TATA STEEL

TATA

Inline and Inline Plus

Specialist building and engineering services - industrial, process and linepipe solutions

Contents

INLINE AND INLINE PLUS

An exclusive range of UK manufactured multi-certified pressure tube products to meet the specific needs and expectations of end-users

Dedicated rationalised products

Inline and **Inline Plus** tube products bring a fresh approach to HFI (High Frequency Induction) welded pressure tube for specialist building and engineering services - industrial, process and linepipe applications, offering a rationalised, simplified and convenient range of dedicated multi-certified products to satisfy market and customer needs.

Maximum flexibility

Inline and **Inline Plus** tube products cover key standards, regulations and legislative requirements, ensuring suitability for a wide range of applications, delivering maximum flexibility to service multiple market applications from a rationalised range.

Proven products

Inline and **Inline Plus** tube products are manufactured in the UK at our tube sites in Corby (≤OD168.3mm) and Hartlepool (≥OD219.1mm) using our proven process routes, delivering premium stress relieved tube products with true application benefits.

Welded vs seamless

Inline and **Inline Plus** HFI welded hot-finished tubes are generally equivalent to and designed to be interchangeable with seamless tubes of similar strength levels, they provide a range of additional benefits including improved ovality and wall consistency, and the opportunity to service multiple market applications

Inline

Multi-certified HFI welded pressure tube
for specialist building and engineering services -
industrial, process and linepipe solutions

- Primary standard EN 10217-2 Grade P265GH/TC1
- API 5L Grade B PSL1
- API 5L Grade X42 PSL1 (≥OD219.1mm)
- ISO 3183 L245
- EN 10208-1 L245GA
- Generally equivalent to seamless ASTM A106 Grade B & C, ASTM A53 Grade B, EN 10216-2 , P265GH, EN 10208-1 L245GA, ISO 3183 L245 & API 5L Grade B (also X42 for ≥OD219.1mm)
- Fully aligned with PED-97/23/EC & AD 2000 W4

Primary grade
P265GH /TC1

Inline Plus

High strength multi-certified
HFI welded pressure tube with additional
testing requirements,
for specialist building and engineering services -
industrial, process and linepipe solutions

- Primary standard EN 10208-2 Grade L360NB
- EN 10217-3 P355NH/TC1
- ISO 3183 L360N/M
- API 5L Grade X52N/M PSL2
- Generally equivalent to seamless EN 10216-2 P355NH/TC1, EN 10208-2 L360NB, ISO 3183 L360N & API 5L X52N
- Fully aligned with PED-97/23/EC & AD 2000 W4

Primary grade
L360NB/MB

DEDICATED MULTI-CERTIFIED PRESSURE PRODUCTS

Maximum flexibility for a wider range of applications

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 pressure tube product is best suited for any particular market application.

The solution

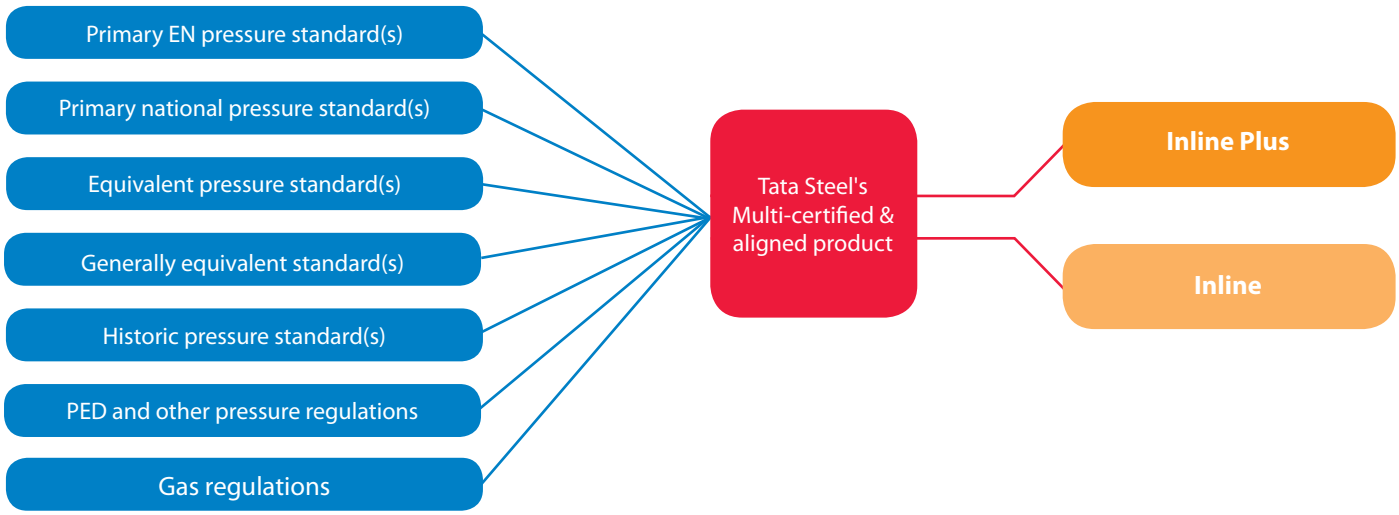
Our new family of multi-certified and aligned HFI (High Frequency Induction) welded tubes, deliver a rationalised, simplified and convenient range of dedicated products, to satisfy the widest range of conveyance and pressure requirements.

