Install® and **Install® Plus** product offering

Thread Size R (inch)	Specified Outside Diameter D (mm)	NB	Thickness (mm)									
			2.00	2.30	2.60	2.90	3.20	3.60	4.00	4.50	5.00	5.40
⅜	17.2	10		Medium		Heavy						
½	21.3	15	L2	L	Medium		Heavy					
¾	26.9	20		L&L2	Medium		Heavy					
1	33.7	25			L2	L	Medium		Heavy			
1¼	42.4	32			L2	L	Medium		Heavy			
1½	48.3	40				L&L2	Medium		Heavy			
2	60.3	50				L2	L	Medium		Heavy		
2½	76.1	65					L&L2	Medium		Heavy		
3	88.9	80					L&L2		Medium		Heavy	
4	114.3	100						L&L2		Medium		Heavy
5	139.7	125									Medium	Heavy
6	165.1	150									Medium	Heavy

Note: L and L2 light weight material is non standard. Please contact one of our account managers to confirm availability.

Inflow, **Inflow Plus**, **Inline** and **Inline Plus** generic product offering

OD (mm)	Thickness (mm)																		
	2.0	2.3	2.6	2.9	3.2	3.6	4.0	4.5	5.0	5.6	6.3	7.1	8.0	8.8	10.0	11.0	12.5	14.2	16.0
17.2	■	■	■	■	■														
21.3	■	■	■	■	■	■	■												
26.9	■	■	■	■	■	■	■												
31.8		■	■	■	■	■	■	■											
33.7		■	■	■	■	■	■	■											
38.0		■	■	■	■	■	■	■											
42.4		■	■	■	■	■	■	■	■										
48.3		■	■	■	■	■	■	■	■	■	■								
51.0		■	■	■	■	■	■	■	■	■	■								
57.0			■	■	■	■	■	■	■	■	■								
60.3			■	■	■	■	■	■	■	■	■	■							
70.0			■	■	■	■	■	■	■	■	■								
76.1				■	■	■	■	■	■	■	■	■							
82.5				■	■	■	■	■	■	■	■	■	■						
88.9					■	■	■	■	■	■	■	■	■						
114.3					■	■	■	■	■	■	■	■	■						
139.7					■	■	■	■	■	■	■	■	■	■	■				
159.0								■	■	■	■	■	■	■	■	■	■		
168.3							■	■	■	■	■	■	■	■	■	■	■		
193.7							■	■	■	■	■	■	■	■	■	■	■		
219.1								■	■	■	■	■	■	■	■	■	■	■	■
244.5									■	■	■	■	■	■	■	■	■	■	■
273.0									■	■	■	■	■	■	■	■	■	■	■
323.9									■	■	■	■	■	■	■	■	■	■	■
355.6									■	■	■	■	■	■	■	■	■	■	■
406.4										■	■	■	■	■	■	■	■	■	■
457.0										■	■	■	■	■	■	■	■	■	■
508.0										■	■	■	■	■	■	■	■	■	■

The table above is for guidance only, some sizes may not be standard or covered by regular manufacturing cycles. Other sizes may be available upon request. Please refer to the relevant technical literature or contact one of our account managers for confirmation of product specifications, sizes, lengths and finishing options available.

