SURFACING ALLOYS

TECH 1-K SELECTOR CHART

WALLCOLMONOY
SURFACING ALLOYS

COLMONOY®
(nickel-based)

ALLOY	NOMINAL COMPOSITION (%)									ROCKWELL HARDNESS (C-scale)	FUSING TEMPERATURE (APPROX.)	SUPPLIED AS	METHOD OF APPLICATION	DESCRIPTION AND GENERAL USES
	C	Cr	B	Si	Fe	Ni	Mo	W	Others					
with chromium boride[1]														
6	0.6	14.0	3.0	4.2	4.0	Bal				56-63	1890 °F 1030 °C	Crushed Powder, Bare Rods, Ingot	Spraywelder, Oxyacetylene, GTAW, PTA*, HVOF* (63HV), Laser Cladding	The original, nickel-based 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. Finished by grinding. *See spec I.*
56	0.5	13.0	2.6	3.8	4.0	Bal				50-55	1885 °F 1030 °C	Crushed Powder, Bare Rods, Ingot, Cored Wire	GTAW, Oxyacetylene, GMAW, PTA*, Laser Cladding	Better ductility and impact resistance than Colmonoy 6. Finished with carbide tools and grinding. Used for valve seats, ball valves, and marine engine valves.
5	0.5	13.8	2.3	3.4	4.0	Bal				45-50	1880 °F 1025 °C	Atomized Powder, Crushed Powder, Bare Rods, Ingot	Spraywelder, Oxyacetylene, GTAW, PTA*, HVOF* (53HV), Laser Cladding	Has greater ductility, better impact resistance and workability than Colmonoy 6. For wear rings, plungers, dies. Finished with carbide tools and grinding. *See spec. II.* Used when "salt bath" quenching is required to achieve a hardened base metal. Also used for glass mould press-n-blow plungers.
45	0.5	12.0	2.3	3.0	3.5	Bal				43-46	1910 °F 1045 °C	Atomized Powder, Crushed Powder, Ingot	Spraywelder, PTA*, Laser Cladding	Developed for the oil patch industry for the sole purpose of being able to be polmer quenched. This quenching process is more severe than "salt bath" quenching to achieve a deeper and more thorough hardening of the base metal. The polymer is held at around 150°F
4	0.4	10.0	2.2	2.3	2.5	Bal				35-40	1925 °F 1050 °C	Atomized Powder, Crushed Powder, Bare Rods, Ingot	Spraywelder, Oxyacetylene, GTAW, PTA*, HVOF* (43HV), Laser Cladding	Has greater impact resistance and workability than Colmonoy 5. For dies, moulds, valves, and plungers. Finished with carbide tools and grinding. *See spec. III.* Used for glass mould press-n-blow plungers.
with chromium carbide														
98[4]		8.0	3.2	4.2		Bal	2.0		Cu: 2.5 Nb: 2.0	55-60	1860 °F 1015 °C	Atomized Powder	Spraywelder, Fusewelder	Nickel-based alloy with superior resistance to corrosive liquids. Low coefficient-of-friction to reduce metal-to-metal adhesive wear loss.
88[2]	0.6	15.0	3.0	4.0	3.5	Bal		15.5		59-64	2020 °F 1100 °C	Atomized Powder, Bare Rod, Cored Wire	Spraywelder, Fusewelder, GMAW, Oxyacetylene, GTAW, PTA*, HVOF*,5P (88M), Laser Cladding	Unique alloy contains chromium and tungsten borides and 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.
84	1.1	29.0	1.4	2.2	2.0	Bal		7.5		40-45	2000 °F 1095 °C	Atomized Powder, Ingot	Spraywelder, PTA*, Laser Cladding	A nickel-based alternative to cobalt surfacing alloys, for service temperatures up to 1500 °F. Boron and silicon content provide better weldability at lower application temperatures.
72[3]	0.5	12.0	3.2	3.0	4.0	Bal		13.0		57-62	1940 °F 1060 °C	Atomized Powder, Bare Rods, Ingot	Spraywelder, Fusewelder, Oxyacetylene, GTAW PTA* 5P (72M)	Tungsten content strengthens the nickel matrix, giving this alloy excellent resistance to low-stress abrasion and scouring action. Wear resistance often superior to Colmonoy 6. For pump parts. Finished by grinding.
69	0.5	16.5	3.5	5.1	3.0	Bal	3.0		Cu: 2.0	58-63	1890 °F 1030 °C	Atomized Powder	Spraywelder (69SC), HVOF*, 5P (69SM)	Additions of chromium and molybdenum for better corrosion resistance. Wide plastic range makes overlays easier to fuse without sagging. For marine and petro-chemical applications. Finished by grinding.
62	0.6	14.0	3.0	4.2	4.0	Bal				57-63	1875 °F 1025 °C	Atomized Powder	Spraywelder (62SA), HVOF*(63HV), 5P (62SM)	Hard nickel-chromium-boron alloy containing chromium carbides. Excellent abrasion and corrosion resistance. Recommended for hardfacing parts to resist wear, corrosion, heat and galling. Typical applications: shafts, sleeves, pump plungers, sucker rod couplings, bed knives, camshafts, bushings, mill guides, mixer blades, seal rings, brick manufacturing equipment, and conveyor screws.
52	0.5	13.5	2.4	3.7	4.0	Bal				45-50	1950 °F 1065 °C	Atomized Powder	Spraywelder (52SA), HVOF* (53HV), 5P (52M)	Similar to Colmonoy 62, but has increased ductility with slightly lower abrasion resistance and similar corrosion resistance. Finished by grinding.
42	0.2	4.0	1.2	2.8	<0.5	Bal	3.0		P: 2.2	35-40	1800 °F 980 °C	Atomized Powder	Spraywelder (42SA), HVOF* (43HV), 5P (42M)	Better ductility and toughness than Colmonoy 52. Less hardness and slightly less abrasion and corrosion resistance. Addition of molybdenum improves resistance to chipping or sharp corners. Finished by carbide tools and grinding.

