

High-strength steel

Cold-rolled high-strength steel is available in Corus' own Tenform grades and to European and specific national standards.

High-strength steel allows the user to increase the strength of the finished component or reduce the steel thickness, or both.

Tenform grades

Cold-rolled Tenform is available in high-strength low-alloy grades (Tenform CXK) and in a carbon-manganese grade (Tenform CMN).

Tenform CXK is cold-rolled high-strength low-alloy steel which combines high strength with improved formability for less difficult cold-formed applications that require steels with good surface finish and impact resistance.

Tenform CMN combines high strength with excellent formability for the most difficult cold-forming applications.

Other high-strength steel grades

Corus can also supply cold-rolled high-strength low-alloy steel grades to comply with EN 10268 : 1999 and high-strength rephosphorised steel grades to meet the German SEW 094 : 1987 standard.

Table 18: Standard

Tenform CXK
Grade
CXK300
CXK350

Table 20: Standards

European	Germany
EN 10268 : 1999	SEW 093
Grade	
H240LA	ZSt E260
H280LA	ZSt E300
H320LA	ZSt E340
H360LA	ZSt E360

Typical applications

- automotive suspension components
- internal structural parts
- welded tube

Standards

Tenform grades

Tenform CXK is available in the grades shown in table 18 below.

Tenform CMN is available in the grade shown in table 19 below.

High-strength low-alloy steel

Corus offers cold-rolled high-strength low-alloy steel to EN 10268 : 1999 as shown in table 20 below. A former national standard and nearest related grades are also shown in the table.

High-strength rephosphorised steel

Corus offers cold-rolled high-strength rephosphorised steel to comply with SEW 094 : 1987 in the grades shown in table 21 below.

Table 19: Standard

Tenform CMN
Grade
CMN300

Table 21: Standard

Germany
SEW 094 : 1987
Grade
ZSt E220P
ZSt E260P

Mechanical properties

Tenform grades

The values shown for the mechanical properties in tables 22 and 23 below are for skin-passed material and are for test pieces taken in the rolling direction.

High-strength low-alloy steel

The values shown for the mechanical properties in table 24 below are for skin-passed material and are for test pieces taken in the rolling direction.

High-strength rephosphorised steel

The values shown for the mechanical properties in table 25 below are for test pieces taken transverse to the rolling direction.

Table 22: Mechanical properties: Tenform CXK

Grade	R _p (N/mm ²)	R _m (N/mm ²)	A ₈₀ (%)
	Min-max	Min-max	Min
CXK300	300-450	400-550	22
CXK350	350-500	430-580	20

Table 23: Mechanical properties: Tenform CMN

Grade	R _p (N/mm ²)	R _m (N/mm ²)	A ₈₀ (%)
	Min-max	Min-max	Min
CMN300	280-360	440-500	26

Table 24: Mechanical properties: EN 10268 : 1999

Grade	R _p (N/mm ²)	R _m (N/mm ²)	A ₈₀ (%)
	Min-max	Min	Min
H240LA	240-310	340	27
H280LA	280-360	370	24
H320LA	320-410	400	22
H360LA	360-460	430	20

Table 25: Mechanical properties: SEW 094 : 1987

Grade	R _p (N/mm ²)	R _m (N/mm ²)	A ₈₀ (%)	Bend test mandrel diameter
	Min-max	Min-max	Min	Min
ZSt E220P	220-280	340-420	30	0t
ZSt E260P	260-320	380-460	26	0t

Note: Material thickness, t, is in millimetres.

Chemical composition

Tenform grades

Tenform CXK meets the requirements of the cast analysis as shown in table 26 below.

Tenform CMN meets the requirements of the cast analysis shown in table 27 below.

High-strength low-alloy steel

Cold-rolled high-strength low-alloy steel meets the requirements of the cast analysis in the standard, as shown in table 28 below.

High-strength rephosphorised steel

Cold-rolled high-strength rephosphorised steel meets the requirements of the cast analysis in the standard, as shown in table 29 below.

Dimensions

The width and thickness limits are shown in table 30 on page 45. The minimum width is 750mm for all products except CMN300, which has a minimum width of 900mm.

Table 26: Chemical composition: Tenform CXK

Grade	C	Mn	Si	P	S	Nb+V+Ti
	Max	Max	Max	Max	Max	Max
CXK300	0.10	1.20	0.50	0.025	0.020	0.30
CXK350	0.10	1.20	0.50	0.025	0.020	0.30

Note: Values are in weight percentages.

Table 27: Chemical composition: Tenform CMN

Grade	C	Mn	Si	P	S
	Max	Max	Max	Max	Max
CMN300	0.18	0.90	0.02	0.025	0.012

Note: Values are in weight percentages.

Table 28: Chemical composition: EN 10268 : 1999

Grade	C	Mn	Si	Al	P	S	Nb	Ti
	Max	Max	Max	Min	Max	Max	Max	Max
H240LA	0.10	0.60	0.50	0.015	0.025	0.025	0.090	0.15
H280LA	0.10	0.95 ¹	0.50	0.015	0.025	0.025	0.090	0.15
H320LA	0.10	1.10 ¹	0.50	0.015	0.025	0.025	0.090	0.15
H360LA	0.10	1.65 ¹	0.50	0.015	0.025	0.025	0.090	0.15

Notes:

1. These values do not conform to EN 10268 : 1999.
2. Values are in weight percentages.

Table 29: Chemical composition: SEW 094 : 1987

Grade	C	Mn	Si	Al	P	S
	Max	Max	Max	Min	Max	Max
ZSt E220P	0.075	0.70	0.500	0.020	0.080	0.030
ZSt E260P ¹	0.080	0.70	0.500	0.020	0.100	0.030

Notes:

1. %C + %P ≤ 0.16
2. Values are in weight percentages.

Table 30: Dimensions : Tenform CXK, Tenform CMN, EN 10268 : 1999, SEW 094 : 1987

Thickness		Width						
		CXK300 CXK350	CMN300	H240LA	H280LA	H320LA	H360LA	ZSt E220P ZSt E260P
>	≤	Max	Max	Max	Max	Max	Max	Max
0.45	0.50	–	–	–	–	–	–	1400
0.50	0.60	–	–	–	–	–	–	1500
0.60	0.70	1300	–	1450	–	–	–	1800
0.70	0.75	1300	1370	1450	1500	1432	–	1800
0.75	0.90	1300	1370	1550	1500	1432	–	1800
0.90	1.00	1300	1370	1600	1500	1432	–	1800
1.00	1.10	1300	1400	1600	1550	1432	–	1800
1.10	1.25	1300	1400	1700	1550	1523	–	1800
1.25	1.50	1300	1400	1700	1600	1600	1090	1800
1.50	1.60	1300	1400	1700	1600	1600	1330	1800
1.60	1.75	1300	–	1700	1600	1600	1330	1800
1.75	2.00	1300	–	1600	1500	1500	1500	1800
2.00	2.25	–	–	1600	1500	1500	1500	1800
2.25	2.45	–	–	1500	1200	1200	1200	1800
2.45	2.50	–	–	1500	1200	1200	1200	1600
2.50	2.60	–	–	1500	1100	1100	1100	1600
2.60	2.70	–	–	1500	–	–	–	1600
2.70	2.75	–	–	1500	–	–	–	1400
2.75	3.00	–	–	1400	–	–	–	1400
3.00	3.10	–	–	–	–	–	–	1250

Notes:

1. The minimum width is 750mm for all products except CMN300, which has a minimum width of 900mm.
2. Dimensions are in millimetres.