

## Cold drawn seamless steel tubes for mechanical applications



Cold drawn precision seamless tubes for mechanical and general engineering applications.

Available in various steel grades, according to the EN 10305-1 and other different international norms.



Quality System Certified  
n. 1109501029

# Cold drawn seamless steel tubes for mechanical applications

## Product description and field of application

Tenaris produce precision seamless tubes for mechanical applications that satisfy the European norm EN 10305-1, in the grades shown in table 1 (Tenaris can supply others steel grades according to different international standards, i.e.: EN... ASTM..., as shown in table 1).

The tubes are cold drawn, thereby guaranteeing optimum dimensional tolerances and can be supplied in different final treatment states. Certain grades can be supplied with a limited sulfur content to guarantee good machinability.

The products described below have an application in the field defined by 'Machinery Directive 98/37/EC', that is for mechanical and general engineering purposes. They are excluded from use in specialized work, such as in pressure vessels and structural applications. These being subject to other EN norms, Community directives or national laws in force in the countries where they are being used.

## Order definition

- Product: 'Precision seamless tubes for mechanical applications'
- Manufacturing standard
- Steel grade
- Delivery condition
- Dimensions: OD x ID, OD x WT or ID x WT
- Length
- Quantity

### Options

- a) Controlled 0,020 ÷ 0,035% sulfur content to improve machinability
- b) Different heat treatments and mechanical properties
- c) Tolerances different to those indicated
- d) Lengths different to those shown as standard
- e) Additional checks and tests

## Grades and indicative correspondence to the standards

The tubes can be manufactured in compliance with the grades of the different norms. Detailed in table 1.

GRADES AND INDICATIVE CORRESPONDENCE TO THE STANDARDS					TABLE 1
DEN. TENARIS	EN10305-1	EN 10083	EN 10084	ASTM A519	
Engineering application	E235	E235			
	E255	E255			
	E355	E355			
	E410 1026	E410		1026	
Case hardening	C10		C10E	1010	
	20NiCrMo2-2		20NiCrMo2-2	8620	
	16MnCrS5		16MnCrS5		
Quench & temper	C35	C35E			
	C45	C45E			
	C60		C60E		
	25CrMo4	25CrMo4			
	30CrMo4			4130	
	42CrMo4	42CrMo4			

## Chemical Analysis

The chemical analysis %, satisfying the norms cited, are shown in table 2.

### Option a

Certain steel grades can be requested with a controlled 0,020 ÷ 0,035% sulfur content to improve mechinability

CHEMICAL ANALYSIS %												TABLE 2
GRADE	C	Si	Mn	P	S	V	NB	Cr	Mo	Ni	Al	
E235	≤ 0,17	0,15-0,35	0,40-1,20	≤ 0,025	≤ 0,025	-	-	-	-	-	-	
E255	≤ 0,22	0,10-0,35	0,40-1,10	≤ 0,025	≤ 0,025	-	-	-	-	-	-	
E355	≤ 0,20	0,15-0,35	1,00-1,60	≤ 0,025	≤ 0,025	-	-	-	-	-	-	
E410	0,16-0,22	0,15-0,50	1,30-1,70	≤ 0,030	≤ 0,035	0,08-0,15	≤ 0,070	-	-	-	0,010-0,060	
1026	0,22-0,28	-	0,60-0,90	≤ 0,040	≤ 0,050	-	-	-	-	-	-	
C10	0,07-0,13	0,15-0,40	0,30-0,60	≤ 0,035	≤ 0,035	-	-	-	-	-	-	
20NiCrMo2-2	0,17-0,23	0,15-0,40	0,65-0,95	≤ 0,035	≤ 0,035	-	-	0,35-0,70	0,15-0,25	0,40-0,70	-	
16MnCrS5	0,14-0,19	≤ 0,40	1,00-1,30	≤ 0,035	0,020-0,040	-	-	0,80-1,10	-	-	-	
C35	0,32-0,39	0,15-0,40	0,50-0,80	≤ 0,035	≤ 0,035	-	-	≤ 0,40	≤ 0,10	-	-	
C45	0,42-0,55	0,15-0,40	0,50-0,80	≤ 0,035	≤ 0,035	-	-	≤ 0,40	≤ 0,10	-	-	
C60	0,57-0,65	0,15-0,40	0,60-0,90	≤ 0,035	≤ 0,035	-	-	≤ 0,40	≤ 0,10	≤ 0,40	-	
25CrMo4	0,22-0,29	0,15-0,40	0,60-0,90	≤ 0,035	≤ 0,035	-	-	0,90-1,20	0,15-0,30	-	-	
30CrMo4	0,28-0,33	0,15-0,35	0,40-0,60	≤ 0,035	≤ 0,035	-	-	0,80-1,10	0,15-0,25	-	-	
42CrMo4	0,38-0,45	0,15-0,40	0,60-0,90	≤ 0,035	≤ 0,035	-	-	0,90-1,20	0,15-0,30	-	-	

## Delivery condition

The tubes can be supplied in the conditions described in table 3.

