STRUCTURAL STEEL

Extra high strength.
A true fact.

LÁMINA Y PLACA COMERCIAL

VILLACERO | PLANOS, LARGOS Y TRANSFORMACIÓN

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Extra high strength Optim™ MC structural steel grades offer excellent bendability, weldability and cutting properties. Lightened structures mean increased payloads for machines and equipment, reduced fuel consumption, environmentally sound construction and sustainable development. Surface quality and dimensional and geometrical accuracy are guaranteed.

Optim MC is a thermomechanically rolled (M), cold formable (C) structural steel which meets and exceeds the requirements of EN 101492.

Estimate fuel savings with energy calculator.

APPLICATIONS:

- Frame structures for mobile vehicles
- Superstructures of commercial vehicles
- Frames and booms for forestry vehicles
- Crane arms and other lifting equipment
- Load handling equipment
- Masts

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DATA SHEET

CUT LENGTHS WITH MILL EDGES

RUUKKI OPTIM™	THICKNESS INCH	WIDTH INCH [1)]	LENGTH INCH [1)]
Optim 500 MC	0.078″ - 0.437″	39.37″ - 70.86″	6.5´ - 42.5´
Optim 550 MC	0.087″ - 0.394″	39.37″ - 64.56″	6.5´ - 42.5´
Optim 600 MC	0.087″ - 0.394″	39.37″ - 64.56″	6.5´ - 42.5´
Optim 650 MC	0.098″ - 0.394″	39.37″ - 64.56″	6.5´ - 42.5´
Optim 700MC / 100XF	0.118″ - 0.394″	39.37″ - 61.02″	6.5´ - 42.5´
Optim 700 MC / 100 XF Plus	0.236″ - 0.472″	39.37″ - 60.03″	6.5´ - 39.4´

1) Exact maximum width and length depend on the thickness.

Moreover, Optim MC steels are also available as coils and slit strips. Pickled products are available on a limited dimensional range.

TOLERANCES

TOLERANCES ON DIMENSIONS AND SHAPES

The dimension and shape tolerances conform with, and in part exceed, EN 10051 requirements. Flatness of cut lengths is 3 mm/m. Optim MC cut lengths are delivered with the Dead Flat guarantee.

SURFACE QUALITY

Cut lengths, coils and slit strips are available in asrolled or pickled condition. Some dimensional limitations exist for pickled products.

PROPERTIES

MECHANICAL PROPERTIES: Tensile test

OPTIM MC STEELS. TENSILE TEST, LONGITUDINAL TESTING

STEEL GRADE	THICKNESS MM	YIELD STRENGTH	TENSILE STRENGTH	ELONGATION % MINIMUM% MÍNIMO	
Ruukki Optim		ReH o Rp0,2 MPa Mín.	Rm MPa	A_{80} [1)]	A
Optim 500 MC	2 - 12	500	550 - 700	14	18
Optim 550 MC	2,2 - 10	550	600 - 760	13	17
Optim 600 MC	2,2 - 10	600	650 - 820	12	16
Optim 650 MC	2,5 - 10	650 [2)]	700 - 880	12	14
Optim 700 MC	3 - 10	700 [2)]	750 - 950	NA	13
Optim 700 MC Plus	3 - 12	700 [2)]	750 - 950	NA	13

Yield and tensile strength are tested longitudinally to the rolling direction, and guaranteed both in the longitudinal and transverse directions.
1) Elongation A80 is used for thickness below 3 mm.
2) For thickness >8 mm, the minimum yield strength can be 20 MP a lower, according to EN 101492.

MECHANICAL PROPERTIES: impact strength test

OPTIM MC STEELS. IMPACT STRENGTH, LONGITUDINAL TESTING

Ruukki Optim	Espesor en mm	Ancho mm [1]
500/550/600/650 MC	-20°C 40 J mínimo	40°C 27 J mínimo
700 MC / 100 XF [1]	-20°C 40 J mínimo	40°C 27 J mínimo
700 MC / 100 XF Plus [2]	-60°C 40 J mínimo	NA

The requirement value 40 J means tests carried out with 10 x 10 longitudinal standard test pieces. When testing thicknesses less than 10 mm, the width of the test pieces corresponds with the strip thickness and the requirement values decrease in direct relation to the surface area of the test piece. No impact tests are carried out for thicknesses less than 6 mm.

