CR330Y590T-DP (HCT590X+Z*, HCT600XD, HC340XD**)

Dual-phase steel for cold forming

Material No.	1.0941/1.0996
IMDS	9620804/ 539810688
	51310241*
Materialinformationsblatt	
gemäß	DIN EN 10346 (Okt. 15)/
	DIN EN 10143 (Sept. 06)
	VDA 239-100 (2016)

* steel type designation specific to yield strength

** VDA 239-100 (08/11)

General Information

Dual-phase steel features a (soft) ferrite microstructure, with a matrix containing islands of martensite (increasing yield to tensile strength) in the secondary phase (with propotional volume fraction increase in analogue to tensile strength). It may contains parts of bainite and retained austenite. Dual-phase steel features a low yield to tensile strength ratio, high tensile strength and work hardening rate.

The multiphase steel is also available in xpand® version with a guranteed greater hole expansion. The resistance to crack expansion at the edges is increased to reduce the risk of failure during processing.

The steel melt is produced in an oxygen top blowing process in the converter, and undergoes an alloy treatment in the secondary metallurgy phase. The product is alluminium-killed steel, with high tensile strength achieved by the composition with manganese, chromium and silicon.

A similar forming capacity of microaloyed steel grades is required for plastic forming during processing.

The increase in the yield to strength ratio in the martensitic phase is produced by quenching the hot cold rolled strip before it enters the zinc pot of the hot-dip galvanization unit.

Chemical compositions[1)]

(according to DIN EN, in percent by weight)

	min. in %	max. in %
C		0,15
Si		0,75
Mn		2,50
P		0,040
S		0,015
Altotal	0,015	1,5
Cr + Mo		1,40
Nb + Ti		0,15
V		0,20
B		0,005

(according to VDA, in percent by weight)

	min. in %	max. in %
C		0,15
Si		0,80
Mn		2,50
P		0,050
S		0,010
Al_{total}	0,015	1,5
Cr + Mo		1,40
Nb + Ti		0,15
Cu		0,20
B		0,005

1) Heat analysis

Mechanical properties[2, 3)]

Yield strength $R_{p0,2}$ in MPa	
DIN EN	330 – 430
VDA	330 – 430

Tensile strength R_m in MPa	
DIN EN	≥ 590
VDA	590 – 700

Total elongation A_{80} in %	
DIN EN	≥ 20
VDA	≥ 20

Hardening exponent n	
DIN EN	≥ 0,14
VDA	≥ 0,14

Bake-Hardening BH_2 in MPa	
DIN EN	≥ 30
VDA	≥ 30

2) The characteristic values are valid up to 6 months after supply.

3) Test direction is according to DIN EN and according to VDA in longitudinal direction.

For the xpand® variant, a hole expansion of more than according to ISO16630 of more than 50 % is guaranteed.

Available dimensions[4)]

Thickness in mm	Width in mm
0,50 – 0,70	1.000 – 1.435
0,71 – 0,90	900 – 1.600
0,91 – 2,50	900 – 1.750
2,51 – 3,00	1.000 – 1.450

4) Further dimensions by agreement

Surface finish

Thickness ranges

MB	0,50 – 3,00
MC	by agreement

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Form of delivery

These steel sheet products with increased yield strength are supplied in the form of hot-dip galvanised steel sheet (cold rolled steel sheet carrier material) with a thickness of ≥ 0.70 mm ≤ 3.00 mm, and surface finish MB with Pretex®Texturing in accordance with DIN EN 10346. Delivery is based on conditions to DIN EN 10021, in combination with relevant valid dimensioning standards (DIN EN 10143) or special terms of delivery. The test unit comprises 20 tons, or 20 tons of each new batch of products of the same steel grade and nominal thickness. Strip material is tested in coil form.

The maximum strip width is 1750 mm, as determined by the steel sheet thickness.

Application examples

Galvanised dual-phase steel products were developed for the automotive industry. There is a constantly rising demand in other fields of application.

A special feature of these steel products is their high performance in terms of deflection limiting volume despite their high tensile strength, making the products particularly suitable for the production of components with complex structure.

High strength in the component is achieved by a combination of the work-hardening effect and the bake-hardening effect, which represents a special advantage of dual-phase steels.

The work-hardening effect refers to the increase in strength after the shaping procedure (strain hardening). The bake-hardening effect refers to the increase in strength after the stove-enamel process. Such properties contribute towards the mechanical strength of components, under the aspect of reduced weight.

Value added potentials in terms of weight optimization by means of a reduction of steel sheet thickness were proven in extensive examinations, including an FEM (Finite Element Method) simulation.

Companies processing such steel products must verify compliance of their calculation, construction and processing methods with material requirements. The forming technology deployed must be fit for the purpose, compliant with stateof-the-art, and should be adapted as required.

Our dual-phase steel products can be finished with anti-corrosive / forming aid (prelube oil, hotmelt), including forming aids such as ATP® to suit application requirements.

Dual-phase steel products support all known processes, such as stamping, joining and varnishing techniques. Dual-phase steel products feature an excellent cold forming capability and high yield strength after forming.

The dual-phase steel products described in this document can be welded manually or automatically in any known welding technique. Only the welding wires and electrodes approved as auxiliary welding materials for this group of high-tensile products should be used. A primer for corrosion protection can be used.

Information for processing

Dual-phase steel features a natural aging and tends to heat-aging properties (= bake hardening effect). It is therefore in the interests of the user to process the material in time.

The validity of the mechanical properties are limited to the maximum of 6 months after supply.

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