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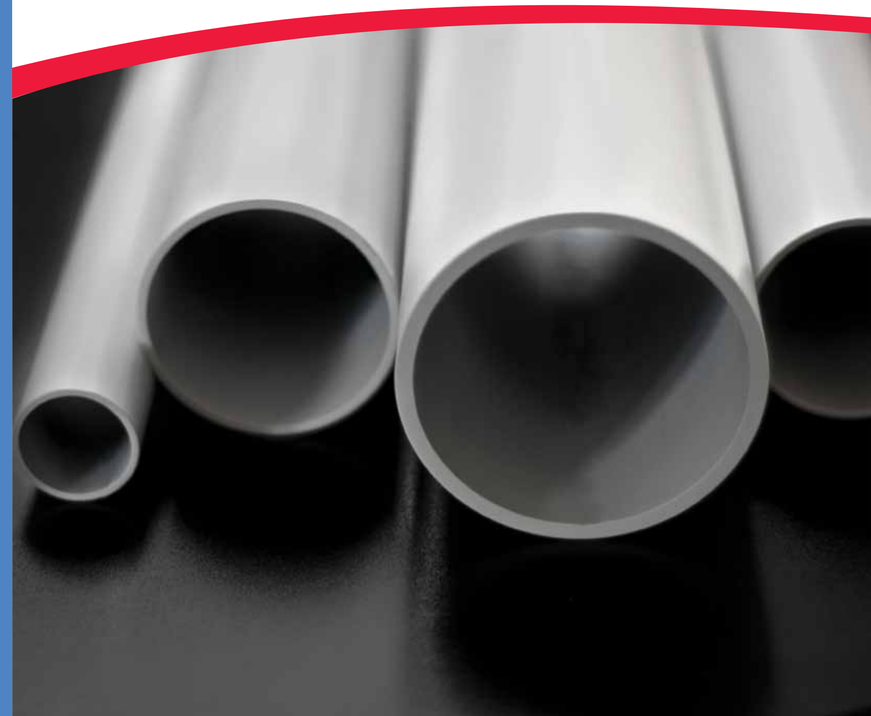
TATA STEEL

TATA

The complete solution

A dedicated family of tube products for conveyance and pressure applications



THE NEW PRODUCT FAMILY

Multi-certified pressure products - the complete solution

We are Tata Steel

Tata Steel is the UK's largest steel manufacturer with many decades of experience in the production of robust and reliable conveyance and pressure tube products.

The challenge

In today's markets, customers are presented with a confusing assortment of different standards, regulations and tube specifications, making it difficult to clearly understand what tube product is best suited for any particular market application.

The solution

Our new family of multi-certified and aligned HFI (High Frequency Induction) welded tubes, deliver a rationalised, simplified and convenient range of dedicated products, to satisfy the widest range of conveyance and pressure requirements.

Maximum flexibility

By manufacturing to the widest range of aligned standards, even historic ones, we provide the ability to satisfy project specifications, and service different market requirements from a rationalised range.

Hot vs cold

Our fully hot-finished products provide uniform fully stress-free tubes, with consistent mechanical properties, improved ductility and no loss of structural integrity as a result of subsequent heating, delivering true application benefit.

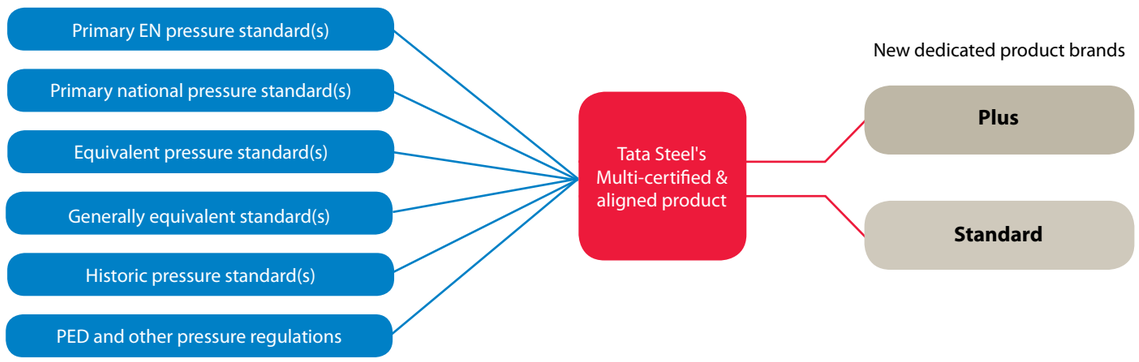
Seamless substitution

Inflow Plus and **Inline** products are an ideal substitute for comparable hot-finished seamless products, providing improved ovality, uniform wall thickness, end matching and tighter control on standard fixed lengths.

