BRITISH STANDARD

BS EN
10025-2:2004

Hot rolled products of structural steels —

Part 2: Technical delivery conditions for non-alloy structural steels

The European Standard EN 10025-2:2004 has the status of a British Standard

National foreword

This British Standard is the official English language version of EN 10025-2:2004. BS EN 10025-2:2004 together with BS EN 10025-1:2004 supersedes BS EN 10025:1993, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/12, Structural steels, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

Cross-references

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Warmgewalzte Erzeugnisse aus Baustählen - Teil 2: Technische Lieferbedingungen für unlegierte Baustähle

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Foreword

This document (EN 10025-2:2004) has been prepared by Technical Committee ECISS/TC 10 “Structural steels - Grades and qualities”, the secretariat of which is held by NEN.

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of an identical text or by endorsement, at the latest by May 2005, and conflicting national standards shall be withdrawn at the latest by May 2005.

This document supersedes EN 10025:1990 + A1:1993, *Hot rolled products of non-alloy structural steels - Technical delivery conditions*.

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

Part 1: General technical delivery conditions;

Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels;

Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels;

Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance;

Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of the EU Construction Products Directive (89/106/EEC). For relationship with the EU Construction Products Directive, see informative Annex ZA of EN 10025-1:2004.

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, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

Part 2 of this document, in addition to Part 1, specifies the technical delivery conditions for flat and long products and semi-finished products which are meant for further processing to flat and long products of hot rolled non-alloy quality steels in the grades and qualities given in Tables 2 to 6 (chemical composition) and Tables 7 to 9 (mechanical properties) in the delivery conditions as given in 6.3. Three engineering steels are also specified in this document (see Tables 3 and 5) (chemical composition) and Table 8 (mechanical properties). This document does not apply to structural hollow sections and tubes (see EN 10210-1 and EN 10219-1).

The technical delivery conditions apply to thicknesses ≥ 3 mm and ≤ 150 mm for long products of steel grade S450J0. The technical delivery conditions apply to thicknesses ≤ 250 mm for flat and long products of all other grades and qualities. In addition for flat products of qualities J2 and K2 the technical conditions apply to thicknesses ≤ 400 mm.

Products made of steel grades S185, E295, E335 and E360 cannot be CE marked.

The steels specified in this Part 2 are not intended to be heat treated except products delivered in delivery condition +N. Stress relief annealing is permitted (see also the NOTE in 7.3.1.1 of EN 10025-1:2004). Products delivered in +N condition can be hot formed and/or normalized after delivery (see Clause 3).

NOTE 1 Semi-finished products which are to be converted to rolled finished products conforming to this document should be the subject of special agreement at the time of the enquiry and order. The chemical composition can also be agreed at the time of the order, however the values should be within the limits of Tables 2 and 3.

NOTE 2 For certain grades and product forms suitability for particular applications may be specified at the time of the enquiry and order (see 7.4.2, 7.4.3 and Table 10).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

2.1 General standards

EN 1011-2, *Welding – Recommendations for welding of metallic materials - Part 2: Arc welding of ferritic steels.*

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

EN 10025-1:2004, *Hot rolled products of structural steels - Part 1: General technical delivery conditions.*

EN 10027-1, *Designation systems for steels - Part 1: Steel names, principal symbols.*

EN 10027-2, *Designation systems for steels - Part 2: Numerical system.*

EN 10163-1, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 1: General requirements.*

EN 10163-2, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 2: Plates and wide flats.*

EN 10163-3, *Delivery requirements for surface condition of hot-rolled steel plates, wide flats and sections – Part 3: Sections.*

EN 10164, *Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions.*

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

CR 10260, *Designation systems for steels - Additional symbols.*

2.2 Standards on dimensions and tolerances (see 7.7.1)

EN 10017, *Non-alloy steel rod for drawing and/or cold rolling – Dimensions and tolerances.*

EN 10024, *Hot rolled taper flange I sections - Tolerances on shape and dimensions.*

EN 10029, *Hot rolled steel plates 3 mm thick or above - Tolerances on dimensions, shape and mass.*

EN 10034, *Structural steel I and H sections - Tolerances on shape and dimensions.*

EN 10048, *Hot rolled narrow steel strip - Tolerances on dimensions and shape.*

EN 10051, *Continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels - Tolerances on dimensions and shape.*

EN 10055, *Hot-rolled steel equal flange tees with radiused root and toes - Dimensions and tolerances on shape and dimensions.*

EN 10056-1, *Structural steel equal and unequal leg angles - Part 1: Dimensions.*

EN 10056-2, *Structural steel equal and unequal leg angles - Part 2: Tolerances on shape and dimensions.*

EN 10058, *Hot rolled flat steel bars for general purposes - Dimensions and tolerances on shape and dimensions.*

EN 10059, *Hot rolled square steel bars for general purposes - Dimensions and tolerances on shape and dimensions.*

EN 10060, *Hot rolled round steel bars for general purposes - Dimensions and tolerances on shape and dimensions.*

EN 10061, *Hot rolled hexagon steel bars for general purposes - Dimensions and tolerances on shape and dimensions.*

EN 10067, *Hot rolled bulb flats - Dimensions and tolerances on shape, dimensions and mass.*

EN 10162, *Cold rolled steel sections - Technical delivery conditions - Dimensional and cross-sectional tolerances.*

EN 10279, *Hot rolled steel channels - Tolerances on shape and dimensions.*

2.3 Standards on testing

EN 10160, *Ultrasonic testing of steel flat product of thickness equal to or greater than 6 mm (reflection method).*

EN 10306, *Iron and steel - Ultrasonic testing of H beams with parallel flanges and IPE beams.*

EN 10308, *Non-destructive testing - Ultrasonic testing of steel bars.*

EN ISO 643, *Steels – Micrographic determination of the apparent grain size (ISO 643:2003).*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10025-1:2004 and the following apply.

3.1
normalizing rolling
rolling process in which the final deformation is carried out in a certain temperature range leading to a material condition equivalent to that obtained after normalizing so that the specified values of the mechanical properties are retained even after normalizing

The abbreviated form of this delivery condition is +N

NOTE In international publications for both the normalizing rolling, as well as the thermo-mechanical rolling, the expression "controlled rolling" may be found. However in view of the different applicability of the products a distinction of the terms is necessary.

3.2
as-rolled
delivery condition without any special rolling and/or heat treatment condition.

The abbreviated form of this delivery condition is +AR

3.3
thermomechanical rolling
rolling process in which the final deformation is carried out in a certain temperature range leading to a material condition with certain properties which cannot be achieved or repeated by heat treatment alone

NOTE 1 Subsequent heating above 580 °C may lower the strength values. If temperatures above 580 °C are needed reference should be made to the supplier.

NOTE 2 Thermomechanical rolling leading to the delivery condition M can include processes with an increasing cooling rate with or without tempering including self-tempering but excluding direct quenching and quenching and tempering.

