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July 1985

Stainless steels

Technical delivery conditions for cold rolled strip and slit strip and for plate and sheet cut therefrom

DIN 17 441

Nichtrostende Stähle; technische Lieferbedingungen für kaltgewalzte Bänder und Spaltbänder sowie daraus geschnittene Bleche

This standard, together with DIN 17 440, DIN 17 455, DIN 17 456, DIN 17 457 and DIN 17 458 (July 1985 editions) supersedes DIN 17 440, December 1972 edition.

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

See Explanatory notes for connection with International Standards ISO 683/13 – 1974 published by the International Organization for Standardization (ISO), and also for connection with EURONORMS 88 – 1971 and 141 – 1979 published by the European Coal and Steel Community (ECSC).

The clauses marked with a single dot ● give specifications which are to be agreed upon at the time of ordering.

The subclauses marked with two dots ●● give specifications which are optional and may be agreed upon at the time of ordering.

Contents

1 Field of application

1.1 This standard applies to cold rolled strip in thicknesses up to 6 mm and widths up to 1600 mm, made from stainless steels with a wide range of applications. It also applies to plate and sheet cut from strip and to slit strip produced by longitudinal slitting and to rods (strips) cut therefrom.

Plate and sheet, hot rolled strip, wire rod, drawn wire, steel bars, forgings and semi-finished products made from stainless steels are specified in DIN 17 440, whilst stainless steel tubes and pipes are dealt with in DIN 17 455 to DIN 17 458.

1.2 In addition to the requirements specified in the present standard, the general technical delivery conditions for steel and steel products as given in DIN 17 010 shall apply, unless otherwise specified in this standard.

1.3 This standard is not applicable to the components manufactured by subsequent processing which exhibit quality characteristics deviating from those specified here, as a result of manufacturing processes.

2 Concepts

2.1 Stainless steels

Steels which are particularly resistant to chemically aggressive agents are considered to be stainless steels; they generally have a chromium content of not less than 12 % by mass and a carbon content not exceeding 1,2 % by mass.

2.2 Types of heat treatment

The terminology used in DIN 17 014 Part 1 shall apply for the types of heat treatment.

3 Dimensions and permissible dimensional deviations

The specifications given in DIN 59 381 and DIN 59 382 shall apply for the dimensions and permissible dimensional deviations.

4 Calculation of mass

The density values listed in table A.1 shall be adopted for the calculation of the theoretical mass of the products.

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5 Designation and ordering

5.1 The standard designation for a steel complying with this standard shall be composed of the following particulars, as illustrated in the examples below:

- the term "steel";
- the number of this standard;
- the symbol or material number of the steel grade concerned (see table 1) [1];
- the symbol for the type of condition (see table 8);
- if applicable, the degree of strain hardening (see table 7).

Example 1:

Steel DIN 17 441 – X 5 CrNi 18 10 n
or
Steel DIN 17 441 – X 5 CrNi 18 10 III c
or
Steel DIN 17 441 – 1.4301 n
or
Steel DIN 17 441 – 1.4301 IIIc

Example 2:

Steel DIN 17 441 – X 5 CrNi 18 10 f K800
or
Steel DIN 17 441 – X 5 CrNi 18 10 III a K800
or
Steel DIN 17 441 – 1.4301 f K800
or
Steel DIN 17 441 – 1.4301 IIIa K800

5.2 The specifications given in the relevant dimensional standard shall apply for the standard designation of the product concerned.

5.3 The order shall provide any information necessary for a clear description of the required products, including their condition and testing. Should in certain cases the designations as in subclauses 5.1 and 5.2 not be adequate for this purpose, for example in the case of agreements as provided for in the clauses marked with ● and ●●, the necessary information shall be added to these designations.

6 Requirements

6.1 Manufacturing process

The steelmaking process for the products complying with this standard shall be left to the manufacturer's discretion unless a particular steelmaking process has been agreed at the time of ordering.

●● If agreed, the purchaser shall be informed on the steelmaking process used.

6.2 As delivered condition

The normal treatment conditions and types of condition are listed in tables 3 to 5 and 8 (see also table A.2).

6.3 Chemical composition

6.3.1 Cast analysis

The chemical composition of the steels as determined in the cast analysis shall correspond to table 1. Minor deviations from these values shall be permitted by agreement with the purchaser or his representative, on condition that the mechanical properties, the weldability and the corrosion resistance of the steel comply with the requirements specified in this standard.

[1] *DIN-Normenheft* (DIN Standardization booklet) No. 3 provides information on how the symbols and material numbers for steels are formed.

6.3.2 Product analysis

When testing the chemical composition of the finished product, the deviations shown in table 2 from the values given in table 1 are permitted.

6.4 Corrosion resistance

The data given in table 3 shall apply for the resistance of the ferritic steels to intercrystalline corrosion when tested as described in DIN 50 914. In the as delivered condition and in the welded condition, all austenitic steels covered by this standard are resistant to intercrystalline corrosion when tested as described in DIN 50 914.

Note. The behaviour of stainless steels in respect of corrosion cannot be characterized unambiguously by laboratory tests. It is advisable therefore to refer to experience gained in the use of these steels for confirmation of likely behaviour. The DECHEMA tables of materials, amongst others, provide information on the behaviour of these steels under given corrosion conditions.

6.5 Mechanical properties

6.5.1 Tables 3 and 4 shall apply for the mechanical properties at ambient temperature of the ferritic and martensitic steels in the annealed condition, whilst table 5 shall apply for the austenitic steels in the quenched condition (see also subclause 6.5.3). If transverse test pieces are shown to meet the given property requirements, the longitudinal test pieces shall be considered compliant with the minimum values without further verification.

6.5.2 Table 6 shall apply for the elevated temperature 0,2 % and 1 % proof stresses (see also subclause 6.5.3).

6.5.3 If austenitic steel products are heat treated during subsequent processing (as a general rule, quenching in accordance with table A.2), then the values listed in tables A.3 and A.4 shall apply, in place of the values listed in tables 5 and 6. The warming up associated with welding shall not be regarded as a heat treatment in this context.

6.5.4 Table 7 shall apply for the mechanical properties of strain hardened strip at ambient temperature.

●● In this context, agreement may be reached as to whether the ordered tensile strength range shall apply for test pieces taken in the direction of rolling or transverse to this direction. Unless otherwise agreed, the values determined for test pieces taken transverse to the direction of rolling shall apply.

6.6 Surface finish

Table 8 gives information on the surface finish.

6.7 Susceptibility to brittle fracture and low temperature toughness

The austenitic steels specified in this standard are unsusceptible to brittle fracture and tough at low temperatures; they may therefore also be used at low temperatures.

7 Testing

7.1 ●● Tests to be carried out and documents on materials testing

At the time of ordering, the issue of one of the documents on materials testing specified in DIN 50 049 may be agreed for each consignment.

7.1.1 If it has been agreed in the purchase order that a test report (DIN 50 049 – 2.2) shall be issued, said document shall include the following particulars:

a) the confirmation that the products comply with the purchase order specifications;

b) the results of the cast analysis in respect of all the elements listed in table 1 for the steel grade concerned.

