

		<b>CORPORATE PURCHASING SPECIFICATIONS</b>		AA56101
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<b>ANTI-CORROSIVE PRIMING PAINT</b>				
<b>1.0 GENERAL:</b>				
<p>This specification governs the quality requirements of air drying Anti Corrosive ready mixed Red oxide Zinc phosphate priming paint which shall be capable of being brushed, sprayed by conventional methods. The priming paint shall be suitable to be thinned with MTO/white spirit conforming to BHEL specification AA56701.</p> <p>The paint shall be compatible with high quality full glossy outdoor finishing paint to BHEL specification AA56126 (IS: 2832 Part 1), when surfaces primed with this paint are coated with 2 coats of finishing paint.</p>				
<b>2.0 APPLICATION:</b>				
<p>The material shall be intended for use as a primer coat in the painting system for protection of steel surfaces against corrosion for outdoor and indoor application on Electrical equipment. Normally, for best performance the surface to be coated shall be ensured free from oil, loose rust/dust etc., followed by blast cleaning to Sa 2 1/2.</p> <p>This shall be followed by application of two coats of the priming so as to achieve dft of 30 microns, min.</p>				
<b>3.0 COMPLIANCE WITH NATIONAL STANDARDS:</b>				
<p>The material shall comply with the requirements of the following national standard and also meet the requirements of this specification.</p> <p>IS:12744 (Part: 1): 2013: Ready Mixed Paint, Air Drying, Red Oxide-Zinc Phosphate Priming-Specification.</p>				
<b>4.0 COLOUR:</b> The colour of the material shall be that of red oxide.				
<b>5.0 FINISH:</b> Smooth and Matt to Egg shell flat				
<b>6.0 FREEDOM FROM DEFECTS:</b>				
<p>The priming paint shall remain free from defects like hard settling of pigments, thick and hard skinning etc., when kept in closed container and riving (excessive viscosity build up) during its rated shelf life.</p> <p>The dried surface of the coating shall be smooth, uniform, homogenous appearance and shall be free from physical defects like, pinholes, wrinkles, hard particles, blisters, air bubbles etc.</p>				
<b>7.0 CHEMICAL COMPOSITION:</b>				
<p>The paint shall be formulated with anti-corrosive pigments like Red oxide of iron, Zinc phosphate, extenders etc., dispersed in unsaponifiable modified alkyd medium in solvent,</p>				
Revisions: Clause 1, 9.7, 11 and Annexure 1		<b>APPROVED:</b> INTER PLANT MATERIAL RATIONALISATION COMMITTEE – MRC(CPO+NM)		
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thinner and drier in suitable proportions so as to satisfy the requirements prescribed in this specification. The raw materials used in the formulation of the priming paint shall be of good quality and conform to following Indian standards.				
a) Zinc Phosphate		: IS: 10897		
b) Red Oxide of Iron		: IS: 44		
c) Oil or turpentine				
d) Petroleum hydrocarbon solvent		: IS: 1745		
e) Liquid drier		: IS: 8766		
The supplier of the material has to certify that the paint supplied shall be free from lead or its compounds and also meets the legislative requirements of ISO 14001.				
8.0 TEST SAMPLES AND TEST METHODS				
Tender samples will not be required when once the type approval is given and the supplier concerned declared that the material for which the tender is given of the same quality as the type approved sample.				
500ml of thoroughly mixed sample representing lot be drawn from randomly selected drum and shall be sent to laboratory for testing. The testing shall be done in accordance with relevant part and section of IS: 101 or as specified in this specification.				
9.0 PROPERTIES:				
9.1. Drying Time				
Surface dry		: 2 hours, maximum		
Hard dry		: 18 hours, maximum		
9.2. Consistency				
Smooth and uniform and suitable for brushing without appreciable drag on the brush or spraying as required.				
Efflux time by Ford cup No. 4, at 27 ± 20°C: 80 - 120 secs.				
9.3. Mass per Ten Litres:				
13.5 kgs. ± 3 %				
9.4. Flash Point:				
30°C, min				
9.5. Scratch Hardness:				
When tested on coated panels air dried for 48 hrs and tested at a load of 1500g on steel panels and 1000g on tinned mild steel panels, no such scratch as to show the bare metal shall be produced.				
9.6. Flexibility and Adhesion:				
When tested on coated panels air dried for 48 hrs, no visible damage or detachment of coating shall take place and passes the test when tested by cylindrical bend test method.				

