

**Sömlösa rör av stål för tryckändamål – Tekniska leveransbestämmelser –**

Del 4: Olegerade och legerade stål med fordrade lågtemperaturegenskaper

**Seamless steel tubes for pressure purposes – Technical delivery conditions –**

Part 4: Non-alloy and alloy steel tubes with specified low temperature properties

Europastandarden EN 10216-4:2002 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 10216-4:2002 med EN 10216-4:2002/A1:2004 inarbetad.

The European Standard EN 10216-4:2002 has the status of a Swedish Standard. This document contains the official English version of EN 10216-4:2002 with EN 10216-4:2002/A1:2004 incorporated.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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**EN 10216-4**

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English version

**Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 4: Non-alloy and alloy steel tubes with specified low temperature properties**

Tubes sans soudure en acier pour service sous pression -  
Conditions techniques de livraison - Partie 4: Tubes en  
acier non allié et allié avec caractéristiques spécifiées à  
basse température

Nahtlose Stahlrohre für Druckbeanspruchungen -  
Technische Lieferbedingungen - Teil 4: Rohre aus  
unlegierten und legierten Stählen mit festgelegten  
Eigenschaften bei tiefen Temperaturen

This European Standard was approved by CEN on 25 April 2002.

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 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 Management Centre has the same status as the official versions.

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



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

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## EN 10216-4:2002 (E)

### Foreword

This document (EN 10216-4:2002) has been prepared by Technical Committee ECISS/TC 29, "Steel tubes and fittings for steel tubes", the secretariat of which is held by UNI.

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 2002, and conflicting national standards shall be withdrawn at the latest by November 2002.

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 EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

Other Parts of EN 10216 are:

- Part 1: Non-alloy steel tubes with specified room temperature properties.
- Part 2 : Non-alloy and alloy steels tubes with specified elevated temperature properties
- Part 3 : Alloy fine grain steel tubes
- Part 5 : Stainless steel tubes

Another European Standard series covering tubes for pressure purposes is:

EN 10217: Welded steel tubes for pressure purposes

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

## 1 SCOPE

This Part of EN 10216 specifies the technical delivery conditions in two test categories for seamless tubes of circular cross section, with specified low temperature properties, made of non-alloy and alloy steel.

## 2 NORMATIVE REFERENCES

This European Standard incorporates by date or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For date references, subsequent amendments to or revisions of, any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

The requirements of this European Standard rule when they differ from those in the standards and documents referred to below:

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Method of test (at ambient temperature)*.

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

EN 10021, *General technical delivery requirements for steel and iron products*.

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

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

EN 10045-1, *Metallic materials - Charpy impact test - Part 1: Test method*.

EN 10052, *Vocabulary of heat treatment terms for ferrous products*.

EN 10204, *Metallic products - Types of inspection documents*.

ENV 10220, *Seamless and welded steel tubes - Dimensions and masses per unit length*

EN 10233, *Metallic materials - Tubes - Flattening test*.

EN 10234, *Metallic materials - Tubes - Drift expanding test*.

EN 10236, *Metallic materials - Tubes - Ring expanding test*.

EN 10237, *Metallic materials - Tubes - Ring tensile test*.

EN 10246-1, *Non-Destructive Testing of steel tubes Part 1 : Automatic electromagnetic testing of seamless and welded (except submerged arc welded) ferromagnetic steel tubes for verification of hydraulic leak-tightness*.

EN 10246-5, *Non-Destructive Testing of steel tubes – Part 5: Automatic full peripheral magnetic transducer/flux leakage testing of seamless and welded (except submerged arc-welded) ferromagnetic steel tubes for the detection of longitudinal imperfections*.

EN 10246-6, *Non-Destructive Testing of steel tubes - Part 6: Automatic full peripheral ultrasonic testing of seamless steel tubes for the detection of transverse imperfections*.

