

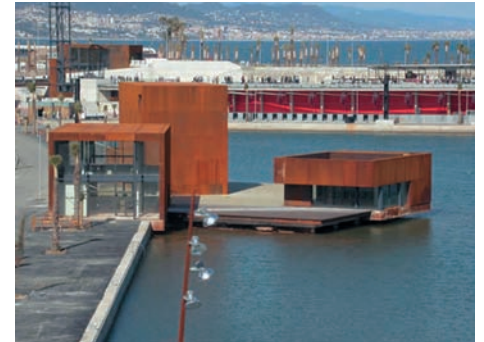


ArcelorMittal

ArcelorMittal Sestao

Atmospheric Corrosion Resistant Steel

When used uncoated and in the case of exposure to bad weather, a protective oxide layer develops on the steel surface. This is why this steel is often called "the weathering steel".



Properties

This steel combines the high strength of S355 structural steel (EN10025) with improved resistance to atmospheric corrosion.

Advantages

When used uncoated and in the case of exposure to bad weather, an oxide layer develops on the steel surface, forming a purplish-brown, finely grained patina which bonds very strongly to the steel and protects it. If the patina is damaged, the steel oxidises again and thus repairing the patina and maintaining the protective barrier.

It is optimal for coating processes (painting, metal linings, etc...). The protective patina on components manufactured with this material prevents rust propagation under the paint layer. Experience has shown that the adhesion of organic coatings on this steel is superior to bonding on other carbon steel grades.

This steel can withstand higher temperatures than ordinary building steel and has excellent weldability with all the usual welding processes, thanks to the low carbon content and the fine grain of the steel.

