The high-strength alloy: HOKOTOL

Characteristics

- low weight (approx. three times lighter in comparison to steel)
- excellent machinability (approx. five times better in comparison to steel)
- extreme uniform mechanical properties across the total thickness
- excellent mechanical properties in the centre of the plate
- excellent dimensional stability by stress relieved stretching or cold compressing
- excellent thermal conductivity (approx. four times higher in comparison to steel)
- excellent electrical conductivity (approx. two times higher in comparison to steel)

Fields of application

- moulds for blow forming and injection moulding for the plastic processing industry
- bolsters and force plates (punching technique)
- machine parts for high strength requirements at a low weight
- mechanical components with elevated mechanical properties

Chemical composition

	Chemical elements	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Zr	Other Individual	Other Total
HOKOTOL	Min. weight (%)	0.00	0.00	1.5	0.00	1.8	0.00	5.7	0.00	0.08	0.00	0.00
	Max. weight (%)	0.30	0.35	2.6	0.1	2.6	0.05	7.6	0.06	0.25	0.05	0.15

Physical properties in comparison to steel

Property	Hardness	Density		E-Modulus		Coeff. of thermal expansion 20-100°C (68-212°F)	Thermal conductivity at room temperature		Electrical conductivity at room temperature	
	HB	g/cm³	lbs/ins³	MPa	ksi	$10^{-6} \cdot K^{-1}$	W/(m · K)	BTU · ins/ft² · h · °F	m/Ω · mm²	%IACS
HOKOTOL	180	2.83	0.10	70,300	10,200	23.5	154	1,067.8	23.0	39.7
Steel 1.2312 (40CrMnMoS86)	300	7.85	0.28	215,000	31,200	12.5	35	242.7	10.3	17.8
Relation Al : St	1 : 1.7	1 : 2.8	1 : 2.8	1 : 3.1	1 : 3.1	1.9 : 1	4.4 : 1	4.4 : 1	2.2 : 1	2.2 : 1

*IACS = Int. Annealed Copper Standard; BTU = British Thermal Unit

Guaranteed minimum values for various thicknesses

Thickness		Tensile strength R_m		Yield strength $R_{p0.2}$		Elongation (2") A_{50}
mm	ins	MPa	ksi	MPa	ksi	%
100	3.9	550	80.0	495	72.0	4.0
200	7.9	500	72.7	430	62.5	1.0
300	11.8	460	66.9	400	58.2	1.0
325	12.8	450	65.5	390	56.7	1.0

*at room temperature; measured at S/4; test direction L-T

Typical tensile properties for various thicknesses

Thickness		Tensile strength R_m		Yield strength $R_{p0.2}$		Elongation (2") A_{50}
mm	ins	MPa	ksi	MPa	ksi	%
100	3.9	575	83.4	535	77.6	7.5
200	7.9	545	79.0	485	70.3	4.0
300	11.8	515	74.7	455	66.0	2.0
400	15.7	485	70.3	415	60.2	2.0

*at room temperature; measured at S/4; test direction L-T

The classic alloy: GIANTAL

Characteristics

low weight
good machinability
excellent dimensional stability by stress relieved stretching or cold compressing
very good thermal conductivity
excellent anodisation ability for technical applications
excellent electrical conductivity

Fields of application

prototype moulds for blow forming and injection moulding for the plastic processing industry
moulds for thermo forming and rotation forming for the plastic processing industry
mould support plates and base plates for moulds
housing and frames for food machinery
base plates for packaging machines and high voltage insulators
refrigeration engineering

Chemical composition

	Chemical elements	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Zr	Other Individual	Other Total
GIANTAL	Min. weight (%)	0.00	0.00	0.00	0.5	3.0	0.00	0.00	0.00	0.00	0.00	0.00
	Max. weight (%)	2.0	1.0	1.0	2.0	5.5	0.4	1.0	0.2	0.4	0.5	0.15

