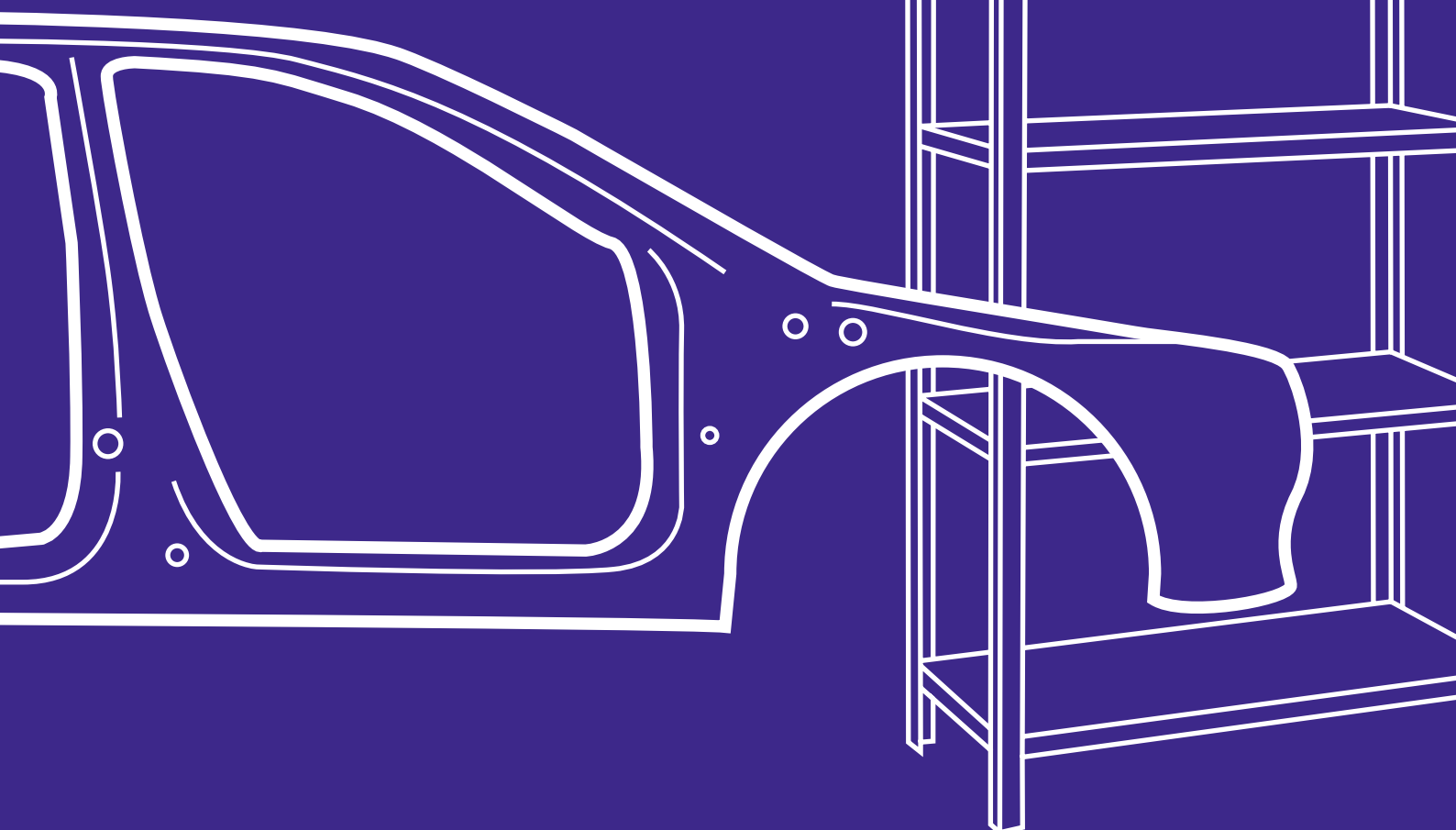
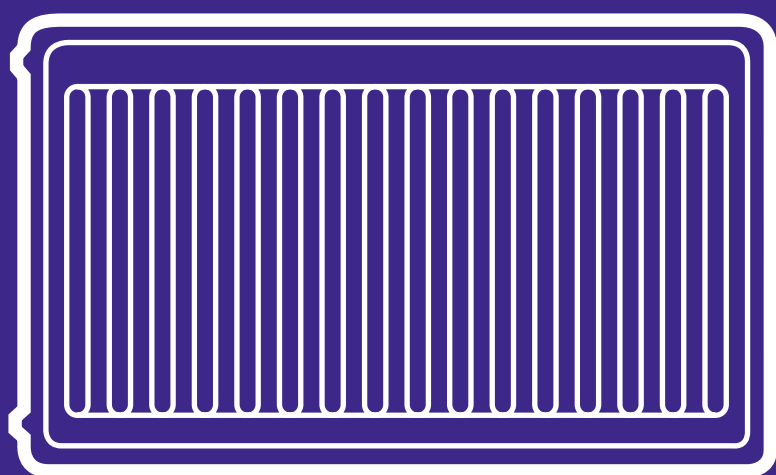


