

# High performance seamless circular unalloyed steel tubes

Technical delivery conditions

**DIN**  
**1630**

Nahtlose kreisförmige Rohre aus unlegierten Stählen für besonders hohe Anforderungen; technische Lieferbedingungen

Supersedes DIN 1629 Part 4,  
January 1961 edition,  
and parts of DIN 1629 Part 1,  
January 1961 edition

1988年9月8日

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

The subclauses marked with a single dot • give specifications which are to be agreed upon at the time of ordering.  
The subclauses marked with two dots •• give specifications which are optional and may be agreed upon at the time of ordering.

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1999年8月9日

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## 1 Field of application

**1.1** This standard applies to seamless circular tubes and pipes (hereinafter briefly referred to as "tubes") made of unalloyed steels as listed in table 1. These tubes are predominantly used in the construction of chemical plant, vessels, pipework and for general mechanical engineering purposes. They are designed to meet high performance requirements. Normally, there are no limiting values for the maximum permissible working pressure of these tubes. The permissible working temperature shall not exceed 300 °C. (The upper yield stress values for tubes at temperatures up to 300 °C are specified in Appendix A.)

The limits of application and other specifications given in this standard shall apply except in cases where other specifications are contained in codes of practice for specific fields of application, e.g. the *Technische Regeln für Dampfkessel (TRD)* (Technical rules on steam boilers) or the *Technische Regeln für Druckbehälter (TRB)*

(Technical rules on pressure vessels), *AD-Merkblätter* (AD Instruction sheets).

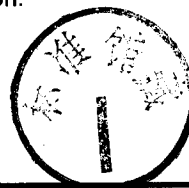
**1.2** This standard does not apply to

- seamless circular unalloyed steel tubes subject to special requirements (DIN 1629);
- seamless circular steel tubes for structural steelwork (see DIN 17 121);
- seamless creep-resisting steel tubes (see DIN 17 175);
- seamless precision steel tubes (see DIN 2391 Part 2);
- medium-weight threaded steel tubes (see DIN 2440);
- heavyweight threaded steel tubes (see DIN 2441).

## 2 Classification into grades

This standard covers tubes made from the steel grades shown in table 1.

- The selection of the steel grade is at the purchaser's discretion.



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### 3 Designation and ordering

3.1 The standard designation for tubes complying with this standard shall give in the following order:

- the term “tube”;
- DIN number of dimensional standard (DIN 2448);
- characteristic dimensions of tube (outside diameter  $\times$  wall thickness);
- number of DIN Standard giving the technical delivery conditions (DIN 1630);
- symbol or material number for the steel grade (see tables 1 and 3);
- where applicable, the code letter N where the tubes are to be supplied in the normalized condition (see subclause 4.2.2).

**Examples:**

- a) A seamless tube conforming to this standard, with an outside diameter of 168,3 mm and a wall thickness of 4,5 mm as specified in DIN 2448, made from St 52.4 steel (material number 1.0581) shall be designated as follows:

Tube DIN 2448 – 168,3  $\times$  4,5  
DIN 1630 – St 52.4

or Tube DIN 2448 – 168,3  $\times$  4,5  
DIN 1630 – 1.0581

- b) A seamless tube conforming to this standard, with an outside diameter of 139,7 mm and a wall thickness of 4 mm as specified in DIN 2448, made from St 37.4 steel (material number 1.0255) in the normalized condition (N) shall be designated as follows:

Tube DIN 2448 – 139,7  $\times$  4  
DIN 1630 – St 37.4 N

or Tube DIN 2448 – 139,7  $\times$  4  
DIN 1630 – 1.0255 N

3.2 ● In addition to the standard designation as given in subclause 3.1, the purchaser shall always state in his order the required quantity (e.g. total length to be supplied), the type of length (see table 4), the length of the individual tube in the case of specified lengths and exact lengths, the type of document on materials testing as specified in DIN 50 049 and, where applicable, any additional code of practice that may apply.

Example of an order:

**1000 m tube DIN 2448 – 168,3  $\times$  4,5**  
**DIN 1630 – St 52.4**

in specified lengths of 8 m, accompanied by document DIN 50 049 – 3.1 B.

3.3 ●● In addition to this, further details may be agreed at the time of ordering as described in those subclauses marked with two dots.

## 4 Requirements

### 4.1 Manufacturing process

4.1.1 The process employed for making the steels used to manufacture the tubes conforming to this standard is at the manufacturer's discretion. The type of deoxidation of the steels shall be as specified in table 1.

●● If so agreed, the purchaser shall be informed of the steelmaking process used.

4.1.2 ●● Unless otherwise agreed at the time of ordering, the process used to manufacture the tubes is at the manufacturer's discretion.

Tubes complying with this standard shall be manufactured by hot or cold rolling, hot pressing or hot and cold drawing.

