

Tubular hot finished structural hollow sections



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Seamless tubular structural hollow sections with an application in construction and steel structural work. In accordance with the standard EN 10210, which has replaced the various European national standards, Tenaris produces various steel grades in an extensive dimensional range, aimed at both traditional and specific applications.

Description and product application field

This catalogue is for tubular hot finished hollow sections produced according to the standard EN 10210 parts 1 and 2.

When used in civil and industrial construction the products shall follow the directive 89/106/EEC (CPD) dated, December 21st 1988, which concerns products for construction and the relative CE mark.

Applicable standards

This catalogue is based on EN 10210-1/2 standards that are listed in the following table. In all cases, latest editions of these standards shall be used.

EN 10210-1	Hot finished structural hollow sections of non-alloy and fine grain steels Part. 1: Technical delivery conditions
EN 10210-2	Hot finished structural hollow sections of non-alloy and fine grain steels Part. 2: Tolerances, dimensions and sectional properties

Performance characteristics for steel construction ECC directive (CPD) 89/106/EEC (CE Mark)

Tenaris meets all performance characteristics for steel construction stated by ECC directive (CPD) 89/106/EEC as amended by 93/68/EEC. This directive has the purpose to ensure that the constructions and all the products used are made in order not to compromise the safety of persons, animals and property.

Tenaris has obtained the EC Factory Production Control Certificate n°0038.

The tubes will have the CE mark reported on invoicing documents and on material Certificates.



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Comparison with other standards

LIST OF CORRESPONDING FORMER NATIONAL DESIGNATIONS				
EUROPEAN STD	ITALY	GERMANY	FRANCE	GREAT BRITAIN
EN 10210-1	UNI 7806	DIN 17121 DIN 17124	NF A 35-501 NF A 49-501	BS 4360
S235JRH	Fe 360 B	St 37.2	E 24-2	
S275J0H	Fe 430 C	St 44-3 U	E 28-3	43 C
S275J2H	Fe 430 D	St 44-3 N	E 28-4	43 D
S355J0H	Fe 510 C	St 52-3 U	E 36-3	50 C
S355J2H	Fe 510 D	St 52-3 N	E 36-4	50 D
S275NH		St E 285 N		
S355NH		St E 355 N		
S460NH		St E 460 N		

COMPARISON OF EN 10210 (EU) VS. ASTM A500 , A618/A 618M (USA) & CSA G40.21 (CANADA)				
Standard	EN 10210	ASTM A500	ASTM A618/A 618M	CSA G40.21
Grade	S355J0H/J2H/K2H	C	II	50W
Analysis % (max)	C 0,22	C 0,23	C 0,22	C 0,23
	Mn 1,60	Mn 1,35	Mn 0,85 -1,35	Mn 1,35
Yield Strength Min (MPA)	355	317	345	345
Tensile Strength Min (MPA)	510	427	485	450
Elongation Min % in 2"	22	21	22	22
Impact test Min	J0H at 0°C = 27J	N.A	N.A	N.A
	J2H at -20°C = 27J	N.A	N.A	N.A
	K2H at -20°C = 40J	N.A	N.A	N.A

EN 10210 (EUROPE) Hot finished structural hollow sections of non -alloy and fine grain steels

ASTM A500 (USA) Cold -Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A618/A618 M (USA) Hot -Formed Welded and Seamless High-Strength Low -Alloy Structural Tubing

CSA G40.21 (CANADA) Rolled or Welded Structural Quality Steel

Order definition

Details (Essential datas):

Manufacturing Norms: EN 10210

- Steel grade
- Dimensions: External diameter, wall thickness & length in mm
- Quantity and relative tolerances

Example:

EN 10210 – S460NH – 139,7 x 14,2 x 12000



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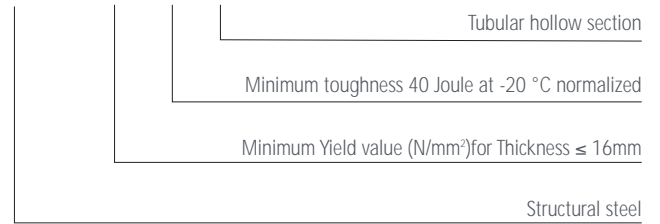
Example 1 Steel grade designation EN 10210 - EU Standard

