E50 - Steels with Alusi® aluminium-silicon coating

The presence of silicon allows the coating to be used at very high temperatures, making it ideal for all applications where parts are subjected to heat.

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Properties

Alusi® is a flat carbon steel product coated on both sides with an aluminium-silicon alloy. The coating is composed of 90% aluminium and 10% silicon and is applied by means of a continuous hot dip galvanising process. Alusi® is available in a wide range of steel grades: steels for cold forming and deep drawing applications, and structural steels.

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Advantages

Alusi® is particularly suitable for applications requiring high resistance to oxidation at high temperatures. Up to 450°C, the top surface of the Alusi® coating does not alter and its thermal and light reflectivity remains at 80%, which is an important requirement for thermal shielding applications. The presence of silicon allows the coating to be used at temperatures as high as 650°C without flaking.

A passivating layer of aluminium oxide is formed instantly in contact with the oxygen present in air. Since this passivation protection renews itself naturally when damaged (scratches), the coating offers excellent resistance to corrosion and chemical attacks.

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Applications

Because Alusi® can resist high temperatures, it is particularly suitable for use in thermal shielding. However, Alusi® also has many other applications:

- General industry: exhaust systems, thermal shields, heating equipment, boilers, ducts, fume exhaust pipes, heat exchangers, industrial ovens etc
- Building: fire doors etc
- Domestic appliances: ovens, deep fryers, toasters, barbecues etc

Alusi® can be supplied oiled and/or passivated, or with an Easyfilm® thin organic coating (please see data sheet E80 for the specific properties of Easyfilm®).

Under certain conditions, Alusi® is suitable for food contact, as specified in the Regulation (EC) No. 1935/2004 and French standard NF A 36-712-2. Please contact us for further information on this subject.

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Recommendations for use

Alusi® must be transported and stored in a sheltered, moisture-free environment.

The forming and joining techniques currently used for uncoated steel are also suitable for Alusi®.

Alusi® coated steel can be welded using various types of resistance welding processes (spot, seam, butt welding). TIG, MIG, MAG, High Frequency Induction welding and laser welding are also suitable.
When supplied oiled, Alusi® needs degreasing and surface treatment before painting.

Alusi® coated with an Easyfilm® thin organic coating can be painted directly, without any prior surface treatment. However, the paint must be compatible with the Easyfilm® resin.

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Coating weight and typical thickness

Alusi®	Coating weight - double sided (g/m²)	Coating thickness (µm per side)
AS50	50	8.5
AS60	60	10
AS80	80	13
AS100	100	17
AS120	120	20
AS150	150	25
AS240	240	40

For other coating thicknesses, please contact us.

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Brand correspondence

Steels for cold forming and deep drawing applications

	NFA 36-340	ASTM A463 Type 1	JIS 3314	EN 10154:2002	EN 10292:2007	EN 10326:2004	EN 10327:2004	EN 10346:2009	EN 10346:2015	Old brand names
DX51D +AS EN 10346	AS C / AS TC	CS	SA 1 C	DX51D+AS			DX51D+AS	DX51D+AS	DX51D+AS	AL2/BM/BO
DX52D +AS EN 10346	AS E	FS		DX52D+AS			DX52D+AS	DX52D+AS	DX52D+AS	AL3/BS
DX53D +AS EN 10346	AS ES	DDS	SA 1 D	DX53D+AS			DX53D+AS	DX53D+AS	DX53D+AS	(AL4)/BSR
DX54D +AS EN 10346	AS EX	EDDS	SA 1 E	DX54D+AS			DX54D+AS	DX54D+AS	DX54D+AS	AL5/BX
DX55D +AS EN 10346				DX55D+AS			DX55D+AS	DX55D+AS	DX55D+AS	ALT/BHT
DX56D +AS EN 10346				DX56D+AS			DX56D+AS	DX56D+AS	DX56D+AS	AL6/BXS
DX57D +AS EN 10346							DX57D+AS	DX57D+AS	DX57D+AS	

() Closest grade as no fully equivalent grade exists.

