Steel

Hot-dip coated sheet Z

Product information

thyssenkrupp

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Areas of application

Hot-dip coated sheet Z from thyssenkrupp is a quality sheet protected against corrosion by a firmly adhering zinc coating. The cold rolled sheet is continuously coated by immersion in a bath of molten zinc. Hot-dip galvanized sheets in accordance with DIN EN 10346 are available with different coatings from Z100 to Z600, and in finish types A to C, depending on the intended use.

In the industrial sector, hot-dip galvanized flat rolled products are used in a wide range of components with increased requirements for corrosion protection and surface finish. Areas of application include structural elements in the construction industry, gates and racking structures, ducts in ventilation and air-conditioning technology, washing machines and refrigerators in the household appliances industry, and sections and telescopic rails in the furniture industry. In addition, hot-dip zinc coated sheets serve as a substrates for the coil-coated pladur® products.

Content

Available steel grades

Deep-drawing steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
DX51D	DX51D	●
DX52D	DX52D	●
DX53D	DX53D	●
DX54D	DX54D	●
DX56D	DX56D	●
DX57D	DX57D	●
DX58D	–	●

High-strength IF steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
HX 160	HC160YD	●
HX 180	HC180Y/HX180YD	●
HX 220	HC220Y/HX220YD	●
HX 260	HC260Y/HX260YD	●

Bake hardening steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
BHZ 180	HC180B/HX180BD	
BHZ 220	HC220B/HX220BD	●
BHZ 260	HC260B/HX260BD	●
BHZ 300	HC300B/HX300BD	●

Hot-dip coated structural steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
S220GD	S220GD	●
S250GD	S250GD	●
S280GD	S280GD	●
S320GD	S320GD	●
S350GD	S350GD	●
S390GD	S390GD	●
S420GD	S420GD	●
S450GD	S450GD	●

Work hardening steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
WHZ 300	–	●
WHZ 420	–	●

Micro-alloyed steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
MHZ® 220	–	●
MHZ® 260	HC260LA / HX260LAD	●
MHZ® 300	HC300LA/HX300LAD	●
MHZ® 340	HC340LA / HX340LAD	●
MHZ® 380	HC380LA/HX380LAD	●
MHZ® 420	HC420LA / HX420LAD	●
MHZ® 460	HC460LA / HX460LAD	●
MHZ® 500	HC500LA / HX500LAD	●

● Serial production
Z Hot-dip galvanized

Detailed information on properties, processing and dimensions can be found in our product information at www.thyssenkrupp-steel.com.

Dual-phase steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
DP-K® 290Y490T	HCT490X	●
DP-K® 330Y590T	HCT590X	●
DP-K® 330Y590T DH	–	●
DP-K® 34/60 HF	–	●
DP-K® 420Y590T	–	●
DP-K® 440Y780T	HCT780X	●
DP-K® 440Y780T DH	–	●
DP-K® 590Y980T	HCT980X	●
DP-K® 700Y980T	HCT980XG	●
DP-K® 780Y980T	–	●
DP-K® 900Y1180T	–	●

Retained-austenite steel (TRIP steel)

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
RA-K® 400Y690T	HCT690T	●

Complex-phase steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
CP-W® 660Y760T	HDT760C	●
CP-W® 800	–	●
CP-K® 900Y1180T	–	●

Chassis steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
CH-W® 660Y760T	HDT760C	●

Hot-dip galvanized flat product with very close thickness tolerances

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
scalur®+Z DX51D	DX51D	●
scalur®+Z DX52D	DX52D	●
scalur®+Z S220GD	S220GD	●
scalur®+Z S250GD	S250GD	●
scalur®+Z S280GD	S280GD	●
scalur®+Z S320GD	S320GD	●
scalur®+Z S350GD	S350GD	●
scalur®+Z S390GD	S390GD	●
scalur®+Z S420GD	S420GD	●
scalur®+Z S450GD	S450GD	●
scalur®+Z HX260LAD	HX260LAD	●
scalur®+Z HX300LAD	HX300LAD	●
scalur®+Z HX340LAD	HX340LAD	●
scalur®+Z HX380LAD	HX380LAD	●
scalur®+Z HX420LAD	HX420LAD	●
scalur®+Z HX460LAD	HX460LAD	●
scalur®+Z HX500LAD	HX500LAD	●
scalur®+Z HDT760T	HDT760T	●

Ferritic-bainitic-phase steel

Steel grade	Reference grade DIN EN 10346	Surface finishing Z
FB-W® 300Y450T	HDT450F	●
FB-W® 460Y580T	HDT580F	●

● Serial production
Z Hot-dip galvanized

Tolerances

Dimensional and shape tolerances according to DIN EN 10143.

Detailed information on properties, processing and dimensions can be found in our product information at www.thyssenkrupp-steel.com.

Surfaces

Surface refinements, hot-dip coated

	Specification	Minimum coating two-sided [g/m²]		Coat thicknesses on each side of single spot sample [µm]	
		Triple spot sample	Single spot sample	Range	Typical value
Hot-dip zinc coated					
Designation					
Z100	DIN EN 10346	100	85	5 – 12	7
Z140	DIN EN 10346	140	120	7 – 15	10
Z200	DIN EN 10346	200	170	10 – 20	14
Z225	DIN EN 10346	225	195	11 – 22	16
Z275	DIN EN 10346	275	235	13 – 27	20
Z350	DIN EN 10346	350	300	17 – 33	25
Z450	DIN EN 10346	450	385	22 – 42	32
Z600	DIN EN 10346	600	510	29 – 55	42

Other coatings on request. Tolerances of zinc coating weights are regulated in DIN EN 10346.

