



Supralsim® 690

A High Yield Strength steel for welded and weight-saving structures

Supralsim® 690 is a high strength quenched and tempered steel dedicated for structure and enables to make weight savings thanks to a minimum yield strength of 690 N/mm².

Thanks to its exceptional purity rate (very low sulphur and phosphorous contents), and its adapted chemical analysis, the Supralsim® 690 steel is easy to shape and to weld.

Standards

Supralsim® 690 fulfills the requirements of S 690 QL according to EN 10025-6 standard, last edition

Chemical analysis - Weight %

C	Mn	Si	Cr	Mo	P	S	V	Ni	Cu	Al
.20	1.60	.50	1.50	.60	.02	.010	.080	1	.50	.02 to .05

Maximum values

C. Equivalent

$$C_{eq} = C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Ni+Cu}{15}$$

Thickness range - mm (")	C.Eq
≤ 15 (.59")	≤ .45
15-50 (.59"-2")	≤ .60
50.01-150 (2"-5.9")	≤ .70

Mechanical properties

Thickness	Y.S. 0.2 N/mm ² (KSI)	UTS N/mm ² (KSI)	El. A 5%
≤ 50 mm (2")	690 (100)	770-940 (112 - 136)	14
50 < th ≤ 100mm (2" < th ≤ 4")	650 (94)	760-930 (110 - 134)	14
100 < th ≤ 150 (4" < th ≤ 5.9")	630 (91)	710-900 (103 - 130)	14

Minimum values

Physical properties

Impact tests

Guaranteed Minimum value (average on several tests)

Temperature	Transversal direction
-40°C (-40°F)	27 J (20 ft.lbs)

For 6mm (.24") \leq th \leq 10 (.4"), subsize specimen will be used and requirement adapted accordingly.

Charpy V typical value in cross direction at -40°C (-40°F)

Thickness	\leq 10mm → (\leq .4")	10 - 65 mm (.4" - 2 1/2")	> 65 mm ($>$ 2 1/2")
J	40-45	100	100-120
ft.lbs	26-30	73	73-90

Weight saving and/or more resistant structures

Due to its high yield strength compared to classical steel (750 MPa in average), you can :

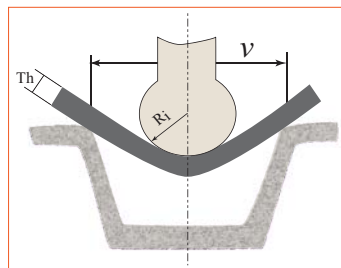
- reduce thickness of structure and make weight saving, and / or
- support higher stresses and realize more resistant structures.

Processing

Forming

Thanks to the quality of steel making process, Supralsim® 690 is easy to shape providing the following conditions are respected:

- Dressing (or grinding) of the ridges caused by gas-cutting to limit the hardened zones,
- Sufficiently powerful equipment,
- Respect of minimum forming radius



Bending angle \leq 90°

<i>th</i> = thickness	Perpendicular to the rolling direction	Parallel to the rolling direction
Bending internal radius R_i (mini)	2 x <i>th</i>	3 x <i>th</i>
Die opening <i>V</i> (mini)	8 x <i>th</i>	10 x <i>th</i>

In hot condition, Supralsim® 690 is unsuitable for hot forming at a temperature higher than 600°C (1110°F).

Machining

Supralsim® 690 can be machined without any difficulty using the same methods as those used for the classical steels.

Welding

The reduced carbon and alloying elements content of Supralsim® 690 allow welding in very good conditions with excellent characteristics.

Weld preparation

The preparation of joints and surfaces is obviously very important to work in safe conditions :

- Removing all traces of grease and water,
- Grinding of cuts to remove any oxides, slag of grooves from cutting with excessive oxygen pressure,
- Grinding of any sheared edges, tears, final drips.