Galvatite hot-dip galvanised steel

Tenform CMN300 high-strength carbon-manganese steel substrate



General

Description

Galvatite with a Tenform CMN300 substrate is characterised by a higher yield strength than the forming qualities of standard mild steels and a low ratio of yield strength to tensile strength. It is available with a zinc coating (Z) or an iron-zinc alloy coating (ZF).

Applications

- Automotive body-in-white structural components
- General engineering

Benefits

The relatively high yield strength of the Tenform CMN300 substrate allows the user to increase the strength of the finished component or to reduce the steel thickness, or both. This property means that the output from each tonne of steel can be increased. Products can be made stronger, lighter and safer under load.

With its low ratio of yield strength to tensile strength, this product has better forming characteristics than ordinary high-strength steels for a given strength. The combination of high strength and formability expands the freedom of design. For example, a single press-formed part can replace two or more welded parts.

Galvatite is recognised for its excellent corrosion resistance, which remains an integral part of the sheet during fabrication and painting, and in service.

Standard and grade

This product is equivalent to JFS A 3011-1998, grade JAC440W.

Basic properties

Mechanical properties

Table 1: Mechanical properties			
Grade	R _{eL} (N/mm ²)	R _m (N/mm ²)	A (%)
JFS JAC440W	≥265	≥440	≥27.0 (A ₅₀)
Tenform CMN300+Z/+ZF	300-400	440-500	≥26.0 (A ₈₀)
Typical properties	327	470	29.0 (A ₈₀)

Notes:

1. The values shown for the mechanical properties are for test pieces taken transverse to the rolling direction.
2. The index of elongation indicates the original gauge length used, expressed in millimetres, e.g. A₅₀ indicates a 50mm gauge length.
3. The mechanical properties of Tenform CMN300 are valid for three months from the date the material is made available by the works.

Chemical composition

Table 2: Chemical composition						
Grade	C	Mn	Si	P	S	Al
Tenform CMN300+Z/+ZF	≤0.18	≤0.9	≤0.02	≤0.025	≤0.015	≥0.02
Typical values	0.165	0.8	0.015	0.015	0.01	0.04

Note: Values are in weight percentages.

Dimensions

Table 3: Dimensions			
Thickness		Width	
>	≤	Min	Max
1.02	1.82	900	1400
1.82	2.01	900	1225

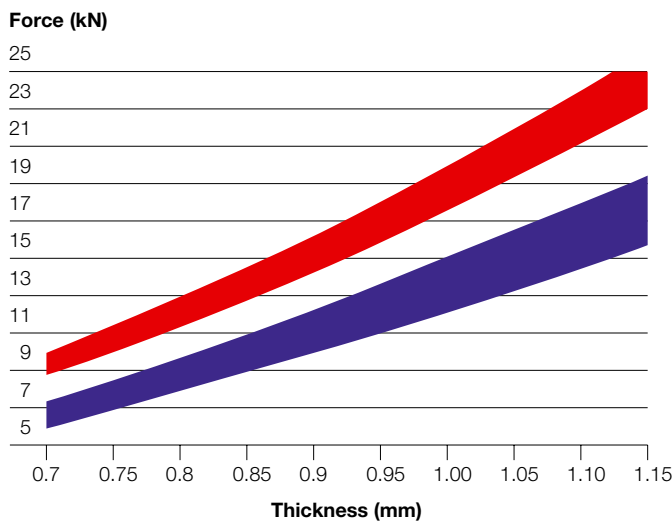
Notes:

1. Widths refer to mill edge. A side-trimmed product is available.
2. For dimensions outside the ranges shown, consult Corus.
3. Dimensions are in millimetres.

