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Low Carbon Unalloyed Steels for Bolts, Nuts and Rivets
Technical Conditions of Delivery

DIN 17 111

Kohlenstoffarme unlegierte Stähle für Schrauben, Muttern und Niete; Technische Lieferbedingungen

The sections marked by a dot (●) contain details of agreements which either must be made or can be made at the time of placing the purchase order.

1 Scope

1.1 This Standard applies to the unalloyed low carbon steels listed in Table 1, up to 40 mm product thickness max., which are not intended for a heat treatment (quenching and tempering) and for case hardening, and which are used for the hot or cold forming of bolts, nuts and rivets (and similar shaped pieces), in connection with which the strength requirements or the free-machining properties may predominate.

1.2 This Standard does not apply to

- Steels for cold heading and cold extruding in accordance with DIN 1654 Part 1 to Part 5,
- Creep resistant and high temperature strength materials for bolts and nuts (see DIN 17 240),
- Free-cutting steel (see DIN 1651),
- Bright unalloyed steel (see DIN 1652),
- Wire rod made from base steel and from unalloyed high grade and special steels (see DIN 17 140, at present still in draft form),
- Steels for quenching and tempering (see DIN 17 200),
- Case hardening steels (see DIN 17 210),
- Steels for general structural purposes (see DIN 17 100).

1.3 In addition to the stipulations of this Standard, the general technical conditions of delivery for steel and steel products in accordance with DIN 17 010 (at present still in draft form) apply, unless anything to the contrary has been specifically stipulated below.

2 Other relevant Standards and documents

DIN 17 010	(at present still in draft form) General technical conditions of delivery for steel and steel products
DIN 50 049	Certificates on material tests
DIN 50 115	Testing of metallic materials; notched bar impact bending test
DIN 50 125	Testing of metallic materials; tensile test specimens, directions for their preparation
DIN 50 145	Testing of metallic materials; tensile test
DIN 50 150	Testing of steel and cast steel; conversion table for Vickers hardness, Brinell hardness, Rockwell hardness and tensile strength
DIN 50 351	Testing of metallic materials; Brinell hardness testing
DIN 51 210 Part 1	Testing of metallic materials; tensile test on wires without extensometer measurement
DIN 51 210 Part 2	Testing of metallic materials; tensile test on wires with extensometer measurement
DIN 51 212	Testing of metallic materials; torsional test on wires

Handbuch für das Eisenhüttenlaboratorium (Handbook for the Ferrous Metallurgy Laboratory), Vol. 2: Investigation of metallic materials; 4000 Düsseldorf, Verlag Stahleisen mbH, 1966

Vol. 5 (supplementary volume):
A 4.1 – Setting up of recommended arbitration procedures
B – Sampling procedures
C – Analysis procedures
4000 Düsseldorf, Verlag Stahleisen mbH, refer to the most recent edition in each case

3 Dimensions and permissible dimensional deviations

The following Standards apply to the dimensions and to the permissible dimensional deviations:

DIN 668	Bright round steel; dimensions, permissible variations acc. to ISA tolerance zone h11, weights
DIN 671	Bright round steel; dimensions, permissible variations to ISA tolerance zone h9, weights
DIN 1013 Part 1	Steel bars; hot rolled round steel for general purposes; dimensions, permissible variations for dimension and form
DIN 1013 Part 2	Steel bars, hot rolled round steel for special purposes; dimensions, permissible variations for dimension and form
DIN 1014 Part 1	Steel bars; hot rolled squares for general purpose, dimensions, permissible deviations on dimension and form
DIN 1014 Part 2	Steel bars; hot rolled squares for special purpose, dimensions, permissible deviations on dimension and form
DIN 1015	Steel bars; hot rolled hexagon steel; dimensions, weights, permissible variations
DIN 1016	Flat products of steel; hot rolled strip, hot rolled sheet under 3 mm thickness, dimensions, permissible variations on dimension, form and weight
DIN 59 110	Steel wire rod; dimensions, permissible variations, weights

Continued on pages 2 to 10
Explanations on page 10

DIN 59 115	Steel wire rod for bolts, nuts and rivets; dimensions, permissible variations, weights
DIN 59 130	Steel bars; hot rolled round steel for bolts and rivets; dimensions, permissible deviations on dimension and form

● The required dimensional Standard must be specified in the purchase order.