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<b>9.7. Resistance to Salt Spray:</b>				
When tested as per test method of IS 2074 Part 1, the test panel prepared from the followed by air drying for 48 hrs, material shall show no sign of corrosion after continuous exposure for 96 hrs, in salt spray cabinet.				
<b>9.8. Protection against Corrosion under Conditions of Condensations:</b>				
The coated panels air dried for 48 hrs, are subjected to continuous exposure, shall show no sign of deterioration of the coating & metal surface show no sign of corrosion.				
<b>9.9. COMPOSITION:</b>				
<b>9.9.1. Pigment Content:</b> 50 ± 5% by mass				
<b>9.9.2. Zinc Phosphate (IS 10897):</b> 16.0%, min. by mass on pigment				
<b>9.9.3. Red Oxide AS Fe<sub>2</sub>O<sub>3</sub> (IS 44):</b> 50.0% min. by mass on pigment				
<b>10.0 VOLUME SOLIDS:</b> 40.0% min. (Pigment + Binder) by weight.				
<b>11.0 COMPATIBILITY TEST WITH COATS:</b>				
The primer paint shall be fully compatible with top coats like, High quality full glossy finishing paint conforming to AA56126 /IS 2932 Part 1, when tested as per method prescribed in Annexure-1.				
<b>12.0 WET OPACITY (FOR INFORMATION ONLY):</b>				
Theoretical coverage: 10 sq.m / litre @ dft: 35 microns.				
<b>13.0 TEST CERTIFICATES:</b>				
Unless otherwise stated, three copies of test certificates shall be supplied along with each consignment.				
In addition, the supplier shall ensure to enclose one copy of the test certificates along with their despatch documents to facilitate quick clearance of the material.				
The test certificates shall bear the following information:				
AA56101 Rev. No. 08 - ANTI-CORROSIVE PRIMING PAINT				
BHEL order:				
Supplier's Name and address				
Identification/Trade Mark, if any.				
Batch No/Lot No.:				
Date of Manufacture and Expiry.				
Lot Quantity:				
Test results of clause 7.0 to 12.0.				
Special Instructions, if any.				

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**14.0 KEEPING PROPERTY:**

When the material stored in a covered dry place in the original sealed container at under ambient conditions, the same shall retain the properties prescribed in this specification for a period of at least 12 months after the date of manufacture, which shall not be subsequent to the date of placing the order and not earlier than one month of the scheduled delivery date mentioned in BHEL order.

**15.0 ENVIRONMENTAL REQUIREMENTS:**

The supplier shall furnish Material Safety Data Sheet (MSDS) covering all information relating to human safety and environmental impacts of the hazardous materials particularly during their transportation, storage, handling and disposal along with each supply. Each container shall be marked with corresponding symbol and minimum worded cautionary notice for flammable / corrosive / toxic / harmful / irritant and oxidizing etc. as applicable.

**16.0 PACKING & MARKING:**

Unless otherwise stated, the paint shall be supplied in packing size as specified in BHEL order and shall be packed in air tight leak -proof metal container conforming to IS: 1407 and IS: 2552. Each container shall bear following information neatly written or pasted on the container.

AA56101 - ANTI-CORROSIVE PRIMING PAINT

BHEL order:

Name of supplier and address:

Identification/Trade Mark, if any.

Quantity of material:

Batch No/Lot No.:

Date of Manufacture and Expiry.


Special Instructions, if any:

**17.0 REFERRED STANDARDS (Latest Publications Including Amendments)**

1) IS: 44	2) IS : 101
3) IS : 1407	4) IS : 1745
5) IS : 2074	6) IS : 2552
7) IS: 2932 : Part 1	8) IS: 10897
9) IS : 12744	10) IS : 13262
11) ASTM D 3359	12) AA56126
13) AA56701	14) IS: 8766

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**ANNEXURE-I**

**TEST FOR COMPATIBILITY OF ANTIL-CORROSION PRIMING PAINT (AA 56101)  
WITH TOP COATS OF FINISHING PAINT (AA56126/IS 2932 : Part 1)**

The compatibility of anti- corrosive priming paint conforming to AA 56101 with top coat finishing paint to AA56126/IS 2932 : Part 1, shall be checked by Cross-cut tape adhesion method prescribed in ASTM D 3359. The adhesion tape used shall conform to IS 13262 or any other tape bearing ISI mark having sufficient adhesion strength.

