HIGH TEMPERATURE CARBON STEEL TUBES FOR BUILDING & INDUSTRIAL SERVICES

ÇAYIROVA boru

www.cayirovaboru.com

HIGH TEMPERATURE CARBON STEEL TUBES

DESCRIPTION OF PRODUCT

BS EN10255/**10217-2** Grade S195T/**P235GH**
Hot-finished Carbon Steel Tube.

DESCRIPTION OF STANDARDS

BS EN 10255:2004: Non-alloy steel tubes suitable for welding and threading.

BS EN 10217:2019: Welded steel tubes for pressure purposes-Technical delivery conditions
Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties.

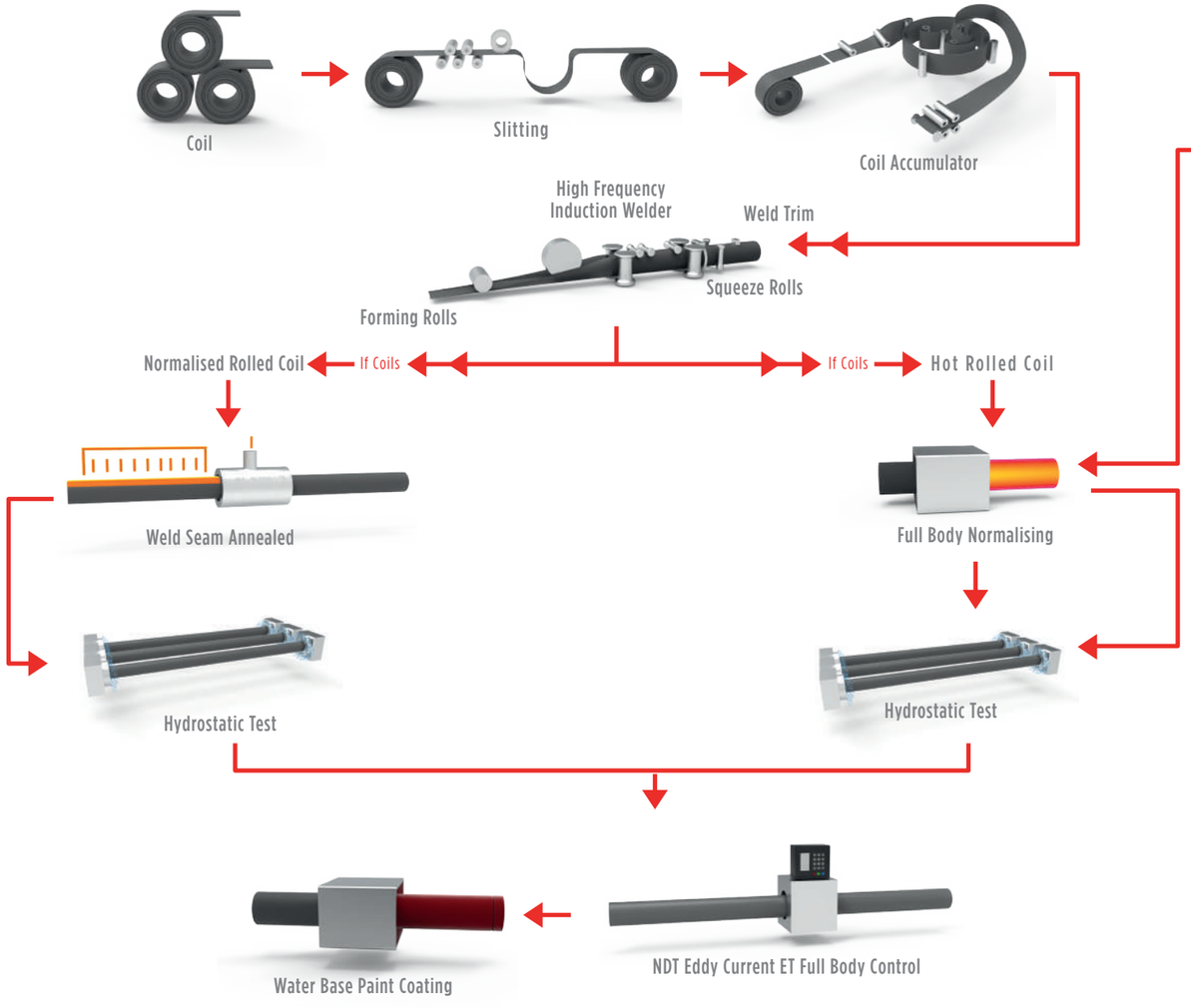
APPLICATIONS

In installation for the transportation/ distribution/storage of gas-fuel

In intend for the supply of building heating/cooling systems from the external storage

