

# HDG STEELS – HOT DIP GALVANIZED STEEL PRODUCTS

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**Duferco**  
Duferco Steel Processing

# HOT DIP GALVANISED STEELS (HDG)

Zinc has long proven itself as the ideal corrosion protection for steel. Hot-dip galvanized steel combines the exceptional properties of zinc as an oxidation inhibitor and high-quality surface appearance; with mechanical properties provided by the base metal characteristics for respective steel grades suitable for the applicable end-use.

The life-expectancy of the zinc coated steel product is directly proportional to the thickness of the zinc-coating layer and the climate condition in which the steel is used.

Applicable areas of end-use includes structural use such as air ducts, pipe insulation, roof drainage, roof sheeting, ceiling elements, door frames, building construction, and commercial use for various industries such as manufacturing of house hold appliances, panels, drums, consumer electronics, shelving etc.

## 1. Product Data

Material:	Mild Steel Grades
Maximum coil weight:	25.0 MT
Specific Coil Weight:	18 kg/mm
Maximum Coil OD:	1880 mm
Coil ID:	508 mm (610mm available on request)

## 2. HDG Steel grades available and equivalent specification standards

### 2.1. Commercial grades

Steel Category	ASTM	EN	JIS	ISO
Group A	ASTM A653 CS Type A ASTM A653 CS Type B ASTM A653 CS Type C	EN 10346 DX 51 D+Z	JIS G3302 SGCC	ISO 3575 01

### 2.1. Drawing grades

Steel Category	ASTM	EN	JIS	ISO
Group B	ASTM A653 FS Type A ASTM A653 FS Type B	EN 10346 DX 52 D+Z	JIS G3302 SGCD	ISO 3575 02

### 2.2. Structural grade

Steel Category	ASTM	EN	JIS	ISO
Group C	ASTM A653 SQ33 [SS230]	EN 10346 S220 GD	JIS G3302 SGCH	ISO 4998 Grade 220
Group D	ASTM A653 SQ37 [SS250]	EN 10346 S250 GD	JIS G3302 SGC 340	ISO 4998 Grade 250
Group E	ASTM A653 SQ40 [SS275]	EN 10346 S280 GD	JIS G3302 SGC 400	ISO 4998 Grade 280
Group F	ASTM A653 SQ50 [SS340]	EN 10346 S350 GD	JIS G3302 SGC 440	ISO 4998 Grade 350
Group G	ASTM A653 SQ80 [SS550]	EN 10346 S550 GD	JIS G3302 SGC 570	ISO 4998 Grade 550

Above respective Steel Category is used for the purpose of the product range in order to distinguish between groups of equivalent steel grades available.

### 3. Coating Qualities and Surface Finishes

A chemical treatment (passivation) is used to protect galvanized products against corrosion during transport and storage. Untreated galvanized should be oiled with rust preventative oil to protect the surface from corroding. Duferco Steel Processing (DSP) is able to supply untreated and not oiled galvanized products on request by the customer. However, DSP cannot be held liable for corrosion related claims thereof.

DSP offers two different types of passivation protection mediums; hexavalent based (chrome 6) and trivalent based (chrome 3). Both products provide adequate passivation protection.

