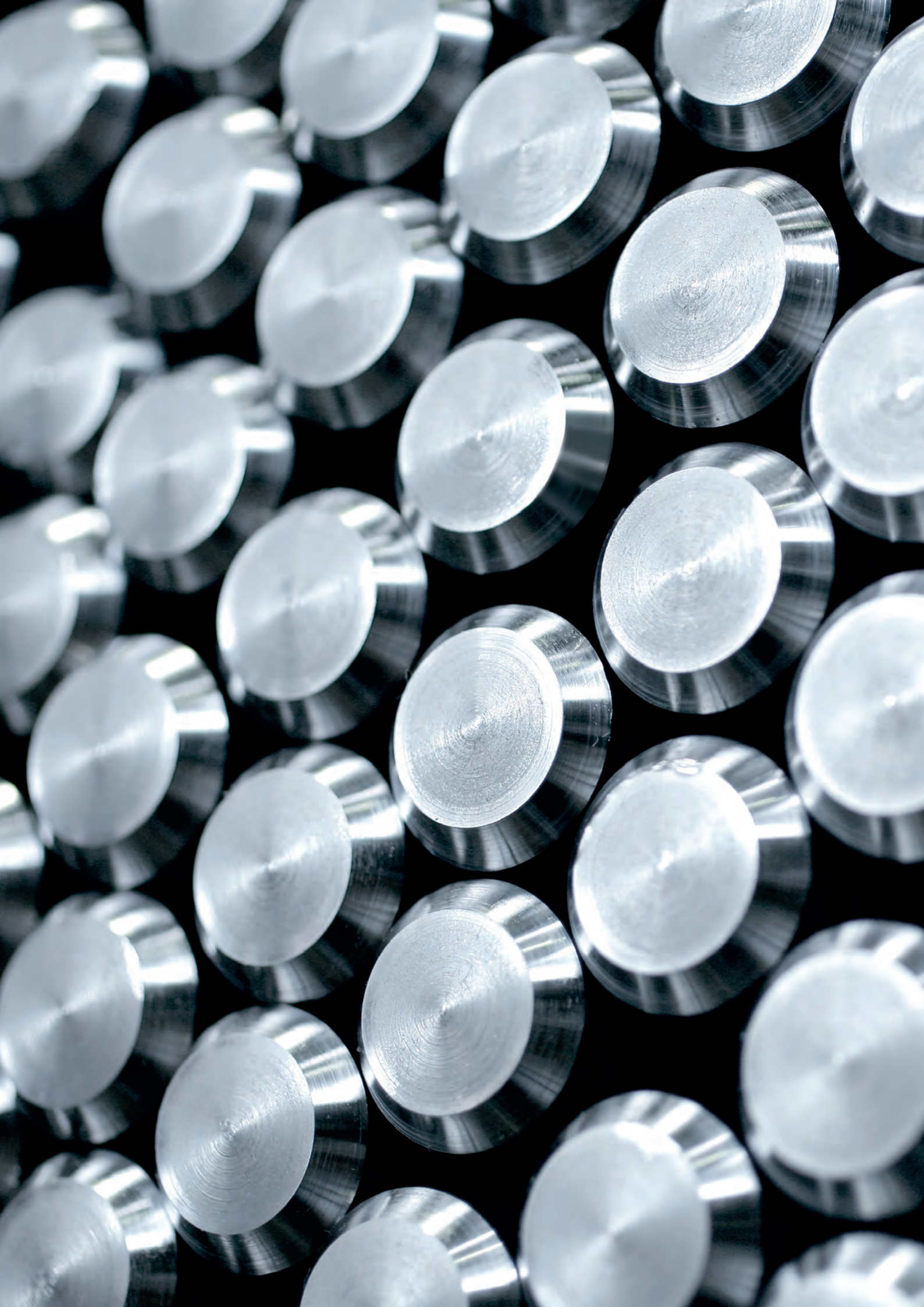


## **Stock program – Stainless steel bars**

Stainless, acid- and heat-resistant steel



# Content

## Steel grades

EN	Short name	AISI	UNS	Microstructure	Page
1.4021	X20Cr13	420	S42000	M	6/7
1.4028	X30Cr13	420	S42000	M	8
1.4034	X46Cr13	420	S42000	M	9
1.4057	X17CrNi16-2	431	S43100	M	10/11
1.4104	X14CrMoS17	-	-	M	12
1.4122	X39CrMo17-1	-	-	M	13
1.4418	X4CrNiMo16-5-1	-	-	M	14
1.4542	X5CrNiCuNb16-4	630 / 17-4PH	S17400	PH	15/16
1.4301/07	X5CrNi18-10 / X2CrNi18-9	304 / 304L	S30400 / S30403	A	17/18
1.4305	X8CrNiS18-9	303	S30300	A	19
1.4401/04	X5CrNiMo17-12-2 / X2CrNiMo17-12-2	316 / 316L	S31600 / S31603	A	20/21
1.4435	X2CrNiMo18-14-3	316L	S31603	A	22/23
1.4541	X6CrNiTi18-10	321	S32100	A	24/25
1.4571	X6CrNiMoTi17-12-2	316Ti	S31635	A	26/27
1.4462	X2CrNiMoN22-5-3	F51	S31803	FA	28/29
1.4828	X15CrNiSi20-12	-	-	A	30
1.4841	X15CrNiSi25-21	314	S31400	A	31