NOTE 3 In some publications the word TMCP (Thermomechanical Control Process) is also used.

4 Classification and designation

4.1 Classification

4.1.1 Main quality classes

The steel grades specified in this document shall be classified as non-alloy quality steels according to EN 10020.

4.1.2 Grades and qualities

This document specifies eight steel grades S185, S235, S275, S355, S450, E295, E335 and E360. They differ in their mechanical properties.

The steel grades S235 and S275 may be supplied in qualities JR, J0 and J2. The steel grade S355 may be supplied in qualities JR, J0, J2 and K2. The steel grade S450 is supplied in quality J0.

The qualities differ in specified impact energy requirements.

4.2 Designation

4.2.1 The designation shall be in accordance with EN 10025-1.

NOTE For a list of corresponding former designations and the former designations from EN 10025:1990 and EN 10025:1990+A1:1993 see Annex A, Table A.1.

4.2.2 The designation shall consist of:

- number of this document (EN 10025-2);
- steel name or the steel number; the steel name consisting of:
  - symbol S (for structural steel) or E (for engineering steel);
  - indication of the minimum specified yield strength for thickness ≤ 16 mm expressed in MPa[1)];
  - if applicable, the quality designation (see 4.1.2) in respect of specified impact energy values;
  - if applicable, the additional symbol C for the suitability for the particular application (see Tables 10, 11, 12 and 13).
- indication "+N or +AR", when the products are ordered and delivered in the condition +N or +AR (see 3.1, 3.2 and 6.3). The indication "+N or +AR" shall also be added to the steel number.

EXAMPLE Structural steel (S) with a specified minimum yield strength at ambient temperature of 355 MPa[1)], with a minimum impact energy value of 27 J at 0 ºC (J0) and suitable for cold flanging (C), delivery condition normalized rolled (or as rolled):

Steel EN 10025-2 - S355J0C+N (or +AR)

or

Steel EN 10025-2 - 1.0554+N (or +AR)

5 Information to be supplied by the purchaser

5.1 Mandatory information

The information that shall be supplied by the purchaser at the time of the order is specified in EN 10025-1.

In addition to EN 10025-1 the following information shall be supplied by the purchaser at the time of the order:

[1)] 1 MPa = 1 N/mm^2.

g) whether products have to be submitted to specific or non-specific inspection and testing and which inspection document is required (see 8.2);

h) whether the verification of the mechanical properties for the quality JR and the steel grades E295, E335 and E360 has to be carried out by cast or by lot (see 8.3.1.1).

5.2 Options

A number of options are specified in Clause 13. In the event that the purchaser does not indicate his wish to implement any of these options, the supplier shall supply in accordance with the basic specification.

6 Manufacturing process

6.1 Steel making process

The steel making process shall be in accordance with EN 10025-1. If specified at the time of the order the steel making process shall be reported to the purchaser, with the exception of steel S185.

See option 1.

6.2 Deoxidation

6.2.1 The method of deoxidation shall be as given in Tables 2 and 3.

6.2.2 The deoxidation methods are designated as follows:

a) Optional - Method at the manufacturer's discretion;

b) FN - Rimming steel not permitted;

c) FF - Fully killed steel containing nitrogen binding elements in amounts sufficient to bind the available nitrogen (for example min. 0,020 % total aluminium). The usual guideline is a minimum aluminium to nitrogen ratio of 2:1, when no other nitrogen binding elements are present. Such other elements shall be reported in the inspection document.

6.3 Delivery conditions

The delivery condition of long products and continuous mill flat products can be +AR, +N or +M at the manufacturer's discretion. The delivery condition of quarto mill products can only be +AR or +N at the manufacturer's discretion.

The delivery condition +AR or +N can be ordered.

See option 19A.

If an inspection document is required (see 8.2) the delivery condition shall be indicated in it with its specific symbol (+N, +AR or +M). In case the products are ordered in the delivery condition +N or +AR the specific symbol (+N or +AR) shall be added to the designation (see 4.2.2).

7 Requirements

7.1 General

The following requirements apply when sampling, preparation of test pieces and testing specified in Clauses 8, 9 and 10 are carried out.

7.2 Chemical composition

7.2.1 The chemical composition determined by ladle analysis shall comply with the specified values of Tables 2 and 3.

7.2.2 The upper limits applicable for the product analysis are given in Tables 4 and 5.

The product analysis shall be carried out when specified at the time of the order.

See option 2.

7.2.3 The maximum carbon equivalent values for the grades S235, S275, S355 and S450, based on the ladle analysis, given in Table 6 shall apply. For the carbon equivalent value formula see 7.2.3 of EN 10025-1:2004.

7.2.4 For all S235, S275 and S355 qualities the following additional chemical requirement can be agreed at the time of the order:

– Copper-content between 0,25 % and 0,40 % on ladle analysis and between 0,20 % and 0,45 % on product analysis. In this case the maximum carbon equivalent value of Table 6 shall be increased by 0,02 %.

See option 20.

7.2.5 When products of grade S275 and S355 are supplied with a control on Si e.g. for hot-dip zinc-coating so that there could be a need to increase the content of other elements like C and Mn to achieve the required tensile properties, the maximum carbon equivalent values of Table 6 shall be increased as follows:

– for Si ≤ 0,030 %, increase CEV by 0,02 %;

– for Si ≤ 0,25 %, increase CEV by 0,01 %.

7.3 Mechanical properties

7.3.1 General

7.3.1.1 Under the inspection and testing conditions as specified in Clauses 8, 9 and 10 and in the delivery condition as specified in 6.3 the mechanical properties shall comply with the values given in Tables 7, 8 and 9.

7.3.1.2 For products ordered and supplied in the normalized or normalized rolled condition (see 6.3) the mechanical properties shall comply with Tables 7, 8 and 9 in the normalized or normalized rolled condition as well as after normalizing by heat treatment after delivery.

7.3.1.3 For products supplied as-rolled for normalizing by the purchaser the samples shall be normalized, if requested at the time of the order. The values obtained from the normalized samples shall comply with this document. The results shall be reported in the inspection document.

NOTE The results of these tests do not represent the properties of the supplied products but indicate the properties which can be achieved after correct normalizing.

7.3.1.4 For flat products the nominal thickness applies. For long products of irregular section the nominal thickness of that part from which the samples are taken applies (see Annex A of EN 10025-1:2004).

7.3.2 Impact properties

7.3.2.1 The verification of the impact energy value shall be carried out in accordance with EN 10025-1.

7.3.2.2 The impact properties of quality JR products are verified only when specified at the time of the order.

See option 3.

7.3.2.3 For products of quality J2 and K2 with nominal thickness < 6 mm the ferritic grain size shall be ≥ 6, verified by the method as described in EN ISO 643, if specified at the time of the order.

See option 21.