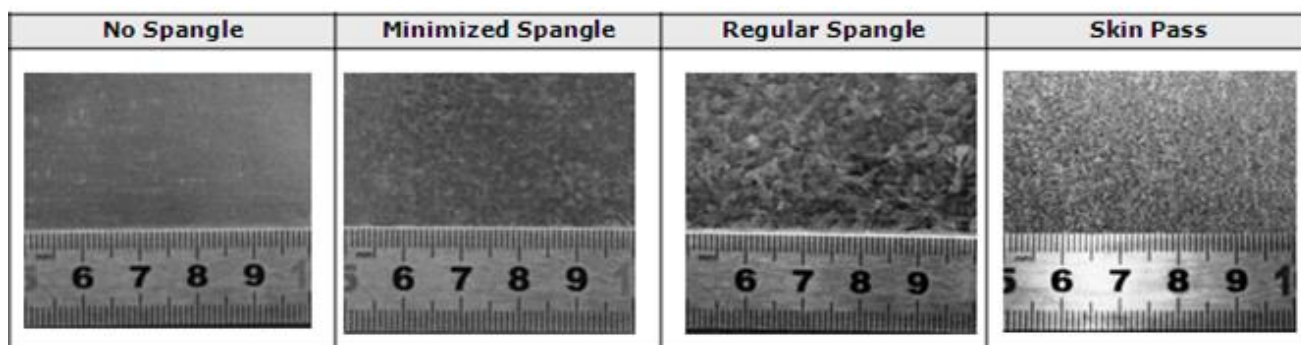
**Types of coating Qualities are:**

- NA: normal / regular spangle coating; as coated
- NB: normal / regular spangle coating with improved surface finish (skin passed)
- MA: minimized spangle coating, as coated
- MB: Minimized spangle coating with improved surface finish (skin passed)
- MZ: Zero Spangle

Classification	Codes	Remarks
Regular spangle	NA	Normal zinc crystal spangles as a result of the unrestricted growth of zinc crystals during normal solidification.
Minimized spangle	MA	Zinc crystal spangles obtained by restricting normal spangle growth during solidification.
Regular spangle with improved surface	NB	Regular spangle surface that has been skin passed to improve the consistency of strip surface quality.
Minimized spangle with improved surface (May be perceived as Zero spangle/no spangle)	MB	Minimised spangle surface that has been skin passed to improve the consistency of strip surface quality.

- A range of surface roughness (Ra values) is available and may be agreed at the time of enquiry. This is only applicable to improved surface finishes.

**Typical spangle coatings:**



## Roughness range

Type	EN Ra values	ASTM Ra values
Normal / Matt finish	0.60 - 1.20 Ra	1.016-1.651 Ra
Rough finish	1.20 - 1.80 Ra	1.20 - 1.80 Ra

## Surface treatment

Type
Hexavalent chromate type (Cr 6)
Trivalent chromate type (Cr 3)
Untreated / unprotected
Oiled
Not oiled

Notes:

- Localized colour variations as a result of chromate surface treatments are permissible and do not impair the quality of zinc coating.
- DSP cannot be held liable for corrosion related claims (white rust) on products that are not chromated and not oiled.

## Oil coating weight

Lightly oiled	Approx. 0.7 g/m <sup>2</sup> per side	Temporary form of corrosion protection and cold forming aid for medium forming operations.
Normal oiled	Approx. 1.2 g/m <sup>2</sup> per side	Temporary form of corrosion protection and cold forming aid for heavy forming operations.

Notes:

- Although the oil is distributed evenly, certain amounts of oil will invariably spread across the length and width of the strip and some oil from heavily oiled strip will be shed between the surface during transportation and storage, this is technically unavoidable.
- Products with thickness of <0.3mm cannot be supplied in oiled condition.
- It is also recommended that minimized spangle with improved surface material be supplied in oiled condition to avoid fret marks formation during transportation.

## Zinc coating weight and nominal thickness table

Total coating weight on both sides	Z100	Z120	Z140	Z150	Z160	Z180	Z200	Z275
Minimum coating weight in triple spot test on both sides (g/m <sup>2</sup> )	100	120	140	150	160	180	200	275
Nominal coating thickness per side (µm)	7	8	10	11	12	13	14	20

Zinc coating mass of 100g/m<sup>2</sup> on both surfaces corresponds to a zinc coating thickness of approximately 7.0 µm per side.

Coating designations tabulated below is based on the EN10346 specification standard (with the exception of Z120, Z150, Z160 and Z180 coating designations which DSP can supply). ASTM A653, JIS3302, ISO3575 and ISO4998 specific coating designations are available, and can be supplied on request.

### 3.1. Applicable to Group A – Group F grades

Gauge	Coating designations
<0.4mm	Z100 - Z150 (G30 – G60)
≥0.4 - <0.6mm	Z100 - Z275 (G30 – G90)
≥0.6 - <0.8mm	Z100 - Z275 (G30 – G90)
≥0.8 - <1.0mm	Z100 - Z275 (G30 – G90)
≥1.0 - <1.2mm	Z100 - Z275 (G30 – G90)
≥1.2 - <1.4mm	Z100 - Z275 (G30 – G90)
≥1.4 - <1.6mm	Z100 - Z275 (G30 – G90)
>1.6mm	Z100 - Z275 (G30 – G90)

Notes:

- Z90/G30 may be supplied on request.
- Z350 (for order thicknesses of ≥1.0mm) may be supplied on request (surface appearance not guaranteed).
- Gauges >1.20mm with coating ≥275 surface appearance not guaranteed.