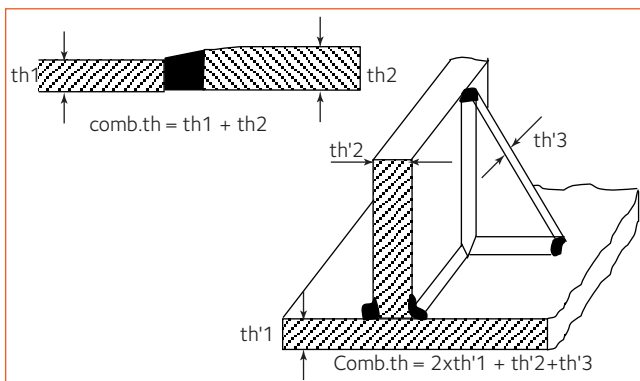
Welding process

Any conventional fusion welding method can be used, such as submerged arc welding (SAW), manual metal arc welding (SMAW), flux core wire arc welding (FCAW), MIG, MAG (GMAW) and TIG (GTAW)

Interpass temperature should be limited to a maximum of 200°C (392°F).

Pre-heating

Supralsim® 690 can be welded without any crack risk according to recommended conditions (forecast for highly clamped weld).



Welding processes SMAW - GMAW - SAW	Energy (kJ/cm)	10mm	20mm	30mm	40mm	50mm
		.4"	0.8"	1.18"	1.57"	1.96"
	15					
	30					
Welding processes SMAW - GMAW - SAW	Energy (kJ/cm)	60mm	70mm	80mm	90mm	100mm
		2.4"	2.75"	3.15"	3.54"	3.93"
	15					
	30					

Without pre-heating

With slight pre-heating at 75°C (165°F)

With pre-post-heating ≥ 100°C (210°F)

With pre-post-heating ≥ 150°C (300°F)



Welding consumables

Electrodes fluxes will have to be stored at 350°C (660°F) – 2 hours before using.

They must be stocked at 160°C (320°F).

	AFNOR	AWS	DIN
SMAW	NFA81-340 EY69 1.5NiCrMoBxxT BH	A5-5 E 110xx	DIN 8529 EY69 xx Mn2NiCrMo B
GMAW		A5-28 ER110 Sx	
FCAW		A5-29 ER110-T5	
SAW	NF A81-322 FP/x xx/xx xB x Saxx750605	A5-23 F11x6-EF6-F6 or F11x6-ECF6-F6	

Sizes and tolerances

Thicknesses		Coils			Quarto			Flatness* mm (")
mm	inches	Width mm	Width feet	Tol./Th mm	Width mm	Width feet	Tol./th mm	
4-6	.15-.24	1500	4.92'	± 0.25	1500-2500	4.92'-8.20'	± 0.6	5 (.20)
7-10	.27-.39				1500-3100	4.92'-10.17'	± 0.6	5 (.20)
11-14	.43-.55				1500-3800	4.92'-12.47'	± 0.6	5 (.20)
15-24	.59-.94				1500-3800	4.92'-12.47'	± 0.7	5 (.20)
25-39	.98-1.53				1500-3800	4.92'-12.47'	± 0.8	5 (.20)
40-59	1.57-2.32				1500-3800	4.92'-12.47'	± 1.2	5 (.20)
60-65	2.36-2.56				1500-3800	4.92'-12.47'	± 1.4	5 (.20)
66-120	2.60-4.72				1500-3500	4.92'-11.48'	± 1.4	5 (.20)
121-150	4.76-5.90				1500-3500	4.92'-11.48'	± 1.6	5 (.20)

Maximum length = 13 m. (42.65')

*Tighter flatness can be achieved upon request.

Applications



①



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③

- ① Cranes, Mobile cranes
- ② Tailers, bulldozers, loaders, industrial trucks, buckets
- ③ Pipes, bridge, steel buildings...

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Furthermore, in service, real conditions are specific for each application. The data presented here are only for the purpose of description, and considered as guarantees when written formal approval has been delivered by our company.