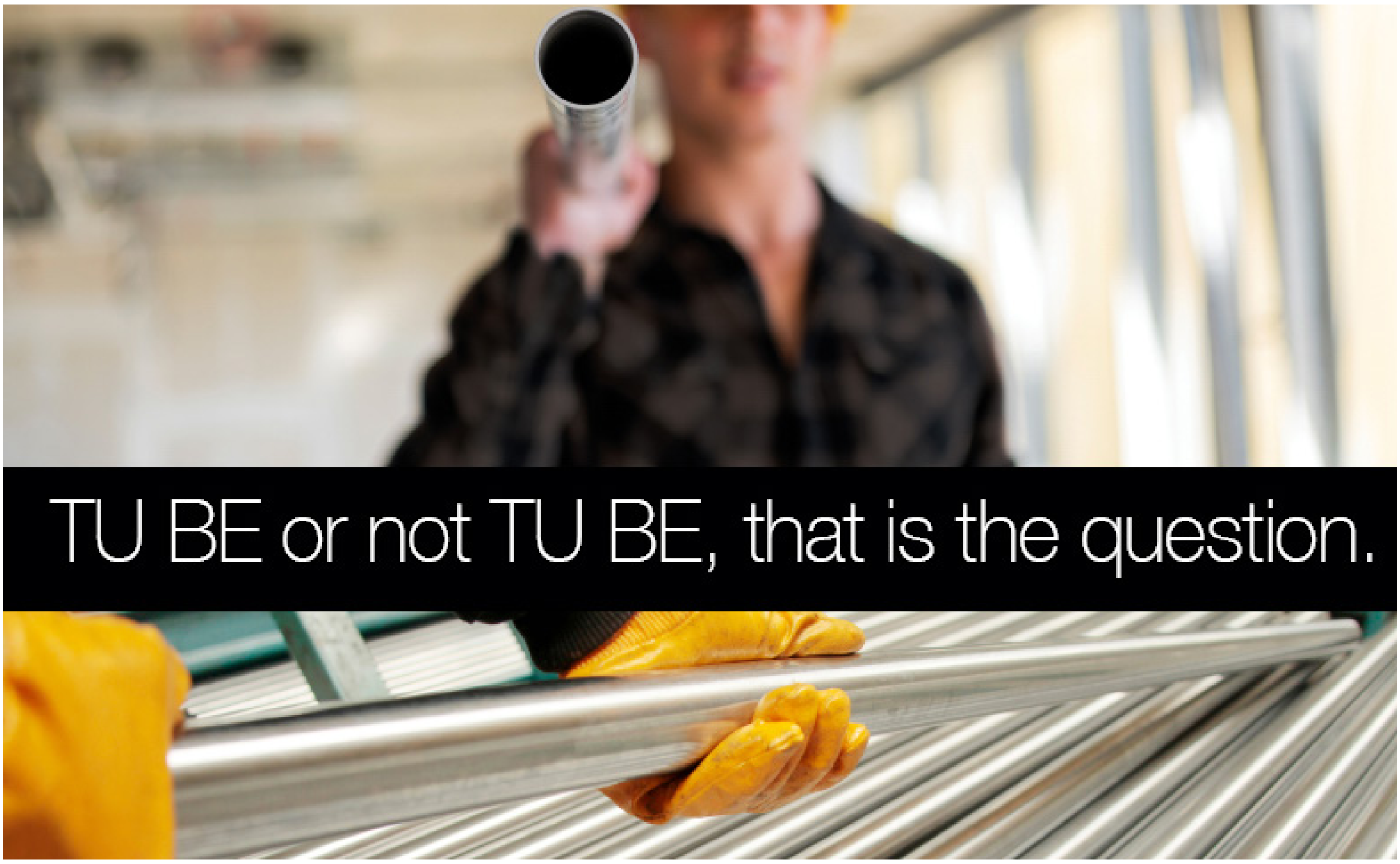
MANNESMANN STAINLESS TUBES
A Member of the Salzgitter Group

The language of the differences between Tube & Pipe



Whilst we often use the words ‘tube’ and ‘pipe’ interchangeably there is, both by application and dimensional definition, a difference between them. Here we have a look at the historical evolution of the product language and how this lead to today’s applicability and language.