Structural steels

	NFA 36-340	ASTM A463 Type 1	JIS 3314	EN 10154:2002	EN 10292:2007	EN 10326:2004	EN 10327:2004	EN 10346:2009	EN 10346:2015	Old brand names
S250GD +AS EN 10346	C250	SS Grade 37		S250GD+AS		S250GD+AS		S250GD+AS	S250GD+AS	AL250
S280GD +AS EN 10346	C280	SS Grade 40		S280GD+AS		S280GD+AS		S280GD+AS	S280GD+AS	AL280/BJ
S320GD +AS EN 10346	C320			S320GD+AS		S320GD+AS		S320GD+AS	S320GD+AS	AL320/BK
S350GD +AS EN 10346	C350	SS Grade 50		S350GD+AS		S350GD+AS		S350GD+AS	S350GD+AS	AL350/BL

High Strength Low Alloy steels

	NFA 36-340	ASTM A463 Type 1	JIS 3314	EN 10154:2002	EN 10292:2007	EN 10326:2004	EN 10327:2004	EN 10346:2009	EN 10346:2015	Old brand names
HX260LAD +AS EN 10346					HX260LAD+AS			HX260LAD+AS	HX260LAD+AS	AL250NB
HX300LAD +AS EN 10346					HX300LAD+AS			HX300LAD+AS	HX300LAD+AS	AL280NB
HX340LAD +AS EN 10346					HX340LAD+AS			HX340LAD+AS	HX340LAD+AS	AL320NB
HX380LAD +AS EN 10346					HX380LAD+AS			HX380LAD+AS	HX380LAD+AS	AL380
HX420LAD +AS EN 10346					HX420LAD+AS			HX420LAD+AS	HX420LAD+AS	AL420

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Dimensions

Steels for cold forming and deep drawing applications

Thickness (mm)	Min width	DX51D +AS EN 10346, DX52D +AS EN 10346, DX53D +AS EN 10346	DX54D +AS EN 10346	DX55D +AS EN 10346	DX56D +AS EN 10346	DX57D +AS EN 10346
		Max width	Max width	Max width	Max width	Max width
0.30 ≤ th < 0.40	750	1150	1150	1150	-	-
0.40 ≤ th < 0.50				1170	1170	
0.50 ≤ th < 0.55		1280	1300	1280	1280	
0.55 ≤ th < 0.60		1400		1400	1400	
0.60 ≤ th < 0.70		1525	1400	1525	1525	
0.70 ≤ th < 0.90						1400
0.90 ≤ th < 1.80		1700	1700			
1.80 ≤ th < 2.00		1600	1600			-
2.00 ≤ th < 2.30		1525	1400			
2.30 ≤ th < 2.50		1440		1440		
2.50 ≤ th < 2.65		1370	1100	1370	-	
2.65 ≤ th < 3.00		1200		1200		

Structural steels

Thickness (mm)	Min width	S250GD +AS EN 10346, S280GD +AS EN 10346	S320GD +AS EN 10346	S350GD +AS EN 10346
		Max width	Max width	Max width
0.30 ≤ th < 0.40	800	-	1150	-
0.40 ≤ th < 0.45		1250	1250	
0.45 ≤ th < 0.55			1270	1230
0.55 ≤ th < 0.60		1400	1400	
0.60 ≤ th < 1.00		1525	1525	1500
1.00 ≤ th < 1.60				
1.60 ≤ th < 2.00				
2.00 ≤ th < 2.50		1440		-
2.50 ≤ th < 3.00		1200	1250	

High Strength Low Alloy steels

Thickness (mm)	Min width	HX260LAD +AS EN 10346, HX300LAD +AS EN 10346, HX340LAD +AS EN 10346, HX380LAD +AS EN 10346, HX420LAD +AS EN 10346
		Max width
0.35 ≤ th < 0.45	800	1250
0.45 ≤ th < 0.55		1300
0.55 ≤ th < 0.60		1500
0.60 ≤ th < 2.00		