Physical properties in comparison to steel

Property	Hardness	Density		E-Modulus		Coeff. of thermal expansion 20-100°C (68-212°F)	Thermal conductivity at room temperature		Electrical conductivity at room temperature	
	HB	g/cm³	lbs/ins³	MPa	ksi	$10^{-6} \cdot K^{-1}$	W/(m · K)	BTU · ins/ft² · h · °F	m/Ω · mm²	%IACS
GIANTAL	75	2.78	0.10	74,000	10,700	24.4	123	852.8	18.0	31.1
Steel 1.2312 (40CrMnMoS86)	300	7.85	0.28	215,000	31,200	12.5	35	242.7	10.3	17.8
Relation Al : St	1 : 4.0	1 : 2.8	1 : 2.8	1 : 2.9	1 : 2.9	2.0 : 1	3.5 : 1	3.5 : 1	1.75 : 1	1.75 : 1

*IACS = Int. Annealed Copper Standard; BTU = British Thermal Unit

Guaranteed minimum values for various thicknesses

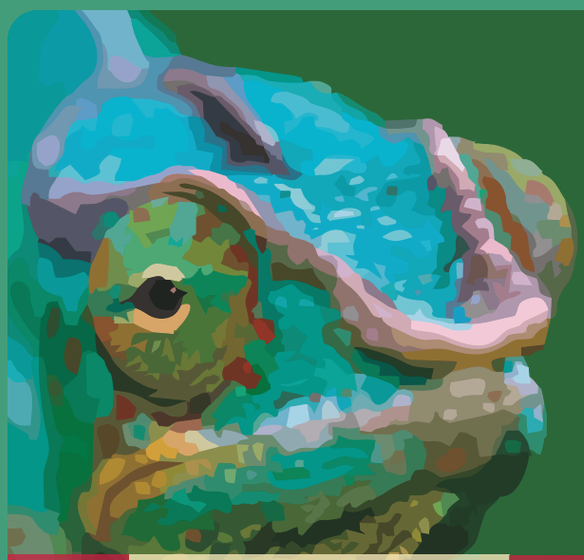
Thickness		Tensile strength R_m		Yield strength $R_{p0.2}$		Elong. (2") A_{50}
mm	ins	MPa	ksi	MPa	ksi	%
100	3.9	245	35.6	120	17.5	10.0
200	7.9	230	33.5	120	17.5	9.0
350	13.8	210	30.5	90	13.1	6.0

*at room temperature; measured at S/4; test direction L-T

Typical tensile properties for various thicknesses

Thickness		Tensile strength R_m		Yield strength $R_{p0.2}$		Elong. (2") A_{50}
mm	ins	MPa	ksi	MPa	ksi	%
100	3.9	260	37.7	155	22.5	16.5
200	7.9	255	37.0	130	18.9	14.5
300	11.8	240	34.8	120	17.4	10.0
400	15.7	235	34.1	115	16.7	9.0
500	19.7	200	29.0	105	15.2	5.0
600-1,000	27.6-39.4	200	29.0	120	17.4	2.5

*at room temperature; measured at S/4; test direction L-T



The universal alloy: WELDURAL

Characteristics

- low weight (approx. three times lighter in comparison to steel)
- very good machinability (approx. four times better in comparison to steel)
- extreme uniform mechanical properties across the total thickness
- excellent dimensional stability by stress relieved stretching or cold compressing
- very good thermal conductivity (approx. three times higher in comparison to steel)
- excellent electrical conductivity (approx. two times higher in comparison to steel)

Fields of application

- moulds for blow forming and injection moulding for the plastic processing industry
- moulds and each type of mechanical part exposed to heat, e. g. moulds for elastomer plastics
- highly precise mechanical parts (which require high dimensional stability)
- moulds with welded constructions
- refrigeration engineering