In reservoir of the last pressure reduction unit of the boiler/heater/ cooler system(s) of the building (s)

The tubes are manufactured by an electric welding process employing high frequency welding (HFW) in accordance with manufacturing route specified in below Table. All pipes are heated at normalising temperature for fine grain, homogeneous microstructure, and hardness.

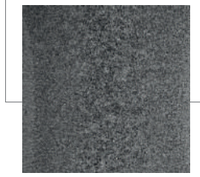


FULL BODY NORMALISING

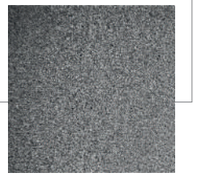
The heat affected zone (HAZ) is occured after welding during the pipe manufacturing. HAZ is a non-melted area of metal that has undergone changes in material properties as a result of being exposed to high temperatures. These changes in material property are usually as a result of welding. HAZ is harder than the pipe body and has martensitic microstructure. Therefore, Çayırova Boru apply full body normalising process to normalise this hard zone on the pipes according to EN 10217 Part 2 standard. Pipe normalising is a heat treatment process performed after cold forming and welding processes to refine the distorted grains in the microstructure.

BENEFITS OF FULL BODY NORMALISING

Macro Structure 40X

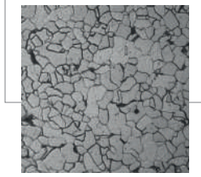


After Welding (Before Normalising) Weld Zone Heat Effected Zone (HAZ) Macro-structure

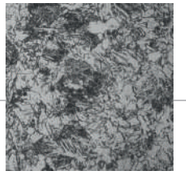


After Normalising Macro-structure

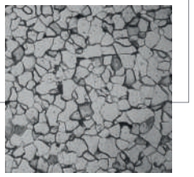
Micro Structure 400X



Pipe Body Micro-structure



After Welding (martensitic structure HAZ)



After Normalising Weld Zone

After heat treatment, the pipe body and welding line microstructure have the same homogeneous structure and hardness.

