PLATED
STEEL BARS

NCB

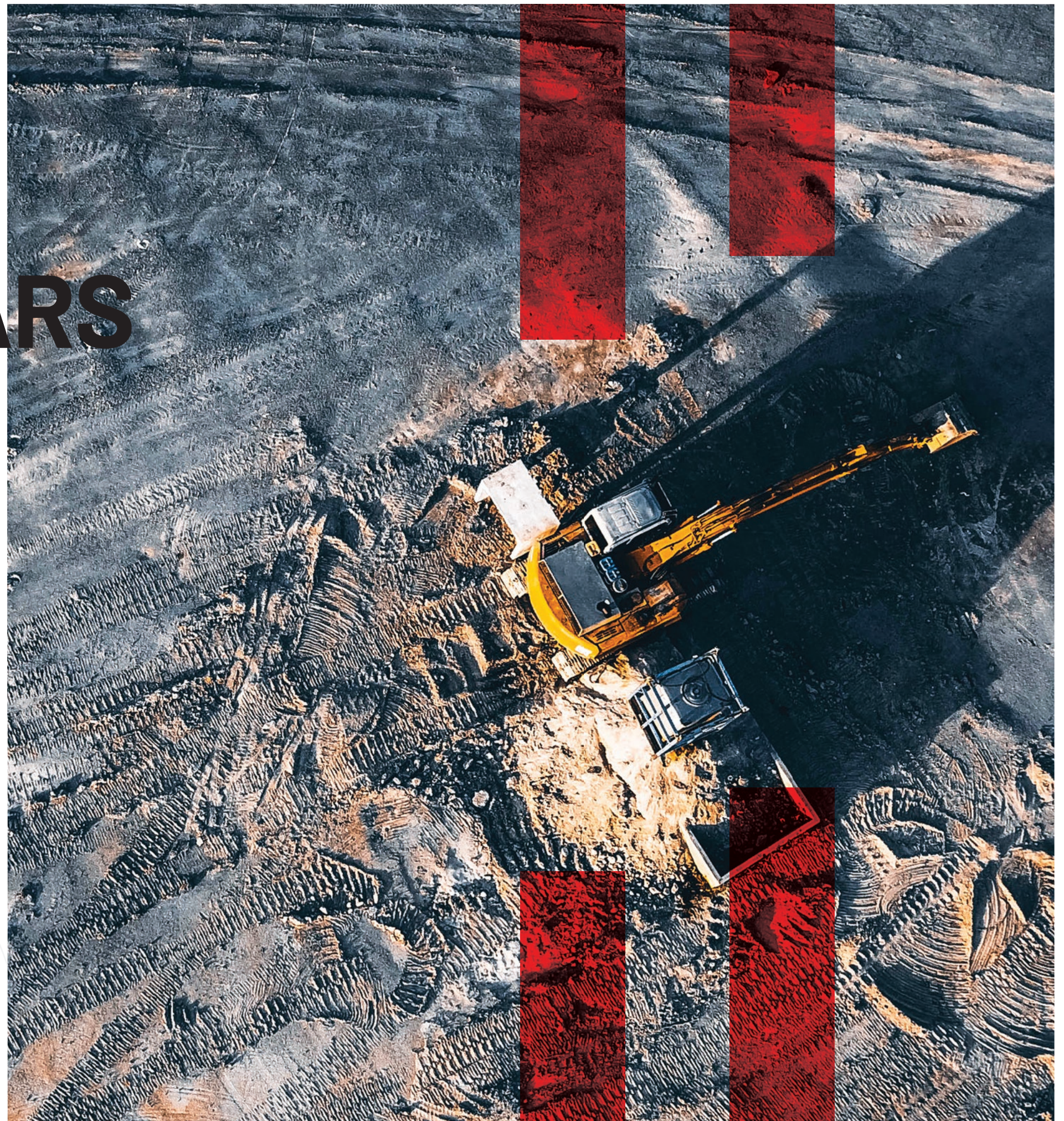
NICKEL-CHROME PLATED
STEEL BARS

INCB

INDUCTION HARDENED AND
NICKEL-CHROME PLATED
STEEL BARS

CBX

CHROME PLATED STAINLESS
STEEL BARS



● STEEL GRADES CORRESPONDENTS

EN	Werkstoff	DIN	B.S.	UNI	JIS	GOST	AISI / SAE / ASTM
C45E	1.1191	Ck45	080M46	C45	S45C	45	1045
C35E	1.1181	Ck35	080M36	C35	S35C	35	1035
-	1.5217	20MnV6	55M	-	-	-	A572
38MnVS6	1.1303	38MnSiVS5	-	-	-	-	(15V41) ⁽¹⁾
46MnVS6	1.1304	44MnSiVS6	-	-	-	-	(10V45) ⁽¹⁾
42CrMo4	1.7225	42CrMo4	708M40	42CrMo4	SCM440(H)	40ChFA	4140

⁽¹⁾ Equivalent

● CHEMICAL COMPOSITION - IN % BY WEIGHT

Steel grade	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	V	N
C45E ⁽¹⁾	0.42 ÷ 0.50	0.10 ÷ 0.40	0.50 ÷ 0.80	max. 0.025	max. 0.035	max. 0.40	max. 0.10	max. 0.40	max. 0.30	-	-
C35E ⁽¹⁾	0.32 ÷ 0.39	0.10 ÷ 0.40	0.50 ÷ 0.80	max. 0.025	max. 0.035	max. 0.40	max. 0.10	max. 0.40	max. 0.30	-	-
20MnV6	0.16 ÷ 0.22	0.10 ÷ 0.50	1.30 ÷ 1.70	max. 0.035	max. 0.035	-	-	-	-	0.08 ÷ 0.20	-
38MnVS6	0.34 ÷ 0.41	0.15 ÷ 0.80	1.20 ÷ 1.60	max. 0.025	0.020 ÷ 0.060	max. 0.30	max. 0.08	-	-	0.08 ÷ 0.20	0.010 ÷ 0.020
46MnVS6	0.42 ÷ 0.49	0.15 ÷ 0.80	1.20 ÷ 1.60	max. 0.025	0.020 ÷ 0.060	max. 0.30	max. 0.08	-	-	0.08 ÷ 0.20	0.010 ÷ 0.020
42CrMo4	0.38 ÷ 0.45	0.10 ÷ 0.40	0.60 ÷ 0.90	max. 0.025	max. 0.035	0.90 ÷ 1.20	0.15 ÷ 0.30	-	max. 0.40	-	-

⁽¹⁾ Cr+Mo+Ni = max. 0.63

STEEL GRADE

20MnV6 steel grade offers good weldability, enhanced mechanical characteristics, impact resistance at lower temperatures (-20°C).

38MnVS6 steel grade has excellent machinability, good weldability and it is widely used in civil, mechanical and chemical engineering applications.

42CrMo4 steel grade has high hardenability and is an excellent material for the oil and gas industry, mining and automotive engineering.