A Steel plate of size 150x100mm is taken for testing compatibility. Thoroughly clean the plate with emery to make it free from rust, oil, dust etc. Apply two coats of homogenized anticorrosive priming paint after allowing coating to dry over night before, application of next coat.

Apply two coats of top coat finishing paint evenly covering plate completely. Allow the coatings, to dry for 48 hours at ambient conditions before performing the cross cut adhesion test.

Test method B shall be followed and the acceptance criteria shall be 4 B, i.e., small flakes of the coating material are detached at intersections and less than 5% of the area is affected

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	DIN EN 10025-6	<div>DIN</div>
ICS 77.140.10; 77.140.50	Supersedes DIN EN 10025-6:2005-02	
<p><b>Hot rolled products of structural steels – Part 6: Technical delivery conditions for flat products of high yield strength structural steels in the quenched and tempered condition (includes Amendment A1:2009) English version of DIN EN 10025-6:2009-08</b></p> <p>Warmgewalzte Erzeugnisse aus Baustählen – Teil 6: Technische Lieferbedingungen für Flacherzeugnisse aus Stählen mit höherer Streckgrenze im vergüteten Zustand (enthält Änderung A1:2009) Englische Fassung DIN EN 10025-6:2009-08</p>		
Document comprises 26 pages		

## National foreword

This standard has been prepared by Technical Committee ECISS/TC 10 “Structural steels — Grades and qualities”, (Secretariat: DIN, Germany).

The responsible German body involved in its preparation was the *Normenausschuss Eisen und Stahl* (Iron and Steel Standards Committee), Subcommittee NA 021-00-04-01 UA *Stähle für den Stahlbau*.

The amendments are largely based on the publication of CEN/TR 10347.

ECSC IC 2 referred to in Annex B was withdrawn in November 2005.

## Amendments

This standard differs from DIN EN 10025-6:2005-02 as follows:

- a) The foreword has been changed.
- b) Subclauses 7.4.2.1 and 7.4.2.2 have been revised.
- c) The reference to ECSC IC 2:1983 (withdrawn) has been deleted from the bibliography.
- d) CEN/TR 10347 has been included in the bibliography.

## Previous editions

EURONORM 137: 1983-03

DIN EN 10137-2: 1995-11

DIN EN 10025-6: 2005-02

## English Version

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

Produits laminés à chaud en aciers de construction —  
Partie 6: Conditions techniques de livraison pour  
produits plats en aciers à haute limite d'élasticité  
à l'état trempé et revenu

Warmgewalzte Erzeugnisse aus Baustählen —  
Teil 6: Technische Lieferbedingungen für  
Flacherzeugnisse aus Stählen mit  
höherer Streckgrenze im vergüteten Zustand

This European Standard was approved by CEN on 1 April 2004 and includes Amendment 1 approved by CEN on 17 April 2009.

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 CEN Management Centre 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 CEN Management Centre has the same status as the official versions.

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## Foreword

This document (EN 10025-6:2004+A1:2009) has been prepared by Technical Committee ECISS/TC 10 “Structural steels - Grades and qualities”, the secretariat of which is held by DIN.

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 November 2009, and conflicting national standards shall be withdrawn at the latest by November 2009.

This document includes Amendment 1, approved by CEN on 2009-04-17.

This document supersedes A1 EN 10025-6:2004 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

A1 *deleted text* A1

The titles of the other parts of this document are:

*Part 1: General technical delivery conditions;*

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

*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.*

This document has been prepared under Mandate M/120 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, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## 1 Scope

Part 6 of this document, in addition to part 1, specifies requirements for flat products of high yield strength alloy special steels. The grades and qualities are given in Tables 2 to 4 (chemical composition) and Tables 5 to 7 (mechanical properties) and are supplied in the quenched and tempered condition as given in 6.3.