ADVANTAGES OF NORMALISED STEEL PIPES

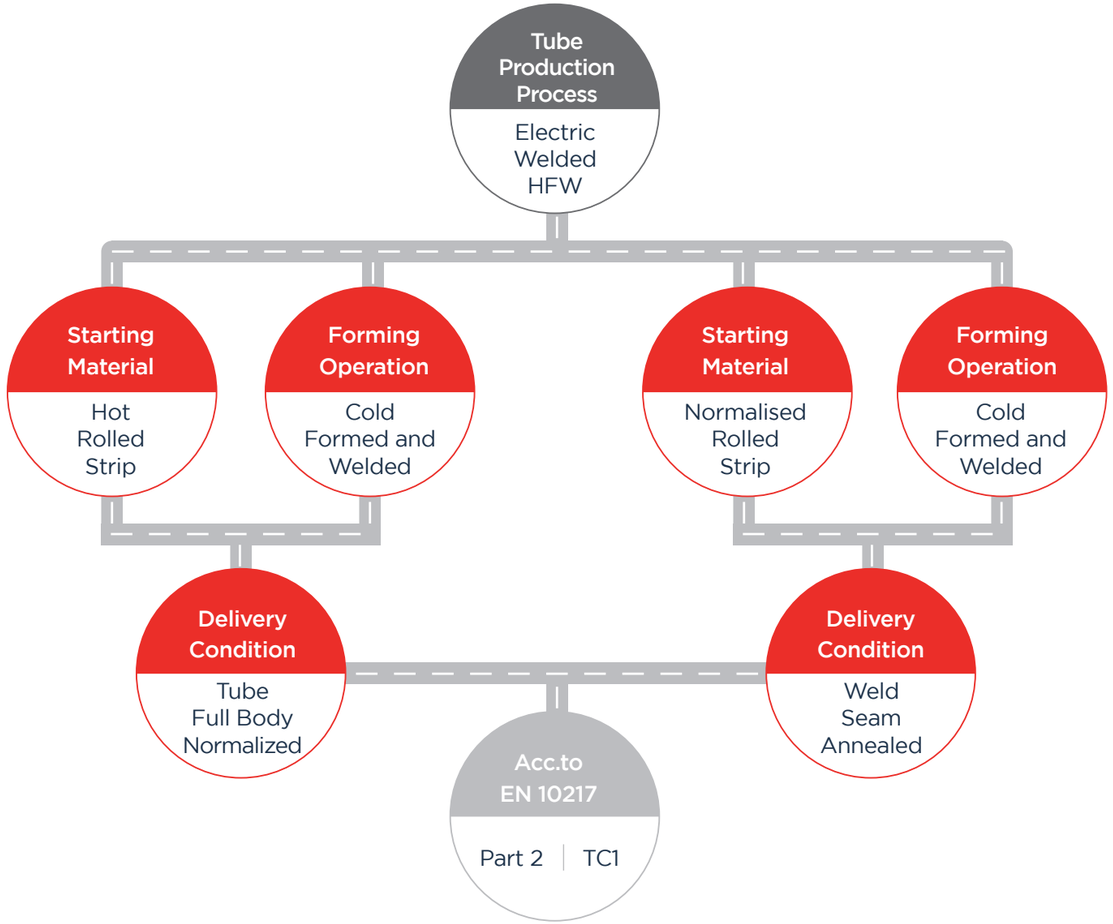
- The heat affected zone (HAZ) is normalised and obtained a homogeneous microstructure.
- The Ductility that has been lost in some pipe processing, forming and welding are improved.
- The hardness that has been increased by mechanical forming and welding processes is reduced.
- The toughness of the pipes is increased.
- The internal stresses that occured during the cold forming are relieved.
- The machinability and stability are improved.
- The strength and resistance for elevated temperature applications are increased.

Therefore, Çayırova Boru apply full body normalising process to normalise this hard zone on the pipes according to EN 10217 Part 2 standard.

The pipes that are produced by Çayırova Boru have adequate creep strength, good heat resistance, corrosion resistance, metallurgical stability, oxidation resistance and stress-rupture resistance.

MANUFACTURING PROCESS

MANUFACTURING ROUTE



QUALITY CONTROL PROCESSES

All elements are cross checked from raw material and product with chemical, mechanical and physical analysis method according to standards requirements for full traceability.

CHEMICAL AND MECHANICAL TESTS

The tubes conform to the requirements of the below table in accordance with standards EN 10255 / EN 10217-2 and inspected with in accordance with all specified requirements of both standards.

It's also suitable for design temperatures from -20 to +300°C, and can be validated in accordance with BS EN 10217-2, with guaranteed elevated temperature properties, in accordance with Part 2 Table 5, up to and including 300°C.

		Chemical Compositions				Mechanical Properties				
		Max %				MPa		Min %	Min Joule	
Standard	Steel	C	Mn	P	S	Yield (min)	Tensil (min-max)	Elongation	Impact Energy	
								l t	l (0°)	l (-10°) t (0°)
BS EN10255/ 10217-2	S195T/ P235GH	0,16	1,20	0,025	0,020	235	360-500	25 23	40	28 27

l: longitudinal | **t:** transverse

CHEMICAL TESTS

All raw materials are tested in terms of chemical and mechanical properties during incoming material control. In addition, for each casting, all products are retested after all production processes, including heat treatment, ensuring full traceability.

MECHANICAL TESTS

TENSILE TEST

The tensile test is performed at room temperature in accordance with EN ISO 6892-1, and the tensile test strength (Rm), the yield strength (Rp0,2) and the percentage elongation are checked according to standard requirments. Also this test can be performed in accordance with EN ISO 6892-2, at one temperature from Table 5 in EN 10217-2, if agreed at the time of enquiry and order, and the proof strength (Rp0,2) can be determined and verified.