● MECHANICAL PROPERTIES

Steel grade	Diameter Ø mm	Tensile strength R _m N/mm ²	Yield point R _{p0.2} N/mm ²	Elongation A ₅ %	Impact energy KV ₂ J	Hardness ⁽¹⁾ Brinell N/mm ²	Norm
C45E	6 < Ø ≤ 10	750 - 1050	min. 565	min. 5	-	225 - 320	EN 10277
	10 < Ø ≤ 16	710 - 1030	min. 500	min. 6		210 - 315	
	16 < Ø ≤ 40	650 - 1000	min. 410	min. 7		200 - 298	
	18 ≤ Ø ≤ 100	min. 580	min. 305	min. 14	-	172 - 242	EN ISO 683-1
	100 < Ø ≤ 200	min. 560	min. 275	min. 14		172 - 242	
C45E+QT	20 ≤ Ø ≤ 40	650 - 800	min. 430	min. 16	-	195 - 240	EN ISO 683-1
	40 < Ø ≤ 100	630 - 780	min. 370	min. 17		190 - 270	
	100 < Ø ≤ 160	The values of R _m , R _{p0.2} and A ₅ must be agreed				-	
C35E	6 < Ø ≤ 10	650 - 1000	min. 510	min. 6	-	190 - 298	EN 10277
	10 < Ø ≤ 16	600 - 950	min. 420	min. 7		180 - 285	
	16 < Ø ≤ 40	580 - 880	min. 320	min. 8		172 - 263	
	18 ≤ Ø ≤ 100	min. 520	min. 270	min. 19	-	154 - 207	EN ISO 683-1
	100 < Ø ≤ 200	min. 500	min. 245	min. 19		154 - 207	
20MnV6	6 < Ø ≤ 25	min. 700	min. 620	min. 10	min. 27J / - 20°C	213 - 260	Technical data according to internal norm
	19 < Ø ≤ 80	min. 600	min. 460	min. 18		159 - 220	
	80 < Ø ≤ 200	min. 550	min. 420	min. 18		155 - 220	
20MnV6 M	20 < Ø ≤ 90	min. 600	min. 520	min. 19	min. 27J / - 20°C	165 - 225	Technical data according to internal norm
38MnVS6	20 < Ø ≤ 120	800 - 950	min. 520	min. 12	-	240 - 290	EN 10267
	120 < Ø ≤ 200	700 - 950	min. 520	min. 12	-	210 - 300	
38MnV6X	20 < Ø ≤ 90	850 - 1000	min. 580	min. 14	-	240 - 290	EN 10267
46MnVS6	20 < Ø ≤ 160	900 - 1050	min. 585	min. 10	-	240 - 290	EN 10267
42CrMo4+QT	6 < Ø ≤ 16	1100 - 1300	min. 900	min. 10	-	298 - 359	EN ISO 683-2
	16 < Ø ≤ 40	1000 - 1200	min. 750	min. 11	min. 35J / 20°C	298 - 359	
	40 < Ø ≤ 100	900 - 1100	min. 650	min. 12		271 - 331	
	100 < Ø ≤ 160	800 - 950	min. 550	min. 13		240 - 290	
	160 < Ø ≤ 200	750 - 900	min. 500	min. 14		225 - 275	

⁽¹⁾ The hardness values are for information only

● STEEL GRADES CORRESPONDENTS

Werkstoff	EN	DIN	B.S.	UNI	JIS	GOST	AISI / SAE / ASTM
1.4021	X20Cr13	X20Cr13	420S37	X20Cr13	SUS420F	20Ch13	420
1.4057	X17CrNi16-2	X17CrNi16-2	431S29	X16CrNi16	SUS431	20Ch17N2	431
1.4301	X5CrNi18-10	X5CrNi18-10	304S17	X5CrNi18-10	SUS304	08Ch18N10	304
1.4401	X5CrNiMo17-12-2	X5CrNiMo17-12-2	316S19	X5CrNiMo17-12-2	SUS316	08X17H13M2	316
1.4542	X5CrNiCuNb16-4	X5CrNiCuNb16-4	17Cr4Ni	-	SCS 25 SUS630	-	630

● CHEMICAL COMPOSITION - IN % BY WEIGHT

Steel grade	C	Si	Mn	P	S	Cr	Mo	Ni	N	Cu
		max.	max.	max.	max.					
W1.4021	0.16 ÷ 0.25	1.00	1.50	0.040	0.03	12.00 ÷ 14.00	-	-	-	-
W1.4057	0.12 ÷ 0.22	1.00	1.50	0.040	0.03	15.00 ÷ 17.00	-	1.50 ÷ 2.50	-	-
W1.4301	max. 0.07	1.00	2.00	0.045	0.03	17.50 ÷ 19.50	-	8.00 ÷ 10.50	max. 0.10	-
W1.4401	max. 0.07	1.00	2.00	0.045	0.03	16.50 ÷ 18.50	2.00 ÷ 2.50	10.00 ÷ 13.00	max. 0.10	-
W1.4542	max. 0.07	0.70	1.50	0.040	0.03	15.00 ÷ 17.00	max.0.60	3.00 ÷ 5.00		3.00 ÷ 5.00

● MECHANICAL PROPERTIES

Steel grade	Delivery condition	Diameter Ø mm	Tensile strength R _m N/mm²		Yield point R _{p0.2} N/mm²	Elongation ⁽¹⁾ A ₅ %	Hardness Brinell N/mm²	Norm
W1.4021	A	6 ≤ Ø ≤ 80	-	max. 760 ⁽²⁾	-	-	max. 230 ⁽²⁾	EN 10088-3
	QT700	Ø ≤ 100	min. 700	max. 850	min. 500	min. 13	-	
	QT800	Ø ≤ 100	min. 800	max. 950	min. 600	min. 12	-	
W1.4057	A	6 ≤ Ø ≤ 80	-	max. 950 ⁽²⁾	-	-	max. 295 ⁽²⁾	EN 10088-3
	QT800	Ø ≤ 60	min. 800	max. 950	min. 600	min. 14	-	
		60 < Ø ≤ 100	min. 800	max. 950	min. 600	min. 12	-	
W1.4301	QT900	Ø ≤ 60	min. 900	max. 1050	min. 700	min. 12	-	EN 10088-3
		60 < Ø ≤ 100	min. 900	max. 1050	min. 700	min. 10	-	
W1.4301	A	Ø ≤ 100	min. 500	max. 700 ⁽³⁾	min. 190	min. 40 ⁽³⁾	max. 215 ⁽³⁾	EN 10088-3
W1.4401	A	Ø ≤ 100	min. 500	max. 700 ⁽³⁾	min. 200	min. 40 ⁽³⁾	max. 215 ⁽³⁾	EN 10088-3
W1.4542	AT	Ø ≤ 100	-	max. 1200	-	-	max. 360 ⁽⁴⁾	EN 10088-3
	P800	Ø ≤ 100	min. 800	max. 950	min. 520	min. 18	-	
	P930	Ø ≤ 100	min. 930	max. 1100	min. 720	min. 16	-	
	P960	Ø ≤ 100	min. 960	max. 1160	min. 790	min. 12	-	
	P1070	Ø ≤ 100	min. 1070	max. 1270	min. 1000	min. 10	-	

A = Annealed / QT = Quenched and tempered

⁽¹⁾ Longitudinal

⁽²⁾ The maximum HB values may be raised with 60 HB or the maximum tensile strength with 150 N/mm² for bars up to 35 mm, having undergone final cold working

⁽³⁾ The maximum HB values may be raised with 100 HB or the tensile strength with 200 N/mm² and the minimum elongation value be lowered to 20% for bars up to 35 mm, having undergone final cold working

CHROME PLATED BARS

CB

CHROME PLATED STEEL BARS

The hard chromed surface of the bars ensures corrosion and wear resistance and improves durability. Commonly used in non aggressive environments, for rods not exposed to mechanical strokes.

SUSTAINABLE PRODUCTS

NCB

NICKEL-CHROME PLATED STEEL BARS

In spite of the well known oxidation resistance, chrome plating has its limitations when exposed to aggressive environments.