7.1.2 If it has been agreed in the purchase order that a manufacturer's test certificate (DIN 50049 – 2.3) shall be issued, said document shall include the following particulars:

a) the details given in subclause 7.1.1;

b) the results of the tests carried out in accordance with subclauses 7.2.2 to 7.2.7;

c) the marking of the products as described in clause 8.

7.1.3 If it has been agreed in the purchase order that either an inspection certificate (DIN 50049 – 3.1 A, DIN 50049 – 3.1 B or DIN 50049 – 3.1 C) or an inspection report (DIN 50049 – 3.2 A or DIN 50049 – 3.2 C) shall be issued, said document shall include the following particulars:

a) the results of the tests carried out in accordance with subclauses 7.2.2 to 7.2.7;

b) the marking of the products as described in clause 8.

7.2 Scope of test programme

7.2.1 ●● Unless otherwise agreed at the time of ordering, the uncut strip shall be the test unit.

7.2.2 ●● Unless otherwise agreed, the following tests shall be carried out:

— cast analysis;

— tensile test at ambient temperature on test pieces taken from the beginning and end of the strip.

In the case of consignments for plants subject to regular inspection, proof of the uniformity of the material properties over the entire length of the strip shall be furnished.

7.2.3 ●● At the time of ordering, a verification of the elevated temperature 0,2% and 1% proof stress values specified in table 6 may be agreed; in this connection, the test temperature and the scope of test programme shall also be agreed.

7.2.4 ●● At the time of ordering, a test of the resistance to intercrystalline corrosion may be agreed; in this connection, the scope of test programme shall also be agreed.

7.2.5 The dimensions of all products shall be checked.

7.2.6 The surface finish of all products shall be examined.

7.2.7 All products shall be subjected to a materials identity test by the manufacturer.

7.3 Sampling and sample preparation

7.3.1 As regards the product analysis, the specifications given in *Stahl-Eisen-Prüfblatt* (Iron and steel test sheet) 1805 shall be complied with.

7.3.2 For the tensile test, if the rolling width is equal to or exceeds 400 mm, the test pieces transverse to the direction of rolling shall be taken in such a manner that the centre line of the test piece shall have a minimum distance from the edges of the strip equal to one quarter of the strip width. In the case of rolling widths less than 400 mm, longitudinal test pieces shall be tested, the centre line of which shall have a minimum distance from the edges of the strip equal to one quarter of the strip width.

7.4 Procedure

7.4.1 The chemical composition shall be checked in accordance with the methods [2]) specified by the Chemists' Committee of the *Verein Deutscher Eisenhüttenleute* (Society of German Ferrous Metallurgy Engineers).

7.4.2 In the case of products with a nominal thickness of less than 3 mm, the tensile test shall be carried out as described in DIN 50114 on test pieces with a gauge length of 80 mm and a width of 20 mm (large ISO flat test piece). In the case of strip with thicknesses not less than 3 mm, the tensile test shall be carried out as described in DIN 50145, on short proportional test pieces specified in DIN 50125.

7.4.3 The Vickers hardness test shall be carried out as described in DIN 50133 and the Brinell hardness test as described in DIN 50351.

7.4.4 The verification of resistance to intercrystalline corrosion shall be carried out as specified in DIN 50914.

●● If required, agreements may be made in respect of the details of testing.

7.4.5 The dimensions of the products and the dimensional deviations shall be checked in accordance with the specifications given in DIN 59381 or DIN 59382.

7.4.6 The surface finish shall be examined visually under appropriate lighting conditions by an inspector having normal vision.

7.5 Retests

DIN 17010 shall apply for retests.

8 Marking

8.1 Extent of marking

8.1.1 ●● Unless otherwise agreed at the time of ordering, the products shall be marked with the manufacturer's trade mark, the steel grade, the cast number, the symbol for the type of condition, the thickness and the coil number.

8.1.2 In the case of acceptance inspections, the products shall be marked in addition with the inspector's mark. Only the samples from which the test pieces were taken shall be marked with the test piece number, unless the test batch number is used in lieu of the test piece number.

8.2 Method of marking

As a general rule, plate, sheet and strip shall be marked by coloured stamp at right angles to the direction of rolling; however, roll stamping in the longitudinal direction is also permitted.

●● Other types of marking may be agreed at the time of ordering.

9 Complaints

9.1 Under current law, a complaint may only be raised against defective products if the defects impair their processing and use to a more than negligible extent. This shall apply unless otherwise agreed at the time of ordering.

9.2 It is normal and practical for the purchaser to give the supplier the opportunity to judge whether the complaints are justified, if possible by submitting the products objected to or samples of the products supplied.

[2]) *Handbuch für das Eisenhüttenlaboratorium* (Handbook for the ferrous metallurgy laboratory); see "Standards and other documents referred to" clause.

54 Table 1. **Steel grades and chemical composition determined in the cast analysis [1]**

Steel grade		Chemical composition (% by mass)				
Symbol [2]	Material number	C	Cr	Mo	Ni	Others [3]
Ferritic and martensitic steels						
X 6 CrTi 12	1.4512	≦ 0,08	10,5 to 12,5	–	–	Ti 6 x % C to 1,00
X 6 Cr 13	1.4000	≦ 0,08	12,0 to 14,0	–	–	–
X 6 CrAl 13	1.4002	≦ 0,08	12,0 to 14,0	–	–	Al 0,10 to 0,30
X 10 Cr 13	1.4006	0,08 to 0,12	12,0 to 14,0	–	–	–
X 15 Cr 13	1.4024	0,12 to 0,17	12,0 to 14,0	–	–	–
X 20 Cr 13	1.4021	0,17 to 0,25	12,0 to 14,0	–	–	–
X 30 Cr 13	1.4028	0,28 to 0,35	12,0 to 14,0	–	–	–
X 38 Cr 13	1.4031	0,35 to 0,42	12,5 to 14,5	–	–	–
X 46 Cr 13	1.4034	0,42 to 0,50	12,5 to 14,5	–	–	–
X 45 CrMoV 15	1.4116	0,42 to 0,50	13,8 to 15,0	0,45 to 0,60	–	V 0,10 to 0,15
X 6 Cr 17	1.4016	≦ 0,08	15,5 to 17,5	–	–	–
X 6 CrTi 17	1.4510	≦ 0,08	16,0 to 18,0	–	–	Ti 7 x % C to 1,20
X 6 CrNb 17	1.4511	≦ 0,08	16,0 to 18,0	–	–	Nb 12 x % C to 1,20 [4]
X 6 CrMo 17 1	1.4113	≦ 0,08	16,0 to 18,0	0,9 to 1,3	–	–
Austenitic steels						
X 5 CrNi 18 10	1.4301	≦ 0,07	17,0 to 19,0	–	8,5 to 10,5	–
X 5 CrNi 18 12	1.4303	≦ 0,07	17,0 to 19,0	–	11,0 to 13,0	–
X 2 CrNi 19 11	1.4306	≦ 0,030	18,0 to 20,0	–	10,0 to 12,5	–
X 2 CrNiN 18 10	1.4311	≦ 0,030	17,0 to 19,0	–	8,5 to 11,5	N 0,12 to 0,22
X 6 CrNiTi 18 10	1.4541	≦ 0,08	17,0 to 19,0	–	9,0 to 12,0	Ti 5 x % C to 0,80
X 6 CrNiNb 18 10	1.4550	≦ 0,08	17,0 to 19,0	–	9,0 to 12,0	Nb 10 x % C to 1,00 [4]
X 5 CrNiMo 17 12 2	1.4401	≦ 0,07	16,5 to 18,5	2,0 to 2,5	10,5 to 13,5	–
X 2 CrNiMo 17 13 2	1.4404	≦ 0,030	16,5 to 18,5	2,0 to 2,5	11,0 to 14,0	–
X 2 CrNiMoN 17 12 2	1.4406	≦ 0,030	16,5 to 18,5	2,0 to 2,5	10,5 to 13,5	N 0,12 to 0,22
X 6 CrNiMoTi 17 12 2	1.4571	≦ 0,08	16,5 to 18,5	2,0 to 2,5	10,5 to 13,5	Ti 5 x % C to 0,80
X 2 CrNiMoN 17 13 3	1.4429	≦ 0,030	16,5 to 18,5	2,5 to 3,0	11,5 to 14,5	N 0,14 to 0,22; S ≦ 0,025
X 2 CrNiMo 18 14 3	1.4435	≦ 0,030	17,0 to 18,5	2,5 to 3,0	12,5 to 15,0	S ≦ 0,025
X 5 CrNiMo 17 13 3	1.4436	≦ 0,07	16,5 to 18,5	2,5 to 3,0	11,0 to 14,0	S ≦ 0,025
X 2 CrNiMo 18 16 4	1.4438	≦ 0,030	17,5 to 19,5	3,0 to 4,0	14,0 to 17,0	S ≦ 0,025
X 2 CrNiMoN 17 13 5	1.4439	≦ 0,030	16,5 to 18,5	4,0 to 5,0	12,5 to 14,5	N 0,12 to 0,22; S ≦ 0,025