When aluminum is used as the grain refining element, the grain size requirement shall be deemed to be fulfilled if on ladle analysis the aluminum content is not less than 0,020 % total aluminum or alternatively, 0,015 % acid soluble aluminum. In this case verification of the grain size is not required, but the aluminum content shall be indicated in the inspection document.

7.3.3 Improved deformation properties perpendicular to the surface

If agreed at the time of the order products of qualities J2 and K2 shall comply with one of the requirements of EN 10164.

See option 4.

7.4 Technological properties

7.4.1 Weldability

7.4.1.1 General requirements for welding of the steels of the qualities JR, J0, J2 and K2 shall be given in EN 1011-2.

NOTE With increasing product thickness and strength level cold cracking can occur. Cold cracking is caused by the following factors in combination:

– the amount of diffusible hydrogen in the weld metal;

– a brittle structure of the heat affected zone;

– significant tensile stress concentrations in the welded joint.

7.4.1.2 This document gives no information concerning the weldability of the steel grades S185, E295, E335 and E360 because the chemical composition is not specified.

7.4.2 Formability

NOTE Recommendations regarding hot and cold forming are laid down in ECSC IC 2. Although ECSC IC2 is specially meant for fine grain steels, these recommendations can also apply for the steel grades of EN 10025-2:2004.

7.4.2.1 Hot forming

Only products ordered and supplied in the normalized or normalized rolled condition shall comply with the requirements of Tables 7, 8 and 9 if hot forming is carried out after delivery (see 7.3.1.2).

7.4.2.2 Cold formability

7.4.2.2.1 General

Grades and qualities suitable for cold forming and engineering steels suitable for cold drawing shall be designated by the appropriate steel name (including symbol C or GC) or the appropriate steel number as indicated in Tables 10 to 13 (see 4.2.2).

NOTE Cold forming leads to reduction in the ductility. Furthermore it is necessary to draw the attention to the risk of brittle fracture in connection with hot-dip zinc-coating.

7.4.2.2.2 Flangeability

If specified at the time of the order plate, sheet, strip, wide flats and flats (width < 150 mm) with a nominal thickness ≤ 30 mm shall be suitable for flanging without cracking with the minimum recommended bend radii given in Table 12. The grades and qualities to which this applies are given in Table 10.

See option 11.

7.4.2.2.3 Roll forming

If specified at the time of the order plate, sheet and strip with a nominal thickness ≤ 8 mm shall be suitable for the production of sections by cold rolling (for example according to EN 10162). The suitability is applicable for bend radii given in Table 13. The grades and qualities concerned are given in Table 10.

See option 12.

7.4.2.2.4 Drawing of bars

If specified at the time of the order, bars shall be suitable for cold drawing. The grades and qualities to which this applies are given in Tables 10 and 11.

See option 22.

7.4.3 Suitability for hot-dip zinc-coating

Hot-dip zinc-coating requirements shall be agreed between manufacturer and purchaser.

EN ISO 1461 and EN ISO 14713 should be used to set these coating requirements. The definition of suitability classes based upon chemical analysis limitations as laid down in Table 1 can be used for guidance purposes.

Table 1 - Classes for the suitability for hot-dip zinc-coating based on the ladle analysis (for guidance)

Classes	Elements % by mass		
	Si	Si + 2,5 P	P
Class 1	≤ 0,030	≤ 0,090	-
Class 2 [a]	≤ 0,35	-	-
Class 3	0,14 ≤ Si ≤ 0,25	-	≤ 0,035
[a] Class 2 applies only for special zinc alloys.			

For class 1 the maximum carbon equivalent value of Table 6 shall be increased by 0,02. For class 3 the maximum carbon equivalent value of Table 6 shall be increased by 0,01. These increases apply for S275 and S355 (see 7.2.5).

See option 5.

NOTE Product shape, composition of the zinc bath, other hot-dip treatment settings and other factors should be considered when agreeing upon hot-dip zinc-coating requirements.

7.4.4 Machinability

All steel grades and qualities are machinable with common operations.

NOTE Due to the good ductility of qualities JR, J0, J2 and K2 problems can occur in the chip formation and in surface finish quality. Generally a higher S content improves machinability. A proper Ca treatment applicable for long products gives better machining properties (see footnote [e] of Table 2 and footnote [c] of Table 3).

7.5 Surface properties

7.5.1 Strip

The surface condition should not impair an application appropriate to the steel grade if adequate processing of the strip is applied.

7.5.2 Plates and wide flats

EN 10163 parts 1 and 2 shall apply for the permissible surface discontinuities and for the repair of surface defects by grinding and/or welding. Class A, subclass 1 of EN 10163-2 shall apply, unless otherwise agreed at the time of the order.

See option 15.

7.5.3 Sections

EN 10163 parts 1 and 3 shall apply for the permissible surface discontinuities and for the repair of surface defects by grinding and/or welding. Class C, subclass 1 of EN 10163-3 shall apply, unless otherwise agreed at the time of the order.

See option 16.

7.5.4 Bars and rods

EN 10221 applies for the permissible surface discontinuities and for the repair of surface defects by grinding and/or welding. Class A of EN 10221 shall apply, unless otherwise agreed at the time of the order.

See option 17.

7.6 Internal soundness

The permissible level of internal imperfections shall be in accordance with EN 10025-1.

See option 6 (for flat products).

See option 7 (for H beams with parallel flanges and IPE beams).

See option 8 (for bars).

7.7 Dimensions, tolerances on dimensions and shape, mass

7.7.1 Dimensions, tolerances on dimensions and shape shall be in accordance with the requirements given in the order by reference to the relevant documents according to 2.2 and according to 2.2 and 7.7.1 of EN 10025-1:2004.

For hot rolled plate tolerances the basic requirements shall be in accordance with EN 10029, including thickness tolerances to class A, unless otherwise agreed at the time of the order.

See option 18.

For plates cut from continuously hot rolled strip, the thickness tolerances shall be in accordance with EN 10051.

7.7.2 The nominal mass shall comply with EN 10025-1.

8 Inspection

8.1 General

The products shall be delivered either with specific or non-specific inspection and testing to indicate compliance with the order and this document (see 5.1).

8.2 Type of inspection and inspection document

The type of inspection and inspection document required shall comply with EN 10025-1.

See option 9.

In addition to the requirements of EN 10025-1 products of steel S185 shall only be submitted to non-specific inspection and testing and only certificates of compliance with the order shall be supplied when specified at the time of the order.

See option 23.

8.3 Frequency of testing

8.3.1 Sampling

8.3.1.1 The verification of the mechanical properties shall be carried out:

— by cast or by lot as specified at the time of the order for the quality JR and the steel grades E295, E335 and E360;

see option 24;

— by cast for the qualities J0, J2 and K2.

8.3.1.2 If it is specified at the time of the order that sampling should be by lot, it is permissible for the manufacturer to substitute sampling by cast, if the products are delivered by cast.