The steels specified in this document are applicable to hot-rolled flat products with a minimum nominal thickness of 3 mm and a maximum nominal thickness  $\leq 150$  mm for grades S460, S500, S550, S620 and S690, a maximum nominal thickness  $\leq 100$  mm for grade S890 and a maximum nominal thickness  $\leq 50$  mm for grade S960, in steels which, after quenching and tempering, have a specified minimum yield strength of 460 MPa<sup>1)</sup> to 960 MPa<sup>1)</sup>.

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

A1 deleted text A1

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<sup>1)</sup> 1 MPa = 1 N/mm<sup>2</sup>.

## 2.2 Standards on dimensions and tolerances (see 7.7.1)

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

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

## 2.3 Standards on testing

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

## 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

#### **quenching**

operation which consists of cooling a ferrous product more rapidly than in still air

### 3.2

#### **tempering**

heat treatment applied to a ferrous product generally after quench hardening or other heat treatment to bring the properties to the required level

It consists of heating to specific temperatures ( $< A_{c1}$ ) and soaking one or more times followed by cooling at an appropriate rate.

## 4 Classification and designation

### 4.1 Classification

#### 4.1.1 Main quality classes

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

#### 4.1.2 Grades and qualities

This document specifies seven steel grades. They differ in their minimum yield strength at ambient temperature.

All the grades can be delivered in the following qualities as specified at the time of the enquiry and order:

- (no symbol) with specified minimum values of impact energy at temperatures not lower than -20 °C;
- L with specified minimum values of impact energy at temperatures not lower than -40 °C;
- L1 with specified minimum values of impact energy at temperatures not lower than -60 °C (with the exclusion of S960).

## 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 10137-2:1995 see Annex A, Table A.1.

**4.2.2** The designation shall consist of:

- the number of this document (EN 10025-6);
- the steel name or the steel number; the steel name consisting of:
  - the symbol S (for structural steel);
  - the indication of the minimum specified yield strength for thickness  $\leq 50$  mm expressed in MPa<sup>1</sup>);
  - the delivery condition Q;
- the capital letter L or L1 for the quality with specified minimum values of impact energy at temperatures not lower than  $-40$  °C or  $-60$  °C.

EXAMPLE Structural steel (S) with a specified minimum yield strength at ambient temperature of 460 MPa<sup>1</sup>), in the quenched and tempered delivery condition (Q) and of quality L:

Steel EN 10025-6 – S460QL

or

Steel EN 10025-6 - 1.8906

## 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:

- g) the type of inspection document (see 8.2).

### 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.

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<sup>1</sup>) 1 MPa = 1 N/mm<sup>2</sup>.

## 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.

See option 1.

### 6.2 Deoxidation or grain size

The steels specified in this document shall be fully killed. The steels shall have a fine grain structure containing nitrogen binding elements in amounts sufficient to bind the nitrogen.

### 6.3 Delivery conditions

The products shall be supplied in the quenched and tempered condition (Q) as defined in Clause 3.

NOTE Direct quenching after hot-rolling followed by tempering is considered equivalent to conventional quenching and tempering.

## 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 Table 2. On special request of the purchaser the manufacturer shall inform the purchaser at the time of the enquiry and order which of the alloying elements appropriate to the steel grade required will be deliberately added to the material to be delivered.

See option 29.

**7.2.2** The limits applicable for the product analysis are given in Table 3. The manufacturer shall inform the purchaser at the time of the enquiry and order which of the alloying elements appropriate to the steel grade required will be deliberately added to the material to be delivered. 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 based on the ladle analysis, given in Table 4 shall apply. For the carbon equivalent value formula see 7.2.3 of EN 10025-1:2004.

**7.2.4** When products 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 4 shall be increased as follows:

- for  $Si \leq 0,030 \%$ , increase CEV by 0,02 %;
- for  $Si \leq 0,25 \%$ , 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 5, 6 and 7.

**7.3.1.2** For the products specified in this document the nominal thickness applies.

### 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.

Furthermore the verification of the impact energy value shall be carried out, unless otherwise agreed (see 7.3.2.2 and 7.3.2.3) with longitudinal test pieces for:

- Q at -20 °C;
- QL at -40 °C;
- QL1 at -60 °C.

**7.3.2.2** Another temperature (given in Tables 6 and 7) may be agreed at the time of the order.

See option 3.