Advanced properties

Blanking performance

Figure 1: Limits of theoretical shearing force



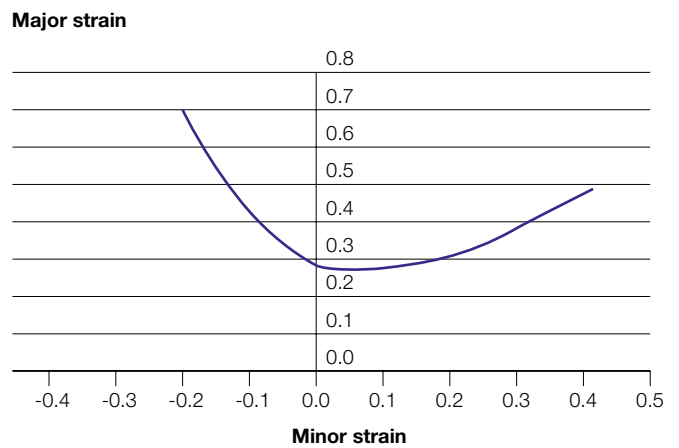
Key

- Tenform CMN300+Z/+ZF
- DX54D+Z/+ZF

Note: Calculated from 2001 plant data (knife angle 0.5°).

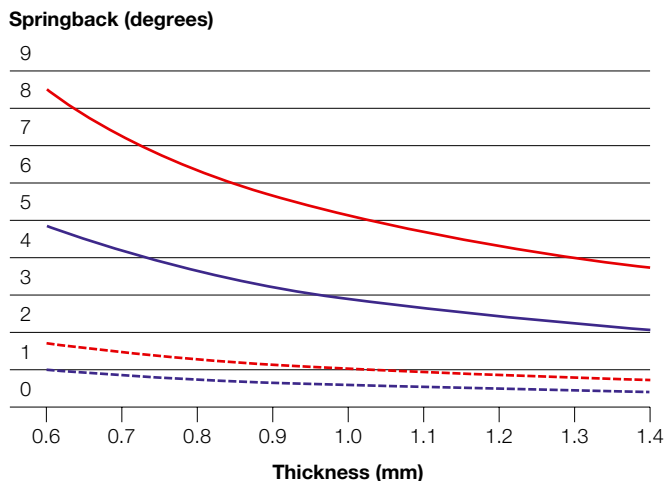
Formability

Figure 2: Forming limit curve for 1.0mm Tenform CMN300+Z/+ZF



Springback

Figure 3: Comparison of theoretical springback for a bending angle of 90°

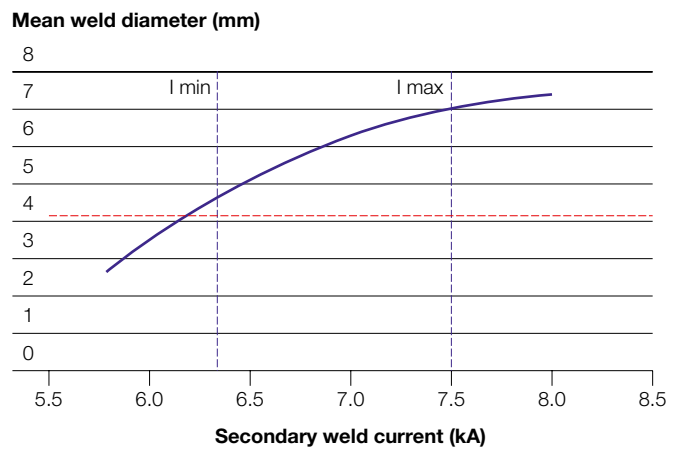


Key

- 10mm bend radius:
- Tenform CMN300+Z/+ZF
 - DX54D+Z/+ZF
- 2mm bend radius:
- Tenform CMN300+Z/+ZF
 - DX54D+Z/+ZF

Spot welding

Figure 4: Weld growth curve for 1.4mm Tenform CMN300+Z/+ZF



Key

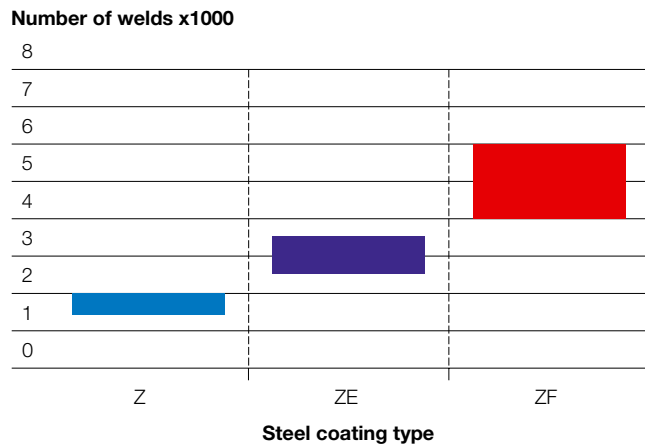
- Welding range, 3.5√t to splash=1.2kA
- Dmin=3.5√t=4.14mm

Note: The curve is calculated on the basis of ISO 14373.