Our solution in this case is nickel-chrome plating, a process meant to give products more durability even in high salinity, high humidity and heavy polluted environments. Steel grades as 20MnV6 or 38MnVS6, having a low carbon content and good weldability, are the most suitable bases for nickel-chrome plated products.

When using 38MnVS6, the nickel and chrome plated product combines the high strength with utmost corrosion resistance and excellent machinability.

The nickel and chrome plating technology is the solution to extreme environments with intense corrosion: offshore, marine conditions, wind, solar and aerospace sectors, agriculture, mining industry, oil and gas industry.

ICB

INDUCTION HARDENED AND CHROME PLATED STEEL BARS

Extensively used for those applications requiring a high surface hardness and excellent resistance to surface impact (eg. mining equipment).

Offering greater strength and resistance to mechanical strokes, coupled with good core strength, the induction hardened and hard chrome plated steel bars are characterized by an extremely smooth surface finish, granting as well an excellent wear and corrosion resistance.

The surface does not withstand though a high, direct and continuous pressure, but only the one of hydraulic seals.

INCB

INDUCTION HARDENED AND NICKEL-CHROME PLATED STEEL BARS

The hardening is used mainly for conferring a protection of the surface against mechanical strokes. The surface does not withstand though the high, direct and continuous pressure, but only the one of hydraulic seals.

CBX

CHROME PLATED STAINLESS STEEL BARS

Obtained trough a chrome plating process over a stainless steel base material, this product not only satisfies certain oxidation resistance requirements, given by the used type of stainless steel, but also different mechanical demands.

Granting higher corrosion resistance, generally used in automotive, food and pharmaceutical industries, the stainless steel grades with higher Nickel content provide a good impact resistance even at lower temperatures (-20°C).

CHROME PLATED STEEL BARS

CB

NIMAX CB - C45E | C35E
NIMAX CBM - 20MnV6 | 38MnVS6
NIMAX CBV - 42CrMo4+QT

INDUCTION HARDENED AND CHROME PLATED STEEL BARS

ICB

NIMAX ICB - C45E | C35E
NIMAX ICBM - 20MnV6 | 38MnVS6
NIMAX ICBV - 42CrMo4+QT

NICKEL-CHROME PLATED STEEL BARS

NCB

NiCro NCB - C45E | C35E
NiCro NCBM - 20MnV6 | 38MnVS6
NiCro NCBV - 42CrMo4+QT

INDUCTION HARDENED AND NICKEL-CHROME PLATED STEEL BARS

INCB

NiCro INCB - C45E
NiCro INCBM - 20MnV6 | 38MnVS6

Dimensions

Ø6 - 200 mm / Ø1/4" - 7"

Diameter tolerance

ISO f7 / other, on request

Roundness

max. 1/2 from diameter tolerance

Standard lengths

5000 - 7500 mm

Special lengths

On request we can offer cut to fix lengths pieces and special lengths up to 11.500 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 microhardness

min. 900 HV0.1

Straightness

Ø ≤ 16 mm: max. 0.3 mm/1000 mm

Ø > 16 mm: max. 0.2 mm/1000 mm

● TABLE OF DIMENSIONS TOLERANCE

Diameter mm	ISO f7 µm
Ø = 6	-10 / -22
6 < Ø ≤ 10	-13 / -28
10 < Ø ≤ 18	-16 / -34
18 < Ø ≤ 30	-20 / -41
30 < Ø ≤ 50	-25 / -50
50 < Ø ≤ 80	-30 / -60
80 < Ø ≤ 120	-36 / -71
120 < Ø ≤ 180	-43 / -83
180 < Ø ≤ 200	-50 / -96

● CORROSION RESISTANCE LEVELS

Production	Diameter mm	Mild corrosion resistance		Medium corrosion resistance		High corrosion resistance		Extreme corrosion resistance		
		NIMAX 120		NIMAX 200		NIMAX 500		NIMAX 1000		NICASS
		NSS	AASS	NSS	AASS	NSS	AASS	NSS	AASS	CASS
Regular	Ø < 20	rating 9 after 72h								
	Ø ≥ 20	rating 9 after 120h	rating 9 after 48h	rating 9 after 200h	rating 9 after 80h	rating 9 after 500h	rating 9 after 200h			
Special	Ø ≥ 20	rating 10 after 120h	rating 10 after 48h	rating 10 after 250h	rating 10 after 100h	rating 10 after 500h	rating 10 after 200h	rating 9 after 1000h	rating 9 after 350h	rating 9 after 64h

Tested in our own laboratory according to ISO 9227, evaluated according to ISO 10289.

● CORRESPONDENCE BETWEEN STEEL GRADE AND SURFACE HARDNESS (ICB)

	NIMAX ICB C35E	NIMAX ICB C45E	NIMAX ICBM 20MnV6	NIMAX ICBM 38MnVS6	NIMAX ICBV 42CrMo4+QT
Surface hardness beneath the chrome layer	55±3 HRC	58±3 HRC	45±3 HRC	57±3 HRC	59±3 HRC

Dimensions

Ø20 - 160 mm / Ø1" - 6"

Diameter tolerance

ISO f7 / other, on request

Roundness

max. 1/2 from diameter tolerance

Standard lengths

5000 - 6400 mm

Special lengths

On request we can offer cut to fix lengths pieces and special lengths up to max. 6.400 mm

Surface roughness

Ra: max. 0.20 µm

NiCro 150

min. 10 µm

NiCro 350

min. 20 µm

NiCro 500

min. 30 µm

Nickel layer thickness

min. 10 µm

min. 20 µm

min. 30 µm

Chrome layer thickness

min. 20 µm

min. 20 µm

min. 20 µm

Nickel layer microhardness

min. 300 HV0.1

Chrome layer microhardness

min. 900 HV0.1

Straightness

max. 0.2 mm/1000 mm

● TABLE OF DIMENSIONS TOLERANCE

Diameter mm	ISO f7 µm
20 ≤ Ø ≤ 30	-20 / -41
30 < Ø ≤ 50	-25 / -50
50 < Ø ≤ 80	-30 / -60
80 < Ø ≤ 120	-36 / -71
120 < Ø ≤ 160	-43 / -83

● CORROSION RESISTANCE LEVELS

Diameter mm	NiCro 150		NiCro 350		NiCro 500	
	NSS	AASS	NSS	AASS	NSS	AASS
Ø20 - 160	rating 10 after 500h	rating 10 after 150h	rating 10 after 1000h	rating 10 after 350h	rating 10 after 1500h	rating 10 after 500h

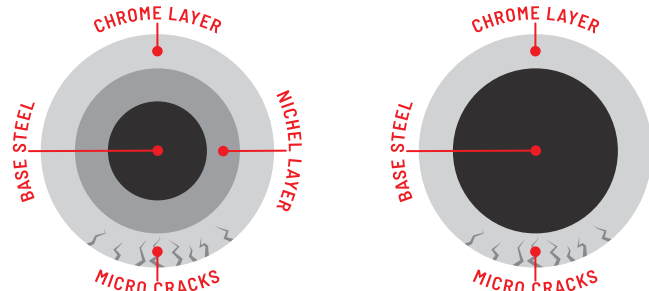
Tested in our own laboratory according to ISO 9227, evaluated according to ISO 10289.

