ArcelorMittal

Steels for cold stamping -Fortiform®

Extract from the product catalogue -European edition

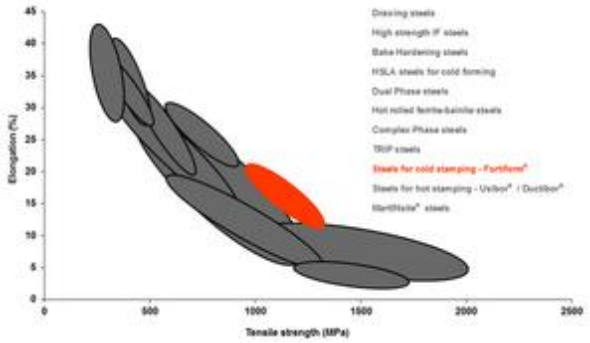
Note: Information contained in this catalogue is subject to change.
Please contact our sales team whenever you place an order to ensure that your requirements are fully met.
Please contact us if you have a specific requirement that is not included in the range of products and services covered by this catalogue.
We are also reachable by the e-mail address automotive.request@arcelormittal.com.

Steels for cold stamping -Fortiform®

Ultra high strength steels

Description

The family of Fortiform® steels extends ArcelorMittal's range of Ultra High Strength Steels (UHSS). These steels allow the realization of lightweight structural elements by a cold forming method such as stamping. These Ultra High Strength Steels of third generation are used to provide additional weight reduction thanks to their higher mechanical properties than conventional Advanced High Strength Steels (AHSS) while keeping the same formability.



Position of Fortiform® steels in the ArcelorMittal steel range

Applications

Thanks to their excellent mechanical properties, these grades are particularly suitable for automotive safety parts for crash resistance. Typical parts are shown in the figure below:

Typical parts for Fortiform® steels

Designation and standard

	Euronorms	VDA 239-100
Fortiform® 980		
Fortiform® 1050		CR700Y980T-DH(-UNC,-EG)
Fortiform® 1180		

Euronorms

VDA 239-100

The above indicative table summarizes the European and VDA standards corresponding to the ArcelorMittal product range.

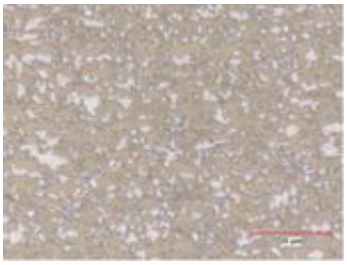
Technical characteristics

Mechanical properties

Guaranteed for 20x80 mm ISO specimen of uncoated sheet
ST -Transverse direction (perpendicular to the rolling direction) / SL -Rolling direction

	YS (MPa)	UTS (MPa)	e_r (%) L_0 = 80 mm th < 3 mm	Direction
Fortiform® 980	600 -750	980 -1130	≥ 19	SL
Fortiform® 1050	700 -820	1050 -1180	≥ 14	SL
Fortiform® 1180	850 -1060	1180 -1330	≥ 13	SL

* The guarantees for this grade are subject to change.



Fortiform® 1050 microstructure

Chemical Composition (%)

	C Max	Mn Max	Si Max
Fortiform® 980	0.23	2.3	2
Fortiform® 1050	0.23	2.3	2
Fortiform® 1180	0.23	2.3	2

Available coatings and Worldwide availability

	Uncoated					Electrogalvanized					Extragal®					Zagnelis®				
	EUR	NAM	SAM	RSA	CHI	EUR	NAM	SAM	RSA	CHI	EUR	NAM	SAM	RSA	CHI	EUR	NAM	SAM	RSA	CHI
Fortiform® 980	■	■				■	■				■	■								
Fortiform® 1050	■					■					■									
Fortiform® 1180	■	■				■	■				■	■								

■ Available in non-visible part quality ■ Undergoing customer testing ■ Under development ■ Available in visible and non-visible part quality (Z)

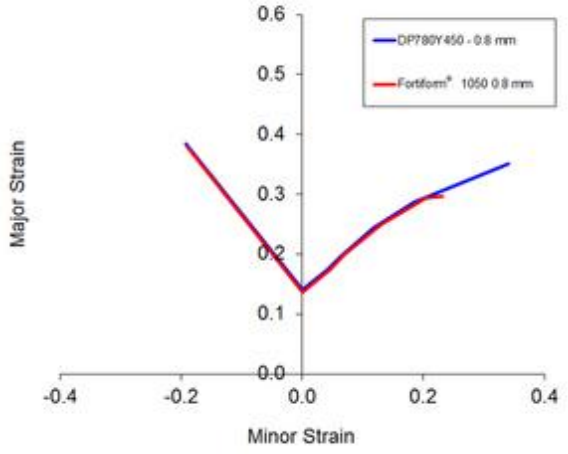
EUR : Europe Region -NAM : North America Region -SAM : South America Region -RSA : South Africa Region -CHI : China

X available /O under development
Please contact us for products under development.

Recommendations for use and secondary processing

Forming

Fortiform® steels exhibit very good ductility compared with their level of tensile strength.
The figure below shows an example of forming limit curve for Fortiform® 1050 steel 0.8 mm thick. This shows the same formability of Dual Phase 780 steel with lower strength.



