

High Strength Steel (HSS) tubes for engineering applications



Tenaris produces a large dimensional range of seamless tubes, in high strength steel, for engineering applications where the critical factor is controlling weight and/or a high resistance to stress requirement.



High Strength Steel (HSS) tubes for engineering applications

Description and product application field

Tenaris has developed the following steel grades, supplied quenched and tempered:

- TN 690
- TN 770
- TN 890

The principal characteristics of these products, with respect to traditional steel grades, are elevated yield value and good toughness, with the guarantee of a chemistry that allows weldability.

High strength seamless steel tubes, used in a variety of mechanical engineering applications, are produced in conformity to the following specifications and to EN

10297-1, unless otherwise specified at the time of ordering.

They can also be used in steel construction for civil engineering purposes where the relationship between mass and space occupied is especially critical. For the latter use, applicability would be dependent on compliance with possible regulations in force in the country where the construction is taking place.

1. Order definition

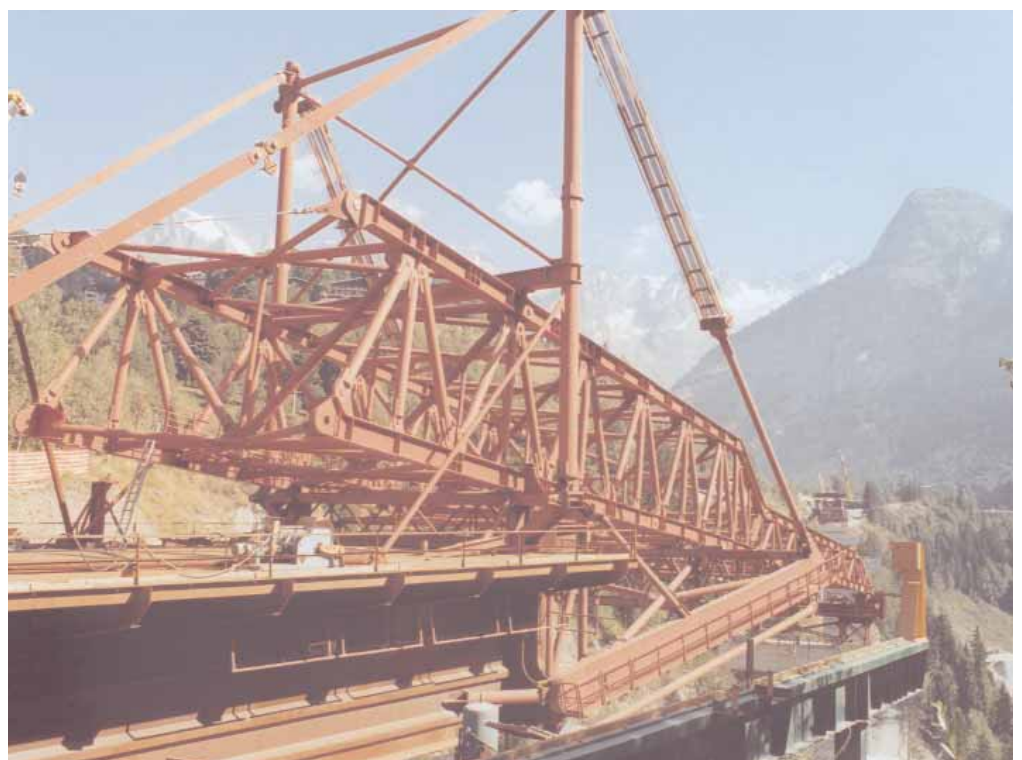
Details (essential data)

- Manufacturing norms
- Steel grade

- Nominal dimensions: external diameter and wall thickness in mm
- Quantity and relative tolerance

Options

- a) Straightness different to that shown in the current specifications
- b) Lengths different to that shown in the current specifications
- c) Fixed lengths
- d) Additional specific controls
- e) Other certification
- f) Other identification
- g) Color-coding at one end



2. Steel grades

Steel grades with low carbon and sulfur content, with the addition of micro-alloying and tempering elements, which can vary in percentage according to the steel grade.

For the chemical composition and mechanical characteristics, the field of application is similar to products conforming to SEW (Stahl-Eisen Werkstoffblätter) 090 Part 2, and EN 10297 (grade E 730 K2).

Analogically to the tubular product, sheets of similar grades are included in EN 10137.