● CORRESPONDENCE BETWEEN STEEL GRADE AND SURFACE HARDNESS (INCB)

	NiCro INCB C45E	NiCro INCBM 20MnV6	NiCro INCBM 38MnVS6
Surface hardness beneath the chrome layer	54±3 HRC	44±3 HRC	54±3 HRC

The hardening depth is defined as the distance from the surface, beneath the chrome layer up to the point where the hardness value has dropped to the value of 513 HV1 for C45E and 38MnVS6 steel grades, respective 360HV1 for 20MnV6 steel grade.

The hardening depth is between 1.0 - 2.0 mm, depending on diameter and steel grade.



The nickel layer is completely free of cracks, pores and by this, the base material is isolated from the atmospheric corrosion, while the chrome layer ensures a very good wear resistance.

CHROME PLATED STAINLESS
STEEL BARS

CBX

W1.4021(AISI 420) | W1.4057(AISI 431) | W1.4542(AISI 630) | W1.4301(AISI 304) | W1.4401(AISI 316)

CBX

Dimensions	Ø6 - 100 mm / Ø1/4" - 4"
Diameter tolerance	ISO f7 / other, on request
Roundness	max. 1/2 from diameter tolerance
Standard lengths	3000 - 6500 mm
Special lengths	On request we can offer cut to fix lengths pieces
Surface roughness	Ra: max. 0.20 µm
Chrome layer thickness	Ø < 20 mm: min. 15 µm Ø ≥ 20 mm: min. 20 µm
Chrome layer microhardness	min. 900 HV0.1
Straightness	Ø ≤ 16 mm: max. 0.3 mm/1000 mm Ø > 16 mm: max. 0.2 mm/1000 mm

● TABLE OF DIMENSIONS TOLERANCE

Diameter mm	ISO f7 µm
Ø = 6	-10 / -22
6 < Ø ≤ 10	-13 / -28
10 < Ø ≤ 18	-16 / -34
18 < Ø ≤ 30	-20 / -41
30 < Ø ≤ 50	-25 / -50
50 < Ø ≤ 80	-30 / -60
80 < Ø ≤ 100	-36 / -71

● CORROSION RESISTANCE LEVELS

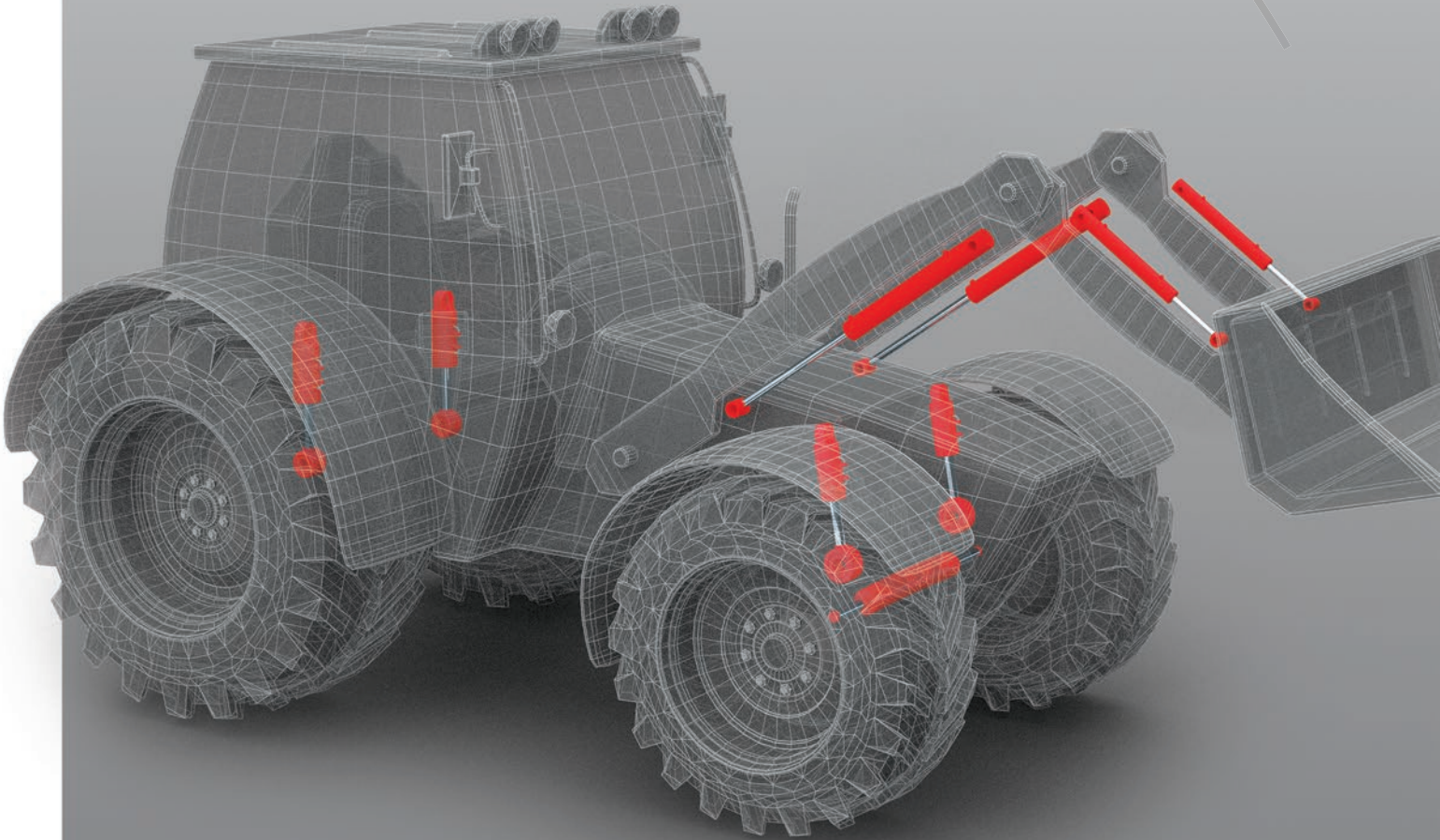
Diameter mm	NIMAX CBX	NSS
Ø6 - 100	W.14021 (AISI 420)	rating 9 after 200 h
	W.14057 (AISI 431)	rating 9 after 500 h
	W.1.4542 (AISI 630)	rating 9 after 1000 h
	W.1.4301 (AISI 304)	rating 9 after 1200 h
	W.1.4401 (AISI 316)	rating 9 after 1450 h

Tested in our own laboratory according to ISO 9227, evaluated according to ISO 10289.



