INTERNATIONAL STANDARD ISO 683/XIII

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

(17)

Heat-treated steels, alloy steels and free-cutting steels — Part 13 : Wrought stainless steels

Aciers pour traitement thermique, aciers alliés et aciers pour décolletage — Treizième partie : Aciers corroyés inoxydables

First edition — 1974-04-01

UDC 669.14/.15.018.2

Ref. No. ISO 683/XIII-1974 (E)

Descriptors : steels, alloyed steels, stainless steels, materials specifications, chemical composition, mechanical properties, tests.

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 683/XIII was drawn up by Technical Committee ISO/TC 17, *Steel*, and circulated to the Member Bodies in March 1972.

It has been approved by the Member Bodies of the following countries :

Austria	Germany	Romania
Belgium	Hungary	South Africa, Rep. of
Canada	India	Spain
Czechoslovakia	Ireland	Switzerland
Denmark	Italy	Thailand
Egypt, Arab Rep. of	Netherlands	Turkey
Finland	Poland	United Kingdom
France	Portugal	U.S.A.

The Member Bodies of the following countries expressed disapproval of the document on technical grounds :

Norway
Sweden

Printed in Switzerland

Heat-treated steels, alloy steels and free-cutting steels — Part 13 : Wrought stainless steels

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard gives specifications for the grades of wrought stainless steels listed in table 1 and intended for applications in which corrosion resistance is essential, excluding those groups referred to in 1.2.

1.2 Other International Standards will cover precipitation hardening stainless steels, heat resisting steels, creep resisting steels, and stainless steels for use on and with pressure vessels and boilers and for cryogenic applications.

1.3 This International Standard is applicable only to bars of 5 to 100 mm in diameter or thickness in the hot-rolled and heat-treated or forged and heat-treated or cold-drawn condition and to flat products of 0,5 to 30 mm thickness in the hot, or cold-rolled and heat-treated condition, or finally cold-rolled condition.

2 REFERENCES

ISO/R 79, *Brinell hardness test for steel.*

ISO/R 80, *Rockwell hardness test (B and C scales) for steel.*

ISO/R 81, *Vickers hardness test for steel (Load 5 to 100 kgf).*

ISO/R 82, *Tensile testing of steel.*[1)]

ISO/R 83, *Charpy impact test (U-notch) for steel.*

ISO/R 85, *Bend test for steel.*

ISO/R 86, *Tensile testing of steel sheet and strip less than 3 mm and not less than 0,5 mm thick.*[1)]

ISO/R 377, *Selection and preparation of samples and test pieces for wrought steel.*

ISO/R 404, *General technical delivery requirements for steel.*

3 REQUIREMENTS

3.1 Production processes

Unless otherwise agreed in the order, the processes used in making the steel and the product are left to the discretion of the manufacturer. When he so requests, the user shall be informed what steelmaking process is being used.

1) At present under revision for publication as an International Standard.

3.2 Chemical composition

3.2.1 The chemical composition expressed by the cast analysis shall be in accordance with table 1.

TABLE 1 – **Types of steel and chemical composition guaranteed (applicable to cast analysis)**