4 Calculation of weight and permissible weight deviations

4.1 For weight calculations, the density of the steels covered by this Standard shall be assumed to be 7.85 kg/dm³.

4.2 ● In cases where the dimensional Standard specified in the purchase order does not lay down any details about the permissible weight deviation, then said weight deviation can be mutually agreed at the time of placing the purchase order.

5 Classification of grades

The classsification of the steels by grades is contained in Tables 1 and 2. A distinction is made between two groups:

5.1 Grades which are characterized by a minimum value of tensile strength.

5.2 Grades which are characterized by their sulphur content.

6 Designations

6.1 Designation of steel grades and of treatment conditions

The code numbers have been constituted in accordance with Sections 2.1.1.1 and 2.1.2.1 of the explanations relating to DIN-Normenheft 3 (DIN Standard Book 3), and the material numbers have been formed in accordance with DIN 17 007 Part 2. The code letter or the suffix number characterizing the treatment condition shall be appended to the code number or to the material number of the steel grade concerned.

Example: Steel UQSt 36, material number 1.0204, in the condition "untreated with rolled surface" (U or 00, resp.):

UQSt 36 U

or 1.0204.00

6.2 Designation in order

The following particulars shall be specified in the purchase order: Quantity, shape of product, dimensional Standard, code number or material number of the desired steel grade, treatment condition, dimensions and symbol relating to the requirement class.

Example: 20 t round wire rod of diameter d = 10 mm in measuring accuracy class B in accordance with DIN 59 115, made from a steel with the code number UQSt 36 or with the material number 1.0204, respectively, in the condition "untreated with rolled surface" (U or 00, resp.), requirement class 1v:

20 t wire DIN 59 115 – UQSt 36 U – 10 B – 1v

or **20 t wire DIN 59 115 – 1.0204.00 – 10 B – 1v**

7 Requirements

7.1 Manufacturing process

7.1.1 ● Unless anything to the contrary has been mutually agreed at the time of placing the purchase order, the melting process of the steel and the process for the shaping of the product are left to the manufacturer's discretion. The melting process adopted must however be notified to the purchaser on request.

7.1.2 The type of deoxidation of the steels is specified in Table 1.

7.2 Treatment condition on delivery

The steels are as a general rule delivered in the untreated condition with a rolled surface (U or 00, resp.).

● Other treatment conditions and surface finishes (e. g. cold drawn) require mutual agreement at the time of placing the purchase order.

7.3 ● Requirement classes

When purchasing steels in accordance with this Standard, one of the following requirement classes shall be mutually agreed: 1r or 1v (see explanations in Table 4).

7.4 Chemical composition

7.4.1 The values in accordance with Table 1 shall apply to the ladle analysis.

7.4.2 The data specified in Table 3 shall apply to the permissible deviations of the product analysis from the limiting values of the ladle analysis.

● If the manufacturer is asked to submit proof that the limiting values applying to the product analysis have been complied with, then this must be mutually agreed separately in the purchase order.

7.5 Mechanical properties

The data in accordance with Table 2 for longitudinal test specimens in the hot rolled condition at room temperature shall apply.

● For other treatment conditions (see Section 7.2), the requirements relating to the mechanical properties shall be mutually agreed at the time of placing the purchase order.

Note: It should be borne in mind that any subsequent processing or machining, in particular any subsequent cold forming may modify the mechanical properties of the steels to a considerable extent.

7.6 Technological properties

7.6.1 Formability (ductility)

7.6.1.1 Only steels UQSt 36 (1.0204) and UQSt 38 (1.0224) are capable of cold heading (as regards steel USt 36 [1.0203] see footnote 6 of Table 2).