S 275 J0 H



Example 2 Steel grade designation EN 10210 - EU Standard

S 460 N H



Steel grades

CHEMICAL ANALYSIS %

GRADE	C		Si	Mn	P	S	N
	Norm. W.T. mm						
	≤ 40	> 40 ≤ 65					
S235JRH	≤ 0,17	≤ 0,20	-	≤ 1,40	≤ 0,040	≤ 0,040	≤ 0,009
S275JOH	≤ 0,20	≤ 0,22	-	≤ 1,50	≤ 0,035	≤ 0,035	≤ 0,009
S275J2H	≤ 0,20	≤ 0,22	-	≤ 1,50	≤ 0,030	≤ 0,030	-
S355JOH	≤ 0,22	≤ 0,22	≤ 0,55	≤ 1,60	≤ 0,035	≤ 0,035	≤ 0,009
S355J2H	≤ 0,22	≤ 0,22	≤ 0,55	≤ 1,60	≤ 0,030	≤ 0,030	-
S355K2H	≤ 0,22	≤ 0,22	≤ 0,55	≤ 1,60	≤ 0,030	≤ 0,030	-



Volos Stadium - Greece

CHEMICAL ANALYSIS %

STEEL GRADE	C	Si	Mn	P	S	Nb	V	Al tot.	Ti	Cr	Ni	Mo	Cu	N
S275NH	≤ 0,20	≤ 0,40	0,50 1,40	≤ 0,035	≤ 0,030	≤ 0,050	≤ 0,08	≥ 0,020	≤ 0,03	≤ 0,30	≤ 0,30	≤ 0,10	≤ 0,35	≤ 0,015
S275NLH				≤ 0,030	≤ 0,025									
S355NH	≤ 0,20	≤ 0,50	0,90 1,65	≤ 0,035	≤ 0,030	≤ 0,050	≤ 0,12	≥ 0,020	≤ 0,03	≤ 0,30	≤ 0,50	≤ 0,10	≤ 0,35	≤ 0,020
S355NLH	≤ 0,18			≤ 0,030	≤ 0,025									
S420NH	≤ 0,22	≤ 0,60	1,00 1,70	≤ 0,035	≤ 0,030	≤ 0,050	≤ 0,20	≥ 0,020	≤ 0,03	≤ 0,30	≤ 0,80	≤ 0,10	≤ 0,70	≤ 0,025
S420NLH				≤ 0,030	≤ 0,025									
S460NH	≤ 0,22	≤ 0,60	1,00 1,70	≤ 0,035	≤ 0,030	≤ 0,050	≤ 0,20	≥ 0,020	≤ 0,03	≤ 0,30	≤ 0,80	≤ 0,10	≤ 0,70	≤ 0,025
S460NLH				≤ 0,030	≤ 0,025									

MECHANICAL PROPERTIES

STEEL GRADE	Min. Yield Strength (R _{eH}) N/mm ²			Tensile Strength (R _m) N/mm ²		Elongation % Minimum				Impact Strength Minimum	
	Nominal W.T. mm			Nominal W.T. mm		Nominal W.T. mm				T °C	J
	0 ≤ 16	> 16 ≤ 40	> 40 ≤ 65	≤ 3	> 3 ≤ 65	Long. ≤ 40	> 40 ≤ 65	Transv. ≤ 40	> 40 ≤ 65		
S235JRH	235	225	215	360 ÷ 510	340 ÷ 470	26	25	24	23	20	27
S275J0H	275	265	255	430 ÷ 580	410 ÷ 560	22	21	20	19	0	27
S275J2H										- 20	27
S355J0H	355	345	335	510 ÷ 680	490 ÷ 630	22	21	20	19	0	27
S355J2H										- 20	27
S355K2										- 20	40