The period of industrialisation commenced with conditions less defined and very different from those we are accustomed to today. When talking about a ‘tube‘ the wall thickness often related to the language of wire diameters or sheet/plate thicknesses in use at the time. Standard Wire Gauge, (SWG) and the alternatively used Birmingham Wire Gauge (BWG) have their origins dating from 1883, about the same time that the Mannesmann Brothers developed the Pilgering process, the key transformation process in the production of cold finished tubes.

The inch designation originally referred to the true tube Inside Diameter (ID) with its transfer capacity for fluid and/or gases being the primary consideration.

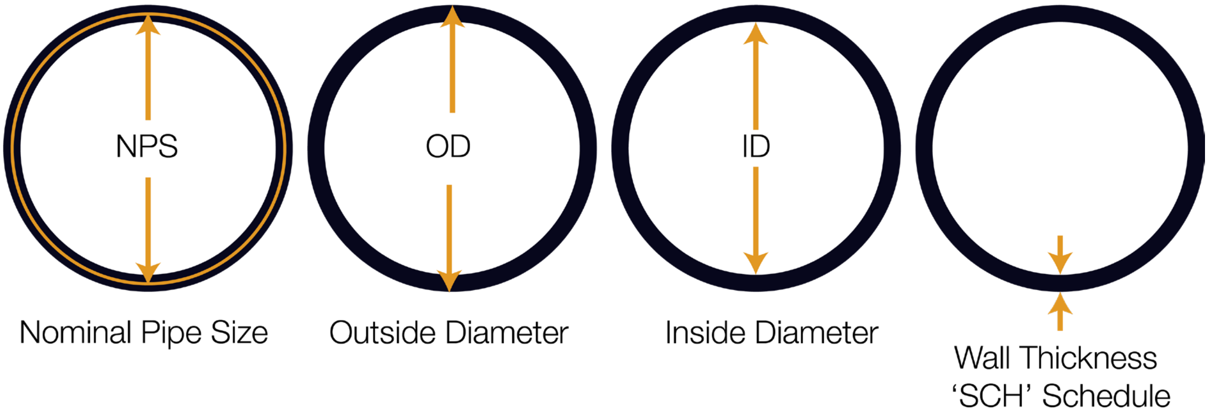
The wall thickness, t, was added as a means to define the required strength, taking into consideration the materials typically in use at the time.

Thus by knowing the ID and t we could calculate the Outside Diameter (OD). example ID = 50mm, t = 5mm therefore OD = 60mm.

In order to connect pipes it was common practice to screw them into pipe fittings with the thread being on the outside diameter.

As materials developed and became stronger and higher performance the wall thickness (t) could be reduced (made thinner). This presented a challenge as the established fittings system based upon OD’s necessitated the OD remaining constant whilst the ID was changed, severing the link between ID and actual inch definition.

Thus, a tube with an original ID of 1” (25.4mm) and OD of 33.4mm became, with its thinner wall new ID of, for example, 27.2mm but the nominal description of ‘1” ‘was retained, hence 1” nominal bore.
The language of ‘nominal bore pipe size’ was thereby created with the ‘pipe’ aspect relating to the historical connection with pipe fittings. Common references include: Nominal pipe size: Nominal bore: Nominal diameter: Nominal size.



Nominal Pipe Size (NPS) originates from a North American set of standard sizes for pipes with the commonly used terminology of eg 2 inch, 4 inch, 6 inch etc having a historical association with the time when ‘inch’ referenced the actual ID.

