SLOVENSKI STANDARD
SIST EN 10250-2:2000

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Prosto kovani jekleni izkovki za splošno tehnično uporabo - 2. del: Nelegirana kakovostna in plemenita jekla

Open die steel forgings for general engineering purposes - Part 2: Non-alloy quality and special steels

Freiformschmiedestücke aus Stahl für allgemeine Verwendung - Teil 2: Unlegierte Qualitäts- und Edelstähle

Pieces forgées en acier pour usage général - Partie 2: Aciers de qualité non alliés et aciers spéciaux

Ta slovenski standard je istoveten z: EN 10250-2:1999

ICS:

77.140.20	Visokokakovostna jekla	Stainless steels
77.140.45	Nelegirana jekla	Non-alloyed steels
77.140.85	Železni in jekleni kovani izdelki	Iron and steel forgings

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This European Standard was approved by CEN on 9 September 1999.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. 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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

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Contents

Foreword

This European Standard has been prepared by Technical Committee ECISS/TC 28 "Steel forgings", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by April 2000, and conflicting national standards shall be withdrawn at the latest by April 2000.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association. This European Standard is considered to be a supporting standard to those application and product standards which in themselves support an essential safety requirement of a New Approach Directive and which make reference to this European Standard.

The titles of the other Parts of this European Standard are:

Part 1: General requirements

Part 3: Alloy special steels

Part 4: Stainless steels

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This Part of this European Standard specifies the technical delivery requirements for open die forgings, forged bars and products pre-forged and finished in ring rolling mills, manufactured from non-alloy quality and special steels and supplied in the normalized, normalized and tempered, quenched and tempered or annealed condition

NOTE: The majority of steels listed in this Part of EN 10250, with properties in the quenched and tempered condition up to 160 mm thickness, are identical to steels specified in EN 10083-1 and -2 and more extensive information on hardenability and technological properties is given in that European Standard.

General Information on technical delivery conditions is given in EN 10021.

2 Normative references

This Part of EN 10250 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 10003-1	Metallic materials - Brinell hardness test – Part 1: Test method.
EN 10021	General technical delivery requirements for iron and steel products
EN 10083-1	Quenched and tempered steels – Part 1: Technical delivery conditions for special steels
EN 10083-1	Quenched and tempered steels – Part 2: Technical delivery conditions for unalloyed quality steels
EN 10250-1	Open die steel forgings for general engineering purposes – Part 1: General requirements

3 Chemical composition

3.1 Cast analysis

The chemical composition of the steel shall be determined by cast analysis and shall conform to the analysis given in table 1 (see A.7 and A.8, of EN 10250-1).

Measures should be taken to prevent the addition from the scrap, or other material used in the manufacture of the steel, of such elements which affect the hardenability, mechanical properties and applicability of the steel.

3.2 Product analysis

The product analysis shall not deviate from the specified cast analysis (see table 1) by more than the values specified in table 2. (see 9.2 to EN 10250-1).

4 Heat treatment

Heat treatment details are given in table A.1 for guidance.

Table 1: Steel grades and chemical composition - cast analysis[1)]