7.6.1.2 The steels must be capable of being upset without cracking in the hot or cold heading test under the conditions specified in Table 2 (see Section 7.8.3, para. a). The heading test shall be performed on longitudinal specimens.

Wire made from the steels UQSt 36 and UQSt 38 with diameters of less than 5.0 mm shall be tested in the alternating torsion test.

7.6.2 Insensitivity towards brittle fracture

7.6.2.1 In order to ensure an adequate degree of insensitivity towards brittle fracture, the minimum values of absorbed energy (ISO-V-test specimens) according to Table 2 must be achieved in the case of the steels characterized by their minimum tensile strength (see also Section 8.4.2). The values apply to longitudinal test specimens.

7.6.2.2 ● The insensitivity towards brittle fracture shall only be demonstrated if this has been specifically agreed in the purchase order.

7.7 Weldability

The steels shall be suitable for resistance butt welding.

7.8 Internal and external condition

7.8.1 The rolled products shall exhibit a smooth and even surface from the technical rolling aspect. Surface flaws such as slivers, score marks, pinchers and cracks may be eliminated by suitable means; the depressions which are formed as a result of such repair work must be smoothed out, taking care to ensure that the permissible thickness deviations are not exceeded and that any machining allowances provided have not been used up in the process.

7.8.2 Internal flaws such as shrinkholes, laminations and coarse non-metallic inclusions must not impair the processing and utilization appropriate to the steel grade concerned more than just marginally.

7.8.3 In the case of steels UQSt 36 (1.0204) and UQSt 38 (1.0224), the following requirements must be satisfied in order to demonstrate the appropriate freedom from defects:

a) During the cold heading test in accordance with Sections 8.4.5 and 8.5.3:
The specimens shall exhibit no cracks after the test. However, in the case of specimens with an "as rolled" surface, score marks due to roll pick-up and typical superficial cracks shall not be considered as flaws.

b) During the surface crack examination in accordance with Sections 8.4.6 and 8.5.4:
The requirements specified in a) above shall apply.

c) During the alternating torsion test in accordance with Sections 8.4.7 and 8.5.5:
The number of torsions (twists) in each direction shall amount to 5.
The requirements specified in a) above shall apply.

In the assessment of specimens cut from coils, it must be taken into consideration that the specimens have only been taken from the ends in accordance with Section 8.4.8.

● In cases of doubt, a processing test can be mutually agreed.

8 Testing

8.1 Agreement relating to tests and certificates relating to material tests

8.1.1 ● The purchaser can arrange for the issuing of one of the certificates relating to material tests in accordance with DIN 50 049 for all steel grades.

8.1.2 ● In cases where the issuing of a works certificate has been agreed, the results of the ladle analysis shall be entered in said certificate.

8.1.3 ● In cases where the issuing of an acceptance test certificate has been agreed, the stipulations of Sections 8.2 through 8.6 shall apply to the acceptance tests required in this connection.

8.2 Test unit

The particulars in Table 5 shall apply to the test unit.

8.3 Extent of testing

The particulars in Table 5 shall apply to the extent of testing.

8.4 Sampling and preparation of samples

8.4.1 In the case of steel bars and of wire rod up to 25 mm thickness or diameter, respectively, the section of sample for the tensile test shall be taken in such a way that it can be used as a test specimen with the minimum amount of machining. In the case of thicknesses or diameters above 25 mm and up to 40 mm, the specimens can be taken out of the cross-section at any desired spot.

8.4.2 In the case of notched bar impact specimens, one side of the specimen should be situated as close as possible to the rolled surface. The notch should be orientated at right angles to the rolled surface. The section of sample for the notched bar impact bending tests must be large enough to provide six test specimens. The actual test is however limited to three specimens if the test results satisfy the conditions required.

● In the case of products from which the notched bar impact specimens stipulated in Section 7.6.2.1 cannot be taken, special arrangements must be made at the time of placing the purchase order regarding the demonstration of insensitivity towards brittle fracture.