Shown below are:

- Chemical analysis (maximum percentage values) valid for all three grades
- Mechanical properties

3. Weldability

The steel grades indicated in the specification are weldable with traditional welding procedures, given observance of the generally accepted technical rules. It is important to define a welding procedure that takes into account the following conditions:

- Thickness of the base material
- Specific heat input (especially for HAZ)
- Design requirements
- Procedure used
- Weld material characteristics

Particular precautions should be taken towards cold crackability phenomena, which is more likely to happen with high thickness and high resistance.

This phenomenon is connected to the following factors:

- Chemical analysis (by means of CE)
- The amount of diffusible hydrogen in the weld material
- A fragile HAZ structure
- Substantial concentrations of tensile stress at the weld joint (linked to the constraint level it is subjected to)

CHEMICAL ANALYSIS %									
C	Mn	Si	P	S	Ni	V	Cr	Mo	
max									
≤ 0,20	≤ 1,70	≤ 0,60	≤ 0,025	≤ 0,015	≤ 1,20	≤ 0,12	≤ 0,50	≤ 0,50	≤ 0,50

CE (IIW) maximum value 0.63%

MECHANICAL PROPERTIES										
GRADE	DELIVERY CONDITION	TENSILE PROPERTIES					IMPACT TEST*			
		Rp02 (MPa) min		Rm (MPa) min		A %	Charpy KV long.		Charpy KV Transv.	
		Wall thickness mm					(J min)		Temperature	
		≤ 20	> 20 ≤ 40	≤ 20 ≤	> 20 ≤ 40 ≤	long. min	-20 °C	-50 °C	-20 °C	-50 °C
TN 690	B	690	650	770-960	720-930	16	55	-	27	-
TN1 690	B	690	650	770-960	720-930	16	-	40	-	27
TN 770	B	770	700	820-1000	750-960	15	50	-	27	-
TN1 770	B	770	700	820-1000	750-960	15	-	40	-	27
TN 890	B	890	850	960-1100	920-1070	14	50	-	27	-
TN1 890	B	890	850	960-1100	920-1070	14	-	30	-	21

* The impact test values indicated are meant to be calculated as the average of the three samples of width W = 10mm. If the sample width W is less than 10mm, the requested KV₁₀ values are reduced in the new value KV_W = KV₁₀ × (W/10).

4. Dimensional tolerances

The tolerances are in agreement with EN 10297-1, in cases of mechanical applications; in general they will be in agreement with the norms specified at the time of ordering.

Straightness: not more than 1,5‰ cumulative on the entire length.

Option a
Straightness different to a cumulative maximum of 1,5‰ can be agreed upon when ordering

5. Lengths

The standard delivery is in lengths made up of between 6 to 12 meters.

The delivery length varies according to the dimensions; for every dimension the range is 2 meters.

Option b
Lengths greater than 12 meters or less than 6 meters can be agreed upon at time of ordering

Option c
The tubes can be supplied in fixed lengths with a tolerance of -0/+10 mm, to be specified at time of ordering.

Service Center
Tenaris has a Service Center where it is possible to ask for additional working, such as cutting to measure (tolerance -0/+5mm), chamfering, drilling and boring. It is also possible to agree upon packaging different to that indicated in the current catalogue.

6. General Delivery requirements

Conformity of the tube to the requisites of the order is verified by means of a specific inspection in accordance with EN 10021.

7. Inspection Documents

The product is subjected to the following:

- Inspection and test procedures conforming to the standard indicated at the time of ordering
- UT transversal and longitudinal check conforming to EN 10246 – 6 and 7 at level U2 severity (5%) on 100% of tubes supplied
- Visual and dimensional inspection in compliance with the norm specified in the order

Option d
Additional specific inspections can be agreed upon at time of ordering.

8. Surfaces

The product is supplied with hot finished surfaces.

9. Inspection Certificate

The product comes with a 3.1 type inspection certificate in accordance with EN 10204: 2004.

Option e
Other certification can be agreed upon when ordering.

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

10. Identification and marking

The tubes are identified by the following marking:

Paint stenciled continuously along the entire length of the tube:

- Manufacturer's trademark
- Manufacturing norms
- Steel type code
- O.D x W.T. in mm
- S (production process)
- Cast no.
- Internal confirmation no.
- Plant inspector

Dye Stamping – at one end of the tube:

- Manufacturer's trademark
- Steel grade
- S (production process)
- Plant inspector

Option f
Further identification (specified by the customer) can be inserted in the painted marking

Option g
Color-coding at one end can be specified.