FLATTENING AND EXPANDING TESTS FOR WELD DURABILITY

In flattening test, the samples are flattened in one press until the distance between the plates reaches two wall thicknesses of the tube to be sure the strength of the weld. Weld is check against any crack or defect. Further, the tubes are expanded with a conical tool until they break. The surface outside the break zone is checked for cracks or breaks for each coil strip. So, weld and material durability are verified a second time for each coil strip during the production.

LEAK TIGHTNESS TEST

HYDROSTATIC & NDT TESTS

Hydrostatic and full body Eddy Current test (NDT) are performed to comply leak tightness, although one of them is optional in the standard. Also, after all destructive test and full body normalising, final NDT test is performed to all final products..

COMPLIANCE TO REGULATIONS

Manufactured in accordance with a range of standards, including EN10255 and EN10217-2 to satisfy both Construction Products Regulation (CPR) and the Pressure Equipment Directive (PED) requirements, where applicable. Also products are CE marked to CAT 3 (fuel, air, gas) & 4 (water) under the Construction Products Regulations (CPR), fully harmonised with the Pressure Equipment Directive (PED), and is technically compliant for use at elevated temperatures.

Dual Certified welded carbon steel pipes for building services products

Standart	BS EN 10255 / 10217-2:2019 GH Part 2 - TC 1
Technical Delivery Condition	HOT FINISHED
Grade	S195T-P235GH
Temp Classification	High Temp (HT)
PED Compliance	YES
CPR CE Compliance	YES – System 3&4
UKCA Compliance	YES

CE marked to CPR CAT 3 (gas/fuel) and CPR CAT 4 (water) for added confidence and application suitability. Also UKCA marked for CPR CAT 4 (water).Available in a wide range of sizes and weights.

Diameter			Wall Thickness (mm)									
inch	mm	DN	1,80	2,00	2,30	2,60	2,90	3,20	3,60	4,00	4,50	5,00	5,40
3/8	17,2	10	L2	L / L1	M		H						
1/2	21,3	15		L2	L / L1	M		H					
3/4	26,9	20			L/L1/L2	M		H					
1	33,7	25				L2	L / L1	M		H			
1 1 4	42,4	32				L2	L / L1	M		H			
1 1 2	48,3	40					L/L1/L2	M		H			
2	60,3	50					L2	L / L1	M		H		
2 1 2	76,1	65						L/L1/L2	M		H		
3	88,9	80						L / L2	L1	M		H	
4	114,3	100							L / L2	L1	M		H
5	139,7	125									L	M	H
6	165,1	150									L	M	H

M: Medium, L: Light, L1: Light 1, L2: Light 2.
Note: L and L2 light weight material is non standard. Please contact one of our sales represents to confirm availability.