M = martensitic

PH = precipitation hardened

A = austenitic

FA = ferritic-austenitic (Duplex)

## General informations

### Tolerances

ISO 286 k12

### Lengths

Ø 20.0 – 70 mm	6,000 – 6,200 mm	short length mind. 3,000 mm
Ø 70.1 – 200 mm	5,000 – 6,000 mm	short length mind. 3,000 mm
Ø 200.1 – 400 mm	3,000 – 6,000 mm	short length mind. 2,000 mm
Ø 400.1 – 550 mm	3,000 – 6,000 mm	short length mind. 1,000 mm

### Coil weight

Ø 20.0 – 80 mm	approx. 1,000 kg
Ø 80.1 – 500 mm	max. 2,000 kg

Bar weight > 1,000 kg: individual bars  
per bundle at least 2 signode strips

### Defect depth

Allowed defect depth:

Ø 20.0 – 75 mm	max. 0.01xd
Ø > 75 mm	max. 0.75 mm

(EN 10277-1, Class 3)

### Surface

Ø 20.0 – 400 mm	peeled
Ø 400.1 – 500 mm	turned

### Ends

Ø 20.0 – 80 mm	chamfered on one side 45°/2 - 3 mm and hot-sawed/cold-sawed end
Ø 80.1 – 400 mm	deburred on both sides
Ø 400.1 – 500 mm	deburred on both sides, center hole on both ends

### Straightness

2 mm/m

### Anti-mixing test

State of the art

### Identification

Adhesive labels for each bar and one bundle label per bundle

Dimensions ≤ 35 mm only bundle labels.

Information on adhesive label:

brand, heat, grade, production order, work inspector's stamp

### Ultrasonic testing

Steels Grades	ø [mm]	Basic test	Also corresponds to
<b>Martensitic steels</b>	20.0 – 150	EN 10308, Type 1a, Tab.2, Class 4	EN 10228-3, Type 1a, Tab.5, Class 4, ASTM A 388, ASME SA 388
	150.1 – 350	EN 10308, Type 1a, Tab.2, Class 3	EN 10228-3, Type 1a, Tab.5, Class 3, ASTM A 388, ASME SA 388
	350.1 – 400	EN 10308, Type 1a, Tab.2, Class 2	EN 10228-3, Typ 1a, Tab.5, Class 2, ASTM A 388, ASME SA 388
	> 400	EN 10228-3, Type 1a, Tab.5, Class 2	ASTM A 388, ASME SA 388
<b>Austenitic and duplex steels</b>	20.0 – 400	EN 10308, Type 1a, Tab.3, Class 3	EN 10228-4, Typ 1a, Tab.5, Class 3, ASTM A 388, ASME SA 388
	> 400	EN 10228-4, Type 1a, Tab.5, Class 3	ASTM A 388, ASME SA 388

### Certification

EN 10204 / 3.1 in German, English and French

Details: melting process, post-treatment, casting process, reduction ratio

heat treatment, ultrasonic test, anti-mixing-test, chemical analysis,

mechanical properties

ASME BPVC S.2 P.A means ASME Boiler Pressure Vessel Code, Section 2, Part A

up to ø 60 mm:

CE-marking for 1.4021, 1.4057, 1.4418, 1.4542, 1.4301/1.4307, 1.4305, 1.4401/1.4404, 1.4435, 1.4541, 1.4571, 1.4462

# 1.4021

## Chemical composition

		C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %
Ø ≤ 80 mm	Min.	0.16	≤	≤	≤	0.010	12.0	≤	≤
	Max.	0.25	1.0	1.0	0.040	0.030	14.0	0.50	0.50
Ø ≤ 220 mm	Min.	0.16	≤	≤	≤	0.010	12.0	≤	≤
	Max.	0.25	0.8	0.8	0.030	0.025	14.0	0.50	0.50
Ø > 220 mm	Min.	0.16	≤	≤	≤	≤	12.0	≤	≤
	Max.	0.25	0.8	0.8	0.030	0.015	14.0	0.50	0.50

## Mechanical properties

	20 – 160 mm longitudinal	> 160 – 500 mm transversal
R <sub>p0,2</sub> in MPa	≥ 600	≥ 600
R <sub>m</sub> in MPa	800 – 950	800 – 950
A <sub>5</sub> in %	≥ 12	as tested
Z in %	as tested	as tested
A <sub>v</sub> ISO-V in J	≥ 20	as tested
Hardness in HBW	as tested	as tested