Coating application and exceptions:

- Regular coating spangle (NA) and normal coating spangle with improved surface (NB) may be produced for all commercial grades, drawing grades and structural grades.
- Minimized coating spangle (MA) may be unintentionally achieved in designations Z100 and Z120 in thicknesses thinner than 0.30mm.
- Minimized coating spangle with improved surface

(MB), can ONLY be produced on widths  $\geq 900\text{mm}$ , and gauges  $\geq 0.30\text{mm}$ .

### 3.2. Applicable to Group G grades

Gauge	Coating designations
$< 0.4\text{mm}$	Z100 - Z150 (G30 – G60)
$\geq 0.4 - < 0.6\text{mm}$	Z100 - Z275 (G30 – G90)
$\geq 0.6 - < 0.8\text{mm}$	Z100 - Z275 (G30 – G90)
$\geq 0.8 - < 1.0\text{mm}$	Z100 - Z275 (G30 – G90)
$\geq 1.0 - < 1.2\text{mm}$	Z100 - Z275 (G30 – G90)
$\geq 1.2 - < 1.4\text{mm}$	Z100 - Z275 (G30 – G90)
$\geq 1.4 - < 1.6\text{mm}$	Z100 - Z275 (G30 – G90)

Notes:

- Z90 may be supplied on request.
- Z350 (for order thicknesses of  $\geq 1.0\text{mm}$ ) may be supplied on request (surface appearance not guaranteed).

Coating application and exceptions:

- Regular coating spangle surface (NA) with improved surface (NB) may be produced on full hard grades.
- Minimized spangle (MA) may be unintentionally achieved in designations Z90, Z100 and Z120 in thicknesses thinner than  $0.30\text{mm}$ .

### 4. Product dimensional and shape tolerances

- 4.1. ASTM designated dimensional and shape tolerances are supplied according to the ASTM A924 specification standard.
- 4.2. EN designated dimensional and shape tolerances are supplied according to the EN 10143 specification standard.
- 4.3. ISO designated dimensional and shape tolerances are supplied according to the ISO 16163 specification standard.
- 4.4. JIS designated dimensional and shape tolerances are supplied according to the JIS G3302 specification standard.

### 5. Mechanical properties

- 5.1. The Customer should refer to respective material quality specification standards for the applicable mechanical property limits, taking into account the relevant footnotes.
- 5.2. DSP may provide the customer with typical mechanical properties achievable, for respective equivalent grades, on request.

## 6. Test Certificates/reports

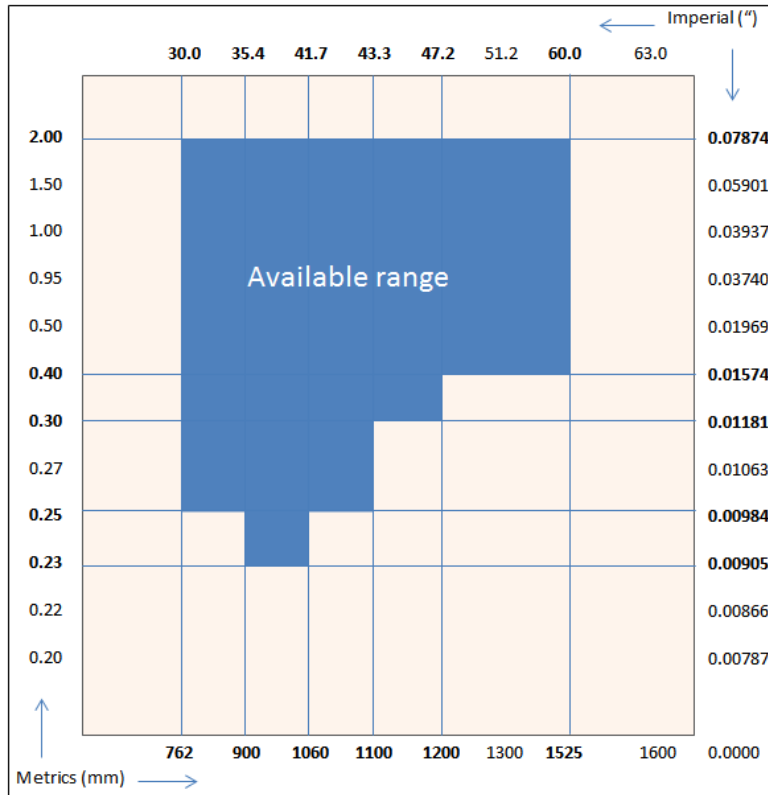
6.1. Test certificate accompanies each final product produced and may be supplied to the Customer on request; as prescribed by EN 10204:2004 Type 3.1 specification standard.