**7.3.2.3** If agreed at the time of the enquiry and order transverse impact energy values as given in Table 7 shall apply instead of longitudinal values.

See option 30.

### 7.3.3 Improved deformation properties perpendicular to the surface

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

See option 4.

## 7.4 Technological properties

### 7.4.1 Weldability

The steels specified in this document do not have unlimited suitability for the various welding processes, since the behaviour of a steel during and after welding depends not only on the material but also on the dimensions and shape and on the manufacturing and service conditions of the components.

General requirements for arc welding of the steels specified in this document shall be as 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.



## 7.4.2 Formability

### 7.4.2.1 General

**NOTE** Recommendations regarding hot forming, cold forming and flame-straightening are laid down in CEN/TR 10347. **A1**

### 7.4.2.2 Hot forming

**NOTE** Hot forming is not recommended for quenched and tempered steels as the necessary heat treatment after hot forming is very difficult to reproduce. **A1**

### 7.4.2.3 Cold formability

#### 7.4.2.3.1 General

**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.

#### 7.4.2.3.2 Flangeability

If specified at the time of the order plates and wide flats ordered and supplied in the quenched and tempered condition with a nominal thickness  $\leq 16$  mm are suitable for flanging without cracking with the indicative values for the inside minimum bend radii for cold forming as given in Annex C.

See option 11a.

## 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	$\leq 0,030$	$\leq 0,090$	-
Class 2 <sup>a</sup>	$\leq 0,35$	-	-
Class 3	$0,14 \leq \text{Si} \leq 0,25$	-	$\leq 0,035$
<sup>a</sup> Class 2 applies only for special zinc alloys.			

For class 1 the maximum carbon equivalent value of Table 4 shall be increased by 0,02. For class 3 the maximum carbon equivalent value of Table 4 shall be increased by 0,01 (see 7.2.4).

See option 5.

**NOTE 1** 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.

**NOTE 2** Products quenched in water may be susceptible to stress corrosion cracking after hot-dip zinc-coating.

## 7.5 Surface properties

EN 10163 parts 1 and 2 shall apply for the permissible surface discontinuities for plates and wide flats and for the repair of surface defects by grinding. Class A, subclass 1 of EN 10163-2 shall apply, class B regarding grinding or subclasses 2 or 3 regarding repair by welding can be agreed at the time of the order.

See option 15.

## 7.6 Internal soundness

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

See option 6 (for flat products).

## 7.7 Tolerances on dimensions and shape, mass

**7.7.1** 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 with specific inspection and testing to indicate compliance with the order and this document.

### 8.2 Type of inspection and inspection document

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

See option 9.

### 8.3 Frequency of testing

#### 8.3.1 Sampling

The verification of the mechanical properties shall be carried out by cast.

#### 8.3.2 Test units

**8.3.2.1** Unless otherwise specified (see 8.3.2.2) for verifying the mechanical properties the following test unit shall apply:

- 40 tonnes or part thereof.

The test unit shall contain products of the same form and grade and of the same thickness range for the yield strength requirement as given in Table 5. The nominal thickness of a product within the test unit shall not deviate more than 5 mm from that of the sample product.

**8.3.2.2** If specified at the time of the order the impact properties only or the impact properties and the tensile properties shall be verified on each heat treatment unit.

See option 13a.

See option 14a.

### **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 the impact test.

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

- a) for all products the impact test at another temperature or on transverse test pieces (see 7.3.2.2 and 7.3.2.3);

See option 3.

See option 30.

- b) the product analysis (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 any product of the test unit.

### 9.2.3 Preparation of test pieces

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

In addition to EN 10025-1 the following applies:

For the tensile test pieces either the full product thickness or half the product thickness can be used, but one product surface shall be retained. A round test piece with its axis at a quarter of the product thickness may also be used for product thicknesses over 30 mm. In cases of disputes the total thickness of the plate shall be subdivided in equal thick flat test pieces. The average of the individual results of the mechanical tests shall be valid.

### 9.2.4 Impact test pieces

In addition to EN 10025-1 the following requirement applies:

- impact test pieces shall be taken from  $\frac{1}{4}t$  position for plates with nominal thickness  $\geq 40$  mm.

