Wear Resistant
Products & Services

COLMONOY®

ALLOY SELECTOR CHART

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Technical Data Sheet Tech-IG (GB)

Specification I
MIL-R-17131C:RNiCr-C-1
AWS A5. 13-80: RNiCr-C & ENiCr-C
SFA 5. 13:NiCr-C
AMS:4775A

Specification II
MIL-R-17131C:RNiCr-B-1
AWS A5. 13-80: RNiCr-B & ENiCr-B
SFA 5. 13:NiCr-B

Specification III
AWS A5. 13-80: RNiCr-A & ENiCr-A
SFA 5. 13:NiCr-A

NICKEL ALLOYS

	Alloy Name	Nominal Composition (%)			Rockwell Hardness (HRc)	Method of Application	Density (gm/cc)	Liquidus (Approx.)	Resistance to: Abrasion	Corrosion	Impact	Galling	Hot Hardness	Weldability	Available Forms	Description and General Uses	Alloy Name
WITH CHROMIUM BORIDE	COLMONOY 6	C 0.70 Si 4.25	Cr 14.3 Fe 4.0	B 3.0 Ni Balance	56-61	Oxy fuel, DC Electric Arc, GTAW, Sprayweld, PTA	8.11	1040°C	1	1	4	1	2	1	Powder, Rods Castings, Ingots	The original, nickel-base hard-surfacing alloy, containing diamond-like chromium borides and carbides. Extremely resistant to wear, especially under corrosive conditions. Low coefficient-of-friction. Can be hot-formed. For shafts, sleeves, valve trim. Finished by grinding. See spec. I.	COLMONOY 6
	COLMONOY 56P	C 0.90 Si 5.3	Cr 18.0 Fe 5.4	B 1.9 Ni Balance	53-58	PTA	8.01	1080°C	2	2	3	2	2	2	Atomized Powder	Specifically designed for protecting and restoring plastic extrusion screws using plasma transferred arc application.	COLMONOY 56P
	COLMONOY 56	C 0.60 Si 3.8	Cr 13.1 Fe 4.4	B 2.6 Ni Balance	50-55	Oxy fuel, DC Electric Arc, GTAW, Sprayweld	8.14	1050°C	2	2	4	2	2	2	Powder, Rods Castings, Ingots	Contains wear-resistant chromium borides and carbides. Between Colmonoy Nos. 6 and 5 in chemistry and hardness. Better ductility and impact resistance than No. 6 For plastic extrusion screws, shafts, sleeves. Finished with carbide tools and grinding. See spec. II.	COLMONOY 56
	COLMONOY 5	C 0.45 Si 3.3	Cr 13.8 Fe 4.8	B 2.1 Ni Balance	45-50	Oxy fuel, DC Electric Arc, GTAW, Sprayweld, PTA	8.22	1065°C	3	2	3	3	2	2	Powder, Rods Castings, Ingots	Contains wear-resistant chromium borides and carbides. Has greater ductility, better impact resistance and workability than Colmonoy No. 6 For wear rings, plungers, dies. Finished with carbide tools and grinding. See spec. II.	COLMONOY 5
	COLMONOY 4	C 0.40 Si 2.8	Cr 10.0 Fe 2.5	B 2.1 Ni Balance	35-40	Oxy fuel, DC Electric Arc, GTAW, Sprayweld, PTA	8.40	1105°C	4	2	2	3	2	2	Powder, Rods Castings, Ingots	Contains wear-resistant chromium borides and carbides. Has greater impact resistance and workability than Colmonoy No. 5. For dies, moulds, valves, and plungers. Finished with carbide tools and grinding. See spec. III.	COLMONOY 4
	COLMONOY 3	C 0.25 Si 3.25	Cr 6.75 Fe 3.0	B 1.5 Ni Balance	28-33	TIG Process	8.42	1125°C	4	2	2	3	2	3	Rods	A hardfacing alloy of low hardness for TIG welding aluminium bronze glass container mould components.	COLMONOY 3
WITH CHROMIUM BORIDE	COLMONOY 69	C 0.7 Si 4.5 Mo 2.15	Cr 14 Fe 4.0 Ni Balance	B 3.0 Cu 2.0	58-63	Sprayweld, HVOF	8.08	1200°C	1	1	4	1	2	2	Atomized Powder	Contains Cu and Mo for improved ductility and corrosion resistance. The wide plastic range makes it easy to fuse without sagging. For marine and petro-chemical applications. Finished by grinding.	COLMONOY 69
	COLMONOY 62	C 0.70 Si 4.25	Cr 14.3 Fe 4.0	B 3.0 Ni Balance	56-61	Sprayweld, PTA	8.09	1025°C	1	1	4	1	2	1	Atomized Powder	Hard nickel-chromium-boron alloy containing chromium carbides. Excellent abrasion and corrosion resistance. Finished by grinding. See spec. I.	COLMONOY 62
	COLMONOY 52	C 0.55 Si 3.7	Cr 12.2 Fe 3.8	B 2.2 Ni Balance	45-50	Sprayweld, PTA	8.22	1065°C	3	2	3	3	2	2	Atomized Powder	Similar to Colmonoy No. 62, but has increased ductility with almost the same abrasion and corrosion resistance. Finished by grinding. See spec II.	COLMONOY 52