11. Packaging

Diameters greater than 139.7 mm: loose
Diameters less than or equal to 139.7 mm: in bundles

Tenaris offers technical assistance for tailor-made applications of its product.

DIMENSIONAL RANGE

OUTSIDE DIAMETER mm	WALL THICKNESS													
	2,3	2,6	2,9	3,2	3,6	4,0	4,5	5,0	5,4	5,6	6,3	7,1	8,0	8,8
26,9	1,4	1,6	1,7	1,9	2,1	2,3	2,5							
33,7	1,8	2,0	2,2	2,4	2,7	2,9	3,2	3,5	3,8	3,9				
35,0	1,9	2,1	2,3	2,5	2,8	3,1	3,4	3,7	3,9	4,1				
38,0	2,0	2,3	2,5	2,7	3,1	3,4	3,7	4,1	4,3	4,5	4,9			
40,0		2,4	2,7	2,9	3,2	3,6	3,9	4,3	4,6	4,8	5,2	5,8		
42,4		2,6	2,8	3,1	3,4	3,8	4,2	4,6	4,9	5,1	5,6	6,2		
44,5		2,7	3,0	3,3	3,6	4,0	4,4	4,9	5,2	5,4	5,9	6,5		
48,3		2,9	3,2	3,6	4,0	4,4	4,9	5,3	5,7	5,9	6,5	7,2	8,0	
51,0		3,1	3,4	3,8	4,2	4,6	5,2	5,7	6,1	6,3	6,9	7,7	8,5	
54,0		3,3	3,7	4,0	4,5	4,9	5,5	6,0	6,5	6,7	7,4	8,2	9,1	9,8
57,0		3,5	3,9	4,2	4,7	5,2	5,8	6,4	6,9	7,1	7,9	8,7	9,7	10,5
60,3		3,7	4,1	4,5	5,0	5,6	6,2	6,8	7,3	7,6	8,4	9,3	10,3	11,2
63,5			4,3	4,8	5,3	5,9	6,5	7,2	7,7	8,0	8,9	9,9	10,9	11,9
70,0			4,8	5,3	5,9	6,5	7,3	8,0	8,6	8,9	9,9	11,0	12,2	13,3
73,0			5,0	5,5	6,2	6,8	7,6	8,4	9,0	9,3	10,4	11,5	12,8	13,9
76,1			5,2	5,8	6,4	7,1	7,9	8,8	9,4	9,7	10,8	12,1	13,4	14,6
82,5				6,3	7,0	7,7	8,7	9,6	10,3	10,6	11,8	13,2	14,7	16,0
88,9				6,8	7,6	8,4	9,4	10,3	11,1	11,5	12,8	14,3	16,0	17,4
101,6					8,7	9,6	10,8	11,9	12,8	13,3	14,8	16,5	18,5	20,1
108					9,3	10,3	11,5	12,7	13,7	14,1	15,8	17,7	19,7	21,5
114,3					9,8	10,9	12,2	13,5	14,5	15,0	16,8	18,8	21,0	22,9
121						11,5	12,9	14,3	15,4	15,9	17,8	19,9	22,3	24,3
127						12,1	13,6	15,0	16,2	16,8	18,8	21,0	23,5	25,7
133						12,7	14,3	15,8	17,0	17,6	19,7	22,0	24,7	27,0
139,7						13,4	15,0	16,6	17,9	18,5	20,7	23,2	26,0	28,4
141,3							15,1	16,8	18,1	18,7	21,0	23,5	26,3	28,8
152,4							16,4	18,2	19,6	20,3	22,7	25,4	28,5	31,2
159							17,1	19,0	20,5	21,2	23,7	26,6	29,8	32,6
168,3							18,1	20,1	21,7	22,5	25,2	28,2	31,6	34,6
177,8								21,3	23,0	23,8	26,6	29,9	33,5	36,7
193,7										26,0	29,1	32,7	36,6	40,1
203											27,3	30,6	34,3	38,5
219,1												29,5	33,1	37,1
229													34,6	38,9
244,5														43,6
273														51,1
298,5														57,3
323,9														62,3
355,6														68,6
368,0														77,9
406,4														86,3
419														89,0
457														97,3
508														108,3
521														111,2
559														
610														
660														
711														
	2,3	2,6	2,9	3,2	3,6	4,0	4,5	5,0	5,4	5,6	6,3	7,1	8,0	8,8

The number in each square indicates the metric weight (kg/m)

