TATA STEEL

TATA

Preliminary data sheet

Ympress® S960

Exceptional strength for lightweighting

Ympress S960 is a hot-rolled, high-strength low-alloy steel currently being developed by Tata Steel. This steel grade is ideal for applications where high strength is essential. These include loader crane booms, earthmoving equipment and truck trailers.

Ympress S960 combines high strength with outstanding formability and consistent quality. It delivers improved weldability and excellent surface quality compared to a reverse mill plate product. Consistent product properties and reliable material thickness allow trouble-free, repeatable processing. Ympress S960 has been designed specifically for thermal cutting processes including laser and (micro) plasma methods.

This hot-rolled steel delivers improved load-bearing capacity without weight penalties due to its high yield strength. Its strength also enables production of lighter components for applications where weight savings are a prime consideration. Downgauging offers an additional benefit of increased yield per ton of steel.

Please note: as Ympress S960 is currently under development, the final dimensions and specifications in this preliminary data sheet may change. Our technical specialists will be happy to update you and answer your questions.

Mechanical properties

The values shown for the mechanical properties apply to test samples parallel to the rolling direction.

Direction	Min. yield strength	Min. tensile strength	Min elongation after fracture A_5
	MPa	MPa	%
Longitudinal	960	1010-1250	8

Chemical composition

The following table represents the targeted composition.

C	Mn	Si	P	S	Al_{sol}	Cb	V	Ti	Mo	B	Ni	CR
≤ 0.12	≤ 1.8	≤ 0.15	≤ 0.02	≤ 0.003	≥ 0.015	≤ 0.05	≤ 0.15	≤ 0.05	≤ 0.5	≤ 0. 005	≤ 0.1	≤ 0.6

All values are in weight%

Weldability

Ympress S960 can be welded with all conventional welding processes. The weldability of the material is fairly good due to the relatively low carbon equivalent (typical CEV of 0.53) and low content of residual elements. The equivalent carbon content is used to understand how the different alloying elements affect hardness and weldability of the steel. The most commonly used carbon equivalents are calculated here (in weight%).

CEV	CEV	CET	Pcm
typical	max.	max.	max.
0.53	0.56	0.33	0.27

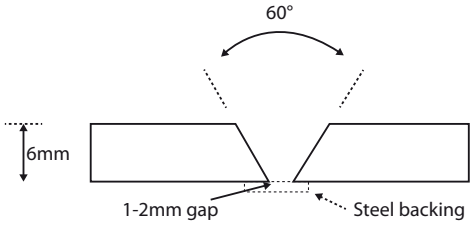
CEV = C+Mn/6+(Cr+Mo+V)/5 + (Ni+Cu)/15 (IIW)
CET = C+ (Mn+Mo)/10 + (Cr+Cu)/20 + Ni/40
Pcm = C+Si/30+(Mn+Cu+Cr)/20+Ni/60+Mo/15+V/10+5B

To achieve a minimal 980 MPa cross-weld tensile strength, Tata Steel advises that heat input is kept below 0.7 kJ/mm for gauge 4-8mm and below 1.1 kJ/mm for 9-10mm.

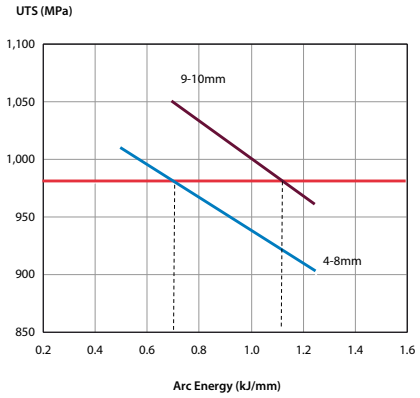
	Thickness	
	4 < t ≤ 8mm	9 < t ≤ 10mm
Arc Energy kJ/mm	0.7	1.1

Charpy test results at weld fusion line are consistently meeting minimum required energy of 40J in longitudinal direction. Matching weld wire is available.

Weldability (continued)



R&D weld test setup: Nil pre-heat, max interpass temperature 68°F.
Union X96 wire (1.0mm), M21 gas 80/20

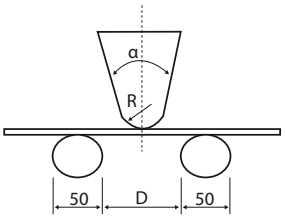


Plot of UTS vs arc energy resulting in recommended heat input

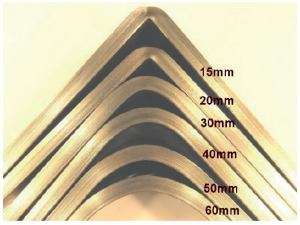
Bendability

Direction	Min. inner bend radius	
	4 < t ≤ 8mm	8 < t ≤ 10mm
Transverse	3t	4t

A repeatable bending performance is realized through consistent product properties and material thickness. The 90° bend test is performed with polished edges, with the bend line parallel to the rolling direction. For a thickness range of 4-8mm, a 3t minimum inner bend ability is confirmed, with the bend line parallel to the rolling direction. Above this range, we guarantee a 4t bend performance.



R&D bend test setup
D=2R+3t +/-(1/2t), R=7.5-40mm,
α= max 45°, aim bend angle is 90°.
Specimen size is 200x40xt mm

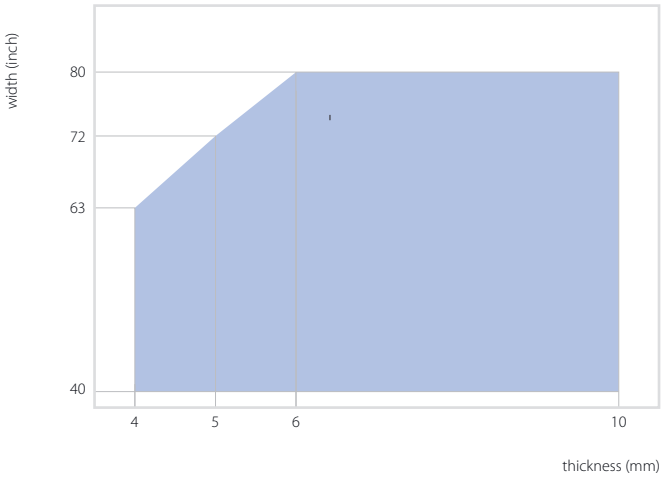


Bend samples for 6mm gauge resulting in guaranteed minimum inner bend radius

Impact strength

Direction	Thickness	Temperature	Guaranteed
Longitudinal	6-10mm	-40°F	≥ 40J
Transverse	6-10mm	-40°F	≥ 27J

Target dimensions



Other dimensions are under development. Please inquire if you need material in dimensions outside the window that is currently available.

Gauge tolerances

Tolerances for strip comply with ASTM A568 and ASTM A635. Tighter tolerances are available - please contact us. Tolerances provided in the table are based on minimum thickness (tolerance over, no tolerance under).

HR HSLA gauge tolerances

	ASTM A568		ASTM A635		
Width/gauge	0.157-0.180	0.180-0.230	0.23-0.313	0.313-0.375	0.375-0.394
40-48	0.015	0.015	0.018	0.020	0.021
48-60	0.015	0.015	0.018	0.021	0.022
60-72	0.016	0.016	0.020	0.022	0.024
72-80	0.018	0.018	0.022	0.024	0.027

Product support

We want you to get the best from Ympress® products. Our technical support staff and trained sales force are always happy to answer your questions on steel selection and application. Our technical specialists are available to assist you with process and product design optimization for improved throughput, yield and end product performance.

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