## Forming

Ø ≤ 220 mm	hot rolled
Ø > 220 mm	forged

## Heat treatment

Quenched and tempered QT 800

### Material discription

Bars made of stainless steel

Corrodur 4021, X20Cr13, 1.4021, 420, SUS 420J1, 20X133

<b>Ø ≤ 80 mm</b>	<p>according EN 10088-3/-5 QT 800</p> <p>chemical analysis, <math>R_m</math>, <math>R_{p0.2}</math> according EN 10250-4</p> <p>Chemical analysis according ASTM A 276M, ASME BPVC S.2 P.A SA 276M, JIS G4303</p>
<b>Ø ≤ 160 mm</b>	<p>according EN 10088-3 QT 800</p> <p>chemical analysis, <math>R_m</math>, <math>R_{p0.2}</math> according EN 10250-4</p> <p>Chemical analysis according ASTM A 276M, ASME BPVC S.2 P.A SA 276M, JIS G4303, GOST 5632</p>
<b>Ø &gt; 160 mm</b>	<p>Chemical analysis, <math>R_m</math>, <math>R_{p0.2}</math> according EN 10088-3, EN 10250-4</p> <p>Chemical analysis according ASTM A 276M, ASME BPVC S.2 P.A SA 276M, JIS G4303, GOST 5632</p>

**Certification and CE-marking up to Ø 60 mm!**

# 1.4028

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %
<b>Min.</b>	0.26	≤	≤	≤	0.010	12.00	≤	–
<b>Max.</b>	0.35	0.80	0.80	0.03	0.025	14.00	0.50	1.00

## Mechanical properties

	20 – 160 mm longitudinal	> 160 – 500 mm transversal
<b>R<sub>p0.2</sub> in MPa</b>	≥ 650	≥ 650
<b>R<sub>m</sub> in MPa</b>	850 – 1000	850 – 1000
<b>A<sub>5</sub> in %</b>	≥ 10	as tested
<b>Z in %</b>	as tested	as tested
<b>A<sub>v</sub> ISO-V in J</b>	≥ 12	as tested
<b>Hardness in HBW</b>	as tested	as tested

## Forming

<b>Ø ≤ 220 mm</b>	hot rolled
<b>Ø &gt; 220 mm</b>	forged

## Heat treatment

Quenched and tempered QT 850 and stress relieved before peeling

## Material discription

Bars made of stainless steel

Corrodur 4028, X30Cr13, 1.4028, 420, 420B, 30X13

<b>Ø ≤ 160 mm</b>	EN 10088-3 QT 850, ASTM F 899 chemical analysis, R <sub>m</sub> , R <sub>p0.2</sub> according EN 10250-4 Chemical analysis according ASTM A 276M, ASME BPVC S.2 P.A SA 276M, GOST 5632
<b>Ø &gt; 160 mm</b>	ASTM F 899 chemical analysis, R <sub>m</sub> , R <sub>p0.2</sub> according EN 10088-3 QT 850, EN 10250-4 Chemical analysis according ASTM A 276M, ASME BPVC S.2 P.A SA 276M, GOST 5632



# 1.4034

## Chemical composition

	C %	Si %	Mn %	P %	S %	Ni %	Cr %
Min.	0.43	≤	≤	≤	≤	–	12.50
Max.	0.50	1.00	1.00	0.04	0.03	1.00	14.00

## Mechanical properties

	20 – 500 mm
R <sub>p0.2</sub> in MPa	–
R <sub>m</sub> in MPa	≤ 800
A <sub>5</sub> in %	–
Z in %	–
A <sub>v</sub> ISO-V in J	–
Hardness in HBW	≤ 241

## Forming

Ø ≤ 220 mm	hot rolled
Ø > 220 mm	forged

## Heat treatment

Annealed

## Material discription

Bars made of stainless steel

Corrodur 4034, X46Cr13, 1.4034, 420, 420C

Ø ≤ 500 mm	according EN 10088-3, ASTM A 276M, ASME BPVC S.2 P.A SA 276M, ASTM F 899
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# 1.4057

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Ni %
<b>Min.</b>	0.12	≤	≤	≤	≤	15.00	1.25
<b>Max.</b>	0.20	1.00	1.00	0.04	0.03	17.00	2.50

## Mechanical properties

	20 – 160 mm longitudinal	> 160 mm longitudinal
<b>R<sub>p0,2</sub> in MPa</b>	≥ 620	≥ 620
<b>R<sub>m</sub> in MPa</b>	800 – 950	800 – 950
<b>A<sub>5</sub> in %</b>	≥ 14	as tested
<b>A<sub>2+</sub> in %</b>	≥ 15	≥ 15
<b>Z in %</b>	≥ 45	≥ 45
<b>A<sub>v</sub> ISO-V in J</b>	≥ 27	as tested (transversal)
<b>Hardness in HBW</b>	≤ 321	≤ 321