10,0	11,0	12,5	14,2	16,0	17,5	20,0	22,2	25,0	28,0	30	32	36	40	
														26,9
														33,7
														35,0
														38,0
														40,0
														42,4
														44,5
														48,3
														51,0
														54,0
														57,0
														60,3
12,4														63,5
13,2														70,0
14,8	16,0													73,0
15,5	16,8	18,6												76,1
16,3	17,7	19,6												82,5
17,9	19,4	21,6	23,9	26,2										88,9
19,5	21,1	23,6	26,2	28,8	30,8									101,6
22,6	24,6	27,5	30,6	33,8	36,3	40,2	43,5							108
24,2	26,3	29,4	32,8	36,3	39,1	43,4	47,0	51,2						114,3
25,7	28,0	31,4	35,1	38,8	41,8	46,5	50,4	55,1						121
27,4	29,8	33,4	37,4	41,4	44,7	49,8	54,1	59,2						127
28,9	31,5	35,3	39,5	43,8	47,3	52,8	57,4	62,9						133
30,3	33,1	37,1	41,6	46,2	49,8	55,7	60,7	66,6						139,7
32,0	34,9	39,2	43,9	48,8	52,7	59,0	64,3	70,7	77,1	81,2				141,3
32,4	35,3	39,7	44,5	49,4	53,4	59,8	65,2	71,7	78,2	82,3				152,4
35,1	38,4	43,1	48,4	53,8	58,2	65,3	71,3	78,5	85,9	90,6	95,0			159
36,7	40,1	45,2	50,7	56,4	61,1	68,6	74,9	82,6	90,5	95,4	100,2			168,3
39,0	42,7	48,0	54,0	60,1	65,1	73,1	80,0	88,3	96,9	102,3	107,6			177,8
41,4	45,2	51,0	57,3	63,8	69,2	77,8	85,2	94,2	103,4	109,3	115,1			193,7
45,3	49,6	55,9	62,9	70,1	76,0	85,7	93,9	104,0	114,4	121,1	127,6	140,0	151,6	203
47,6	52,1	58,7	66,1	73,8	80,1	90,3	99,0	109,7	120,8	128,0	134,9	148,3	160,8	219,1
51,6	56,4	63,7	71,8	80,1	87,0	98,2	107,8	119,7	132,0	139,9	147,6	162,5	176,7	229
54,0	59,1	66,7	75,2	84,0	91,3	103,1	113,2	125,8	138,8	147,2	155,5	171,3	186,4	244,5
57,8	63,3	71,5	80,6	90,2	98,0	110,7	121,7	135,3	149,5	158,7	167,7	185,1	201,7	273
64,9	71,1	80,3	90,6	101,4	110,3	124,8	137,3	152,9	169,2	179,8	190,2	210,4	229,8	298,5
71,1	78,0	88,2	99,6	111,5	121,3	137,4	151,3	168,6	186,8	198,6	210,3	233,0		323,9
77,4	84,9	96,0	108,4	121,5	132,2	149,9	165,2	184,3	204,3	217,4	230,3	255,6	280,0	355,6
85,2	93,5	105,8	119,5	134,0	145,9	165,5	182,5	203,8	226,2	240,9	255,4	283,7	311,3	368,0
88,3	96,8	109,6	123,9	138,9	151,3	171,6	189,3	211,5	234,8	250,1	265,1	294,7	323,5	406,4
97,8	107,3	121,4	137,3	154,0	167,8	190,6	210,3	235,1	261,3	278,5	295,4	328,8	361,4	419
100,9	110,7	125,3	141,7	159,0	173,3	196,8	217,2	242,9	270,0	287,8				457
110,2	121,0	137,0	155,1	174,0	189,7	215,5	238,0	266,3	296,2	315,9				508
122,8	134,8	152,7	172,9	194,1	211,7	240,7	266,0	297,8	331,4	353,6				521
126,0	138,3	156,7	177,5	199,3	217,3	247,1	273,1	305,8	340,4	363,2				559
135,4	148,7	168,5	190,8	214,2	233,7	265,8	293,9	329,2						610
148,0	162,5	184,2	208,6	234,4	255,7	291,0	321,8	360,7						660
160,3	176,0	199,6	226,1	254,1	277,3	315,6	349,2							711
	189,9	215,3	244,0	274,2	299,3									
10,0	11,0	12,5	14,2	16,0	17,5	20,0	22,2	25,0	28,0	30	32	36	40	mm