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EN 10246-7, *Non-Destructive Testing of steel tubes - Part 7 : Automatic full peripheral ultrasonic testing of seamless and welded (except submerged arc welded) steel tubes for the detection of longitudinal imperfections.*

EN 10246-14, *Non-Destructive Testing of steel tubes - Part 14:Automatic ultrasonic testing of seamless and welded (except submerged arc welded) steel tubes for the detection of laminar imperfections.*

EN 10256, *Non-Destructive Testing of steel tubes - Qualification and competence of level 1 and level 2 NDT personnel.*

EN ISO 377, *Steel and steel products - Location and preparation of samples and test pieces for mechanical testing (ISO 377:1997)*

EN ISO 2566-1, *Steel - Conversion of elongation values – Part 1: Carbon and low-alloy steels (ISO 2566-1:1984)*

prEN 10168 <sup>1)</sup> *Iron and steel products - Inspection documents - List of information and description*

prEN 10266 <sup>1)</sup> *Steel tubes, fittings and structural hollow sections - Symbols and definition of terms for use in product standards*

ISO 14284, *Steel and iron - Sampling and preparation of samples for the determination of chemical composition*

CR 10260, *Designation systems for steel - Additional symbols*

CR 10261, *ECISS Information Circular IC 11 - Iron and steel - Review of available methods of chemical analysis.*

### **3 TERMS AND DEFINITIONS**

For the purposes of this Part of EN 10216, the terms and definitions of EN 10020, EN 10021, EN 10052, prEN 10266 and the following apply:

#### **3.1**

##### **test category**

classification that indicates the extent and level of inspection and testing.

#### **3.2**

##### **employer**

organisation for which a person works on a regular basis.

NOTE The employer may be either the tube manufacturer or supplier or a third party organisation providing Non-Destructive Testing (NDT) services.

### **4 SYMBOLS**

For the purposes of this Part of EN 10216, the symbols given prEN 10266 and the following apply:

— TC test category

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<sup>1)</sup> In preparation; until this document is published as a European Standard, the corresponding national standard(s) should be agreed at the time of enquiry and order.



## 5 CLASSIFICATION AND DESIGNATION

### 5.1 Classification

In accordance with the classification system in EN 10020, the steel grades P 215NL, P 255QL and P265NL are classified as non-alloy quality steels and the other steel grades are classified as alloy special steels.

### 5.2 Designation

**5.2.1** For the tubes covered by this Part of EN 10216 the steel designation consists of:

— the number of this Part of EN 10216 ;

plus either:

— the steel name in accordance with EN 10027-1 and CR 10260;

or:

— the steel number allocated in accordance with EN 10027-2.

**5.2.2** The steel name of non-alloy steel grades is designated by:

— the capital letter P for pressure purposes;

— the indication of the specified minimum yield strength at room temperature, expressed in MPa (see Table 4);

— the symbol of the heat treatment for the steel grade concerned (see Table 1);

— the symbol L for low temperature.

**5.2.3** The steel name of alloy-steel grades is designated by the chemical composition (see Table 2) and the symbols for the heat treatment, where specified in column 1 and footnote a) of Table 1

## 6 INFORMATION TO BE SUPPLIED BY THE PURCHASER

### 6.1 Mandatory information

The following information shall be supplied by the purchaser at the time of enquiry and order:

- a) the quantity (mass or total length or number);
- b) the term "tube";
- c) the dimensions (outside diameter D and wall thickness T) (see Table 6);
- d) the designation of the steel grade in accordance with this Part of EN 10216 (see 5.2);
- e) the test category for non-alloy steel(see 9.3).

### 6.2 Options

A number of options are specified in this Part of EN 10216 and these are listed below. In the event that the purchaser does not indicate a wish to implement any of these options at the time of enquiry and order, the tubes shall be supplied in accordance with the basic specification (see 6.1).

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- 1) cold finishing (see 7.3.2);
- 2) restriction on copper and tin content (see Table 2);
- 3) product analysis (see 8.2.2);
- 4) selection of leak-tightness test method (see 8.4.2.1);
- 5) Non-Destructive Testing for test category 2 tubes for detection of transverse imperfections (see 8.4.2.2);
- 6) Non-Destructive Testing for test category 2 tubes for detection of laminar imperfections (see 8.4.2.2);
- 7) special ends preparation (see 8.6);
- 8) exact lengths (see 8.7.3);
- 9) the type of inspection document other than the standard document (see 9.2.1);
- 10) test pressure for hydrostatic leak-tightness test (see 11.8.1);
- 11) wall thickness measurement away from the ends (see 11.9);
- 12) Non-Destructive Testing method (see 11.11.1);
- 13) additional marking (see 12.2);
- 14) protection (see 13);

