

Non-alloy steel rod for drawing and/or cold rolling —

Part 3: Specific requirements for rimmed and rimmed substitute low carbon steel rod

The European Standard EN 10016-3:1994 has the status of a
British Standard

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee ISE/71, Steel rod for wire drawing, upon which the following bodies were represented:

British Steel Industry
 British Steel Industry (Wire Section)
 Process Plant Association
 Welding Manufacturers' Association (BEAMA) Ltd.

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 December 1995

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Contents

| | Page |
|------------------------|--------------------|
| Committees responsible | Inside front cover |
| National foreword | ii |
| Foreword | 2 |
| Text of EN 10016-3 | 3 |
| List of references | Inside back cover |

National foreword

This British Standard has been prepared under the direction of the Engineering Sector Board and is the English language version of EN 10016-3:1994 *Non-alloy steel rod for drawing and/or cold rolling — Part 3: Specific requirements for rimmed and rimmed substitute low carbon steel rod* published by the European Committee for Standardization (CEN).

Cross-reference

| Publication referred to | Corresponding British Standard |
|-------------------------|--|
| EN 10020:1988 | BS EN 10020:1991 <i>Definition and classification of grades of steel</i> |

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 4, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Descriptors: Iron and steel products, unalloyed steels, wire drawing, cold rolling, wire rod, low carbon steels, rimming steels, chemical composition, grades: quality, defects, inspection, mechanical properties

English version

Non-alloy steel rod for drawing and/or cold rolling — Part 3: Specific requirements for rimmed and rimmed substitute low carbon steel rod

Fil machine en acier non allié destiné au tréfilage et/ou au laminage à froid —
Partie 3: Prescriptions spécifiques au fil machine en acier effervescent ou pseudoeffervescent à bas carbone

Walzdraht aus unlegiertem Stahl zum Ziehen und/oder Kaltwalzen —
Teil 3: Besondere Anforderungen an Walzdraht aus unberuhigtem und ersatzunberuhigtem Stahl mit niedrigem Kohlenstoffgehalt

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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 EN 10016 is subdivided as follows:

- *Part 1: General requirements;*
- *Part 2: Specific requirements for general purpose rod;*
- *Part 3: Specific requirements for rimmed and rimmed substitute low carbon steel rod;*
- *Part 4: Specific requirements for rod for special applications.*

This European Standard has been drawn up by ECISS/TC 15, Wire-rod — Qualities, dimensions, tolerances and specific tests, whose Secretariat is held by UNI/UNSIDER.

Parts 1, 2, 3 and 4 of this European Standard replace:

EURONORM *Non alloy steel wire rod for cold*
16 (1987): *drawing and/or cold rolling*

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 1995, and conflicting national standards shall be withdrawn at the latest by June 1995.

According to the CEN/CENELEC Internal Regulations, 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, United Kingdom.

Contents

| | Page |
|--|------|
| Foreword | 2 |
| 1 Scope | 3 |
| 2 Normative references | 3 |
| 3 Requirements | 3 |
| 3.1 Chemical composition | 3 |
| 3.2 Internal soundness and surface quality | 3 |
| 3.3 Depth of surface defects | 3 |
| 3.4 Inspection of non-metallic inclusions | 3 |
| 3.5 Mechanical properties | 4 |
| Table 1 — Chemical analysis (heat analysis) | 4 |
| Table 2 — Permissible deviations in the product analysis in relation to the actual heat analysis | 4 |
| Table 3 — Limit values for the depth of surface discontinuities | 4 |
| Table 4 — Tensile strength values | 4 |

1 Scope

This Part of this European Standard is applicable to rod of low carbon, low silicon, rimmed and rimmed substitute steel with high ductility for drawing and/or cold rolling.

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 10016-1, *Non-alloy steel rod for drawing and/or cold rolling — Part 1: General requirements.*

EN 10020, *Definition and classification of grades of steel.*

EN 10221, *Surface quality classes for hot rolled bars and rods — Technical delivery conditions.*

PrENV 10247, *Micrographic examination of the inclusion content of steels using standard pictures.*

3 Requirements

For the general requirements see EN 10016-1.

3.1 Chemical composition

For the heat analysis, the values shown in Table 1 apply. The permissible deviations of the product analysis in relation to the actual heat analysis are given in Table 2.