Chemical composition % (m/m) Steel Designation		C	Si Max	Mn	P Max	S Max	Cr Max	Mo Max	Ni Max	Cr+Mo+Ni Max	Al Min
Name	Number										
S235JRG2	1.0038	0,20 max[2)]	0,55	1,40 max	0,045	0,045	0,30	0,08	0,30	0,48	0,020
S235J2G3	1.0116	0,17 max[2)]	0,55	1,40 max	0,035	0,035	0,30	0,08	0,30	0,48	0,020
S355J2G3	1.0570	0,22 max[2)]	0,55	1,60 max	0,035	0,035	0,30	0,08	0,30	0,48	0,020
C22	1.0402	0,17 to 0,24	0,40	0,40 to 0,70	0,045	0,045	0,40	0,10	0,40	0,63	–
C25	1.0406	0,22 to 0,29	0,40	0,40 to 0,70	0,045	0,045	0,40	0,10	0,40	0,63	–
C25E	1.1158	0,22 to 0,29	0,40	0,40 to 0,70	0,035	0,035	0,40	0,10	0,40	0,63	–
C30	1.0528	0,27 to 0,34	0,40	0,50 to 0,80	0,045	0,045	0,40	0,10	0,40	0,63	–
C35	1.0501	0,32 to 0,39	0,40	0,50 to 0,80	0,045	0,045	0,40	0,10	0,40	0,63	–
C35E	1.1181	0,32 to 0,39	0,40	0,50 to 0,80	0,035	0,035	0,40	0,10	0,40	0,63	–
C40	1.0511	0,37 to 0,44	0,40	0,50 to 0,80	0,045	0,045	0,40	0,10	0,40	0,63	–
C45	1.0503	0,42 to 0,50	0,40	0,50 to 0,80	0,045	0,045	0,40	0,10	0,40	0,63	–
C45E	1.1191	0,42 to 0,50	0,40	0,50 to 0,80	0,035	0,035	0,40	0,10	0,40	0,63	–
C50	1.0540	0,47 to 0,55	0,40	0,60 to 0,90	0,045	0,045	0,40	0,10	0,40	0,63	–
C55	1.0535	0,52 to 0,60	0,40	0,60 to 0,90	0,045	0,045	0,40	0,10	0,40	0,63	–
C55E	1.1203	0,52 to 0,60	0,40	0,60 to 0,90	0,035	0,035	0,40	0,10	0,40	0,63	–
C60	1.0601	0,57 to 0,65	0,40	0,60 to 0,90	0,045	0,045	0,40	0,10	0,40	0,63	–
C60E	1.1221	0,57 to 0,65	0,40	0,60 to 0,90	0,035	0,035	0,40	0,10	0,40	0,63	
28Mn6	1.1170	0,25 to 0,32	0,40	1,30 to 1,65	0,035	0,035	0,40	0,10	0,40	0,63	–
20Mn5	1.1133	0,17 to 0,23	0,40	1,00 to 1,50	0,035	0,035	0,40	0,10	0,40	0,63	0,020

[1)] At the option of the manufacturer the elements aluminium, titanium, vanadium and niobium may be added singly or in combination for grain size control purposes. Elements not quoted in table 1 shall not be added to the steel without the agreement of the purchaser, except for the purpose of finishing the heat.

[2)] For forgings with an equivalent diameter or thickness > 100 mm the carbon content shall be agreed between purchaser and supplier.

Table 2: Permissible deviations between the product analysis and the limiting values given in table 1 for the cast analysis

Element	Permissible maximum content in the cast analysis %	Permissible deviation %
Carbon	< 0,55	± 0,02
	> 0,55 ≤ 0,65	± 0,03
Silicon	≤ 0,40	± 0,03
	> 0,40	± 0,04
Manganese	≤ 1,00	± 0,04
	> 1,00 ≤ 1,65	± 0,06
Phosphorus	≤ 0,045	+ 0,005
Sulfur	≤ 0,045	+ 0,005
Chromium	≤ 0,40	+ 0,05
Molybdenum	≤ 0,10	+ 0,03
Nickel	≤ 0,40	+ 0,05
Aluminium	≥ 0,020	- 0,005

5 Mechanical properties

5.1 Forgings in the normalized, normalized and tempered, and quenched and tempered condition

The mechanical properties determined on test pieces selected, prepared and tested in accordance with clauses 11 and 12 of EN 10250-1 shall conform to the property requirements given in tables 3 and 4 respectively.

5.2 Forgings in the annealed condition (Steels C45, C55 and C60)

Representative forgings selected by a method agreed with the purchaser shall be Brinell hardness tested in designated positions using techniques described in EN 10003-1. The maximum hardness obtained shall not exceed those given for the steel in table 5.