

<b>Designation</b>	<b>Duratherm 600 (CoNiCr)</b>	UNS	AISI	LMSA
		-	2.4781	<b>F135</b>

## Chemical composition

Ni	Co	Cr	Fe	W	Mo	Ti	Al	Mn	Si
Bal.	40.0 - 43.0	10.5 - 13.5	8.0 - 10.0	3.0 - 5.0	3.0 - 5.0	1.0 - 3.0	0.50 - 1.5	0.5 - 1.5	0.3 - 1.0

Values (Weight %). In order to achieve maximum homogeneity and consistent quality, the actual manufacturing tolerances are tighter and more precise than the composition indicated.

## Main technical properties and features

Duratherm® 600 is a superalloy developed by VACCUMSCHMELZE and belonging to the group of age-hardenable cobalt-nickel-chromium multi-phase materials. This alloy has excellent corrosion resistance, especially in environments containing hydrogen sulfide (H<sub>2</sub>S).

Duratherm® is a material of choice for spring applications, it has excellent ductility and formability in the soft temper, and the spring properties can be enhanced with cold work. This alloy can be hardened by precipitation in the soft temper, and the spring properties reach their maximum after the precipitation hardening treatment. Hardening treatment takes place at a temperature between 650°C and 750°C, for 2 - 4 hours.

Lamineries MATTHEY offers cold rolled products in the form of strips and plates made of Duratherm® 600 alloy.

## Typical uses

Various types of springs, automotive industry, military industry, watch industry, measuring instruments, loudspeakers, membranes for pressure gauges, retention springs in the chemical industry, electronic and micro technical industry, etc.

## Typical manufacturing range

	Thickness (mm)	Width (mm)	Length (mm)
<b>Rolled products</b> Strip in coils <sup>[1]</sup>	0.010 - 1.000	1.5 - 200.0	-
Strip as sheets <sup>[1]</sup>	0.015 - 1.000	10.0 - 200.0	100 - 3000

<sup>[1]</sup> Not all our production possibilities are presented here. Other dimensions or product forms available upon request. Some combinations of thicknesses and widths are not possible.

## Mechanical properties of strips

Temper	R <sub>m</sub> (N/mm <sup>2</sup> )	R <sub>p0.2</sub> (N/mm <sup>2</sup> )	A <sub>50mm</sub> (%)	Hardness HV
R800 soft	800 - 920	250 - 450	35 min.	190 - 230
R900 soft + skin pass	800 - 950	300 - 470	30 min.	200 - 250
R950 ½ hard	950 - 1200	700 - 1100	5 min.	300 - 400
R1300 hard	1300 - 1550	1100 - 1450	-	400 - 520
R1550 spring	1550 min.	1400 min.	-	510 min.

### After hardening (by customer)

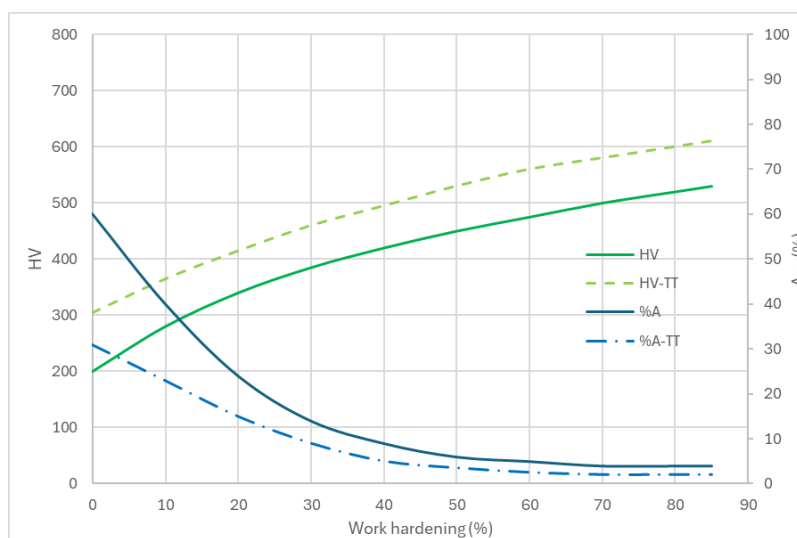
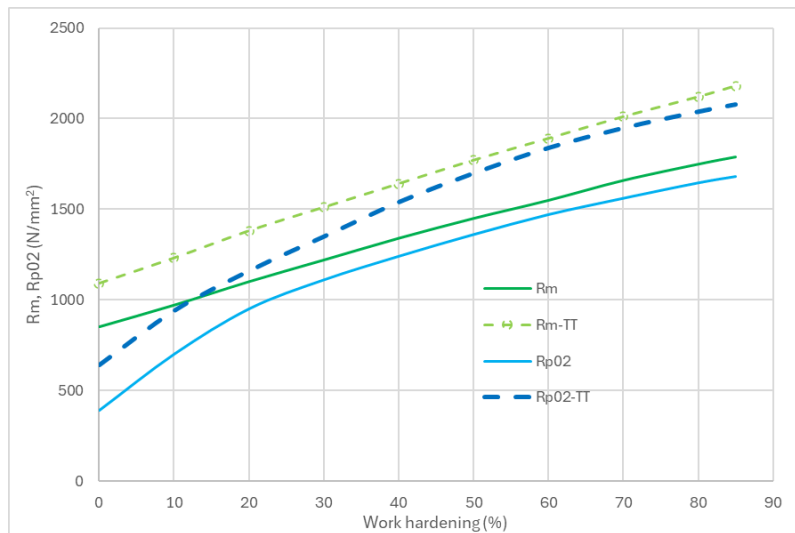
soft + hardened	950 - 1100	450 - 700	20 min.	290 - 330
Skin pass + hardened	1100 - 1200	550 - 850	10 min.	330 - 370
½ hard + hardened	1200 - 1500	850 - 1400	2 min.	370 - 460
hard + hardened	1600 - 1900	1450 - 1800	-	510 - 580
Spring + hardened	1900 min.	1800 min.	-	580 min.