## 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.

In addition to EN 10025-1 the following NOTE applies:

NOTE In the scope of EN ISO 2566-1 quenched and tempered steels are excluded. In practice the figures of EN ISO 2566-1 can be used.

### 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 be in accordance with EN 10025-1.

See option 10.

In addition to EN 10025-1 if specified at the time of the enquiry and order there shall be either no die stamping or only die stamping in positions indicated by the purchaser.

See option 31.

## 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 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) At which temperature the impact properties shall be verified (see 7.3.2.2 and 8.4.2).
- 4) Products 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  $\geq 6$  mm the freedom from internal defects shall be verified in accordance with EN 10160 (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 10025-6:

- 11a) Plate and wide flats with a nominal thickness  $\leq 16$  mm shall be suitable for flanging without cracking (see 7.4.2.3.2).
- 13a) For each heat treatment unit the impact properties only shall be verified (see 8.3.2.2).
- 14a) For each heat treatment unit 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).
- 18) Other tolerances than class A of EN 10029 for hot rolled plates apply (see 7.7.1).

- 29) The manufacturer shall inform the purchaser at the time of the enquiry and order which of the alloying elements appropriate to the steel grade required will be deliberately added to the material to be delivered (see 7.2.1).
- 30) The impact properties shall be verified on transverse V-notch test pieces (see 7.3.2.3 and 8.4.2).
- 31) Die stamping is not allowed or the position for die stamping shall be as indicated by the purchaser (see Clause 11).

Table 2 — Chemical composition of the ladle analysis for quenched and tempered steels <sup>a</sup>

Grade	Quality	C % max.	Si % max.	Mn % max.	P % max.	S % max.	N % max.	B % max.	Cr % max.	Cu % max.	Mo % max.	Nb % max. <sub>b</sub>	Ni % max.	Ti % max. <sub>b</sub>	V % max. <sub>b</sub>	Zr % max. <sub>b</sub>
All grades	(no symbol) L L1	0,20	0,80	1,70	0,025	0,015	0,015	0,005 0	1,50	0,50	0,70	0,06	2,0	0,05	0,12	0,15
					0,020	0,010										
					0,020	0,010										

<sup>a</sup> Depending on the thickness of the product and the manufacturing conditions, the manufacturer may add to the steel one or several alloying elements up to the maximum values given in order to obtain the specified properties (see 7.2.2).

<sup>b</sup> There shall be at least 0,015 % of a grain-refining element present. Aluminium is also one of these elements. The minimum content of 0,015 % applies to soluble aluminium, this value is regarded as attained if the total aluminium content is at least 0,018 %; in case of dispute the soluble aluminium content shall be determined.

Table 3 — Chemical composition of the product analysis based on Table 2 <sup>a</sup>

Grade	Quality	C % max.	Si % max.	Mn % max.	P % max.	S % max.	N % max.	B % max.	Cr % max.	Cu % max.	Mo % max.	Nb % max. <sub>b</sub>	Ni % max.	Ti % max. <sub>b</sub>	V % max. <sub>b</sub>	Zr % max. <sub>b</sub>
All grades	(no symbol) L L1	0,22	0,86	1,80	0,030	0,017	0,016	0,006 0	1,60	0,55	0,74	0,07	2,1	0,07	0,14	0,17
					0,025	0,012										
					0,025	0,012										

<sup>a</sup> Depending on the thickness of the product and the manufacturing conditions, the manufacturer may add to the steel one or several alloying elements up to the maximum values given in order to obtain the specified properties (see 7.2.2).

<sup>b</sup> There shall be at least 0,010 % of a grain-refining element present. Aluminium is also one of these elements. The minimum content of 0,010 % applies to soluble aluminium, this value is regarded as attained if the total aluminium content is at least 0,013 %; in case of dispute the soluble aluminium content shall be determined.

