Applicable Standards

The following list contains specification references for products we can offer. **Applicable Standards** describe specification requirements our suppliers can meet. **Other Reference Standards** are included for your reference.

Type	Applicable Standards	Other Reference Standards
Quality Designations	ASTM A792	
Coating Designations	ASTM A792	EN10215
Base Metal Chemical Composition	ASTM A792	
Mechanical Properties	ASTM A792	EN10215
Dimensional Tolerances	ASTM A792	EN10215
Other Tolerances	ASTM A792	EN10215
Surface Quality & Treatment		EN10215
Coating Bend Test	ASTM A792	EN10215
Suggested Minimum Inside Radii for Cold Bending	ASTM A792	
Conversion Factors b/w Coating Weight and Thickness	ASTM A792	

ASTM A792 - 97

Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-dip Process

- **Quality Designations**

  - Commercial quality(CQ): Material intended for applications where material is subjected to bending or moderate forming.
  - Lock-forming quality(LFQ): Material intended for applications where

material is subjected to machine lock forming.

- Structural (physical) quality(SQ): Material intended for applications where mechanical properties are specified or required. Such properties or values include those indicated by tension, hardness, or other commonly accepted mechanical tests.
- High-temperature quality: Material intended for applications subjected to high temperatures. The high temperature quality will resist oxidation and scaling while avoiding base metal embrittlement.

- **Coating Designation and minimum Coating Test Limits**

Coating Designation	Triple-spot Test		Single-Spot Test	
	min. g/m²	min.oz/ft²	min. g/m²	min.oz/ft²
AZM 150 AZ50	150	0.50	130	0.43
AZM 165 AZ55	165	0.55	150	0.50
AZM 180 AZ60	180	0.60	155	0.52

- **Chemical Composition**

Base Metal

Designation	Composition, % - Heat Analysis Element, Maximum (unless otherwise shown)				
	Carbon	Manganese	Phosphorus	Sulfur	Aluminum[A]
CS Type A[C,D]	0.10	0.60	0.030	0.035	-
CS Type B[B,C,D]	0.02 to 0.15	0.60	0.030	0.035	-
CS Type C[C,D]	0.08	0.60	0.10	0.035	-
FS[C]	0.02 to 0.10	0.50	0.020	0.030	-

DS[E]	0.06	0.50	0.020	0.025	0.01 min
HTS[F]	0.02 to 0.15	0.60	0.040 min	0.035	-

Structural Steel	Composition,%. Element, Maximum				
Grade 230 33	0.20	1.15	0.04	0.040	
Grade 255 37	0.20	1.15	0.10	0.040	
Grade 275 40	0.25	1.15	0.10	0.040	
Grade 345A.B 50 A,B	0.40	1.15	0.20	0.040	
Grade 550 80	0.20	1.15	0.04	0.040	

Chemical Requirements - Limits on Unspecified Elements

Copper, %, max[A]	Heat Analysis Product Analysis	0.20 0.23
Nickel, %, max[A]	Heat Analysis Product Analysis	0.20 0.23
Chromium, %, max[A]	Heat Analysis Product Analysis	0.15 0.19
Molybdenum, %, max[A]	Heat Analysis Product Analysis	0.06 0.07
Vanadium, %, max	Heat Analysis Product Analysis	0.008 0.018
Columbium, %, max [b.c]	Heat Analysis Product Analysis	0.008 0.018
Titanium, %, max	Heat Analysis Product Analysis	0.30 0.33

- **Mechanical Property**

Requirements, Structural Steel Base Metal(Longitudinal)

Grade	Yield Strength, min. MPa min.ksi	Tensile Strength[C], min. MPa min.ksi	Elongation in 50 mm(2in),min, %
230 33	230 33	310 45	20
255 37	255 37	360 52	18
275 40	275 40	380 55	16
345A 50A	345 50	450 65	12
345B 50B	345 50	- -	12
550[A] 80[A]	550[B] 80[B]	570 82	-

Typical Ranges of Mechanical Properties (Non-mandatory)[A,B]