## Forming

<b>Ø ≤ 220 mm</b>	hot rolled
<b>Ø &gt; 220 mm</b>	forged

## Heat treatment

Quenched and tempered QT 800

**Material discription**

Bars made of stainless steel

Acidur 4057, 1.4057, Type 431, SUS 431

<b>Ø ≤ 160 mm</b>	EN 10088-3/-5, EN 10272 QT800, ASTM A 479M, ASME BPVC S.2 P.A SA 479M, Chemical analysis according ASTM A 276M, ASME BPVC S.2 P.A SA 276M, JIS G4303
<b>Ø &gt; 160 mm</b>	ASTM A 479M, ASME BPVC S.2 P.A SA 479M, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10088-3, EN 10272 QT800, Chemical analysis according ASTM A 276M, ASME BPVC S.2 P.A SA 276M, JIS G4303

**Certification and CE-marking up to Ø 60 mm!**

# 1.4104

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Mo %
<b>Min.</b>	0.10	≤	≤	≤	0.15	15.50	0.20
<b>Max.</b>	0.17	1.00	1.50	0.04	0.35	17.50	0.60

## Mechanical properties

	20 – 60 mm longitudinal	> 60 – 160 mm longitudinal	> 160 mm longitudinal
<b>R<sub>p0.2</sub> in MPa</b>	≥ 500	≥ 500	≥ 500
<b>R<sub>m</sub> in MPa</b>	650 – 850	650 – 850	650 – 850
<b>A<sub>5</sub> in %</b>	≥ 12	≥ 10	as tested
<b>Z in %</b>	as tested	as tested	as tested
<b>A<sub>v</sub> ISO-V in J</b>	–	–	–
<b>Hardness in HBW</b>	as tested	as tested	as tested

## Forming

<b>Ø ≤ 170 mm</b>	hot rolled
<b>Ø &gt; 170 mm</b>	forged

## Heat treatment

Quenched and tempered QT 650

## Material description

Bars made of stainless steel

1.4104

<b>Ø ≤ 160 mm</b>	EN 10088-3 QT650
<b>Ø &gt; 160 – 500 mm</b>	Chemical analysis, R <sub>m</sub> , R <sub>p0.2</sub> according EN 10088-3 QT650

# 1.4122

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %
<b>Min.</b>	0.33	≤	≤	≤	≤	15.50	0.80	≤
<b>Max.</b>	0.45	1.00	1.50	0.04	0.03	17.50	1.30	1.00

## Mechanical properties

	25 – 60 mm longitudinal	60,1 – 160 mm longitudinal	> 160 mm transversal
<b>R<sub>p0.2</sub> in MPa</b>	≥ 550	≥ 550	≥ 550
<b>R<sub>m</sub> in MPa</b>	750 – 950	750 – 950	750 – 950
<b>A<sub>5</sub> in %</b>	≥ 12	≥ 12	as tested
<b>Z in %</b>	as tested	as tested	as tested
<b>A<sub>V</sub> ISO-V in J</b>	≥ 15	≥ 10	as tested
<b>Hardness in HBW</b>	as tested	as tested	as tested

## Forming

<b>Ø ≤ 220 mm</b>	hot rolled
<b>Ø &gt; 220 mm</b>	forged

## Heat treatment

Quenched and tempered QT 750

## Material discription

Bars made of stainless steel

1.4122

<b>Ø ≤ 160 mm</b>	EN 10088-3 QT750
<b>Ø &gt; 160 – 500 mm</b>	Chemical analysis, R <sub>m</sub> , R <sub>p0.2</sub> according EN 10088-3 QT750

# 1.4418

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	N %
<b>Min.</b>	≤	≤	≤	≤	≤	15.00	0.80	4.00	0.02
<b>Max.</b>	0.06	0.70	1.50	0.04	0.03	17.00	1.50	6.00	–

## Mechanical properties

	20 – 160 mm longitudinal	160,1 – 250 mm transversal	> 250 mm transversal
<b>R<sub>p0,2</sub> in MPa</b>	≥ 750	≥ 750	≥ 750
<b>R<sub>m</sub> in MPa</b>	1000 – 1100	1000 – 1100	1000 – 1100
<b>A<sub>5</sub> in %</b>	≥ 16	≥ 14	as tested
<b>Z in %</b>	as tested	as tested	as tested
<b>A<sub>v</sub> ISO-V in J</b>	≥ 80	≥ 60	as tested
<b>A<sub>v</sub> ISO-V in J bei -40°C</b>	≥ 42	≥ 42 (longitudinal)	≥ 42 (longitudinal)
<b>Hardness in HBW</b>	as tested	as tested	as tested

## Forming

<b>Ø ≤ 170 mm</b>	hot rolled
<b>Ø &gt; 170 mm</b>	forged

## Heat treatment

Quenched and tempered QT 900

## Material discription

Bars made of stainless steel

1.4418

<b>Ø ≤ 250 mm</b>	EN 10088-3/-5, EN 10272 QT900
<b>Ø &gt; 250 – 400 mm</b>	Chemical analysis, R <sub>m</sub> , R <sub>p0,2</sub> according EN 10088-3, EN 10272 QT900