Table 4: Mechanical properties of the spot weld in figure 4

Grade	General			Lap Shear	Cross tension		
	Thickness	Welding range 3.5vt-splash	Max weld size	Failure strength 5vt	Failure mode	Failure strength 5vt	Failure mode
	(mm)	(kA)	(mm)	(kN)		(kN)	
Tenform CMN300+Z/+ZF	1.4	1.2	7.7	12.9	Plug	8.0	Plug

Note: Material thickness, t, is in millimetres.

Figure 5: Electrode life for different types of steel coating**Key**

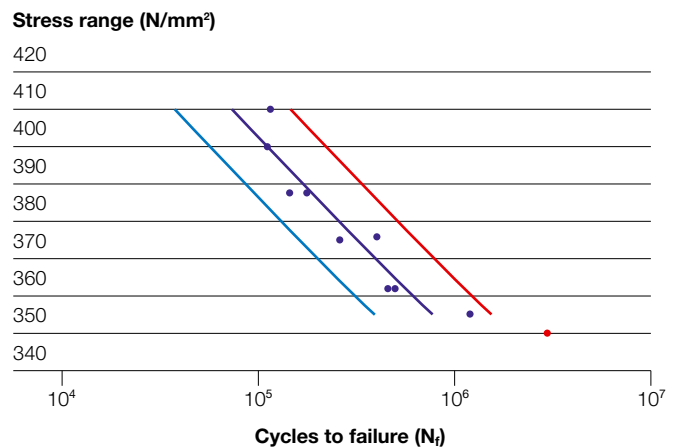
- (Z) Hot-dip galvanised steel: 140g/m² pure zinc coating mass (10µm).
- (ZE) Electrogalvanised steel: 7.5µm coating thickness.
- (ZF) Hot-dip iron-zinc alloy coated steel: 140g/m² (10µm).

Note: Laboratory tests of 0.8mm mild steel, 5mm tip diameter, 1.8kN force.

High strain rate properties**Table 5: Strain rate values****1.2mm Tenform CMN300+Z/+ZF**

Strain rate	R _{p0.2}	R _m (max)
(1/s)	(N/mm ²)	(N/mm ²)
0.001	331	462
100	483	589

Note: Strain rate values were calculated using Bergström law.

Fatigue**Figure 6: SN fatigue curves for Tenform CMN300+Z/+ZF****Key**

- Data point Tenform CMN300+Z/+ZF
- Runout Tenform CMN300+Z/+ZF
- Fitted curve: $D_s = 820.57x^{-0.0617}$
- 1% certainty of survival: $D_s (1\%) = 856.1x^{-0.0617}$
- 99% certainty of survival: $D_s (99\%) = 786.51x^{-0.0617}$

Note: Curves were determined using uniaxial high-cycle fatigue testing with a ratio of maximum load to minimum load (R value) of -1.