Type of steel[1]	C % max.[2]	Si % max.	Mn % max.[2]	P % max.	S % max.[2]	Cr %	Mo %	Ni %[4]	Other elements, %
Ferritic steels									
1	0,08	1,0	1,0	0,040	0,030	11,5 to 14,0	–	⩽ 0,50	
2	0,08	1,0	1,0	0,040	0,030	11,5 to 14,0	–	⩽ 0,50	Al 0,10 to 0,30
8	0,10	1,0	1,0	0,040	0,030	16,0 to 18,0	–	⩽ 0,50	
8a	0,12	1,0	1,5	0,060	0,15 to 0,35	16,0 to 18,0	0,60 max.[3]	⩽ 0,50	
8b	0,10	1,0	1,0	0,040	0,030	16,0 to 18,0	–	⩽ 0,50	5 C ⩽ Ti ⩽ 0,80
9c	0,10	1,0	1,0	0,040	0,030	16,0 to 18,0	0,90 to 1,30	–	
Martensitic steels									
3	0,09 to 0,15	1,0	1,0	0,040	0,030	11,5 to 14,0	–	⩽ 1,0	
7	0,08 to 0,15	1,0	1,5	0,060	0,15 to 0,35	12,0 to 14,0	0,60 max.[3]	⩽ 1,0	
4	0,16 to 0,25	1,0	1,0	0,040	0,030	12,0 to 14,0	–	⩽ 1,0	
9	0,10 to 0,20	1,0	1,0	0,040	0,030	15,0 to 18,0	–	1,5 to 3,0	
9b	0,17 to 0,25	1,0	1,0	0,040	0,030	16,0 to 18,0	–	1,5 to 2,5	
5	0,26 to 0,35	1,0	1,0	0,040	0,030	12,0 to 14,0	–	⩽ 1,0	
6	0,36 to 0,45	1,0	1,0	0,040	0,030	12,5 to 14,5	–	⩽ 1,0	
6a	0,42 to 0,50	1,0	1,0	0,040	0,030	12,5 to 14,5	–	⩽ 1,0	
A-1b	0,95 to 1,20	1,0	1,0	0,040	0,030	16,0 to 18,0	⩽ 0,75	⩽ 0,50	
Austenitic steels									
10	0,030	1,0	2,0	0,045	0,030	17,0 to 19,0	–	9,0 to 12,0	
15	0,08	1,0	2,0	0,045	0,030	17,0 to 19,0	–	9,0 to 12,0	5 C ⩽ Ti ⩽ 0,80
16	0,08	1,0	2,0	0,045	0,030	17,0 to 19,0	–	9,0 to 12,0	5 C ⩽ Nb ⩽ 1,0[7]
11	0,07[5][6]	1,0	2,0	0,045	0,030	17,0 to 19,0	–	8,0 to 11,0	
12	0,12	1,0	2,0	0,045	0,030	17,0 to 19,0	–	8,0 to 10,0	
17	0,12	1,0	2,0	0,20	0,15 to 0,35[8]	17,0 to 19,0	0,60 max.[3]	8,0 to 10,0	
13	0,10	1,0	2,0	0,045	0,030	17,0 to 19,0	–	11,0 to 13,0	
14	0,15	1,0	2,0	0,045	0,030	16,0 to 18,0	–	6,0 to 8,0	
19	0,030	1,0	2,0	0,045	0,030	16,0 to 18,5	2,0 to 2,5	11,0 to 14,0	
20	0,07[5][6]	1,0	2,0	0,045	0,030	16,0 to 18,5	2,0 to 2,5	10,5 to 14,0	
21	0,08	1,0	2,0	0,045	0,030	16,0 to 18,5	2,0 to 2,5	10,5 to 14,0	5 C ⩽ Ti ⩽ 0,80
23	0,08	1,0	2,0	0,045	0,030	16,0 to 18,5	2,0 to 2,5	10,5 to 14,0	10 C ⩽ Nb ⩽ 1,0[7]
19a	0,030	1,0	2,0	0,045	0,030	16,0 to 18,5	2,5 to 3,0	11,5 to 14,5	
20a	0,07[6]	1,0	2,0	0,045	0,030	16,0 to 18,5	2,5 to 3,0	11,0 to 14,5	
21a	0,08	1,0	2,0	0,045	0,030	16,0 to 18,5	2,5 to 3,0	11,0 to 14,5	5 C ⩽ Ti ⩽ 0,80
23a	0,08	1,0	2,0	0,045	0,030	16,0 to 18,5	2,5 to 3,0	11,0 to 14,5	10 C ⩽ Nb ⩽ 1,0[7]
24	0,030	1,0	2,0	0,045	0,030	17,5 to 19,5	3,0 to 4,0	14,0 to 17,0	
25	0,07[6]	1,0	2,0	0,045	0,030	17,5 to 19,5	3,0 to 4,0	13,0 to 16,0	
A-2	0,15	1,0	5,5 to 7,5	0,060	0,030	16,0 to 18,0		3,5 to 5,5	N 0,05 to 0,25
A-3	0,15	1,0	7,5 to 10,5	0,060	0,030	17,0 to 19,0		4,0 to 6,0	N 0,05 to 0,25

1) The type numbers are tentative and will be subject to alteration when the relevant International Standards have been established.