**Certification and CE-marking up to Ø 60 mm  
(restricted tensile strength R<sub>m</sub> and yield strength R<sub>p0,2</sub> compared to EN 10088-3)!**

# 1.4542

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %
<b>Min.</b>	≤	≤	≤	≤	≤	15.00
<b>Max.</b>	0.07	0.70	1.00	0.04	0.03	17.00

	Mo %	Ni %	Cu %	Nb+T %	Nb %
<b>Min.</b>	≤	3.00	3.00	0.15	5xC
<b>Max.</b>	0.60	5.00	5.00	0.45	–

## Mechanical properties (delivery condition - solution annealed)

	20 – 220 mm
<b>R<sub>m</sub> in MPa</b>	≤ 1200
<b>Z in %</b>	as tested
<b>A<sub>v</sub> ISO-V in J</b>	as tested
<b>Hardness in HRC</b>	≤ 38
<b>Hardness in HBW*</b>	≤ 360

\*converted according to DIN EN ISO 18265, table A.1

## Mechanical properties

(reference test - precipitation hardened - P1070 / H1025)

	20 – 220 mm longitudinal	Reference condition P1070 / H1025
<b>R<sub>p0.2</sub> in MPa</b>	≥ 1000	delivery condition + 550°C/4 h/air
<b>R<sub>m</sub> in MPa</b>	1070 – 1270	
<b>A<sub>5</sub> in %</b>	≥ 10	
<b>A<sub>2+</sub> in %</b>	≥ 12	
<b>Z in %</b>	≥ 45	
<b>A<sub>v</sub> ISO-V in J</b>	≥ 20	
<b>Hardness in HRC</b>	35 – 40	

### Forming

$\varnothing \leq 220 \text{ mm}$	hot rolled
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### Heat treatment

Solution annealed

(There is a risk of stress cracking. For more information please check our letter to 1.4542)

### Material discription

Bars made of stainless steel

1.4542, Type 630, SUS 630

$\varnothing \leq 100 \text{ mm}$	EN 10088-3/-5, ASTM A 564, ASME SA 564, ASTM F 899 Chemical analysis according JIS G4303
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$\varnothing > 100 - 220 \text{ mm}$	ASTM A 564, ASME SA 564, ASTM F 899 Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10088-3 Chemical analysis according JIS G4303
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**Certification and CE-marking up to  $\varnothing 60 \text{ mm}$ !**



# 1.4301 / 1.4307

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	Cu %	N %	DeLong
<b>Min.</b>	≤	≤	≤	≤	0.015	18.00	–	8.00	–	≤	as tested
<b>Max.</b>	0.03	1.00	2.00	0.045	0.030	19.50	–	10.00	–	0.10	

## Mechanical properties

	20 – 160 mm longitudinal	> 160 mm transversal
<b>R<sub>p0,2</sub> in MPa</b>	≥ 205	≥ 205
<b>R<sub>p1,0</sub> in MPa</b>	≥ 230	≥ 230
<b>R<sub>m</sub> in MPa</b>	515 – 680	515 – 680
<b>A<sub>5</sub> in %</b>	≥ 45	≥ 35
<b>A<sub>2°</sub> in %</b>	≥ 40	≥ 40
<b>Z in %</b>	≥ 50	≥ 50
<b>A<sub>v</sub> ISO-V in J</b>	≥ 100	≥ 60
<b>Hardness in HBW</b>	≤ 215	≤ 215
<b>Hardness in HRC</b>	≤ 22	≤ 22

## Forming

<b>Ø ≤ 220 mm</b>	hot rolled
<b>Ø &gt; 220 mm</b>	forged

**Grain size**

≤ 2 according ASTM E 112

**Heat treatment**

Quenched

**IC resistance**

Corrosion resistance warranted according ASTM E 262 Prac. E, EURONORM 114, ISO 3651-2, methode A, T1

**Material discription**

Bars made of stainless steel

1.4301/1.4307 Niro-Cut, Type 304/304L, F304/F304L, SUS304

<b>Ø ≤ 250 mm</b>	EN 10088-3/-5, EN 10272, AD2000 - W2 / W10, ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10222-5, EN 10250-4 Chemical analysis according JIS G 4303
<b>Ø &gt; 250 – 400 mm</b>	EN 10272, ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10088-3, EN 10222-5, EN 10250-4 Chemical analysis according JIS G 4303
<b>Ø &gt; 400 mm</b>	ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10088-3, EN 10222-5 EN 10272, EN 10250-4 Chemical analysis according JIS G 4303

**Certification and CE-marking up to Ø 60 mm!**

# 1.4305

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Cu %	N %	DeLong
<b>Min.</b>	≤	≤	≤	≤	0.15	17.00	8.00	≤	≤	as tested
<b>Max.</b>	0.10	1.00	2.00	0.045	0.35	19.00	10.00	1.00	0.10	

