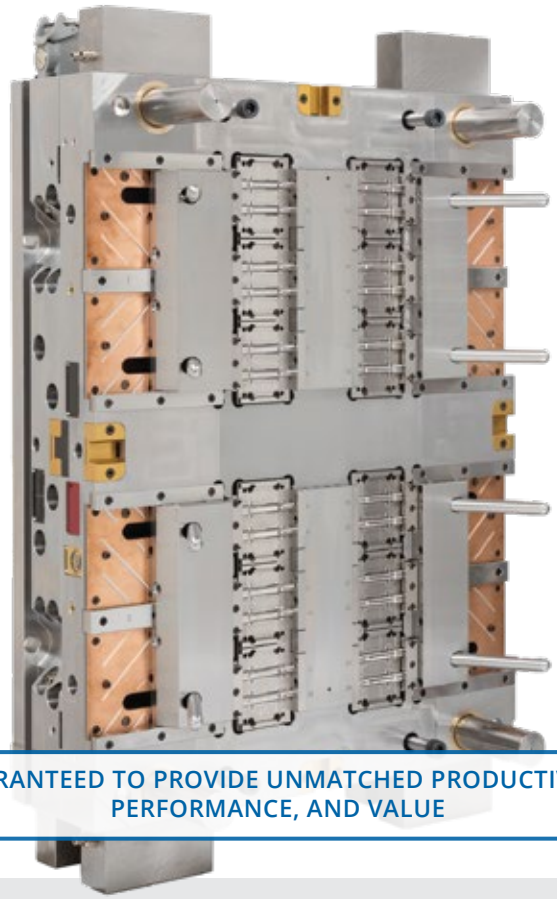
RoyAlloy®

RoyAlloy is trademarked, registered under DIN 1.2095, and US Patents 11,318,640, 6,358,334 and 6,045,633

EDRO #6



FREE MACHINING, PREHARD STAINLESS HOLDER STEEL

GUARANTEED TO PROVIDE UNMATCHED PRODUCTIVITY, PERFORMANCE, AND VALUE

RoyAlloy® (DIN 1.2095) provides significant cost savings and advantages compared to 420F (DIN 1.2085) type stainless steels.

- SUPERIOR DIMENSIONAL STABILITY
- EXCELLENT CORROSION RESISTANCE
- HIGHER THERMAL CONDUCTIVITY
- IMPROVED TOUGHNESS AND DUCTILITY
- ENHANCED MACHINABILITY
- SAFE AND SIMPLISTIC WELDABILITY

RoyAlloy® was developed and patented by EDRO to provide superior properties and performance in all critical areas of the manufacture and operation of high volume plastics mold base tooling. RoyAlloy's unique composition and micro-structure with zero retained austenite results in unparalleled stability with up to 15% higher thermal conductivity, and more than double the impact strength and resistance to cracking compared to 420F. RoyAlloy also demonstrates superior machinability with faster feeds and speeds and extended cutting tool life, providing substantial time and cost savings. RoyAlloy allows for safe and simple welding and is suitable for texturing and photoetching.

RoyAlloy — 400 series martensitic stainless holder steel supplied pre-hardened to approximately 300-321 HB.

Approximate Hardness	Machinability	Corrosion Resistance	Wear Resistance	Toughness	Polishability	Dimensional Stability
321 HB	★★★★★	★★★★☆	★★☆☆☆	★★★★☆	★★★☆☆	★★★★★

PROPERTIES

PHYSICAL DATA
Prehardened to 321 HB. Data at room and elevated temperatures.

Temperature	68°F (20°C)	390°F (200°C)
Density		
kg/m³	7,800	7,750
lbs/in³	.284	.282
Modulus of elasticity		
N/mm² (Mpa)	200,000	190,000
psi	29.0 x 10^6	27.6 x 10^6

TENSILE STRENGTH
Longitudinal Tests from 3" (76mm) rolled plate at 321 HB.

Testing temperature	68°F (20°C)	390°F (200°C)
Ultimate tensile strength		
psi	155,000	152,000
N/mm²	1069	1048
Yield strength @ .2% offset		
psi	129,000	126,000
N/mm²	890	869
% Elongation in 2"	12	12
% Reduction in area	34	34

IMPACT STRENGTH
Longitudinal Charpy V-notch Tests from a 3" (76mm) rolled plate at 321 HB.

Testing temperature	68°F (20°C)	390°F (200°C)
Ft-lbs	16	26
Joules	22	36

THERMAL CONDUCTIVITY

20°C	→	21.7 W/m*K
100°C	→	22.8 W/m*K
200°C	→	23.7 W/m*K

EDRO

RoyAlloy® is available in rolled plate, forged block, and round bar executions in the saw-cut or machined condition.
Services: Saw cutting, rotary grinding, surface grinding, precision machining, and gun drilling.