2) Unless otherwise indicated.

3) At the option of the producer.

4) For austenitic steels, with the exceptions of steels 17, 14, A-2 and A-3, the maximum nickel content of bars for fabrication into seamless tubes may be increased by 1,0 %.

5) When required for pressure vessel applications at elevated temperatures, these steels can be supplied to the composition ranges specified in ISO ... (in preparation).

6) For special applications, a lower maximum carbon content, but higher than 0,030 %, can be agreed at the time of enquiry and order.

7) Tantalum determined as niobium.

8) By special agreement at the time of the enquiry and order, the specified sulphur may be replaced by 0,15 % min. selenium with 0,060 % sulphur max.

3.2.2 The permissible deviations between the values specified in table 1 and the product analysis are given in table 2.

TABLE 2 – **Permissible deviations[1] between specified analysis and product analysis**

Type of steel	C %	Si %	Mn %	P %	S %	Al %	Cr %	Mo %	Ni %	N %	Nb %	Ti %	Se %
1	+ 0,01	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,15	–	+ 0,03	–	–	–	–
2	+ 0,01	+ 0,05	+ 0,03	+ 0,005	+ 0,005	± 0,05	± 0,15	–	+ 0,03	–	–	–	–
8	+ 0,01	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,20	–	+ 0,03	–	–	–	–
8a	+ 0,01	+ 0,05	+ 0,04	+ 0,010	± 0,020	–	± 0,20	+ 0,03	+ 0,03	–	–	–	–
8b	+ 0,01	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,20	–	+ 0,03	–	–	± 0,05	–
9c	+ 0,01	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,20	± 0,05	–	–	–	–	–
3	± 0,01	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,15	–	+ 0,03	–	–	–	–
7	± 0,01	+ 0,05	+ 0,04	+ 0,005	± 0,020	–	± 0,15	+ 0,03	+ 0,03	–	–	–	–
4	± 0,02	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,15	–	+ 0,03	–	–	–	–
9	± 0,01	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,20	–	± 0,07	–	–	–	–
9b	± 0,02	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,20	–	± 0,07	–	–	–	–
5	± 0,02	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,15	–	+ 0,03	–	–	–	–
6	± 0,02	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,15	–	+ 0,03	–	–	–	–
6a	± 0,02	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,15	–	+ 0,03	–	–	–	–
A-1b	± 0,03	+ 0,05	+ 0,03	+ 0,005	+ 0,005	–	± 0,20	+ 0,05	+ 0,03	–	–	–	–
10	+ 0,005	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	–	± 0,15	–	–	–	–
15	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	–	± 0,15	–	–	± 0,05	–
16	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	–	± 0,15	–	± 0,05	–	–
11	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	–	± 0,15	–	–	–	–
12	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	–	± 0,10	–	–	–	–
17	+ 0,01	+ 0,05	+ 0,04	+ 0,010	+ 0,020	–	± 0,20	+ 0,10	± 0,10	–	–	–	± 0,03
13	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	–	± 0,15	–	–	–	–
14	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	–	± 0,10	–	–	–	–
19	+ 0,005	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	–	–	–
20	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	–	–	–
21	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	–	± 0,05	–
23	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	± 0,05	–	–
19a	+ 0,005	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	–	–	–
20a	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	–	–	–
21a	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	–	± 0,05	–
23a	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	± 0,05	–	–
24	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	–	–	–
25	+ 0,01	+ 0,05	+ 0,04	+ 0,005	+ 0,005	–	± 0,20	± 0,10	± 0,15	–	–	–	–
A-2	+ 0,01	+ 0,05	± 0,06	+ 0,010	+ 0,005	–	± 0,20	–	± 0,10	– 0,01 + 0,02	–	–	–
A-3	+ 0,01	+ 0,05	± 0,06	+ 0,010	+ 0,005	–	± 0,20	–	± 0,10	– 0,01 + 0,02	–	–	–