## Mechanical properties

	20 – 160 mm longitudinal	> 160 mm longitudinal
<b>R<sub>p0.2</sub> in MPa</b>	≥ 190	≥ 190
<b>R<sub>p1.0</sub> in MPa</b>	≥ 225	≥ 225
<b>R<sub>m</sub> in MPa</b>	500 – 700	500 – 700
<b>A<sub>5</sub> in %</b>	≥ 35	as tested
<b>A<sub>2%</sub> in %</b>	as tested	as tested
<b>Z in %</b>	as tested	as tested
<b>Hardness in HBW</b>	≤ 230	≤ 230

## Forming

<b>Ø ≤ 210 mm</b>	hot rolled
<b>Ø &gt; 210 mm</b>	forged

## Heat treatment

Quenched

## Material description

Bars made of stainless steel

1.4305, Type 303

<b>Ø ≤ 160 mm</b>	EN 10088-3/-5, ASTM A 582M
<b>Ø &gt; 160 mm</b>	ASTM A 582M, Chemical analysis, R <sub>m</sub> , R <sub>p0.2</sub> according EN 10088-3

**Certification and CE-marking up to Ø 60 mm!**

# 1.4401 / 1.4404

## Chemical composition in weight-%

	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	N	DeLong
<b>Min.</b>	≤	≤	≤	≤	0.015	16.50	2.00	10.00	≤	≤	as tested
<b>Max.</b>	0.03	1.00	2.00	0.045	0.030	18.00	2.50	13.00	0.70	0.10	

## Mechanical properties

	20 – 160 mm longitudinal	> 160 mm longitudinal
<b>R<sub>p0,2</sub> in MPa</b>	≥ 205	≥ 205
<b>R<sub>p1,0</sub> in MPa</b>	≥ 240	≥ 240
<b>R<sub>m</sub> in MPa</b>	515 – 690	515 – 690
<b>A<sub>5</sub> in %</b>	≥ 45	≥ 35
<b>A<sub>2*</sub> in %</b>	≥ 40	≥ 40
<b>Z in %</b>	≥ 50	≥ 50
<b>A<sub>v</sub> ISO-V in J</b>	≥ 100	≥ 60
<b>Hardness in HBW</b>	≤ 215	≤ 215
<b>Hardness in HRC</b>	≤ 22	≤ 22

## Forming

<b>Ø ≤ 220 mm</b>	hot rolled
<b>Ø &gt; 220 mm</b>	forged

**Grain size**

≤ 2 according ASTM E 112

**Heat treatment**

Quenched

**IC resistance**

Corrosion resistance warranted according ASTM E 262 Prac. E, EURONORM 114, ISO 3651-2, methode A, T1

**Material discription**

Bars made of stainless steel

1.4401/1.4404 Niro-Cut, Type 316/316L, F316/F316L

<b>Ø ≤ 250 mm</b>	EN 10088-3/-5, EN 10272, AD2000 - W2 / W10, ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945 Chemical analysis, R <sub>m</sub> , R <sub>p0.2</sub> according EN 10222-5, EN 10250-4
<b>Ø &gt; 250 – 400 mm</b>	EN 10272, ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, R <sub>m</sub> , R <sub>p0.2</sub> according EN 10088-3, EN 10222-5, EN 10250-4
<b>Ø &gt; 400 mm</b>	ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, R <sub>m</sub> , R <sub>p0.2</sub> according EN 10088-3, EN 10222-5, EN 10272, EN 10250-4

**Certification and CE-marking up to Ø 60 mm!**

# 1.4435

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Mo %
<b>Min.</b>	≤	≤	≤	≤	0.005	17.00	2.50
<b>Max.</b>	0.03	1.00	2.00	0.045	0.015	18.00	3.00

	Ni %	Cu %	N %	Ferrit content Basler Norm 2	DeLong
<b>Min.</b>	12.50	≤	≤	≤	as tested
<b>Max.</b>	14.00	0.50	0.10	7.70	

## Mechanical properties

	20 – 160 mm longitudinal	> 160 mm transversal
<b>R<sub>p0,2</sub> in MPa</b>	≥ 200	≥ 200
<b>R<sub>p1,0</sub> in MPa</b>	≥ 235	≥ 235
<b>R<sub>m</sub> in MPa</b>	520 – 670	520 – 670
<b>A<sub>5</sub> in %</b>	≥ 45	≥ 35
<b>A<sub>2<sup>n</sup></sub> in %</b>	≥ 40	≥ 40
<b>Z in %</b>	≥ 50	≥ 50
<b>A<sub>v</sub> ISO-V in J</b>	≥ 100	≥ 60
<b>Hardness in HBW</b>	≤ 215	≤ 215
<b>Hardness in HRC</b>	≤ 22	≤ 22

## Forming

<b>Ø ≤ 220 mm</b>	hot rolled
<b>Ø &gt; 220 mm</b>	forged

**Grain size**

≤ 2 according ASTM E 112

**Heat treatment**

Quenched

**IC resistance**

Corrosion resistance warranted according ASTM E 262 Prac. E, EURONORM 114, ISO 3651-2, methode A, T1

**Ferrit content**

Max. 0.5 % (magnetic measurement)