[1] Elements not quoted in this table in respect of the individual steel grades shall not be added deliberately to the steel without the purchaser's consent, except for the purpose of finishing the melt. Such elements shall in no way impair the usability or processability of the steel, e.g. its weldability, nor shall they affect the properties specified in this standard.

[2] The symbols given in the December 1972 edition of DIN 17 440 may continue to be used during the period of validity of this standard (see comparison table in the Explanatory notes).

[3] Unless otherwise specified, P ≦ 0,045 %, S ≦ 0,030 %, Si ≦ 1,0 % and for ferritic and martensitic steels, Mn ≦ 1,0 %, whilst for austenitic steels, Mn ≦ 2,0 %.

[4] Tantalum determined together with niobium and expressed in the form of niobium content.

Table 2. **Amounts by which the chemical composition in the product analysis may deviate from the limit values specified for the cast analysis**

Element	Limit values for the cast analysis as specified in table 1 % by mass	Permissible deviations [1] % by mass
Carbon (C)	≦ 0,030 > 0,030 < 0,20 ≧ 0,20 ≦ 0,50	+ 0,005 ± 0,01 ± 0,02
Silicon (Si)	≦ 1,0	+ 0,05
Manganese (Mn)	≦ 1,0 > 1,0 ≦ 2,0	+ 0,03 + 0,04
Phosphorus (P)	≦ 0,045	+ 0,005
Sulfur (S)	≦ 0,030	+ 0,005
Nitrogen (N)	≦ 0,22	± 0,01
Aluminium (Al)	≦ 0,30	± 0,05
Chromium (Cr)	≧ 10,5 < 15,0 ≧ 15,0 ≦ 20,0	± 0,15 ± 0,20
Molybdenum (Mo)	≦ 0,60 > 0,60 < 1,75 ≧ 1,75 ≦ 5,0	± 0,03 ± 0,05 ± 0,10
Nickel (Ni)	≧ 8,5 < 10,0 ≧ 10,0 ≦ 17,0	± 0,10 ± 0,15
Niobium (Nb)	≦ 1,20	± 0,05
Titanium (Ti)	≦ 1,20	± 0,05
Vanadium (V)	≦ 0,15	± 0,03

[1] If several product analyses are carried out for a single cast and if these elements show contents for a single element outside the range specified for the cast analysis, this content shall either exceed the permissible maximum content or be below the permissible minimum content, but not both at the same time for one cast.

Table 3. **Mechanical properties of cold rolled ferritic stainless steel strip in the annealed condition [1] at ambient temperature and resistance to intercrystalline corrosion**

Steel grade		Minimum yield stress or 0,2 % proof stress		Tensile strength	Minimum elongation after fracture		Resistance to intercrystalline corrosion when tested as described in DIN 50914	
		Longitudinal	Transverse	Longitudinal and transverse	$A_{80\,mm}$	A_5		
Symbol	Material number	N/mm²		N/mm²	Longitudinal and transverse %		In the as delivered condition	In the welded condition
X 6 CrTi 12	1.4512	200 [2]	220 [2]	390 to 560	18	20	No	No
X 6 Cr 13	1.4000	250	250	400 to 600	15	17	No	No
X 6 CrAl 13	1.4002	250	250	400 to 600	15	17	No	No
X 6 Cr 17	1.4016	250	270	450 to 600	18	20	Yes	No
X 6 CrTi 17	1.4510	270	280	430 to 600	18	20	Yes	Yes
X 6 CrNb 17	1.4511	250	260	450 to 600	18	20	Yes	Yes
X 6 CrMo 17 1	1.4113	260	280	480 to 630	18	20	Yes	No

[1] These values still remain valid after hot or cold working and subsequent annealing in accordance with the specifications of table A.2.

[2] ●● If used for construction purposes, a minimum value of 260 N/mm² may be agreed at the time of ordering.

Table 4. **Mechanical properties of cold rolled martensitic stainless steel strip in the annealed condition at ambient temperature (longitudinal and transverse test piece values) [1]**

Steel grade		Maximum hardness [2]	Tensile strength	Minimum elongation after fracture	
				$A_{80\,mm}$	A_5
Symbol	Material number	HB or HV	N/mm²	%	
X 10 Cr 13	1.4006	200	450 to 600	13	15
X 15 Cr 13	1.4024	215	480 to 680	13	15
X 20 Cr 13	1.4021	225	500 to 700	13	15
X 30 Cr 13	1.4028	235	540 to 740	13	15
X 38 Cr 13	1.4031	240	560 to 760	13	15
X 46 Cr 13	1.4034	245	580 to 780	13	15
X 45 CrMoV 15	1.4116	280	650 to 850	13	15

[1] These values still remain valid after hot or cold working and subsequent annealing in accordance with the specifications of table A.2.

[2] Guideline values; a recomputation of the tensile strength from the hardness values gives inaccurate values.

