



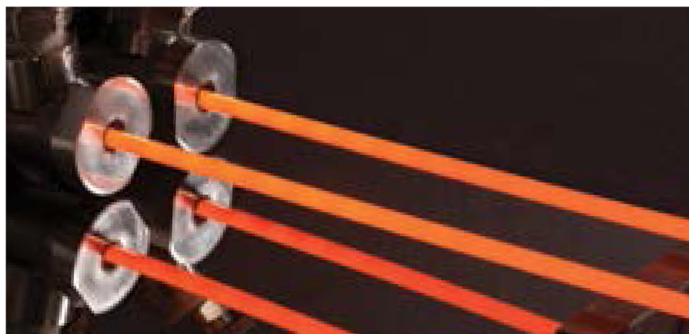
## HIGH TEMPERATURE WEAR RESISTANT CONTINUOUS CAST HARDFACING ROD COBALT & NICKEL BASED

We are HERO Protective Alloys, manufacturers of superior high temperature, wear resistant hardfacing rod. For a broad range of applications in industries ranging from automotive, marine and aircraft, to forging and stamping, to chemical, oil, gas and food—our cobalt and nickel based hardfacing rods offer heroic protection against abrasion and impact, corrosion and erosion, and chemical and mechanical wear in high temperature environments.

Only the highest quality raw materials are used in HERO's advanced continuous casting facility. The result is a homogenous,

metallurgically superior hardfacing rod with an extremely accurate chemical composition. And while the HERO product range offers many proven solutions, we are ready to customize a formula to defeat the specific wear characteristics of your toughest application.

Every stage of our process—from sourcing raw materials, to our advanced manufacturing techniques, through quality control and prompt delivery—is executed with focus on our customer's applications and needs.



HERO PROTECTIVE ALLOYS INC.  
400 Watt Drive, Fairfield, CA 94534 USA  
TF 888-950-HERO (4376) T 707-864-3355 F 707-864-2403  
sales@heroalloys.com  
[www.heroalloys.com](http://www.heroalloys.com)

COBALT BASED / CONTINUOUS CAST / BARE HARDFACING ROD

	SPECIFICATIONS	HERO 1	HERO 6	HERO 12	HERO 20	HERO 21	HERO 31	HERO 190	HERO 694
COMPOSITIONS	COBALT CHROMIUM TUNGSTEN CARBON MOLYBDENUM NICKEL IRON SILICON	Co Bal. Cr 31.0 W 12.0 C 2.4 Mo - Ni <3.0 Fe <3.0 Si <2.0	Co Bal. Cr 29.0 W 4.6 C 1.1 Mo - Ni <3.0 Fe <3.0 Si <2.0	Co Bal. Cr 30.0 W 8.0 C 1.6 Mo - Ni <3.0 Fe <3.0 Si <2.0	Co Bal. Cr 32.0 W 12.0 C 2.4 Mo - Ni <3.0 Fe <3.2 Si <2.0	Co Bal. Cr 28.0 W - C 0.25 Mo 5.0 Ni <3.0 Fe <3.0 Si <1.5	Co Bal. Cr 26.0 W 7.4 C 0.6 Mo - Ni 10.0 Fe <2.0 Si <1.0	Co Bal. Cr 27.0 W 13.5 C 3.2 Mo - Ni <1.0 Fe <3.0 Si <1.0	Co Bal. Cr 29.0 W 18.5 C 1.0 Mo - Ni 5.0 Fe <3.0 Si <1.0
PROPERTIES	HARDNESS HRC (HV)  DENSITY g/cm <sup>3</sup> (lb/in <sup>3</sup> )  MELTING RANGE °F (°C)  SPECIFICATION AWS	50 - 59 (548 - 718)  8.67 (0.311)  2187 - 2436 (1197 - 1335)  ERCoCr-C	38 - 47 (378 - 486)  8.37 (0.303)  2338 - 2550 (1281 - 1398)  ERCoCr-A	45 - 52 (437 - 593)  8.49 (0.307)  2215 - 2463 (1213 - 1351)  ERCoCr-B	50 - 59  8.7 (0.316)  2287 - 2367 (1252 - 1297)  GRINDING	26 - 38 (287 - 425)  8.29 (0.299)  2387 - 2598 (1308 - 1426)  MACHINING	21 - 34  8.63 (0.312)  2453 - 2549 (1345 - 1398)  MACHINING	51 - 61 (568 - 757)  8.63 (0.311)  2263 - 2414 (1239 - 1323)  GRINDING	48 - 54 (320 - 440)  (0.326)  2257 - 2361 (1236 - 1294)  GRINDING
APPLICATIONS	APPLICATIONS FOR USE  DEPOSIT METHOD  FINISHING METHOD	Pump sleeves, rotary seal rings, wear pads, valve seats, expeller screws, seaming rolls, bearing sleeves, drill heads & crushers.  Oxy-Act & TIG  GRINDING	High temp. & pressure valves seats & gates, engine valves, hot cutting & rotary knives, pump shafts & sleeves, extrusion screws.  Oxy-Act & TIG  MACHINING	Wood cutting tools, knives, scissor blades, shear edge, saw teeth, industrial knives, guide bars, pinch rollers, push rods & extrusion dies.  Oxy-Act & TIG  MACHINING	Petrochemical control valves, marine engine valve components, steel mill rolls, homogenizer valve components & centerless grinder work rests.  Oxy-Act & TIG  GRINDING	Hot stamping & forging dies, hot shears, pump impellers, rings, Chemical & petrochemical valves. High temperature & pressure valves.  TIG  MACHINING	Gas turbine vanes, blades, bushings & spacers, furnace working tools, areas subjected to hot gas erosion. Resistant to thermal shock.  Oxy-Act & TIG  MACHINING	Journals of tri-cone rock bits in the oil & gas industry. Resistant to heat & abrasive conditions.  Oxy-Act & TIG  GRINDING	Gas turbine parts.  TIG  GRINDING
RESISTANCE RATING	HIGH TEMP. PROPERTIES HIGH TEMP. HARDNESS CORROSION RESIST. EROSION RESIST. ABRASION RESIST. GALLING RESIST. IMPACT RESIST. MECH. WEAR RESIST. CHEMICAL WEAR RESIST.	Excellent Excellent Good Good Excellent Good Moderate Excellent Good	Excellent Good Good Good Good Excellent Good Good Excellent	Excellent Excellent Good Good Excellent Good Moderate Excellent Good	Good Excellent Good Good Excellent Good Moderate Good Good	Excellent Good Excellent Good Moderate Excellent Excellent Good Good	Excellent Excellent Excellent Good Good Good Good Excellent Good	Excellent Excellent Moderate Good Excellent Good Moderate Good Good	Excellent Excellent Good Excellent Good Good Moderate Good Good



