E00

ArcelorMittal's range

Last update: 2014-4-28

Introduction

Metallic coatings offer a wide range of manufacturing options with outstanding economic, technological and environmental advantages.

There is certainly a metallic coated steel to meet your requirements.

ArcelorMittal provides the necessary technical assistance to help clients choose the best metallic coated steel for their applications in terms of performance and price, in order to create a long-term win-win partnership.

Definition

ArcelorMittal's metallic coated steels consist of a steel substrate with a metallic coating of zinc, an alloy of zinc and aluminium, an alloy of zinc with magnesium and aluminium, an alloy of aluminium and silicon, or even pure aluminium.

These products are manufactured in a continuous process. Various coating processes may be used:

- The hot dip coating process, in which the steel strip is continuously immersed in a bath containing a molten metal. The composition of the metal in the bath (zinc, zinc-aluminium, zinc-aluminium-magnesium, aluminium-silicon or aluminium) determines the nature of the metallic coating
- The electrodeposition coating process, which enables the continuous application of a metallic coating by electrogalvanising

Process	Hot dip coating	Electrodeposition coating
Products	Hot dip galvanised steel (Z): pure zinc-based coating (E20)	Electrogalvanised steel (ZE): pure zinc coating (E10)
	Galfan (ZA): coating composed of zinc and aluminium (E30)	
	Magnelis® (ZM): coating composed of zinc, aluminium and magnesium (E35)	
	Aluzinc® (AZ): coating composed of aluminium, zinc and silicon (E40)	
	Alusi® (AS): coating composed of aluminium and silicon (E50)	
	Alupur® (AL): pure aluminium-based coating (E60)	

Durability and protection

Metallic coatings such as zinc, aluminium and their alloys are most frequently used to protect steel against atmospheric corrosion.

Basically, zinc and other sacrificial coatings protect steel against a corrosive environment in two ways:

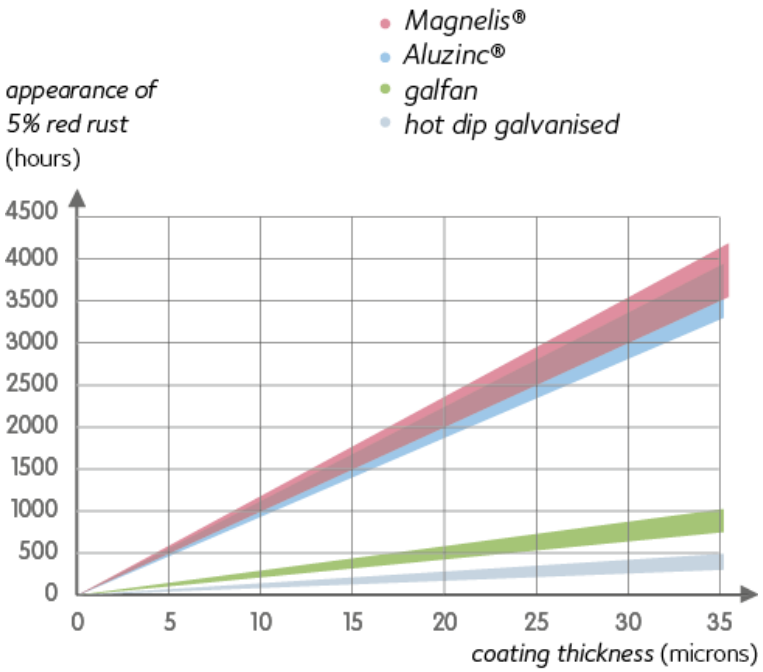
- **Barrier effect:** the coating isolates the steel product from the corrosive environment. In addition, the corrosion products of the metallic coating create a protective layer, which delays corrosion and protects any uncoated areas
- **Cathodic protection:** steel exposed to a corrosive environment due to damage to its coating (scratches, cut edges, holes etc) is protected from corrosion by the sacrificial dissolution of the surrounding coating

Different accelerated tests can be used to assess how well a metallic coating performs.

The salt spray test (ISO 9227) consists of exposing a test specimen to a salt mist and examining the formation and development of white rust (for zinc coatings), black rust (for aluminised coatings) and red rust.

Choosing the right metallic coating

ArcelorMittal offers a wide range of metallic coatings, each with specific properties. The following graph can serve as a guide for selecting the best metallic coating for your requirements.



Applications for indoor building, general industry and domestic appliances

	Surface protection (unpainted)	Protection (painted)	Aspect durability (unpainted)	Aspect (post-painted)	Coating formability	Suitability for electrical resistance welding	Temperature resistance
Electrogalvanised steels E10	□	⊞	+	⊞	+	⊞	□
Hot dip galvanised steels E20	□	⊞	+	+	+	+	□
Steels with galfan zinc-aluminium coating E30	+	⊞	□	+	⊞	□	□
Steels with Magnelis® zinc-aluminium-magnesium coating E35	⊞	⊞	⊞	⊞	⊞		
Steels with Aluzinc® aluminium-zinc coating E40	⊞	⊞	⊞	□	+[1]	□	+
Steels with Alusi® aluminium-silicon coating E50	⊞	⊞	+	□	□	△	⊞
Steels with Alupur® aluminium coating E60	⊖	⊖	⊖	⊖	⊖	⊖	⊖

⊞ *Excellent*
\+ *Very good*
□ *Good*
△ *Good, but with reservations*
⊖ *Not suitable*

Applications for outdoor building

	Surface protection[2]	Edge and scratch protection[2]	Outdoor exposure performance	Aspect durability (unpainted)	Abrasion resistance (unpainted)	Aptitude to bending and profiling	Temperature resistance	Solar heat reflectivity
Electrogalvanised steels E10	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖
Hot dip galvanised steels E20	□	+	□	+	△	+	□	□
Steels with galfan zinc-aluminium coating E30	+	⊞	+	□	□	⊞	□	□

Steels with Magnelis® zinc-aluminium-magnesium coating	E35	⊞	⊞	⊞	⊞	⊞	⊞		
Steels with Aluzinc® aluminium-zinc coating	E40	⊞	□	⊞	⊞	+	+	+	+
Steels with Alusi® aluminium-silicon coating	E50	⊖	⊖	⊖	⊖	⊖	⊖	⊖	⊖
Steels with Alupur® aluminium coating	E60	⊞	□	⊞	⊞	⊞	□	⊞	⊞

⊞ *Excellent*
\+ *Very good*
□ *Good*
△ *Good, but with reservations*
⊖ *Not suitable*

(1) If post-annealed

(2) Salt spray test

For commercial information (quotations, deliveries, product availability):

- Europe: http://industry.arcelormittal.com/agencies
- Other countries: contact@arcelormittal.com

For technical questions about these products: flateurope.technical.assistance@arcelormittal.com
For researchers: click here

E10

Electrogalvanised steels

The surface quality of electrogalvanised steels makes them ideal for the manufacture of visible components. Typical applications include indoor building, electrical and electronic appliances, metal furniture etc.

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Properties

ArcelorMittal's electrogalvanised steel is a flat carbon steel product, coated by electrodeposition on one or both sides with a pure zinc layer.
This coating is characterised by its uniform and regular thickness.

Advantages

ArcelorMittal’s electrogalvanised steel offers good resistance to corrosion for indoor applications.
It has also excellent weldability, due to the uniformity and regularity of the zinc coating.

Electrogalvanised products are an excellent substrate for painting, both in terms of adhesion and appearance. This advantage is further enhanced by the use of post-coating surface treatments: phosphating and/or passivation, Easyfilm® thin organic coating (please see data sheet E80 for the specific properties of Easyfilm®).

Applications

Electrogalvanised products are particularly suitable for industrial and domestic appliances. Some of the most common applications include:

- Domestic appliances: washing machines, dryers, dish washers, cookers, microwave ovens, refrigerators etc
- Teletronics: computers, laptop and hi-fi casings, casings for TVs, video and CD players, decoders etc
- Furniture: cupboards, desks, shelves, electrical cabinets etc
- Miscellaneous: air conditioners, road signs, electric motors, toys, construction items etc

Recommendations for use

Storage

ArcelorMittal’s electrogalvanised steel is supplied passivated and/or phosphated and/or oiled to temporarily limit the risk of white rust formation. During transport and storage, all necessary precautions must be taken to keep the material dry and to prevent the formation of condensation. Rust prevention can be further improved by the application of an Easyfilm® thin organic coating.

Forming and joining

The forming and joining techniques mainly used for uncoated steel sheets are also suitable for steel sheet with electrogalvanised coatings, even in the case of extreme forming operations. Forming performance is improved if electrogalvanised steel is coated with an Easyfilm® thin organic coating.

Painting

Electrogalvanised steel can be painted after degreasing and surface treatment when supplied oiled.
When phosphated or coated with an Easyfilm® thin organic coating, electrogalvanised steel can be painted directly, without any prior surface treatment. However, the paint must be compatible with the Easyfilm® resin.

Weldability

In electrical resistance welding, the welding current must be suitably regulated and regularly adjusted. Electrode life can be extended by regularly stepping up the welding current and periodically dressing (machining) the electrodes.

Brand correspondence

Steels for cold forming and deep drawing applications

	EN 10268:2006	UNE 36122	NF A36-232	ASTM	ASTM 607	DIN 1623/1	BS 1449/1	SIS	JIS G 3313	EN 10152:2009	NF A36-401	Old brand names
DC01 +ZE EN 10152				A 366		St 12	CR 4	14 11 42	SECC	DC01+ZE	C	
DC03 +ZE EN 10152				A 619		RRSt 13	CR 2	14 11 48	SECD	DC03+ZE	E	Solstamp® 03+ZE
DC04 +ZE EN 10152				A 620		St 14	CR 1	14 11 47	SECE	DC04+ZE	ES	Solstamp® 04+ZE
DC04 AM FCE +ZE				A 620		St 14	CR 1	14 11 47	SECE	DC04+ZE	ES	Solstamp® 04+ZE
DC05 +ZE EN 10152				A 621		(St 15)				DC05+ZE	SES	Solstamp® 05+ZE
DC06 +ZE EN 10152										DC06+ZE		
DC07 +ZE EN 10152										DC07+ZE		

High strength low alloy steels

	EN 10268:2006	UNE 36122	NF A36-232	ASTM	ASTM 607	DIN 1623/1	BS 1449/1	SIS	JIS G 3313	EN 10152:2009	NF A36-401	Old brand names
HC260LA +ZE EN 10268	HC260LA		E 260 C									Profilar® 260+ZE/MA 240L/HQE240+ZE/ZStE 260
HC300LA +ZE EN 10268	HC300LA		E 280 C									Profilar® 300+ZE/MA 280L +ZE/Sidca® M-300/ HQE280+ZE/Soldur® 280+ZE/ZStE 300
HC340LA +ZE EN 10268	HC340LA	AE 335 HF	E 315 C									Profilar® 340+ZE/MA 320L +ZE/Sidca® M-340/Soldur ® 320+ZE/ZStE 340
HC380LA +ZE EN 10268	HC380LA	AE 390 HF	E 355 C		Grade 607-50							Profilar® 380+ZE/MA 360L +ZE/Soldur® 360+ZE/ ZStE 380
HC420LA +ZE EN 10268	HC420LA											

() Closest grade as no fully equivalent grade exists.