The number in each square indicates the metric weight (kg/m)

— EN 10297-1 standard range

EN 10297 -1 tolerances

Outside diameter
+/- 1% (min 0,5 mm)

Wall thickness

+/- 12,5%

+/- 15%

+/- 20%

to be agreed

OUTSIDE DIAMETER

WALL THICKNESS

Contact Us

Europe

Pietro Braguglia
Technical Assistance Manager
pbraguglia@tenaris.com
(49 – 0) 89 5908 2056 tel
(49 – 0) 89 5908 1369 fax

Alessandro Giacobbe
Product Manager Structural Pipes
dalgia@dalmine.it
(39) 035 560 2332 tel
(39) 035 560 2454 fax

ARGENTINA

Buenos Aires
Adrian Fila
afila@tenaris.com
(54) 3489 435332 tel
(54) 3489 435366 fax

BOLIVIA

Santa Cruz de la Sierra
Richard Mariaca
rmariaca@tenaris.com
(591) 3 312 0603 tel
(591) 3 312 0602 fax

BRAZIL

Sao Paulo
Germano Fehr
gfehr@confab.com.br
(55) 12 244 9400 tel
(55) 12 244 9003 fax

CANADA

Toronto
George Nogalo
gnogalo@tenaris.com
(416) 216 4617 tel
(416) 214 2043 fax

CASPIAN SEA

Aktau
Derek Smith
dsmith@tenaris.com
(994) 12 921411 tel
(994) 12 971023 fax

CHINA

Beijing
David Crooks
dcrooks@tenaris.com
(86) 10 6437 6744 tel
(86) 10 6437 6746 fax

COLOMBIA

Bogotá
Gaston Mengelle
gmengelle@tenaris.com
(57) 1 636 2920 tel
(57) 1 623 4780 fax

ECUADOR

Quito
Marcelo Gonzalez Pondal
mgonzalezpondal@tenaris.com
(593) 2 298 6240 tel
(593) 2 298 6250 fax

FRANCE

Paris
Gregoire Flipo
gflipo@tenaris.com
(33) 1 4757 1212 tel
(33) 1 4757 1081 fax

GERMANY

München
Marc Rennings
mrennings@tenaris.com
(49) 0 89 5908 2111 tel
(39) 035 378 097 fax

ITALY

Dalmine
Ricardo Perugini
rperugini@tenaris.com
(39) 035 560 3351 tel
(39) 035 560 2454 fax

JAPAN

Kawasaki
Marcelo Ramos
mramos@tenaris.com
(81) 44 328 3400 tel
(81) 44 328 3456 fax

KOREA

Seoul
Leandro Ramos
lramos@tenaris.com
(82) 2 798 3385 tel
(82) 2 798 3392 fax

MEXICO

Veracruz
Ricardo Baez
rbaez@tenaris.com
(52) 229 989 1911 tel
(52) 229 989 404 fax

NETHERLANDS

Rotterdam
Frans Reijkersz
freiijkersz@dalmine.it
(31) 651 359 914 tel
(39) 035 378 095 fax

NIGERIA

Port Harcourt
Jorge Mayer
jmayer@tenaris.com
(234) 84 610299 tel
(234) 84 611859 fax

NORWAY

Stavanger
Arnt Oxaas
aoxaas@tenaris.com
(47) 51 44 3440 tel
(47) 51 44 3441 fax

ROMANIA

Zalau
Laurentiu Paval
laurentiu.paval@silcotub.ro
(40) 745 107 093 tel
(40) 260 610 743 fax

RUSSIA

Moscow
Alex Kondrashov
akondrashov@tenaris.com
(7) 095 502 1630 tel
(7) 095 937 6781 fax

SINGAPORE

Singapore
Sia Soon Tee
stisia@tenaris.com
(65) 6395 9000 tel
(65) 6 222 4090 fax

UAE

Dubai
Ricardo Capria
rcapria@tenaris.com
(971) 4 2725 394 tel
(971) 4 2725 392 fax

UK

Coseley
Carlo Alberto De Stefanis
cdestefanis@tenaris.com
(44) 1902 665288
(44) 1902 665263

USA

Houston
Fabio Gomez
fgomez@tenaris.com
(1) 713 767 4484 tel
(1) 713 336 7610 fax

VENEZUELA

Caracas
Jorge Samitier
csamitier@tenaris.com
(58) 212 902 3969 tel
(58) 212 902 3937 fax