Compositions meet ISO specification requirements for compositional reporting, therefore these values may not reflect an exact 100%. The chemical analysis is for the standard product and may differ depending on the specification or standard noted when ordering.

Oxy-Acetylene Process: Oxy-Act, Gas Tungsten Arc Welding or Tungsten Inert Gas: TIG

Available Diameters: 1/8" (3.2 & 3.4mm), 5/32" (4.0mm), 3/16" (4.8mm), 1/4" (6.4mm), 5/16" (8.0mm)



# NICKEL BASED / CONTINUOUS CAST / BARE HARDFACING ROD

	SPECIFICATIONS	HERO 40	HERO 50	HERO 56	HERO 60
COMPOSITIONS	NICKEL	Ni Bal.	Ni Bal.	Ni Bal.	Ni Bal.
	CHROMIUM	Cr 9.5	Cr 12.0	Cr 12.0	Cr 14.0
	IRON	Fe 2.5	Fe 4.0	Fe 4.1	Fe 4.5
	SILICON	Si 2.5	Si 3.6	Si 4.0	Si 4.1
	BORON	B 2.0	B 2.1	B 2.3	B 3.2
	CARBON	C 0.35	C 0.50	C 0.60	C 0.72
PROPERTIES	HARDNESS HRC	36 - 45	45 - 55	51 - 58	55 - 62
	DENSITY g/cm <sup>3</sup> [lb/in <sup>3</sup> ]	8.08 [0.292]	8.14 [0.294]	8.00 [0.288]	8.7 [0.316]
	MELTING RANGE °F [°C]	1790 - 2030 [977 - 1110]	1810 - 1985 [989 - 1085]	1790 - 1910 [977 - 1043]	1758 - 1843 [956 - 1006]
	SPECIFICATION AWS	RNiCr-A	RNiCr-B		RNiCr-C
APPLICATIONS	APPLICATIONS FOR USE	Glass industry mold components, plungers, dies & valve slides.	Nuclear industry valve components, bushings, cages, liners & thrust shoes. Diesel engine valve facings, cam shafts.	Plastics industry extrusion screws, shafts & sleeves. Food processing conveyor screws & scraper blades.	Pump sleeves, plungers, shafts & mechanical couplings.
	DEPOSIT METHOD	Oxy-Act & TIG	Oxy-Act & TIG	Oxy-Act & TIG	Oxy-Act & TIG
	FINISHING METHOD	MACHINING	MACHINING	MACHINING	GRINDING
RESISTANCE RATING	HIGH TEMP. HARDNESS	Good	Good	Excellent	Excellent
	CORROSION RESIST.	Excellent	Excellent	Excellent	Excellent
	EROSION RESIST.	Good	Excellent	Good	Good
	ABRASION RESIST.	Moderate	Good	Excellent	Excellent
	GALLING RESIST.	Good	Good	Good	Good
	IMPACT RESIST.	Excellent	Moderate	Moderate	Moderate
	MECH. WEAR RESIST.	Good	Good	Good	Excellent



Compositions meet ISO specification requirements for compositional reporting, therefore these values may not reflect an exact 100%. The chemical analysis is for the standard product and may differ depending on the specification or standard noted when ordering.

Oxy-Acetylene Process: Oxy-Act, Gas Tungsten Arc Welding or Tungsten Inert Gas: TIG

Available Diameters: 1/8" [3.2 & 3.4mm], 5/32" [4.0mm], 3/16" [4.8mm], 1/4" [6.4mm], 5/16" [8.0mm]