8.4.3 When cutting off the samples, any deformation should be avoided as far as possible; if shears or cutting torches are used, an adequate material allowance must be provided, which is subsequently machined off. If the hardness increase resulting from the torch cutting process does not permit any subsequent machining, preheating to 550 °C max. is permissible. Sections of sample which have become deformed by bending or twisting shall in principle be straightened out in the cold state. If the deformation is too severe to allow cold straightening, the straightening may be effected in the warm state.

8.4.4 When straightening and preparing the samples, any cold working or heating which modifies the properties in comparison with those of the products to be delivered must be avoided.

8.4.5 ● Unless anything to the contrary has been mutually agreed in the purchase order, the specimens for the heading tests shall be manufactured in the form of straight specimens without any change of surface condition and with plane parallel end faces and an initial height $h_0 = 1.5 \cdot d_0$ (d_0 = diameter of test specimen).

8.4.6 In the case of the surface crack examination (applies only to steels UQSt 36 [1.0204] and UQSt 38 [1.0224]) of steel bars by means of the magnetic powder testing method for instance, the bars to be tested, in accordance with the agreement on the extent of testing, shall be considered as being samples.

In the case of the surface crack examination by purely visual inspection, the inspection is usually carried out directly on the coil or bar, in the case of bright wire or steel bars. If the surface is covered with scale, samples of 200 mm length approx. should be taken and pickled in a suitable solution until the scale has disappeared.

8.4.7 In the case of the alternating torsion test carried out on products of less than 5.0 mm diameter (applies only to steels UQSt 36 [1.0204] and UQSt 38 [1.0224]), the test length shall amount to 50 times the nominal diameter.

8.4.8 In the case of wire rod, the section of sample shall be taken at a distance of at least 300 mm from the beginning or from the end of the coil. In arbitration cases, the minimum distance shall correspond to the stipulations of Table 6.

8.5 Test methods to be adopted

8.5.1 The chemical composition shall be determined in accordance with the methods[1]) specified by the Chemist's Committe of the Verein Deutscher Eisenhüttenleute (Association of German Ferrous Metallurgy Engineers).

[1]) See page 4

In the case of a check test of the chemical composition on individual pieces, the chips required for the test shall be removed uniformly over the entire cross-section of the product.

8.5.2 The tensile test shall be performed in accordance with DIN 50 145, in most cases on short proportional test bars (in the case of diameters of 6 mm and over or of cross-sectional areas of 28 mm^2 or over) with a measuring length $L_0 = 5\,d_0$ in accordance with DIN 50 125 (on square section specimens, $L_0 = 5.65 \cdot \sqrt{\text{cross-section}}$); in the case of diameters of less than 6 mm or of cross-sectional areas of less than 28 mm^2, the test is performed on specimens with a measuring length $L_0 = 10\,d_0$, in accordance with DIN 51 210. In cases of doubt, and for arbitration tests, this type of specimen must be used.

As a rough approximation, the tensile strength can be read from the comparative table in DIN 50 150 on the basis of the corresponding Brinell hardness, which must be determined in accordance with DIN 50 351. However the tensile test remains determining for the acceptance.

8.5.3 During the heading test, specimens with an initial height $h_0 = 1.5\,d_0$ are upset in the cold or warm state to one third of their initial height. During the warm heading test, the specimens must be heated up to 900 °C approx.

8.5.4 The surface crack examintion shall be carried out in accordance with suitable methods, e.g. the magnetic powder test. Examination in respect of surface cracks by purely visual inspection is also quite common.

If there are any doubts concerning the admissibility of a defect, then a cold heading test in accordance with Sections 8.4.5 and 8.5.3, or an alternating torsion test in accordance with Sections 8.4.7 and 8.5.5, in the case of diameters of less than 5.0 mm, shall be carried out on a specimen exhibiting the defect concerned or a corresponding defect.

8.5.5 In respect of the alternating torsion test, the stipulations of DIN 51 212 apply as a general rule (see also Section 8.4.7). However the test should not be carried out in one direction only until the specimen breaks, but first with 5 twists in the one direction followed by 5 twists in the reverse direction.