	COLMONOY 42	C 0.40 Si 3.1	Cr 10.0 Fe 2.5	B 2.1 Ni Balance	35-40	Sprayweld, PTA	8.40	1120°C	4	2	2	3	2	2	Atomized Powder	Similar to Colmonoy No. 52, but better ductility, less hardness, and slightly less abrasion and corrosion resistance. Finished by carbide tools and grinding. See spec. III.	COLMONOY 42
	COLMONOY 32	C 0.45 Si 3.3	Cr 7.50 Fe 2.20	B 1.70 Ni Balance	32-37	Sprayweld, PTA	8.45	1120°C	5	2	1	3	2	2	Atomized Powder	Similar to Colmonoy No. 42, but softer so deposits are easily machined. For cast iron pressware molds and martensitic stainless steel plungers.	COLMONOY 32
	COLMONOY 88	C 0.80 Si 4.0 Ni Balance	Cr 15.0 Fe 3.5	B 3.0 W 17.3	59-64	Sprayweld, HVOF, Fuseweld, PTA	8.89	1180°C	1	1	3	1	1	2	Atomized Powder	Unique alloy contains chromium and tungsten carbides for maximum abrasion and corrosion resistance. For high-temperature, highly abrasive applications; glass mould plungers, pump plungers and sleeves, valve seats, plastics extrusion screws. Finished by grinding or CBN tools.	COLMONOY 88
	COLMONOY 86P	C 0.35 Si 4.0 Nb 1.0	Cr 16.0 Fe Trace B 2.7	Mo 7.0 Ni Balance	Double Pass 51-56/Single Pass 44-49	PTA	8.28	1080°C	2	1	3	2	2	2	Atomized Powder	Designed for protecting and restoring plastics extrusion and injection moulding screws. Combination of chromium and molybenum provide superior corrosion and crack resistance.	COLMONOY 86P
	COLMONOY 84	C 1.10 Si 2.0 Ni Balance	Cr 29.0 Fe 2.0	B 1.3 W 7.5	40-45	Sprayweld, PTA, HVOF	8.88	1230°C	1	1	3	1	1	2	Atomized Powder, Castings, Ingot	A nickel-based alternative to cobalt surfacing alloys, for service temperatures up to 800°C Boron and silicon content provide better weldability at lower application temperatures.	COLMONOY 84
	COLMONOY 63	C 0.55 Si 4.8	Cr 15.0 Fe 4.0	B 3.25 Ni Balance	57-62	Fuseweld, HVOF	8.09	1025°C	1	1	4	1	2	1	Atomized Powder	Made specifically for use in the Fuseweld Torch, Colmonoy 63 is like No. 62SA. Resists metal-to-metal wear under corrosive conditions. Low coefficient-of-friction. Finished by grinding. See spec. I.	COLMONOY 63
	COLMONOY 53	C 0.55 Si 3.7	Cr 12.0 Fe 3.8	B 2.3 Ni Balance	45-50	Fuseweld, HVOF	8.22	1065°C	3	2	3	3	2	2	Atomized Powder	Colmonoy 53 has greater ductility than No. 63, for better impact resistance and workability. Finished with carbide tools and grinding. See spec. II.	COLMONOY 53
	COLMONOY 43	C 0.40 Si 3.1	Cr 10.0 Fe 2.5	B 2.1 Ni Balance	35-40	Fuseweld, HVOF	8.40	1105°C	4	2	2	3	2	2	Atomized Powder	Colmonoy 43 has even greater impact resistance and workability than No. 53. Easily finished with carbide tools and grinding. See spec. III.	COLMONOY 43
	COLMONOY 33	B 1 Cr 6	Si 4.1 Fe 1.5	Ni Balance	30-35	Fuseweld, PTA	8.6	1140°C	5	4	3	3	3	2	Atomized Powder	Used in foundries for repair of castings or mould parts. It is used extensively in the glass industry.	COLMONOY 33
	COLMONOY 225	Custom formulated Ni-base alloys containing low-melting constituents for ease of application, particularly to glass container moulds.			13-18	Fusewelder	8.59		6	2	1	3	3	1	Atomized Powder	Used for glass container mould repairs this alloy is easily filed.	COLMONOY 225
	COLMONOY 226				18-22	Fusewelder	8.58		6	2	1	3	3	1	Atomized Powder	Corners and seams of preform blanks and finish moulds. Repairs to neck rings and blow heads.	COLMONOY 226
	COLMONOY 227				22-27	Fusewelder	8.53		6	2	1	3	3	1	Atomized Powder	Guide rings, mould edges, funnels etc.	COLMONOY 227
	COLMONOY 228				28-33	Fusewelder	8.46		6	2	1	3	3	1	Atomized Powder	Preform blank and mould edges, guide sleeves, bottom plates etc.	COLMONOY 228
	COLMONOY 229				24-29	Fusewelder	8.4		5	2	1	3	2	2	Atomized Powder	General purpose grade for cast iron moulds. Contains Cr for enhanced high temperature properties.	COLMONOY 229
	COLMONOY 230				30	Fusewelder	8.50		6	2	1	3	3	1	Atomized Powder	Bottom plates, mould edges.	COLMONOY 230
	COLMONOY 234				34	Fusewelder	8.52		6	2	2	3	3	1	Atomized Powder	Neck rings, baffles.	COLMONOY 234
	COLMONOY 237				37	Fusewelder	8.54		6	2	2	3	3	1	Atomized Powder	Neck rings, blow plugs.	COLMONOY 237