Chemical composition

	Chemical elements	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Zr	Other Individual	Other Total
WELDURAL	Min. weight (%)	0.00	0.00	5.8	0.2	0.00	0.00	0.00	0.02	0.10	0.00	0.00
	Max. weight (%)	0.30	0.4	6.8	0.4	0.1	0.05	0.1	0.10	0.25	0.05	0.15

Physical properties in comparison to steel

Property	Hardness	Density		E-Modulus		Coeff. of thermal expansion 20-100°C (68-212°F)	Thermal conductivity at room temperature		Electrical conductivity at room temperature	
	HB	g/cm³	lbs/ins³	MPa	ksi	$10^{-6} \cdot K^{-1}$	W/(m · K)	BTU · ins/ft² · h · °F	m/Ω · mm²	%IACS
WELDURAL	130	2.84	0.10	73,800	10,700	22.5	130	901.4	17.4	30.0
Steel 1.2312 (40CrMnMoS86)	300	7.85	0.28	215,000	31,200	12.5	35	242.7	10.3	17.8
Relation Al : St	1 : 2.3	1 : 2.8	1 : 2.8	1 : 2.9	1 : 2.9	1.9 : 1	3.7 : 1	3.7 : 1	1.7 : 1	1.7 : 1

*IACS = Int. Annealed Copper Standard; BTU = British Thermal Unit

Guaranteed minimum values for various thicknesses

Thickness mm	Thickness ins	Tensile strength R_m MPa	Tensile strength R_m ksi	Yield strength $R_{p0.2}$ MPa	Yield strength $R_{p0.2}$ ksi	Elongation (2") A_{50} %
100	3.9	415	60.4	305	44.4	5.0
200	7.9	370	53.8	270	39.3	3.0
300	11.8	340	49.5	240	34.9	1.5
400	15.7	320	46.5	240	34.9	1.5
500	19.7	310	45.1	230	33.5	0.5

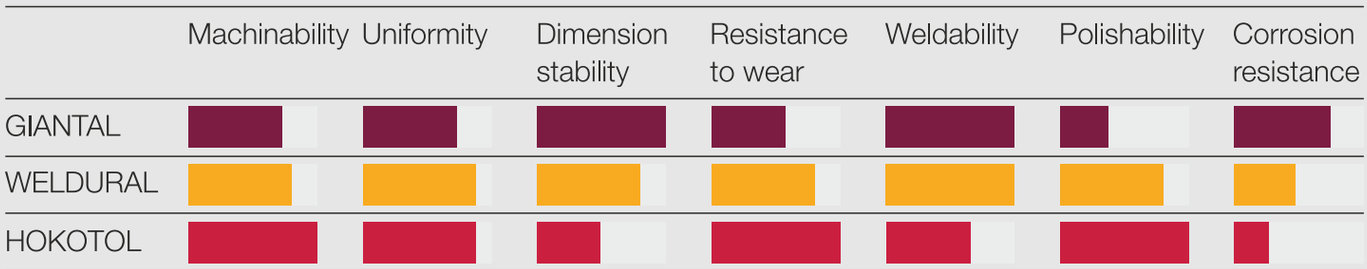
*at room temperature; measured at S/4; test direction L-T

Typical tensile properties for various thicknesses

Thickness mm	Thickness ins	Tensile strength R_m MPa	Tensile strength R_m ksi	Yield strength $R_{p0.2}$ MPa	Yield strength $R_{p0.2}$ ksi	Elongation (2") A_{50} %
100	3.9	455	66.0	350	50.8	7.5
200	7.9	440	63.8	335	48.6	6.5
300	11.8	405	58.7	320	46.4	3.5
400	15.7	365	52.9	305	44.2	2.5
500	19.7	345	50.0	295	42.8	1.5
600	23.6	395	57.3	315	45.7	3.5
700	27.6	395	57.3	315	45.7	3.5

*at room temperature; measured at S/4; test direction L-T

Characteristics of GIANTAL, WELDURAL and HOKOTOL



not suitable ⟶ very good suitable

Comparison of various mould alloys dependent on the used type of plastic and the typical number of closures