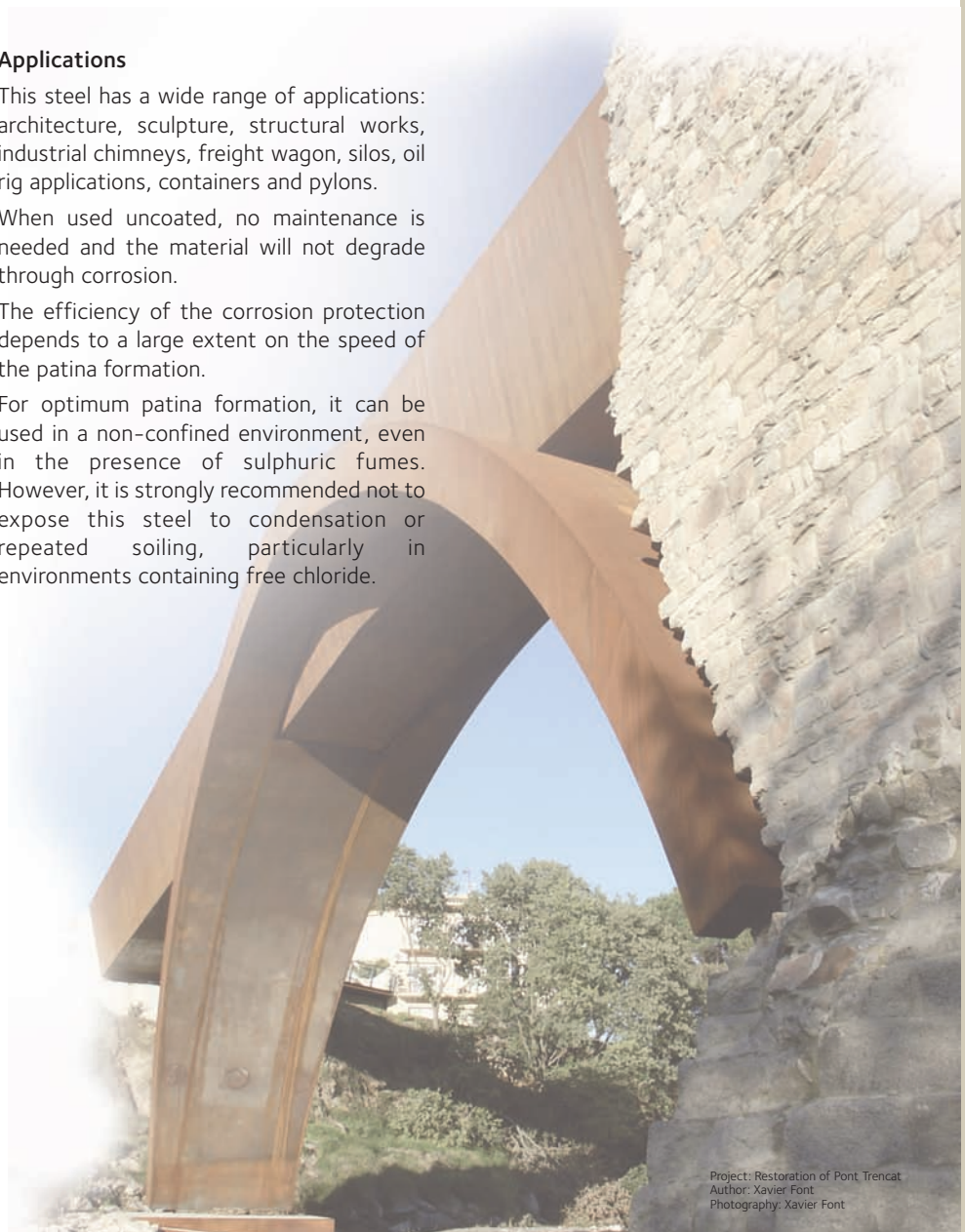
Applications

This steel has a wide range of applications: architecture, sculpture, structural works, industrial chimneys, freight wagon, silos, oil rig applications, containers and pylons.

When used uncoated, no maintenance is needed and the material will not degrade through corrosion.

The efficiency of the corrosion protection depends to a large extent on the speed of the patina formation.

For optimum patina formation, it can be used in a non-confined environment, even in the presence of sulphuric fumes. However, it is strongly recommended not to expose this steel to condensation or repeated soiling, particularly in environments containing free chloride.



Brand correspondence and norms

ArcelorMittal Sestao offer	EN 10025-5:2004	DIN 17119	BS 4360	EN 10155:1993	Old brand name
S355J2W	S355J2W	W St 52-3	WR 50C	S355J2G2W	Ensacor® D

 Available quality


Dimensions

Hot rolled black coil

Thickness (mm)	Min. width (mm)	S355J2W
		Max. width (mm)
≥ 1,50 and ≤ 1,79	845	1250
≥ 1,80 and ≤ 1,99		1280
≥ 2,00 and ≤ 12,7		1550

 UF Steels range

 Commercial thicknesses range

 Dimensions as per tables above

Pickled coil

Thickness (mm)	Min. width (mm)	S355J2W
		Max. width (mm)
≥ 1,50 and ≤ 1,79	845	1250
≥ 1,80 and ≤ 1,99		1280
≥ 2,00 and ≤ 2,49		1500
≥ 2,50 and ≤ 3,00		1400


For other dimensions please contact:
consultastecnicas.sestao@arcelormittal.com

Mechanical properties

	Direction	Thickness (mm)	R _e (MPa)	R _m (MPa)	A ₈₀ (%)	A 5,65-VS ₀ (%)	Bending ratio (th.)	KV -20 °C (J)
S355J2W	L	5-12,7	-	-	-	-	-	≥ 27
	T	1,5 - 3	≥ 355	510 - 680	≥ 16	-	-	-
		3 - 10		470 - 630	-	≥ 20		
		10 - 12,7		450 - 600	-	≥ 16		

Chemical properties

	≤ C (%)	≤ Mn (%)	≤ P (%)	≤ S (%)	≤ Si (%)	≥ Al (%)	≤ Cu (%)	≤ Ni (%)	≤ Cr (%)	Galvanisation
S355J2W	0,075	1,00	0,035	0,020	0,500	0,020	0,550	0,550	0,800	Yes

 Mechanical and chemical properties as per tables above.

The chemical properties given are based on cast analysis data.

Recommendations for use

APPEARANCE OF THE PATINA

Outdoor use: The patina is formed naturally in the open air (over a period of three-four years). Variations of appearance will be observed, depending on the weather condensation, evacuation and evaporation conditions. After a few years, the patina will stabilise, even in an industrial, sulphur containing or rural atmosphere. To ensure optimum patina formation and limit the formation of rust streaks, the oxidation process can be accelerated artificially by first descaling the surface (by sandblasting or shotblasting) and then subjecting to alternated periods of dry and humid conditions.

