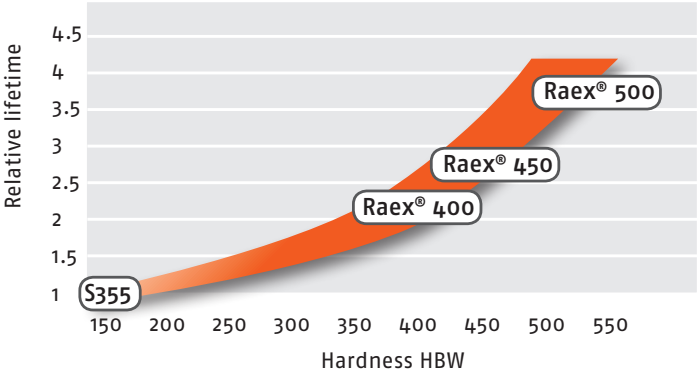
RUUKKI
LIVING. WORKING. MOVING.

RAEX® 400, RAEX® 450 AND RAEX® 500 WEAR-RESISTANT STEEL GRADES

RAEX® – IMPROVING LIFETIME [1)]



SAFETY AT WORK

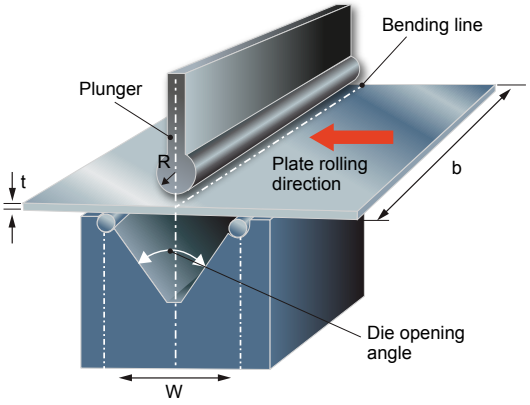
The safety instructions must be adhered to in detail in all workshop processing of wear-resistant steels.

[1)] As a reference, an ordinary S355 structural steel.

STANDARD VALUES FOR FREE BENDING AND FLANGING. THICKNESS ≤ 20 mm

Ruukki Raex	Minimum inside bending radius Plate thickness = t mm		Springback Degree	Gap width / plate thickness W/t		Bending to 90° V groove W/t
	Transverse[1)]	Longitudinal[1)]		Transverse[1)]	Longitudinal[1)]	
Raex 400	3 x t	4 x t	9° – 13°	9	11	~15
Raex 450	4 x t	5 x t	9° – 14°	11	13	~15
Raex 500	5 x t	6 x t	10° – 15°	13	15	~15

[1)] Bending line position vs. rolling direction of the plate. It is recommended to do flanging in a single pass.
It is recommended to consult Ruukki Technical Support when bending of Raex 500 or plates thicker than 20 mm.



BENDING FORCE (F, NEWTON) IN FLANGING

$$F = 1.6 \cdot \frac{R_m \cdot b \cdot t^2}{W}$$

R_m = Raex 400/450/500 ~ 1250/1450/1600 N/mm²
b = Bending length, mm
t = Plate thickness, mm
W = Die gap, mm
(R = Plunger radius)

UNDERMATCHING FERRITIC WELDING CONSUMABLES. YIELD STRENGTH ~ 500 MPA

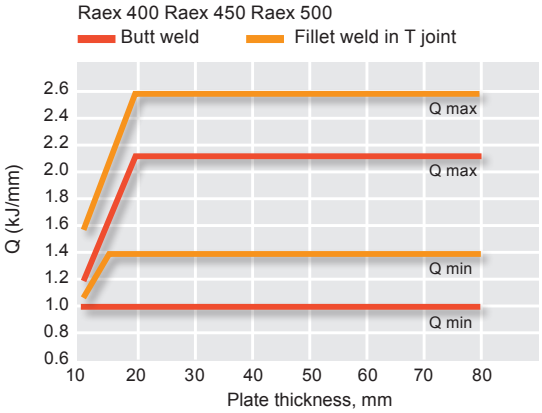
Welding method	Classification of consumables	Consumables (Esab)
MAG solid wire	EN ISO 14341: G 42 X EN ISO 14341: G 46 X	OK Autrod 12.51 OK AristoRod 12.63
FCAW / Metal-cored wire	EN ISO 16834: T 42 X	OK Tubrod 14.12
FCAW / Rutile flux-cored wire	AWS A5.20 E71T-X	OK Tubrod 15.14
MMA (Manual Metal Arc) welding	EN ISO 2560: E 42 X EN ISO 2560: E 46 X	OK 48.00 OK 55.00

WORKING TEMPERATURES[1,2] FOR WELDING. HEAT INPUT RANGE BELOW

Ruukki Raex	Plate thickness, mm							
	10	20	30	40	50	60	70	80
Raex 400	+20	+75	+100	+125	+150	+175		
Raex 450	+20	+75	+100	+125	+150	+175	+200	
Raex 500	+20	+100	+125	+150	+175	+200		

[1] Applicable for undermatching ferritic consumables with low hydrogen content (HD≤5 ml/100g).
[2] Working temperatures or interpass temperatures higher than +220°C may not be used.

HEAT INPUT RANGES (Q) FOR MAG, FCAW AND MMA WELDING



$$Q = \frac{0.8 \times 60 \times U \times I}{1000 \times v}$$

Q = Heat input (kJ/mm)
0.8 = Thermal efficiency for MAG, FCAW and MMA
U = Voltage (V), I = Current (A)
v = Welding speed (mm/min)

GUIDELINES FOR WORKING TEMPERATURE[1] IN FLAME CUTTING

Ruukki Raex	Plate thickness, mm							
	10	20	30	40	50	60	70	80
Raex 400	+20		+75	+100	+125	+150	+175	
Raex 450	+20	+75	+100	+125	+150	+175		
Raex 500	+20	+100	+125	+150	+175			

[1] Working temperatures higher than +220°C may not be used. NOTE: Preheating can be avoided by reducing the cutting speed and by choosing nozzles and other cutting equipment correspondingly.

Ruukki Metals Oy, Suolakivenkatu 1, FI-00810 Helsinki, Finland, +358 20 5911, www.ruukki.com