8.3.2 Test units

8.3.2.1 The test unit shall contain products of the same form, grade and quality, delivery condition and of the same thickness range as specified in Table 7 for the yield strength and shall be:

— by lot: 20 tonnes or part thereof;

— by cast: 40 tonnes or part thereof;

60 tonnes or part thereof for heavy sections with a mass > 100 kg/m;

80 tonnes or part thereof for all sections if the mass of the cast exceeds 200 tonnes.

8.3.2.2 If specified at the time of the order for flat products of quality J2 and K2 the impact properties only or the impact properties and the tensile properties shall be verified out of each parent plate or coil.

See option 13.

See option 14.

8.3.3 Verification of chemical composition

The verification of the chemical composition shall be in accordance with EN 10025-1.

See option 2.

8.4 Tests to be carried out for specific inspection

8.4.1 The following tests shall be carried out:

— for all products the ladle analysis;

— for all products the tensile test;

— for all products of quality J0, J2 and K2 the impact test.

8.4.2 At the time of the order the following additional tests can be agreed:

a) for all products of quality JR the impact test (see 7.3.2.2);

See option 3.

b) the product analysis if the products are delivered per cast (see 8.3.3.2 of EN 10025-1:2004).

See option 2.

9 Preparation of samples and test pieces

9.1 Selection and preparation of samples for chemical analysis

The preparation of samples for product analysis shall be in accordance with EN 10025-1.

9.2 Location and orientation of samples and test pieces for mechanical tests

9.2.1 General

The location and orientation of samples and test pieces for mechanical tests shall be in accordance with EN 10025-1.

9.2.2 Preparation of samples

In addition to EN 10025-1 the samples shall be taken:

— from the thickest product in the test unit;

— from any product of the test unit for products in delivery condition +N (see 3.1).

In addition to EN 10025-1 the preparation of samples for semi-finished products, when the order specifies the requirement for testing the mechanical properties, in addition to chemical composition, shall be agreed at the time of the order.

See option 25

9.2.3 Preparation of test pieces

The preparation of test pieces for mechanical tests shall be in accordance with EN 10025-1.

9.3 Identification of samples and test pieces

The identification of samples and test pieces shall be in accordance with EN 10025-1.

10 Test methods

10.1 Chemical analysis

The chemical analysis shall be in accordance with EN 10025-1.

10.2 Mechanical tests

The mechanical tests shall be in accordance with EN 10025-1.

10.3 Ultrasonic testing

Ultrasonic testing shall be carried out in accordance with EN 10025-1.

10.4 Retests

The retests shall be in accordance with EN 10025-1.

11 Marking, labelling, packaging

The marking, labelling and packaging shall comply with EN 10025-1.

See option 10.

12 Complaints

Any complaints shall be dealt with in accordance with EN 10025-1.

13 Options (see 5.2)

The following options of EN 10025-1:2004 apply:

1) The steel making process of the relevant quality shall be indicated (see 6.1).

2) Product analysis shall be carried out; the number of samples and the elements to be determined shall be as agreed (see 7.2.2, 8.3.3 and 8.4.2).

3) The impact properties of quality JR shall be verified (see 7.3.2.2 and 8.4.2).

4) Products of the relevant quality shall comply with one of the improved properties perpendicular to the surface of EN 10164 (see 7.3.3).

5) The product shall be suitable for hot-dip zinc-coating (see 7.4.3).

6) For flat products in thickness ≥ 6 mm the freedom from internal defects shall be verified in accordance with EN 10160 (see 7.6 and 10.3).

7) For H beams with parallel flanges and IPE beams the freedom from internal defects shall be verified in accordance with EN 10306 (see 7.6 and 10.3).

8) For bars the freedom from internal defects shall be verified in accordance with EN 10308 (see 7.6 and 10.3).

9) Inspection of surface condition and dimensions shall be witnessed by the purchaser at the manufacturer's works (see 8.2).

10) The type of marking required (see Clause 11).

In addition to the options of EN 10025-1:2004 the following options apply to products according to EN 10025-2:

11) Sheet, plate, strip, wide flats and flats (width < 150 mm) with a nominal thickness ≤ 30 mm shall be suitable for flanging without cracking (see 7.4.2.2.2).

12) Plate and strip with nominal thickness ≤ 8 mm shall be suitable for the production of sections by cold rolling with bend radii given in Table 13 (see 7.4.2.2.3).

13) For flat products of quality J2 and K2 out of each parent plate or coil the impact properties only shall be verified (see 8.3.2.2).

14) For flat products of quality J2 and K2 out of each parent plate or coil the impact properties and the tensile properties shall be verified (see 8.3.2.2).

15) For plates and wide flats the permissible surface discontinuities and for the repair of surface defects by grinding and/or welding another class than class A, subclass 1 of EN 10163-2 applies (see 7.5.2).

16) For sections the permissible surface discontinuities and for the repair of surface defects by grinding and/or welding another class than class C, subclass 1 of EN 10163-3 applies (see 7.5.3).

17) For bars and rods the permissible surface discontinuities and for the repair of surface defects by grinding and/or welding another class than class A of EN 10221 applies (see 7.5.4).

18) Other tolerances than class A of EN 10029 for hot rolled plates apply (see 7.7.1).

19A) The delivery condition +N or +AR is required (see 6.3).

19B) The delivery condition +AR is required with a verification of the mechanical properties on normalized samples (see 7.3.1.3).

20) A copper content between 0,25 % and 0,40 % on ladle analysis and between 0,20 % and 0,45 % on product analysis for all S235, S275 and S355 qualities is required (see 7.2.4).

21) The grain size shall be verified for products of quality J2 and K2 with nominal thickness < 6 mm (see 7.3.2.3).

22) Bars shall be suitable for cold drawing (see 7.4.2.2.4).

23) A certificate of compliance with the order shall be supplied for the grade S185 (see 8.2).

24) The verification of the mechanical properties for the quality JR and the steel grades E295, E335 and E360 shall be carried out by lot or by cast (see 5.1.h) and 8.3.1.1).

25) The preparation of samples shall be agreed for semi-finished products, when the order specifies the requirement for testing the mechanical properties, in addition to chemical composition (see 9.2.2).

26) The limitation of the maximum carbon content shall be provided for sections with nominal thickness > 100 mm (see Tables 2 and 4).

27) For long products the max. S content can be increased for improved machinability by 0,015 % if the steel is treated to modify the sulphide morphology and the chemical composition shows min. 0,0020 % Ca (see Tables 2 to 5).

28) The minimum impact values shall be provided for sections with a nominal thickness > 100 mm (see Table 9).