Dimensions

Steels for cold forming and deep drawing applications

Thickness (mm)	Min width	DC01 +ZE EN 10152, DC03 +ZE EN 10152, DC04 +ZE EN 10152, DC04 AM FCE +ZE, DC05 +ZE EN 10152	DC06 +ZE EN 10152	DC07 +ZE EN 10152
		Max width	Max width	Max width
0.25 ≤ th < 0.55	600	1820	1600	-
0.55 ≤ th < 2.30		1860	1860	1500
2.30 ≤ th < 2.55		1820	1690	1690
2.55 ≤ th < 3.00			1550	1510
3.00 ≤ th < 3.20				-

High strength low alloy steels

Thickness (mm)	Min width	HC260LA +ZE EN 10268	HC300LA +ZE EN 10268	HC340LA +ZE EN 10268	HC380LA +ZE EN 10268	HC420LA +ZE EN 10268
		Max width	Max width	Max width	Max width	Max width
0.40 ≤ th < 0.60	600	1820	1490	1830	1600	1250
0.60 ≤ th < 0.70			1700			1600
0.70 ≤ th < 0.80		1860				1670
0.80 ≤ th < 0.90				1840		
0.90 ≤ th < 1.25			1860			
1.25 ≤ th < 2.00				1860		
2.00 ≤ th < 2.30					1550	1760
2.30 ≤ th < 2.55		1820	1690	1830		1700
2.55 ≤ th < 3.00			1540			1540
3.00 ≤ th < 3.20		-	-		-	

Mechanical properties

The choice of direction for the mechanical properties should be specified when ordering.

Steels for cold forming and deep drawing applications

	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	r 90	n 90
DC01 +ZE EN 10152	T	0.3 -0.5	140 -320	270 -410	≥ 24	-	-
		0.5 -0.7	140 -300		≥ 26		
		0.7 -3	140 -280		≥ 28		
DC03 +ZE EN 10152	T	0.3 -0.5	140 -280	270 -370	≥ 30	-	-
		0.5 -0.7	140 -260		≥ 32	≥ 1.3	
		0.7 -2	140 -240		≥ 34		
		2 -3				≥ 1.1	
DC04 +ZE EN 10152	T	0.3 -0.5	140 -260	270 -350	≥ 33	-	-
		0.5 -0.7	140 -240		≥ 35	≥ 1.6	≥ 0.170
		0.7 -2	140 -220		≥ 37		
		2 -3				≥ 1.4	
DC04 AM FCE +ZE	T	0.3 -0.5	140 -**250**	270 -350	**≥ 34**	-	-
		0.5 -0.7	140 -**230**		**≥ 36**	**≥ 1.8**	**≥ 0.190**
		0.7 -2	140 -**210**		**≥ 38**		
		2 -3				**≥ 1.6**	
DC05 +ZE EN 10152	T	0.3 -0.5	140 -240	270 -330	≥ 35	-	-
		0.5 -0.7	140 -220		≥ 37	≥ 1.9	≥ 0.190
		0.7 -2	140 -200		≥ 39		
		2 -3				≥ 1.7	
DC06 +ZE EN 10152	T	0.3 -0.5	130 -220	270 -350	≥ 37	-	-
		0.5 -0.7	130 -200		≥ 39	≥ 2.1	≥ 0.210
		0.7 -2	130 -180		≥ 41		
		2 -3				≥ 1.9	
DC07 +ZE EN 10152	T	0.5 -0.7	110 -180	250 -310	≥ 41	≥ 2.5	≥ 0.220
		0.7 -2	110 -160		≥ 43		
		2 -3				≥ 2.3	

Values in bold: tighter than the standard

High strength low alloy steels

	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	r 90	n 90
HC260LA +ZE EN 10268	L	0.5 -0.7	240 -310	340 -420	≥ 25	-	-
		0.7 -3			≥ 27		
	T	0.5 -0.7	260 -330	350 -430	≥ 24	-	-
		0.7 -3			≥ 26		
HC300LA +ZE EN 10268	L	0.5 -0.7	280 -360	370 -470	≥ 22	-	-
		0.7 -3			≥ 24		
	T	0.5 -0.7	300 -380	380 -480	≥ 21	-	-
		0.7 -3			≥ 23		
HC340LA +ZE EN 10268	L	0.5 -0.7	320 -410	400 -500	≥ 20	-	-
		0.7 -3			≥ 22		
	T	0.5 -0.7	340 -420	410 -510	≥ 19	-	-
		0.7 -3			≥ 21		
HC380LA +ZE EN 10268	L	0.5 -0.7	360 -460	430 -550	≥ 18	-	-
		0.7 -3			≥ 20		
	T	0.5 -0.7	380 -480	440 -560	≥ 17	-	-
		0.7 -3			≥ 19		
HC420LA +ZE EN 10268	L	0.5 -0.7	400 -500	460 -580	≥ 16	-	-
		0.7 -3			≥ 18		
	T	0.5 -0.7	420 -520	470 -590	≥ 15	-	-
		0.7 -3			≥ 17		

Chemical composition

Steels for cold forming and deep drawing applications

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Al (%)	Nb (%)	Ti (%)
DC01 +ZE EN 10152	≤ 0.120	≤ 0.60	≤ 0.045	≤ 0.045	-	-	-	-
DC03 +ZE EN 10152	≤ 0.100	≤ 0.45	≤ 0.035	≤ 0.035	-	-	-	-
DC04 +ZE EN 10152	≤ 0.080	≤ 0.40	≤ 0.030	≤ 0.030	-	-	-	-
DC04 AM FCE +ZE	≤ 0.080	≤ 0.40	≤ **0.025**	≤ **0.025**	-	-	-	-
DC05 +ZE EN 10152	≤ 0.060	≤ 0.35	≤ 0.025	≤ 0.025	-	-	-	-
DC06 +ZE EN 10152	≤ 0.020	≤ 0.25	≤ 0.020	≤ 0.020	-	-	-	≤ 0.300
DC07 +ZE EN 10152	≤ 0.010	≤ 0.20	≤ 0.020	≤ 0.020	-	-	-	≤ 0.200
Values in bold: tighter than the standard								

High strength low alloy steels

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Al (%)	Nb (%)	Ti (%)
HC260LA +ZE EN 10268	≤ 0.100	≤ 0.60	≤ 0.025	≤ 0.025	≤ 0.50	≥ 0.015	-	≤ 0.150
HC300LA +ZE EN 10268	≤ 0.100	≤ 1.00	≤ 0.025	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HC340LA +ZE EN 10268	≤ 0.100	≤ 1.10	≤ 0.025	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HC380LA +ZE EN 10268	≤ 0.100	≤ 1.60	≤ 0.025	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HC420LA +ZE EN 10268	≤ 0.100	≤ 1.60	≤ 0.025	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150

Coating properties

		Thickness (µm per side)	Weight (g/m² per side)
One-sided coating	ZE 0/25	0.0/2.5	0/18
	ZE 0/50	0.0/5.0	0/36
Two-sided coating	ZE 25/25	2.5/2.5	18/18
	ZE 50/50	5.0/5.0	36/36

For other or intermediate layer thicknesses, please contact us.

For commercial information (quotations, deliveries, product availability):

- Europe: http://industry.arcelormittal.com/agencies
- Other countries: contact@arcelormittal.com

For technical questions about these products: flateurope.technical.assistance@arcelormittal.com
For researchers: click here

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Hot dip galvanised steels

These steels can be used in a very wide range of applications, both indoors and outdoors. One example is this metallic ceiling for a railway station.

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Properties

ArcelorMittal's hot dip galvanised steels consist of a steel substrate with a metallic zinc coating applied by means of a continuous hot dip galvanising process. Metallic zinc coatings are available in steel grades ranging from steel for bending and deep drawing applications, to structural steels and high yield strength steels.

A glossy surface finish obtained under specific skin-pass conditions (either non-skin-passed or skin-passed with smooth cylinders to obtain low roughness) can be provided if required at time of enquiry.

Advantages

Hot dip galvanised products offer excellent corrosion resistance combined with very good forming properties. The coating process can apply very thick zinc layers, up to 725 g/m² (total of both sides).

Applications

ArcelorMittal's hot dip galvanised steels can be used in a very wide range of applications for industrial markets, both indoors and outdoors. Some of the most common applications are:

- Building: wide sections for roofing and cladding, doors, door frames, metallic ceilings, partitions, structural members etc
- Domestic appliances: all appliances for this sector (both white and brown goods) are manufactured with hot dip galvanised steels
- Miscellaneous: electrical cabinets, aeraulic components, air conditioners, road signs etc

Zinc hot dip galvanised steel is suitable for contact with foodstuffs under certain conditions, as specified in the Regulation (EC) No. 1935/2004 and French standard NF A 36-712-1. Please contact us for further information on this subject.

Since 1 July 2013, the Construction Products Regulation (Regulation (EU) No. 305/2011 – CPR) has required that CE marking be affixed to all products delivered in accordance with a harmonised European Standard or a European Technical Approval (ETA). This CE marking guarantees, for the uses defined in the standard, the properties described in the declaration of performance submitted by the manufacturer.

The steel grade S390GD +Z ETA-13/0257 in this data sheet complies with this Regulation.

The corresponding declarations of performance are available on our website at:

http://dop.arcelormittal.net/index.php

Recommendations for use

Storage

Galvanised strips are usually supplied passivated or oiled to temporarily limit any risk of white rust formation. During transport and storage, all necessary precautions must be taken to keep the material dry and to prevent the formation of condensation. Improved protection can be achieved by the application of an Easyfilm® thin organic coating (please see data sheet E80 for the specific properties of Easyfilm®).

Forming and joining

The forming and joining techniques currently used for uncoated steel are also suitable for galvanised steel.
It is essential to select a coating thickness that is compatible with the forming and joining processes envisaged, without compromising the desired degree of corrosion protection.

Painting

Hot dip galvanised steels can be painted after degreasing and surface treatment when supplied oiled. If an Easyfilm® thin organic coating has been applied, they can be painted directly, without any prior surface treatment. However, the paint must be compatible with the Easyfilm® resin.

Weldability

In electrical resistance welding, the welding current must be suitably regulated and regularly adjusted. Electrode life can be extended by regularly stepping up the welding current and periodically dressing (machining) the electrodes.