Surface finishes

Crystals of different sizes and with different gloss level are formed, depending on the solidification of the hot-dip coating, whether uninfluenced or deliberately influenced. This does not affect the quality of the coating.

Surface finish and surface qualities

	Finish type	Surface quality	
Designation			
Hot-dip coated flat products	Hot-dip zinc coated	A	Normal surface
		B	Improved surface
		C	Best surface

A / B / C as per DIN EN 10346

Surface treatments

Type	
U	Without surface treatment
O	Oiled
C	Chemically passivated
CO	Chemically passivated and oiled
S	Sealed

At the customer's request, hot-dip coated sheets Z can be supplied without surface treatment (untreated, U); this is done under the customer's own responsibility. In this case, thyssenkrupp is not responsible for the corrosion risk (for example white rust formation).

Characteristic features as well as information on warranty periods for surface treatments O, C, CO and S can be found in the brochure "Continuously Hot-Dip Coated Steel Strip and Sheet" (CM095-E): https://www.stahl-online.de/publikationen. Further information can be found in our product information documents covex® T (surface treatment C) as well as covex® S & covex® E (surface treatment S): https://www.thyssenkrupp-steel.com/en/publications.

Technical features

Coating processes

Cold rolling strip[1] undergoes continuously recrystallization annealing as wide strip in a furnace under a protective atmosphere; it is passed through a zinc bath where it is given a zinc coating (hot-dip process) and, depending on requirements, temper-pass rolled, stretch-bend leveled and usually provided with a surface protection.

[1] Use of hot strip possible.

Information on application and processing

Forming

All common forming processes used for cold rolled sheet can be used for hot-dip coated sheets if the die geometry and die surface are matched to these materials. The hot-dip galvanization (coating) of sheets in conjunction with the surface topography exerts a decisive influence on the tribology of the forming process

The characteristic parameter is the friction coefficient μ. At thyssenkrupp Steel, the friction coefficient is determined in the drawing test between plane parallel tools. Compared with uncoated sheet ($0.14 \leq \mu_{KB} \leq 0.18$), hot-dip galvanized sheet has a lower mean friction coefficient ($0.08 \leq \mu_{Z} \leq 0.12$). The scatter band results from the roughness spectrum, which is set in production to customer requirements. When changing over from a different surface finish (coating) to hot-dip galvanized sheet, the blank shape, blankholder forces or the geometry of the drawing bead may have to be adapted to the flow behavior of the material in the flange area. The only exception is the changeover from zinc-aluminum coated galfan® sheet to hot-dip galvanized sheet.

To avoid coating abrasion, which tends to occur more when forming with short cycle times, the die surface must be completely smooth. thyssenkrupp Steel measures abrasion using the draw-bead test. Hot-dip galvanized sheet displays almost comparable measurable abrasion rates (0.2 to 0.8 g/m²) to uncoated sheet on which abrasion can also be measured (0.5 to 1.0 g/m²).

Joining

All thermal and mechanical joining techniques can be used, as can adhesive bonding and sealing. However, the particular properties of the hot-dip zinc coating require the processing parameters for some joining techniques to be adapted from those used for ungalvanized cold rolled sheet. Joining techniques which do not impair the surface, i.e., which preserve the anticorrosion properties of the coating, such as clinching and adhesive bonding are continually gaining in importance. However, resistance spot welding, inert gas, and laser welding remain the most frequently used joining processes. The first of these, in the form of spot, projection and roll seam welding, has largely come to dominate in automobile manufacturing. These processes are easy to automate, cause little surface damage or component distortion and do not require weld fillers.

In comparison with uncoated cold rolled sheet, a higher welding current and higher electrode force must be applied when resistance spot-welding galvanized sheets, as the coating has a lower contact resistance. The higher thermal and mechanical loads and the tendency to electrode pick-up with the zinc coating reduce the tool life in terms of components processed. These factors can be counteracted by the use of a suitable electrode material, e.g. CuCrZr, an adapted electrode geometry and adequate electrode cooling coupled with optimized process control. For example, a stepper control is used to increase the welding current in stages and so considerably increases the number of components that can be processed by a set of electrodes. Milling the electrodes after a specific number of weld points has also proved effective in this respect.

When fusion welding is used, the coating metal in the area of the weld seam burns. A fusion welding process that does not introduce much heat to the weld seam area should therefore be selected in order to produce the minimum possible degradation of the corrosion protection.

Laser welding has proven to be the ideal fusion welding method. A slower welding speed than that used with cold rolled sheet improves degassing of the weld pool and avoids the formation of pores. Fumes containing Zn oxides arise when welding galvanized sheet. The quantity of these fumes is largely determined by the coating thickness and the welding process. Adequate ventilation and extraction is essential in any event. Under unfavorable conditions, e.g., in small rooms, an extraction system should be fitted as close as possible to the source of the welding fumes.

Corrosion protection

The assignment of the protective effect of hot-dip galvanized sheet according to DIN EN 55634-1 to the corrosivity categories/corrosion loads C1 to C5 is given as C2(L) and C2(M) for coating Z100 with a coating thickness of 7 µm and as maximum C3(L) for coating Z275 with a coating thickness of 20 µm. In general, the corrosion protection increases with increasing zinc coating.

Application examples

Hot-dip galvanized pallet racks.

Stamped parts made of hot-dip galvanized sheet.

Hot-dip zinc coated telescopic rails.

Hot-dip galvanized sheet for household appliances.

Special mill grades are supplied subject to the special conditions of thyssenkrupp. Other delivery conditions not specified here will be based on the applicable specifications. The specifications used will be those valid on the date of issue of this product information brochure.

General information

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