The benefits

As well as providing maximum flexibility to service a wide range of application requirements, our dedicated multi-certified pressure products make it easier for customers and specifiers to ensure that a suitable product is being selected thereby reducing the risk of installation compliance issues.

Multiple standard options that can confuse or restrict flexibility

Our simplified tube offering for convenience and flexibility, suitable for a wide range of applications



Key characteristics

Product brands		Inline	
Sub-brands		Inline	Inline Plus
Delivery condition & size range	Cold Hot WLA (Weld Line Anneal)	N/A OD60.3 - 168.3mm OD219.1 - 508.0mm	N/A OD60.3 - 168.3mm OD219.1 - 508.0mm
Main targeted application		Specialist building & engineering services	
		Industrial, process and linepipe solutions (gas ≤16bar only)	Industrial, process and linepipe solutions (gas ≤100bar only)
Primary grade/min yield strength MPa		265~	360-510
Tensile strength MPa		415-555	490-650
Elongation (longitudinal min) %		23	22
Standard temperature range (°C)		-20 to 400	-20 to 400
Low temp option (request at time of order)		ref #	ref #
Seamless substitute		Yes	Yes

Standards and regulations

	Standard	Grade	Type	Inline	Inline Plus
Standards & grades	EN 10217-1	P265TR1	W		
	EN 10217-2	P265GH/TC1	W	Primary Standard	
	EN 10217-3	P355NH/TC1	W		
	EN 10208-1	L245GA	W		
	EN 10208-2	L360NB (M≥OD219.1mm)	W		Primary Standard
	ISO 3183	L245	W		
		L360N (MB≥OD219.1mm)	W		
	API 5L	Grade B (PSL1)	W		
		X42 (PLS1)	W	≥OD219.1mm only	
		X52 N/M (PSL2)	W		
Regulations	Pressure Equipment Directive (PED)			Full compliance	Full compliance
	AD 2000 Merkblatt W 4			Full compliance	Full compliance
	CE Marking Construction Products Directive (CPD)			N/A	N/A

Generally equivalent offering

	Standard	Grade	Type	Inline	Inline Plus
Generally equivalent standards & grades	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 (PLS1)	S	≥OD219.1mm only	
		X52 (PSL2)	S		
	EN10216-2	P265GH/TC1	S		
	EN 10216-3	P355NH/TC1	S		
	DIN 1626	St52.0N/G	W		G for ≥OD219.1mm
	DIN 1629	St37.0N	S		

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.

FEATURES AND BENEFITS

Dedicated products with maximum flexibility

World-class feedstock

- Our **Inline** and **Inline Plus** products are manufactured from specifically selected fully killed, high quality hot rolled coil supplied from our steel works in Port Talbot, Wales, delivering product consistency and full traceability.
- Fully killed steel is deoxidised and treated with nitrogen-binding elements, providing a steel composition designed to eliminate any tendency for strain age embrittlement when in service.

Integrated steel maker

- Unlike other tube manufacturers, Tata Steel benefits from being a fully integrated steel maker.
- Because we manufacture the steel to be used in the production of our **Inline** and **Inline Plus** tube products, each element of the steel making process can be strictly monitored and controlled to ensure our exacting standards are satisfied and product consistency can be guaranteed.

Welder approvals and PED

- Tata Steel has obtained independently verified welder approvals, welding procedure approvals and quality management system approvals for their HFI tube to ensure that **Inline** and **Inline Plus** tube products are completely suitable for all categories of pressure equipment under the PED (97/23/EC).
- These approvals further confirm the ability of **Inline** and **Inline Plus** to be used in place of comparable hot-finished seamless tubes of similar strength levels.

Inline

Product offering

- Multi-certified HFI welded pressure tube for specialist building and engineering services - industrial, process and linepipe solutions (gas ≤16bar)
- Fully weldable
- Fully killed steel for improved ductility
- HFI welded pressure tube to EN 10217-2 Grade P265GH
- Quality designation TC1 supplied as standard
- Quality designation TC2 option for sizes ≥OD219.1mm
- **Inline** provides full PED compliance and is suitable for pressure equipment and assemblies in PED categories I, II, III or IV, and is aligned with AD2000 Merkblatt W4
- GH grade for elevated temperature use ≤400°C
- Low temperature suitability (-20°C longitudinal Charpy impact tests)
- **Inline** P265 also fully satisfies the requirements of EN 10217-1 & EN10216-1 Grade P265 Quality designation TR2
- Multi-certified satisfying the mechanical requirements of EN10208-1 Grade L245GA, ISO3183 Grade L245, API5L Grade B (PSL1) and for sizes ≥OD219.1mm X42 (PSL1) – Note PSL2 option available on selected sizes, please contact one of our account managers to discuss your requirements
- **Suitable substitute for equivalent seamless tube grades** e.g. ASTM A106 Grade B and C, ASTM A53 Grade B, EN10216-2 Grade P265GH , seamless EN10208-1 Grade L245GA, ISO3183 Grade L245 and API5L Grade B (PSL1) and for sizes ≥OD219.1mm X42 (PSL1)
- **Inline** HFI welded pressure tubes have OD & ID weld beads fully removed