Brand correspondence

Steels for cold forming and deep drawing applications

	EN 10142:1991	DIN 17162/1	NF A36-321	BS 2989	ASTM A653	EN 10142:2000	PN-89/ H-92125:1989	EN 10292:2007	EN 10326:2004	EN 10147:2000	EN 10346:2009
DX51D +Z EN 10346	FeP02 G	St 01Z /St 02Z		Z1 G / Z2 G	CS	DX51D +Z	P,T,G				DX51D +Z
DX52D +Z EN 10346	FeP03 G	St 03Z	GC	Z3 G	FS	DX52D +Z					DX52D +Z
DX53D +Z EN 10346	FeP05 G	St 04Z /St 05Z	GE	Z4 G	DDS	DX53D +Z	B				DX53D +Z
DX54D +Z EN 10346	FeP06 G	St 06Z	GES	Z5 G	EDDS	DX54D +Z					DX54D +Z
DX56D +Z EN 10346	FeP07 G	St 07Z				DX56D +Z					DX56D +Z
DX57D +Z EN 10346											DX57D +Z

	EN 10327:2004	EN 10147:1991	DIN 17162/2	NF A36-322	Old brand names
DX51D +Z EN 10346	DX51D +Z				
DX52D +Z EN 10346	DX52D +Z				Solstamp® 03
DX53D +Z EN 10346	DX53D +Z				
DX54D +Z EN 10346	DX54D +Z				Solstamp® 04
DX56D +Z EN 10346	DX56D +Z				Solstamp® 05
DX57D +Z EN 10346	DX57D +Z				

Structural steels

	EN 10142:1991	DIN 17162/1	NF A36-321	BS 2989	ASTM A653	EN 10142:2000	PN-89/ H-92125:1989	EN 10292:2007	EN 10326:2004	EN 10147:2000	EN 10346:2009
S220GD +Z EN 10346				Z22 G	CS Type B				S220GD +Z	S220GD +Z	S220GD +Z
S250GD +Z EN 10346				Z25 G	SS Grade 230				S250GD +Z	S250GD +Z	S250GD +Z
S280GD +Z EN 10346				Z28 G	SS Grade 255				S280GD +Z	S280GD +Z	S280GD +Z
S320GD +Z EN 10346					SS Grade 275				S320GD +Z	S320GD +Z	S320GD +Z
S350GD +Z EN 10346				Z35 G	HSLA Type A Grade 340				S350GD +Z	S350GD +Z	S350GD +Z
S390GD +Z ETA-13/0257*											
S390GD AM FCE +Z											
S550GD +Z EN 10346									S550GD +Z	S550GD +Z	S550GD +Z

Grades in italics: not included in the standard

** CE marked steel grade in accordance with European Technical Approval ETA-13-0257*

	EN 10327:2004	EN 10147:1991	DIN 17162/2	NF A36-322	Old brand names
S220GD +Z EN 10346		FeE 220 G	StE 220-2Z	C.230	SC220GD +Z
S250GD +Z EN 10346		FeE 250 G	StE 250-2Z	C.250	SC250GD +Z
S280GD +Z EN 10346		FeE 280 G	StE 280-2Z	C.280	SC280GD +Z
S320GD +Z EN 10346		FeE 320 G	StE 320-2Z	C.320	SC320GD +Z
S350GD +Z EN 10346		FeE 350 G	StE 350-2Z	C.350	SC350GD +Z
S390GD +Z ETA-13/0257*					
S390GD AM FCE +Z					*SC390GD +Z*
S550GD +Z EN 10346		FeE 550 G		C.550	SC550GD +Z

Grades in italics: not included in the standard

** CE marked steel grade in accordance with European Technical Approval ETA-13-0257*

High strength low alloy steels

	EN 10142:1991	DIN 17162/1	NF A36-321	BS 2989	ASTM A653	EN 10142:2000	PN-89/ H-92125:1989	EN 10292:2007	EN 10326:2004	EN 10147:2000	EN 10346:2009
HX260LAD +Z EN 10346								HX260LAD +Z			HX260LAD +Z
HX300LAD +Z EN 10346								HX300LAD +Z			HX300LAD +Z
HX340LAD +Z EN 10346								HX340LAD +Z			HX340LAD +Z
HX380LAD +Z EN 10346								HX380LAD +Z			HX380LAD +Z
HX420LAD +Z EN 10346								HX420LAD +Z			HX420LAD +Z
HX460LAD +Z EN 10346											HX460LAD +Z
HX500LAD +Z EN 10346											HX500LAD +Z

	EN 10327:2004	EN 10147:1991	DIN 17162/2	NF A36-322	Old brand names
HX260LAD +Z EN 10346					MA 240L/Profilar® 260/ Soldur® 260
HX300LAD +Z EN 10346					MA 280L/Profilar® 300/ E280D +Z/Soldur® 280
HX340LAD +Z EN 10346					MA 320L/Profilar® 340/ E320D +Z/Soldur® 320
HX380LAD +Z EN 10346					MA 360L/Profilar® 380/ E360D +Z/Soldur® 380
HX420LAD +Z EN 10346					MA 400L/Profilar® 420
HX460LAD +Z EN 10346					MA 440L
HX500LAD +Z EN 10346					

Dimensions

Steels for cold forming and deep drawing applications

<table>
<tr><th rowspan="2">Thickness (mm)</th><th rowspan="2">Min width</th><th>DX51D +Z EN 10346, DX52D +Z EN 10346</th><th>DX53D +Z EN 10346</th><th>DX54D +Z EN 10346</th><th>DX56D +Z EN 10346</th><th>DX57D +Z EN 10346</th></tr>
<tr><th>Max width</th><th>Max width</th><th>Max width</th><th>Max width</th><th>Max width</th></tr>
<tr><td>0.20 ≤ th < 0.30</td><td rowspan="23">800</td><td>1100</td><td>-</td><td>-</td><td>-</td><td rowspan="5">-</td></tr>
<tr><td>0.30 ≤ th < 0.35</td><td>1280</td><td>1030</td><td>1280</td><td>1140</td></tr>
<tr><td>0.35 ≤ th < 0.40</td><td>1270</td><td>1140</td><td>1400</td><td>1200</td></tr>
<tr><td>0.40 ≤ th < 0.45</td><td>1490</td><td rowspan="2">1500</td><td>1500</td><td>1430</td></tr>
<tr><td>0.45 ≤ th < 0.50</td><td>1610</td><td>1570</td><td>1500</td></tr>
<tr><td>0.50 ≤ th < 0.60</td><td>1640</td><td>1640</td><td>1660</td><td>1640</td><td>1540</td></tr>
<tr><td>0.60 ≤ th < 0.65</td><td>1840</td><td>1740</td><td>1850</td><td>1820</td><td>1700</td></tr>
<tr><td>0.65 ≤ th < 0.75</td><td>1860</td><td>1840</td><td>1950</td><td>1850</td><td>1810</td></tr>
<tr><td>0.75 ≤ th < 0.85</td><td rowspan="4">2069</td><td>1940</td><td>2000</td><td>1990</td><td rowspan="2">1840</td></tr>
<tr><td>0.85 ≤ th < 1.40</td><td rowspan="3">2069</td><td rowspan="3">2069</td><td rowspan="3">2069</td></tr>
<tr><td>1.40 ≤ th < 1.50</td><td>1750</td></tr>
<tr><td>1.50 ≤ th < 1.75</td><td>1570</td></tr>
<tr><td>1.75 ≤ th < 1.85</td><td>2000</td><td>2000</td><td>2000</td><td>2000</td><td rowspan="11">1510</td></tr>
<tr><td>1.85 ≤ th < 1.90</td><td>2020</td><td>2020</td><td>1930</td><td>1950</td></tr>
<tr><td>1.90 ≤ th < 1.95</td><td>1940</td><td>1970</td><td>1900</td><td>1900</td></tr>
<tr><td>1.95 ≤ th < 2.00</td><td>1920</td><td>1920</td><td>1830</td><td>1830</td></tr>
<tr><td>2.00 ≤ th < 2.05</td><td>1870</td><td>1870</td><td>1780</td><td>1780</td></tr>
<tr><td>2.05 ≤ th < 2.10</td><td>1830</td><td>1830</td><td>1790</td><td>1790</td></tr>
<tr><td>2.10 ≤ th < 2.35</td><td rowspan="4">1760</td><td>1780</td><td>1700</td><td>1700</td></tr>
<tr><td>2.35 ≤ th < 2.50</td><td>1620</td><td rowspan="2">1760</td><td rowspan="3">1515</td></tr>
<tr><td>2.50 ≤ th < 2.55</td><td rowspan="2">1510</td></tr>
<tr><td>2.55 ≤ th < 3.05</td><td>1630</td></tr>
<tr><td>3.05 ≤ th < 3.35</td><td>1670</td><td rowspan="6">-</td><td rowspan="6">-</td><td rowspan="6">-</td><td rowspan="6">-</td></tr>
<tr><td>3.35 ≤ th < 4.00</td><td rowspan="2">1620</td></tr>
<tr><td>4.00 ≤ th < 4.30</td></tr>
<tr><td>4.30 ≤ th < 4.60</td><td rowspan="2">1500</td></tr>
<tr><td>4.60 ≤ th < 5.50</td></tr>
<tr><td>5.50 ≤ th < 6.35</td><td>-</td></tr>
</table>

Structural steels

Thickness (mm)	Min width	S220GD +Z EN 10346	S250GD +Z EN 10346	S280GD +Z EN 10346	S320GD +Z EN 10346	S350GD +Z EN 10346	S390GD +Z ETA-13/0257*, S390GD AM FCE +Z	S550GD +Z EN 10346
		Max width	Max width	Max width	Max width	Max width	Max width	Max width
0.25 ≤ th < 0.30	800	1250	1250	1140	1150	-	-	1080
0.30 ≤ th < 0.35		1290	1290	1250	1260	1170		1280
0.35 ≤ th < 0.40		1380	1350	1350	1380	1300	1150	1300
0.40 ≤ th < 0.45		1500	1450	1470	1500		1220	
0.45 ≤ th < 0.50		1620	1560	1640	1620	1460	1300	
0.50 ≤ th < 0.55		1640	1640		1640	1510	1330	
0.55 ≤ th < 0.60		1730	1730			1540		
0.60 ≤ th < 0.65		1840	1840	1700	1700	1560	1350	
0.65 ≤ th < 0.70		1860	1860	1780	1720	1600	1380	1490
0.70 ≤ th < 0.75		1970	1970	1860		1610	1410	
0.75 ≤ th < 0.80		2060	2060		1740	1630	1440	
0.80 ≤ th < 0.85					1770	1660	1470	
0.85 ≤ th < 1.05					1810	1680	1500	
1.05 ≤ th < 1.50					1860	1760	1600	1300
1.50 ≤ th < 1.75						1850	1800	1240
1.75 ≤ th < 1.80				1700	1830	1780		1400
1.80 ≤ th < 1.85						1730	1730	
1.85 ≤ th < 1.90		1970	1970			1690	1690	
1.90 ≤ th < 1.95		1920	1920	1660		1640	1640	1490
1.95 ≤ th < 2.00		1870	1870	1640			1620	1500
2.00 ≤ th < 2.05		1830	1830		1800			
2.05 ≤ th < 2.10		1780	1780		1780			
2.10 ≤ th < 2.15		1740	1740		1740			
2.15 ≤ th < 2.20		1700	1700		1700			
2.20 ≤ th < 2.25			1690		1660			
2.25 ≤ th < 2.30					1650			
2.30 ≤ th < 2.35			1700					
2.35 ≤ th < 2.40		1750	1750	1660		1650		
2.40 ≤ th < 2.45					1670	1670		
2.45 ≤ th < 2.50				1670	1690	1680		
2.50 ≤ th < 2.65						1690	1630	
2.65 ≤ th < 2.75				1680			1560	
2.75 ≤ th < 2.95						1700	1610	
2.95 ≤ th < 3.05		1670	1670	1670				
3.05 ≤ th < 3.15		1630	1630	1630	1640	1620		