### 4.2 As delivered condition

4.2.1 Tubes manufactured by hot forming shall be supplied in the hot formed condition. In order to comply with the requirements regarding mechanical and technological properties specified in table 3 and subclause 4.5 the tubes shall, if necessary, be normalized.

4.2.2 ●● If normalizing of the tubes is desired, this shall be agreed at the time of ordering. In this case, code letter N shall be used in the designation (see subclause 3.1).

If the final forming stage in the production of the tube is a temperature-controlled hot forming operation, the requirement for normalizing shall be deemed to have been met if the forming process produces a condition equivalent to that produced by normalizing.

4.2.3 Cold rolled or cold drawn tubes shall be normalized after forming and supplied in this condition.

4.2.4 ●● If the surfaces of the tubes are to be provided with an anti-corrosive agent with a limited life, this shall be agreed at the time of ordering.

4.2.5 ●● If special requirements are made on the tubes (e.g. with regard to galvanizing, chromium plating or enamelling), this shall be agreed at the time of ordering.

### 4.3 Chemical composition

#### 4.3.1 Cast analysis

The chemical composition of the steels determined in the cast analysis<sup>1)</sup> shall be as specified in table 1. Slight deviations from these values are permitted if the mechanical and technological properties of the tubes conform to this standard and weldability is not impaired.

#### 4.3.2 Product analysis

In the test on the finished tube, the deviations shown in table 2 are permitted in comparison with the values specified in table 1.

### 4.4 Mechanical properties

The yield stress, tensile strength, elongation after fracture and impact strength of the tubes shall conform to the values specified in table 3. These shall apply for tubes in the as delivered condition and for the test conditions described in clause 5 of this standard.

### 4.5 Technological properties

The tubes shall meet the requirements specified in subclauses 5.5.3 to 5.5.5. In the tests described in the same subclauses, no unacceptable defects (e.g. cracks, scabs, laps or laminations) shall occur.

<sup>1)</sup> When sequential castings are supplied, as is possible with continuously cast tubes, the term “cast” should be read as “casting unit”.

Table 1. Chemical composition (cast analysis) of steels for high-performance seamless circular tubes

Steel grade		Type of deoxidation (RR, fully killed)	Chemical composition, % by mass					Addition of nitrogen fixing elements (e.g. not less than 0,020% Al <sub>total</sub> )
Symbol	Material number		C	Si	Mn	P	S	
St 37.4	1.0255	RR	0,17 max.	0,35	≥ 0,35	0,040 max.	0,040	Yes
St 44.4	1.0257	RR	0,20	0,35	≥ 0,40	0,040	0,040	Yes
St 52.4	1.0581	RR	0,22	0,55	≤ 1,60	0,040	0,035	Yes

Table 2. Amounts by which the chemical composition in the product analysis may deviate from the limiting values applicable to the cast analysis (see table 1)

Element	Amount by which the product analysis may deviate from the limiting values applicable to the cast analysis % by mass
C	+ 0,02
Si	+ 0,03
Mn	+ 0,06 or - 0,06
P	+ 0,010
S	+ 0,010

Table 3. Mechanical properties of tubes in the as delivered condition at room temperature

- For wall thicknesses exceeding 65 mm, the values shall be agreed at the time of ordering.

Steel grade		Upper yield stress $R_{eH}$ for wall thicknesses, in mm, up to 16   over 16   over 40 up to 40   up to 65			Tensile strength $R_m$	Elongation after fracture $A_5$		Impact energy 1) (ISO V-notch test pieces at +20°C)	
Symbol	Material number	N/mm <sup>2</sup> min.			N/mm <sup>2</sup>	longi- tudinal	trans- verse	longi- tudinal	trans- verse
St 37.4	1.0255	235	225	215	350 <sup>3)</sup> to 480	25	23	43	27
St 44.4	1.0257	275 <sup>2)</sup>	265 <sup>2)</sup>	255 <sup>2)</sup>	420 <sup>3)</sup> to 550	21	19	43	27
St 52.4	1.0581	355	345	335	500 <sup>3)</sup> to 650	21	19	43	27

1) Average value from three tests; only one individual value may fall short of the specified minimum value by not more than 30%.

2) For cold finished tubes in the NBK condition (annealed above the upper transformation point under shielding gas or in a vacuum), minimum values of yield stress lower than these values by 20 N/mm<sup>2</sup> are permitted.

3) For cold finished tubes in the NBK condition, minimum values of tensile strength lower than these values by 10 N/mm<sup>2</sup> are permitted.

#### 4.6 Weldability

Tubes made from the steel grades specified in this standard are suitable for gas fusion welding, arc welding, flash butt welding, electric pressure welding, and gas pressure welding.

According to DIN 8528 Part 1 however, weldability is dependent not only on the steel grade but also on the

conditions during welding, on the design and the operating conditions of the structural component.

#### 4.7 Appearance of surface

4.7.1 The tubes shall have a smooth outside and inside surface consistent with the manufacturing process used.

4.7.2 Slight irregularities in the surface resulting from the manufacturing process, such as raised or depressed