



Industrial Services &  
Automotive

## 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 various national norms.



Quality System Certified  
n. 110950/029

# Cold drawn seamless steel tubes for mechanical applications

## Product description and field of application

Tenaris produce precision seamless tubes for mechanical applications that satisfy both the European norm EN 10305-1 and the various national standards in force, in the grades 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 norms and grades detailed in table 1.

GRADES AND INDICATIVE CORRESPONDENCE TO THE STANDARDS						TABLE 1
DEN. TENARIS	EN10305-1	UNI	DIN	AFNOR	ASTM	
Engineering application	<b>E235</b>	E235	Fe360 UNI 7945 FFe 35-2 UNI 663	St35 DIN 2391	Tu 37b NF A 49310	
	<b>E255</b>	E255	Fe410 UNI 7945 Fe 45-2 UNI 663	St45 DIN 2391		
	<b>E355</b>	E355	Fe 490 UNI 7945 Fe 52-2 UNI 663 Fe510 UNI 6403	St52 DIN 2391	Tu 52b NF A 49310	
	<b>E410</b>	E410			20MV6 NF A 49310	
	<b>1026</b>					1026 A 519
Case hardening	<b>C10</b>		C10 UNI 6403	C10 DIN EN 10084		
	<b>16NiCrMo2</b>		16NiCrMo2 UNI 6403			8617H A 519
	<b>16MnCrS5</b>		16MnCrS5 UNI/EN 10084	16MnCrS5 DIN EN 10084		
Quench & temper	<b>C35</b>	C35E	C35 UNI 6403	C35, Ck35 DIN 17204		
	<b>C45</b>	C45E	C45 UNI 6403	C45, Ck45 DIN 17204		1045 A 519
	<b>C60</b>		C60 UNI 7845	C60, Ck60 DIN 17204		
	<b>25CrMo4</b>	25CrMo4	25CrMo4 UNI 6403	25CrMo4 DIN 17204		
	<b>30CrMo4</b>		30CrMo4 UNI 6403			4130 A 519
	<b>42CrMo4</b>	42CrMo4	42CrMo4 UNI 6403	42CrMo4 DIN 17204		4140 A 519

## 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
<b>E235</b>	≤ 0,17	0,15-0,35	0,40-0,75	≤ 0,025	≤ 0,025	-	-	-	-	-	-
<b>E255</b>	≤ 0,21	0,10-0,35	0,50-1,10	≤ 0,025	≤ 0,025	-	-	-	-	-	-
<b>E355</b>	≤ 0,20	0,15-0,35	1,00-1,50	≤ 0,025	≤ 0,025	-	-	-	-	-	-
<b>E410</b>	0,16-0,22	0,15-0,30	1,30-1,70	≤ 0,030	≤ 0,035	0,08-0,15	≤ 0,070	-	-	-	0,010-0,060
<b>1026</b>	0,22-0,28	-	0,60-0,90	≤ 0,040	≤ 0,040	-	-	-	-	-	-
<b>C10</b>	0,07-0,13	0,15-0,35	0,30-0,60	≤ 0,035	≤ 0,035	-	-	-	-	-	-
<b>16NiCrMo2</b>	0,15-0,18	0,15-0,35	0,70-0,90	≤ 0,035	≤ 0,035	-	-	0,40-0,60	0,15-0,25	0,40-0,70	-
<b>16MnCrS5</b>	0,14-0,19	≤ 0,40	1,00-1,30	≤ 0,035	0,020-0,040	-	-	0,80-1,10	-	-	-
<b>C35</b>	0,32-0,39	0,15-0,35	0,50-0,80	≤ 0,035	≤ 0,035	-	-	≤ 0,40	≤ 0,10	-	-
<b>C45</b>	0,42-0,50	0,15-0,35	0,50-0,80	≤ 0,035	≤ 0,035	-	-	≤ 0,40	≤ 0,10	-	-
<b>C60</b>	0,57-0,65	0,15-0,40	0,60-0,80	≤ 0,035	≤ 0,035	-	-	-	-	-	-
<b>25CrMo4</b>	0,22-0,29	0,15-0,35	0,60-0,80	≤ 0,035	≤ 0,035	-	-	0,90-1,20	0,15-0,25	-	-
<b>30CrMo4</b>	0,27-0,33	0,15-0,35	0,40-0,60	≤ 0,035	≤ 0,035	-	-	0,80-1,10	0,15-0,25	-	-
<b>42CrMo4</b>	0,39-0,43	0,15-0,35	0,75-0,90	≤ 0,035	≤ 0,035	-	-	0,90-1,10	0,15-0,25	-	-

## 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>	240	360	460	28	370	440	16	480	6	420	12		340	26
<b>E255</b>	255	441	539	23	375	520	12	580	6	520	8		400	24
<b>E355</b>	355	510	630	22	520	600	12	650	5	580	8		490	23
<b>E410</b>	410	550	700	22	590	690	12	750	4	700	8		520	22
<b>C10</b>	215	360	480	25								131		
<b>16MnCr5</b>												207		
<b>16NiCrMo2</b>												230		
<b>C35</b>	310	540	680	21				590	5	540	7	183	440	22
<b>C45</b>	350/340*	610/590*	760/740*	18				720	4	670	6	220	510	20
<b>C60</b>	390/380*	720/700*	900/880*	14								260		
<b>25CrMo4</b>	390	620	800	18				720	4	670	6	215		
<b>30CrMo4</b>	415	640	820	17								220		
<b>42CrMo4</b>								720	4	670	6	245		

\*For WT ≤ 16/ WT > 16

Grade 1026: mechanical properties are not required by the standard

### 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.B 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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