3.15 ≤ th < 3.35		1620	1620	1620	1620	1610	1500	
3.35 ≤ th < 4.55		1500	1500	1600	1500	1500		1250
4.55 ≤ th < 5.45				1500				
5.45 ≤ th < 6.35		-	-	1280	-	-	-	-
* CE marked steel grade in accordance with European Technical Approval ETA-13-0257								

High strength low alloy steels

Thickness (mm)	Min width	HX260LAD +Z EN 10346	HX300LAD +Z EN 10346	HX340LAD +Z EN 10346	HX380LAD +Z EN 10346	HX420LAD +Z EN 10346	HX460LAD +Z EN 10346	HX500LAD +Z EN 10346
		Max width	Max width	Max width	Max width	Max width	Max width	Max width
0.30 ≤ th < 0.35	800	1250	1230	1230	1170	-	-	-
0.35 ≤ th < 0.40		1360	1300	1300	1300			
0.40 ≤ th < 0.45		1480		1380		950		
0.45 ≤ th < 0.50		1590	1520	1520	1460	1260	1400	
0.50 ≤ th < 0.55		1640	1610	1610	1510	1500	1460	
0.55 ≤ th < 0.60		1730		1630	1540		1500	
0.60 ≤ th < 0.65		1840	1700	1700	1560	1550	1550	
0.65 ≤ th < 0.70		1860	1780	1780	1590			
0.70 ≤ th < 0.75			1810	1810	1630	1570	1570	
0.75 ≤ th < 0.80			1840	1840		1620		
0.80 ≤ th < 0.85			1860	1860	1660	1650		-
0.85 ≤ th < 0.90					1680	1710		
0.90 ≤ th < 1.00					1700	-		
1.00 ≤ th < 1.05					1740	1730		
1.05 ≤ th < 1.10					1760	1750		
1.10 ≤ th < 1.15					1780	1770		
1.15 ≤ th < 1.25					1790	1822		
1.25 ≤ th < 1.30		1940			1830	1690		
1.30 ≤ th < 1.40		1990			1850	1840		
1.40 ≤ th < 1.45								
1.45 ≤ th < 1.50								
1.50 ≤ th < 1.55								
1.55 ≤ th < 1.60								
1.60 ≤ th < 1.65								
1.65 ≤ th < 1.70						1780		
1.70 ≤ th < 1.75			1830	1820		1750		
1.75 ≤ th < 1.80				1830	1780	1730		
1.80 ≤ th < 1.85					1730			
1.85 ≤ th < 1.90					1690			
1.90 ≤ th < 1.95		1920	1800					

1.95 ≤ th < 2.00	1870	1780					
2.00 ≤ th < 2.05	1830	1750	1800		1640	1510	1500
2.05 ≤ th < 2.10	1780		1780				
2.10 ≤ th < 2.15	1740	1720	1740	1640			
2.15 ≤ th < 2.20	1700	1690	1700				
2.20 ≤ th < 2.25	1660		1660				
2.25 ≤ th < 2.30	1640	1710	1650		1630	1500	
2.30 ≤ th < 2.35					1640		
2.35 ≤ th < 2.40				1650	1650		
2.40 ≤ th < 2.45	1660		1670	1670	1670		
2.45 ≤ th < 2.50	1680		1690	1690	1680		
2.50 ≤ th < 2.55	1700		1710	1700	1700	1520	
2.55 ≤ th < 2.65						1530	1530
2.65 ≤ th < 2.75	1710	1740				1560	1570
2.75 ≤ th < 2.85	1720	1760		1710			1590
2.85 ≤ th < 2.95						1550	
2.95 ≤ th < 3.05	1730						1600
3.05 ≤ th < 3.15	1690	1690	1690	1640	1630	1600	1660
3.15 ≤ th < 3.35				1620	1620	1640	
3.35 ≤ th < 4.00				1570	1570		
4.00 ≤ th < 4.55						1680	
4.55 ≤ th < 4.65							1600
4.65 ≤ th < 4.85							
4.85 ≤ th < 5.00							
5.00 ≤ th < 5.25							
5.25 ≤ th < 5.50							
5.50 ≤ th < 5.60	1680	1680	1680				
5.60 ≤ th < 6.00	1580	1580	1580			1570	
6.00 ≤ th < 6.20	1550	1550	1550	1550	1550	1550	-
6.20 ≤ th < 6.35	1490	1490	1490	-	1490	1490	

Mechanical properties

Steels for cold forming and deep drawing applications

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	**MP guarantees** (Months)	r 90	n 90
DX51D +Z EN 10346		T	0.2 -0.5	-	270 -500	≥ 18	< 1	-	-
			0.5 -0.7			≥ 20			
			0.7 -6			≥ 22			
DX52D +Z EN 10346	1	T	0.2 -0.5	140 -300	270 -420	≥ 22	< 1	-	-
			0.5 -0.7			≥ 24			
			0.7 -6			≥ 26			
DX53D +Z EN 10346		T	0.3 -0.5	140 -260	270 -380	≥ 26	< 1	-	-
			0.5 -0.7			≥ 28			
			0.7 -6			≥ 30			
DX54D +Z EN 10346		T	0.2 -0.5	120 -220	260 -350	≥ 32	< 6	≥ 1.6	≥ 0.180
			0.5 -0.7			≥ 34			
			0.7 -1.5			≥ 36			
			1.5 -3					≥ 1.4	
DX56D +Z EN 10346		T	0.3 -0.5	120 -180	260 -350	≥ 35	< 6	≥ 1.9	≥ 0.210
			0.5 -0.7			≥ 37			
			0.7 -1.5			≥ 39			
			1.5 -3					≥ 1.7	
DX57D +Z EN 10346		T	0.5 -0.7	120 -170	260 -350	≥ 39	< 6	≥ 2.1	≥ 0.220
			0.7 -1.5			≥ 41			
			1.5 -3					≥ 1.9	

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

Structural steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	**MP guarantees** (Months)	r 90	n 90
S220GD +Z EN 10346		L	0.2 -0.5	≥ 220	≥ 300	≥ 16	< 1	-	-
			0.5 -0.7			≥ 18			
			0.7 -6			≥ 20			
S250GD +Z EN 10346		L	0.2 -0.5	≥ 250	≥ 330	≥ 15	< 1	-	-
			0.5 -0.7			≥ 17			
			0.7 -6			≥ 19			
S280GD +Z EN 10346		L	0.2 -0.5	≥ 280	≥ 360	≥ 14	< 1	-	-
			0.5 -0.7			≥ 16			
			0.7 -6			≥ 18			
S320GD +Z EN 10346		L	0.2 -0.5	≥ 320	≥ 390	≥ 13	< 1	-	-
			0.5 -0.7			≥ 15			
			0.7 -6			≥ 17			
S350GD +Z EN 10346		L	0.2 -0.5	≥ 350	≥ 420	≥ 12	< 1	-	-
			0.5 -0.7			≥ 14			
			0.7 -6			≥ 16			
S390GD +Z ETA-13/0257*		L	1 -6	≥ 390	≥ 460	≥ 16	< 1	-	-
S390GD AM FCE +Z		L	0.2 -0.7	≥ 390	≥ 460	≥ 14	< 1	-	-
			0.7 -6			≥ 16			
S550GD +Z EN 10346		L	0.2 -5	≥ 550	≥ 560	-	< 1	-	-

Grades in italics: not included in the standard

** CE marked steel grade in accordance with European Technical Approval ETA-13-0257*

High strength low alloy steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	**MP guarantees** (Months)	r 90	n 90
HX260LAD +Z EN 10346		T	0.3 -0.5	260 -330	350 -430	≥ 22	< 6	-	-
			0.5 -0.7			≥ 24			
			0.7 -6			≥ 26			
HX300LAD +Z EN 10346		T	0.3 -0.5	300 -380	380 -480	≥ 19	< 6	-	-
			0.5 -0.7			≥ 21			
			0.7 -6			≥ 23			
HX340LAD +Z EN 10346		T	0.3 -0.5	340 -420	410 -510	≥ 17	< 6	-	-
			0.5 -0.7			≥ 19			
			0.7 -6			≥ 21			

HX380LAD +Z EN 10346		T	0.3 -0.5	380 -480	440 -560	≥ 15	< 6	-	-
			0.5 -0.7			≥ 17			
			0.7 -6			≥ 19			
HX420LAD +Z EN 10346		T	0.3 -0.5	420 -520	470 -590	≥ 13	< 6	-	-
			0.5 -0.7			≥ 15			
			0.7 -6			≥ 17			
HX460LAD +Z EN 10346		T	0.4 -0.5	460 -560	500 -640	≥ 11	< 6	-	-
			0.5 -0.7			≥ 13			
			0.7 -6			≥ 15			
HX500LAD +Z EN 10346		T	1.5 -6	500 -620	530 -690	≥ 13	< 6	-	-

Chemical composition

Steels for cold forming and deep drawing applications

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

Structural steels

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Al (%)	Nb (%)	Ti (%)
S220GD +Z EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S250GD +Z EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S280GD +Z EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S320GD +Z EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S350GD +Z EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S390GD +Z ETA-13/0257*	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S390GD AM FCE +Z	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S550GD +Z EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
Grades in italics: not included in the standard								
** CE marked steel grade in accordance with European Technical Approval ETA-13-0257*								

High strength low alloy steels

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Al (%)	Nb (%)	Ti (%)
HX260LAD +Z EN 10346	≤ 0.110	≤ 0.60	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.120
HX300LAD +Z EN 10346	≤ 0.110	≤ 1.00	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX340LAD +Z EN 10346	≤ 0.110	≤ 1.00	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX380LAD +Z EN 10346	≤ 0.110	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX420LAD +Z EN 10346	≤ 0.110	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX460LAD +Z EN 10346	≤ 0.150	≤ 1.70	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX500LAD +Z EN 10346	≤ 0.150	≤ 1.70	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150

Coating properties

Designation EN 10346	Coating weight -double sided (g/m²)	Coating thickness (µm per side)
Z80	80	5.5
Z100	100	7.0
Z140	140	10.0
Z200	200	14.0
Z225	225	16.0
Z275	275	20.0
Z350	350	25.0
Z450	450	31.0
Z600	600	42.0
Z725	725	51.0

For commercial information (quotations, deliveries, product availability):

- Europe: http://industry.arcelormittal.com/agencies
- Other countries: contact@arcelormittal.com

For technical questions about these products: flateurope.technical.assistance@arcelormittal.com
For researchers: click here

E30

Steels with galfan zinc-aluminium coating

The excellent corrosion resistance of this product makes it ideal for applications such as doors and garages, HVAC equipment, washing machine casings etc. One example is the structure for this greenhouse.