STEEL GRADE	Min. Yield Strength (R _{eH}) N/mm ²			Tensile Strength (R _m) N/mm ²	Minimum Elongation %		Minimum Impact energy KV ²	
	at specified thickness mm				at specified thickness ≤ 65 mm		J	
	≤ 16	> 16 ≤ 40	> 40 ≤ 65	Longitudinal ≤ 65	Longitudinal	Transverse	At test temperature of -50 °C	-20 °C
S275NH	275	265	255	370 ÷ 510	24	22	-	40
S275NLH							27	
S355NH	355	345	335	470 ÷ 630	22	20	-	40
S355NLH							27	
S420NH	420	400	390	520 ÷ 680	19	17	-	40
S420NLH							27	
S460NH	460	440	430	540 ÷ 720	17	15	-	40
S460NLH							27	

N to indicate normalized condition

L for the qualities with specified impact properties at -50 °C

H to indicate hollow sections

Weldability

Weldability is a key factor for the tubes in structural and engineering applications.

Tenaris guarantees the good weldability of its products thanks to its controlled chemical composition with low carbon equivalent.

Carbon Equivalent Value (CEV)

The maximum Carbon Equivalent Value (CEV) is determined, based on the cast analysis, by the following formula:

$$CEV = C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Ni+Cu}{15}$$

The maximum CEV for each steel grade is stated on the tables. 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 (specially for HAZ)
- Design requirements
- Welding method used
- Weld material characteristics

Particular precautions should be taken towards crack susceptibility, 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 CEV)
- The amount of diffusible hydrogen in the weld material
- HAZ micro-structure
- Tensile stress concentrations at the weld joint.

CARBON EQUIVALENT (CEV)%				
STEEL GRADE	Maximum Carbon Equivalent (CEV) in % for specified thicknesses in mm			
	≤16	>16 ≤ 40	>40 ≤ 65	>65 ≤ 120
S235JRH	0,37	0,39	0,41	0,44
S275J0H	0,41	0,43	0,45	0,48
S275J2H	0,41	0,43	0,45	0,48
S355J0H	0,45	0,47	0,50	0,53
S355J2H	0,45	0,47	0,50	0,53
S355K2H	0,45	0,47	0,50	0,53

CARBON EQUIVALENT (CEV)%		
STEEL GRADE	Maximum Carbon Equivalent (CEV) in % for specified thicknesses in mm	
	≤16	>16 ≤ 65
S275NH	0,40	0,40
S275NLH		
S355NH	0,43	0,45
S355NLH		
S420NH	0,50	0,52
S420NLH		
S460NH	0,53	0,55
S460NLH		

Dimensions and Tolerances

Outside Diameter OD	±1% with a minimum of ±0.5
Wall Thickness WT	-10% ^{(a)(b)}
Straightnes	max 0.2% of total length and max 3 mm over any 1m length
Mass (Kg/m)	-6%/+8% on individual delivered lengths

a) The positive deviation is limited by the tolerance on mass

b) Tenaris can guarantee a WT tolerance in one section of -10%/+15%, average wall thickness shall be such as to comply with minimum and maximum weight per meter

Length

The standard length supplied are from 5 to 12 m inclusive. The length supplied vary with the dimension; for each dimension the range is max 2 m.

Service Center

The Service center can supply tubes cut in fixed lengths with tolerances of -0 +10 mm.

Option

Fixed or multiple lengths can be agreed upon at time of ordering.

Tests

The product is subjected always to the following tests:

- Cast analysis
- Tensile test
- Impact test
- Electromagnetic test acc.to EN 10246-5-Lev.F3 (not required by EN 10210)
- Visual inspection

Option

Additional specific controls to be agreed

Surface protection

Tubes shall have external and internal bare surfaces

Marking

All pipes shall be stenciled with: TENARIS XX (mill code), heat number, dimensions, specification, grade, CE mark (option).

Die Stamping

All pipes shall be stamped with: Manufacturer's trademark, Steel grade, S (Production Process), Plant Inspector Code.