6.2. Information available on the test certificates / reports includes:

- Customer order detail
- Material quality
- Material identification number
- Dimensional characteristics
- Coating weight (customer ordered)
- Chemical composition
- Mechanical properties results
- Coating adherence results
- Net mass (Mt)

## 7. Applicable product ranges (based on nominal order gauge)

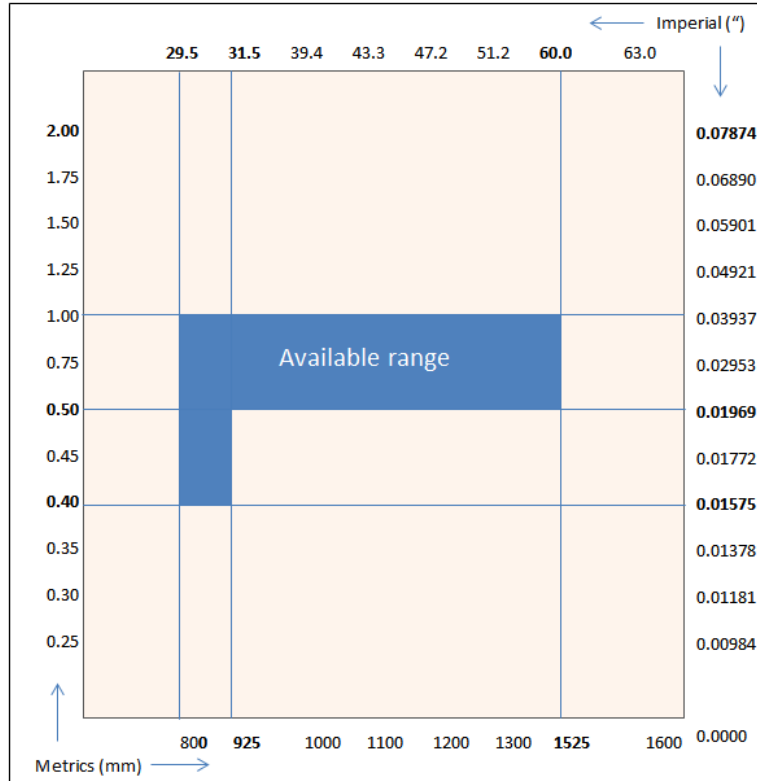
### 7.1. Group A grades (Commercial Steel grades)



#### Notes:

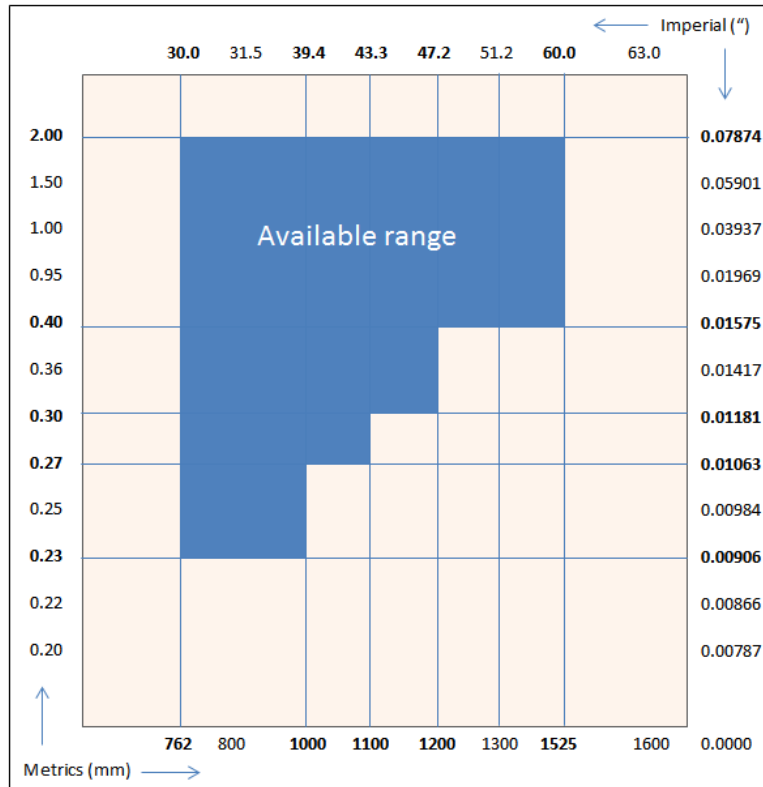
- Maximum thickness orders (as per ASTM specification) are not achievable for total coated thicknesses  $\leq 0.23$ mm.
- Orders with thickness  $\geq 1.85$ mm might be supplied in pickled and galvanized form, on request.