[1]Contains chromium-boride crystals (hardness 4100 DPH), made by a patented process, exclusive to certain Colmonoy alloys.
[2]U.S. Patent No. 5141571 and other patents
[3]U.S. Patent No. 2868639 and other patents
[4]U.S. Patent No. 5234510

Density of individual alloys based on theoretical density of elemental constituents

Wear resistance and red hardness of individual alloys are classified on a comparative scale of 1 (highest) 6 (lowest). Corrosion resistance varies with the media involved.

Colmonoy alloy powders are supplied in particle size ranges to suit the user's welding equipment.

Alloy Name	Nominal Composition (%)				Rockwell Hardness (HRc)	Method of Application	Density (gm/cc)	Liquids (Approx.)	Resistance to				Hot Hardness	Weldability	Available Forms	Description and General Uses	Alloy Name
									Abrasion	Corrosion	Impact	Galling					
COLMONOY 75	C 1.90 Si 2.8 Cr 9.3	Fe 2.60 B 2.0 Co 4.2	W 29.50	Ni Balance	58.63	Sprayweld	11.25	1050°C	1	2	4	1	2	2	Powder	A nickel-chromium-boron matrix alloy rich in chromium boride holding extremely hard tungsten-carbide particles. Used primarily for protection from severe abrasion. Finished by grinding.	COLMONOY 75
COLMONOY 845	C 2.4 Si 1.2	Cr 12.7 Fe 1.1	B 0.8 W 51.2	Ni Balance	57-62	Fuseweld	13.66	1230°C	1	1	3	1	2	2	Crushed and Atomized Powder	A nickel-chromium-tungsten matrix alloy enriched with extremely hard tungsten-carbide particles and chromium carbides for increased wear resistance. For highly abrasive applications such as conveyors, centrifuges and slurry-pump casings. Finished by grinding.	COLMONOY 845
COLMONOY 83	C 2.00 Si 1.40	Cr 20.30 Fe 1.40	B 0.90 W 34.00	Ni Balance	49-56	PTA	11.78	1230°C	1	1	3	1	2	1	Crushed and Atomized Powder	A tough nickel-chromium-tungsten-boron matrix alloy containing chromium carbides with the addition of extremely hard tungsten-carbide particles for excellent abrasive wear protection. Excellent edge retention. Specifically for PTA application.	COLMONOY 83
COLMONOY 705	C 2.20 Si 1.90	Cr 7.00 Fe 2.20	B 1.50 Co 0.10	W 48.20 Ni Balance	58-63	Fuseweld	13.36	1040°C	1	2	4	1	2	3	Crushed and Atomized Powder	A tough nickel-chromium-boron matrix alloy holds extremely hard tungsten-carbide particles used for protection from severe sliding abrasion. Used on screw conveyors and augers. Finished by grinding.	COLMONOY 705
COLMONOY 730	C 2.3 Si 2.34	Cr 8.45 Fe 2.50	B 1.75 Co 2.50	W 35.10 Ni Balance	58-63	Sprayweld, HVOF	12.33	1060°C	1	2	4	1	2	3	Crushed and Atomized Powder	A tough nickel-chromium-tungsten matrix alloy holds fine, extremely hard tungsten-carbide particles. Used on pump plungers and sleeves for protection fine-particulate abrasive conditions. Minimises packing wear. Finished by grinding.	COLMONOY 730
COLMONOY 750	C 2.05 Si 2.34	Cr 8.45 Fe 2.60	B 1.95 Co 4.20	W 37.30 Ni Balance	58-63	Sprayweld	12.15	1060°C	1	2	4	1	2	3	Crushed and Atomized Powder	A tough nickel-chromium-tungsten matrix alloy holds fine, extremely hard tungsten-carbide particles. Best used for the most severe abrasive conditions. Finished by grinding.	COLMONOY 750