Certification and testing

- Supplied with 3.1 inspection certification to EN 10204
- Hot-finished: Full body normalised as standard for Corby sizes ≤OD168.3mm. Normalised strip and Weld Line Annealed (WLA) as standard for Hartlepool sizes ≥OD219.1mm
- **Inline** tube weld seam is ultrasonically tested (V=1.0) as standard
- For Corby sizes ≤OD168.3mm, **Inline** tube weld seam is also Eddy Current (EC) tested as standard
- Pressure tightness demonstrated by EC or hydrostatic testing

Supply options

- Self-colour as standard (varnish option for sizes ≥OD219.1mm)
- Bevelled ends as standard - ends free from burrs
- Bevel protection / protective caps available for selected sizes on request#
- Standard supply fixed lengths of 6.0 & 12.0m (-0+150mm for sizes ≤168.3mm, -0+250mm for sizes ≥OD219.1mm) – other lengths up to 16m available on selected sizes upon request#
- Coating options (PP, PE, Epoxy) available on selected sizes#
- Product marking for identification and traceability where applicable

Inline Plus

Product offering

- High strength, multi-certified HFI welded pressure tube with additional testing requirements, for specialist building and engineering services - industrial, process and linepipe solutions (gas≤100bar)
- Fully weldable
- Fully killed steel produced to fine grain practice for enhanced ductility
- HFI welded pressure tube to EN 10208-2 Grade L360NB
- **Inline Plus** provides full PED compliance being suitable for equipment in PED categories I, II, III or IV, also aligned with AD2000 Merkblatt W4
- NH grade for elevated temperature use ≤400°C
- Low temperature suitability (-20°C longitudinal Charpy impact tests)
- **Inline Plus** delivers improved mechanical property performance compared to **Inline** with higher yield strength and elevated temperature proof strength values
- Superior range of minimum tensile properties to **Inline** (490 MPa compared to 415 MPa)
- Increased wear resistance – providing improved service life for applications where this is a consideration
- Multi-certified satisfying the mechanical properties of EN10217-3 Grade P355NH, Quality designation TC1 supplied as standard (Quality designation TC2 option for sizes ≥OD219.1mm), ISO3183 Grade L360N, API5L Grade X52N (PSL2)
- **Suitable substitute for equivalent seamless tube grades** e.g. EN10216-3 Grade P355GH , seamless EN10208-2 Grade L360NB (MB ≥OD219.1mm), ISO3183 Grade L360N and API5L Grade X52N (PSL2)
- **Inline Plus** HFI welded pressure tubes have OD & ID weld beads fully removed

Certification and testing

- Supplied with 3.1 inspection certification to EN 10204
- Hot-finished: Full body normalised as standard for Corby sizes ≤OD168.3mm. Normalised strip and Weld Line Annealed (WLA) as standard for Hartlepool sizes ≥OD219.1mm
- **Inline Plus** tube weld seam is ultrasonically tested (V=1.0) as standard
- For Corby sizes ≤OD168.3mm, **Inline Plus** tube weld seam is also Eddy Current (EC) tested as standard
- Pressure tightness demonstrated by EC or hydrostatic testing

Supply option

- Self-colour as standard (varnish option for sizes ≥OD219.1mm)
- Bevelled ends as standard - ends free from burrs
- Bevel protection / protective caps available for selected sizes on request#
- Standard supply fixed lengths of 6.0 & 12.0m (-0+150mm for sizes ≤OD168.3mm, -0+250mm for sizes ≥OD219.1mm) – other lengths up to 16m available on selected sizes upon request#
- Coating options (PP, PE, Epoxy) available on selected sizes#
- Product marking for identification and traceability where applicable

Refer to TST41, the relevant product data sheet or contact one of our account managers for full confirmation of specifications and availability

PRODUCT AND PRESSURE DATA

Building on the previous success of our triple certified product offering, Tata Steel now presents our new and improved **Inline** and **Inline Plus** multi-certified products

A proven record

Our triple certified pressure products were proven in some of the most demanding applications, and recognised as the product of choice for meeting end user expectations – through customer and market interaction, and our desire to constantly perfect and develop our tube product offering, opportunities to further expand the product capabilities were identified.

The next generation

Our new **Inline** and **Inline Plus** tube range now provides customers, end users and specifiers with a rationalised, simplified and convenient range of dedicated products, capable of satisfying a wider range of conveyance and pressure requirements.

Available in the key market sizes, with improved temperature range and pressure integrity data, **Inline** and **Inline Plus** tube delivers true flexibility.