Designation	Longitudinal Direction				
	Carbon MPa	Manganese ksi	Elongation 50mm (2 in),%	r_m Value[C]	n Value[D]
CS Type A[C.D]	205/410	30/60	>=20	E	E
CS Type B[B.C.D]	245/410	35/60	>=20	E	E
CS Type C[C.D]	205/450	30/65	>=15	E	E
FS[C]	170/275	25/40	>=24	1.0/1.4	0.16/0.20
DS[E]	140/240	20/35	>=30	1.3/1.7	0.18/0.22
HTS[F]	205/450	30/65	>=15	E	E

- **Suggested Minimum Inside Radii For Cold Bending**

Designation	Grade	Minimum Inside Radius for cold Bending[A]

Structural Steel	230 33	1 1/2 *t*
	255 37	2 *t*
	275 40	2 *t*
	345A.B 50 A,B	not applicable

- **Conversion Factors Between Coating Weight[Mass] and Thickness** [A]

Coating Weight(Mass)		Coating Thickness	
oz/ft²	g/m²	mils	µm
1.0	305.15[B]	3.2	81.28[B]
0.00328[B]	1.0	0.010487<none>[B]	0.26636[B]
0.3125[B]	95.360[B]	1.0	25.4[B]
0.012303[B]	3.7543[B]	0.03937[B]	1.0

- **Coating Bend Test Requirements-Structural Steel**

Grade	Ratio of the Inside Bend Diameter to Thickness of the Specimen (Any Direction)
230 33	1 1/2
255 37	2
275 40	2 1/2
345A.B 50 A,B	A
350 80	A

- **Dimensional Tolerances**

Thickness Tolerances for Hot-Dip Metallic-Coated Sheet

3/8 in. [10mm] Minimum Edge Distance

Specified Width, mm		Thickness Tolerance, Plus and Minus, mm, for Specified Thickness, mm					
Over	Through	Through 0.4	Over 0.4 Through 1.0	Over 1.0 Through 1.5	Over 1.5 Through 2.0	Over 2.0 Through 2.5	Over 2.5 Through 5.0
-	1500	0.08	0.10	0.13	0.15	0.20	0.23
1500	-	-	0.10	0.13	0.15	0.23	0.23

1 in. [25mm] Minimum Edge Distance

Specified Width, mm	Thickness Tolerance, Plus and Minus, mm, for Specified Thickness, mm			
	1.5 and thinner	Over 1.5 to 2.0, inclusive	Over 2.0 to 2.5, inclusive	Over 2.5 to 5.0, inclusive
to 1500	0.005	0.08	0.15	0.18
inclusive over 1500	0.05	0.08	0.18	0.18

Width Tolerances for Hot-Dip Metallic-Coated Sheet, Coils, and Cut Length, Not Resquared

Specified Width, mm		Tolerance Over Specified Width, No Tolerance Under, mm
Over	Through	
300	600	3
600	1200	5
1200	1500	6
1500	1800	8

Width Tolerances-Narrow Widths for Hot-Dip Metallic-Coated Sheet, Coils, and Cut Length, Not Resquared

Specified Width, mm		Width, Tolerance, Over and Under, mm
Over	Through	
50	100	0.3
100	200	0.4
200	300	0.8

Length Tolerances for Hot-Dip Metallic-Coated Sheet, Cut Length, Not Resquared

Length Tolerances-Narrow Width for Hot-Dip Metallic-Coated Sheet, Cut Length, Not Resquared

Specified Length, mm		Tolerance Over Specified Length, No Tolerance Under, mm
Over	Through	
300	1500	6
1500	3000	20
3000	6000	35
6000	-	45

Specified Length, mm		Tolerance Over Specified Length, No Tolerance Under, mm
Over	Through	
600	1500	15
1500	3000	20
3000	6000	25

Camber Tolerances for Hot-Dip Metallic-Coated Sheet

For Coils Over 300mm in Width		
Cut Length, mm		Camber Tolerance, mm
Over	Through	
-	1200	4
1200	1800	5
1800	2400	6
2400	3000	8
3000	3700	10
3700	4300	13
4300	4900	16
4900	5500	19
5500	6000	22
6000	9000	32
9000	12,200	38