MACHINING RECOMMENDATIONS

Extensive machining trials have shown that RoyAlloy is readily machined, provides excellent surface finishes and thread quality. RoyAlloy's superior dimensional stability after machining eliminates the need for stress relieving and excess stock oversize.

The cutting data below should be considered a general guideline and may require adjustments based on the equipment, selection of cutting tools, cutting parameters, and other factors. Individual results will vary and may frequently exceed these recommendations.

DRILLING

HIGH SPEED STEEL TWIST DRILLS

Drill diameter		Cutting speed (v_c)		Feed (f)	
mm	inch	m/min	f.p.m	mm/r	i.p.r
–5	–3/16	17–19*	56–62*	0.05–0.10	0.002–0.004
5-10	3/16–3/8	17–19*	56–62*	0.10–0.20	0.004–0.008
10-15	3/8–5/8	17–19*	56–62*	0.20–0.25	0.008–0.010
15-20	5/8–3/4	17–19*	56–62*	0.25–0.30	0.010–0.014

*For coated HSS drill vc = 29–31 m/min (95–102 f.p.m.)

TURNING

Cutting data parameter	Turning with carbide		Turning with HSS*
	Rough turning	Fine turning	Fine turning
Cutting speed (v_c)			
m/min	130–190	190–250	25–28
f.p.m.	430–620	620–820	80–90
Feed (f)			
mm/r	0.2–0.4	0.05–0.2	0.05–0.3
i.p.r.	0.008–0.016	0.002–0.008	0.002–0.01
Depth of cut (a_p)			
mm	2-4	0.5–2	0.5–3
inch	0.08–0.16	0.02–0.08	0.02–0.1
Carbide designation			
ISO	P20–P30	P10–P20	-
US	C6–C5 Coated carbide	C7–C6 Coated carbide or cermet	-

*HSS = High Speed Steel

MILLING

FACE AND SQUARE SHOULDER MILLING

Cutting data parameter	Milling with carbide	
	Rough milling	Fine milling
Cutting speed (v_c)		
m/min	130–190	190–250
f.p.m.	430–620	620–820
Feed (f_z)		
mm/tooth	0.2–0.4	0.1-0.2
in/tooth	0.008–0.016	0.004–0.008
Depth of cut (a_p)		
mm	2-5	≤2
inch	0.08–0.2	≤0.08
Carbide designation		
ISO	P20–P40	P10–P20
US	C6–C5 Coated carbide	C7–C6 Coated carbide or cermet

END MILLING

Cutting data parameter	Solid carbide	Carbide indexable insert	HSS
Cutting speed (v_c)			
m/min	80–120	120–170	35–40[1]
f.p.m.	260–390	390–560	115–130
Feed (f_z)			
mm/tooth	0.006–0.20[2]	0.06–0.20[2]	0.01–0.35[2]
in/tooth	0.0002–0.008[2]	0.002–0.008[2]	0.0004–0.014[2]
Carbide designation			
ISO	-	P15–P40	-
US		C6–C5	

[1] For coated HSS end mill v_c = 60–66 m/min (197–217 f.p.m.)
[2] Depending on radial depth of cut and cutter diameter

CARBIDE DRILLING

Cutting data parameter	Type of drill		
	Indexable insert	Solid carbide	Carbide tip[1]
Cutting speed (v_c)			
m/min	215–240	110–130	70–110
f.p.m.	715–790	360–427	230–360
Feed (f_z)			
mm/r	0.05–0.15[2]	0.10–0.25[3]	0.15–0.25[4]
i.p.r	0.002–0.006[2]	0.004–0.010[3]	0.006–0.010[3]

[1] Drill with replaceable or brazed carbide tip
[2] Feed rate for drill diameter 20–40 mm (0.8"–1.6")
[3] Feed rate for drill diameter 5–20 mm (0.2"–0.8")
[4] Feed rate for drill diameter 10–20 mm (0.4"–0.8")

GRINDING

A general grinding wheel recommendation is given below.

Type of grinding	Delivery condition
Face grinding straight wheel	A 46 HV
Face grinding segments	A 36 GV
Cylindrical grinding	A 60 KV
Internal grinding	A 60 JV
Profile grinding	A 120 JV

HEAT TREATMENT

RoyAlloy is provided prehardened to approximately 300-321 HB, and is characterized by uniform and consistent hardness in all dimensions.

WELDING

RoyAlloy is readily weldable without pre or post heating as it does not develop an over-hardened heat affected zone (HAZ) surrounding the weld deposit. This eliminates the risk of weld induced cracking during repairs or in future service.

For best results special RoyAlloy welding electrodes, available from EDRO, should be used. RoyAlloy electrodes will provide optimal chemical and mechanical properties, in order to match the filler with the base metal. Welding with dissimilar materials is NOT recommended as it can cause localized corrosion due to galvanic reactions.

Alternatively, processes such as gas metal arc welding (GMAW) and shielded metal arc welding (SMAW) may be employed, using several standard stainless filler metals.

More welding information and best practices are available upon request.

EDRO

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