Last update: 2014-6-24

Properties

Galfan is a flat carbon steel product coated on both sides with a zinc-aluminium alloy. The coating is composed of 95% zinc and 5% aluminium and is applied by means of a continuous hot dip galvanising process.
Galfan is available in a very wide range of steel grades: steels for cold forming and deep drawing applications, structural steels and high strength low alloy steels.

Advantages

Because of the nature and the particular structure of its coating, galfan is characterised by very good ductility and excellent forming performance. It is therefore recommended for parts requiring severe deep drawing.

The presence of aluminium in the coating makes the corrosion resistance of galfan significantly higher than that of standard hot dip galvanised steel of equivalent thickness. Galfan offers excellent edge corrosion resistance.

Applications

Galfan is used in numerous industrial applications, such as:

- Construction: structural or trim members, metallic ceilings, partitions and partition panels, doors, guttering, metallic door frames, swimming pools, road signs, greenhouses etc
- Domestic appliances: casings of washing machines, tumble dryers, refrigerators etc
- Miscellaneous: HVAC equipment, electrical cabinets, tanks, gas pumps, raceways, electric motor casings etc

Recommendations for use

Storage

Galfan is supplied passivated and/or oiled to temporarily limit any risk of white rust formation. During transport and storage, all necessary precautions must be taken to keep the material dry and to prevent the formation of condensation. Improved rust prevention can be obtained by the application of Easyfilm® (please see data sheet E80 for the specific properties of Easyfilm®).

Forming and joining

The forming and joining techniques currently used for uncoated steel sheets are also suitable for galvanised steel.
The coating thickness must therefore be compatible with both the desired degree of corrosion protection and the requirements of the forming and welding processes envisaged.
Forming performance will be improved if galfan is coated with an Easyfilm® thin organic coating.

Painting

The organic paintability of galfan is very good both before forming (coil coating) and after forming (post-coating).
Degreasing and a suitable surface treatment are necessary before painting when the material is supplied oiled. Galfan supplied with an Easyfilm® thin organic coating can be painted directly without any surface treatment. However, the paint used must be compatible with the Easyfilm® resin.

Weldability

In electrical resistance welding, the welding current must be suitably regulated and regularly adjusted. Electrode life can be extended by regularly stepping up the welding current and periodically dressing (machining) the electrodes.

Brand correspondence

Steels for cold forming and deep drawing applications

	EN 10214:1995	NFA 36-323	ASTM A875	JIS 3317	EN 10346:2009	EN 10327:2004	EN 10326:2004	NFA 36-324	EN 10292:2007	Old brand names
DX51D +ZA EN 10346	DX51D +ZA	FC	CS	SZ AC C	DX51D +ZA	DX51D +ZA				DC51D +ZA
DX52D +ZA EN 10346	DX52D +ZA	FE	FS	SZ AC D1	DX52D +ZA	DX52D +ZA				DC52D +ZA/Solstamp® 03
DX53D +ZA EN 10346	DX53D +ZA	FES	DDS	SZ AC D2	DX53D +ZA	DX53D +ZA				
DX54D +ZA EN 10346	DX54D +ZA	FEX	EDDS	SZ AC D3	DX54D +ZA	DX54D +ZA				Solstamp® 04
DX56D +ZA EN 10346					DX56D +ZA	DX56D +ZA				Solstamp® 05
DX57D +ZA EN 10346					DX57D +ZA	DX57D +ZA				

Structural steels

	EN 10214:1995	NFA 36-323	ASTM A875	JIS 3317	EN 10346:2009	EN 10327:2004	EN 10326:2004	NFA 36-324	EN 10292:2007	Old brand names
S220GD +ZA EN 10346	S220GD +ZA		SS Grade 33		S220GD +ZA		S220GD +ZA	C220		SC220GD +ZA
S250GD +ZA EN 10346	S250GD +ZA		SS Grade 37	SZ AC 340	S250GD +ZA		S250GD +ZA	C250		SC250GD +ZA
S280GD +ZA EN 10346	S280GD +ZA		SS Grade 40	SZ AC 400	S280GD +ZA		S280GD +ZA	C280		SC280GD +ZA
S320GD +ZA EN 10346	S320GD +ZA			SZ AC 440	S320GD +ZA		S320GD +ZA	C320		
S350GD +ZA EN 10346	S350GD +ZA		SS Grade 50	SZ AC 490	S350GD +ZA		S350GD +ZA	C350		
S550GD +ZA EN 10346			SS Grade 80		S550GD +ZA		S550GD +ZA			

High strength interstitial free steels

	EN 10214:1995	NFA 36-323	ASTM A875	JIS 3317	EN 10346:2009	EN 10327:2004	EN 10326:2004	NFA 36-324	EN 10292:2007	Old brand names
HX220YD +ZA EN 10346					HX220YD +ZA				HX220YD +ZA	

High Strength Low Alloy steels

	EN 10214:1995	NFA 36-323	ASTM A875	JIS 3317	EN 10346:2009	EN 10327:2004	EN 10326:2004	NFA 36-324	EN 10292:2007	Old brand names
HX260LAD +ZA EN 10346					HX260LAD +ZA				HX260LAD +ZA	
HX300LAD +ZA EN 10346					HX300LAD +ZA				HX300LAD +ZA	
HX340LAD +ZA EN 10346			Grade 50		HX340LAD +ZA				HX340LAD +ZA	
HX380LAD +ZA EN 10346					HX380LAD +ZA				HX380LAD +ZA	
HX420LAD +ZA EN 10346			Grade 60		HX420LAD +ZA				HX420LAD +ZA	

Dimensions

Steels for cold forming and deep drawing applications

Thickness (mm)	Min width	DX51D +ZA EN 10346, DX52D +ZA EN 10346	DX53D +ZA EN 10346, DX54D +ZA EN 10346, DX56D +ZA EN 10346, DX57D +ZA EN 10346
		Max width	Max width
0.22 ≤ th < 0.24	800	1000	-
0.24 ≤ th < 0.26		1090	
0.26 ≤ th < 0.28		1130	
0.28 ≤ th < 0.30		1180	
0.30 ≤ th < 0.32		1220	1010
0.32 ≤ th < 0.34		1260	1050
0.34 ≤ th < 0.36		1300	1090
0.36 ≤ th < 0.38		1350	1140
0.38 ≤ th < 0.40		1390	1180
0.40 ≤ th < 0.45		1430	1280
0.45 ≤ th < 0.50		1540	1360
0.50 ≤ th < 1.50		1640	1630

1.50 ≤ th < 2.50		1040	1520
2.50 ≤ th < 3.00		1500	1200

Structural steels

Thickness (mm)	Min width	S220GD +ZA EN 10346	S250GD +ZA EN 10346	S280GD +ZA EN 10346	S320GD +ZA EN 10346	S350GD +ZA EN 10346	S550GD +ZA EN 10346
		Max width	Max width	Max width	Max width	Max width	Max width
0.24 ≤ th < 0.26	800	1060	1100	1090	-	-	1050
0.26 ≤ th < 0.28		1110	1130	1130			1090
0.28 ≤ th < 0.30		1160	1170	1170			1120
0.30 ≤ th < 0.32		1200	1220	1220		990	1160
0.32 ≤ th < 0.34		1250	1260	1270			1190
0.34 ≤ th < 0.36		1300	1300	1310	980	1060	1240
0.36 ≤ th < 0.38		1350	1350	1360	1060		
0.38 ≤ th < 0.40		1400	1400	1400	1140	1210	
0.40 ≤ th < 0.45		1440	1450	1450	1210	1280	
0.45 ≤ th < 0.50		1560	1560	1570	1420	1350	
0.50 ≤ th < 0.55		1640	1640	1640	1610	1400	1130
0.55 ≤ th < 0.60							
0.60 ≤ th < 0.65					1620	1520	1090
0.65 ≤ th < 0.70					1630		
0.70 ≤ th < 0.80					1640		-
0.80 ≤ th < 1.00							
1.00 ≤ th < 1.50						1570	
1.50 ≤ th < 1.80		-	1520	1520	1520	1510	
1.80 ≤ th < 2.00						1400	
2.00 ≤ th < 2.10						1410	
2.10 ≤ th < 2.15				1440	1440	1300	
2.15 ≤ th < 2.25				1340	1340	1150	
2.25 ≤ th < 2.40				1200			
2.40 ≤ th < 2.50			1240		1270	1120	
2.50 ≤ th < 3.00					1200	-	

High strength interstitial free steels

Thickness (mm)	Min width	HX220YD +ZA EN 10346
		Max width
0.38 ≤ th < 0.40	800	930
0.40 ≤ th < 0.45		1175
0.45 ≤ th < 0.50		1280
0.50 ≤ th < 0.55		1400
0.55 ≤ th < 0.60		1520
0.60 ≤ th < 0.65		1550
0.65 ≤ th < 0.70		1580
0.70 ≤ th < 0.80		1610
0.80 ≤ th < 1.50		1640
1.50 ≤ th < 2.00		1520
2.00 ≤ th < 2.25		1510
2.25 ≤ th < 2.50		1500
2.50 ≤ th < 3.00		1200

High Strength Low Alloy steels

Thickness (mm)	Min width	HX260LAD +ZA EN 10346	HX300LAD +ZA EN 10346	HX340LAD +ZA EN 10346	HX380LAD +ZA EN 10346	HX420LAD +ZA EN 10346
		Max width	Max width	Max width	Max width	Max width
0.20 ≤ th < 0.22	800	1030	-	-	-	-
0.22 ≤ th < 0.24		1070	950			
0.24 ≤ th < 0.26		1110	1020			
0.26 ≤ th < 0.28		1150	1080			
0.28 ≤ th < 0.30		1190	1150			
0.30 ≤ th < 0.32		1250	1210	1230	1190	
0.32 ≤ th < 0.34		1300	1260	1260	1260	1060
0.34 ≤ th < 0.36			1290	1290	1290	1150
0.36 ≤ th < 0.38		1310	1300	1300	1300	1250
0.38 ≤ th < 0.40		1350				1280
0.40 ≤ th < 0.45		1390				1300
0.45 ≤ th < 0.50		1490	1390	1420		
0.50 ≤ th < 0.55		1590	1560	1580		
0.55 ≤ th < 0.60			1580	1590		
0.60 ≤ th < 0.65			1600	1610		
0.65 ≤ th < 0.70			1620	1620		
0.70 ≤ th < 0.80		1640	1630	1640	1500	
0.80 ≤ th < 1.00			1640			
1.00 ≤ th < 1.50					1380	-
1.50 ≤ th < 1.80		1520	1500	1500	1300	
1.80 ≤ th < 2.00			1410	1410	1250	
2.00 ≤ th < 2.10			1310	1310	-	
2.10 ≤ th < 2.15						
2.15 ≤ th < 2.25			1220	1220		
2.25 ≤ th < 2.40		1500	1000	1000		
2.40 ≤ th < 2.50						
2.50 ≤ th < 3.00		1250	-	-		