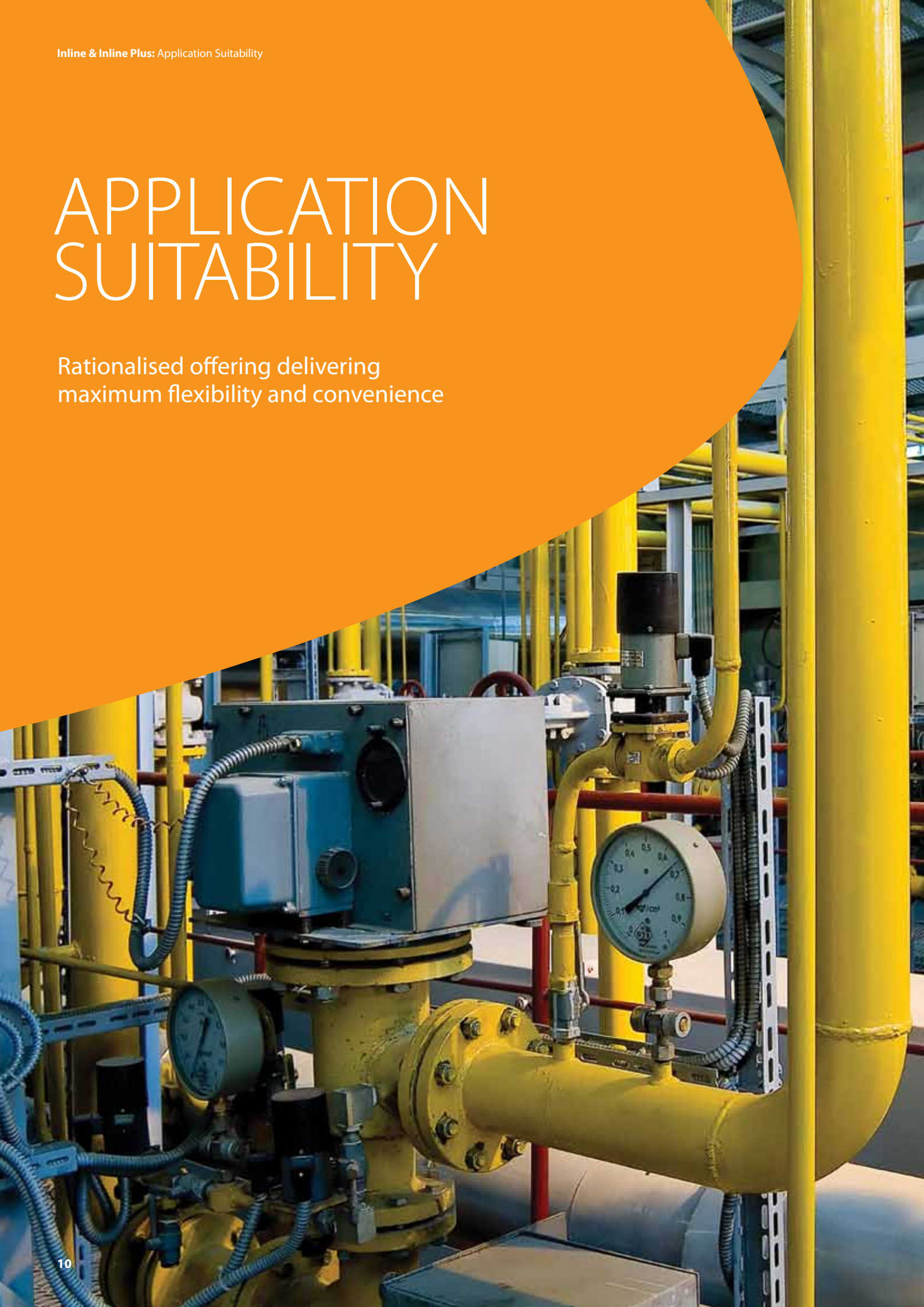
OD (mm) (NB)(inches)	Thickness (mm)	Designation		Mass (kg/m)	Length/Weight (m/tonne)	**Inline** Recommended Maximum Operating Pressure (bar) Based on 245 MPa min yield #		**Inline Plus** Recommended Maximum Operating Pressure (bar) Based on 360 MPa min yield #	
		Strength	Schedule			Ambient Temp	Elevated Temp 400ºC	Ambient Temp	Elevated Temp 400ºC
60.3	3.91	STD	40	5.42	184.5	148	69	219	103
(50) (2")	5.54	XS	80	7.43	134.6	209	98	307	145
88.9	5.49	STD	40	11.31	88.4	142	66	210	99
(80) (3")	7.62	XS	80	15.24	65.6	197	92	290	136
114.3	6.02	STD	40	16.02	62.4	121	56	179	84
(100) (4")	8.56	XS	80	22.42	44.6	174	81	256	120
168.3	7.11	STD	40	28.22	35.4	97	45	144	68
(150) (6")	10.97	XS	80	42.67	23.4	151	70	223	105
	6.35		20	33.57	29.8	65	32	100	47
	7.04		30	36.61	27.3	73	35	109	51
219.1	8.18	STD	40	42.65	23.5	85	40	128	60
(200) (8")	10.31		60	53.03	18.1	107	51	161	76
	12.70	XS	80	64.64	15.5	133	63	198	93
	15.10		100	75.96	13.2	160	74	236	111
	6.35		20	42.09	23.8	52	25	80	38
	7.80		30	51.03	19.6	64	31	98	46
273.0	9.27	STD	40	60.50	16.5	77	37	117	55
(250) (10")	12.70	XS	60	81.55	12.3	106	50	159	75
	15.09		80	96.07	10.4	127	60	189	89
	6.35		20	50.11	20.0	44	21	68	32
	8.38		30	65.35	15.3	58	28	89	42
323.9	9.53	STD		73.65	13.6	66	32	101	47
(300) (12")	10.31		40	79.55	12.6	72	34	109	51
	12.70	XS		97.46	10.3	89	42	134	63
	14.27		60	109.18	9.2	100	48	151	71
	6.35		10	55.11	18.2	40	19	62	29
	7.92		20	67.74	14.8	50	24	76	36
355.6	9.53	STD	30	81.08	12.3	60	29	92	43
(350) (14")	11.13		40	94.30	10.6	71	34	107	50
	12.70	XS		107.39	9.3	81	39	122	58
	15.09		60	126.79	7.9	97	46	146	68
	6.35		10	63.13	15.8	35	17	54	25
406.4	7.92		20	77.63	12.9	44	21	67	31
(400) (16")	9.53	STD	30	92.98	10.8	53	25	80	38
	12.70	XS	40	123.30	8.1	71	34	107	50
	6.35		10	71.12	14.1	31	15	48	23
	7.92		20	87.49	11.4	39	19	59	28
457.1	9.53	STD		104.84	9.5	47	23	71	34
(450) (18")	11.13		30	122.05	8.2	55	26	83	39
	12.70	XS		139.15	7.2	63	30	95	45
	14.27		40	156.11	6.4	70	34	107	50
	6.35		10	79.16	12.6	28	14	43	20
508.0	9.53	STD	20	116.78	8.6	42	20	64	30
(500) (20")	12.70	XS	30	155.12	6.5	56	27	86	40
	15.09		40	183.54	5.5	67	32	102	48

