

Docol 1000 LCE

Cold-rolled ultra-high strength DP steel with excellent weldability

Product

Docol 1000 LCE (LCE= Low Carbon Equivalent) is a cold-rolled ultra-high strength dual phase steel. The low carbon content means that the steel has excellent welding properties. Docol 1000 LCE also offers increased drawability. The steel is a dual phase steel subjected to a special heat treatment in the continuous annealing line, which produces a two-phase structure in which the ferrite imparts unique forming properties and the martensite accounts for the strength. The steel is also available with an electro galvanized surface.

Typical applications for Docol 1000 LCE are components in cars including door beams and B-pillars as well as cross-members and seat parts.

Dimension range

Thickness: 0.50 - 2.10 mm

Width: max 1500 mm

Tolerances

The Docol 1000 LCE is supplied with tolerances in accordance with EN 10131.

Mechanical properties

Steel grade	Yield strength $R_{p0.2}$ or R_{el} MPa min - max	Tensile strength R_m MPa min - max	Elongation A_{80} % min	Inside radius for 90°
Docol 1000 LCE	700 - 950	1000 - 1200	7	2 x thickness

Chemical composition

(typical values and CE max)

Steel grade	% by mass							
	C	Si	Mn	P	S	Al	Nb	CE* max
Docol 1000 LCE	0.13	0.2	1.0	0.015	0.002	0.04	0.015	0.24

* CE = C+Mn/20+Si/30+2P+4S

Forming

Docol 1000 LCE is meant for cold forming and can be formed in a traditional way.

Bending

Docol 1000 LCE has good bendability. At advanced bending it is important if possible to bend transverse to the rolling direction, where the bendability is somewhat better than in the longitudinal direction.

Roll forming

Roll forming is very suitable for Docol 1000 LCE and this also permits smaller radii compared to bending.

Pressing

The high work hardening of Docol 1000 LCE results in good stretchability and formability. Docol 1000 LCE can be formed just like other steel grades of the same strength level.

Shearing and Punching

When shearing and punching Docol 1000 LCE it is important to use the right cutting clearances. Factors ruling this are sheet thickness, strength and the demand on the cut surface shape. A cutting clearance of 10-12% of sheet thickness is recommended for Docol 1000 LCE.

Welding

Docol 1000 LCE has very good welding properties. The reason is that the steel has a lean steel composition with a very low carbon equivalent. All common welding methods can be used for Docol 1000 LCE e.g. resistance spot welding, HF welding and different fusion welding methods.

Docol 1000 LCE has excellent resistance spot welding properties. Due to the low carbon equivalent of the steel full plug failures are always obtained e.g. when peel and cross tension testing are conducted. Full plug failure is the failure mode which is always aimed for in the automotive industry. Wide welding current ranges are obtained for this steel. The best result is achieved if the electrode force is somewhat increased compared to what is normally used for mild steels. Docol 1000 LCE can be welded using the same weld times as with conventional steels. A slightly longer weld time can be recommended. Despite the low carbon equivalent the strength of the spot weld is high.



Docol 1000 LCE with full plug failure.

Laser welding can be used for Docol 1000 LCE. Typical for laser welding is the very fast cooling rate and for such methods it is very beneficial to use a steel with a low carbon content as for example Docol 1000 LCE.

For Docol 1000 LCE all common arc welding methods can be used e.g. gas metal arc welding (GMAW), TIG welding and plasma welding. The same shielding gases can be used for Docol 1000 LCE as for conventional mild steels. For GMAW a filler metal of high strength is recommended e.g. "AWS: A5.28 ER 10XS-X". If the weld can be placed in an area of low stresses also filler metals of lower strength can be utilized.

Technical service and information

Our Knowledge Service Center will be pleased to assist with additional information concerning this product from SSAB.

The particulars in this data sheet are correct at the time of going to print and are intended to give general guidance for the use of the product. Subject to changes arising from continual product development. The information and data must not be regarded as guaranteed values, unless specially confirmed in writing.

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