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 +ZA EN 10346		T	0.2 -0.5	-	270 -500	≥ 18	-	-
			0.5 -0.7			≥ 20		
			0.7 -3			≥ 22		
DX52D +ZA EN 10346	1	T	0.2 -0.5	140 -300	270 -420	≥ 22	-	-
			0.5 -0.7			≥ 24		
			0.7 -3			≥ 26		
DX53D +ZA EN 10346		T	0.3 -0.5	140 -260	270 -380	≥ 26	-	-
			0.5 -0.7			≥ 28		
			0.7 -3			≥ 30		
DX54D +ZA EN 10346		T	0.3 -0.5	120 -220	260 -350	≥ 32	≥ 1.6	≥ 0.180
			0.5 -0.7			≥ 34		
			0.7 -1.5			≥ 36		
			1.5 -3				≥ 1.4	
DX56D +ZA EN 10346		T	0.3 -0.5	120 -180	260 -350	≥ 35	≥ 1.9	≥ 0.210
			0.5 -0.7			≥ 37		
			0.7 -1.5			≥ 39		
			1.5 -3				≥ 1.7	
DX57D +ZA EN 10346		T	0.3 -0.5	120 -170	260 -350	≥ 37	≥ 2.1	≥ 0.220
			0.5 -0.7			≥ 39		
			0.7 -1.5			≥ 41		
			1.5 -3				≥ 1.9	

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

Structural steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	r 90	n 90

S220GD +ZA EN 10346		L	0.2 -0.5	≥ 220	≥ 300	≥ 16	-	-
			0.5 -0.7			≥ 18		
			0.7 -3			≥ 20		
S250GD +ZA EN 10346		L	0.2 -0.5	≥ 250	≥ 330	≥ 15	-	-
			0.5 -0.7			≥ 17		
			0.7 -3			≥ 19		
S280GD +ZA EN 10346		L	0.2 -0.5	≥ 280	≥ 360	≥ 14	-	-
			0.5 -0.7			≥ 16		
			0.7 -3			≥ 18		
S320GD +ZA EN 10346		L	0.3 -0.5	≥ 320	≥ 390	≥ 13	-	-
			0.5 -0.7			≥ 15		
			0.7 -3			≥ 17		
S350GD +ZA EN 10346		L	0.3 -0.5	≥ 350	≥ 420	≥ 12	-	-
			0.5 -0.7			≥ 14		
			0.7 -3			≥ 16		
S550GD +ZA EN 10346		L	0.3 -3	≥ 550	≥ 560	-	-	-

High strength interstitial free steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	r 90	n 90
HX220YD +ZA EN 10346		T	0.3 -0.5	220 -280	340 -420	≥ 28	-	-
			0.5 -0.7			≥ 30		
			0.7 -3			≥ 32		

High Strength Low Alloy steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	r 90	n 90
HX260LAD +ZA EN 10346		T	0.3 -0.5	260 -330	350 -430	≥ 22	-	-
			0.5 -0.7			≥ 24		
			0.7 -3			≥ 26		
HX300LAD +ZA EN 10346		T	0.3 -0.5	300 -380	380 -480	≥ 19	-	-
			0.5 -0.7			≥ 21		
			0.7 -3			≥ 23		
HX340LAD +ZA EN 10346		T	0.3 -0.5	340 -420	410 -510	≥ 17	-	-
			0.5 -0.7			≥ 19		
			0.7 -3			≥ 21		
HX380LAD +ZA EN 10346		T	0.3 -0.5	380 -480	440 -560	≥ 15	-	-
			0.5 -0.7			≥ 17		
			0.7 -3			≥ 19		
HX420LAD +ZA EN 10346		T	0.3 -0.5	420 -520	470 -590	≥ 13	-	-
			0.5 -0.7			≥ 15		
			0.7 -3			≥ 17		

Chemical composition

Steels for cold forming and deep drawing applications

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

Structural steels

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Al (%)	Nb (%)	Ti (%)
S220GD +ZA EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S250GD +ZA EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S280GD +ZA EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S320GD +ZA EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S350GD +ZA EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S550GD +ZA EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-

High strength interstitial free steels

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Al (%)	Nb (%)	Ti (%)
HX220YD +ZA EN 10346	≤ 0.010	≤ 0.90	≤ 0.080	≤ 0.025	≤ 0.20	≤ 0.100	≤ 0.090	≤ 0.120

High Strength Low Alloy steels

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Al (%)	Nb (%)	Ti (%)
HX260LAD +ZA EN 10346	≤ 0.110	≤ 0.60	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.120
HX300LAD +ZA EN 10346	≤ 0.110	≤ 1.00	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX340LAD +ZA EN 10346	≤ 0.110	≤ 1.00	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX380LAD +ZA EN 10346	≤ 0.110	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX420LAD +ZA EN 10346	≤ 0.110	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150

Coating properties

Galfan	Coating weight -double sided (g/m²)	Coating thickness (µm per side)
ZA95	95	7.0
ZA130	130	10.0
ZA180	180	13.5
ZA200	200	15.0
ZA255	255	19.5
ZA300	300	22.5

For commercial information (quotations, deliveries, product availability):

- Europe: http://industry.arcelormittal.com/agencies
- Other countries: contact@arcelormittal.com

For technical questions about these products: flateurope.technical.assistance@arcelormittal.com
For researchers: click here

E35

Steels with Magnelis® zinc-aluminium-magnesium coating

This product is ideal for use in construction and civil engineering applications, where good corrosion resistance in very aggressive environments (e.g. chloride or highly alkaline) is required.

Last update: 2014-6-24

Properties

Magnelis® is a flat carbon steel product coated on both sides with a zinc-aluminium-magnesium alloy. This alloy, composed of 93.5% zinc, 3.5% aluminium and 3% magnesium, is applied by means of a continuous hot dip galvanising process. This optimum chemical composition has been selected to provide the best results in terms of corrosion resistance.

Magnelis® is available in a very wide range of steel grades: steels for cold forming and deep drawing applications, structural steels and high strength low alloy steels.

Advantages

Thanks to its 3% magnesium content, Magnelis® offers self-healing on cut edges and superior corrosion resistance in chloride and ammonia atmospheres. This high corrosion resistance means that less metallic coating is required (weight reduction), which facilitates processing steps such as welding.

The zinc-rich metallic coating composition permits all the conventional processing operations possible with standard hot dip galvanised steel: bending, drawing, clinching, profiling, stamping, welding etc. The friction coefficient of Magnelis® coated steel is lower than the one of standard hot dip galvanised steel and stable during forming operations.

Applications

Magnelis® can be used in numerous industrial applications, such as:

- Construction: profiles, structural material, roofing & cladding, cable trays, expanded metal, concrete moulds
- Public works & civil engineering: decks for car parks, sound insulation wall panels, walls providing protection against hail
- Agricultural & farming: barns, greenhouse structures
- Road & railway applications: safety & protection equipment

Technical approvals for civil construction

Magnelis® is approved for use in Civil Construction by different national bodies:

- Germany: DIBt Z-30.11-51 Magnelis® ZM250 and ZM310 for KIII, and Magnelis® ZM120 for KII in accordance with DIN 55928-8
- France: CSTB Magnelis® ZM195, ZM250 and ZM310 for use in exterior applications, and Magnelis® ZM90, ZM120 and ZM310 for use in interior applications

Recommendations for use

Storage

Magnelis® is supplied passivated and/or oiled to temporarily limit any risk of white rust formation. During transport and storage, all necessary precautions must be taken to keep the material dry and to prevent the formation of condensation.

Forming and joining

The forming and joining techniques currently used for galvanised steel are also available for Magnelis®. Magnelis® behaves very well during profiling operations. The coating thickness must be compatible with both the desired degree of corrosion protection and the requirements of the forming and welding processes envisaged.

Weldability

In electrical resistance welding, the welding current must be suitably regulated and regularly adjusted. Electrode life can be extended by regularly stepping up the welding current and periodically dressing (machining) the electrodes.

Brand correspondence

Steels for cold forming and deep drawing applications

DX51D +ZM
DX52D +ZM
DX53D +ZM
DX54D +ZM
DX56D +ZM
DX57D +ZM

Structural steels

S220GD +ZM
S250GD +ZM
S280GD +ZM
S320GD +ZM
S350GD +ZM
S390GD AM FCE +ZM
Grades in italics: not included in the standard

High strength low alloy steels

HX260LAD +ZM
HX300LAD +ZM
HX340LAD +ZM
HX380LAD +ZM
HX420LAD +ZM

Dimensions

Steels for cold forming and deep drawing applications

<table>
<tr><th rowspan="2">Thickness (mm)</th><th rowspan="2">Min width</th><th>DX51D +ZM, DX52D +ZM</th><th>DX53D +ZM, DX54D +ZM</th><th>DX56D +ZM, DX57D +ZM</th></tr>
<tr><th>Max width</th><th>Max width</th><th>Max width</th></tr>
<tr><td>0.45 ≤ th < 0.50</td><td>850</td><td>1300</td><td>-</td><td>-</td></tr>
<tr><td>0.50 ≤ th < 0.70</td><td rowspan="19">600</td><td>1560</td><td>1500</td><td>1560</td></tr>
<tr><td>0.70 ≤ th < 1.40</td><td rowspan="2">1630</td><td rowspan="5">1620</td><td>1610</td></tr>
<tr><td>1.40 ≤ th < 1.60</td><td>1500</td></tr>
<tr><td>1.60 ≤ th < 1.80</td><td>1580</td><td>1470</td></tr>
<tr><td>1.80 ≤ th < 2.00</td><td>1530</td><td>1300</td></tr>
<tr><td>2.00 ≤ th < 2.50</td><td rowspan="4">1650</td><td rowspan="12">-</td></tr>
<tr><td>2.50 ≤ th < 3.00</td><td>1350</td></tr>
<tr><td>3.00 ≤ th < 4.60</td><td rowspan="10">-</td></tr>
<tr><td>4.60 ≤ th < 4.80</td><td>1580</td></tr>
<tr><td>4.80 ≤ th < 5.00</td><td>1520</td></tr>
<tr><td>5.00 ≤ th < 5.20</td><td>1470</td></tr>
<tr><td>5.20 ≤ th < 5.40</td><td>1410</td></tr>
<tr><td>5.40 ≤ th < 5.60</td><td>1350</td></tr>
<tr><td>5.60 ≤ th < 5.80</td><td>1300</td></tr>
<tr><td>5.80 ≤ th < 6.00</td><td>1240</td></tr>
</table>

For product thicknesses of 5.0 mm < th ≤ 6.0 mm, please contact us.