Table 5. **Mechanical properties of cold rolled austenitic stainless steel strip in the quenched condition [1] at ambient temperature**

Steel grade		Minimum 0,2 % proof stress [2]		Minimum 1 % proof stress [2]		Tensile strength	Minimum elongation after fracture			
							$A_{80\,mm}$		A_5	
Symbol	Material number	Longitudinal	Transverse	Longitudinal	Transverse	Longitudinal and transverse	Longitudinal	Transverse	Longitudinal	Transverse
		N/mm²		N/mm²		N/mm²	%			
X 5 CrNi 18 10	1.4301	220	235	250	265	550 to 750	35	40	43	45
X 5 CrNi 18 12	1.4303	200	215	230	245	500 to 650	35	40	43	45
X 2 CrNi 19 11	1.4306	220	235	250	265	520 to 670	35	40	43	45
X 2 CrNiN 18 10	1.4311	270	285	300	315	550 to 760	35	40	43	45
X 6 CrNiTi 18 10	1.4541	230	245	260	275	540 to 740	35	40	43	45
X 6 CrNiNb 18 10	1.4550	240	255	270	285	550 to 750	33	38	38	40
X 5 CrNiMo 17 12 2	1.4401	240	255	270	285	550 to 700	35	40	43	45
X 2 CrNiMo 17 13 2	1.4404	240	255	270	285	550 to 700	35	40	43	45
X 2 CrNiMoN 17 12 2	1.4406	280	295	310	325	580 to 800	30	35	38	40
X 6 CrNiMoTi 17 12 2	1.4571	240	255	270	285	540 to 690	35	40	43	45
X 2 CrNiMoN 17 13 3	1.4429	300	315	330	345	580 to 800	30	35	38	40
X 2 CrNiMo 18 14 3	1.4435	240	255	270	285	540 to 690	35	40	43	45
X 5 CrNiMo 17 13 3	1.4436	240	255	270	285	550 to 700	35	40	43	45
X 2 CrNiMo 18 16 4	1.4438	220	235	250	265	500 to 700	35	40	43	45
X 2 CrNiMoN 17 13 5	1.4439	300	315	330	345	600 to 800	30	35	38	40

[1] After a heat treatment during the course of further processing, the values listed in table A.3 shall apply. The warming up associated with welding shall not be regarded as a heat treatment in this context.

[2] In the case of thicknesses of less than 1,0 mm, the proof stress values may be lower by 15 N/mm².

58 Table 6. **Minimum values of elevated temperature 0,2 % and 1 % proof stress** [1])

Steel grade		Heat treatment condition [2])	Minimum 0,2 % proof stress at a temperature, in °C, of										Minimum 1 % proof stress at a temperature, in °C, of										Limit temperature [3])
Symbol	Material number		50	100	150	200	250	300	350	400	450	500	50	100	150	200	250	300	350	400	450	500	
			N/mm²										N/mm²										°C
Ferritic and martensitic steels																							
X 6 Cr 13	1.4000	Annealed	240	235	230	225	225	220	210	195	–	–	–	–	–	–	–	–	–	–	–	–	
X 6 CrAl 13	1.4002																						
X 10 Cr 13	1.4006																						
Austenitic steels [4])																							
X 5 CrNi 18 10	1.4301	Quenched	204	182	165	152	143	135	128	123	120	117	234	212	195	182	173	165	158	153	150	147	300
X 5 CrNi 18 12	1.4303		185	162	149	134	125	117	110	105	102	99	215	192	179	164	155	147	140	135	132	129	300
X 2 CrNi 19 11	1.4306		204	182	165	152	143	135	128	123	120	117	234	212	195	182	173	165	158	153	150	147	350
X 2 CrNiN 18 10	1.4311		245	205	175	157	145	136	130	125	121	119	280	240	210	187	175	167	161	156	152	149	400
X 6 CrNiTi 18 10	1.4541		210	196	186	177	164	156	147	145	142	139	240	226	216	207	194	186	177	175	172	169	400
X 6 CrNiNb 18 10	1.4550		210	196	186	177	164	156	147	145	142	139	240	226	216	207	194	186	177	175	172	169	400
X 5 CrNiMo 17 12 2	1.4401	Quenched	222	197	182	167	157	147	140	135	132	130	252	227	212	197	187	177	170	165	162	160	300
X 2 CrNiMo 17 13 2	1.4404		212	186	172	157	147	138	133	128	123	120	242	216	202	187	177	168	163	158	153	150	400
X 2 CrNiMoN 17 12 2	1.4406		252	216	187	167	155	145	140	135	131	129	282	246	218	198	183	175	169	164	160	158	400
X 6 CrNiMoTi 17 12 2	1.4571		225	205	197	187	175	165	157	155	151	149	255	235	227	217	205	195	187	185	181	179	400
X 2 CrNiMoN 17 13 3	1.4429	Quenched	265	225	197	178	165	155	150	145	140	138	300	260	227	208	195	185	180	175	170	168	400
X 2 CrNiMo 18 14 3	1.4435		212	186	172	157	147	138	133	128	123	120	242	216	202	187	177	168	163	158	153	150	400
X 5 CrNiMo 17 13 3	1.4436		222	197	182	167	157	147	140	135	132	130	252	227	212	197	187	177	170	165	162	160	300
X 2 CrNiMo 18 16 4	1.4438		186	172	157	147	137	127	120	115	112	110	221	206	186	177	167	156	148	144	140	138	350
X 2 CrNiMoN 17 13 5	1.4439		260	225	200	185	175	165	155	150	–	–	290	255	230	210	200	190	180	175	–	–	400

[1]) See table A.4 for values at 550 °C.

[2]) See table A.2.

[3]) When used up to the temperatures listed in the table, and for service times up to 100 000 hours, no intercrystalline corrosion will occur when tested as described in DIN 50 914.

[4]) After a heat treatment during the course of further processing, the values listed in table A.4 shall apply. The warming up associated with welding shall not be regarded as a heat treatment in this context.

Table 7. **Mechanical properties of strain hardened austenitic steel strip**

Strain hardening class	Minimum 0,2 % proof stress (guideline values) N/mm²	Tensile strength N/mm²	Minimum elongation after fracture $A_{80\,mm}$ (guideline value) %	Thicknesses which can be supplied mm
K 700	350	700 to 850	25 [2]	≦3,0
K 800	500	800 to 1000	12 [2]	≦3,0
K 1000	750	1000 to 1200	–	≦2,5
K 1200 [1]	950	1200 to 1400	–	≦1,5

[1] Not possible for every austenitic steel grade specified in this standard.
[2] For thicknesses of less than 0,5 mm, this value may be lower, depending on the dimension.

Table 8. **Type of condition and surface finish of the strip**

Symbol [1]	Type of condition	Surface finish	Notes
f or **IIIa**	Heat treated, mechanically or chemically descaled, and finally cold rolled	Smooth and bright	Cold rolling modifies the properties, depending on the degree of working (see table 7). In cases where this type of condition is specified for ferritic or martensitic steels, the mechanical properties shall be agreed.
h or **IIIb**	Mechanically or chemically descaled, cold rolled, heat treated [2], pickled	Smoother than hot rolled and pickled strip	
m or **IIId**	Mechanically or chemically descaled, cold rolled, bright annealed [3] or bright annealed [3] and lightly cold rerolled	Glossy and smoother than for condition h or IIIb	Particularly suitable for grinding and polishing.
n or **IIIc**	Mechanically or chemically descaled, cold rolled, heat treated [2], pickled, lightly rerolled	Smoother than for condition h or IIIb	Particularly suitable for grinding, brushing or polishing.
o or **IV**	Ground	●● The nature, degree and extent of grinding or polishing shall be agreed at the time of ordering.	Conditions n or IIIc and m or IIId, but also f or IIIa are generally used as starting condition.
p or **V**	Polished		
q	Brushed	Matt silk	The best starting condition is condition n or IIIc.