Table 2 - Chemical composition of the ladle analysis for flat and long products of steel grades and qualities with values for the impact strength [a]

Designation		Method of deoxi-dation [b]	C in % max. for nominal product thickness in mm			Si % max.	Mn % max.	P % max. [d]	S % max. [d, e]	N % max. [f]	Cu % max. [g]	Other % max. [h]
According EN 10027-1 and CR 10260	According EN 10027-2		≤ 16	> 16 ≤ 40	> 40 [c]							
S235JR	1.0038	FN	0,17	0,17	0,20	-	1,40	0,035	0,035	0,012	0,55	-
S235J0	1.0114	FN	0,17	0,17	0,17	-	1,40	0,030	0,030	0,012	0,55	-
S235J2	1.0117	FF	0,17	0,17	0,17	-	1,40	0,025	0,025	-	0,55	-
S275JR	1.0044	FN	0,21	0,21	0,22	-	1,50	0,035	0,035	0,012	0,55	-
S275J0	1.0143	FN	0,18	0,18	0,18 [i]	-	1,50	0,030	0,030	0,012	0,55	-
S275J2	1.0145	FF	0,18	0,18	0,18 [i]	-	1,50	0,025	0,025	-	0,55	-
S355JR	1.0045	FN	0,24	0,24	0,24	0,55	1,60	0,035	0,035	0,012	0,55	-
S355J0	1.0553	FN	0,20 [j]	0,20 [k]	0,22	0,55	1,60	0,030	0,030	0,012	0,55	-
S355J2	1.0577	FF	0,20 [j]	0,20 [k]	0,22	0,55	1,60	0,025	0,025	-	0,55	-
S355K2	1.0596	FF	0,20 [j]	0,20 [k]	0,22	0,55	1,60	0,025	0,025	-	0,55	-
S450J0 [l]	1.0590	FF	0,20	0,20 [k]	0,22	0,55	1,70	0,030	0,030	0,025	0,55	[m]

[a] See 7.2.

[b] FN = rimming steels not permitted; FF = fully killed steel (see 6.2.2).

[c] For sections with nominal thickness > 100 mm the C content by agreement.

See option 26.

[d] For long products the P and S content can be 0,005 % higher.

[e] For long products the max. S content can be increased for improved machinability by 0,015 % by agreement if the steel is treated to modify the sulphide morphology and the chemical composition shows min. 0,0020 % Ca.

See option 27.

[f] The max. value for nitrogen does not apply if the chemical composition shows a minimum total Al content of 0,020 % or alternatively min. 0,015 % acid soluble Al or if sufficient other N binding elements are present. In this case the N binding elements shall be mentioned in the inspection document.

[g] Cu content above 0,40 % may cause hot shortness during hot forming.

[h] If other elements are added, they shall be mentioned on the inspection document.

[i] For nominal thickness > 150 mm: C = 0,20 % max..

[j] For grades suitable for cold roll forming (see 7.4.2.2.3): C = 0,22 % max..

[k] For nominal thickness > 30 mm: C = 0,22 % max..

[l] Applicable for long products only.

[m] The steel may show a Nb content of max. 0,05 %, a V content of max. 0,13 % and a Ti content of max. 0,05 %.

Table 3 - Chemical composition of the ladle analysis for flat and long products of steel grades with no values for the impact strength [a]

Designation		Method of deoxi-dation [b]	P % max.	S % max. [c]	N % max. [d]
According EN 10027-1 and CR 10260	According EN 10027-2				
S185	1.0035	opt.	-	-	-
E295	1.0050	FN	0,045	0,045	0,012
E335	1.0060	FN	0,045	0,045	0,012
E360	1.0070	FN	0,045	0,045	0,012

[a] See 7.2.

[b] opt. = method at the manufacturer's discretion; FN = rimming steels not permitted (see 6.2.2).

[c] For long products the max. S content can be increased for improved machinability by 0,010 % by agreement if the steel is treated to modify the sulphide morphology and the chemical composition shows min. 0,0020 % Ca.

See option 27.

[d] The max. value for nitrogen does not apply if the chemical composition shows a minimum total Al content of 0,020 % or if sufficient other N binding elements are present. In this case the N binding elements shall be mentioned in the inspection document.

Table 4 - Chemical composition of the product analysis based on Table 2 [a]

Designation		Method of deoxi-dation [b]	C in % max. for nominal product thickness in mm			Si % max.	Mn % max.	P % max. [d]	S % max. [d, e]	N % max. [f]	Cu % max. [g]	Other % max. [h]
According EN 10027-1 and CR 10260	According EN 10027-2		≤ 16	> 16 ≤ 40	> 40[c]							
S235JR	1.0038	FN	0,19	0,19	0,23	-	1,50	0,045	0,045	0,014	0,60	-
S235J0	1.0114	FN	0,19	0,19	0,19	-	1,50	0,040	0,040	0,014	0,60	-
S235J2	1.0117	FF	0,19	0,19	0,19	-	1,50	0,035	0,035	-	0,60	-
S275JR	1.0044	FN	0,24	0,24	0,25	-	1,60	0,045	0,045	0,014	0,60	-
S275J0	1.0143	FN	0,21	0,21	0,21[i]	-	1,60	0,040	0,040	0,014	0,60	-
S275J2	1.0145	FF	0,21	0,21	0,21[i]	-	1,60	0,035	0,035	-	0,60	-
S355JR	1.0045	FN	0,27	0,27	0,27	0,60	1,70	0,045	0,045	0,014	0,60	-
S355J0	1.0553	FN	0,23[j]	0,23[k]	0,24	0,60	1,70	0,040	0,040	0,014	0,60	-
S355J2	1.0577	FF	0,23[j]	0,23[k]	0,24	0,60	1,70	0,035	0,035	-	0,60	-
S355K2	1.0596	FF	0,23[j]	0,23[k]	0,24	0,60	1,70	0,035	0,035	-	0,60	-
S450J0[l]	1.0590	FF	0,23	0,23[k]	0,24	0,60	1,80	0,040	0,040	0,027	0,60	[m]

[a] See 7.2.

[b] FN = rimming steels not permitted; FF = fully killed steel (see 6.2.2).

[c] For sections with nominal thickness > 100 mm the C content by agreement.

See option 26.

[d] For long products the P and S content can be 0,005 % higher.

[e] For long products the max. S content can be increased for improved machinability by 0,015 % by agreement if the steel is treated to modify the sulphide morphology and the chemical composition shows min. 0,0020 % Ca.

See option 27.

[f] The max. value for nitrogen does not apply if the chemical composition shows a minimum total Al content of 0,015 % or alternatively min. 0,013 % acid soluble Al or if sufficient other N binding elements are present. In this case the N binding elements shall be mentioned in the inspection document.

[g] Cu content above 0,45 % may cause hot shortness during hot forming.

[h] If other elements are added, they shall be mentioned on the inspection document.

[i] For nominal thickness > 150 mm: C = 0,22 % max..

[j] For grades suitable for cold roll forming (see 7.4.2.2.3): C = 0,24 % max..

[k] For nominal thickness > 30 mm: C = 0,24 % max..