Table 4 — Maximum CEV based on the ladle analysis for quenched and tempered steel <sup>a</sup>

Designation		Maximum CEV in % for nominal product thickness in mm		
According EN 10027-1 [A1] deleted text [A1]	According EN 10027-2	≤ 50	> 50 ≤ 100	> 100 ≤ 150
S460Q S460QL S460QL1	1.8908 1.8906 1.8916	0,47	0,48	0,50
S500Q S500QL S500QL1	1.8924 1.8909 1.8984	0,47	0,70	0,70
S550Q S550QL S550QL1	1.8904 1.8926 1.8986	0,65	0,77	0,83
S620Q S620QL S620QL1	1.8914 1.8927 1.8987	0,65	0,77	0,83
S690Q S690QL S690QL1	1.8931 1.8928 1.8988	0,65	0,77	0,83
S890Q S890QL S890QL1	1.8940 1.8983 1.8925	0,72	0,82	-
S960Q  S960QL	1.8941  1.8933	0,82	-	-
<sup>a</sup> For the optional increase of elements which influence the CEV see 7.4.3.				



Table 5 — Mechanical properties at ambient temperature for quenched and tempered steel

Designation		Minimum yield strength $R_{eH}$ MPa <sup>a</sup> Nominal thickness  mm			Tensile strength $R_m$ MPa <sup>a</sup> Nominal thickness  mm			Minimum percentage elongation after fracture %  $L_o = 5,65 \sqrt{S_o}$
According EN 10027-1 [A <sub>1</sub> ] <i>deleted</i> text [A <sub>1</sub> ]	According EN 10027-2	≥ 3 ≤ 50	> 50 ≤ 100	> 100 ≤ 150	≥ 3 ≤ 50	> 50 ≤ 100	> 100 ≤ 150	
S460Q S460QL S460QL1	1.8908 1.8906 1.8916	460	440	400	550 to 720		500 to 670	17
S500Q S500QL S500QL1	1.8924 1.8909 1.8984	500	480	440	590 to 770		540 to 720	17
S550Q S550QL S550QL1	1.8904 1.8926 1.8986	550	530	490	640 to 820		590 to 770	16
S620Q S620QL S620QL1	1.8914 1.8927 1.8987	620	580	560	700 to 890		650 to 830	15
S690Q S690QL S690QL1	1.8931 1.8928 1.8988	690	650	630	770 to 940	760 to 930	710 to 900	14
S890Q S890QL S890QL1	1.8940 1.8983 1.8925	890	830	-	940 to 1 100	880 to 1 100	-	11
S960Q S960QL	1.8941 1.8933	960	--	-	980 to 1 150	-	-	10
<sup>a</sup> 1 MPa = 1 N/mm <sup>2</sup>								

Table 6 — Minimum values of impact energy for impact tests on longitudinal V-notch test pieces for quenched and tempered steel

Designation		Minimum values of impact energy in J at test temperatures, in °C			
According EN 10027-1 <div><div>A1</div> deleted text <div>A1</div></div>	According EN 10027-2	0	- 20	- 40	- 60
S460Q S500Q S550Q S620Q S690Q S890Q S960Q	1.8908 1.8924 1.8904 1.8914 1.8931 1.8940 1.8941	40	30	-	-
S460QL S500QL S550QL S620QL S690QL S890QL S960QL	1.8906 1.8909 1.8926 1.8927 1.8928 1.8983 1.8933	50	40	30	-
S460QL1 S500QL1 S550QL1 S620QL1 S690QL1 S890QL1	1.8916 1.8984 1.8986 1.8987 1.8988 1.8925	60	50	40	30

**Table 7 — Minimum values of impact energy for impact tests on transverse V-notch test pieces for quenched and tempered steel, when the impact test on transverse test pieces is agreed at the time of the order**

See option 30

Designation		Minimum values of impact energy in J at test temperatures, in °C			
According EN 10027-1 [A1] deleted text [A1]	According EN 10027-2	0	- 20	- 40	- 60
S460Q S500Q S550Q S620Q S690Q S890Q S960Q	1.8908 1.8924 1.8904 1.8914 1.8931 1.8940 1.8941	30	27	-	-
S460QL S500QL S550QL S620QL S690QL S890QL S960QL	1.8906 1.8909 1.8926 1.8927 1.8928 1.8983 1.8933	35	30	27	-
S460QL1 S500QL1 S550QL1 S620QL1 S690QL1 S890QL1	1.8916 1.8984 1.8986 1.8987 1.8988 1.8925	40	35	30	27

Annex A  
(informative)