= Our standard product sizes
STD = Standard
XS = Extra strong

The pressure rating information above is calculated based on a combination of ASME B31.3 and European guidelines, for straight pipes, using full penetration welded joints, and is provided for information only. Pipework systems should be designed in accordance with appropriate established standards or codes and due consideration must be taken of additional factors, such as any allowance required for corrosion and bending, fittings etc. It is the responsibiity of the user to ensure that the tube is suitable for the intended application, that they are operating fully in accordance with all relevant statutory and legislative requirements and that all standards and engineering documents referenced are correctly applied.

APPLICATION SUITABILITY

Rationalised offering delivering maximum flexibility and convenience



Wide range of application suitability

- **Inline** and **Inline Plus** tubes are suitable for a wide range of conveyance and pressure applications, key examples are listed below.
- Due to the varied nature of the industries and applications that our products can service, it is very difficult to show suitability for all possible cases. For confirmation of product and application suitability Tata Steel has Customer Technical Service experts who can be contacted and consulted.
- **Inline** and **Inline Plus** tubes are suitable for a range of line pipe applications in accordance with API 5L, and gas systems in accordance with EN 10208.

Installation ease

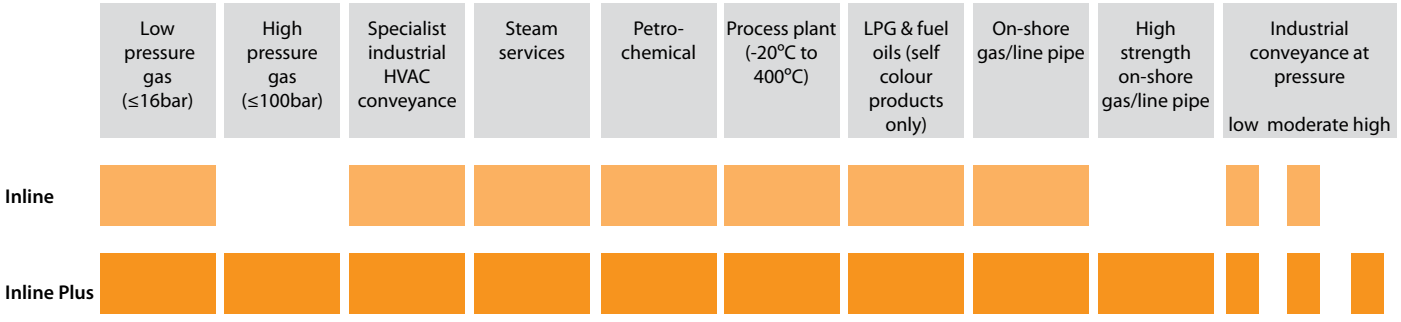
- The uniform, stress free, fine grain structure of our **Inline** and **Inline Plus** hot-finished products provides improved ductility, so are more suited to applications where bending or manipulation is required, delivering installation ease and fabrication advantages.