CHEMICAL COMPOSITION

	CONTENIDO % (ANÁLISIS DE LA COLADA)					
Ruukki Optim	C Maximum	Si Maximum	Mn Maximum	P Maximum	S Maximum	Al Maximum
Optim 500 MC	0,10	0,20	1,50	0,020	0,010	0,015
Optim 550 MC	0,10	0,20	1,70	0,020	0,010	0,015
Optim 600 MC	0,10	0,20	1,90	0,020	0,010	0,015
Optim 650 MC	0,10	0,20	2,00	0,020	0,010	0,015
Optim 700 MC / 100 XF	0,10	0,20	2,10	0,020	0,010	0,015
Optim 700 MC / 100 XF Plus	0,10	0,25	2,10	0,020	0,010	0,015

In addition, niobium (Nb), vanadium (V), titanium (Ti), boron (B), molybdenum (Mo), nickel (Ni) or copper (Cu) may be used as alloying elements either singly or in combination.

CARBON EQUIVALENT VALUES (CEV)

CEV = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15

RUUKKI OPTIM	CEV AVERAGE	CEV MAXIMUM
Optim 500 MC	0,32	0,36
Optim 550 MC	0,33	0,38
Optim 600 MC	0,34	0,41
Optim 650 MC	0,35	0,41
Optim 700 MC / 100 XF	0,37	0,41
Optim 700 MC / 100 XF Plus [1]	0,37	0,40
Optim 700 MC / 100 XF Plus [2]	0,40	0,44

1) In the thickness range of 3 10 mm CEV average is 0.37 and maximum is 0.40.
2) In the thickness range of (10) 12mm CEV average is 0.40 and maximum is 0.44.

PREFABRICATION SERVICES

WIDE FLATS

Wide flats are components which are ready for assembly. They are dimensionally accurate speeding up the manufacture and assembly of steel structures and, avoiding wasting material. Thanks to the extensive range available, steel grades best suited for the application in question can be used.

PRECISION CUT LENGTHS

Precision cut lengths with a bevelled edge are components that can be delivered directly to the installation site, which saves time and reduces transport and storage costs. The dimensionally accurate groove ensures uninterrupted automated welding and fitting.

PROCESSING INSTRUCTIONS

WELDING

The weldability is excellent and all the common welding processes can be used. Preheating is not necessary under normal conditions. A narrow heat affected zone (HAZ) with a somewhat lower strength is formed immediately adjacent to the weld. The softening tendency can be limited by avoiding unnecessarily high heat input during welding. In applications where high strength is required, the welded joints should be placed in the less stressed locations. So, the effect of welds on the structure will be minimised. Matching welding materials are recommended when high strength of the weld is needed. Alternatively, undermatching consumables may be used if the weld is located in a less stressed part of the structure.

CUTTING

Optim MC steels can be cut easily by using thermal methods such as flame, plasma and laser cutting. Mechanical cutting can also be applied, but attention must be paid to the stiffness of the equipment, blade condition and clearance, and support of the work piece.

BENDING

Optim MC. Minimum permissible bend radius, bend angle 90°, in all directions

RUUKKI OPTIM	THICKNESS (MM)			
	t ≤ 3	3 < t ≤ 6	6 < t ≤ 10	t > 10
	Radio deMinimum permissible inside bend radius			
Optim 500 MC	0,6xt	0,8xt	1xt	1xt
Optim 550 MC	0,8xt	1xt	1,2xt	NA
Optim 600 MC	0,9xt	1,2xt	1,3xt	NA
Optim 650 MC	1xt	1,3xt	1,5xt	NA
Optim 700 MC / 100 XF	1,2xt	1,4xt	1,8xt	NA
Optim 700 MC / 100 XF Plus	1xt	1xt	1xt	1,5xt

HEAT TREATMENT

If relieving of residual stresses is required, Optim MC steels may be annealed at temperatures of +530°C to +580°C. Heating the steel to temperatures higher than +580°C reduces its strength.

HEAT TREATMENT	TEMPERATURE °C	TREATMENT TIME AND MANNER OF COOLING
Stress relieving	+530 °C – +580 °C (Objetivo: +560 °C)	2 minutes/millimetre thickness, minimum 30 minutes Slow cooling in furnace

Too high temperature and long treatment time may weaken mechanical properties.

HOTDIP GALVANISING

Optim MC steels can be hotdip galvanised.

ORDER & DELIVERY

INSPECTION DOCUMENT

Inspection documents are in accordance with EN 102043.1.

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