**Material discription**

Bars made of stainless steel

1.4435 Niro-Cut, Type 316L, F316L

Ø ≤ 250 mm

EN 10088-3/-5, EN 10272, AD2000 - W2 / W10,  
ASTM A 182M/276M/479M,  
ASME BPVC S.2 P.A SA 182M/276M/479M,  
NACE MR 0103/0175, ISO 15156-3/17945  
Basler Norm 2  
Chemical analysis,  $R_m$ ,  $R_{p0.2}$  according EN 10222-5, EN 10250-4

**Certification and CE-marking up to Ø 60 mm!**

# 1.4541

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Ni %	Cu %	N %	Ti %
<b>Min.</b>	0.04	≤	≤	≤	–	17.00	9.00	–	–	5xC + N
<b>Max.</b>	0.08	0.80	2.00	0.04	≤ 0.015	19.00	12.00	–	–	0.70

## Mechanical properties

	20 – 160 mm longitudinal	> 160 mm transversal
<b>R<sub>p0,2</sub> in MPa</b>	≥ 210	≥ 200
<b>R<sub>p1,0</sub> in MPa</b>	≥ 235	≥ 235
<b>R<sub>m</sub> in MPa</b>	515 – 700	515 – 700
<b>A<sub>5</sub> in %</b>	≥ 40	≥ 40
<b>A<sub>2*</sub> in %</b>	≥ 40	≥ 40
<b>Z in %</b>	≥ 50	≥ 50
<b>A<sub>v</sub> ISO-V in J</b>	≥ 100	≥ 60
<b>Hardness in HBW</b>	≤ 215	≤ 215
<b>Hardness in HRC</b>	≤ 22	≤ 22

## Forming

<b>Ø ≤ 220 mm</b>	hot rolled
<b>Ø &gt; 220 mm</b>	forged



**Grain size**

≤ 2 according nach ASTM E 112

**Heat treatment**

Quenched

**IC resistance**

Corrosion resistance warranted according ASTM E 262 Prac. E, EURONORM 114, ISO 3651-2, Verfahren A, T1

**Material discription**

Bars made of stainless steel

1.4541, 1.4878, Type 321, Type 321H, SUS321, 08X18H10T, 12X18H10T

<b>Ø ≤ 160 mm</b>	EN 10088-3, EN 10272, EN 10095, AD2000 - W2 / W10, ASTM A 182M/276M/479M, ASME BPVC E S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, SEW 470 Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10222-5, EN 10250-4
<b>Ø 160 – 250 mm</b>	EN 10088-3, EN 10272, AD2000 - W2 / W10, ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10222-5, EN 10250-4, SEW 470, EN 10095
<b>Ø &gt; 250 – 400 mm</b>	EN 10272, ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10088-3, EN 10222-5, EN 10250-4, SEW 470, EN 10095
<b>Ø &gt; 400 mm</b>	ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10088-3, EN 10222-5, EN 10272, EN 10250-4, SEW 470, EN 10095

# 1.4571

## Chemical composition

		C %	Si %	Mn %	P %	S %	Cr %
Ø ≤ 160 mm	Min.	≤	≤	≤	≤	0.013	16.50
	Max.	0.08	1.00	2.00	0.045	0.030	18.00
Ø > 160 mm	Min.	≤	≤	≤	≤	≤	16.50
	Max.	0.08	1.00	2.00	0.045	0.030	18.00

		Mo %	Ni %	N %	Ti %	DeLong
Ø ≤ 160 mm	Min.	2.00	10.50	≤	5xC + N	as tested
	Max.	2.50	13.50	0.10	0.70	
Ø > 160 mm	Min.	2.00	10.50	≤	5xC + N	as tested
	Max.	2.50	13.50	0.10	0.70	

## Mechanical properties

	20 – 160 mm longitudinal	> 160 mm transversal
R <sub>p0,2</sub> in MPa	≥ 210	≥ 210
R <sub>p1,0</sub> in MPa	≥ 245	≥ 245
R <sub>m</sub> in MPa	515 – 700	515 – 700
A <sub>5</sub> in %	≥ 45	≥ 35
A <sub>2%</sub> in %	≥ 40	≥ 40
Z in %	≥ 50	≥ 50
A <sub>v</sub> ISO-V in J	≥ 100	≥ 60
Hardness in HBW	≤ 215	≤ 215
Hardness in HRC	≤ 22	≤ 22

### Forming

$\varnothing \leq 220 \text{ mm}$	hot rolled
$\varnothing > 220 \text{ mm}$	forged

### Grain size

$\leq 2$  according ASTM E 112

### Heat treatment

Quenched

### IC resistance

Corrosion resistance warranted according ASTM E 262 Prac. E, EURONORM 114, ISO 3651-2, methode A, T1