Structural steels

Thickness (mm)	Min width	S220GD +ZM, S250GD +ZM, S280GD +ZM	S320GD +ZM, S350GD +ZM	S390GD AM FCE +ZM
		Max width	Max width	Max width
0.45 ≤ th < 0.50	850	1300	1300	-
0.50 ≤ th < 0.70	600	1500	1350	1500
0.70 ≤ th < 1.40		1630	1630	1630
1.40 ≤ th < 1.60		1600	1600	1580
1.60 ≤ th < 1.80		1520	1570	1260
1.80 ≤ th < 2.00		1580	1550	
2.00 ≤ th < 2.50		1650	1420	1420
2.50 ≤ th < 3.00			1570	1380
3.00 ≤ th < 3.50			1630	1580
3.50 ≤ th < 4.40			1650	1650
4.40 ≤ th < 4.60		1640	1640	1640
4.60 ≤ th < 4.80		1580	1580	1580
4.80 ≤ th < 5.00		1530	1530	1530
5.00 ≤ th < 5.20		1460	1460	1460
5.20 ≤ th < 5.40		1410	1410	1410
5.40 ≤ th < 5.60		1360	1360	1360
5.60 ≤ th < 5.80		1300	1300	1300
5.80 ≤ th < 6.00		1250	1250	1250

For product thicknesses of 5.0 mm < th ≤ 6.0 mm, please contact us.

High strength low alloy steels

Thickness (mm)	Min width	HX260LAD +ZM, HX300LAD +ZM	HX340LAD +ZM	HX380LAD +ZM, HX420LAD +ZM
		Max width	Max width	Max width
0.45 ≤ th < 0.50	850	1300	1300	-
0.50 ≤ th < 0.70	600	1560	1350	1500
0.70 ≤ th < 1.40		1630	1630	1630
1.40 ≤ th < 1.60		1580	1600	1580
1.60 ≤ th < 1.80		1520	1570	1260
1.80 ≤ th < 2.00			1550	
2.00 ≤ th < 2.50			1420	1420
2.50 ≤ th < 3.00		1650	1570	1380
3.00 ≤ th < 3.50			1630	1580
3.50 ≤ th < 4.40			1650	1650
4.40 ≤ th < 4.60		1640	1640	1640
4.60 ≤ th < 4.80		1580	1580	1580
4.80 ≤ th < 5.00		1530	1530	1530
5.00 ≤ th < 5.20		1460	1460	1460
5.20 ≤ th < 5.40		1410	1410	1410
5.40 ≤ th < 5.60		1360	1360	1360
5.60 ≤ th < 5.80		1300	1300	1300
5.80 ≤ th < 6.00		1250	1250	1250

For product thicknesses of 5.0 mm < th ≤ 6.0 mm, please contact us.

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 +ZM		T	0.45 -0.7	-	270 -500	≥ 20	-	-
			0.7 -6			≥ 22		
DX52D +ZM	1	T	0.45 -0.7	140 -300	270 -420	≥ 24	-	-
			0.7 -6			≥ 26		
DX53D +ZM		T	0.45 -0.7	140 -260	270 -380	≥ 28	-	-
			0.7 -3			≥ 30		
DX54D +ZM		T	0.45 -0.7	120 -220	260 -350	≥ 34	≥ 1.6	≥ 0.180
			0.7 -1.5			≥ 36		
			1.5 -3				≥ 1.4	
DX56D +ZM		T	0.45 -0.7	120 -180	260 -350	≥ 37	≥ 1.9	≥ 0.210
			0.7 -1.5			≥ 39		
			1.5 -2				≥ 1.7	
DX57D +ZM		T	0.45 -0.7	120 -170	260 -350	≥ 39	≥ 2.1	≥ 0.220
			0.7 -1.5			≥ 41		
			1.5 -2				≥ 1.9	

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

Structural steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	r 90	n 90
S220GD +ZM		L	0.45 -0.7	≥ 220	≥ 300	≥ 18	-	-
			0.7 -6			≥ 20		
S250GD +ZM		L	0.45 -0.7	≥ 250	≥ 330	≥ 17	-	-
			0.7 -6			≥ 19		
S280GD +ZM		L	0.45 -0.7	≥ 280	≥ 360	≥ 16	-	-
			0.7 -6			≥ 18		
S320GD +ZM		L	0.45 -0.7	≥ 320	≥ 390	≥ 15	-	-
			0.7 -6			≥ 17		
S350GD +ZM		L	0.45 -0.7	≥ 350	≥ 420	≥ 14	-	-
			0.7 -6			≥ 16		
S390GD AM FCE +ZM		L	0.45 -0.7	≥ 390	≥ 460	≥ 14	-	-
			0.7 -6			≥ 16		

Grades in italics: not included in the standard

High strength low alloy steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	r 90	n 90
HX260LAD +ZM		T	0.45 -0.7	260 -330	350 -430	≥ 24	-	-
			0.7 -6			≥ 26		
HX300LAD +ZM		T	0.45 -0.7	300 -380	380 -480	≥ 21	-	-
			0.7 -6			≥ 23		
HX340LAD +ZM		T	0.45 -0.7	340 -420	410 -510	≥ 19	-	-
			0.7 -6			≥ 21		
HX380LAD +ZM		T	0.45 -0.7	380 -480	440 -560	≥ 17	-	-
			0.7 -6			≥ 19		
HX420LAD +ZM		T	0.45 -0.7	420 -520	470 -590	≥ 15	-	-
			0.7 -6			≥ 17		

Chemical composition

Steels for cold forming and deep drawing applications

	C (%)	Mn (%)	P (%)	S (%)	Si (%)	Al (%)	Nb (%)	Ti (%)
DX51D +ZM	≤ 0.180	≤ 1.20	≤ 1.200	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX52D +ZM	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX53D +ZM	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX54D +ZM	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX56D +ZM	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300

DX57D +ZM	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300

Structural steels

	C (%)	**Mn** (%)	**P** (%)	**S** (%)	**Si** (%)	**Al** (%)	**Nb** (%)	**Ti** (%)
S220GD +ZM	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S250GD +ZM	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S280GD +ZM	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S320GD +ZM	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S350GD +ZM	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S390GD AM FCE +ZM	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
Grades in italics: not included in the standard								

High strength low alloy steels

	C (%)	**Mn** (%)	**P** (%)	**S** (%)	**Si** (%)	**Al** (%)	**Nb** (%)	**Ti** (%)
HX260LAD +ZM	≤ 0.110	≤ 0.60	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.120
HX300LAD +ZM	≤ 0.110	≤ 1.00	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX340LAD +ZM	≤ 0.110	≤ 1.00	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX380LAD +ZM	≤ 0.110	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX420LAD +ZM	≤ 0.110	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150

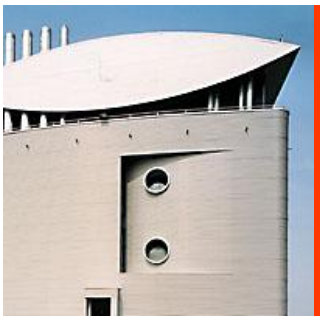
Coating properties

Magnelis®	Coating weight -double sided (g/m²)	Coating thickness (µm per side)
ZM90	90	7
ZM120	120	9
ZM175	175	13
ZM195	195	16
ZM250	250	19
ZM310	310	24

For commercial information (quotations, deliveries, product availability):

- Europe: http://industry.arcelormittal.com/agencies
- Other countries: contact@arcelormittal.com

For technical questions about these products: flateurope.technical.assistance@arcelormittal.com
For researchers: click here



E40

Steels with Aluzinc® aluminium-zinc coating

Thanks to its excellent corrosion resistance and spangled silver colour, Aluzinc® is very popular for roofing and cladding applications.

Last update: 2014-6-24

Properties

Aluzinc® is a flat carbon steel product coated on both sides with an aluminium-zinc alloy. The coating is composed of 55% aluminium, 43.4% zinc and 1.6% silicon and applied by means of a continuous hot dip galvanising process. Aluzinc® is available in a wide range of steel grades: steels for cold forming and deep drawing applications, and structural steels.

Advantages

The excellent corrosion resistance of Aluzinc® is a result of the properties of its two metallic constituents: the barrier effect of the aluminium present on the surface of the coating and the sacrificial protection of zinc.

The characteristic spangled silver colour of Aluzinc® gives it a very attractive appearance. Thanks to a thin transparent layer of aluminium oxide on the top surface of the coating, this appearance is preserved over time.

Aluzinc® offers additional advantages:

- Good corrosion resistance at high temperatures
- Good abrasion resistance because of its surface hardness
- Excellent thermal and light reflectivity

Applications

Aluzinc® coated steels are used widely in both indoor and outdoor applications:

- Construction: roofing, cladding, structural sections, composite panels, tiles etc
- Domestic appliances: washing machines, tumble dryers, refrigerators, toasters, microwave ovens etc
- Miscellaneous: boiler casings, air ducts, electrical cabinets, lighting, computer casings etc

Aluzinc® can be supplied oiled and/or with a chemical surface treatment, or with an Easyfilm® thin organic coating (please see data sheet E80 for the specific properties of Easyfilm®). DX56D AM FCE +AZHFX +Easyfilm® is suitable for standing seam applications in roofing and cladding.

Aluzinc® Florelis is a product with improved uniformity, with the result that there is no visible difference between the sheets. It is specially designed for facades of buildings with the highest aesthetic requirements.

Recommendations for use

Storage

Aluzinc® is supplied passivated or oiled to temporarily limit any risk of black rust formation. During transport and storage, all necessary precautions must be taken to keep the material dry and to prevent the formation of condensation. Improved protection can be obtained by the application of an Easyfilm® coating.

Forming and joining

The forming and joining techniques currently used for uncoated steel sheets are also suitable for Aluzinc®.
The coating thickness must therefore be compatible with both the desired degree of corrosion protection and the requirements of the forming and welding processes envisaged. Forming performance is improved if Aluzinc® is coated with an Easyfilm® thin organic coating.

Painting

Aluzinc® can be painted after degreasing and surface treatment when delivered oiled. Aluzinc® 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.

Weldability

In electrical resistance welding, the welding current must be suitably regulated and regularly adjusted. Electrode life can be extended by regularly stepping up the welding current and periodically dressing (machining) the electrodes.