1) ± means that in one cast the deviation may occur over the upper value or under the lower value of the specified range in table 1, but not both at the same time.

3.3 Mechanical properties

3.3.1 If specified, the mechanical properties shall be those shown in

- Table 3 for the ferritic steels;
- Table 4 for the martensitic steels other than cutlery steels;
- Table 5 for the cutlery steels;
- Table 6 for the austenitic steels in the solution treated condition;
- Table 7 for austenitic steel bars in the cold-drawn condition;
- Table 8 for austenitic steel bars in the lightly cold-drawn condition; or
- Table 9 for austenitic steel flat products in the cold-rolled condition.

3.3.2 The specified mechanical properties apply to test pieces, taken in the direction of the metal fibre, the axis of the test piece corresponding to that shown in figure 1.

3.3.3 The mechanical properties in tables 3 to 6 apply to products heat-treated in accordance with the corresponding data in table 10.

It should be noted that heat-treatment temperatures other than those in table 10 may be used for special purposes. In such cases the mechanical properties may be different from those shown in tables 3 to 6 and should be subject to special agreement at the time of enquiry and order.

3.4 Corrosion resistance

The performance of the stainless steels under the various conditions of chemical attack cannot be characterized by test values in general terms. If desired, a corrosion test shall be agreed at the time of the enquiry and order.

3.5 Tolerances on dimensions and mass

The tolerances allowable on dimensions and mass shall be stated in the order as long as there are no International Standards to cover them.

4 TESTING

4.1 Number of tests

4.1.1 *Chemical composition*

The cast analysis is given by the manufacturer. If a product analysis is required by the purchaser, at least one sample product shall be taken from each cast.

4.1.2 *Mechanical properties*

One sample product shall be tested for each cast and for each separate heat-treatment, cold-drawn or cold-rolled batch.

4.2 Samples and test pieces

4.2.1 For product analyses, the selection of samples shall be carried out in conformity with the requirements of ISO/R 377. For each sample product, one test piece for the tensile test and, when it is appropriate, one test piece for the bend test and three test pieces for the impact test shall be provided.

The test pieces shall be taken in the longitudinal direction of the products according to figure 1. For flat products, the manufacturer is permitted to use a transverse test piece.

4.2.2 General conditions for selection and preparation of samples and test pieces for steel shall be in accordance with ISO/R 377.

4.3 Test methods

4.3.1 In case of dispute, the methods for the chemical analysis shall be those established by the relevant International Standard. If no International Standards are available, the methods may be agreed upon and specified at the time of enquiry and order.

4.3.2 The tensile test shall be made in accordance with ISO/R 82, and ISO/R 86.

4.3.3 The impact test shall be made in accordance with ISO/R 83.

Unless otherwise specified at the time of enquiry and order, the impact value shall be determined by the arithmetic value of the results obtained by the breaking of three test pieces next to one another in the test sample or test bar.

4.3.4 The Brinell hardness test shall be made in accordance with ISO/R 79.

The Rockwell hardness test shall be made in accordance with ISO/R 80.

The Vickers hardness test shall be made in accordance with ISO/R 81.