[1] The new symbols in alphabetical order have not yet become generally established. In addition, work is still proceeding on an international system of symbols, so that the usefulness of conversion to the letters featured in the above table is now debatable. Consequently, both kinds of symbols have again been listed in the above table, as in the previous December 1972 edition of DIN 17 440.
[2] In this context, "heat treated" is understood to mean the conventional heat treatment condition specified in tables 3 to 5.
[3] In this context, "bright annealed" is understood to mean the conventional heat treatment condition specified in tables 3 to 5.

Appendix A
Additional information

A.1 Physical properties

Guideline data on physical properties are listed in table A.1.

A.2 Guideline data on heat treatment and further processing

A.2.1 Agreement with the manufacturer is recommended in respect of the further processing of the steels.

A.2.2 Guideline data on heat treatment are listed in table A.2.

A.2.3 The ferritic and austenitic steels are particularly suitable for cold working (e.g. deep drawing, stretch forming, bending, spinning). It shall be borne in mind that the susceptibility to corrosion, mechanical and physical properties are affected by cold working.

A.2.4 The steels may be welded with or without filler metals. In the case of martensitic steels, special precautions shall be observed in respect of welding. In the case of ferritic and austenitic steels, no postweld treatment is usually necessary.

A.2.5 Soft soldering is possible on all steel grades. Brazing is not possible in the case of the hardenable martensitic steels. Austenitic steels shall be soldered with solders (silver solders) with a low melting point.

A.2.6 Because the resistance of stainless steels to corrosion is only reliably ensured if the surface is metallically clean, it is essential to remove any layers of scale and annealing colours which may have formed during hot working, heat treatment or welding, before use. Finished steel components containing approximately 13 % Cr demand the very best surface finish quality (precision ground or polished) in order to achieve the highest degree of resistance to corrosion.

A.3 Mechanical properties of austenitic stainless steels after heat treatment in the course of further processing

After heat treatment in the course of further processing of products complying with this standard, the values listed in table A.3 shall apply for the mechanical properties at ambient temperature and the values listed in table A.4 shall apply for the elevated temperature 0,2 % and 1 % proof stress.

The warming up associated with welding shall not be regarded as a heat treatment in this context.

Table A.1. **Guideline data on physical properties**

Steel grade		Density	Modulus of elasticity at						Thermal expansion between 20 °C and					Thermal conductivity at 20 °C	Specific heat capacity at 20 °C	Electrical resistance at 20 °C	Magnetizability
Symbol	Material number	kg/dm³	20 °C	100 °C	200 °C	300 °C	400 °C	500 °C	100 °C	200 °C	300 °C	400 °C	500 °C	W/(m · K)	J/(kg · K)	Ω · mm²/m	
			kN/mm²						$10^{-6} \cdot K^{-1}$								
Ferritic and martensitic steels																	
X 6 CrTi 12	1.4512	7,7	220	215	210	205	200		10,5	11,0	11,5	12,0	–	25	460	0,60	Existing.
X 6 Cr 13 X 6 CrAl 13 X 10 Cr 13 X 15 Cr 13 X 20 Cr 13	1.4000 1.4002 1.4006 1.4024 1.4021		216	213	207	200	192						12,0	30			
X 30 Cr 13 X 38 Cr 13	1.4028 1.4031		220	218	212	205	197									0,65	
X 46 Cr 13 X 45 CrMoV 15	1.4034 1.4116										11,0	11,5					
X 6 Cr 17 X 6 CrTi 17 X 6 CrNb 17	1.4016 1.4510 1.4511	7,7	220	218	212	205	197		10,0	10,0	10,5	10,5	11,0	25	460	0,60	Existing.
X 6 CrMo 17 1	1.4113		216	213	207	200	192			10,5						0,70	
Austenitic steels																	
X 5 CrNi 18 10 X 5 CrNi 18 12 X 2 CrNi 19 11 X 2 CrNiN 18 10 X 6 CrNiTi 18 10 X 6 CrNiNb 18 10	1.4301 1.4303 1.4306 1.4311 1.4541 1.4550	7,9	200	194	186	179	172	165	16,0	17,0	17,0	18,0	18,0	15	500	0,73	Non-existent [1]).
X 5 CrNiMo 17 12 2 X 2 CrNiMo 17 13 2 X 2 CrNiMoN 17 12 2	1.4401 1.4404 1.4406	7,98							16,5	17,5	17,5	18,5	18,5			0,75	
X 6 CrNiMoTi 17 12 2	1.4571										18,5		19,0				
X 2 CrNiMoN 17 13 3 X 2 CrNiMo 18 14 3 X 5 CrNiMo 17 13 3	1.4429 1.4435 1.4436	7,98									17,5		18,5				
X 2 CrNiMo 18 16 4	1.4438	8,00									18,0		19,0	14		0,85	
X 2 CrNiMoN 17 13 5	1.4439	8,02									17,5		18,5				

[1]) Austenitic steels may be slightly magnetizable in the quenched condition in certain cases. Their magnetizability may increase with an increasing degree of cold working.

Table A.2. **Guideline data on heat treatment of cold rolled strip**

Steel grade		Recrystallization annealing or solution annealing		Hardening		Tempering
Symbol	Material number	Temperature [1] °C	Type of cooling	Temperature [1] °C	Type of cooling	Temperature °C
Ferritic steels						
X 6 CrTi 12	1.4512	750 to 850	Air, water			
X 6 Cr 13 X 6 CrAl 13	1.4000 1.4002	750 to 800		950 to 1000	Oil, air [2]	650 to 750
X 6 Cr 17 X 6 CrTi 17 X 6 CrNb 17 X 6 CrMo 17 1	1.4016 1.4510 1.4511 1.4113	750 to 850				
Martensitic steels						
X 10 Cr 13	1.4006	750 to 800	Air, furnace	950 to 1000	Oil, air [2]	680 to 780
X 15 Cr 13	1.4024	730 to 780				
X 20 Cr 13	1.4021			980 to 1030		650 to 750; 600 to 700
X 30 Cr 13	1.4028					640 to 740
X 38 Cr 13 X 46 Cr 13 X 45 CrMoV 15	1.4031 1.4034 1.4116					100 to 200
Austenitic steels [5]						
X 5 CrNi 18 10 X 5 CrNi 18 12 X 2 CrNi 19 11 X 2 CrNiN 18 10	1.4301 1.4303 1.4306 1.4311	1000 to 1100	Water, air [2]			
X 6 CrNiTi 18 10 X 6 CrNiNb 18 10 X 5 CrNiMo 17 12 2 X 2 CrNiMo 17 13 2 X 2 CrNiMoN 17 12 2 X 6 CrNiMoTi 17 12 2	1.4541 1.4550 1.4401 1.4404 1.4406 1.4571	1020 to 1120				
X 2 CrNiMoN 17 13 3	1.4429	1050 to 1150				
X 2 CrNiMo 18 14 3 X 5 CrMiNo 17 13 3	1.4435 1.4436	1020 to 1120				
X 2 CrNiMo 18 16 4 X 2 CrNiMoN 17 13 5	1.4438 1.4439	1050 to 1150				

[1] In the case of continuous annealing of strip, the upper temperature limits may be exceeded.