PRECISION CUSTOMIZED

PISTON
RODS





CHROME PLATED STEEL TUBES

CT

CHROME PLATED
STEEL TUBES

ICT

INDUCTION HARDENED AND
CHROME PLATED
STEEL TUBES

CTI

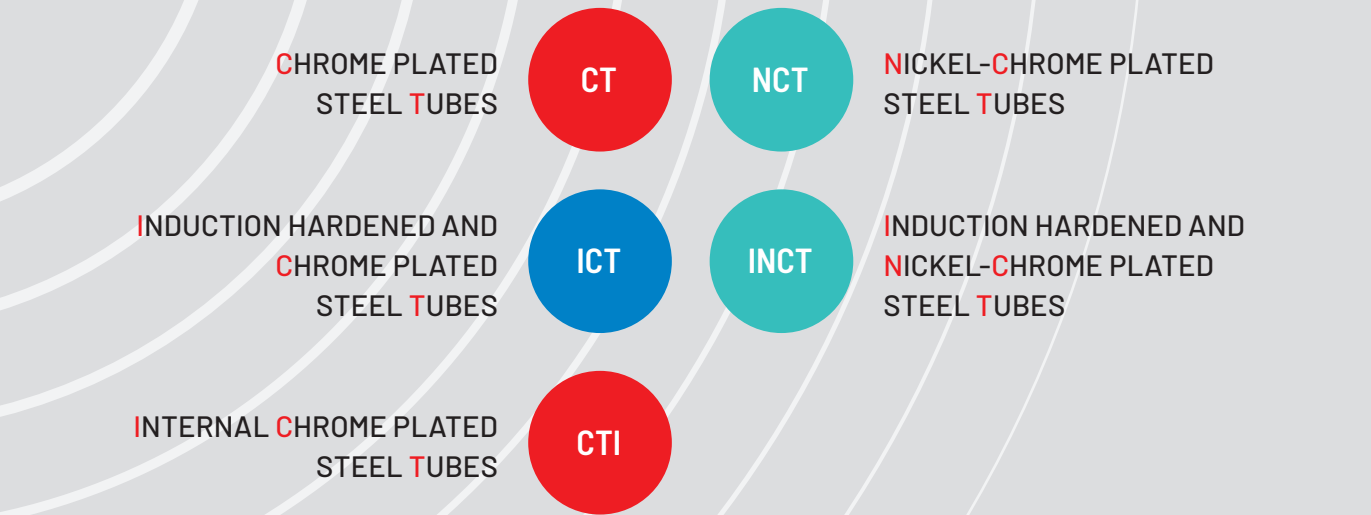
INTERNAL CHROME PLATED
STEEL TUBES

NCT

NICKEL-CHROME PLATED
STEEL TUBES

INCT

INDUCTION HARDENED AND
NICKEL-CHROME PLATED
STEEL TUBES



CHROME PLATED
STEEL TUBES

NIMAX CT

E355+SR | P460N+N | 20MnV6

Replaces the solid piston rod in systems where the total weight needs to be minimized.
The chrome layer protects the inside surface from corrosion and improves the durability.



● STEEL GRADES CORRESPONDENTS

EN	Werkstoff	DIN	B.S.	UNI	JIS	GOST	AISI / SAE / ASTM
E355	1.0580	St52	CFS5	Fe510	STKM19A	St6sp	1524 / 1024
P460N	1.8905	StE460	55C	FeE460KG	-	18G2AF	-
C45E	1.1191	Ck45	080M46	C45	S45C	45	1045
-	1.5217	20MnV6	55M	-	-	-	A572

● CHEMICAL COMPOSITION - IN % BY WEIGHT

Steel grade	C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu	N
E355	max. 0.22	max. 0.55	max. 1.60	max. 0.025	max. 0.025	-	-	-	-	-	-
P460N	max. 0.20	max. 0.60	1.00 ÷ 1.70	max. 0.025	max. 0.020	max. 0.30	max. 0.10	max 0.80	max. 0.20	max. 0.70	max. 0.020
C45E ⁽¹⁾	0.42 ÷ 0.50	max. 0.40	0.50 ÷ 0.80	max. 0.030	max. 0.035	max. 0.40	max. 0.10	-	-	-	-
20MnV6	0.16 ÷ 0.22	0.10 ÷ 0.50	1.30 ÷ 1.70	max. 0.035	max. 0.035	-	-	-	0.08 ÷ 0.20	-	-

⁽¹⁾ Cr+Mo+Ni = max. 0.63

● MECHANICAL PROPERTIES

Steel grade	Tensile strength	Yield point	Elongation (longitudinal)	Impact energy (longitudinal direction)	Hardness ⁽³⁾	Norm
	R _m	R _{p0.2}	A ₅	KV ₂	Brinell	
	N/mm²	N/mm²	%	J	N/mm²	
E355+SR	min. 580	min. 450	min. 10	(min. 27J / -20°C) ⁽²⁾	min. 175	EN 10305-1
E355+C	min. 640	min. 540 ⁽⁴⁾	min. 4	-	min. 185	EN 10305-2
P460N+N	560 - 730	min. 460 ⁽¹⁾	min. 19	min. 40J / -20°C	170 - 220	EN 10216-3
C45E+N	min. 550	min. 340	min. 18	-	min. 163	EN 10305-1
20MnV6+N	550 - 800	min. 450	min. 20	min. 27J / -20°C	165 - 240	Technical data according to internal norm

SR = stress-relieved, N = normalized, C = cold drawn

⁽¹⁾ Wall thickness ≤ 12 mm

⁽²⁾ On request

⁽³⁾ The hardness values is for information only

⁽⁴⁾ The Yield Point value is for information only

● TABLE OF DIMENSIONS OD TOLERANCE

Diameter mm	ISO f7 µm	ISO f8 µm
10 < Ø ≤ 18	-16 / -34	-16 / -43
18 < Ø ≤ 30	-20 / -41	-20 / -53
30 < Ø ≤ 50	-25 / -50	-25 / -64
50 < Ø ≤ 80	-30 / -60	-30 / -76
80 < Ø ≤ 120	-36 / -71	-36 / -90
120 < Ø ≤ 140	-43 / -83	-43 / -106

Outside diameter - OD	Ø12 - 140 mm
Inside diameter - ID	see standard dimensions range
Outside tolerance - OD	ISO f7 / ISO f8 / other, on request
Roundness - OD	max. 1/2 from diameter tolerance
Standard lengths	5000 - 7500 mm
Special lengths	On request we can offer cut to fix lengths pieces and special lengths up to 11.500 mm
Surface roughness - OD	Ra: max. 0.20 µm
Chrome layer thickness	OD < 20 mm: min. 15 µm OD ≥ 20 mm: min. 20 µm
Chrome layer microhardness	min. 900 HV0.1
Straightness	max. 0.25 mm / 1000 mm

● STANDARD DIMENSIONS RANGE

Outside diameter mm	12	16	20	25	28	30	32	35	40	45	50	55	60	63	65	70	75	80	85	90	100	110	120	140
Inside diameter mm	8	10	14	15	16	15	16	25	20	25	30	35	40	43	45	50	55	60	65	70	80	90	100	120
	-	-	15	18	-	20	20	20	25	30	35	40	45	53	50	55	60	65	75	75	85	95	-	-
	-	-	-	20	-	-	-	-	30	35	40	45	50	-	55	60	65	70	-	80	90	-	-	-
Wall thickness mm	2	3	3	5	6	7.5	8	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	-	-	2.5	3.5	-	5	6	7.5	7.5	7.5	7.5	7.5	7.5	5	7.5	7.5	7.5	7.5	5	7.5	7.5	7.5	-	-
	-	-	-	2.5	-	-	-	-	5	5	5	5	5	-	5	5	5	5	-	5	5	-	-	-

● CORROSION RESISTANCE LEVELS

Production	Outside diameter mm	Mild corrosion resistance		Medium corrosion resistance		High corrosion resistance	
		NIMAX 120		NIMAX 200		NIMAX 500	
		NSS	AASS	NSS	AASS	NSS	AA SS
Regular	Ø < 20	rating 9 after 72 h					
	Ø ≥ 20	rating 9 after 120h	rating 9 after 48h	rating 9 after 200h	rating 9 after 80h	rating 9 after 500h	rating 9 after 200h
Special	Ø ≥ 20	rating 10 after 120h	rating 10 after 48h	rating 10 after 250h	rating 10 after 100h	rating 10 after 500h	rating 10 after 200h

Tested in our own laboratory according to ISO 9227, evaluated according to ISO 10289.

INDUCTION HARDENED AND CHROME PLATED
STEEL TUBES

NIMAX ICT

E355+SR | P460N+N | C45E+N | 20MnV6

Extensively used for those applications requiring a high surface hardness and excellent resistance to surface impact (eg. mining equipment). The surface does not withstand though a high, direct and continuous pressure, but only the one of hydraulic seals.

