



# SLOVENSKI STANDARD SIST HD 1039:2000

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## Jeklene cevi za nosilne in delovne odre - Zahteve, preskusi

Steel tubes for falsework and working scaffolds - Requirements, tests

Stahlrohre für Trag- und Arbeitsgerüste - Anforderungen, Prüfungen

Tubes en acier pour échafaudages d'étalement et de service - Conditions générales, essais

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### **ICS:**

77.140.75	Jeklene cevi in cevni profili za posebne namene	Steel pipes and tubes for specific use
91.220	Gradbena oprema	Construction equipment

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HARMONIZATION DOCUMENT

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English version

Steel tubes for falsework and working scaffolds -  
Requirements, tests

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

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## Brief History

This European Harmonization Document was drawn up by the Technical Committee CEN/TC 53 the Secretariat of which is held by DIN.

The text of the original European Standard EN 39 for 3,2 mm steel tube drawn up by a CEN/TC 53 working group was submitted to the CEN Members for ballot in August 1973 with a view to its adoption as a European Standard.

That European Standard was adopted by CEN on 15 December 1976 as a result of its adoption by the following CEN Member countries: Austria, Denmark, France, Germany, Italy, Netherlands, Portugal, Spain and Switzerland.

CEN/TC 53 decided in March 1984 to complete the European Standard EN 39 by further requirements in the European Draft Standard prEN 244 (submitted for ballot in September 1985) for steel tubes with 4,0 mm wall thickness for the construction of falsework and working scaffolds. However, prEN 244 failed the ballot.

CEN/TC 53 decided in Zurich in November 1986 to combine both tubes with 3,2 mm and with 4,0 mm wall thickness in one European Harmonization Document for the construction of falsework and working scaffolds.

If steel tubes with different wall thicknesses were introduced, some member countries could have difficulties and so clause 9 "Marking" was included.

Only 4,0 mm thick tube is included in the national practices of the UK and Ireland. Only 3,5 mm thick tube of a higher strength than specified in this Harmonization Document is included in the national practice of Sweden.

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In accordance with the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

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## 0 Introduction

This European Harmonization Document describes two tubes intended for use in falsework and working scaffolds. Other very similar tubes are available, and to ensure that both scaffolding tubes are able to be identified without doubt on the building site, there is a requirement for marking.

Scaffolds or falsework using these tubes should be erected in accordance with sound national practice; in some countries this could restrict the choice of tube.

Prefabricated steel scaffold components may be fabricated with these tubes, or others. The design of such scaffolds will relate to the steel sections actually used in them.

## 1 Object and field of application

This European Harmonization Document specifies requirements for two types of steel tube intended for use in falsework and in access and working scaffolds constructed with separate tubes and couplers. They have an outside diameter of 48,3 mm, and wall thicknesses of 3,2 mm and 4,0 mm. It also specifies tests on protective coatings and gives values for the design of structures.

## 2 References

- ISO 1460-1973 Metallic coatings - Hot dip galvanised coatings on ferrous materials - Determination of the mass per unit area - Gravimetric method
- ISO 2178-1982 Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method
- ISO 2409-1972 corrected:1981 Paints and varnishes - Cross-cut test
- ISO 4628/3-1982 Paints and varnishes - Evaluation of degradation of paint coatings - Designation of intensity, quantity and size of common types of defect - Part 3: Designation of degrees of rusting

- ISO 6892-1984 Metallic materials - Tensile testing

- ISO 7253-1984 Paints and varnishes - Determination of resistance to neutral salt spray

## 3 Terminology

The two types of tube, of different wall thickness, are referred to as 'type 3' and 'type 4' tubes and represent wall thicknesses of 3,2 mm and 4,0 mm respectively.

## 4 Steel

## 4.1 Chemical composition

Tubes shall be manufactured from steel whose chemical composition shall be in accordance with table 1.

Table 1. Determination of chemical composition of steel by ladle analysis

Elements	%
Carbon	≤ 0,20
Silicon	≤ 0,30
Phosphorus	≤ 0,05
Sulphur	≤ 0,05
Nitrogen	≤ 0,009

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For steel treated with aluminium, the nitrogen content may be increased to a maximum of 0,015 %.

For steel which is to be protected by hot-dip galvanizing, (see 6.1) the silicon content shall not exceed 0,05 %.

The use of rimming steel is not permitted.

#### 4.2 Mechanical properties

The mechanical properties of the tube shall be in accordance with table 2.

Table 2. Mechanical properties

Tensile strength $R_m$	$N/mm^2$	$\geq 340$ $< 480$
Yield stress $R_{eH}$	$N/mm^2$	$\geq 235$
Elongation (on $L_0 = 5,65 \cdot \sqrt{S_0}$ ) <sup>1)</sup>	A	$\geq 24$ %

<sup>1)</sup> In accordance with ISO 6892-1984  
 $L_0$  = original gauge length of the tensile test piece.  
 $S_0$  = original cross sectional area of the gauge length.

tube is not specified in the order, the choice of the method shall be at the option of the tube manufacturer.