- **Other Tolerances**

Diameter Tolerances for Hot-Dip Metallic-Coated Sheet, Sheared Circles

Specified Thickness, mm		Tolerance Over Specified Diameter, No Tolerance Under, mm		
		Diameters		
Over	Through	Through 600	Over 600 Through 1200	Over 1200
-	1.5	1.5	3.0	5.0
1.5	2.5	2.5	4.0	5.5
2.5	-	3.0	5.0	6.5

Out-of-Square Tolerances for Hot-Dip Metallic-Coated Sheet, Cut Length, Not Resquared

The tolerance for cut lengths of all thicknesses and all sizes is 1.0mm in each 100mm of width or fraction thereof.

Resquared Tolerances for Hot-Dip Metallic-Coated Sheet

Shall not exceed 1.6mm for cut lengths up to and including 1200 mm in width and up to and including 3000mm in length. For cut lengths wider or longer, the applicable tolerance is 3.2mm

Flatness Tolerances for Hot-Dip Metallic-Coated Sheet, Cut Length

Specified Thickness, mm	Specified Width, mm		Flatness Tolerance[A], mm
	Over	Through	
Through 1.0	300	900	10
	900	1500	15
	1500	-	20
Over 1.0	300	900	8
	900	1500	10
	1500	1800	15
	1800	-	20

Flatness Tolerances Specified to Restricted Flatness for Hot-Dip Metallic-

Coated Sheet, Cut Length

Specified Thickness, mm	Specified Width, mm	Specified Length, mm	Flatness Tolerance$_A$, mm
0.35 through 0.8	through 900	through 3000	8
	wider or longer		10
Over 0.8	through 1200	through 3000	5
	wider or longer		8

EN 10215/1995

Continuously Hot-dip Aluminum-Zinc (AZ) Coated Steel Sheet and Strip

- **Grades and Mechanical Properties of Low Carbon Steel for Cold Forming**

Designation			Yield Strength R_e N/mm² max.	Tensile Strength R_e N/mm² max.	Elongation A_{80} % min.
Steel Grade		Symbol for the Type of Hot-Dip Coating			
Steel Name	Steel Number				
DX51D	1.0226	+AZ	-	500	22
DX52D	1.0350	+AZ	300	420	26
DX53D	1.0355	+AZ	260	380	30
DX54D	1.0306	+AZ	220	350	36

- **Grades and Mechanical Properties for Structural Steels**

Designation	Yield	Tensile	Elongation

Steel Grade		Symbol for the Type of Hot-Dip Coating	Strength R_{eH} N/mm² max.	Strangth R_{eM} N/mm² max.	A_{80} % min.
Steel Name	Steel Number				
S250GD+AZ	1.0242	+AZ	250	330	19
S280GD+AZ	1.0244	+AZ	280	360	18
S320GD+AZ	1.0250	+AZ	320	390	17
S350GD+AZ	1.0529	+AZ	350	420	16
S550GD+AZ	1.0531	+AZ	550	560	-

- **Coating Mass**

Coating Designation	Minimum Coating Mass, g/m² Total Both Surfaces	
	Triple Spot Test	Single Spot Test
100	100	85
150	150	130
185	185	160

- **Surface Quality**

1)As Coated Surface(A)
Imperfections such as small pits, variations in spangle size, dark spots, stripe, marks and light passivation strains are permissible. Leveller breaks or run-off marks may appear.
2)Improved Surface(B)
Surface quality B is obtained by skin passing. With this surface quality, small imperfections such as stretch levelling breaks, skin pass marks, scratches, indentations, spangle structure, run-off marks and light passivation marks are permissible, The surface has no pits.
3)Best Quality Surface(C)

Surface quality C is obtained by skin passing. The better surface shall not impair the uniform appearance of a high-class paint finish. The other surface shall have at least the characteristics of surface quality B.