[l] Applicable for long products only.

[m] The steel may show a Nb content of max. 0,06 %, a V content of max. 0,15 % and a Ti content of max. 0,06 %.

Table 5 - Chemical composition of the product analysis based on Table 3 [a]

Designation		Method of deoxi-dation [b]	P % max.	S % max. [c]	N % max. [d]
According EN 10027-1 and CR 10260	According EN 10027-2				
S185	1.0035	opt.	-	-	-
E295	1.0050	FN	0,055	0,055	0,014
E335	1.0060	FN	0,055	0,055	0,014
E360	1.0070	FN	0,055	0,055	0,014

[a] See 7.2.

[b] opt. = method at the manufacturer's discretion; FN = rimming steels not permitted (see 6.2.2).

[c] For long products the max. S content can be increased for improved machinability by 0,010 % by agreement if the steel is treated to modify the sulphide morphology and the chemical composition shows min. 0,0020 % Ca.

See option 27.

[d] The max. value for nitrogen does not apply if the chemical composition shows a minimum total Al content of 0,015 % or if sufficient other N binding elements are present. In this case the N binding elements shall be mentioned in the inspection document.

Table 6 - Maximum CEV based on the ladle analysis [a]

Designation		Method of deoxidation [b]	Maximum CEV in % for nominal product thickness in mm				
According EN 10027-1 and CR 10260	According EN10027-2		≤ 30	> 30 ≤ 40	> 40 ≤ 150	> 150 ≤ 250	> 250 ≤ 400
S235JR	1.0038	FN	0,35	0,35	0,38	0,40	-
S235J0	1.0114	FN	0,35	0,35	0,38	0,40	-
S235J2	1.0117	FF	0,35	0,35	0,38	0,40	0,40
S275JR	1.0044	FN	0,40	0,40	0,42	0,44	-
S275J0	1.0143	FN	0,40	0,40	0,42	0,44	-
S275J2	1.0145	FF	0,40	0,40	0,42	0,44	0,44
S355JR	1.0045	FN	0,45	0,47	0,47	0,49[c]	-
S355J0	1.0553	FN	0,45	0,47	0,47	0,49[c]	-
S355J2	1.0577	FF	0,45	0,47	0,47	0,49[c]	0,49
S355K2	1.0596	FF	0,45	0,47	0,47	0,49[c]	0,49
S450J0[d]	1.0590	FF	0,47	0,49	0,49	-	-

[a] For the optional increase of elements which influence the CEV see 7.2.4 and 7.2.5.

[b] FN = rimming steels not permitted; FF = fully killed steel (see 6.2.2).

[c] For long products a maximum CEV of 0,54 applies.

[d] Applicable for long products only.

Table 7 - Mechanical properties at ambient temperature for flat and long products of steel grades and qualities with values for the impact strength

Designation		Minimum yield strength R_{eH} [a] MPa[b] Nominal thickness mm									Tensile strength R_m [a] MPa[b] Nominal thickness mm				
According EN 10027-1 and CR 10260	According EN 10027-2	≤ 16	> 16 ≤ 40	> 40 ≤ 63	> 63 ≤ 80	> 80 ≤ 100	> 100 ≤ 150	> 150 ≤ 200	> 200 ≤ 250	> 250 ≤ 400[c]	< 3	≥ 3 ≤ 100	> 100 ≤ 150	> 150 ≤ 250	> 250 ≤ 400[c]
S235JR	1.0038	235	225	215	215	215	195	185	175	-	360 to 510	360 to 510	350 to 500	340 to 490	-
S235J0	1.0114	235	225	215	215	215	195	185	175	-	360 to 510	360 to 510	350 to 500	340 to 490	-
S235J2	1.0117	235	225	215	215	215	195	185	175	165	360 to 510	360 to 510	350 to 500	340 to 490	330 to 480
S275JR	1.0044	275	265	255	245	235	225	215	205	-	430 to 580	410 to 560	400 to 540	380 to 540	-
S275J0	1.0143	275	265	255	245	235	225	215	205	-	430 to 580	410 to 560	400 to 540	380 to 540	-
S275J2	1.0145	275	265	255	245	235	225	215	205	195	430 to 580	410 to 560	400 to 540	380 to 540	380 to 540
S355JR	1.0045	355	345	335	325	315	295	285	275	-	510 to 680	470 to 630	450 to 600	450 to 600	-
S355J0	1.0553	355	345	335	325	315	295	285	275	-	510 to 680	470 to 630	450 to 600	450 to 600	-
S355J2	1.0577	355	345	335	325	315	295	285	275	265	510 to 680	470 to 630	450 to 600	450 to 600	450 to 600
S355K2	1.0596	355	345	335	325	315	295	285	275	265	510 to 680	470 to 630	450 to 600	450 to 600	450 to 600
S450J0[d]	1.0590	450	430	410	390	380	380	-	-	-	-	550 to 720	530 to 700	-	-

[a] For plate, strip and wide flats with widths ≥ 600 mm the direction transverse (t) to the rolling direction applies. For all other products the values apply for the direction parallel (l) to the rolling direction.

[b] 1 MPa = 1 N/mm^2.

[c] The values apply to flat products.

[d] Applicable for long products only.

(*To be continued*)

Table 7 - Mechanical properties at ambient temperature for flat and long products of steel grades and qualities with values for the impact strength
(*concluded*)

Designation		Position of test pieces [a]	Minimum percentage elongation after fracture [a] %										
			$L_0 = 80$ mm Nominal thickness mm					$L_0 = 5{,}65\sqrt{S_o}$ Nominal thickness mm					
According EN 10027-1 and CR 10260	According EN 10027-2		≤ 1	> 1 ≤ 1,5	> 1,5 ≤ 2	> 2 ≤ 2,5	> 2,5 < 3	≥ 3 ≤ 40	> 40 ≤ 63	> 63 ≤ 100	> 100 ≤ 150	> 150 ≤ 250	> 250[c] ≤ 400 only for J2 and K2
S235JR	1.0038	l	17	18	19	20	21	26	25	24	22	21	-
S235J0	1.0114												-
S235J2	1.0117	t	15	16	17	18	19	24	23	22	22	21	21 (l and t)
S275JR	1.0044	l	15	16	17	18	19	23	22	21	19	18	-
S275J0	1.0143												-
S275J2	1.0145	t	13	14	15	16	17	21	20	19	19	18	18 (l and t)
S355JR	1.0045	l	14	15	16	17	18	22	21	20	18	17	-
S355J0	1.0553												-
S355J2	1.0577												17 (l and t)
S355K2	1.0596	t	12	13	14	15	16	20	19	18	18	17	17 (l and t)
S450J0[d]	1.0590	l	-	-	-	-	-	17	17	17	17	-	-

[a] For plate, strip and wide flats with widths ≥ 600 mm the direction transverse (t) to the rolling direction applies. For all other products the values apply for the direction parallel (l) to the rolling direction.