**6.3 Example of an order**

50 t of seamless tube with an outside diameter of 168,3 mm, a wall thickness of 4,5 mm in accordance with EN 10216-4, made of steel grade P265NL, test category 1, with a 3.1.C inspection certificate in accordance with EN 10204:

50 t - Tube - 168,3 x 4,5 - EN 10216-4 - P265NL - TC1 - Option 9: 3.1.C

**7 MANUFACTURING PROCESS****7.1 Steelmaking process**

The steelmaking process is at the discretion of the manufacturer.

**7.2 Deoxidation process**

Steels shall be fully killed.

**7.3 Tube manufacture and delivery conditions**

**7.3.1** All NDT activities shall be carried out by qualified and competent level 1,2 and/or 3 personnel authorised to operate by the employer.

The qualification shall be in accordance with EN 10256 or, at least, an equivalent to it.

It is recommended that the level 3 personnel be certified in accordance with EN 473 or, at least, an equivalent to it.

The operating authorisation issued by the employer shall be in accordance with a written procedure.

NDT operations shall be authorised by level 3 NDT individual approved by the employer.

EXAMPLE The definition of level 1, 2 and 3 can be found in appropriate Standards, e.g. EN 473 and EN 10256

**7.3.2** The tubes shall be manufactured by a seamless process.

Unless option 1 is specified, the tubes may be either hot or cold finished at the discretion of the manufacturer. The terms “ hot finished “ and “ cold finished “ apply to the condition of the tube before it is heat treated in accordance with 7.3.3.

**Option 1:** *The tubes shall be cold finished before heat treatment.*

**7.3.3** The tubes shall be supplied in the relevant heat treatment conditions as specified in Table 1.

**Table 1 — Delivery conditions**

Steel grade		Heat treatment <sup>a b</sup>	Normalising temperature ° C	Tempering temperature °C	Quenching and tempering		
Steel name	Steel number				Hardening temperature ° C	Cooling medium <sup>c</sup>	Tempering temperature °C
P215NL	1.0451	+N	900 to 940	--	--	--	--
P255QL	1.0452	+QT	--	--	890 to 930	Water or oil	600 to 680
P265NL	1.0453	+N	880 to 940	--	--	--	--
26CrMo4-2	1.7219	+QT	--	--	830 to 860	Water or oil	600 to 680
11 MnNi5-3	1.6212	+N <sup>d</sup>	890 to 940	(580 to 640)	--	--	--
13 MnNi6-3	1.6217	+N <sup>d)</sup>	890 to 940	(580 to 640)	--	--	--
12Ni14	1.5637	+NT	830 to 880	580 to 640	--	--	--
		+QT	--	--	820 to 880	Water or oil	580 to 660
X12Ni5	1.5680	+NT	800 to 850	580 to 640	--	--	--
		+QT	--	--	800 to 850	Water or oil	580 to 660
X10Ni9	1.5682	+N+NT	880 to 915 + 775 to 805	565 to 605 <sup>e</sup>	-	--	--
		+QT <sup>f</sup>	(880 to 930)	--	770 to 820	water or oil	540 to 600

<sup>a</sup> N = Normalising ; QT = Quenching and Tempering; NT = Normalising and Tempering

<sup>b</sup> Where two types of heat treatment are specified for a steel grade, the application depends on wall thickness and T/D ratio. The decision is left to the manufacturer but shall be reported in the inspection document.

<sup>c</sup> When choosing the cooling medium the influence of other parameters, such as dimensions and quenching temperature, on properties and crack susceptibility should be taken into account. Other cooling media such as synthetic quenchants may also be used.

<sup>d</sup> Tempering can occasionally be necessary after normalising; The decision shall be left to the discretion of the manufacturer but shall be stated to the customer at the time of enquiry and order. Steel tubes treated in such a way shall be designated by the steel name supplemented by the symbol “+NT “.

<sup>e</sup> Cooling at still air or accelerated cooling.

<sup>f</sup> An additional prenormalising treatment, in the temperature range indicated may be necessary for this grade. In such a case the manufacturer shall inform the purchaser.