[2] Cooling shall be reasonably rapid.

[3] In the case of a heat treatment forming part of the further processing, the lower values of the range specified for solution annealing shall be aimed at. If the temperature during hot working did not drop below 850 °C, or if the product was cold worked, the solution annealing temperature may, during a repeated solution annealing, be up to 20 K below the lower limit of solution annealing temperature given.

Table A.3. **Mechanical properties of austenitic steels at ambient temperature after a heat treatment in the course of further processing** [1])

Steel grade		Minimum 0,2 % proof stress	Minimum 1 % proof stress	Tensile strength	Minimum elongation after fracture, in %		
					($A_{80\ mm}$)		(A_5)
Symbol	Material number	N/mm²	N/mm²	N/mm²	Longi-tudinal	Transverse	Longi-tudinal Transverse
X 5 CrNi 18 10	1.4301	195	230	500 to 700	35	40	40
X 5 CrNi 18 12	1.4303	185	220	490 to 690	35	40	40
X 2 CrNi 19 11	1.4306	180	215	460 to 680	37	42	40
X 2 CrNiN 18 10	1.4311	270	305	550 to 760	35	40	35
X 6 CrNiTi 18 10	1.4541	200	235	500 to 730	35	42	35
X 6 CrNiNb 18 10	1.4550	205	240	510 to 740	35	42	30
X 5 CrNiMo 17 12 2	1.4401	205	240	510 to 710	35	40	40
X 2 CrNiMo 17 13 2	1.4404	190	225	490 to 690	35	40	40
X 2 CrNiMoN 17 12 2	1.4406	280	315	580 to 800	35	40	35
X 6 CrNiMoTi 17 12 2	1.4571	210	245	500 to 730	35	40	35
X 2 CrNiMoN 17 13 3	1.4429	295	330	580 to 800	35	40	35
X 2 CrNiMo 18 14 3	1.4435	190	225	490 to 690	35	40	40
X 5 CrNiMo 17 13 3	1.4436	205	240	510 to 710	35	40	40
X 2 CrNiMo 18 16 4	1.4438	195	230	490 to 690	35	40	35
X 2 CrNiMoN 17 13 5	1.4439	285	315	580 to 800	35	40	35

[1]) The warming up associated with welding shall not be regarded as a heat treatment in this context.

Table A.4. **Minimum elevated temperature 0,2 % and 1 % proof stress values of austenitic steels after a heat treatment in the course of further processing [1]**

Steel grade		Heat treatment condition	Minimum 0,2 % proof stress											Minimum 1 % proof stress										
			at a temperature, in °C, of											at a temperature, in °C, of										
Symbol	Material number		50	100	150	200	250	300	350	400	450	500	550	50	100	150	200	250	300	350	400	450	500	550
			N/mm²											N/mm²										
X 5 CrNi 18 10	1.4301	Quenched	177	157	142	127	118	110	104	98	95	92	90	211	191	172	157	145	135	129	125	122	120	120
X 5 CrNi 18 12	1.4303		175	155	142	127	118	110	104	98	95	92	90	208	188	172	157	145	135	129	125	122	120	120
X 2 CrNi 19 11	1.4306		162	147	132	118	108	100	94	89	85	81	80	201	181	162	147	137	127	121	116	112	109	108
X 2 CrNiN 18 10	1.4311		245	205	175	157	145	136	130	125	121	119	118	280	240	210	187	175	167	161	156	152	149	147
X 6 CrNiTi 18 10	1.4541		190	176	167	157	147	136	130	125	121	119	118	222	208	195	185	175	167	161	156	152	149	147
X 6 CrNiNb 18 10	1.4550		191	177	167	157	147	136	130	125	121	119	118	226	211	196	186	177	167	161	156	152	149	147
X 5 CrNiMo 17 12 2	1.4401		196	177	162	147	137	127	120	115	112	110	108	230	211	191	177	167	156	150	144	141	139	137
X 2 CrNiMo 17 13 2	1.4404		182	166	152	137	127	118	113	108	103	100	98	217	199	181	167	157	145	139	135	130	128	127
X 2 CrNiMoN 17 12 2	1.4406		250	211	185	167	155	145	140	135	131	129	127	284	246	218	198	183	175	169	164	160	158	157
X 6 CrNiMoTi 17 12 2	1.4571		202	185	177	167	157	145	140	135	131	129	127	234	218	206	196	186	175	169	164	160	158	157
X 2 CrNiMoN 17 13 3	1.4429		265	225	197	178	165	155	150	145	140	138	136	300	260	227	208	195	185	180	175	170	168	166
X 2 CrNiMo 18 14 3	1.4435		182	166	152	137	127	118	113	108	103	100	98	217	199	181	167	157	145	139	135	130	128	127
X 5 CrNiMo 17 13 3	1.4436		196	177	162	147	137	127	120	115	112	110	108	230	211	191	177	167	156	150	144	141	139	137
X 2 CrNiMo 18 16 4	1.4438		186	172	157	147	137	127	120	115	112	110	108	221	206	186	177	167	156	148	144	140	138	136
X 2 CrNiMoN 17 13 5	1.4439		260	225	200	185	175	165	155	150	–	–	–	290	255	230	210	200	190	180	175	–	–	–

[1] The warming up associated with welding shall not be regarded as a heat treatment in this context.

Standards and other docments referred to

DIN 17 010	General technical delivery conditions for steel and steel products
DIN 17 014 Part 1	Heat treatment of ferrous materials; technical concepts
DIN 17 440	Stainless steels; technical delivery conditions for plate and sheet, hot rolled strip, wire rod, drawn wire, steel bars, forgings and semi-finished products
DIN 17 455	General purpose welded circular stainless steel tubes; technical delivery conditions
DIN 17 456	General purpose seamless circular stainless steel tubes; technical delivery conditions
DIN 17 457	Welded circular austenitic stainless steel tubes subject to special requirements; technical delivery conditions
DIN 17 458	Seamless circular austenitic stainless steel tubes subject to special requirements; technical delivery conditions
DIN 50 049	Documents on materials testing
DIN 50 114	Testing of metals; tensile test on sheet or strip less than 3 mm thick, not using an extensometer
DIN 50 125	Testing of metallic materials; tensile test pieces; guidelines for their preparation
DIN 50 133	Testing of metallic materials; Vickers hardness test, range HV 0,2 to HV 100
DIN 50 145	Testing of metallic materials; tensile test
DIN 50 351	Testing of metallic materials; Brinell hardness test
DIN 50 914	Testing of stainless steels for resistance to intercrystalline corrosion; copper sulfate-sulfuric acid method; Strauß test
DIN 59 381	Steel flat products; cold rolled strip made from stainless and heat resisting steels; dimensions, permissible dimensional deviations, deviations of form and in mass
DIN 59 382	Steel flat products; cold rolled wide strip and sheet made from stainless steels; dimensions, permissible dimensional deviations and deviations of form