## Physical properties

Modulus of elasticity	kN/mm <sup>2</sup>	205 (untreated) / 225 (treated)
Density	g/cm <sup>3</sup>	8.45 (untreated) / 8.50 (treated)
Melting point	°C	1350
Linear dilatation coefficient (20 to 100°C)	10 <sup>-6</sup> / °C	13.50 (untreated) / 13.50 (treated)
Thermal conductivity at 20°C	W/m °K	10.00 (untreated) / 10.00 (treated)
Electrical conductivity	MS/m	0.95 (untreated) / 1.05 (treated)
Permeability (H = 300A/cm)		1.02 (untreated) / 1.015 (treated)

## Heat treatment

Duratherm® 600 alloy can be precipitation-hardened at temperatures between 650°C and 750°C for 2 - 4 hours. This treatment considerably increases mechanical strength.



## Tolerances (strip and foil)

Thickness	Thickness (mm)		Lamineries MATTHEY			
	≥	<	LMSA Standard	LMSA Precision	LMSA Extreme	
<p>The table shown is an outline of our typical thickness tolerances available. They are tighter than industry standards.</p> <p>Our "LMSA Precision" and "LMSA Extreme" tolerances are available upon request.</p>	-	0.025	-	-	± 0.001	
	0.025	0.050	± 0.003	± 0.002	± 0.0015	
	0.050	0.065	± 0.004	± 0.003	± 0.002	
	0.065	0.100	± 0.006	± 0.004	± 0.003	
	0.100	0.125	± 0.008	± 0.006	± 0.003	
	0.125	0.150	± 0.008	± 0.006	± 0.004	
	0.150	0.250	± 0.010	± 0.008	± 0.004	
	0.250	0.300	± 0.012	± 0.008	± 0.005	
	0.300	0.400	± 0.012	± 0.009	± 0.005	
	0.400	0.500	± 0.015	± 0.010	± 0.006	
	0.500	0.600	± 0.020	± 0.012	± 0.007	
	0.600	0.800	± 0.020	± 0.014	± 0.007	
	0.800	1.000	± 0.025	± 0.015	± 0.009	
	1.000	1.200	± 0.025	± 0.018	± 0.012	
	1.200	1.250	± 0.030	± 0.020	± 0.012	
1.250	1.500	± 0.035	± 0.025	± 0.014		
<b>Width</b>	Our width tolerances "Standard" is +0.2, -0.0 (or ± 0.1 mm upon request). They are available for slit widths < 125 mm and thicknesses < 1.00 mm. Special tolerances upon request.					
<b>Camber</b>	Width (mm)		Camber max. (mm/m)			
	>	≤	LMSA standard		LMSA extreme	
			≤ 0.5 mm	> 0.5 mm	≤ 0.5 mm	> 0.5 mm
	3	6	12	-	6	-
	6	10	8	10	4	5
10	20	4	6	2	3	
20	250	2	3	1	1.5	
Our tolerance "LMSA Standard" respects the EN Standard 1654 (Length of measurement 1000 mm). Other tolerances upon request.						
<b>Surface</b>	Special surface qualities upon request					
<b>Flatness</b>	Special requirement on the longitudinal or transversal flatness upon request					

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