1 Contains chromium-boride crystals (hardness 3700 HV), made by a patented process, exclusive to certain Colmonoy alloys.
2 U.S. Patent No. 5,141,571
3 U.S. Patent No. 2,868,639
4 U.S. Patent No. 5,183,636

* See WCC_TECH-PTA/HVOF Selector Chart

Specification I
MIL-R-17131C:RNiCr-C-1
AWS 5.21: RNiCr-C & ENiCr-C
SFA 5.21:NiCr-C
AMS:4775A

Specification II
MIL-R-17131C:RNiCr-B-1
SFA 5.21:NiCr-B
AWS 5.21 NiCr-B

Specification III
SFA 5.21:NiCr-A
AWS 5.21 NiCr-A

Specification conformance by request

SURFACING ALLOYS

TECH 1-K SELECTOR CHART

COLMONOY®
(nickel-based)

ALLOY	NOMINAL COMPOSITION (%)									ROCKWELL HARDNESS (C-scale)	FUSING TEMPERATURE (APPROX.)	SUPPLIED AS	METHOD OF APPLICATION	DESCRIPTION AND GENERAL USES
	C	Cr	B	Si	Fe	Ni	Mo	W	Others					
Fuseweld[1]														
234	0.2	4.0	1.0	2.8		Bal	3.0		P: 2.1	32-36	1825 °F 995 °C	Atomized Powder	Fusewelder	Alloy specially designed for glass container mould protection and restoration. More abrasion resistant than Colmonoy 228, with better ductility than Colmonoy 43.
229		3.0	0.9	2.7		Bal			P: 2.0	25-32	1680 °F 915 °C	Atomized Powder	Fusewelder	Specifically design to be used with the Colmonoy Fusewelder Torches for glass mould components. Slightly harder than Colmonoy 227, but slightly softer than Colmonoy 228. An excellent alloy for use on rings, baffles, and seams.
228			1.0	3.7		Bal			P: 2.0	28-33	1705 °F 930 °C	Atomized Powder	Fusewelder	Patented alloy specially designed for glass container mould protection and restoration. Also used for rebuilding automotive parts (clutch components).
227			0.9	2.7		Bal			P: 2.1	22-27	1680 °F 915 °C	Atomized Powder, Bare Rod	Fusewelder, Oxyacetylene, GTAW	Patented alloy specially designed for glass container mould protection and restoration. Also used for rebuilding automotive parts (clutch components).
226			0.8	2.2		Bal			P: 1.9	18-21	1715 °F 935 °C	Atomized Powder	Fusewelder	Patented alloy specially designed for glass container mould protection and restoration. Also used for rebuilding automotive parts (clutch components).
225			0.5	2.2		Bal			P: 1.9	13-17	1650 °F 900 °C	Atomized Powder	Fusewelder	Patented alloy specially designed for glass container mould protection and restoration. Also used for rebuilding automotive parts (clutch components).
63	0.6	14.0	3.0	4.2	4.0	Bal				57-63	1875 °F 1025 °C	Atomized Powder	Fusewelder, HVOF*	Hard nickel-chromium-boron alloy containing chromium carbides. Excellent abrasion and corrosion resistance. Finished by grinding.
53	0.5	13.5	2.4	3.7	4.0	Bal				42-53	1950 °F 1065 °C	Atomized Powder	Fusewelder, HVOF*	Similar to Colmonoy 63, but has increased ductility with slightly lower abrasion and corrosion resistance. Finished by grinding.
43	0.2	4.0	1.2	2.8		Bal	3.0		P: 2.2	35-40	1800 °F 980 °C	Atomized Powder	Fusewelder, HVOF*	Similar to Colmonoy 53, but better ductility, less hardness, and slightly less abrasion and corrosion resistance. Finished by carbide tools and grinding.
23A/24			1.5	2.5		Bal				16-23	1950 °F 1065 °C	Atomized Powder, Bare Rod, Ingot	Fusewelder, Oxyacetylene	Used to repair blow holes, flaws, chips, and cracks in cast iron parts. Colmonoy 23A works best in repairing surface flaws. Colmonoy 24 is recommended for working on edges or corners due to its minimal overspray. Finished by grinding or filing. Colmonoy 23A and 24 are used by commercial mould shops to coat seams of finish moulds and blanks.
22			1.0	3.7		Bal			P: 2.2	28-33	1705 °F 930 °C	Atomized Powder	Fusewelder	A harder version of Colmonoy 23A and 24, for similar applications. Can be finished with a file, used by commercial mould shops to coat seams and finish moulds and blanks.