A replacement for seamless

- Standards such as EN 10208, ISO 3183, ASTM A53 and AP1 5L allow either seamless or welded tubes to be used. HFI welded tube can be used as a replacement for seamless tubes of similar strength and can be substituted for the above hot-finished seamless products.
- **Inline** and **Inline Plus** HFI welded tube (to EN 10217) has the same steel numbers and hence the same basic composition and property requirements as comparable seamless tubes (to EN 10216).
- This further demonstrates full compatibility and inter-changeability. More details regarding welded vs. seamless can be found on page 13 of this brochure.

Wide pressure and temperature range

- **Inline** and **Inline Plus** tubes are suitable for applications from -20°C to 400°C. For pressure applications, suggested maximum operating pressures at ambient and elevated temperatures are provided on page 9 of this brochure.
- Note: tube application suitability may be related to the jointing system, fittings, maintenance practices and inspection methods employed.



HOT vs COLD

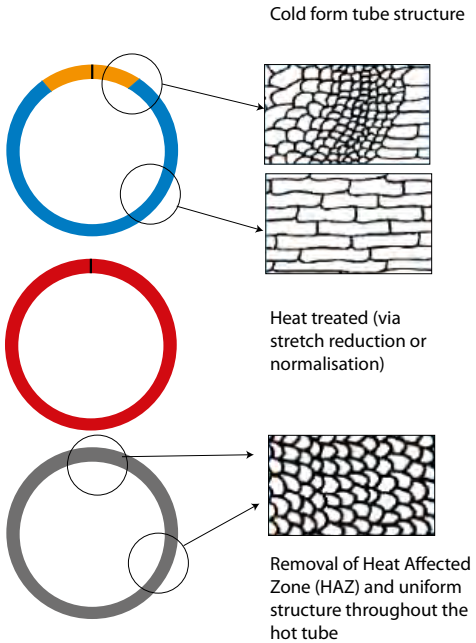
Our hot stretch reduced manufacturing process, supported by other heat treatment capabilities, produces stress relieved tubes that deliver true application benefits

The key benefits

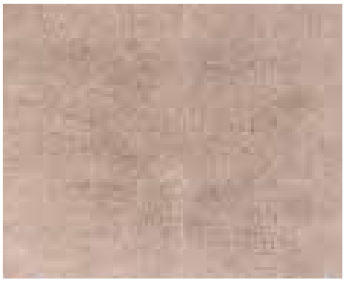
- **Inline** and **Inline Plus** tube, either fully normalised or supplied from normalised rolled coil and post Weld Line Annealed (WLA), has an eliminated Heat Affected Zone (HAZ), providing a uniform homogeneous microstructure.
- Normalised tubes deliver consistent mechanical performance, and will show no significant loss of structural integrity as a result of subsequent localised heating/welding/hot bending.
- The uniform stress relieved fine grain structure of our hot-finished tubes provides better ductility than a cold-formed tube, where the grains are larger and more elongated.
- Hot-finished tubes are therefore able to withstand significantly more manipulation (bending, flaring, flanging and grooving etc) than cold-formed alternatives, which do not have the advantage of being stress free.

Other advantages

- **Inline** and **Inline Plus** tube is generally equivalent to and provides the same fine grain uniform homogeneous microstructure and mechanical properties offered by comparable hot-finished seamless alternatives.
- **Inline** and **Inline Plus** tubes have consistent properties, providing predictable and repeatable behaviour in service.
- The residual stress levels in cold-formed tubular products mean that cracking is always a possibility during additional cold working or other manipulation. **Inline** and **Inline Plus** tubes do not suffer from this problem.
- Tests also show that Tata Steel hot-finished tubes can provide improved resistance to corrosion and can contribute to an extended life expectancy when in service.



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

Inline and **Inline Plus** High Frequency Induction (HFI) welded tubes are an ideal substitute for comparable hot-finished seamless products, delivering true application and performance benefits

Suitability of HFI welded tubes

Inline tubes are interchangeable with seamless EN 10216 P265GH & ASTM A106 Grade B & C, ASTM A53 Grade B, ISO 3183 L245, EN 10208 L245GA and API 5L Grade B (X42 for ≥OD219.1mm only) equivalents.

Inline Plus tubes are interchangeable with seamless EN 10216 P355GH, ISO 3183 L360N, EN 10208 L360NB and API 5L Grade X52N equivalents.

Inline and **Inline Plus** HFI welded tubes (to EN 10217) have the same steel numbers and hence the same basic composition and property requirements as seamless tubes (to EN 10216), further demonstrating full compatibility and inter-changeability.

Inline and **Inline Plus** HFI welded tubes have identical pressure ratings to equivalent seamless tubes of the same diameter and thickness.