Health and safety

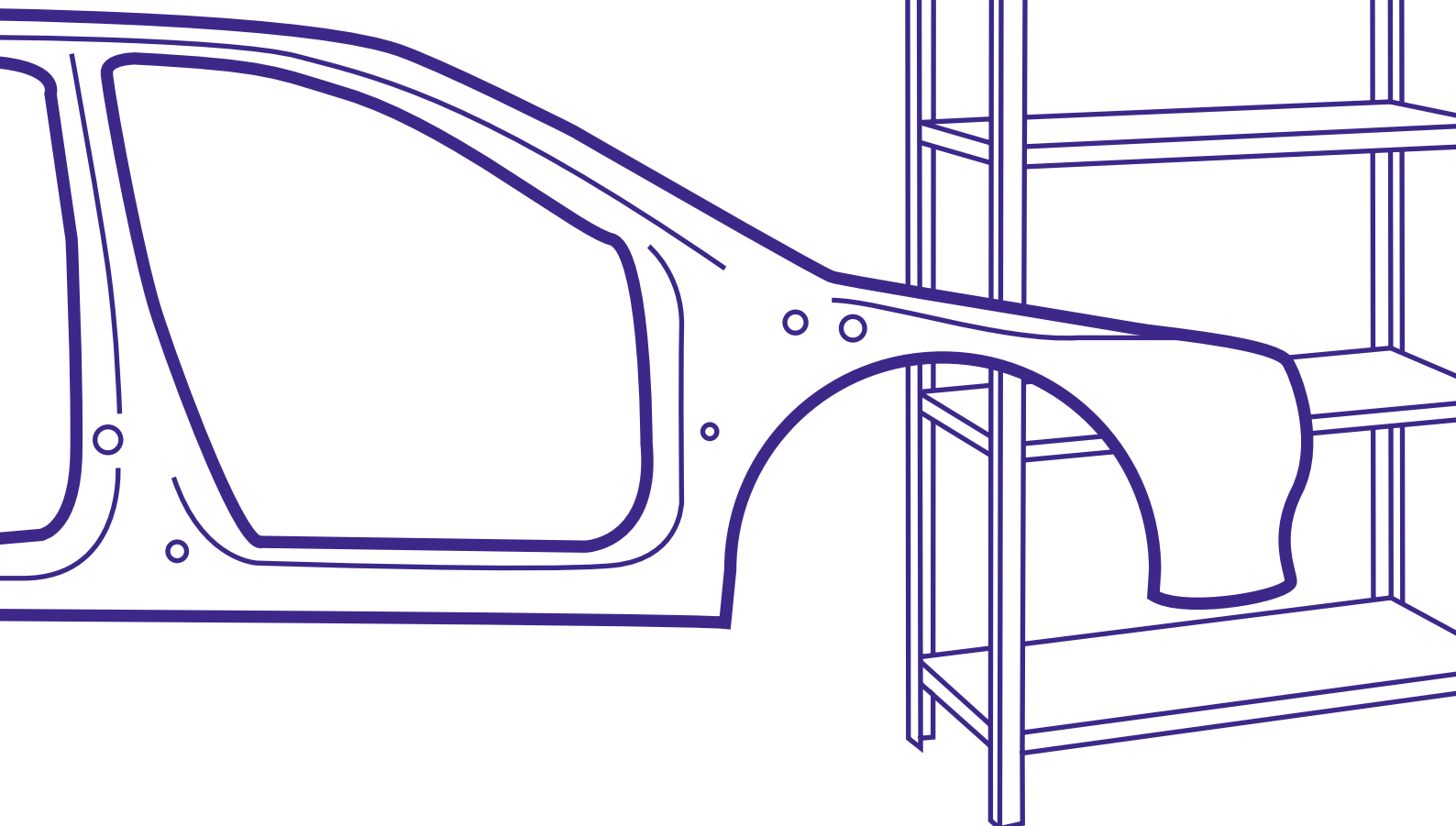
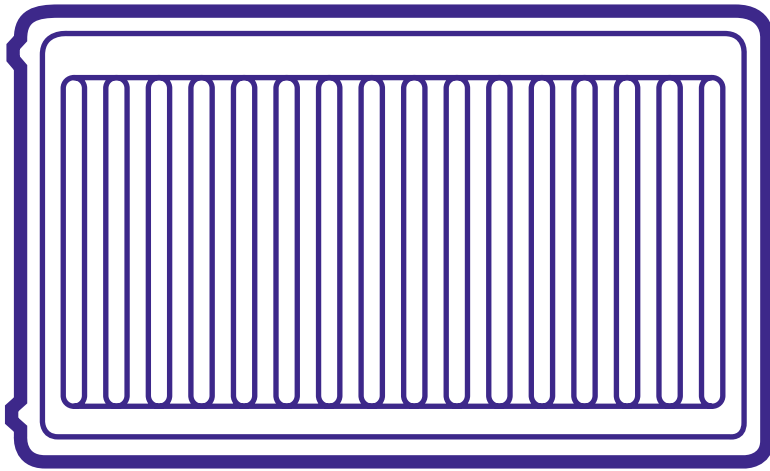
Tenform CMN300 and Galvatite are covered by Product Health and Safety Data Sheets 16a and 18 respectively.

More information

For more information about this product, contact Corus at the address on the back cover.

Galvatite on Tenform CMN300

Increase the strength of components or reduce their thickness, or both, gain extra output from each tonne of steel, and improve forming characteristics.



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