Brand correspondence

Steels for cold forming and deep drawing applications

	ASTM A792	EN 10215:1995	EN 10326:2004	EN 10327:2004	EN 10292:2007	EN 10346:2009	Old brand names
DX51D +AZ EN 10346	CS	DX51D +AZ		DX51D +AZ		DX51D +AZ	AC2
DX51D AM FCE +AZFlorelis +Easyfilm®							
DX52D +AZ EN 10346	FS	DX52D +AZ		DX52D +AZ		DX52D +AZ	AC3
DX53D +AZ EN 10346		DX53D +AZ		DX53D +AZ		DX53D +AZ	(AC4)
DX54D +AZ EN 10346	DS	DX54D +AZ		DX54D +AZ		DX54D +AZ	AC5
DX54D AM FCE +AZHFX +Easyfilm®							
DX56D AM FCE +AZ							
DX56D AM FCE +AZHFX +Easyfilm®							
Grades in italics: not included in the standard							

Structural steels

	ASTM A792	EN 10215:1995	EN 10326:2004	EN 10327:2004	EN 10292:2007	EN 10346:2009	Old brand names
S220GD +AZ EN 10346			S220GD +AZ			S220GD +AZ	
S250GD +AZ EN 10346	SS Grade 255 (37)	S250GD +AZ	S250GD +AZ			S250GD +AZ	AC250
S280GD +AZ EN 10346	SS Grade 275 (40)	S280GD +AZ	S280GD +AZ			S280GD +AZ	AC280
S320GD +AZ EN 10346		S320GD +AZ	S320GD +AZ			S320GD +AZ	AC320
S350GD +AZ EN 10346	SS Grade 340 (50)	S350GD +AZ	S350GD +AZ			S350GD +AZ	AC350
S550GD +AZ EN 10346	SS Grade 550 (80)	S550GD +AZ	S550GD +AZ			S550GD +AZ	AC550

High strength interstitial free steels

	ASTM A792	EN 10215:1995	EN 10326:2004	EN 10327:2004	EN 10292:2007	EN 10346:2009	Old brand names
H220YD +AZ EN 10346					HX220YD +AZ	HX220YD +AZ	

High Strength Low Alloy steels

	ASTM A792	EN 10215:1995	EN 10326:2004	EN 10327:2004	EN 10292:2007	EN 10346:2009	Old brand names
HX260LAD +AZ EN 10346					HX260LAD +AZ	HX260LAD +AZ	AC250NB
HX300LAD +AZ EN 10346					HX300LAD +AZ	HX300LAD +AZ	AC280NB
HX340LAD +AZ EN 10346					HX340LAD +AZ	HX340LAD +AZ	AC320NB
HX380LAD +AZ EN 10346					HX380LAD +AZ	HX380LAD +AZ	AC380
HX420LAD +AZ EN 10346					HX420LAD +AZ	HX420LAD +AZ	AC420
() Closest grade as no fully equivalent grade exists.							

Dimensions

Steels for cold forming and deep drawing applications

Thickness (mm)	Min width	DX51D +AZ EN 10346	DX51D AM FCE +AZFlorelis +Easyfilm®	DX52D +AZ EN 10346, DX53D +AZ EN 10346, DX54D +AZ EN 10346, DX54D AM FCE +AZHFX +Easyfilm®, DX56D AM FCE +AZ, DX56D AM FCE +AZHFX +Easyfilm®
		Max width	Max width	Max width
0.20 ≤ th < 0.25	700	1000	-	-
0.25 ≤ th < 0.30		1200		
0.30 ≤ th < 0.36		1350		
0.36 ≤ th < 0.40		1500	1500	1400
0.40 ≤ th < 0.70				
0.70 ≤ th < 1.20				1500
1.20 ≤ th < 2.00			-	

Structural steels

Thickness (mm)	Min width	S220GD +AZ EN 10346, S250GD +AZ EN 10346, S280GD +AZ EN 10346	S320GD +AZ EN 10346, S350GD +AZ EN 10346	S550GD +AZ EN 10346
		Max width	Max width	Max width
0.20 ≤ th < 0.25	700	1000	-	1000
0.25 ≤ th < 0.30		1200		1100
0.30 ≤ th < 0.36		1350	1250	1250
0.36 ≤ th < 0.46		1500	1350	
0.46 ≤ th < 0.56			1450	
0.56 ≤ th < 2.00			1500	-

High strength interstitial free steels

Thickness (mm)	Min width	H220YD +AZ EN 10346
		Max width
0.36 ≤ th < 0.46	700	1250
0.46 ≤ th < 0.70		1400
0.70 ≤ th < 2.00		1500

High Strength Low Alloy steels

Thickness (mm)	Min width	HX260LAD +AZ EN 10346, HX380LAD +AZ EN 10346, HX420LAD +AZ EN 10346	HX300LAD +AZ EN 10346, HX340LAD +AZ EN 10346
		Max width	Max width
0.30 ≤ th < 0.36	700	-	1350
0.36 ≤ th < 0.46		1250	1500
0.46 ≤ th < 0.70		1400	
0.70 ≤ th < 2.00		1500	

Mechanical properties

Steels for cold forming and deep drawing applications

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	**Bending ratio** (th)	**r 90**	**n 90**
DX51D +AZ EN 10346		T	0.2 -0.5	-	270 -500	≥ 18	-	-	-
			0.5 -0.7			≥ 20			
			0.7 -2			≥ 22			
DX51D AM FCE +AZFlorelis +Easyfilm®		L	< 1.2	-	-	-	< 0	-	-
		T	< 0.8	-	-	-	< 0	-	-
			0.8 -1.2	≥ 140	270 -500	≥ 22			
DX52D +AZ EN 10346	1	T	0.2 -0.5	140 -300	270 -420	≥ 22	-	-	-
			0.5 -0.7			≥ 24			
			0.7 -2			≥ 26			
DX53D +AZ EN 10346		T	0.2 -0.5	140 -260	270 -380	≥ 26	-	-	-
			0.5 -0.7			≥ 28			
			0.7 -2			≥ 30			
DX54D +AZ EN 10346		T	0.2 -0.5	120 -220	260 -350	≥ 32	-	-	-
			0.5 -0.7			≥ 34			
			0.7 -2			≥ 36			
DX54D AM FCE +AZHFX +Easyfilm®		L	< 2	-	-	-	< 0	-	-
		T	< 0.2	-	-	-	< 0	-	-
			0.2 -0.7	120 -220	260 -350	≥ 34		≥ 1.4	≥ 0.180
			0.7 -2			≥ 36			
DX56D AM FCE +AZ		L	< 2	-	-	-	< 0	-	-
		T	< 0.5	-	-	-	< 0	-	-
			0.5 -0.7	120 -180	260 -330	≥ 37		≥ 1.5	≥ 0.200
			0.7 -2			≥ 39		≥ 1.7	
DX56D AM FCE +AZHFX +Easyfilm®		T	0.2 -0.7	120 -180	260 -350	≥ 37	-	≥ 1.5	≥ 0.200
			0.7 -2			≥ 39		≥ 1.7	

Grades in italics: not included in the standard

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

Structural steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	**Bending ratio** (th)	**r 90**	**n 90**
S220GD +AZ EN 10346		L	0.2 -0.3	≥ 220	≥ 300	-	< 0	-	-
			0.3 -0.7			≥ 18			
			0.7 -2			≥ 20			
		T	< 2	-	-	-	< 0	-	-
S250GD +AZ EN 10346		L	0.2 -0.5	≥ 250	≥ 330	≥ 15	-	-	-
			0.5 -0.7			≥ 17			
			0.7 -2			≥ 19			
S280GD +AZ EN 10346		L	0.2 -0.5	≥ 280	≥ 360	≥ 14	-	-	-
			0.5 -0.7			≥ 16			
			0.7 -2			≥ 18			
S320GD +AZ EN 10346		L	0.3 -0.5	≥ 320	≥ 390	≥ 13	-	-	-
			0.5 -0.7			≥ 15			
			0.7 -2			≥ 17			
S350GD +AZ EN 10346		L	0.3 -0.5	≥ 350	≥ 420	≥ 12	-	-	-
			0.5 -0.7			≥ 14			
			0.7 -2			≥ 16			
S550GD +AZ EN 10346		L	0.2 -0.55	≥ 550	≥ 560	-	-	-	-

High strength interstitial free steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	**Bending ratio** (th)	**r 90**	**n 90**
H220YD +AZ EN 10346		L	< 3	-	-	-	< 0	-	-
		T	0.3 -0.5	220 -280	340 -410	≥ 28	< 0	-	-
			0.5 -1.5			≥ 30		≥ 1.3	≥ 0.170
			1.5 -2					≥ 1.1	

High Strength Low Alloy steels

	Notes	Direction	Thickness (mm)	R_e (MPa)	R_m (MPa)	A_{80} (%)	**Bending ratio** (th)	**r 90**	**n 90**
HX260LAD +AZ EN 10346		T	0.3 -0.5	260 -330	350 -430	≥ 20	-	-	-
			0.5 -0.7			≥ 22			
			0.7 -2			≥ 24			
HX300LAD +AZ EN 10346		T	0.3 -0.5	300 -380	380 -480	≥ 17	-	-	-
			0.5 -0.7			≥ 19			
			0.7 -2			≥ 21			
HX340LAD +AZ EN 10346		T	0.3 -0.5	340 -420	410 -510	≥ 15	-	-	-
			0.5 -0.7			≥ 17			
			0.7 -2			≥ 19			
HX380LAD +AZ EN 10346		T	0.35 -0.5	380 -480	440 -560	≥ 13	-	-	-
			0.5 -0.7			≥ 15			
			0.7 -2			≥ 17			
HX420LAD +AZ EN 10346		T	0.35 -0.5	420 -520	470 -590	≥ 11	-	-	-
			0.5 -0.7			≥ 13			
			0.7 -2			≥ 15			

Chemical composition

Steels for cold forming and deep drawing applications

	C (%)	**Mn** (%)	**P** (%)	**S** (%)	**Si** (%)	**Al** (%)	**Nb** (%)	**Ti** (%)
DX51D +AZ EN 10346	≤ 0.180	≤ 1.20	≤ 0.120	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX51D AM FCE +AZFlorelis +Easyfilm®	≤ 0.180	≤ 1.20	≤ 0.120	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX52D +AZ EN 10346	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX53D +AZ EN 10346	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX54D +AZ EN 10346	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX54D AM FCE +AZHFX +Easyfilm®	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX56D AM FCE +AZ	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300
DX56D AM FCE +AZHFX +Easyfilm®	≤ 0.120	≤ 0.60	≤ 0.100	≤ 0.045	≤ 0.50	-	-	≤ 0.300
Grades in italics: not included in the standard								

Structural steels

	C (%)	**Mn** (%)	**P** (%)	**S** (%)	**Si** (%)	**Al** (%)	**Nb** (%)	**Ti** (%)

S220GD +AZ EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S250GD +AZ EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S280GD +AZ EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S320GD +AZ EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S350GD +AZ EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-
S550GD +AZ EN 10346	≤ 0.200	≤ 1.70	≤ 0.100	≤ 0.045	≤ 0.60	-	-	-

High strength interstitial free steels

	C (%)	**Mn** (%)	**P** (%)	**S** (%)	**Si** (%)	**Al** (%)	**Nb** (%)	**Ti** (%)
H220YD +AZ EN 10346	≤ 0.010	≤ 0.90	≤ 0.080	≤ 0.025	≤ 0.20	-	≤ 0.090	≤ 0.120

High Strength Low Alloy steels

	C (%)	**Mn** (%)	**P** (%)	**S** (%)	**Si** (%)	**Al** (%)	**Nb** (%)	**Ti** (%)
HX260LAD +AZ EN 10346	≤ 0.120	≤ 0.60	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX300LAD +AZ EN 10346	≤ 0.110	≤ 1.00	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX340LAD +AZ EN 10346	≤ 0.110	≤ 1.00	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX380LAD +AZ EN 10346	≤ 0.110	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150
HX420LAD +AZ EN 10346	≤ 0.110	≤ 1.40	≤ 0.030	≤ 0.025	≤ 0.50	≥ 0.015	≤ 0.090	≤ 0.150

Coating properties

Aluzinc®	Coating weight -double sided (g/m²)	Coating thickness (µm per side)
AZ100	100	13
AZ150	150	20
AZ165	165	23
AZ185	185	25
AZ200	200	26

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