8.5.6 ● The notched bar impact bending test shall be carried out in accordance with DIN 50 115. It is only performed as a result of mutual agreement at the time of placing the purchase order, and it only applies to dimensions above 14 mm.

8.6 Retests

8.6.1 If the unsatisfactory result of a test can be patently blamed on technical testing deficiencies or on a narrowly defined flaw of the test specimen, then the faulty result shall be disregarded in connection with the decision as to whether the requirements have been met, and the test concerned shall be repeated.

8.6.2 If any specimens which are in correct and orderly condition fail to satisfy the requirements, then the following procedure shall be adopted.

8.6.3 Steel bars

8.6.3.1 If the results of the tensile test, of the heading test or of the torsion test are not up to the requirements, then the bar from which the test specimen was taken shall be rejected. The test shall be repeated on two further specimens taken from other bars of the same test unit, and both these specimens must satisfy the requirements.

8.6.3.2 If the mean value of the three tested notched bar impact specimens is situated below the minimum value specified in Table 2, then three further specimens shall be taken from the section of sample in accordance with Section 8.4.2, and tested. The mean value from the six individual tests must correspond to the minimum mean value.

For each individual specimen which fails to meet the requirements, two further specimens shall be taken. Both these new specimens and the mean value from the total number of tests carried out must satisfy the requirements.

● If the retests give unsatisfactory results, the tested bar shall be rejected and two further bars from the same test unit, and of equal or of the next larger thickness are tested. If one of these bars again fails to meet the requirements, then either the test unit shall be rejected or the remainder of the test unit shall be verified piece by piece after mutual agreement in this connection.

8.6.4 Wire rod

In the case of coils, the retests shall be carried out on double the number of specimens (or on double the number of sets of specimens in the case of the notched bar impact bending test). In this connection, one of the retest specimens shall be taken from the coil under suspicion, by cutting off a further section of its length, whilst the second retest specimen shall be taken from another coil of the same test unit. All the retest specimens must satisfy the requirements.

8.6.5 The manufacturer reserves the right to subject rejected test units to a heat treatment and to submit them again for testing.

9 Marking of the products

9.1 The marking of the products consists of the code number of the steel grade, of the manufacturer's trade mark, of the batch number of the melt and of the dimension.

9.2 ● Further markings can be mutually agreed at the time of placing the purchase order.

9.3 ● Unless anything to the contrary has been agreed in the purchase order, the marking shall be effected by means of tags.

10 Complaints [2]

10.1 Any complaints relating to external and internal defects may only be raised in cases where they adversely affect the processing and utilization appropriate to the steel grade concerned and to the shape of the product more than just superficially.

10.2 The purchaser shall give the supplier the opportunity of convincing himself that the complaints are justified, in so far as possible by the submission of samples of the rejected material and of samples of the material supplied.

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[1] Handbuch für das Eisenhüttenlaboratorium (Handbook for the Ferrous Metallurgy Laboratory), Vol. 2: Investigation of metallic materials, 4000 Düsseldorf, Verlag Stahleisen mbH, 1966;
Vol. 5 (supplementary volume): A 4.1 – Setting up of recommended arbitration procedures, B – Sampling procedures, C – Analysis procedures, 4000 Düsseldorf, Verlag Stahleisen mbH; refer to the most recent edition in each case.

[2] In this connection see explanations to DIN 17 010 (at present still in draft form).