4.3.5 The bend test shall be made in accordance with ISO/R 85.

4.3.6 Details of a corrosion test, if specified, shall be agreed at the time of the enquiry and order.

4.4 Retests

4.4.1 For retests for the product analysis, clause 7.6 of ISO/R 404 is valid.

4.4.2 For retests for mechanical properties, clause 6.5 of ISO/R 404 is valid.

4.5 Certification of the tests

For certification of the tests, section 4 of ISO/R 404 is valid, acceptable documents being namely

- statement of compliance with the order (see 4.1.1), or
- report based on quality control (see 4.1.2), or
- works certificate (see 4.1.3), or
- test certificate (see 4.2.1), or
- certificate of acceptance (see 4.2.2).

5 DEFECTS AND DIMENSIONAL TOLERANCES

The conditions given in section 8 of ISO/R 404 are valid for

- surface defects (see 8.1),
- rectification (see 8.2),
- internal defects (see 8.3),
- dimensional tolerances (see 8.4) and
- reclaiming (see 8.5).

TABLE 3 – **Mechanical properties of the ferritic steels in the annealed condition**

Type of steel	HB[1] max.	R_e[2] N/mm² min.	R_m[3] N/mm²	A % min.[4] for bars $5 \leqslant d \leqslant 25$	A % min.[4] for flat products with thicknesses in mm $0{,}5 \leqslant a < 3$	A % min.[4] for flat products with thicknesses in mm $3 \leqslant a \leqslant 10$	D_{Ma}[5] For flat products $0{,}5 \leqslant a < 3$
1	192	250	440 to 640	20	18	20	2a
2	187	250	410 to 610	20	18	20	2a
8	192	250	440 to 640	18	17	18	2a
8a	192	250	440 to 640	15	–	–	–
8b	192	250	440 to 640	18	17	18	2a
9c	201	250	440 to 640	18	17	18	2a

1) For thin materials the HRB or HV hardness test may be used by agreement between user and producer, where it is not practicable to use the HB test.

2) R_e = yield stress which may be taken as 0,2 % proof stress.

3) R_m = tensile strength.

4) A = percentage elongation after fracture.
The values for bars are valid for a gauge length of $L_o = 5\,d_o$. The values for flat products are valid for both test pieces specified in ISO/R 86. (ISO/R 86 recommends test pieces either of 20 mm width and 80 mm gauge length or of 12,5 mm width and 50 mm gauge length, the latter being only for thicknesses from 0,5 to 2 mm.)

5) D_{Ma} = diameter of the mandrel in the bend test in millimetres; a = thickness of the test piece in millimetres. After the test piece has been bent through 180° around a mandrel with the diameter D_{Ma}, it should not show any cracks, splits or hair-line cracks.

TABLE 4 – **Mechanical properties of martensitic steels (except cutlery steels)**

Type of steel	Annealed HB max.	Quenched and tempered				
		$R_{p\,0,2}$ min. N/mm²	R_m N/mm²	A min. % bars $5 \leqslant d \leqslant 100$ mm	A min. % flat products $3 \leqslant a \leqslant 30$ mm	KCU[1] min. J/cm²
3	212	410	590 to 780	16	16	60
7	223	440	640 to 830	12[2]	–	–
4	229	490	690 to 880	14	14	40
9	262	640	830 to 1 030	10	10	30
9b	269	690	880 to 1 130	9	9	–
5	235	590	780 to 980	11	11	–

1) Values applicable only on bars of 15 to 63 mm diameter or thickness.

2) Only applicable to bars up to 63 mm diameter or thickness.

TABLE 5 – **Hardness values for cutlery steels**

Type of steel	Annealed HB max.	Quenched and tempered hardness, min.	
		HV	HRC
5	241	500	49
6	255	515	50
6a	269	585	54
A-1b	285	660	58

TABLE 6 – **Mechanical properties of the austenitic steel in the solution treated condition**