Options

- *Other specific marking requirements may be performed upon agreement.*
- *Color coding at one end to be agreed*

Packaging

Depending on diameters the packaging will be in loose condition or in bundles.

Documentation

For each shipment a Material Test Certificate (MTC) type 3.1 according to EN10204-1 and Packing List (PL) shall be issued containing at least the following information:

Customer Name and Customer reference
Manufacturer works order
Specification and Steel grade
Chemical Analysis
Mechanical test result
Conformance with NDT.
Quantities, dimensions and lengths shipped

The certificate shall report upon request the declaration:

“ We hereby declare that the above product has been designed, manufactured and tested in accordance to requirement of CPD Directive 93/68/EEC ” and CE mark n° 038

Option

Other certification to be agreed

Quality Assurance

Tenaris mills, in which these products are manufactured, are qualified according to the International Standard ISO-9001:2000.



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DIMENSIONS

		WALL THICKNESS																												
mm		2,4	2,7	3,2	3,6	4	4,5	5,2	6,5	8	9	10	12	16	20	22	26	28	30	33	36	40	45	50	58	60	64			
OUTSIDE DIAMETER	21,3																												0.840	
	26,9																													1.060
	33,7																													1.330
	42,4																													1.670
	48,3																													1.900
	60,3																													2.375
	76,1																													3.000
	88,9																													3.500
	101,6																													4.000
	114,3																													4.500
	139,7																													5.500
	168,3																													6.625
	177,8																													7.000
	193,7																													7.625
	203																													8.000
	219,1																													8.625
	244,5																													9.625
	273																													10.750
	323,9																													12.750
	355,6																													14.000
406,4																													16.000	
457																													18.000	
508																													20.000	
610																													24.000	
660																													26.000	
711																													28.000	
		0.094	0.106	0.126	0.142	0.157	0.177	0.205	0.256	0.315	0.354	0.394	0.472	0.630	0.787	0.866	1.024	1.102	1.181	1.299	1.417	1.575	1.772	1.969	2.283	2.362	2.520	inch.		

Other dimensions not shown can be produced on request.

According to EN 10210-2
 To be agreed

For steel grade S420 MLH, 460NLH any request for quote has to be verified with a technical query (Product Engineering Department)



The New Hospital in Mestre - Italy

Contact Us

EUROPE

Alessandro Giacobbe
agiacobbe@tenaris.com
(39) 035 560 2332 tel
(39) 035 560 3990 fax



ARGENTINA

Buenos Aires
Marcelo de Virgiliis
mdevirgiliis@tenaris.com
(54) 11 4018 3213 tel
(54) 11 4018 8373 fax

CANADA

Toronto
George Nogalo
gnogalo@tenaris.com
(1) 416 216 4617 tel
(1) 416 214 2043 fax

CHINA

Beijing
Alexis Guadarrama
aguadarrama@tenaris.com
(86) 10 8459 7803 tel
(86) 10 6437 6746 fax

GERMANY

München
Marc Rennings
mrennings@tenaris.com
(49) 89 232375 222 tel
(49) 89 232375 200 fax

ITALY

Dalmine
Alessandro Giacobbe
agiacobbe@tenaris.com
(39) 35 560 2332 tel
(39) 35 560 3990 fax

KOREA

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

MEXICO

Veracruz
Victor Palencia
vpalencia@tamsa.com.mx
(52) 55 5282 9943 tel
(52) 55 5282 9966 fax

ROMANIA

Zalau
Andras Balogh
abalogh@tenaris.com
(40) 260 603 223 tel
(40) 260 610 743 fax

SCANDINAVIA

München
Marc Rennings
mrennings@tenaris.com
(49) 89 232375 222 tel
(49) 89 232375 200 fax

UK

Coseley
Kevin Whitehouse
kwhitehouse@tenaris.com
(44) 1902 665288
(44) 1902 665263

USA

Houston
Juan Muhala
jmuhala@tenaris.com
(1) 713 767 4416 tel
(1) 713 582 1650 fax