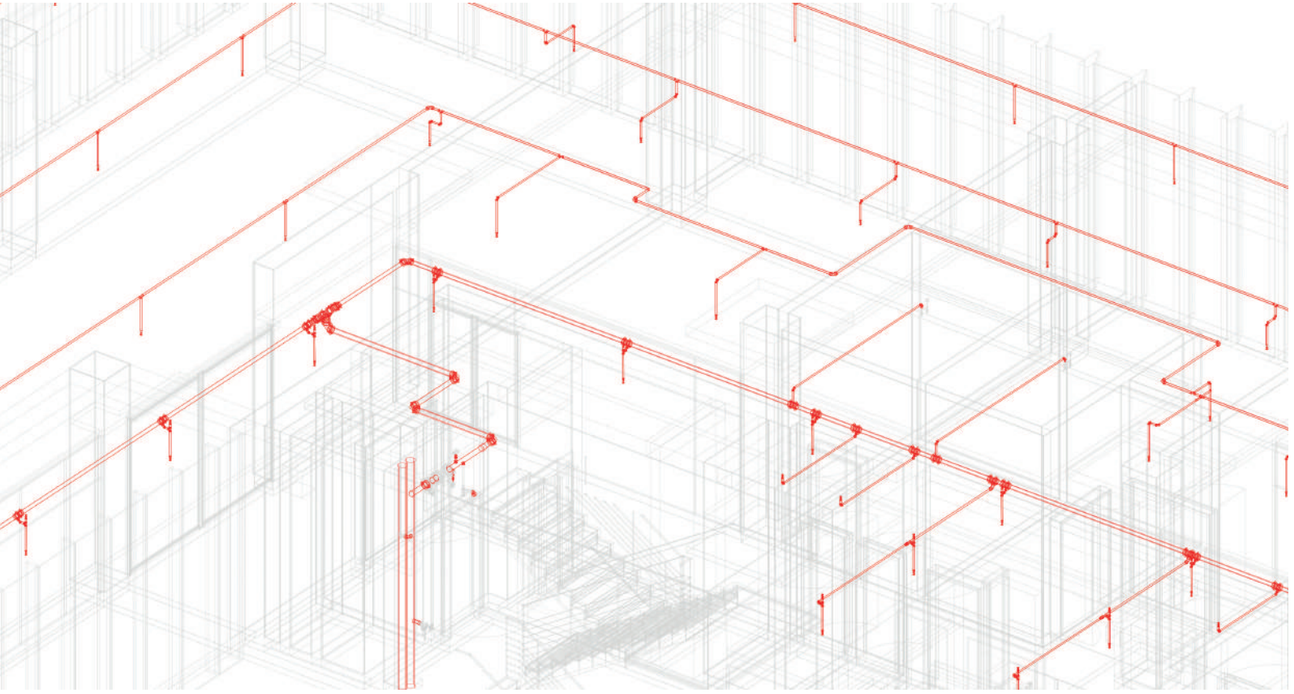
The internal weld bead on all products over 1" is completely removed, providing a clear, smooth inner tube roundness.

Available in a range of ends (plain, grooved or screwed and socketed) and surface finishes (red-painted or galvanised).

Products can be coated with water based red paint. Other special surface colours and finishes, including external powder epoxy is also available.

RECOMMENDED DESIGN TEMPERATURE & PRESSURE

We are able to make the following recommendations with regards to temperature and consequently pressure durability. Suitable for pressure applications and temperature range -20 to +300ºC.



Recommended maximum design pressure at elevated temperatures

			Pipe Sizes mm/inch										
			21.3	26.9	33.7	42.4	48.3	60.3	76.1	88.9	114.3	139.7	165.1
			1/2	3/4	1	11/4	11/2	2	21/2	3	4	5	6
Joints	Conditions	Weight Series	Pressure (bar)										
Screwed and socketed (1)	Water -20 to 100ºC	Medium	80	75	70	55	45	40	35	30	25	N/A*	N/A*
		Heavy	100	90	85	70	60	55	45	40	35	N/A*	N/A*
	Compressed Air	Medium	70	65	60	50	40	35	30	25	20	N/A*	N/A*
		Heavy	90	80	75	65	55	50	40	35	30	N/A*	N/A*
	Steam to 220ºC max	Medium	20	20	20	19	19	17	17	17	15	N/A*	N/A*
		Heavy	22	22	22	21	21	19	19	19	17	N/A*	N/A*
Butt-welded (2)	-20 to 60ºC	Medium	233	186	172	137	120	109	86	82	72	65	55
		Heavy	270	215	215	171	150	136	108	103	86	70	60
	100ºC max	Medium	190	152	149	119	104	94	75	71	62	57	48
		Heavy	234	187	186	148	130	118	93	89	75	61	52
	150ºC max	Medium	182	146	143	114	100	91	72	68	60	54	46
		Heavy	225	179	179	143	125	113	90	85	72	59	50
	300ºC max	Medium	128	103	101	80	71	64	51	48	42	38	32
		Heavy	158	126	126	100	88	80	63	60	51	41	35

(1) When correctly made-up using suitable and appropriate jointing compounds

(2) Butt-welded joints prepared in accordance with current best practice (according to P235GH material mechanical properties)

(3) System design and control engineering will finally prevail

* Pressure data is only for guidance and It will be a function of the jointing system used. Secrewed&Socketed joints may be restricted for some applications so not suggested for 5 and 6".

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