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Mechanical properties

Steels for cold forming and deep drawing applications

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	r_{90}	n_{90}
DX51D +AS EN 10346		T	0.3 - 0.5	-	270 - 500	≥ 18	-	-
			0.5 - 0.7			≥ 20		
			0.7 - 3			≥ 22		
DX52D +AS EN 10346	1	T	0.3 - 0.5	140 - 300	270 - 420	≥ 22	-	-
			0.5 - 0.7			≥ 24		
			0.7 - 3			≥ 26		
DX53D +AS EN 10346		T	0.3 - 0.5	140 - 260	270 - 380	≥ 26	-	-
			0.5 - 0.7			≥ 28		
			0.7 - 3			≥ 30		
DX54D +AS EN 10346		T	0.3 - 0.5	120 - 220	260 - 350	≥ 30	≥ 1.2	≥ 0.180
			0.5 - 0.7			≥ 32		
			0.7 - 1.5			≥ 34	≥ 1.4	
			1.5 - 2				≥ 1.2	
			2 - 3				≥ 1	
DX55D +AS EN 10346		T	0.3 - 0.5	140 - 240	270 - 370	≥ 26	-	-
			0.5 - 0.7			≥ 28		
			0.7 - 3			≥ 30		
DX56D +AS EN 10346		T	0.3 - 0.5	120 - 180	260 - 350	≥ 35	≥ 1.5	≥ 0.190
			0.5 - 0.7			≥ 37		
			0.7 - 1.5			≥ 39	≥ 1.7	≥ 0.200
			1.5 - 2				≥ 1.5	
			2 - 3				≥ 1.3	
DX57D +AS EN 10346		T	0.5 - 0.7	120 - 170	260 - 350	≥ 39	≥ 1.7	≥ 0.200
			0.7 - 1.5			≥ 41	≥ 1.9	≥ 0.210
			1.5 - 2				≥ 1.7	

1. For DX52D +AS EN 10346 the R_e-value only applies to skin-passed products (surface qualities B and C).

Structural steels

	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)
S250GD +AS EN 10346	L	0.3 - 0.5	≥ 250	≥ 330	≥ 15
		0.5 - 0.7			≥ 17
		0.7 - 3			≥ 19
S280GD +AS EN 10346	L	0.3 - 0.7	≥ 280	≥ 360	≥ 16
		0.7 - 3			≥ 18
S320GD +AS EN 10346	L	0.3 - 0.5	≥ 320	≥ 390	≥ 13
		0.5 - 0.7			≥ 15
		0.7 - 3			≥ 17
S350GD +AS EN 10346	L	0.3 - 0.5	≥ 350	≥ 420	≥ 12
		0.5 - 0.7			≥ 14
		0.7 - 3			≥ 16

High Strength Low Alloy steels

	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)
HX260LAD +AS EN 10346	T	0.3 - 0.5	260 - 320	350 - 430	≥ 20
		0.5 - 0.7			≥ 22
		0.7 - 3			≥ 24
HX300LAD +AS EN 10346	T	0.3 - 0.5	300 - 380	380 - 480	≥ 17
		0.5 - 0.7			≥ 19
		0.7 - 3			≥ 21
HX340LAD +AS EN 10346	T	0.3 - 0.5	340 - 420	410 - 510	≥ 15
		0.5 - 0.7			≥ 17
		0.7 - 3			≥ 19
HX380LAD +AS EN 10346	T	0.3 - 0.5	380 - 480	440 - 560	≥ 13
		0.5 - 0.7			≥ 15
		0.7 - 3			≥ 17
HX420LAD +AS EN 10346	T	0.5 - 0.7	420 - 520	470 - 590	≥ 13
		0.7 - 3			≥ 15

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Chemical composition

Steels for cold forming and deep drawing applications

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Ti (%)
DX51D +AS EN 10346	≤ 0.180	≤ 1.20	≤ 0.120	≤ 0.045	≤ 0.50	≤ 0.300
DX52D +AS EN 10346	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	≤ 0.300
DX53D +AS EN 10346	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	≤ 0.300
DX54D +AS EN 10346	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	≤ 0.300
DX55D +AS EN 10346	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	≤ 0.300
DX56D +AS EN 10346	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	≤ 0.300
DX57D +AS EN 10346	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	≤ 0.300

Structural steels

	C (%)	Mn (%)	P (%)	S (%)	Si (%)
S250GD +AS EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60
S280GD +AS EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60
S320GD +AS EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60
S350GD +AS EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60

High Strength Low Alloy steels

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Al (%)	Nb (%)	Ti (%)
HX260LAD +AS EN 10346	≤ 0.110	≤ 1.00	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX300LAD +AS EN 10346	≤ 0.120	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX340LAD +AS EN 10346	≤ 0.120	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.100	≤ 0.150
HX380LAD +AS EN 10346	≤ 0.120	≤ 1.50	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.100	≤ 0.150
HX420LAD +AS EN 10346	≤ 0.120	≤ 1.60	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.100	≤ 0.150

Any questions?
Ask them via our contact form on https://industry.arcelormittal.com/getintouch