



# Colferoloy™ SS 420

Martensitic Stainless Steel Powder for PTA, Laser, HVOF and AM Applications

### Description:

Colferoloy™ SS 420 is high-hardenable martensitic stainless steel containing 12% minimum Cr level. Colferoloy™ SS 420 offers good resistance to corrosion resistance whilst retaining good ductility as annealed. Typical Hardness level of **96 HRB**.

Colferoloy™ SS 420 is designed for application by PTA, High Speed (EHLA / HSLC) and Conventional Laser Cladding, Additive Manufacturing, and HVOF.

Typical applications include cutlery and knifewear applications including medical, and shear blades, particularly in the hardened condition.

### Nominal Composition - % by Weight:

C	Cr	Mn	P	S	Si	Fe
0.30	13.0	<1.0	<0.04	<0.03	<1.0	Bal

### Forms Available:

Colferoloy™ SS 420 are supplied as atomised powder for application with PTA, Laser Cladding, High Speed Laser Cladding, HVOF, and Additive Manufacturing.

Micron Size	Application
-150+53 µm	PTA / LASER
-63+20 µm	HVOF
-106+45 µm	AM
-45+15 µm	

*Additional micron sizes available upon request.*

## Application Methods:

Colferoloy™ SS 420 alloys are easily applied to all steels having less than .25% carbon, gray cast iron; Meehanite, malleable, ingot and wrought iron; nickel, Monel<sup>a</sup> alloy 400, Inconel<sup>a</sup> alloy 600, Nichrome, Chromel<sup>b</sup>. Most high-temperature alloys can be overlaid without special precautions.

Steel having more than .25% carbon can also be overlaid, but requires controlled slow cooling after fusion, in suitable insulation such as Sil-O-Cel, mica, etc. Do not apply to ferrous metals that require subsequent hardening and tempering, because the dimensional change associated with the formation of martensite will crack the deposits of Colferoloy™ SS 420. Hardenable base metals may be overlaid but must be annealed isothermally after uniform austenitizing to prevent cracking of the deposits of Colferoloy™ SS 420. (Consult [Technical Services](#) for further details).

## Application by Laser Cladding:

Colferoloy™ SS 420 alloys produce an excellent weld overlay using various direct laser deposition instruments.

Laser Cladding utilizes a laser beam as a heat source to weld a surfacing material to a substrate. Surface cladding powder is delivered to the weld zone through a powder feeder with an inert gas carrier. The power level of the laser, the powder feed rate, pre-heat of the base metal, and 3-dimensional movement speeds must be balanced to produce a metallurgically bonded, low dilution, crack free, porosity free clad overlay.

Properly applied laser clad overlays can have significantly higher hardness than a corresponding thermal spray applied coating of the same material. Alloy selection for the laser cladding process should take this into consideration.

Laser Cladding can be conducted in a sealed, inert environment, or in an open shop environment. In the latter case, the use of argon or helium carrier gases with argon and/or helium shielding gases are recommended. Nitrogen is not an inert gas and it is not recommended for general use in Laser Cladding.

## Application by Plasma Transferred Arc Welding (PTA):

There are numerous Plasma Transferred Arc Welding systems on the market and a wide range of welding parameters which can be used to produce excellent weld overlays of Colferoloy™ SS 420 alloys.

Wall Colmonoy recommends that a pure argon plasma gas be used in combination with an argon hydrogen shielding gas and an argon carrier gas.

Actual welding parameter settings will depend on the base metal, its thickness, geometry, and metallurgical condition as well as the desired properties/geometry of the weld overlay and the type of PTA equipment being used.

Preheat and weld inter-pass temperature can affect the quality of the weld deposit and its wear properties.