List of corresponding former designations

Table A.1 — List of corresponding former designations

Designation according EN 10025-6		Equivalent former designations in					
		According EN 10137-2:1995		EU 137 (1983)	Germany	France	Sweden
S460Q	1.8908	S460Q	1.8908	FeE 460 V	-		
S460QL	1.8906	S460QL	1.8906	FeE 460 V KT	TStE 460 V	E460T	
S460QL1	1.8916	S460QL1	1.8916		-		
S500Q	1.8924	S500Q	1.8924	FeE 500 V	StE 500 V		2614
S500QL	1.8909	S500QL	1.8909	FeE 500 V KT	TStE 500 V	E 500T	2615
S500QL1	1.8984	S500QL1	1.8984		ESStE 500 V		
S550Q	1.8904	S550Q	1.8904	FeE 550 V	StE 550 V		
S550QL	1.8926	S550QL	1.8926	FeE 550 V KT	TStE 550 V	E 550T	
S550QL1	1.8986	S550QL1	1.8986		ESStE 550 V		
S620Q	1.8914	S620Q	1.8914	FeE 620 V	StE 620 V		
S620QL	1.8927	S620QL	1.8927	FeE 620 V KT	TStE 620 V	E 620T	
S620QL1	1.8987	S620QL1	1.8987		ESStE 620 V		
S690Q	1.8931	S690Q	1.8931		StE 690 V		2624
S690QL	1.8928	S690QL	1.8928	FeE 690 V KT	TStE 690 V	E 690T	2625
S690QL1	1.8988	S690QL1	1.8988		ESStE 690 V		
S890Q	1.8940	S890Q	1.8940		-		
S890QL	1.8983	S890QL	1.8983		TStE 890 V	-	
S890QL1	1.8925	S890QL1	1.8925		ESStE 890 V		
S960Q	1.8941	S960Q	1.8941		-		
S960QL	1.8933	S960QL	1.8933		TStE 960 V	E 960T	

**Annex B**  
(informative)

**List of national standards which correspond with ECSC IC 2 referenced**

Until the following ECSC IC 2 is transformed into a CEN Technical Report, it may be either implemented or reference made to the corresponding national standards as listed in Table B.1.

**Table B.1 — ECSC IC 2 with corresponding national standards**

EURONORM	Corresponding national standard in			
	Germany	France	United Kingdom	Sweden
ECSC IC 2	SEW 088	NF A 36 000	BS 5135	SS 06 40 25

Annex C


(informative)

Minimum recommended inside bend radii for flanging

Table C.1 — Minimum recommended inside bend radii for flanging

Designation		Minimum recommended inside bend radii for nominal thicknesses (t) 3 ≤ t ≤ 16 mm <sup>a</sup>	
According EN 10027-1 A1 deleted text A1	According EN 10027-2	Axis of bend in transverse direction	Axis of bend in longitudinal direction
S460Q	1.8908	3,0t	4,0t
S460QL	1.8906	3,0t	4,0t
S460QL1	1.8916	3,0t	4,0t
S500Q	1.8924	3,0t	4,0t
S500QL	1.8909	3,0t	4,0t
S500QL1	1.8984	3,0t	4,0t
S550Q	1.8904	3,0t	4,0t
S550QL	1.8926	3,0t	4,0t
S550QL1	1.8986	3,0t	4,0t
S620Q	1.8914	3,0t	4,0t
S620QL	1.8927	3,0t	4,0t
S620QL1	1.8987	3,0t	4,0t
S690Q	1.8931	3,0t	4,0t
S690QL	1.8928	3,0t	4,0t
S690QL1	1.8988	3,0t	4,0t
S890Q	1.8940	3,0t	4,0t
S890QL	1.8983	3,0t	4,0t
S890QL1	1.8925	3,0t	4,0t
S960Q	1.8941	4,0t	5,0t
S960QL	1.8933	4,0t	5,0t
<sup>a</sup> The values are applicable for bend angles ≤ 90°.			

## 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 2566-1, *Steel — Conversion of elongation values — Part 1: Carbon and low alloy steels (ISO 2566-1:1984).*
- [3] EN ISO 14713, *Protection against corrosion of iron and steel structures — Zinc and aluminium coatings — Guidelines (ISO 14713:1999).*
- [4]  CEN/TR 10347, *Guidance for forming of structural steels in processing* 