Table 1. **Chemical composition according to the ladle analysis**

Steel grade		Type of deoxidation [1]	Chemical composition in % by weight				
Code number	Material No.		C [2]	Si	Mn	P	S
USt 36	**1.0203**	U	≦ 0.14 [3]	Traces	0.25 to 0.50	≦ 0.050	≦ 0.050
UQSt 36	**1.0204**	U	≦ 0.14 [3]	Traces	0.25 to 0.50	≦ 0.040	≦ 0.040
RSt 36	**1.0205**	R	≦ 0.14 [3]	≦ 0.30	0.25 to 0.50	≦ 0.050	≦ 0.050
USt 38 [4]	**1.0217** [4]	U	≦ 0.19 [5]	Traces	0.25 to 0.50	≦ 0.050	≦ 0.050
UQSt 38 [4]	**1.0224** [4]	U	≦ 0.19 [5]	Traces	0.25 to 0.50	≦ 0.040	≦ 0.040
RSt 38	**1.0223**	R	≦ 0.19 [5]	≦ 0.30	0.25 to 0.50	≦ 0.050	≦ 0.050
U 7 S 6 [6]	**1.0708** [6]	U [6]	≦ 0.10	Traces	0.30 to 0.60	≦ 0.050	0.04 to 0.08
U 10 S 10 [7]	**1.0702** [7]	U [7]	≦ 0.15	Traces	0.30 to 0.60	≦ 0.050	0.08 to 0.12

[1] U = unkilled, R = killed (including semi-killed).

[2] ● A lower maximum carbon content may be mutually agreed at the time of placing the purchase order; in this case however the minimum value of tensile strength according to Table 2 does not apply.

[3] In the case of dimensions above 22 mm, the maximum content amounts to 0.18 % C.

[4] In respect of the subsequent edition of this Standard, it should be investigated whether this steel grade can be deleted (see Explanations).

[5] In the case of dimensions above 22 mm, the maximum content amounts to 0.22 % C.

[6] ● Subject to mutual agreement at the time of placing the purchase order, the killed steel R 7 S 6 (material number 1.0709) can also be supplied; this steel contains 0.40 % Si max. and has an upper limit of the manganese content of 0.80 %.

[7] ● Subject to mutual agreement at the time of placing the purchase order, the killed steel R 10 S 10 (material number 1.0703) can also be supplied; this steel contains 0.40 % Si max. and has an upper limit of manganese content of 0.80 %.

Table 2. **Mechanical and technological properties in the hot rolled condition (longitudinal test specimens)**

Steel grade		Tensile strength [1], [2]	Yield point [1], [3]	Elongation at fracture ($L_0 = 5\,d_0$)	Heading test [4] $h_1 : h_0 = 1 : 3$	Absorbed energy (ISO-V test specimen)	
Code number	Material No.	N/mm²	N/mm²	%	at °C	mean value [5] J minimum	at °C
		minimum					
USt 36	1.0203	330 to 430	205	30	900 [6]	27	+ 20
UQSt 36	1.0204				20		
RSt 36	1.0205				900	27	+ 10
USt 38	1.0217	370 to 460	225	25	900	27	+ 20
UQSt 38	1.0224				20		
RSt 38	1.0223				900	27	+ 10
U 7 S 6	1.0708	(310 to 440)	(205)	–	–	–	–
U 10 S 10	1.0702	(340 to 470)	(225)	–	–	–	–

[1] The values in brackets are provided for information purposes only.

[2] See also footnote 2 of Table 1.

[3] Applies to thicknesses up to 16 mm. For thicknesses over 16 and up to 40 mm, minimum values lower by an amount of 10 N/mm² are permissible.

[4] h_1 = height after heading, h_0 ($\approx 1.5\,d_0$) = initial height. The test temperatures specified are approximate values.

[5] Mean value of three individual tests (see Section 8.6.3.2), in respect of which no individual value may be lower than 19 J.

[6] Steel USt 36 is suitable on a restricted basis for the manufacture of cold headed rivets of simple shape up to a diameter of 16 mm max.

Table 3. **Permissible deviation of the product analysis from the limiting values of the ladle analysis in accordance with Table 1**

Element	Limiting value according to the ladle analysis %	Permissible deviation of the product analysis from the limiting values of the ladle analysis [1] %
C	≦ 0.15 > 0.15 ≦ 0.22	+ 0.03 + 0.04
Si	≦ 0.40	+ 0.05
Mn	≦ 0.80	± 0.05
P	≦ 0.050	+ 0.010
S	≦ 0.050 > 0.050 ≦ 0.12	+ 0.010 - 0.020 + 0.030

[1] For one and the same melt, the deviation of an element in different product analyses may only be situated either below the minimum value or above the maximum value of the range specified for the ladle analysis, but not both simultaneously.