The internal weld bead in our **Inline** and **Inline Plus** HFI pressure products is fully removed in accordance with the relevant international standards, ensuring clear, optimised tube bores, the same as those of seamless alternatives.

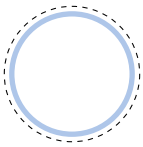
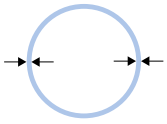
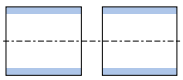
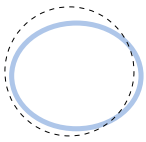
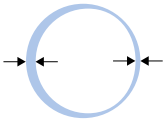
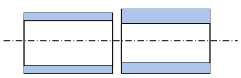
Benefits of HFI welded tubes

Inline and **Inline Plus** HFI welded tubes have significant benefits when aligning pipe lengths for butt-welding due to their improved ovality and ease of end matching compared with seamless.

Consistent wall thickness through tight control of strip gauge and alignment ensures that **Inline** and **Inline Plus** HFI welded tubes have more uniform pressure integrity than seamless.

A uniform wall thickness provides peace of mind and removes the risk of thin or weak spots along the tube body that might degrade the tube or system performance.

Inline and **Inline Plus** HFI welded tubes provide, as standard, tighter tolerances on fixed lengths compared to equivalent hot-finished seamless alternatives, providing significant benefits with planning, costing and handling.

	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)

PRODUCT TESTING

All **Inline** and **Inline Plus** products undergo a stringent test regime to ensure full compliance with the relevant product supply standards. In addition, we also carry out regular supplementary testing as part of our robust in-house manufacturing quality process

Product integrity

- **Inline** and **Inline Plus** tube weld seams are ultrasonically tested (V=1.0) as standard.
- Weld seams for Corby sizes ≤OD168.3mm are also eddy current tested as standard.
- Full pressure tightness is demonstrated by hydrostatic testing - undertaken in accordance to the requirements as defined by API 5L.
- **Inline** tubes are fully tested in accordance with the primary standard, and the requirements of API 5L PSL1. The option of testing to the requirements of PSL2 is available – please contact us to discuss your specific requirements.
- **Inline Plus** tubes are fully tested in accordance with the primary standard, and the requirements of API 5L PSL2.

Robustness

- **Inline** and **Inline Plus** tubes also undergo regular flattening and drift expansion tests during manufacturing to confirm weldline integrity – this is additional testing, and not a requirement of the product supply standards.
- **Inline** and **Inline Plus** tubes also undergo regular weldline metallographic examinations to ensure product integrity – this is an additional test, and is not a requirement of the product supply standards.

Temperature and strength

- Room temperature tensile tests are conducted as standard to validate mechanical and elongation properties.
- **Inline** and **Inline Plus** yield properties are validated up to 400°C, demonstrating suitability for elevated temperature applications.
- **Inline** and **Inline Plus** tubes have guaranteed Charpy impact values at –20°C, demonstrating suitability for low temperature applications.
- As part of Tata Steel Europe we have access to numerous technical experts and additional testing capabilities to support our products. Please contact us to discuss any specific requirements.

Dimensional and inspections

- **Inline** and **Inline Plus** tubes also undergo regular dimensional checks to ensure compliance with the relevant standards.
- Each stage of our robust manufacturing process is covered by a set of in-house quality procedures, in line with EN ISO 9001, to ensure that our tube products fully conform to the expected exacting standards.
- **Inline** and **Inline Plus** tubes are supplied with a 3.1 inspection certification to EN 10204 as standard, option of third partly inspection can be arranged if required and specified at or before time of order – please contact us to discuss your specific requirements.

WELD SEAM INTEGRITY

HFI welded products are supplied with robust and proven, structurally sound weld seams, we conduct rigorous destructive and non-destructive tests to ensure complete confidence

Rigorous testing

- As part of our robust in-house quality manufacturing processes we conduct both Non-Destructive (NDT) and Destructive Testing (DT) of our tube products to provide assured confidence in weld seam integrity.
- **Inline** and **Inline Plus** tube weld seams are ultrasonically tested (V=1.0) as standard
- For Corby sizes ≤OD168.3mm, **Inline** and **Inline Plus** tube weld seams are also Eddy Current (EC) tested as standard
- Full pressure tightness is demonstrated by EC or hydrostatic testing when applicable (hydrotesting is in accordance to the requirements as defined by API 5L).
- Tata Steel also has tube production welding approvals in place to demonstrate suitability for applications under the PED.

Additional in-house testing

- Samples of our tube products are also periodically taken from the manufacturing process for metallurgical examination to ensure full product integrity and undergo flattening and drift expansion tests (these are robust destructive tests that are in excess of the requirements of the manufacturing standards, undertaken as part of our own in-house quality process).
- This testing clearly demonstrates the structural integrity of the weld seam and its robustness, and also shows that the weld seam is of an equivalent strength to the rest of the tube body, dispelling an incorrectly held belief, that the weld seam is a weak point on HFI welded tube products – this is simply not the case.