Preheat Temperature by Class for steels					
Class	Description	up to ½"	½" to 1"	1" to 2"	Interpass
10xx	C steels	100 – 600	100 – 700	100 – 800	200 – 700
13xx	Mn steels	350 – 500	400 – 600	450 – 700	450 – 600
23xx	Ni steels	200 – 400	200 – 500	300 – 700	300 – 600
31xx	Ni – Cr steels	200 – 600	300 – 700	400 – 900	>400
32xx	Ni – Cr steels	300 – 900	400 – 1000	500 – 1100	500 – 900
33xx	Ni – Cr steels	500 – 900	600 – 1000	700 – 1100	700 – 900
34xx	Ni – Cr steels	900 – 1100	900 – 1100	900 – 1100	900 – 1100
4140	Cr – Mo steel	600	700	800	600 – 800
4340		600	800	900	700 – 900
46xx		400 – 600	500 – 700	600 – 800	≅ 600
4820		600	700	800	600 – 800
5120		100 min	200 – 300	250 – 350	≅ 300
5145		400 – 500	450 – 550	500 – 600	≅ 500
86xx		100 – 400	200 – 500	300 – 600	≅ 400
High strength alloy steels (quenched and tempered)					
A533, B		50 – 200	100 – 350	200 – 450	100 – 350
A542		150 – 300	200 – 350	250 – 450	200 – 350
HY-130		75 – 225	75 – 275	200 – 375	200 – 350

## Application by High Velocity Oxygen Fuel (HVOF):

### JP 5000 Parameters for Spraying Colferoloy™ SS 420 Powder\*

Gun barrel:	102mm (4")
Spray distance:	365mm (15")
Coating thickness:	>1.5mm (>0,060")
Spray rate:	4.5 - 5.4kg/hr (10 - 12 lb./hr.)

Spray Parameters	Supply Pressure	Flow	System Pressure **
Oxygen	210 psi	1925 scfh	140 psi +/- 10 psi
Fuel (K1 kerosene)	170 psi	6.0 gph	121 +/- 10 psi
Powder (nitrogen carrier)	50 psi	19-20 scfh	not applicable
Water Temperature: incoming - outgoing -	21°C 50°C +/- 5°C		

\* Some modifications to the parameters may be needed to compensate for longer hoses.

\*\* System pressures are based on supply pressure and flow settings and are present for the purpose of monitoring the condition system consumables; located at the bottom of the control console.

## Safety:

Do not heat any part of the cast iron over 815°C during welding as this will cause oxidation of the surface and create hard spots adjacent to the deposit. If this critical temperature is approached, welding should be stopped, and the part allowed to cool to 315-425°C. The powder is applied by pressing the lever on the torch, which admits the powder to the gas stream. After passing through the flame, the molten particles are deposited on the work. When a small amount of alloy has been deposited, the powder is stopped (by releasing the lever), and the torch flame used to fuse the deposited material to the base metal. This spray-fuse cycle is repeated until sufficient build-up has been achieved. On all except large mass parts, the Fusewelder™ Torch does all the heating required: pre-heating, spraying and fusing. Deposits as easily finished by grinding or by filing.

**Warning: Thermal spray torches and heating torches used for application of this product utilize compressed gasses or liquid fuels including oxygen, air, flammable fuel gas, or flammable liquid fuel. Follow your employer's safety procedures when using and handling these gases and equipment. Infrared and ultraviolet radiation (light) emitted from flame and hot metal can injure eyes and burn skin. HVOF and HVAF systems can produce noise levels that can damage hearing. Use appropriate personal protective equipment.**

**Warning: Laser cladding processes may use high power levels when applying this product. Follow your employer's safety procedures and the equipment manufacturer's instructions when laser cladding. Refer to AISI Z136.1 "Safe use of Lasers" and consult your employer's Laser Safety Officer regarding the proper use of personal protective equipment.**

**Danger: Plasma transferred arc (PTA) welding is a welding process used for application of this product. Follow your employer's safety procedures and the equipment manufacturer's instructions when PTA welding. Electric shock can kill. Properly install and ground electrical equipment prior to use. Infrared and ultraviolet radiation emitted from the hot metal or welding arc can injure eyes and burn skin. Use appropriate personal protective equipment.**

## Storage Requirements:

Keep thermal spray powders in a closed container and protect against moisture pick-up. The containers should be tumbled before using the powder. If moisture is absorbed from the atmosphere, it can be removed and flow ability can be restored by drying the powder, with the seal removed and lid loosened, at 66-93°C (150-200°F) for two hours prior to use.

*The information provided herein is given as a guideline to follow. It is the responsibility of the end user to establish the process information most suitable for their specific application(s). Wall Colmonoy assumes no responsibility for failure due to misuse or improper application of this product, or for any incidental damages arising out of the use of this material.*

*a Registered trademark of Special Metal Corporation.*

*b Registered trademark of Concept Alloys.*

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