3.2 Internal soundness and surface quality

The rod shall have no internal and/or surface imperfections such as: shrink holes, segregation, cracks, folds, incrustations, notches, scabs, rolling burrs, damage, which may be prejudicial to its correct use.

3.3 Depth of surface defects

The rod shall not have any surface discontinuities of depth greater than the values shown in Table 3.

These limit values apply for the test chosen according to EN 10016-1 (clauses 9.5.1 and 9.6.2).

3.4 Inspection of non-metallic inclusions

The method for inspecting non-metallic inclusions and the assessment criteria for it shall be agreed at the time of ordering, as far as possible with reference to the ENV 10247 or to one of the following standards:

- DIN 50 602:1985 *Metallographische Prüfverfahren — Mikroskopische Prüfung von Edelmetallen auf nichtmetallische Einschlüsse mit Bildreihen;*
- NF A 04-107:1980 *Produits sidérurgiques — Méthode micrographique de détermination de la teneur en inclusions non-métalliques du fil-machine en acier non allié;*
- UNI 3244:1980 (with annex) *Esame microscopico dei materiali ferrosi — Valutazione delle inclusioni non metalliche negli acciai mediante immagini tipo;*
- ASTM E 45:1987 *Standard practice for determining the inclusion content of steel.*

Table 1 — Chemical analysis (heat analysis)^a

| Steel grade ^b | | Heat analysis | | | | | | | | | | |
|--------------------------|--------------|---------------|-----------|-----------|----------|----------|------------------------|------------------------|-----------|------------------------|------------------------|----------|
| Steel name | Steel number | C % max. | Si % max. | Mn % | P % max. | S % max. | Cr % ^c max. | Ni % ^c max. | Mo % max. | Cu % ^c max. | Al % ^d max. | N % max. |
| C2D1 | 1.1185 | 0,03 | 0,05 | 0,20–0,35 | 0,020 | 0,20 | 0,10 | 0,10 | 0,03 | 0,10 | 0,01 | 0,007 |
| C3D1 | 1.1187 | 0,05 | 0,05 | 0,20–0,40 | 0,025 | 0,25 | 0,10 | 0,10 | 0,03 | 0,15 | 0,05 | — |
| C4D1 | 1.1188 | 0,06 | 0,10 | 0,20–0,45 | 0,025 | 0,25 | 0,15 | 0,15 | 0,03 | 0,15 | 0,05 | — |

^a Elements not included in this table may not be added intentionally to the steel without the agreement of the purchaser, except those intended for finishing the cast.

^b Special non-alloy steel according to EN 10020.

^c The sum of the contents Cu + Ni + Cr shall not exceed:

- for steel grade C2D1, 0,25 %;
- for steel grade C3D1, 0,30 %;
- for steel grade C4D1, 0,35 %.

^d For steels grade C3D1 and C4D1 a lower maximum limit may be specified at the time of ordering.

Table 2 — Permissible deviations in the product analysis in relation to the actual heat analysis

| Element | Steel grade | Permissible deviation in product analysis % |
|---------|-------------|---|
| C | C2D1 | + 0,01 |
| | C3D1–C4D1 | + 0,02 |
| Si | C2D1–C3D1 | + 0,02 |
| | C4D1 | + 0,04 |
| Mn | All grades | ± 0,05 |
| P and S | All grades | + 0,005 |

Table 3 — Limit values for the depth of surface discontinuities

| Class according to EN 10221 | Nominal diameter d_N mm | Maximum permissible depth ^a of surface discontinuities mm |
|-----------------------------|---------------------------|--|
| C | $5 \leq d_N \leq 12$ | 0,17 |
| | $12 < d_N \leq 30$ | 0,23 |

^a The depth of surface discontinuities is measured from the actual surface of the product in a radial direction.

3.5 Mechanical properties

Unless otherwise specified at the time of ordering, rod of diameter 5,5 mm and above shall have the maximum tensile strength values shown in Table 4.

Table 4 — Tensile strength values

| Steel grade | Maximum tensile strength N/mm ² |
|-------------|--|
| C2D1 | 360 |
| C3D1 | 360 |
| C4D1 | by agreement |

List of references

See national foreword.

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