Weld bead treatment

- For **Inline** and **Inline Plus** tubes, the ID weld bead is fully trimmed and removed, providing a clear, unrestricted tube bore, again dispelling another incorrectly held belief that the internal weld bead is always left in place on welded products.
- All products are provided externally trimmed.

ADDED VALUE FINISHING

By arrangement, our **Inline** and **Inline Plus** tubes can be supplied with a range of different end and surface finishes suiting your applications needs

The following can be supplied, if requested at time of order:

- Bevel end protection or end caps – available on selected sizes#.
- Pre-grooved (rolled grooved) options - available on selected Corby sizes#.
- Special exact length tolerances - available on selected sizes#.
- Varnish option on Hartlepool sizes#.
- Hot dipped galvanised coating - available on selected Corby sizes#
- Painted or powder coated options - available on selected Corby sizes#.
- Polymer coating options (PP, 3-layer PE) or epoxy coatings - available on selected sizes#.
- Additional special finishing, coating or end preparation - available on selected sizes#.

We have a range of different end and surface options available with our **Inline** and **Inline Plus** tubes. In addition, various options regards marking, certification, packing and bundle configurations may also be available. Cost extras may apply. Please contact one of our account managers to discuss your specific requirements in full.

MAXIMUM FLEXIBILITY

Inline and **Inline Plus** provides a range of multi-certified options, aligned with the relevant pressure directives and regulations

- Multi-certified to cover the mechanical properties over a range of pressure standards, regulations and legislative requirements, providing a convenient range of options, and ensuring suitability, whatever the application being serviced.
- For full product descriptions and specifications reference Tata Steel Tubes document TST41:PDF:UK:03/2012.

Product summary

Product	Principal standard	Multi-certified / aligned or equivalent standards	Pressure application suitability	
			PED 97/23/EC	AD 2000 W4
Inline	EN 10217-2 Grade P265GH	• API 5L Grade B PSL1 • API 5L Grade X42 PSL1 (≥OD219.1mm) • ISO 3183 L245 • EN 10208-1 L245GA • Generally equivalent to seamless ASTM A106 Grade B & C, ASTM A53 Grade B, EN 10216-2 P265GH, EN 10208-1 L245GA, ISO 3183 L245 & API 5L Grade B (also X42 for ≥OD219.1mm)	Full compliance All pressure categories Test Category (TC) I, II, III, IV	Yes
Inline Plus	EN 10208-2 Grade L360NB (MB ≥OD219.1mm)	• EN 10217-3 P355NH/TC1 • ISO 3183 L360N/M • API 5L Grade X52N/M PSL2 • Generally equivalent to seamless EN 10216-2 P355NH/TC1, EN 10208-2 L360N, ISO 3183 L360N & API 5L X52N	Full Compliance All pressure categories Test Category (TC) I, II, III, IV	Yes

Reference	
EN 10217-2	Welded steel tubes for pressure purposes - Technical delivery conditions - Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties
EN 10217-3	Welded steel tubes for pressure purposes - Technical delivery conditions - Part 3: Alloy fine grain steel tubes
ISO 3183	ISO 3183:2007 Petroleum and natural gas industries - Steel pipe for pipeline transportation systems
API 5L	Specification for Line Pipe - ANSI/API specification 5L - 44th Edition, October 1, 2007
ASTM A106	Standard specification for - Seamless carbon steel pipe for high-temperature service
ASTM A53	Standard specification for - Pipe, steel, black and hot-dipped, zinc-coated, welded and seamless
EN 10216-2	Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 2: Non-alloy and alloy steel tubes with specified elevated temperature properties
EN 10216-3	Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 3: Alloy fine grain steel tubes
EN 10208-1	Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 1: Pipes of requirement class A
EN 10208-2	Steel pipes for pipelines for combustible fluids - Technical delivery conditions - Part 2: Pipes of requirement class B
PED	Directive 97/23/EC of the European Parliament and of the Council of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment
AD 2000 Merkblatt W4	Materials for pressure vessels, piping and accessories - Tubes made from non-alloy and alloy steels

THE COMPLETE SOLUTION

Tata Steel now provides a complete package of conveyance tube products to meet all your application needs

Inline and **Inline Plus** are new additions to the conveyance and pressure tube product family, specifically developed to provide improved visibility of product options and application suitability.

Our family of branded products enables customers, end users and specifiers to conveniently select the most suitable high quality tube option to meet their needs and expectations - in full.

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

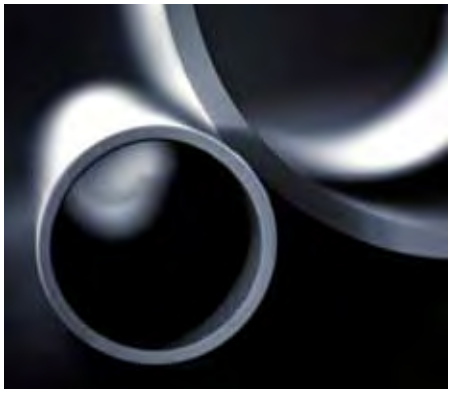
Install®
EN 10255

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

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