Welding

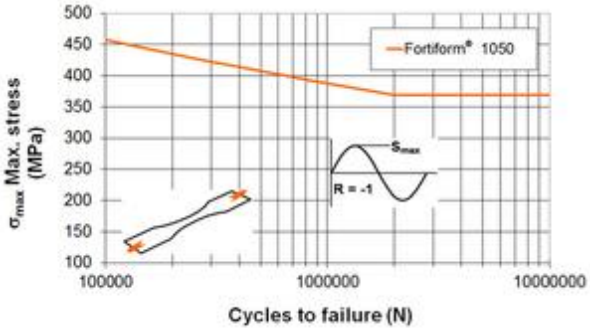
Resistance Spot Welding

Fortiform® steels are weldable with conventional processes by adapting the parameters.
Given the increase of the carbon equivalent, it is necessary to increase welding force and adapt welding cycles to get good quality of spotweld.
For information, here is an example of welding data on Fortiform® 1050 EG steel tested in homogeneous combination according to ISO 18278-2 standard:

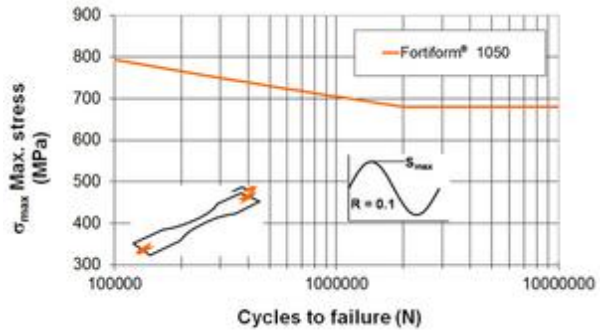
	Coating	Thickness (mm)	Max. intensity (kA)	Nugget diameter (mm)	Tensile-shear (kN)
Fortiform® 1050	Electrogalvanized	0.8	8.2	6	10

Fatigue

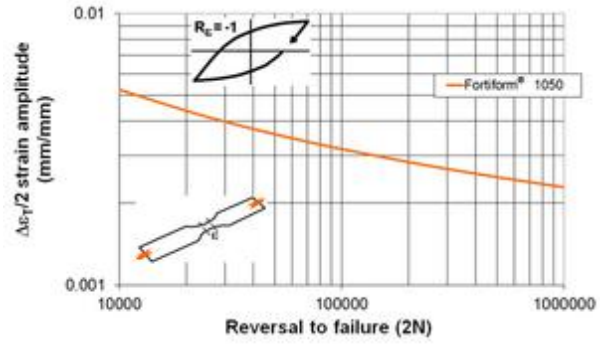
Fortiform® steels exhibit good fatigue properties. The table below gives examples of Wöhler curves for Fortiform® 1050. The curves plot maximum stress versus number of cycles to failure. They are calculated for two loading ratios: tension-compression R=-1 and tension-tension R=0.1.



Wöhler curves or S-N curves for Fortiform® 1050 steel



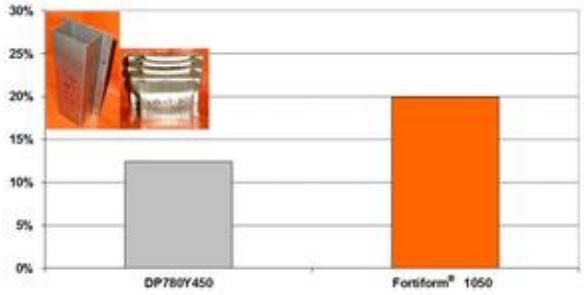
The graph below shows the low cycle or EN curves for the same steels. These are expressed as strain amplitude versus number of reversals (one cycle equals two reversals). Other high and low cycle fatigue data are available on request.



ArcelorMittal can provide a full database on the fatigue performance of Fortiform® steels.

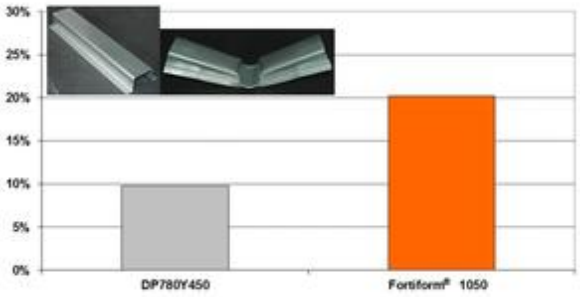
Impact strength

As a result of their very high tensile strength, Fortiform® 1050 steel is particularly suitable for parts designed to absorb energy in an impact. Fortiform® 1050 steel has been characterized in dynamic axial compression tests using an omega structure with a spot-welded closure plate at an impact velocity of 56 kph. These tests have demonstrated the very good impact behavior of these steels.



Mass reduction potential compared to that of an HSLA 380 steel (reference)

Complex Phase steels have been characterized in the 3-point bending test using top hat cross-section specimens impacted at 30 kph. The tests showed very good behavior of these steels.



Mass reduction potential compared to that of an HSLA 380 steel (reference)