Stahl-Eisen-Prüfblatt 1805 [3]) *Probenahme und Probenvorbereitung für die Stückanalyse bei Stählen* (Sampling and sample preparation for the product analysis of steels)

Handbuch für das Eisenhüttenlaboratorium [3]) (Handbook for the ferrous metallurgy laboratory);

volume 2: *Die Untersuchung der metallischen Werkstoffe* (Investigation of metallic materials); Düsseldorf 1966;

volume 2a (supplement): Düsseldorf 1982;

volume 5 (supplement):

A 4.1 – *Aufstellung empfohlener Schiedsverfahren* (List of recommended arbitration procedures);

B – *Probenahmeverfahren* (Sampling methods);

C – *Analysenverfahren* (Methods of analysis);

most recent edition in each case.

DIN-Normenheft 3 *Kurznamen und Werkstoffnummern der Eisenwerkstoffe in DIN-Normen und Stahl-Eisen-Werkstoffblättern* (Symbols and material numbers for ferrous materials in DIN Standards and Iron and steel material sheets)

DECHEMA-Werkstofftabelle [4]) (DECHEMA Table of materials)

Other relevant standards and documents

DIN 17 224 Stainless steel wire and strip for springs; technical delivery conditions

Stahl-Eisen-Werkstoffblatt 390 [3]) *Nichtmagnetisierbare Stähle* (Non-magnetizable steels)

Stahl-Eisen-Werkstoffblatt 400 [3]) *Nichtrostende Walz- und Schmiedestähle* (Stainless rolled and forged steels)

Stahl-Eisen-Werkstoffblatt 470 [3]) *Hitzebeständige Walz- und Schmiedestähle* (Heat resistant rolled and forged steels)

AD-Merkblatt W 2 *Austenitische Stähle* (Austenitic steels)

AD-Merkblatt W 10 *Werkstoffe für tiefe Temperaturen; Eisenwerkstoffe* (Materials for low temperature applications; ferrous materials)

Previous editions

DIN 17 440: 01.67, 12.72

Amendments

The following amendments have been made in comparison with the December 1972 edition of DIN 17 440:

a) The field of application has been restricted to cold rolled strip, slit strip and plate and sheet cut therefrom.

b) X 6 CrTi 12 (1.4512), X 30 Cr 13 (1.4028), X 38 Cr 13 (1.4031) and X 2 CrNiMoN 17 13 5 (1.4439) steels have been included in the standard for the first time. X 12 CrMoS 17 (1.4104), X 22 CrNi 17 (1.4057), X 12 CrNiS 18 8 (1.4305) and X 10 CrNiMoNb 18 10 (1.4580) steels have been dropped from the standard because they are not supplied in the form of cold rolled strip.

[3]) Obtainable from *Verlag Stahleisen mbH*, Postfach 82 29, D-4000 Düsseldorf 1.

[4]) Obtainable from *Deutsche Gesellschaft für chemische Apparatewesen e.V.*, Theodor-Heuss-Allee 25, D-6000 Frankfurt 97.

c) Some symbols have been altered in line with the specifications relating to the chemical composition.

d) The specifications relating to the marking of the products have been formulated in a more precise manner.

e) The specifications relating to the chemical composition of the following steel grades have been altered: 1.4021, 1.4034, 1.4016, 1.4116, 1.4510, 1.4511, 1.4113, 1.4301, 1.4303, 1.4306, 1.4541, 1.4550, 1.4406, 1.4571, 1.4429, 1.4435, 1.4436 and 1.4438.

f) The specifications relating to the mechanical properties at ambient temperature and at elevated temperatures have been revised.

g) The tensile test shall be carried out on transverse test pieces with rolling widths from 400 mm.

Explanatory notes

During the discussions relating to the revised edition of DIN 17 440, it was also decided to exclude cold rolled strip and plate, sheet and bars (strips) cut therefrom from DIN 17 440, in addition to the stainless steel seamless and welded tubes and pipes (see DIN 17 455 to DIN 17 458), and to specify the properties of the above products in a separate standard. The main reason for the exclusion of cold rolled strip from DIN 17 440 resides in the fact that the mechanical properties of this product form are in part widely different from the mechanical properties of other product forms.

With regard to this first edition of a standard covering stainless steel cold rolled strip and also in connection with the revised edition of DIN 17 440 published at the same time, it should be noted that the specifications of the chemical composition of the steels comply with those given in DIN 17 440 and that X 6 CrMo 17 1 (1.4113), X 6 CrNb 17 (1.4511) and X 6 CrTi 12 (1.4512) steels are included in DIN 17 441 but are not specified in DIN 17 440.

At the instigation of the steel manufacturers, an adaptation of the symbols to the altered specification for the chemical composition was already undertaken at the time of the draft edition of DN 17 440 (September 1982); the retention of these new symbols was unanimously confirmed when reviewing the comments received. However, in order to give plenty of time to all parties concerned to revise their existing documents, and taking due note of the fact that international efforts are being made at present to develop a system of symbols, it was also decided that the symbols given in the December 1972 edition of DIN 17 440 could still continue to be used during the period of validity of the present standard.

It should also be mentioned that the former symbols are still specified in several other DIN Standards at the time of publication of the present standard, e.g. in DIN 1654 Part 5, DIN 17 224, DIN 17 442; when these standards are revised, the symbols contained in them will be amended accordingly. The tabular comparison below gives a list of the symbols included in this standard which have been amended in comparison with the December 1972 edition of DIN 17 440, together with their unchanged material numbers.

The specifications relating to mechanical properties featured in this standard are based on large number statistical evaluations of the strip manufacturers. The values listed in tables 3, 4 and 6 for the ferritic and martensitic steels are still capable of being complied with after hot or cold working with subsequent annealing in accordance with the specifications given in table A.2. As regards the austenitic steels after heat treatment in the course of further processing, the partly higher values of tables 5 and 6 are not applicable; in place thereof, the values of tables A.3 and A.4 corresponding to those given in DIN 17 440 shall apply. The warming up associated with welding, in the case of austenitic steels, shall not be regarded as heat treatment in this context. No 0,2 % and 1 % proof stress values are specified in table 6 for a temperature of 550 °C, because there are as yet no practical data available as to whether the generally higher elevated temperature proof stress values can be maintained even after prolonged stressing. Consequently, the values specified in table A.4 shall be adopted for 550 °C.