ICT

Outside diameter - OD	Ø40 - 125 mm
Inside diameter - ID	see standard dimensions range
Outside tolerance - OD	ISO f7 / ISO f8 / other, on request
Roundness - OD	max. 1/2 from diameter tolerance
Standard lengths	5000 - 7500 mm
Special lengths	On request we can offer cut to fix lengths pieces and special lengths
Surface roughness - OD	Ra: max. 0.20 µm
Chrome layer thickness	OD < 20 mm: min. 15 µm OD ≥ 20 mm: min. 20 µm
Chrome layer microhardness	min. 900 HV0.1
Straightness	max. 0.25 mm / 1000 mm

● STANDARD DIMENSIONS RANGE

Outside diameter mm	40	45	50	55	60	63	70	75	80	85	90	100	110	120	125
Inside diameter mm	20	25	30	35	45	43	50	55	50	65	70	80	90	100	100
	25	30	35	40	50	50	55	-	-	-	-	-	-	-	-
Wall thickness mm	10	10	10	10	7.5	10	10	10	15	10	10	10	10	10	12.5
	7.5	7.5	7.5	7.5	5	6.5	7.5	-	-	-	-	-	-	-	-

● CORRESPONDENCE BETWEEN STEEL GRADE AND SURFACE HARDNESS (ICT)

NIMAX ICT E355+SR / P460N+N / 20MnV6					NIMAX ICT C45E+N	
Surface hardness beneath the chrome layer					42±4 HRC	

The hardening depth is defined as the distance from the surface, beneath the chrome layer up to the point where the hardness value has dropped to the value of the steel core hardness, depending on the steel grade. Generally, the hardening depth is between 1.0 - 3.5 mm, depending on diameter and steel grade.

● CORROSION RESISTANCE LEVELS

Production	Outside diameter mm	Mild corrosion resistance		Medium corrosion resistance		High corrosion resistance	
		NIMAX 120		NIMAX 200		NIMAX 500	
		NSS	AASS	NSS	AASS	NSS	AA SS
Regular	Ø ≥ 20	rating 9 after 120h	rating 9 after 48h	rating 9 after 200h	rating 9 after 80h	rating 9 after 500h	rating 9 after 200h
Special	Ø ≥ 20	rating 10 after 120h	rating 10 after 48h	rating 10 after 250h	rating 10 after 100h	rating 10 after 500h	rating 10 after 200h

Tested in our own laboratory according to ISO 9227, evaluated according to ISO 10289.

INTERNAL CHROME PLATED
STEEL TUBES

NIMAX CTI

E355+SR

For niche markets like concrete pumps and renewable energy sectors.

CTI

Outside diameter - OD	Ø80 - 225 mm
Inside diameter - ID	Ø70 - 200 mm
Inside tolerance - ID	ISO H8 / ISO H9
Outside tolerance - OD	according to EN 10305-1
Roundness - OD	within the limits of the diameter tolerances
Roundness - ID	within the limits of the diameter tolerances
Standard lengths	requested by specification, but max. 1.100 mm
Surface roughness - ID	Ra: max. 0.30 µm
Chrome layer thickness	min. 20 µm
Chrome layer microhardness	min. 900 HV0.1
Straightness	max. 0.4 mm / 1000 mm

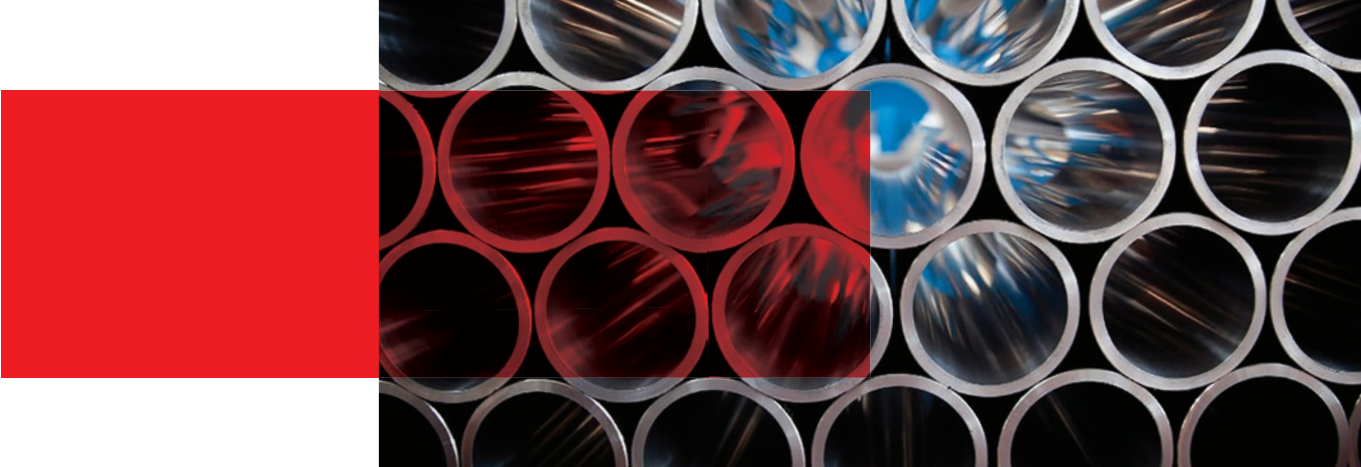
● TABLE OF DIMENSIONS ID TOLERANCE

Diameter mm	ISO H8 µm	ISO H9 µm
50 < Ø ≤ 80	0 / +46	0 / +74
80 < Ø ≤ 120	0 / +54	0 / +87
120 < Ø ≤ 180	0 / +63	0 / +100
180 < Ø ≤ 200	0 / +72	0 / +115

● STANDARD DIMENSIONS RANGE

Outside diameter mm	80	90	105	110	115	125	145	150	160	165	170	175	190	195	210	216	225
Inside diameter mm	70	80	90	95	100	110	125	120	135	140	145	140	160	160	180	200	200
	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-	-	-
Wall thickness mm	5	5	7.5	7.5	7.5	7.5	10	15	12.5	12.5	12.5	17.5	15	17.5	15.0	8	12.5
	-	-	-	-	-	12.5	-	-	-	-	-	-	-	-	-	-	-

* Other dimensions on request



NICKEL-CHROME PLATED
STEEL TUBES

NiCro NCT

E355+SR | P460N+N | 20MnV6

In spite of the well known oxidation resistance, chrome plating has its limitations when exposed to aggressive environments. Our solution in this case is nickel-chrome plating, a process meant to give products more durability even in high salinity, high humidity and heavy polluted environments. The tubes are replacing the solid piston rods in systems where the total weight needs to be minimized.