Indoor use: To preserve the natural appearance of the material and at the same time avoid powdering oxide deposits which may cause staining, the following steps are recommended:

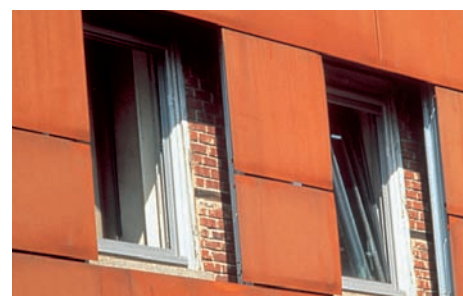
- First remove all dusty deposits, stains or faults and then apply a chemical treatment to the areas where corrosion has not yet developed.
- Clean the surface with water, brush and dry.
- Finally, apply a matt colourless UV resistant varnish.

Used painted: As the surface has a high reactivity, it is recommended to apply the first coat of paint on a clean surface immediately after pickling or sandblasting.

The presence of copper in the layer of oxides contributes to the formation of a strongly bonded, elastic and compact patina on the surface in the course of the corrosion process.

The chromium and nickel contribute to the formation of basic insoluble alkaline sulphates which will seal the pores of the oxide layer thereby protecting the metal from water and oxygen.

Silicon, and to the lesser extent phosphorous, also has a favourable effect on the corrosion resistance.



Research and Development Centre Saint Gobain - Aubervilliers (France) - Architects Benoit Cornette and Odile Decq - Photography Stephane Savary

Weldability

This steel has excellent weldability with all the usual welding processes, thanks to the low carbon content and the fine grain of the steel.

Manual arc welding (process No. 111, SMAW)

Supplier	Esab	Lincoln	Oerlikon	S.A.F.	Commercy	Thyssen
Specific electrode	OK 73-08	Conarc 55T	Tencord Kb	Safer Cu	CY-S-24	SH Patinax Kb
	OK 48-08		Tencord Ti			
			Comet jaune			
Specially adapted electrode	–	Conarc 60G	–	Safer N48	–	–
	–	Conarc 70G	–	Safer NF 510, NF 510 A	–	–
	–	Kryo 1	–	Safer NF 52, NF 53	–	–

Submerged arc welding (process No 21, SAW)

The filler materials to be used are the same as those recommended for welding steels with the same mechanical properties. As SAW involves strong inherent dilution, the welds will develop patina.

The mechanical properties obtained in fusion zones meet the normal property requirements for the base metal.

Supplier	Esab	Lincoln	Oerlikon	S.A.F.	Thyssen
Specific bare welding wires	Fil Autrod 13.36	Fil LNS	–	–	Fil Union Patinax U Flux UV420 o 420TT
	Flux 10.71 o Flux 10.81	Flux P230	–	–	Fil Union Patinax Flux UV420TT MH
Specific cored welding wires	–	–	Fil Fluxocord 48	–	–
	–	–	Flux OS 160	–	–
	–	–	Flux OP 121TT	–	–
Specific adapted welding wires	–	Fil LNS 160 / Flux P230	–	Fil AS 35 / Flux AS 50 o 37	– –
	–	Fil L 61 / Flux 860, 780, 761	–	Fil AS 26 / Flux AS 231	– –



Project: Tennis Club Couder
 Authors: Architects Cervera & Pioz
 Photography: Architects Cervera & Pioz

Metal active gas welding (process No. N° 135, MAG)

The thin wires used for equivalent carbon steel grades can also be used; copperplated wires deposit more copper on the surface of the welded zone, which contributes to the development of the patina on the welds. The cored wires to be used are also the same as those used for the equivalent carbon-manganese steel grades.

Supplier	Esab	S.A.F.	Commercy
Specific welding wires	Autrod 12.51	–	SG 51
Specially adapted welding wires	Autrod 13.29	Netalic 705 o 70A	–

Flux core arc welding (process No. 136, FCAW)

The process is suitable for the assembly of thin products with the same welding parameters recommended for equivalent carbon-manganese steel grades. If a filler wire is used, it must be of the same type as the base material.

Supplier	Esab	Lincoln	Oerlikon	S.A.F.	Contimine
Specific welding wires	Tubrod 14.01	LNM Ni 1	Fluxofil 18	Safdual 48	DW 588
		NR 230 Ni			
		NR 232 y 305	Fluxofil 48	–	–
		NR 400		–	–
Specially adapted welding wires	Tubrod 15.17	Outershield OS	Fluxofil 31	Safdual 31	–
	Tubrod 15.00				–