Multiple options that can confuse or restrict flexibility

Our simplified tube offering for maximum convenience and flexibility

New, dedicated brands, with 'Standard' and 'Plus' options to satisfy a wide range of market requirements



'**Plus**' products have enhanced applications suitability, delivering additional features and benefits to satisfy customer and market demands

Install® Plus Based on EN 10255 with multi-cert options **Primary grade P235**	**Inflow Plus** Based on EN 10217-2/3 with multi-cert options (including seamless equivalents) **Primary grade P235GH & P355NH**	**Inline Plus** Based on EN10208-2 / API 5L X52 with multi-cert options (including seamless equivalents) **Primary grade L360NB/MB**
Install® EN 10255 **Primary grade S195T**	**Inflow** EN 10217-1 and EN 10219-1/2 (CDC - Cold Dual Cert) **Primary grade P235TR1**	**Inline** Based on EN 10217-2 / EN 10208-1 / API 5L B with multi-cert options (including seamless equivalents) **Primary grade P265GH**
		
Building and engineering services solutions	**General purpose pressure and industrial conveyance solutions**	**Specialist building and engineering services - industrial, process and line-pipe solutions**

A SIMPLIFIED APPROACH

Making it easier for you, your customers and specifiers

With confidence

Proven and robust, multi-certified, high quality tube products, UK manufactured to exacting standards, using fully traceable, fully killed, hot rolled coil supplied from our steel works in Port Talbot, Wales.

Product offering

Our **Install**, **Inflow** and **Inline** products are available in a wide range of diameters, wall thicknesses and lengths; refer to our technical literature or contact one of our dedicated account managers for full details regarding availability and full product specifications.

Added value finishing

For selected sizes, products can be supplied with a choice of alternative end and surface finishes; please refer to our technical literature or contact one of our dedicated account managers for full details.

Technical support

Our **Install**, **Inflow** and **Inline** products are supported by a full set of technical literature, including design and pressure data; in addition we have technical experts who can offer advice on applications and product suitability.

KEY
W = welded
S = seamless

~ Min yield 290MPa for ≥OD219.1mm
# It may be possible to demonstrate lower temperature properties if full application is known, please contact one of our account managers to discuss your requirements
* Boiler options only - to be specified at time of order

Key characteristics

Product brands	**Install**		**Inflow**			**Inline**
Sub-brands	**Install**	**Install Plus**	**Inflow CDC**	**Inflow Plus 235**	**Inflow Plus 355**	**Inline**	**Inline Plus**
Delivery condition and size range	OD165.1mm OD17.2 - 139.7mm N/A	OD165.1mm OD17.2 - 139.7mm N/A	OD139.7 - 508.0mm N/A N/A	N/A OD17.2 - 193.7mm OD219.1 - 508.0mm	N/A OD17.2 - 193.7mm OD219.1 - 508.0mm	N/A OD60.3 - 168.3mm OD219.1 - 508.0mm	N/A OD60.3 - 168.3mm OD219.1 - 508.0mm
Main targeted application	Building services		General purpose pressure and industrial conveyance			Specialist building and engineering services	
	HVAC and services conveyance	HVAC, services and general industrial conveyance	Cold-formed Dual Certified (CDC) pressure and engineering	Elevated temp industrial pressure	High strength, elevated temp industrial pressure	Process plant, industrial conveyance and linepipe oil & gas (gas ≤16bar only)	Process plant, industrial conveyance and linepipe oil & gas (gas ≤100bar only)
Primary grade/min yield strength MPa	195	235	235	235	355	265~	360-510
Tensile strength MPa	320-520	360-500	360-500	360-500	490-650	415-555	490-650
Elongation (longitudinal min) %	27	25	25	25	22	23	22
Standard temperature range (ºC)	-20 to 300	-20 to 300	Ambient	-20 to 400	-20 to 400	-20 to 400	-20 to 400
Low temp option (request at time of order)	ref #	ref #	ref #	- 40	ref #	ref #	ref #
Seamless substitute	Yes	Yes	No	Yes	Yes	Yes	Yes

