Штоки хромированные закаленные током высокой частоты (ТВЧ) NIMET NIMAX ICB, NIMAX ICBM, NIMAX ICBV

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INDUCTION HARDENED AND
CHROME PLATED STEEL BARS

ICB

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

In choosing the right product for an application, there are certain aspects to be taken into consideration. Both the properties of the base material and those of the finished surface are of crucial importance in delivering the optimal solution. The questions to be answered in making the correct decision are:

- What is the product that best fits the application's function and its technical requirements?
- What is the most effective cost-wise solution?
- Which is the product with the less long term impact on the environment?

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) *
46MnVS6	1.1304	44MnSiVS6	-	-	-	-	(10V45) *
42CrMo4	1.7225	42CrMo4	708M40	42CrMo4	SCM440(H)	40ChFA	4140

* Equivalent

CHEMICAL COMPOSITION - IN % BY WEIGHT

Steel grade	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	V	N
C45E *	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 *	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	-	-

* Cr+Mo+Ni = max. 0.63

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

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

42CrMo4 steel 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/mm²	Yield point $R_{p0.2}$ N/mm²	Elongation A_5 %	Impact energy KV_2 J	Hardness * Brinell N/mm²	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. 16		172 - 242	EN ISO 683-1
	100 < Ø ≤ 200	min. 560	min. 275	min. 16		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	The values of R_m, $R_{p0.2}$ and A_5 must be agreed			-	-	EN 10267
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		298 - 359	
	40 < Ø ≤ 100	900 - 1100	min. 650	min. 12	min. 35J / 20°C	271 - 331	
	100 < Ø ≤ 160	800 - 950	min. 550	min. 13		240 - 290	
	160 < Ø ≤ 200	750 - 900	min. 500	min. 14			

* The hardness values are for information only

INDUCTION HARDENED AND CHROME PLATED STEEL BARS

ICB

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Dimensions	Ø6 - 200 mm / Ø1/4" - 7"
Diameter tolerance	ISO f7 / other, on request
Roundness	max. 1/2 from diameter tolerance
Standard lengths	5.000 - 7.500 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 72 h								
	Ø ≥ 20	rating 9 after 120 h	rating 9 after 48h	rating 9 after 200 h	rating 9 after 80h	rating 9 after 500h	rating 9 after 200h			
Special	Ø ≥ 20	rating 10 after 120 h	rating 10 after 48h	rating 10 after 250 h	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

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HARDENING DEPTH (SHD)

Diameter	C35E / C45E / 42CrMo4+QT	20MnV6	38MnVS6
mm	mm	mm	mm
6	0.5-0.8	0.5-0.8	1.1-1.4
6.35 - 12	0.6-1.0	0.6-1.0	1.1-1.4
12.7 - 15	0.8-1.4	0.8-1.5	1.1-1.4
15.875 - 18	1.1-1.5	0.8-1.5	1.1-1.4
19 - 19.05	1.2-1.5	0.8-1.5	1.1-1.4
20	1.2-1.5	1.0-2.0	1.1-1.4
22 - 25.4	1.4-1.7	1.0-2.0	1.1-1.4
28	1.5-1.8	1.0-2.0	1.1-1.4
28.575	1.5-1.8	1.0-2.0	1.3-1.7
30 - 36	1.5-1.9	1.0-2.0	1.3-1.7
38 - 40	1.7-2.3	1.0-2.0	1.3-1.7
42.42 - 45	1.7-2.3	1.3-2.5	1.7-2.3
50 - 80	2.2-2.6	1.3-2.5	1.7-2.3
82 - 101.6	2.2-3.2	2.0-3.0	1.7-2.3
105 - 120	2.5-3.5	2.0-3.0	1.7-2.3
125 - 140	2.5-3.5	2.0-3.5	1.7-2.3
145 - 180	2.8-4.0	2.0-3.5	1.7-2.3

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.

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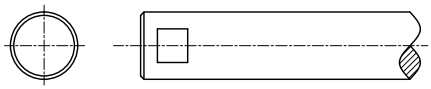
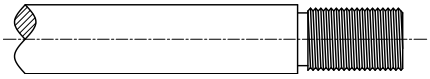
CUSTOMIZED MACHINING

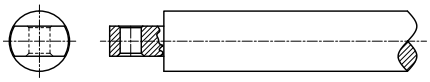
CROSSWISE GROOVE



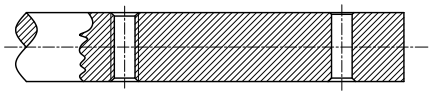
OUTSIDE DIAMETER THREAD



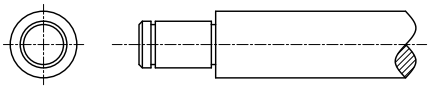
END FOR MOUNT WITH CLEVIS CLAMP



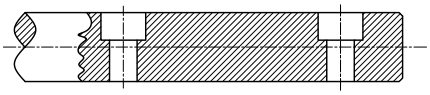
TAPPED OR DRILLED HOLES RADIALLY THROUGH SHAFT



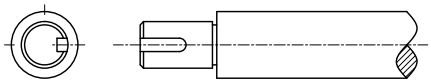
GROOVES FOR SNAP RING



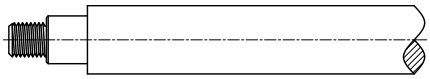
RADIAL DRILLING HOLES, BORED



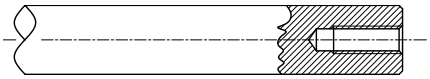
REDUCED DIAMETER WITH/ WITHOUT FEATHER KEYWAY



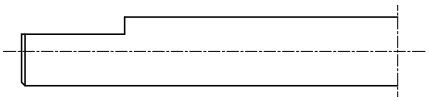
REDUCED DIAMETER WITH THREADED END



AXIAL DRILLED AND THREADED TO ENDS



D-CUT SHAPE



STORAGE AND HANDLING RECOMMENDATIONS

- Keep the products stored in dry and covered spaces.
- Do not expose for a long time the bars or tubes to the sunlight or to very low temperatures.
- For storage, preferable to use rubber supports or wood lined supports; direct contact with the floor and steel supports that are not lined with soft materials must be avoided.
- Whenever possible, please use the crane to load or unload the bundles; when you use the fork lifts please avoid the direct contact of the forks with the products.
- Always lift the bundles using textile slings.
  Don't use metal slings during handling of bundles.
- Always keep dry the cardboard tubes that protect the chromed products.

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