CONDITION SUPPLIED			TABLE 3
SYMBOL	DESCRIPTION	PREVIOUS SYMBOL	
<b>C</b>	Cold drawn/hard	BK	
<b>LC</b>	Cold drawn/soft	BKW	
<b>SR</b>	Cold drawn/stress relieved	BKS	
<b>A</b>	Annealed	GBK	
<b>N</b>	Normalized	NBK	
<b>QT</b>	Quench/tempered*	QT	

\*The mechanical properties and dimensional tolerances are defined upon request.

## Mechanical properties

The mechanical properties are shown in table 4 for the different types of conditions supplied.

### Option b

Different heat treatments and mechanical properties can be requested.

MECHANICAL PROPERTIES															TABLE 4
GRADE	N				SR			C		LC		A			
	Rs (MPa) min	Rm (MPa) min	Rm (MPa) max	A % min	Rs (MPa) min	Rm (MPa) min	A % min	Rm (MPa) min	A % min	Rm (MPa) min	A % min	HB max	Rm (MPa) min	A % min	
<b>E235</b>	235	340	480	25	350	420	16	480	6	420	10		315	25	
<b>E255</b>	255	440	570	21	375	520	12	580	5	520	8		390	21	
<b>E355</b>	355	490	630	22	450	580	10	640	4	580	7		450	23	
<b>E410</b>	410	550	700	22	590	690	12	750	4	620	8		520	22	
<b>C10</b>												131			
<b>16MnCrS5</b>												207			
<b>20NiCrMo2-2</b>												212			
<b>C35</b>	310	460		21				590	5	540	7		440	22	
<b>C45</b>	340*	540		18				720	4	670	6		510	20	
<b>C60</b>	380/340*	710/670*		10/11								260			
<b>25CrMo4</b>								720	4	670	6				
<b>30CrMo4</b>															
<b>42CrMo4</b>								720	4	670	6				

\*For  $WT \leq 16$  /  $WT > 16 \leq 100$  mm

Grade 1026/4130: ASTM A 519 reports only typical tensile properties and hardness for different thermal condition.

## Dimensions and tolerances

The standard dimensions and dimensional tolerances are shown in the table on page 7 and satisfy the requirements of the standard EN10305-1.

The dimensional tolerances apply to tubes supplied in the conditions defined by table 3, with the exception of tubes supplied QT (quenched/tempered).

### Option c

Tolerances different to those indicated can be agreed upon.

## Straightness

A straightness better or equal to 1,5‰ is guaranteed.

## Lengths

The tubes are produced in lengths ranging from 3 to 8 m. The average production length varies with the dimensions. For each individual dimension the length varies within a range of 2m.

### Option d

Fixed lengths different to standard

## Service Center

The Service Center can supply tubes cut in fixed lengths with tolerances of -0 + 5 mm.

## Checks

The tubes undergo the following tests:

- Mechanical tests in accordance with reference standards
- Electromagnetic test on each tube
- Visual and dimensional check of each tube

### Option e

Additional checks and tests can be agreed at the time of ordering.

## Surfaces and protection

The product surfaces are cold finished, as required by EN 10305-1.

The tubes are protected internally and externally with oil, which provides temporary protection against oxidation when undercover.

## Tube ends

The tubes come with square cut and deburred ends.

## Certification

The product is supplied with 3.1. inspection certificate, according to the standards EN 10204 and ISO 10474.

Tenaris employs complete product traceability, with the cast number being indicated on each tube.

## Identification and marking

The tubes are marked in indelible ink, the details being repeated along the entire length of each tube and on a label, as follows:

Manufacturer's trademark - manufacturing standard - dimensions - steel grade - supply condition - cast no. - item number.

## Packaging

The tubes come in strapped bundles.

The minimum weight of each bundle is 2000kg; the maximum bundle weight being 5000kg, with a minimum of 4 pieces.

## Minimum lot and quantity tolerances

The minimum quantity supplied varies on the basis of; the dimensions, the steel and the additional requirements (options) and is agreed upon at the time of ordering.

Quantity tolerance: +/- 10% per item



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