With the original production of pipes being in only one wall thickness this was referred to as ‘standard’ (STD). With increasing requirements to handle higher pressure fluids the wall thicknesses increased and the use of extra strong (XS) and double extra strong (XXS) developed. In March 1927, the American Standards Association created a system based on smaller, incremental, changes in wall thicknesses with the terms ‘schedule’ (SCH) created to define the nominal wall thickness.

SCH 5, 5S, 10, 10S, 20, 30, 40, 40S, 60, 80, 80S, 100, 120, 140, 160, STD, XS AND XXS.

This system evolved into the US ANSI (American National Standards Institute) ANSI B36.19 for stainless steel and ANSI B36.10 for welded and forged steel pipe. The suffix ‘S’ in the schedule number denotes sizes according to B36.19, hence Stainless Steel. Both standards have the same wall thicknesses excepting a few pipe sizes exceeding 8”NB (219.1mm OD).

Nominal Size	Outside Diameter		Wall Thickness			Identification		
inches	inches	mm	inches	mm	kg/M	Schedule Number		
						ANSI B36.10		ANSI B36.19
½	0.840	21.34	0.064 0.083 0.109 0.147 0.187 0.294	1.65 2.11 2.77 3.73 4.75 7.47	0.80 1.016 1.288 1.645 1.980 2.650	STD XS	40 80 160 XXS	5S 10S 40S 80S
¾	1.050	26.67	0.064 0.083 0.113 0.154 0.218 0.308	1.65 2.11 2.87 3.91 5.54 7.82	1.03 1.298 1.710 2.228 2.940 3.690	STD XS	40 80 160 XXS	5S 10S 40S 80S
1	1.315	33.40	0.064 0.109 0.133 0.179 0.250 0.358	1.65 2.77 3.38 4.55 6.35 9.09	1.30 2.125 2.541 3.287 4.300 5.750		40 80 160 XXS	5S 10S 40S 80S
1 ¼	1.660	42.16	0.064 0.109 0.140 0.191 0.250 0.382	1.65 2.77 3.56 4.85 6.35 9.70	1.65 2.732 3.441 4.531 5.690 7.880	STD XS	40 80 160 XXS	5S 10S 40S 80S

The language of ‘Tube’ often has a link with its associated application, for example heat exchangers being historically with the gauge sizes of SWG (Standard Wire Gauge) or BWG (Birmingham Wire Gauge) e.g. 1” OD 16 SWG means the OD is precisely 1” = 25.4 and the wall thickness 1.65mm = 0.065”. (16BWG = wall thickness 1.63mm = 0.063”).

	Imperial Standard Gauge (swg)		Birmingham Wire Gauge (bwg)			Imperial Standard Gauge (swg)		Birmingham Wire Gauge (bwg)	
No	**ins**	**mm**	**ins**	**mm**	**No**	**ins**	**mm**	**ins**	**mm**
10	.128	3.25	.134	3.40	**18**	.048	1.22	.049	1.24
11	.116	2.95	.120	3.04	**19**	.040	1.02	.042	1.07
12	.104	2.64	.109	2.77	**20**	.036	.914	.035	.888
13	.092	2.34	.095	2.41	**21**	.032	.813	.032	.813
14	.080	2.03	.083	2.11	**22**	0.28	.711	.028	.711
15	.072	1.83	.072	1.83	**23**	0.24	.610	.025	.635
16	.064	1.63	.065	1.65	**24**	.0220	.559	.002	.559
17	.056	1.42	.058	1.47	**25**	.0200	.508	.020	.508

Tube or Pipe? Whilst there isn’t a singularly definitive answer to this question we can be guided:

By specification (e.g. ASTM A312 = pipe or ASTM A213 = tube)

By application or function: pipe = a tubular product used for pipeline and piping systems (with associated fittings) for the transference of gas or liquid. Tube = Heat Exchangers, Instrumentation & Control systems.

And of course by language: Nominal Bore Pipe or Tube Gauge sizes.

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