NCT

Outside diameter - OD	Ø30 - 140 mm		
Inside diameter - ID	see standard dimensions range		
Outside tolerance - OD	ISO f7 / ISO f8 / other, on request		
Roundness - OD	max. 1/2 from diameter tolerance		
Standard lengths	5000 - 6400 mm		
Special lengths	On request we can offer cut to fix lengths pieces and special lengths up to max. 6.400 mm		
Surface roughness - OD	Ra: max. 0.20 µm		
	NiCro 150	NiCro 350	NiCro 500
Nickel layer thickness	min. 10 µm	min. 20 µm	min. 30 µm
Chrome layer thickness	min. 20 µm	min. 20 µm	min. 20 µm
Nickel layer microhardness	min. 300 HV0.1		
Chrome layer microhardness	min. 900 HV0.1		
Straightness	max. 0.25 mm / 1000 mm		

● STANDARD DIMENSIONS RANGE

Outside diameter mm	30	32	35	40	45	50	55	60	63	65	70	75	80	85	90	100	110	120	140
Inside diameter mm	15	16	25	20	25	30	35	40	43	45	50	55	60	65	70	80	90	100	120
	20	20	20	25	30	35	40	45	53	50	55	60	65	75	75	85	95	-	-
	-	-	-	30	35	40	45	50	-	55	60	65	70	-	80	90	-	-	-
Wall thickness mm	7.5	8	5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
	5	6	7.5	7.5	7.5	7.5	7.5	7.5	5	7.5	7.5	7.5	7.5	5	7.5	7.5	7.5	-	-
	-	-	-	5	5	5	5	5	-	5	5	5	5	-	5	5	-	-	-



● CORROSION RESISTANCE LEVELS

Diameter mm	NiCro NCT	NSS	AASS
Ø30 - 140	NiCro 150	rating 10 after 500 h	rating 10 after 150 h
	NiCro 350	rating 10 after 1000 h	rating 10 after 350 h
	NiCro 500	rating 10 after 1500 h	rating 10 after 500 h

Tested in our own laboratory according to ISO 9227, evaluated according to ISO 10289.

INDUCTION HARDENED AND NICKEL-CHROME PLATED
STEEL TUBES

NiCro INCT

E355+SR | P460N+N | C45E+N | 20MnV6

Extensively used for those applications requiring a high surface hardness and excellent resistance to surface impact (eg. mining equipment). The surface does not withstand though a high, direct and continuous pressure, but only the one of hydraulic seals.

INCT

Outside diameter - OD	Ø40 - 125 mm		
Inside diameter - ID	see standard dimensions range		
Outside tolerance - OD	ISO f7 / ISO f8 / other, on request		
Roundness - OD	max. 1/2 from diameter tolerance		
Standard lengths	5000 - 6400 mm		
Special lengths	On request we can offer cut to fix lengths pieces and special lengths up to max. 6.400 mm		
Surface roughness - OD	Ra: max. 0.20 µm		
	NiCro 150	NiCro 350	NiCro 500
Nickel layer thickness	min. 10 µm	min. 20 µm	min. 30 µm
Chrome layer thickness	min. 20 µm	min. 20 µm	min. 20 µm
Nickel layer microhardness	min. 300 HV0.1		
Chrome layer microhardness	min. 900 HV0.1		
Straightness	max. 0.25 mm / 1000 mm		

● TABLE OF DIMENSIONS OD TOLERANCE

Diameter mm	ISO f7 µm	ISO f8 µm
30 < Ø ≤ 50	-25 / -50	-25 / -64
50 < Ø ≤ 80	-30 / -60	-30 / -76
80 < Ø ≤ 120	-36 / -71	-36 / -90
120 < Ø ≤ 140	-43 / -83	-43 / -106

● STANDARD DIMENSIONS RANGE

Outside diameter mm	40	45	50	55	60	63	70	75	80	85	90	100	110	120	125
Inside diameter mm	20	25	30	35	45	43	50	55	50	65	70	80	90	100	100
	25	30	35	40	50	50	55	-	-	-	-	-	-	-	-
Wall thickness mm	10	10	10	10	7.5	10	10	10	15	10	10	10	10	10	12.5
	7.5	7.5	7.5	7.5	5	6.5	7.5	-	-	-	-	-	-	-	-

● CORRESPONDENCE BETWEEN STEEL GRADE AND SURFACE HARDNESS (INCT)

NiCro INCT E355+SR / P460N+N / 20MnV6		NiCro INCT C45E+N
Surface hardness beneath the chrome layer	42±4 HRC	54 ±3 HRC

The hardening depth is defined as the distance from the surface, beneath the chrome layer up to the point where the hardness value has dropped to the value of the steel core hardness, depending on the steel grade. Generally, the hardening depth is between 1.0 - 3.5 mm, depending on diameter and steel grade.

● CORROSION RESISTANCE LEVELS

Diameter mm	NiCro 150		NiCro 350		NiCro 500	
	NSS	AASS	NSS	AASS	NSS	AASS
Ø40 - 125	rating 10 after 500h	rating 10 after 150h	rating 10 after 1000h	rating 10 after 350h	rating 10 after 1500h	rating 10 after 500h

Tested in our own laboratory according to ISO 9227, evaluated according to ISO 10289.

CYLINDER TUBES

for hidraulic applications



CYLINDER TUBES, INSIDE HONED
OR SKIVED AND ROLLER BURNISHED

NIMAX H8

E355+SR, EN 10305-1 | EN 10305-2

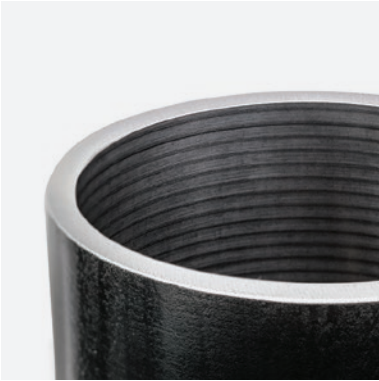
Cylinder steel tubes are suitable for a variety of hydraulic cylinders, where tight tolerances and smooth surface finishing are critical. Tubes either honed or skived and roller burnished are mainly characterized by a precise inside processed surface resulting into a superior finished product.



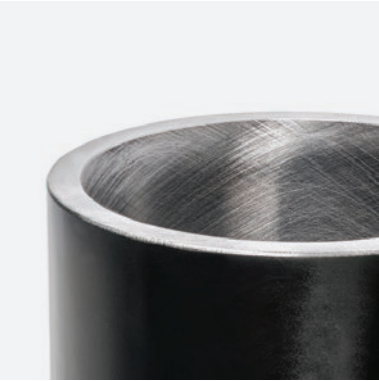
Outside diameter - OD	Ø50 - 245 mm
Inside diameter - ID	Ø40 - 200 mm
Inside tolerance - ID	ISO H8
Outside tolerance - OD	according to EN 10305-1 / EN 10305-2
Roundness - ID	within the limits of diameter tolerances
Standard lengths	mill lengths / on request, cut to fix lengths pieces
Surface roughness - ID	Ra: max. 0.30 µm for skived and roller burnished surface Ra: max. 0.40 µm for honed surface
Straightness local deviation	max. 1 mm / 1000 mm
Straightness total deviation	max. 3.5 mm for tubes with length up to 6000 mm for tubes with length more than 6000 mm, for each meter over this length, the tolerance must be increased by 0.5 mm

● TABLE OF DIMENSIONS ID TOLERANCE

Diameter mm	ISO H8 µm
30 < Ø ≤ 50	0 / +39
50 < Ø ≤ 80	0 / +46
80 < Ø ≤ 120	0 / +54
120 < Ø ≤ 180	0 / +63
180 < Ø ≤ 200	0 / +72



The skiving and roller burnishing production technique refers to a process consisting in micro-finishing metallic internal tube surfaces. The resulted effect is a mirror surface finish with technical roughness advantages.

