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Cold heading and cold extruding steels

Technical delivery conditions for killed unalloyed steels not intended for heat treatment

DIN
1654
Part 2

Kaltstauch- und Kaltfließpreßstähle; technische Lieferbedingungen für nicht für eine Wärmebehandlung bestimmte beruhigte unlegierte Stähle

Supersedes
March 1980 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.

The clauses and subclauses marked ● give specifications which are to be agreed upon at the time of ordering, those marked ●● give specifications which are optional and may be agreed at the time of ordering.

1 Field of application

This standard applies to Al killed unalloyed cold heading and cold extruding steels not intended for heat treatment, with diameters from 2 to 100 mm and subject to particular requirements regarding the chemical composition. It is to be used in conjunction with DIN 1654 Part 1.

2 Concepts

See DIN 1654 Part 1.

3 ● Dimensions and limit deviations

See DIN 1654 Part 1.

4 Mass

See DIN 1654 Part 1.

5 Designation and ordering

See DIN 1654 Part 1.

6 Steel grades

See DIN 1654 Part 1.

Continued on pages 2 to 4

7 Requirements

7.1 ●● Manufacturing process

See DIN 1654 Part 1.

7.2 ● Treatment condition of material on delivery

The steels shall normally be supplied in one of the treatment conditions listed in table 1.

Table 1. **Treatment conditions and product forms in which steels are usually supplied and associated requirements as specified in tables 2 to 4**

No.	1		2	3	4	5	
1	Treatment condition of material on delivery		Product form			The following requirements given in tables 2 to 4 shall apply:	
			Hot rolled steel bars	Wire rod	Drawn products		
		Symbol				5.1	5.2
2	Untreated, with rolled surface	No symbol, or U	×	×	–	Chemical composition as in tables 2 and 3.	Mechanical properties as in table 4.
3	Untreated, with peeled surface	SH	×	–	–		
4	Cold drawn	K	–	–	×		1)

1) ●● Where required, the mechanical properties shall be agreed at the time of ordering.

7.3 Chemical composition, mechanical properties and hardenability

Table 1 summarizes combinations of usual treatment conditions of the material on delivery, product forms and requirements regarding chemical composition and mechanical properties.

7.3.1 The chemical composition as determined by ladle analysis shall comply with the specifications of table 2.

7.3.2 The amounts by which the chemical composition as determined by product analysis may deviate from the limiting values specified for the ladle analysis (cf. table 2) shall be as given in table 3.

7.3.3 The mechanical properties of products in the untreated condition shall be as specified in table 4.

Note. Table 5 lists guideline values for the mechanical properties of products in the normalized condition.

7.3.4 Requirements regarding hardenability are not specified.

7.4 Microstructure

See DIN 1654 Part 1.

7.5 Surface condition and soundness

See DIN 1654 Part 1.

7.6 Decarburization

Requirements regarding depth of decarburization are not specified.

7.7 Separation of products by casts

See DIN 1654 Part 1.

8 ●● Testing

See DIN 1654 Part 1.

9 Marking

See DIN 1654 Part 1.

10 Heat treatment and further processing

See DIN 1654 Part 1.

11 Complaints

See DIN 1654 Part 1.

Table 2. **Chemical composition (ladle analysis)**

Steel grade		Percentage by mass[1]					
Material designation	Material number	C	Si max.	Mn	P max.	S max.	Others
QSt 32-3	**1.0303**	≤ 0,06	0,10	0,20 to 0,40	0,040	0,040	[2]
QSt 34-3	**1.0213**	0,05 to 0,10	0,10	0,20 to 0,40	0,040	0,040	[2]
QSt 36-3	**1.0214**	0,06 to 0,13[3]	0,10	0,25 to 0,45	0,040	0,040	[2]
QSt 38-3	**1.0234**	0,10 to 0,18[3]	0,10	0,25 to 0,45	0,040	0,040	[2]

1) Elements not listed in this table shall not be deliberately added to the steel, except for finishing the cast, without the purchaser's approval. All reasonable precautions shall be taken to prevent accidental addition of any elements (from scrap or from other materials used in manufacture) liable to affect the mechanical properties and use.

2) Aluminium (total content exceeding 0,02 %) to be used for deoxidation and nitrogen control may be replaced by other elements having a similar effect.

3) ●● A higher minimum carbon content may be agreed at the time of ordering.

Table 3. **Amounts by which the chemical composition as determined by product analysis may deviate from the limiting values specified in table 2 for the ladle analysis**

Element	Maximum permissible percentage by mass as determined by ladle analysis	Limit deviations in the product analysis from the limiting values specified for the ladle analysis[1], as a percentage by mass
C	≤ 0,15 > 0,15 ≤ 0,18	0,02 0,03
Si	≤ 0,10	0,03
Mn	≤ 0,45	0,04
P and S	≤ 0,040	0,005

1) If a number of product analyses are to be carried out, the deviations shown by one element within one cast shall lie either only above the upper limit or only below the lower limit of the range specified for the ladle analysis.

Table 4. **Mechanical properties of steel as specified in table 2 in the 'untreated' (U) or 'untreated and peeled' (SH) condition**

Steel grade		Maximum tensile strength, R_m, in N/mm²	Minimum reduction in area after fracture, Z, as a percentage
Material designation	Material number		
QSt 32-3	**1.0303**	400	60
QSt 34-3	**1.0213**	420	60
QSt 36-3	**1.0214**	430	60
QSt 38-3	**1.0234**	460	55

Table 5. **Guideline values of mechanical properties of steel in the normalized condition as specified in table 2, at ambient temperature**

Steel grade		Minimum yield strength, R_e, in N/mm²	Tensile strength, R_m, in N/mm²	Minimum elongation after fracture, A_5 [1], in %	Minimum impact value, A_v (ISO V-notch test pieces), in J
Material designation	Material number				
QSt 32-3	**1.0303**	170	290 to 400	30	27
QSt 34-3	**1.0213**	180	310 to 420	30	27
QSt 36-3	**1.0214**	200	320 to 430	30	27
QSt 38-3	**1.0234**	220	360 to 460	25	27

1) The gauge length, L_0, shall be equal to 10 d_0 for diameters smaller than 6 mm; in this case the minimum value shall be 23 % instead of 30 % and 19 % instead of 25 %.

Standard referred to

DIN 1654 Part 1 Cold heading and cold extruding steels; technical delivery conditions, general

Previous editions

DIN 1654: 05.43, 08.54; DIN 1654 Part 2: 03.80.

Amendments

In comparison with the March 1980 edition, the requirement classes are no longer specified and the standard has been editorially revised.

Explanatory notes

See DIN 1654 Part 1.

International Patent Classification

C 22 C 38/00