Type of steel	HB[1] max.	$R_{p\,0,2}$ min.[2] N/mm²	$R_{p\,1,0}$ min.[2] N/mm²	R_m N/mm²	A min. % bars	A min. % flat products with thicknesses in mm	
					$5 \leqslant d \leqslant 100$	$0,5 \leqslant a < 3$	$3 \leqslant a \leqslant 30$
10	192	180	210	440 to 640	40	38	40
15	192	210	250	490 to 690	35	33	35
16	192	210	250	490 to 690	35	33	35
11	192	200	240	490 to 690	40	38	40
12	192	210	250	490 to 690	40	38	40
17	192	210	250	490 to 690	35	–	–
13	192	180	220	490 to 690	40	38	40
14	212	220	–	590 to 780	–	38	40
19	192	200	230	440 to 640	40	38	40
20	192	210	250	490 to 690	40	38	40
21	192	220	250	490 to 690	35	33	35
23	192	220	250	490 to 690	35	33	35
19a	192	200	230	440 to 640	40	38	40
20a	192	210	250	490 to 690	40	38	40
21a	192	220	250	490 to 690	35	33	35
23a	192	220	250	490 to 690	35	33	35
24	192	200	230	490 to 690	35	33	35
25	192	210	250	490 to 690	35	33	35
A-2	217	300	340	640 to 830	40	38	40
A-3	217	300	340	640 to 830	40	38	40

1) For thin materials the HRB or HV hardness test may be used by agreement between user and producer where it is not practicable to use the HB test.

2) The $R_{p\,0,2}$ min. value shall be determined unless it has been agreed between the purchaser and the supplier that the $R_{p\,1,0}$ min. value is required instead of the $R_{p\,0,2}$ min. value.

TABLE 7 – **Mechanical properties of austenitic steel bars in the cold-drawn condition**

Type of steel	$R_{p\,0,2}$ min. N/mm²	R_m min. N/mm²	A min. %	Applicable to max. diameter[1] mm	Hardness
11,14	490	830	20	45	1/4 hard
	740	1 030	15	25	1/2 hard
	910	1 180	12	19	3/4 hard
	960	1 270	12	12	hard
12	490	830	20	45	1/4 hard
	740	1 030	15	25	1/2 hard
A-3	490	830	20	45	1/4 hard.

1) For bars of other than round section, the maximum thickness applies.

TABLE 8 – **Mechanical properties of steel No. 17 in the lightly cold-drawn condition**

Diameter mm	$R_{p\,0,2}$ min. N/mm²	R_m min. N/mm²	A min. %
$5 \leqslant d < 30$	440	740	18
$30 \leqslant d \leqslant 56$	300	590	26

At the time of enquiry and order and with the exception of the low carbon (0,03 % max.) austenitic steels, values may also be agreed between the purchaser and the supplier, for the lightly cold-drawn condition for the other austenitic stainless steels listed in table 1.

TABLE 9 – **Mechanical properties of austenitic steel flat products in the cold-rolled condition**

Type of steel	$R_{p\,0,2}$ min. N/mm²	R_m min. N/mm²	A min. % for thickness in mm		Applicable to max. thickness mm	Hardness
			$0,5 \leqslant a \leqslant 0,8$	$a > 0,8$		
11	490	830	12	12	2,8	1/4 hard
	740	1 030	8	8	2,4	1/2 hard
	910	1 180	7	7	1,8	3/4 hard
	960	1 270	3	4	1,4	hard
12	490	830	12	12	2,8	1/4 hard
	740	1 030	9	9	2,4	1/2 hard
14	490	830	25	25	3,3	1/4 hard
	740	1 030	10	10	2,9	1/2 hard
	910	1 180	5	7	2,4	3/4 hard
	960	1 270	4	5	2,3	hard
A-2	490	830	20	20	3,3	1/4 hard
	740	1 030	10	10	2,9	1/2 hard
	910	1 180	5	7	2,4	3/4 hard
	960	1 270	4	5	2,3	hard
A-3	490	830	12	12	3,3	1/4 hard

Test pieces either of 20 mm width and 80 mm gauge length or of 12,5 mm width and 50 mm gauge length according to ISO/R 86.