WALLEX 42	C 0.9 W 8.0	Ni 13.5 B 1.7	Cr 18.5 Si 3.0	Fe 2.5 Co Bal	41-46	Sprayweld Fuseweld, PTA, HVOF	9.03	1140°C	2	1	2	2	2	3	Atomized Powder Ingot	A cobalt-nickel alloy powder that forms deposits similar to those of Wallex 50, but softer. Finished with carbide tools and grinding.	WALLEX 42
WALLEX 50	C 2.30 W 10.0 Fe 1.0	Ni 18.0 B 3.4 Co Balance	Cr 19.0 Si 2.75		56-61	Sprayweld, Fuseweld, PTA, HVOF	9.10	1120°C	1	1	4	2	2	2	Atomized Powder Castings, Ingot	Good corrosion resistance and low coefficient-of-friction provides good metal-to-metal wear protection (not involving much impact). For bushings, knives and cams. Finished by grinding.	WALLEX 50
WALLEX 55	C 2.80 Si 1.75	Cr 12.35 Fe 0.65	B 2.30 W 35.40	Ni 9.00 Co Balance	58	Sprayweld	11.87	1120°C	1	2	4	1	2	3	Crushed and Atomized Powder	Uses a cobalt-nickel matrix alloy to hold extremely hard tungsten-carbide particles. Primarily to protect surfaces against severe sliding abrasion. Finished by grinding.	WALLEX 55
WALLEX 505	C 2.30 Si 1.75	Cr 12.35 Fe 0.65	B 2.30 W 35.40	Ni 9.00 Co Balance	58	Fuseweld	11.87	1120°C	2	3	2	1	3	4	Crushed and Atomized Powder	Made specifically for use in the Fuseweld Torch, Wallex 505 is like No. 55. Protects against severe sliding abrasion. Finished by grinding.	WALLEX 505
WALLEX 1	C 2.30 Ni 3.0max	Cr 30.0 Fe 3.0max	W 12.5 Co Bal	Si 1.25	50-55	Oxy fuel Welding Electric Arc Welding Plasma Transferred Arc	8.52	1290°C	2	2	4	1	1	3	Bare Rod, Powder, Investment or other Castings.	Good corrosion resistance and low coefficient-of-friction gives good metal-to-metal wear protection (not involving much impact). For bushings, knives, cams. Finished by grinding.	WALLEX 1
WALLEX 6	C 1.0 Fe 3.0max	Cr 29.0 Ni 3.0max	W 4.5 Co Bal	Si 1.25	38-42	Oxy fuel Welding Electric Arc Welding Plasma Transferred Arc	8.38	1275°C	3	1	1	2	1	2	Bare Rod, Powder, Investment and other Castings.	Better than Wallex 1 corrosion and high heat resistance properties but more ductile and impact resistant. For maintaining cutting edges under heat (hot dies, hot shear blades). Finished with carbide tools and grinding. Also used for protection of VC Engine Valves.	WALLEX 6
WALLEX 12	C 1.8 Fe 3.0max	Cr 29.0 Ni 3.0max	W 9.0 Co Bal	Si 1.25	45-50	Oxy fuel Welding Electric Arc Welding Plasma Transferred Arc	8.67	1280°C	2	1	1	2	1	2	Bare Rod, Powder, Investment and other Castings.	Harder than Wallex 6, more ductile than Wallex 1, for abrasive wear under high heat and corrosive conditions. Finished by grinding. Used on cutting edges of blades in textile and carpet industries.	WALLEX 12
WALLEX 21	Co 0.25 Mo 5.5	Si 0.75 Ni 2.5	Cr 28.0 Co Bal	Fe 1.25	28-33	Oxy fuel Welding Electric Arc Welding Plasma Transferred Arc	8.34	1218°C	3	1	1	2	1	2	Bare Rod, Powder, Investment and other Castings.	Readily machinable cobalt alloy with high corrosion resistance-used for protection of valve seats etc. in chemical and petroleum industries.	WALLEX 21