1 Contains tungsten-carbide particles (hardness 2400 HV)
2 U.S. Patent 5,234,510
3 European Patent 0498989

* See WCC_TECH-PTA/HVOF Selector Chart

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WALLCOLMONOY
SURFACING ALLOYS

COLMONOY®
(nickel-based)

ALLOY	NOMINAL COMPOSITION (%)									ROCKWELL HARDNESS (C-scale)	FUSING TEMPERATURE (APPROX.)	SUPPLIED AS	METHOD OF APPLICATION	DESCRIPTION AND GENERAL USES
	C	Cr	B	Si	Fe	Ni	Mo	W	Others					
with tungsten carbide[1]														
ColTung™ 1	1.8 *40% Tungsten Carbide Particles*	7.0	1.9	2.7	2.2	Bal		38.5	Co: 0.12	59-64	1900 °F 1040 °C	Bare Rods	Oxyacetylene, GTAW	A nickel-chromium-boron matrix alloy rich in chromium boride is used to hold extremely hard tungsten-carbide particles. Produces rod-welded deposits with same chemistry as spray-applied Colmonoy 75 or 705. Finished by grinding.
64	2.5 *40% Tungsten Carbide Particles*	9.0	1.7	2.9	3.8	Bal		33.0	Co: 4.8	58 min	1950 °F 1065 °C	Composite Powder	Spraywelder	A nickel-based composite powder for applications requiring high abrasion resistance. Contains a moderately high volume percent of extremely abrasion resistant tungsten-carbide particles (3500 DPH).
75	2.9 *50% Tungsten Carbide Particles*	7.5	1.4	2.4	2.5	Bal		41.4	Co: 6.0	57-63	1950 °F 1065 °C	Composite Powder	Spraywelder	A nickel-chromium-boron matrix alloy holds extremely hard tungsten-carbide particles. Used primarily for protection from severe sliding abrasion. Finished by grinding.
635	2.3 *35% Tungsten Carbide Particles*	8.0	1.9	3.0	2.5	Bal		30.8	Co: 2.1	57-63	1930 °F 1055 °C	Composite Powder	Spraywelder	A nickel-chromium-boron matrix alloy holds extremely hard tungsten-carbide particles. Provides excellent protection against abrasive wear.
705	2.2 *50% Tungsten Carbide Particles*	7.0	1.5	2.1	2.0	Bal		48.1		56-63	1875 °F 1025 °C	Composite Powder	Fusewelder	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.
730	2.4 *35% Tungsten Carbide Particles*	8.4	1.8	2.4	2.5	Bal		39.2	Co: 2.1	57-63	1940 °F 1060 °C	Composite Powder	Spraywelder	A tough nickel-chromium-tungsten matrix alloy holds extremely hard tungsten-carbide particles. Finer mesh tungsten carbide than Colmonoy 750. Used on pump plungers and sleeves for protection from fine-particulate abrasive conditions. Minimizes packing wear. Finished by grinding.
750	3.0 *50% Tungsten Carbide Particles*	6.0	1.6	1.5	2.0	Bal		46.8	Co: 6.0	57-63	1960 °F 1070 °C	Composite Powder	Spraywelder	A tough nickel-chromium-tungsten matrix alloy is used to hold extremely hard tungsten-carbide particles. Best used for the most severe abrasive conditions. Finished by grinding.

WALLEX™
(cobalt-based)

40	0.6	16.2	2.0	1.9	2.0	23.5		7.6	Co: Bal	41-46	2080 °F 1140 °C	Atomized Powder, Ingot	Spraywelder, Fusewelder	A cobalt-nickel alloy powder that forms deposits similar to those of Wallex 50, but softer. Finished with carbide tools and grinding. Developed as a lower temperature alternative for many cobalt-6 applications.
50	0.8	19.0	3.4	2.8	2.0	18.0		10.0	Co: Bal	56-61	2000 °F 1095 °C	Atomized Powder, Ingot	Spraywelder, Fusewelder	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.
55	2.3 *35% Tungsten Carbide Particles*	12.0	2.0	1.7	1.2	12.6		34.8	Co: Bal	58 min.	2030 °F 1110 °C	Composite Powder	Spraywelder	Uses a cobalt-nickel matrix alloy to hold extremely hard tungsten-carbide particles. Primarily to protect surfaces against severe sliding abrasion. Finished by grinding.

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3 European Patent 0498989