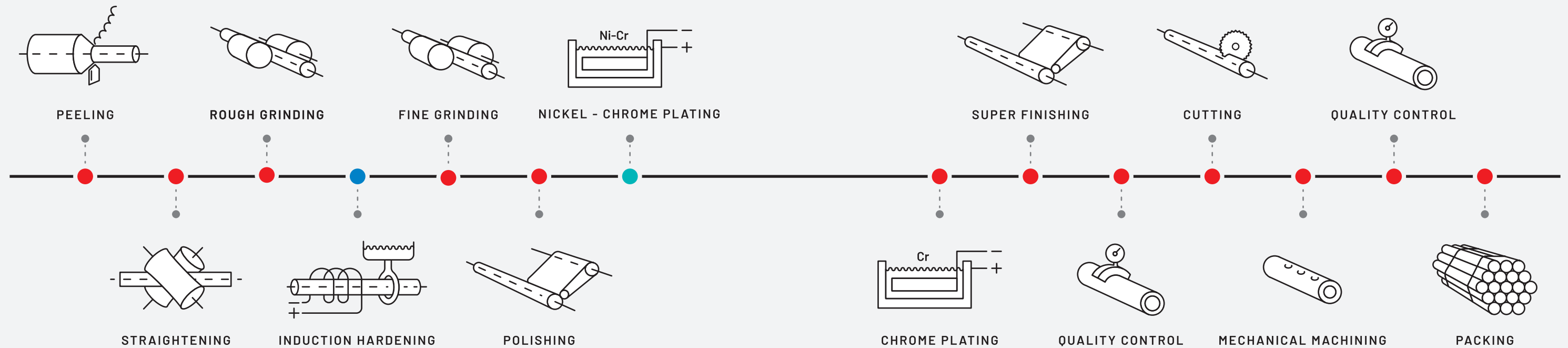


Producing cylinder tubes by honing results in having a cross-grinding pattern. The tubes in this case present an improved inside straightness. The very precise and smooth surface reduce friction negative effects and extends the life of the cylinder's components.

PRODUCTION FLOW

Product portfolio serves both the hydraulic & pneumatic and the linear motion systems sectors.

The main product remains the chrome plated rod for hydraulic cylinders used in various applications from industrial equipment (agricultural, construction, mining, offshore, automotive, railways, oil extraction, cranes) to those that we find useful in our daily lives, such as fitness equipment.



Nowadays, the market is more demanding and requires a high level of service which we are ready to sustain with solutions to the customers needs:

- ✓ materials with particular characteristics (chemical composition, mechanical properties, hardening parameters, surface finishing);
- ✓ special lengths and cutting to specific lengths;
- ✓ technical support;
- ✓ custom finished or semi-finished products based on the customer's drawing or our own design.

PACKAGING

PACKAGING

Plastic Sleeves



WHITE Plastic Sleeves

Ø16 .. 105 mm - Recyclable plastic sleeve.
For sizes less than 16 mm - plastic net,
aluminum bubble foil and wooden cases.

Cardboard Tubes



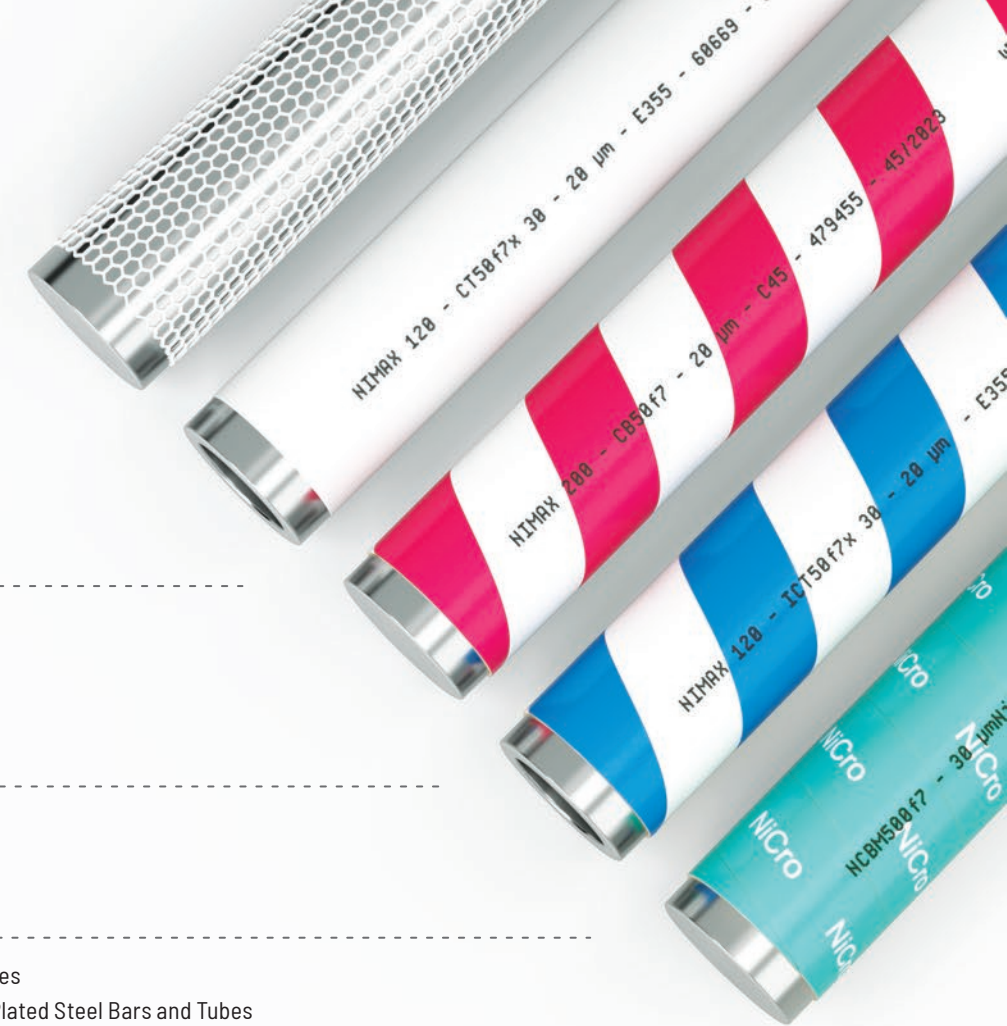
Chrome Plated Steel Bars and Tubes
RED striped tubes



Induction Hardened and Chrome Plated
Steel Bars and Tubes
BLUE striped tubes



Nickel-Chrome Plated Steel Bars and Tubes
Induction Hardened and Nickel-Chrome Plated Steel Bars and Tubes
GREEN striped tubes

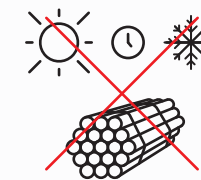


STORAGE & HANDLING

RECOMMENDATIONS



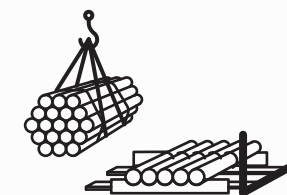
Keep the products stored in dry
and covered spaces.



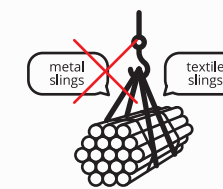
Do not expose the bars or tubes for a
long time to the sunlight or to very low
temperatures.



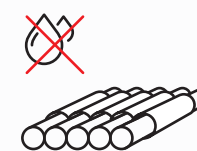
Direct contact with the floor and steel
supports that are not lined with soft
materials must be avoided; preferable to
use rubber or wood lined supports.



Whenever possible, please use the crane
to load or unload the bundles; when
using the fork lift please avoid the direct
contact of the forks with the products.



Always lift the bundles using textile
slings. Do not use metal slings during
handling of bundles.



Always keep dry the cardboard tubes
that protect the chromed products.