### 7.2. Group B grades (Drawing Steel grades)



### 7.3. Structural Steel grades

#### 7.3.1. Group C, D & E grades (excluding ASTM A653 SQ40 [SS275])

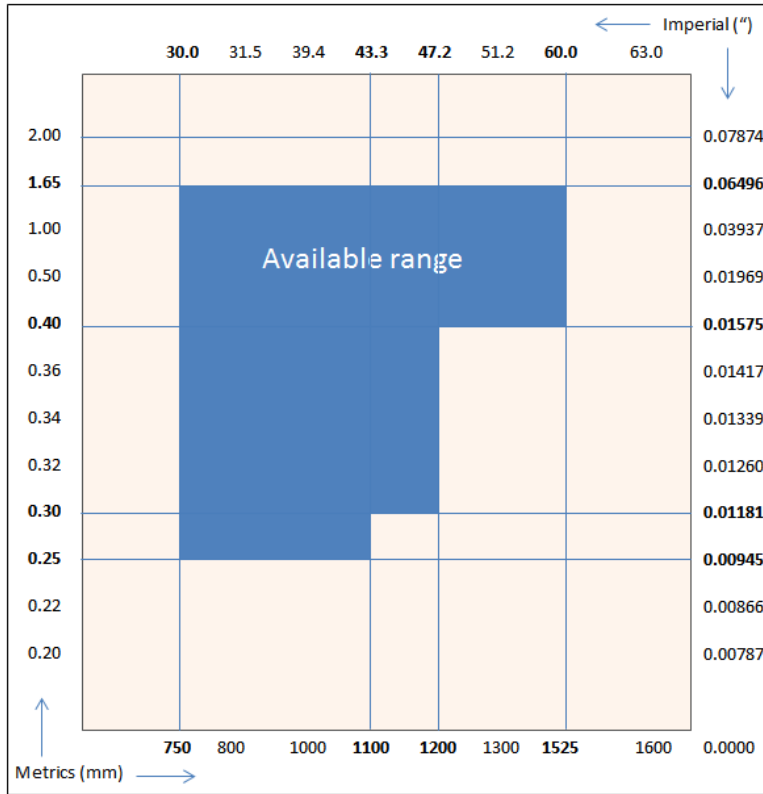


Notes:

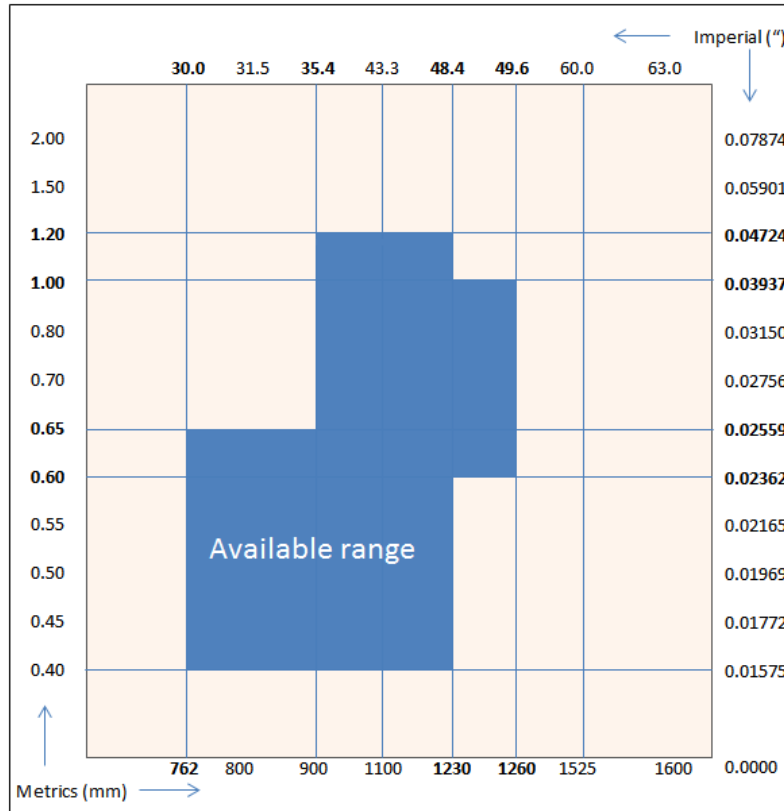
Orders with thickness >1.85mm can be supplied in pickled and galvanized form, on request.



### 7.3.2. ASTM A653 SQ40 [SS275] only



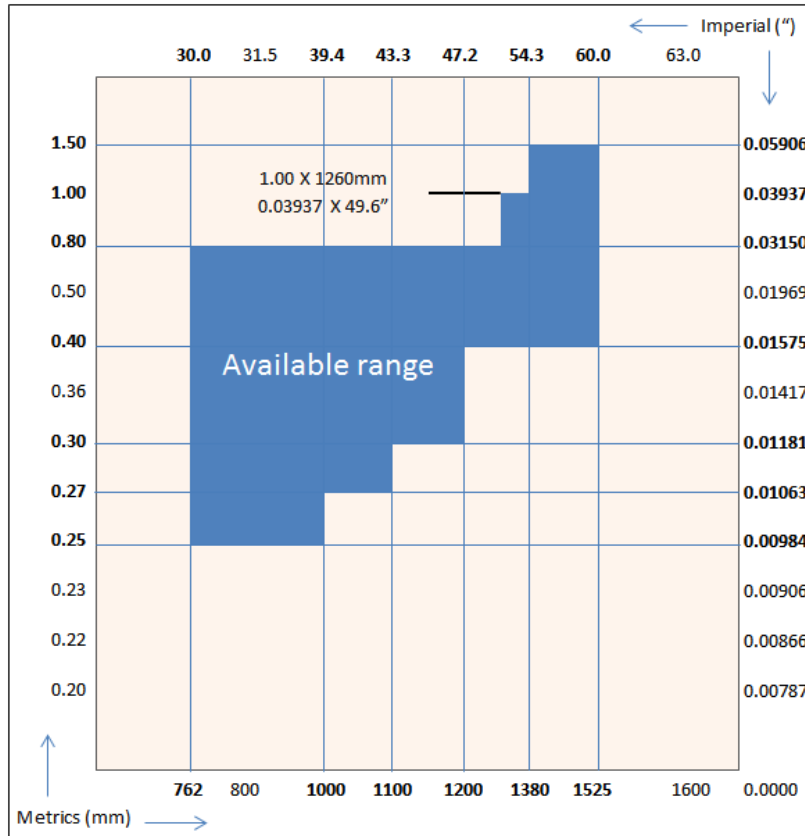
### 7.3.3. Group F



Notes:

Gauges >0.60mm can be supplied based on the availability of Hot rolled coil material.

### 7.3.4. Group G (Full Hard Steel grades)



## 8. General Notes

### 8.1. Fretting corrosion

Mutual friction between strips of hot-dip galvanized steel during transportation can cause dark spots on the zinc surface. These affect the appearance but do not adversely affect the quality of the corrosion protection. The tendency toward fretting corrosion can be minimized by oiling the hot-dip-galvanized steel strip.

### 8.2. Formation of white rust

When hot-dip galvanized steel strip is subjected to humidity for a longer period of time with reduced ventilation, a loose, mat grey to whitish material called white rust forms on the surface. Large area of the strip surface could be attacked particularly when condensation forms and wetness occurs between the sheets or the coil layers.

There is a limited possibility of white rust forming as long as the coils are stored properly.