- **Surface Treatment**

C	Chemical passivation
O	Oiling
CO	Chemical passivation and Oiling
U	Untreated

- **Freedom from Coil Breaks**

Products with the surface condition B or C are free from stretcher strains for the following periods commencing from the agreed date on which they are made available by the works:
*1 month for steel grades DX51D+AZ and DX52D+AZ.
*6 months for steel grades DX53D+AZ and DX54D+AZ.

- **Bend Test to Determine the Adhesion of the Coating**

Steel Grade	Mandrel Diameter D for Coating Designation		
	100	150	185
DX51D+AZ	0	0	1a
DX52D+AZ	0	0	0
DX53D+AZ	0	0	0
DX54D+AZ	0	0	0
S250GD+AZ	1a	1a	1a

S280GD+AZ	2a	2a	2a
S320GD+AZ	3a	3a	3a
S350GD+AZ	3a	3a	3a
S550GD+AZ	-	-	-

- **Thickness Tolerances**

Nominal Thickness	Normal Tolerances for Nominal Widths			Special Tolerances(S) for Nominal Widths		
	<=1200	>1200 <=1500	>1500	<=1200	>1200 <=1500	>1500
<=0.40	±0.05	±0.06	-	±0.03	±0.04	-
>0.40<=0.60	±0.06	±0.07	±0.08	±0.04	±0.05	±0.06
>0.60<=0.80	±0.07	±0.08	±0.09	±0.05	±0.06	±0.06
>0.80<=1.00	±0.08	±0.09	±0.10	±0.06	±0.07	±0.07
>1.00<=1.20	±0.09	±0.10	±0.11	±0.07	±0.08	±0.08
>1.20<=1.60	±0.11	±0.12	±0.12	±0.08	±0.08	±0.9
>1.60<=2.00	±0.13	±0.14	±0.14	±0.09	±0.10	±0.10
>2.00<=2.50	±0.15	±0.16	±0.16	±0.11	±0.12	±0.12
>2.50<=3.00	±0.17	±0.18	±0.18	±0.12	±0.13	±0.13

- **Width Tolerances**

Width a Nominal Width of 600mm or more Wide

Nominal Width	Normal Tolerances		Special Tolerances(S)	
	Lower Deviation	Upper Deviation	Lower Deviation	Upper Deviation
>=600<=1200	0	+5	0	+2
>1200<=1500	0	+6	0	+2

>1500	0	+7	0	+3

Width a Nominal Width Below 600mm or more Wide

Tolerance Class	Nominal Tolerances	Width							
		<125		>=125,<250		>=250,<400		>=400,<600	
		Lower Deviation	Upper Deviation	Lower Deviation	Upper Deviation	Lower Deviation	Upper Deviation	Lower Deviation	Upper Deviation
Nomal	<0.6	0	+0.4	0	+0.5	0	+0.7	0	+1.0
	>=0.6<1.0	0	+0.5	0	+0.6	0	+0.9	0	+1.2
	>=1.0<2.0	0	+0.6	0	+0.8	0	+1.1	0	+1.4
	>=2.0<=3.0	0	+0.7	0	+1.0		+1.3	0	+1.6
Special (S)	<0.6	0	+0.2	0	+0.2	0	+0.3	0	+0.5
	>=0.6<1.0	0	+0.2	0	+0.3	0	+0.4	0	+0.6
	>=1.0<2.0	0	+0.3	0	+0.4	0	+0.5	0	+0.7
	>=2.0<=3.0	0	+0.4	0	+0.5	0	+0.6	0	+0.8

- **Length Tolerances**

Nominal Length	Tolerance on Length			
	Nomal		Special(S)	
	Lower Deviation	Upper Deviation	Lower Deviation	Upper Deviation
<2000	0	6	0	3
>=2000	0	0.003Xl	0	0.0015Xl

- **Flatness Tolerances**

Tolerance Class	Nominal Width	Nominal Thickness		
		<0.7	>=0.70<1.2	>=1.2
Normal	>=600<1200	12	10	8
	>=1200<1500	15	12	10
	>=1500	19	17	15
Special (FS)	>=600<1200	5	4	3
	>=1200<1500	6	5	4
	>=1500	8	7	6