[c] The values apply to flat products.

[d] Applicable for long products only.

Table 8 - Mechanical properties at ambient temperature for flat and long products of steel grades with no values for the impact strength

Designation		Minimum yield strength R_{eH} [a] MPa[b] Nominal thickness mm								Tensile strength R_m [a] MPa[b] Nominal thickness mm			
According EN 10027-1 and CR 10260	According EN 10027-2	≤ 16	> 16 ≤ 40	> 40 ≤ 63	> 63 ≤ 80	> 80 ≤ 100	> 100 ≤ 150	> 150 ≤ 200	> 200 ≤ 250	< 3	≥ 3 ≤ 100	> 100 ≤ 150	> 150 ≤ 250
S185	1.0035	185	175	175	175	175	165	155	145	310 to 540	290 to 510	280 to 500	270 to 490
E295[c]	1.0050[c]	295	285	275	265	255	245	235	225	490 to 660	470 to 610	450 to 610	440 to 610
E335[c]	1.0060[c]	335	325	315	305	295	275	265	255	590 to 770	570 to 710	550 to 710	540 to 710
E360[c]	1.0070[c]	360	355	345	335	325	305	295	285	690 to 900	670 to 830	650 to 830	640 to 830

[a] For plate, strip and wide flats with widths ≥ 600 mm the direction transverse (t) to the rolling direction applies. For all other products the values apply for the direction parallel (l) to the rolling direction.

[b] 1 MPa = 1 N/mm^2.

[c] These steels are normally not used for channels, angles and sections.

(*To be continued*)

Table 8 - Mechanical properties at ambient temperature for flat and long products of steel grades with no values for the impact strength (*concluded*)

Designation		Position of test pieces [a]	Minimum percentage elongation after fracture [a] %									
			$L_0 = 80$ mm Nominal thickness mm					$L_0 = 5{,}65\sqrt{S_o}$ Nominal thickness mm				
According EN 10027-1 and CR 10260	According EN 10027-2		≤ 1	> 1 ≤ 1,5	> 1,5 ≤ 2	> 2 ≤ 2,5	> 2,5 < 3	≥ 3 ≤ 40	> 40 ≤ 63	> 63 ≤ 100	> 100 ≤ 150	> 150 ≤ 250
S185	1.0035	l	10	11	12	13	14	18	17	16	15	15
		t	8	9	10	11	12	16	15	14	13	13
E295[c]	1.0050[c]	l	12	13	14	15	16	20	19	18	16	15
		t	10	11	12	13	14	18	17	16	15	14
E335[c]	1.0060[c]	l	8	9	10	11	12	16	15	14	12	11
		t	6	7	8	9	10	14	13	12	11	10
E360[c]	1.0070[c]	l	4	5	6	7	8	11	10	9	8	7
		t	3	4	5	6	7	10	9	8	7	6

[a] For plate, strip and wide flats with widths ≥ 600 mm the direction transverse (t) to the rolling direction applies. For all other products the values apply for the direction parallel (l) to the rolling direction.

[c] These steels are normally not used for channels, angles and sections.

Table 9 - Mechanical properties - impact strength KV longitudinal for flat and long products [a]

Designation		Tempe-rature	Minimum energy (J) Nominal thickness in mm		
According EN 10027-1 and CR 10260	According EN 10027-2	°C	≤ 150 [a] [b]	> 150 ≤ 250 [b]	> 250 ≤ 400 [c]
S235JR	1.0038	20	27	27	-
S235J0	1.0114	0	27	27	-
S235J2	1.0117	- 20	27	27	27
S275JR	1.0044	20	27	27	-
S275J0	1.0143	0	27	27	-
S275J2	1.0145	- 20	27	27	27
S355JR	1.0045	20	27	27	-
S355J0	1.0553	0	27	27	-
S355J2	1.0577	- 20	27	27	27
S355K2	1.0596	- 20	40[d]	33	33
S450J0[e]	1.0590	0	27	-	-

[a] For nominal thicknesses ≤ 12 mm see 7.3.2.1 of EN 10025-1:2004.

[b] For sections with a nominal thickness > 100 mm the values shall be agreed.

See option 28.

[c] The values apply to flat products.

[d] This value corresponds with 27J at - 30 °C (see Eurocode 3).

[e] Applicable for long products only.

Table 10 - Technological properties for flat and long products of steel grades and qualities with values for the impact strength

Designation		Suitability for		
According EN 10027-1 and CR 10260	According EN 10027-2	Cold flanging	Cold roll forming	Cold drawing
S235JRC	1.0122	x	x	x
S235J0C	1.0115	x	x	x
S235J2C	1.0119	x	x	x
S275JRC	1.0128	x	x	x
S275J0C	1.0140	x	x	x
S275J2C	1.0142	x	x	x
S355JRC	1.0551	-	-	x
S355J0C	1.0554	x	x	x
S355J2C	1.0579	x	x	x
S355K2C	1.0594	x	x	x

Table 11 - Technological properties for flat and long products of steel grades with no values for the impact strength

Designation		Suitability for cold drawing
According EN 10027-1 and CR 10260	According EN 10027-2	
E295GC	1.0533	x
E335GC	1.0543	x
E360GC	1.0633	x

Table 12 - Minimum recommended value of the bend radius for cold flanging of flat products

Designation		Bending direction [a]	Minimum recommended inside bend radius [b] for nominal thicknesses in mm															
According EN 10027-1 and CR 10260	According EN 10027-2		> 1 ≤ 1,5	> 1,5 ≤ 2,5	> 2,5 ≤ 3	> 3 ≤ 4	> 4 ≤ 5	> 5 ≤ 6	> 6 ≤ 7	> 7 ≤ 8	> 8 ≤ 10	> 10 ≤ 12	> 12 ≤ 14	> 14 ≤ 16	> 16 ≤ 18	> 18 ≤ 20	> 20 ≤ 25	> 25 ≤ 30
S235JRC	1.0122	t	1,6	2,5	3	5	6	8	10	12	16	20	25	28	36	40	50	60
S235J0C	1.0115																	
S235J2C	1.0119	l	1,6	2,5	3	6	8	10	12	16	20	25	28	32	40	45	55	70
S275JRC	1.0128	t	2	3	4	5	8	10	12	16	20	25	28	32	40	45	55	70
S275J0C	1.0140																	
S275J2C	1.0142	l	2	3	4	6	10	12	16	20	25	32	36	40	45	50	60	75
S355J0C	1.0554	t	2,5	4	5	6	8	10	12	16	20	25	32	36	45	50	65	80
S355J2C	1.0579																	
S355K2C	1.0594	l	2,5	4	5	8	10	12	16	20	25	32	36	40	50	63	75	90

[a] t: transverse to the rolling direction.
l: parallel to the rolling direction.