Table 4. **Synopsis of the quality requirements which must be complied with for the various requirement classes**

No.	Type of quality requirement	Requirement class [1]		Quality requirement according to	
		1r	1v	Table	Section
1	Chemical composition				
1 a	Ladle analysis	X	X	1	7.4.1
1 b	Product analysis	X	X	3	7.4.2
2	Mechanical properties in the starting condition usually applicable to the forming operation (see Section 7.2)	–	X	2	7.5
3	Internal and external condition				
3 a	Demonstrated by means of a heading test [2] or of an alternating torsion test [3]	X	X	2	7.8.3
3 b	Demonstrated by means of non-destructive testing [4]	X	X		7.8.3

[1] The identification numbers and code letters relating to the various requirement classes must be considered as provisional only until a proper system for the marking of the requirement classes has been set up.

[2] To be carried out in the form of a cold heading test on products made from steels UQSt 36 (1.0204) and UQSt 38 (1.0224).

[3] Only applicable to products made from steels UQSt 36 (1.0204) and UQSt 38 (1.0224) with diameters of less than 5 mm.

[4] Only applicable to products made from steels UQSt 36 (1.0204) and UQSt 38 (1.0224).

Table 5. **Test units and extent of testing**

No.	Type of quality requirement	Test unit [1]	Number of test pieces [2]	Number of test specimens per test piece
1	Chemical composition			
1 a	Ladle analysis	S	–	–
1 b	Product analysis	S	at least 1 per melt	
2	Mechanical properties in the starting condition usually applicable to the forming operation (see Section 7.2)	S + A	1 per 5 t, but 3 at most	1 tensile test specimen and if necessary 3 ISO-V specimens [3]
3	Internal and external condition		to be mutually agreed at the time of placing the purchase order	
3 a	● Demonstrated by means of a heading test [4] or of an alternating torsion test [5]	S + A		
3 b	● Demonstrated by means of non-destructive testing [6]	S + A		

[1] S or A, resp. = test segregated according to melts (S) or according to dimensions (A).

[2] The weight particulars (x) refer to the test unit in each case. The number of test pieces to be taken applies in such cases also to commenced fractional portions of xt.

[3] ● The notched bar impact bending test is only considered for use in connection with steels which have minimum tensile strength requirements and only for dimensions in excess of 14 mm; this test is only carried out on condition that it has been specifically stipulated at the time of placing the purchase order.

[4] To be carried out in the form of a cold heading test on products made from steels UQSt 36 (1.0204) and UQSt 38 (1.0224).

[5] Only applicable to products made from steels UQSt 36 (1.0204) and UQSt 38 (1.0224) with diameters of less than 5 mm.

[6] Only applicable to products made from steels UQSt 36 (1.0204) and UQSt 38 (1.0224).

Table 6. **Minimum distance from beginning of coil or from end of coil to be observed when taking samples of wire rod**
(applies to arbitration procedures)

Diameter d of wire rod mm	Minimum distance from beginning of coil or from end of coil m
$5 \leqq d < 7$	5
$7 \leqq d < 13$	4
$13 \leqq d < 18$	3
$18 \leqq d < 23$	2
$23 \leqq d < 28$	1.5
$28 \leqq d < 30$	1

Further Standards and documents

DIN 17 007 Part 2 Material numbers; systematic-of the principal group 1: steel

DIN-Normenheft 3 Code numbers and material numbers of ferrous materials in DIN Standards and in Steel/Iron Data Sheets

Explanations

During the progress of the revision of DIN 1654 – Steels for cold heading and for cold extruding; technical conditions of delivery – it also became necessary to elaborate a new version of DIN 17 111, especially as the January 1977 draft for DIN 1654 Part 2 – Steels for cold heading and for cold extruding; quality specifications for steels not intended for a heat treatment – also incorporated the cold heading steels UQSt 36-2 (1.0204) and UQSt 38-2 (1.0224) of DIN 17 111 (1.68). During the course of the consultations on DIN 1654 Part 2 and on the publication of the subsequent edition of DIN 17 111 it was however agreed to leave these steels in DIN 17 111, because they are mainly characterized by their strength requirements, apart from the requirements relating to cold heading properties, whereas the cold heading and the cold extruding properties are the salient features of the steels in accordance with DIN 1654 Part 2; these aspects are expressed by maximum values for tensile strength and minimum values for reduction in area after fracture, and also by comparatively narrow analysis spans.