Standards and regulations

	Standard	Grade	Type	Install	Install Plus	Inflow	Inflow Plus 235	Inflow Plus 355	Inline	Inline Plus
Standards and grades	EN 10255	S195T	W	Primary Standard						
	EN 10217-1	P235TR1	W		Primary Standard	Primary Standard				
		P235TR2	W							
		P265TR1	W							
	EN 10217-2	P235GH/TC1	W		for sizes ≤OD139.7mm		Primary Standard			
		P265GH/TC1	W						Primary Standard	
	EN 10217-3	P355NH/TC1	W					Primary Standard		
	EN 10208-1	L245GA	W							
	EN 10208-2	L360NB (MB ≥OD219.1mm)	W							Primary Standard
	ISO 3183	L245	W							
		L360N (M ≥OD219.1mm)	W							
	API 5L	Grade B (PSL1)	W							
		X42 (PSL1)	W						≥OD219.1mm only	
		X52 N/M (PSL2)	W							
	EN 10219-1/2	S235JRH	W							
Regulations	Pressure Equipment Directive (PED)			SEP - Sound Engineering Practice	Full compliance (TC1)	Partial compliance	Full compliance	Full compliance	Full compliance	Full compliance
	AD 2000 Merkblatt W 4			N/A	N/A	Not compliant	Full compliance	Full compliance	Full compliance	Full compliance
	CE Marking Construction Directive (CPD)			CAT 3&4 water, fuel & gas	CAT 3&4 water, fuel & gas	CAT 2+ (EN 10219 only)	N/A	N/A	N/A	N/A