5.1.2 The tubes shall have a smooth external surface consistent with the method of manufacture. Surface imperfections are permissible provided that the tube dimensions remain within the tolerance limit specified in table 3.

5.1.3 The tubes shall have a circular profile and any ovality shall not exceed the tolerance limits on outside diameter specified in table 3.

5.1.4 The deviation from straight shall not exceed 3 mm in any one metre and the maximum deviation over the full length L of the tube shall not exceed  $0,002 \cdot L$  (see figure 1).

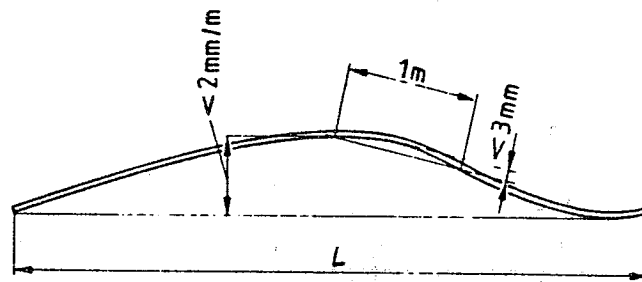


Figure 1. Maximum deviation of a tube from straight

5.1.5 The ends shall be cut square with the axis of the tube and shall be free from burrs.

#### 5 Manufacture

##### 5.1 General

5.1.1 The tube shall be produced by a seamless or welded process. If the method of manufacture of the

##### 5.2 Tube dimensions, mass and tolerances

Tube dimensions, mass and tolerances shall be in accordance with table 3.

Table 3. Nominal dimensions, mass and tolerances for tubes

Tube	Nominal values		Tolerances
	'Type 3,2'	'Type 4,0'	
Wall thickness	3,2 mm	4,0 mm	- 10,0 % <sup>1)</sup>
Outside diameter (including ovality)	48,3 mm	48,3 mm	$\pm 0,5$ mm
Inside diameter <sup>2)</sup>	41,9 mm	—	- 4,2 mm
	—	40,3 mm	- 2,6 mm
Mass, single tube	3,56 kg/m	4,37 kg/m	+ 12,0 % - 8,0 %
Mass, batches of tubes (10 tonnes or more)	3,56 kg/m	4,37 kg/m	$\pm 7,5$ %

<sup>1)</sup> Upper tolerance: governed by the tolerance on the mass.  
Lower tolerance: wall thickness shall be at least 2,9 mm on type 3,2 tube; a tolerance of - 15 % being allowed in isolated places over a length not exceeding 100 mm, but only if the decrease in thickness affects only the external surface.

<sup>2)</sup> The tolerances for the inside diameter shall also include the weld zone.

## 6 Delivery conditions

6.1 Tubes may be delivered from the tube manufacturer as rolled or with a protective coating. Corrosion protection may be applied either by the tube manufacturer, or separately later<sup>1)</sup>.

If tubes are to be delivered as-rolled with a low silicon content (see 4.1), this shall be specified in the order.

Where tubes are to be supplied with a temporary corrosion protection, this shall be specified in the order.

6.2 Where tubes are protected by hot-dip galvanizing, the coating shall be in accordance with clause A.2.

Where tubes are protected by a paint coating, the coating shall be in accordance with clause B.2.

## 7 Testing and certification

### 7.1 Testing and manufacturer's control

The tubes shall be subjected to tests and produc-

<sup>1)</sup> Tubes should be provided with a permanent protection against corrosion before being put into use in falsework or scaffolds.

tion control during manufacture in order to verify that they comply with the requirements of clauses 4, 5 and 6.

7.2 Where tubes are hot-dip galvanized, the effectiveness of the coating shall be assessed by testing in accordance with Annex A.

Where tubes are protected by a paint coating, the effectiveness of the coating shall be assessed in accordance with Annex B.

7.3 These tests and manufacturer's control are the respective responsibilities of the tube manufacturer and applier of the corrosion protection.

