

Technical delivery conditions for steel castings for pressure purposes

Part 3. Steels for use at low temperatures

The European Standard EN 10213-3 : 1995 has the status of a
British Standard

ICS 77.140.30

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee ISE/6, Steel castings, upon which the following bodies were represented:

- BEAMA Ltd.
- British Pump Manufacturers' Association
- British Valve and Actuator Manufacturers' Association
- Castings Technology International
- Engineering Equipment and Materials Users' Association
- Hopkinsons Limited
- Institute of British Foundrymen
- Institution of Mechanical Engineers
- Lloyd's Register of Shipping
- Ministry of Defence
- Railway Industry Association

This British Standard, having been prepared under the direction of the Engineering Sector Board, was published under the authority of the Standards Board and comes into effect on 15 May 1996

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The following BSI references relate to the work on this standard:
Committee reference ISE/6
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National foreword

This British Standard has been prepared under the direction of Technical Committee ISE/6, Steel castings, and is the English language version of EN 10213-3 *Technical delivery conditions for steel castings for pressure purposes — Part 3: Steels for use at low temperatures* published by the European Committee for Standardization (CEN).

The following Parts of BS EN 10213 supersede BS 1504 : 1976 which is now withdrawn:

- | | |
|---------------|--|
| BS EN 10213-1 | <i>Technical delivery conditions for steel castings for pressure purposes</i>
Part 1 : 1996 <i>General</i> |
| BS EN 10213-2 | <i>Technical delivery conditions for steel castings for pressure purposes</i>
Part 2 : 1996 <i>Steel grades for use at room temperature and elevated temperatures</i> |
| BS EN 10213-3 | <i>Technical delivery conditions for steel castings for pressure purposes</i>
Part 3 : 1996 <i>Steels for use at low temperatures</i> |
| BS EN 10213-4 | <i>Technical delivery conditions for steel castings for pressure purposes</i>
Part 4 : 1996 <i>Austenitic and austenitic-ferritic steel grades</i> |

Compliance with a British Standard does not of itself confer immunity from legal obligations.

ISC 77.140.10

Descriptors: Cast steels, structural steels, boilers, pressure equipment, delivery, designation, grades: quality, chemical composition, mechanical properties, low temperature tests

English version

Technical delivery conditions for steel castings for pressure purposes — Part 3: Steel grades for use at low temperatures

Conditions techniques de livraison des pièces
moulées en acier pour service sous pression —
Partie 3: Nuances d'acier pour utilisation à basses
températures

Technische Lieferbedingungen für Stahlguß für
Druckbehälter — Teil 3: Stahlsorten für die
Verwendung bei tiefen Temperaturen

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

This European Standard was prepared by Technical Committee ECISS/TC 31, Steel castings, the secretariat of which is held by AFNOR.
This European Standard EN 10213 *Technical delivery conditions for steel castings for pressure purposes* consists of 4 Parts:

- Part 1 *General*
- Part 2 *Steel grades for use at room temperature and elevated temperatures*
- Part 3 *Steel grades for use at low temperatures*
- Part 4 *Austenitic and austenitic-ferritic steel grades*

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 1996, and conflicting national standards shall be withdrawn at the latest by June 1996.
According to the Internal Regulations of CEN/CENELEC, the following countries are bound to implement this European Standard : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

In accordance to the general delivery conditions of EN 10213-1 this standard specifies the chemical and mechanical requirements to be met under specific inspection of steel grades for use at low temperatures.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 10213-1 *Technical delivery conditions for steel castings for pressure purposes*
Part 1 : 1996 *General*

3 Requirements

3.1 Chemical composition

The cast analysis shall comply with table 1 (see 7.1 of EN 10213-1 for permissible deviations and for unspecified elements). For chemical analysis on castings, see 8.4.1 of EN 10213-1.

3.2 Heat treatment

Heat treatment shall comply with table 2 (see 6.2 of EN 10213-1).

3.3 Mechanical properties

The mechanical properties, at low temperatures and room temperature, shall comply with table 2. For the conditions of verification on test blocks see 7.2.1 of EN 10213-1, and on castings see 7.2.2 and 8.4.2 of EN 10213-1.

Table 1. Chemical composition (cast analysis)									
max. % (or range where specified)									
(%(m/m))									
Designation		C	Si max.	Mn	P max.	S max.	Cr	Mo	Ni
Name	Number								
G17Mn5	1.1131	0,15 to 0,20	0,60	1,00 to 1,60	0,020	0,020 ¹⁾	—	—	—
G20Mn5	1.6220	0,17 to 0,23	0,60	1,00 to 1,60	0,020	0,020 ¹⁾	—	—	0,80 max.
G18Mo5	1.5422	0,15 to 0,20	0,60	0,80 to 1,20	0,020	0,020	—	0,45 to 0,65	—
G9Ni10	1.5636	0,06 to 0,12	0,60	0,50 to 0,80	0,020	0,015	—	—	2,00 to 3,00
G17NiCrMo13-6	1.6781	0,15 to 0,19	0,50	0,55 to 0,80	0,015	0,015	1,30 to 1,80	0,45 to 0,60	3,00 to 3,50
G9Ni14	1.5638	0,06 to 0,12	0,60	0,50 to 0,80	0,020	0,015	—	—	3,00 to 4,00
GX3CrNi13-4	1.6982	0,05 max.	1,00	1,00 max.	0,035	0,015	12,00 to 13,50	0,70 max.	3,50 to 5,00
¹⁾ For castings of ruling thickness < 28 mm, 0,030 % S is permitted.									

Table 2. Mechanical properties											
Designation		Heat treatment				Thickness mm max.	Tensile strength at room temperature			Impact test	
Name	Number	°C		Quenching	Tempering		$R_{p0.2}$ MPa ^{*)} min.	R_m MPa ^{*)}	A % min.	KV J min.	At °C
		Symbol ¹⁾									
G17Mn5	1.1131	+ QT		890 to 980	600 to 700	50	240	450 to 600	24	27	-40
G20Mn5	1.6220	+ N		900 to 980		30	300	480 to 620	20	27	-30
		+ QT		900 to 940	610 to 660	100	300	500 to 650	22	27	-40
G18Mo5	1.5422	+ QT		920 to 980	650 to 730	100	240	440 to 790	23	27	-45
G9Ni10	1.5636	+ QT		830 to 890	600 to 650	35	280	480 to 630	24	27	-70
G17NiCrMo13-6	1.6781	+ QT		890 to 930	600 to 640	200	600	750 to 900	15	27	-80
G9Ni14	1.5638	+ QT		820 to 900	590 to 640	35	360	500 to 650	20	27	-90
GX3CrNi13-4	1.6982	+ QT		1000 to 1050	670 to 690 + 590 to 620	300	500	700 to 900	15	27	-120

¹⁾ + Q : quenching in water except for GX3CrNi13-4 (quenching in air). + T = tempering. + N = normalizing.
^{*)} 1 MPa = 1 N/mm².

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