Despite the retention of these two steel grades, the number of steel grades has been reduced from 16 in the January 1968 edition of this Standard to 10 in the present edition of the Standard. As in DIN 17 100 – Steels for general structural purposes; quality Standard – the steels of quality group 1 (USt 36-1 [1.0201] and USt 38-1 [1.0216]) have been deleted in this Standard, because they are no longer being produced in Germany. In addition, the steels RSt 44-2 (1.0419), 6 P 10 (1.0744) and 6 P 20 (1.0746) have also been deleted because only small quantities of them are being supplied today. Furthermore, the steels U 7 S 10 (1.0700), R 7 S 10 (1.0701) and U 10 S 6 (1.0706), which are also being supplied in small quantities, have been replaced by U 7 S 6 (1.0708) and R 7 S 6 (1.0709).

A highly controversial issue during the selection of the steel grades was the retention of the steel grades USt 38 (1.0217) and UQSt 38 (1.0224). These steel grades are in fact not worthy of being standardized, according to the supply statistics available. Because these grades are still in demand by a few users, they have been retained in this edition of the Standard, but the possibility of their deletion from the subsequent edition is being examined, all the more as a replacement quality is available in the shape of steel grade RSt 38 (1.0223).

Apart from the changes in the available choice of steel grades which we have just mentioned, the following changes have been made in this edition of DIN 17 111 as compared with the January 1968 edition:

a) This Standard has been completely revised editorially and harmonized in its structure with the more recent Standards published.

b) Because the steels of quality group 1 have been omitted, the code numbers of the remaining steels with strength requirements have been modified in so far as no reference is made any more to quality group 2 in these code numbers

c) The footnote which previously referred to the UQ steel grades only, and which stated that a lower maximum carbon content could be mutually agreed at the time of placing the purchase order, but that the minimum value of tensile strength no longer applied in such cases, has been extended to cover all steel grades.

d) Bearing in mind that certain difficulties are experienced in meeting the minimum tensile strength values in the case of the larger dimensions, higher maximum carbon contents have been specified for the steels with strength requirements for dimensions above 22 mm.

e) The manganese contents have been standardized by groups, viz. between 0.25 an 0.50 % for steels with strength requirements, and between 0.30 and 0.60 % or 0.30 and 0.80 %, respectively for the grades with a higher sulphur content.

f) The limitation of the nitrogen content to 0.007 % (or to 0.012 % in the case of electric steel) has been omitted.

g) A separate table featuring the permissible deviations for product analyses in comparison with the limiting values in accordance with Table 1 for the ladle analysis has been incorporated in the Standard.

h) The delivery of the products shall from now on be effected in accordance with requirement classes (see Table 4).

i) Apart from the hot rolled condition, other treatment conditions on delivery are now possible according to Section 7.2. However, the mechanical properties which must be satisfied in such cases must be mutually agreed at the time of placing the purchase order.

j) The data relating to the test unit and to the extent of testing are conveniently grouped together in one table (see Table 5). Testing according to lots has been dropped from the Standard.

k) The heading test is carried out in principle on specimens with a starting height $h_0 = 1.5$ times diameter of test specimen.

l) The proof of resistance to ageing (on the DVMF test specimen) and the folding test have been dropped from the Standard, because experience has shown that no importance is attached to either of these tests at the time of delivery.

m) The guideline data relating to the shear strength have been dropped from the Standard, because these data are solely of interest to the purchasers of the finished rivets (the shearing test is only performed on finished rivets), and therefore have no place in a Standard dealing with a starting material.

n) It was decided that the notched bar impact bending test shall only be considered for products with dimensions in excess of 14 mm.