### Material discription

Bars made of stainless steel

1.4571, Type 316Ti, SUS316Ti

$\varnothing \leq 250 \text{ mm}$	EN 10088-3/-5, EN 10272, AD2000 - W2 / W10, ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945 Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10222-5, EN 10250-4 Chemical analysis according JIS G 4303
$\varnothing > 250 - 400 \text{ mm}$	EN 10272, ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10088-3, EN 10222-5, EN 10250-4 Chemical analysis according JIS G 4303
$\varnothing > 400 \text{ mm}$	ASTM A 182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0103/0175, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10088-3, EN 10222-5, EN 10272, EN 10250-4 Chemical analysis according JIS G 4303

**Certification and CE-marking up to  $\varnothing 60 \text{ mm}$ !**

# 1.4462

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Mo %	Ni %	N %	PREN
<b>Min.</b>	≤	≤	≤	≤	≤	22.00	3.00	4.50	0.14	35
<b>Max.</b>	0.03	0.75	2.00	0.03	0.01	23.00	3.50	6.50	0.20	–

## Mechanical properties

	20 – 160 mm longitudinal	160,1 – 350 mm transversal	350,1 – 550 mm transversal
<b>R<sub>p0,2</sub> in MPa</b>	≥ 450	≥ 450	≥ 450
<b>R<sub>m</sub> in MPa</b>	680 – 880	680 – 880	680 – 880
<b>A<sub>5</sub> in %</b>	≥ 30	≥ 25	as tested
<b>A<sub>2"</sub> in %</b>	≥ 25	≥ 25	≥ 25
<b>Z in %</b>	≥ 45	≥ 45	≥ 45
<b>A<sub>v</sub> ISO-V in J</b>	≥ 200	≥ 100	as tested
<b>A<sub>v</sub> ISO-V in J bei -46 °C</b>	≥ 45	≥ 45 (longitudinal)	–
<b>Hardness in HBW</b>	< 270	< 270	< 270
<b>Hardness in HRC</b>	≤ 25	≤ 25	≤ 25

## Forming

<b>Ø ≤ 210 mm</b>	hot rolled
<b>Ø &gt; 210 mm</b>	forged

**Heat treatment**

Quenched

**IC resistance**

ASTM E 262 Prac. E, EURONORM 114, ISO 3651-2

**Ferrit content**

35 – 55 % according ASTM E562

**Material discription**

Bars made stainless steel

1.4462, F51, F60, UNS S31803, S32205, SUS329J3L

<b>Ø ≤ 160 mm</b>	EN 10088-3/-5, EN 10272, ASTM A 182M/ 276M/ 479M, ASME BPVC S.2 P.A SA 182M/ 276M/ 479M, NACE MR 0175/0103, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10222-5 Chemical analysis according JIS G4303
<b>Ø &gt;160 mm</b>	ASTM A182M/276M/479M, ASME BPVC S.2 P.A SA 182M/276M/479M, NACE MR 0175/0103, ISO 15156-3/17945, Chemical analysis, $R_m$ , $R_{p0.2}$ according EN 10088-3, EN 10222-5, EN 10272 Chemical analysis according JIS G4303

**Certification and CE-marking up to Ø 60 mm!**

Additional ultrasonic testing with AD 2000 A4 and ASTM A 745.

# 1.4828

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Ni %	N %
<b>Min.</b>	≤	1.50	≤	≤	≤	19.00	11.00	≤
<b>Max.</b>	0.20	2.50	2.00	0.045	0.015	21.00	13.00	0.11

## Mechanical properties

	20 – 160 mm
<b>R<sub>p0,2</sub> in MPa</b>	≥ 230
<b>R<sub>p1,0</sub> in MPa</b>	≥ 230
<b>R<sub>m</sub> in MPa</b>	550 – 750
<b>A<sub>5</sub> in %</b>	≥ 30
<b>A<sub>2"</sub> in %</b>	–
<b>Z in %</b>	as tested
<b>Hardness in HBW</b>	≤ 223

## Forming

Hot rolled

## Heat treatment

Solution annealed and quenched

## Material description

Bars made of heat-resistant steel

1.4828

EN 10095

# 1.4841

## Chemical composition

	C %	Si %	Mn %	P %	S %	Cr %	Ni %	N %
<b>Min.</b>	≤	1.50	≤	≤	≤	24.00	19.00	≤
<b>Max.</b>	0.20	2.50	2.00	0.045	0.015	26.00	22.00	0.11

## Mechanical properties

	25 – 160 mm
<b>R<sub>p0,2</sub> in MPa</b>	≥ 230
<b>R<sub>p1,0</sub> in MPa</b>	≥ 270
<b>R<sub>m</sub> in MPa</b>	550 – 750
<b>A<sub>5</sub> in %</b>	≥ 30 longitudinal
<b>A<sub>2"</sub> in %</b>	≥ 40 longitudinal
<b>Z in %</b>	≥ 50 longitudinal
<b>Hardness in HBW</b>	≤ 223

## Forming

Hot rolled

## Heat treatment

Solution annealed and quenched

## Material description

Bars made of heat-resistant steel

1.4841, Type 314

<b>Ø ≤ 160 mm</b>	EN 10095, ASTM A 276M
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