Material number	Symbol specified in DIN 17 440 (December 1972 edition)	New symbol
1.4000	X 7 Cr 13	X 6 Cr 13
1.4002	X 7 CrAl 13	X 6 CrAl 13
1.4016	X 8 Cr 17	X 6 Cr 17
1.4034	X 40 Cr 13	X 46 Cr 13
1.4113	X 6 CrMo 17	X 6 CrMo 17 1
1.4301	X 5 CrNi 189	X 5 CrNi 18 10
1.4303	X 5 CrNi 19 11	X 5 CrNi 18 12
1.4306	X 2 CrNi 189	X 2 CrNi 19 11
1.4401	X 5 CrNiMo 18 10	X 5 CrNiMo 17 12 2
1.4404	X 2 CrNiMo 18 10	X 2 CrNiMo 17 13 2
1.4406	X 2 CrNiMoN 18 12	X 2 CrNiMoN 17 12 2
1.4429	X 2 CrNiMoN 18 13	X 2 CrNiMoN 17 13 3
1.4435	X 2 CrNiMo 18 12	X 2 CrNiMo 18 14 3
1.4436	X 5 CrNiMo 18 12	X 5 CrNiMo 17 13 3
1.4438	X 2 CrNiMo 18 16	X 2 CrNiMo 18 16 4
1.4510	X 8 CrTi 17	X 6 CrTi 17
1.4511	X 8 CrNb 17	X 6 CrNb 17
1.4541	X 10 CrNiTi 189	X 6 CrNiTi 18 10
1.4550	X 10 CrNiNb 189	X 6 CrNiNb 18 10
1.4571	X 10 CrNiMoTi 18 10	X 6 CrNiMoTi 17 12 2

Contrary to the intention expressed on publication of the December 1972 edition of DIN 17 440, no standard dealing with symbols for the surface finish of steel products of all kinds has either been prepared or even planned. Practical experience has shown that the symbols listed in alphabetical sequence are used almost as frequently as the symbols designated as "former symbols" in the December 1972 edition, and as a consequence the present edition of this standard gives both types of symbol side by side and equally valid.

The present standard is related with the following international documents:

ISO 683/13 – 1974	Heat-treated steels, alloy steels and free-cutting steels. Part 13: Wrought stainless steels
EURONORM 88 – 71	Stainless steels; quality specifications
EURONORM 141 – 79	Austenitic stainless steel plate and strip for application at low temperature; technical conditions of delivery

This standard only deals with cold rolled strip and slit strip and with plate, sheet and rods (strips) cut therefrom, whereas EURONORM 141 covers cold and hot rolled plate, sheet and strip, whilst EURONORM 88 and ISO 683/13 also cover steel bars, wire rod and forgings.

ISO 683/13 – 74 and EURONORM 88 – 71 are at present in process of being revised, and a clear picture has already emerged in respect of the selection of grades and chemical composition. A comparison of the steel grades specified in the present standard with those specified in the international standards is given in the following table, which is based on the latest information available on the proposed revised standards, and not on the published versions which are in fact out of date.

Comparison of stainless steels as specified in national documents with the stainless steels specified in ISO/DR 683/13 (at present in the form of document TC 17/SC 4 N 979), **EURONORM 88** (at present in the form of document CECA/AG 23/EU 88 N 53) **and EURONORM 141 – 79**

National documents			ISO/DR 683/13		EURONORM 88		EURONORM 141 – 79	
Source [1] DIN	Symbol	Material number	Steel type	[2]	Symbol	[2]	Symbol	[2]
17441	X6CrTi12	1.4512	1Ti	●	X5CrTi12	●	–	
17441	X6Cr13	1.4000	1	●	X6Cr13	●	–	
17441	X6CrAl13	1.4002	2	●	X6CrAl13	●	–	
17441	X10Cr13	1.4006	3	○	X10Cr13	●	–	
17441	X15Cr13	1.4024	3	○	X15Cr13	●	–	
	–	–	7		X12CrS13		–	
17441	X20Cr13	1.4021	4	○	X20Cr13	○	–	
17441	X30Cr13	1.4028	5	○	X30Cr13	●	–	
17441	X38Cr13	1.4031	–		X40Cr13	●	–	
17441	X46Cr13	1.4034	–		X45Cr13	●	–	
17441	X45CrMoV15	1.4116	–		–		–	
17441	X6Cr17	1.4016	8	○	X8Cr17	○	–	
	–	–	8a		X10CrS17		–	
17441	X6CrTi17	1.4510	8b	●	X8CrTi17	●	–	
17441	X6CrNb17	1.4511	–		–		–	
17441	X6CrMo17 1	1.4113	9c	●	X8CrMo17	●	–	
17440	X4CrMoS18	1.4105	–		–		–	
17440	X12CrMoS17	1.4104	9a	○	X14CrS17	●	–	
17440	X20CrNi17 2	1.4057	9b	●	X21CrNi17	●	–	
17441	X5CrNi1810	1.4301	11	○	X6CrNi1810	○	X6CrNi1810KT	○
17441	X5CrNi1812	1.4303	13	●	X8CrNi1812	●	–	
17440	X10CrNiS189	1.4305	17	●	X10CrNiS189	●	–	
	–	–	17a		–		–	
17441	X2CrNi1911	1.4306	10	○	X3CrNi1810	○	X3CrNi1810KT	○
17441	X2CrNiN1810	1.4311	10N	×	X3CrNiN1810	×	X3CrNiN1810KT	×
17441	X6CrNiTi1810	1.4541	15	×	X6CrNiTi1810	×	X6CrNiTi1810KT	×
17441	X6CrNiNb1810	1.4550	16	×	X6CrNiNb1810	×	–	
	–	–	12		X10CrNi189		–	
SEW 400	X12CrNi177	1.4310	14	○	X12CrNi177	○	–	
	–	–	–		–		X5CrNiN189KT	
17441	X5CrNiMo17122	1.4401	20	×	X6CrNiMo17122	×	–	
17441	X2CrNiMo17132	1.4404	19	×	X3CrNiMo17122	×	–	
17441	X2CrNiMoN17122	1.4406	19N	×	X3CrNiMoN17122	×	–	
17441	X6CrNiMoTi17122	1.4571	21	●	X6CrNiMoTi17122	×	–	
17440	X6CrNiMoNb17122	1.4580	23	●	X6CrNiMoNb17122	×	–	
17441	X2CrNiMoN17133	1.4429	19aN	●	X3CrNiMoN17133	●	–	
17441	X2CrNiMo18143	1.4435	19a	○	X3CrNiMo17133	○	–	
17441	X5CrNiMo17133	1.4436	20a	●	X6CrNiMo17133	●	–	
17441	X2CrNiMo18164	1.4438	24	●	X3CrNiMo18164	●	–	
17441	X2CrNiMoN17135	1.4439	–		X3CrNiMoN17135	●	–	
	–	–	A-2		–		–	
	–	–	A-3		–		–	
	–	–	–		–		X3CrMnNiN1887KT	

[1] DIN 17440 = specified in DIN 17440.
DIN 17441 = specified in this standard.
SEW 400 = specified in *Stahl-Eisen-Werkstoffblatt* 400-73.

[2] This column indicates the degree of agreement with regard to the chemical composition of the steels specified in national documents and those specified in international standards. The symbols have the following meaning: × complete agreement, ● slight differences, ○ significant differences.

International Patent Classification

C 22 C 38/00
C 21 D 9/52