[b] The values are applicable for bend angles ≤ 90°.

Table 13 - Cold roll forming of flat products

Designation		Minimum recommended inside bend radii [a] for nominal thicknesses (t) in mm		
According EN 10027-1 and CR 10260	According EN 10027-2	$t \leq 4$	$4 < t \leq 6$	$6 < t \leq 8$
S235JRC S235J0C S235J2C	1.0122 1.0115 1.0119	1 t	1 t	1,5 t
S275JRC S275J0C S275J2C	1.0128 1.0140 1.0142	1 t	1 t	1,5 t
S355J0C S355J2C S355K2C	1.0554 1.0579 1.0594	1 t	1,5 t	1,5 t

[a] The values are applicable for bend angles ≤ 90°.

Annex A
(informative)
List of corresponding former designations

Table A.1 - List of corresponding former designations

Designation according EN 10025-2:2004		Equivalent former designations in													
		According EN 10025:1990 +A1:1993		According EN 10025:1990	Germany according to DIN 17 100	France according to NF A 35-501	United Kingdom according to BS 4360	Spain according to UNE 36-080	Italy according to UNI 7070	Belgium according to NBN A 21-101	Sweden according to SS 14 followed by number steel grade	Portugal according to NP 1729	Austria according to M 3116	Norway according to number steel grade
S185	1.0035	S185	1.0035	Fe 310-0	St 33	A 33		A 310-0	Fe 320	A 320	13 00-00	Fe 310-0	St 320	
		S235JR	1.0037	Fe 360 B	St 37-2	E 24-2			Fe 360 B	AE 235-B	13 11-00	Fe 360-B		NS 12 120
		S235JRG1	1.0036	Fe 360 BFU	USt 37-2			AE 235 B-FU					USt 360 B	NS 12 122
S235JR	1.0038	S235JRG2	1.0038	Fe 360 BFN	RSt 37-2		40 B	AE 235 B-FN			13 12-00		RSt 360 B	NS 12 123
S235J0	1.0114	S235J0	1.0114	Fe 360 C	St 37-3 U	E 24-3	40 C	AE 235 C	Fe 360 C	AE 235-C		Fe 360-C	St 360 C St 360 CE	NS 12 124
[a]	[a]	S235J2G3	1.0116	Fe 360 D1	St 37-3 N	E 24-4	40 D	AE 235 D	Fe 360 D	AE 235-D		Fe 360-D	St 360 D	NS 12 124
S235J2	1.0117	S235J2G4	1.0117	Fe 360 D2	--									
S275JR	1.0044	S275JR	1.0044	Fe 430 B	St 44-2	E 28-2	43 B	AE 275 B	Fe 430 B	AE 255-B	14 12-00	Fe 430-B	St 430 B	NS 12 142
S275J0	1.0143	S275J0	1.0143	Fe 430 C	St 44-3 U	E 28-3	43 C	AE 275 C	Fe 430 C	AE 255-C		Fe 430-C	St 430 C St 430 CE	NS 12 143
[a]	[a]	S275J2G3	1.0144	Fe 430 D1	St 44-3 N	E 28-4	43 D	AE 275 D	Fe 430 D	AE 255-D	14 14-00	Fe 430-D	St 430 D	NS 12 143
S275J2	1.0145	S275J2G4	1.0145	Fe 430 D2	--						14 14-01			
S355JR	1.0045	S355JR	1.0045	Fe 510 B	--	E 36-2	50 B	AE 355 B	Fe 510 B	AE 355-B		Fe 510-B		
S355J0	1.0553	S355J0	1.0553	Fe 510 C	St 52-3 U	E 36-3	50 C	AE 355 C	Fe 510 C	AE 355-C		Fe 510-C	St 510 C	NS 12 153
[a]	[a]	S355J2G3	1.0570	Fe 510 D1	St 52-3 N		50 D	AE 355 D	Fe 510 D	AE 355-D		Fe 510-D	St 510 D	NS 12 153
S355J2	1.0577	S355J2G4	1.0577	Fe 510 D2	--									
[a]	[a]	S355K2G3	1.0595	Fe 510 DD1	--	E 36-4	50 DD			AE 355-DD		Fe 510-DD		
S355K2	1.0596	S355K2G4	1.0596	Fe 510 DD2	--									
S450J0	1.0590						55C							
E295	1.0050	E295	1.0050	Fe 490-2	St 50-2	A 50-2		A 490	Fe 490	A 490-2	15 50-00 15 50-01	Fe 490-2	St 490	
E335	1.0060	E335	1.0060	Fe 590-2	St 60-2	A 60-2		A 590	Fe 590	A 590-2	16 50 00 16 50-01	Fe 590-2	St 590	
E360	1.0070	E360	1.0070	Fe 690-2	St 70-2	A 70-2		A 690	Fe 690	A 690-2	16 55 00 16 55-01	Fe 690-2	St 690	

[a] When a product is delivered in the N condition +N shall be added to the designation (see 4.2.2).

Annex B
(informative)

List of national standards which correspond with EURONORMS referenced

Until the following EURONORMS are transformed into European Standards, they may be either implemented or reference made to the corresponding national standards as listed in Table B.1.

NOTE Standards listed in Table B.1 are not supposed to be strictly similar although they deal with the same subjects.

Table B.1 — EURONORMS with corresponding national standards

EURONORM	Corresponding national standard in									
	Germany	France	United Kingdom	Spain	Italy	Belgium	Portugal	Sweden	Austria	Norway
19 [a]	DIN 1025 T5	NF A 45 205	BS 4	UNE 36-526	UNI 5398	NBN 533	NP-2116	SS 21 27 40	M 3262	-
53[a]	DIN 1025 T2 DIN 1025 T3 DIN 1025 T4	NF A 45 201	BS 4	UNE 36-527 UNE 36-528 UNE 36-529	UNI 5397	NBN 633	NP-2117	SS 21 27 50 SS 21 27 51 SS 21 27 52	-	NS 1907 NS 1908
54[a]	DIN 1026-1	NF A 45 007	BS 4	UNE 36-525	UNI-EU 54	NBN A 24-204	NP-338	-	M 3260	-
ECSC IC 2	SEW 088	NF A 36 000	BS 5135	-	-	-	-	SS 06 40 25	-	-

[a] This EURONORM is formally withdrawn, but there are no corresponding EN's.

Bibliography

[1] EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles - Specifications and test methods (ISO 1461:1999).*

[2] EN ISO 14713, *Protection against corrosion of iron and steel structures – Zinc and aluminium coatings – Guidelines (ISO 14713:1999).*

[3] ECSC IC 2 (1983)[2)], *Weldable fine-grained structural steels - Recommendations for processing, in particular for welding.*

[2)] Until ECSC IC 2 is transformed into a CEN Technical Report, it can either be implemented or reference made to the corresponding national standards, the list of which is given in Annex B to this document.

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