### 7.4 Certificate of compliance

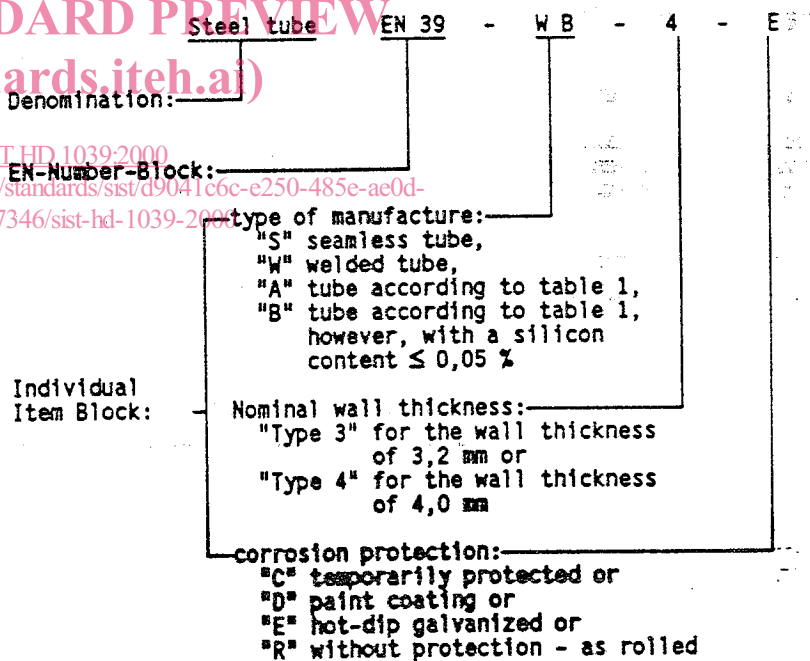
At the purchaser's request in the order, the tube manufacturer, the protective coating applier or the supplier shall supply a certificate of compliance stating that the tubes comply with the requirements of this Harmonization Document.

## 8 EN Designation

The EN designation shall comprise the following items according to the denomination scheme: e.g. for a welded steel tube with a low silicon content, 4,0 mm wall thickness and hot-dip galvanized:

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## 9 Marking

The marking shall be legible after the protective coating has been applied<sup>2)</sup>.

Tubes shall be marked by impressing at intervals not exceeding 1,5 m. The height of the characters shall be at least 4 mm and the impression at least 0,2 mm deep.

When tubes are delivered from the tube manufacturer as-rolled, the tubes shall be marked in the as-rolled condition.

The marking shall show

- the name or trademark of the tube manufacturer,
- the EN number "39",
- the letter "A" or "B" for silicon content as appropriate,
- the nominal wall thickness "3" or "4", which shall not be positioned immediately adjacent to the number "39".

After application of the protective coating an additional durable mark shall be applied to the tubes at intervals not exceeding 1,5 m showing the name or trademark of the coating applier.

**NOTE:**

The marking in the as-rolled condition gives no information about the application of any protective coating.

<sup>2)</sup> Tubes should be marked before being put into use in falsework or scaffolds.

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## Annex A (Mandatory)

## Requirements and quality control of the zinc coating

## A.1 Object and field of application

This annex specifies the quality of the zinc coating of hot-dip galvanized steel tubes complying with this Harmonization Document, the tests for checking compliance with these requirements.

## A.2 Characteristics of the coating

## A.2.1 Appearance

The coating shall be uniform without gaps in the layer of zinc. It shall be free from spikes, which may be removed mechanically.

## A.2.2 Thickness of the coating

When tested in accordance with clause A.3.2, the thickness of the coating shall be not less than 40  $\mu\text{m}$ . The thickness test shall be carried out on the outside only.

## A.2.3 Continuity of the coating

The continuity of the coating shall be considered satisfactory if tubes having any visually suspect spots meet the requirements of clause A.3.2.

## A.3 Testing

## A.3.1 Appearance of the coating

The coating shall be examined visually and manually to ensure that it complies with clause A.2.1.

## A.3.2 Thickness of the coating

## A.3.2.1 Choice of Method

The coating thickness may be assessed by either the magnetic method or the gravimetric method. If a particular method is not specified in the order, the choice of method shall be at the option of the tube manufacturer or galvanizer.

## A.3.2.2 Magnetic method

## A.3.2.2.1 Principle

The thickness is assessed by measuring the influence of the zinc coating on a magnetic field. The test should be conducted in accordance with ISO 2178-1982, and only the main significant points are given here.

## A.3.2.2.2 Equipment

The instrumentation chosen shall be appropriate for the size of tube and coating thickness specified.

## A.3.2.2.3 Calibration

The instrument shall be calibrated on a piece of ungalvanized tube, and rechecked frequently during use.

## A.3.2.2.4 Procedure

Using the same technique as was used in the calibration, take 10 readings spread over the surface of the tube under examination.

## A.3.2.2.5 Accuracy

Calibration and operation of the instrument shall be such that the coating thickness can be determined within 10 % of its true thickness.

## A.3.2.3 Gravimetric method

## A.3.2.3.1 Principle

The thickness is assessed by measuring the mass of the zinc coating on a surface of known area and calculating the average thickness of zinc.

## A.3.2.3.2 Procedure

The test shall be carried out in accordance with ISO 1460-1973 using a sample tube cut from a hot-dip galvanized tube.

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