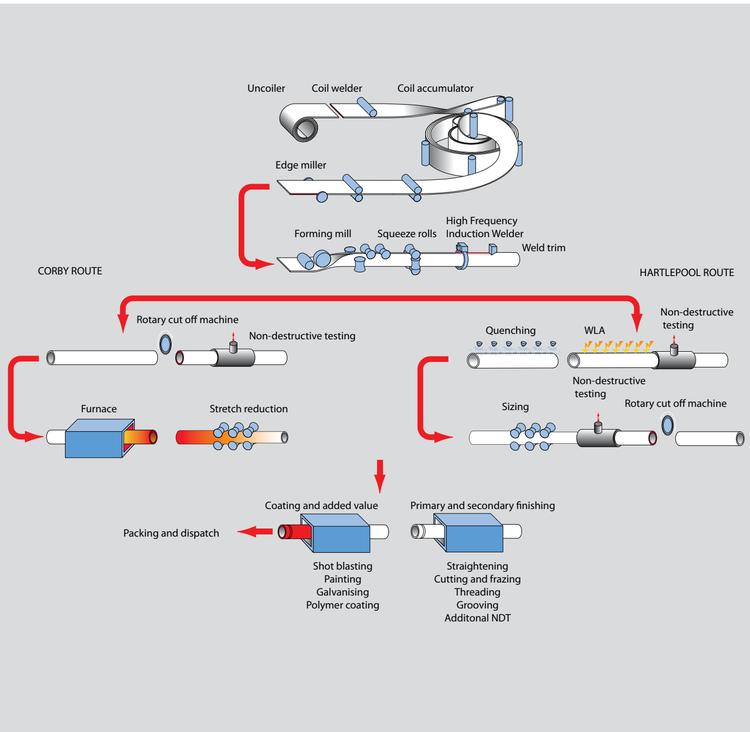
Generally equivalent offering

	Standard	Grade	Type	Install	Install Plus	Inflow	Inflow Plus 235	Inflow Plus 355	Inline	Inline Plus
Generally equivalent standards and grades	EN 10255	S195T	S							
	ASTM A106	Grade B	S							
		Grade C	S							
	ASTM A53	Grade B	W/S							
	ISO 3183	L245	S							
		L360N	S							
	EN 10208-1	L245GA	S							
	EN 10208-2	L360NB	S							
	API 5L	Grade B (PSL1)	S							
		X42 (PSL21)	S						≥OD219.1mm only	
		X52 (PSL2)	S							
	EN 10216-2	P235GH/TC1	S		for sizes ≤OD139.7					
	EN 10216-2	P265GH/TC1	S							
	EN 10216-3	P355NH/TC1	S							
	BS 3059-2	360 (min. tensile)	W/S				Boiler option only*			
	BS 3601	360 (min. tensile)	W/S							
	BS 3602	360 (min tensile)	W/S							
	DIN 1626	St37.0N/G	W				G for ≥OD219.1mm			
		St52.0N/G	W					G for ≥OD219.1mm		G for ≥OD219.1mm
	DIN 1628	St37.4	W				Boiler option only*			
		St52.4	W							
	DIN 1629	St37.0N	S							
		St52.0N	S							
	DIN 1630	St37.4	S				Boiler option only*			
		St52.4	S							
	DIN 17175	St35.8	S				Boiler option only*			
	DIN 17177	St37.8	W				Boiler option only*			
	DIN 17178	WStE355	W							
	DIN 17179	WStE355	S							

MADE WITH CONFIDENCE

Proven, robust, consistent and fully supported

Process diagram



Product testing

All products undergo stringent testing to ensure full compliance with the relevant primary product standards; in addition we carry out regular supplementary testing as part of our in-house quality process.

Pressure tightness

Tube integrity is proven through both destructive (flattening and drift expansion) and non destructive testing (e.g. eddy current, ultrasonic (V=1.0) or hydro-testing) where applicable.

Weld seam integrity

The HFI weld seam is structually sound, of an equivalent strength than the rest of the tube body, and is able to withstand excessive force; it is not a weak point, thereby dispelling an incorrectly held belief.

Internal weld bead

Where applicable, the ID weld bead is fully trimmed and removed, providing a clear, unrestricted tube bore, dispelling another incorrectly held belief that the internal weld bead is always left in place on HFI welded products.

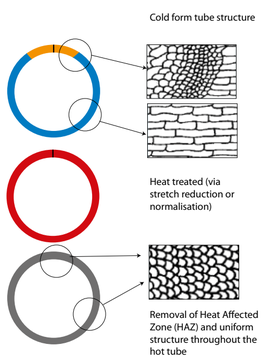
Hot vs cold

Our hot finished manufacturing process routes (fully normalised for Corby sizes ≤OD193.7mm, and Weld Line Annealed (WLA) normalised strip for Hartlepool sizes ≥OD219.1mm) provide a range of products with consistent mechanical properties and improved ductility delivering true application benefit.

Seamless substitution

Inflow Plus and **Inline** products are aligned with comparable seamless standards, and are therefore interchangeable, and an ideal substitute for comparable hot-finished carbon steel seamless products, delivering real benefits, and providing end users with the flexibility to service both welded and seamless market requirements from the same product stock.

Hot vs cold - the benefits of hot



Cold-formed tube micrograph: Inconsistent structure with pockets of stress and variations in mechanical properties

Hot-finished tube micrograph: Stress free, consistent and uniform fine microstructure

Welded vs seamless - the benefits of HFI

	Ovality	Wall	End matching	Length tolerances
Advantages of HFI Welded	Consistent roundness	Consistent thickness	Consistent	Fixed length as standard (mm)
Disadvantages of Seamless	Out of roundness	Inconsistent thickness	Inconsistent	Random length as standard (m)