



Laser Cladding deposition

Colmonoy® 686 Alloys

Alloy with Outstanding Resistance to Pitting Corrosion for Application by PTA, Laser, and HVOF Techniques.

Description:

Colmonoy® 686 is a nickel-based superalloy with high levels of chromium, molybdenum and tungsten, achieving one of the highest ratings possible for pitting corrosion resistance. Coatings made using this alloy also offer outstanding general and crevice corrosion resistance and have a low coefficient of friction. Coatings of Colmonoy® 686 can be produced via plasma transferred arc (PTA), laser and High Velocity Oxygen Fuel (HVOF) deposition methods. Colmonoy® 686, when PTA or laser deposited, can achieve a nominal hardness of **99* HRB**.

**Dependent on application type, equipment used and parameter settings.*

Recommended applications include:

- Marine Engineering*
- Chemical Processing*
- Pollution-Control equipment*
- Nuclear Reactors*
- Automotive*
- Oil & Gas Industry*
- Aerospace Engineering (subject to compliance to customer approvals/standards)

**The above applications are for recommendation purposes and are solely based upon compatibility with the following data:*

Nominal Composition - % by Weight:

C	Cr	Fe	Mn	Mo	P	Si	Ti	W	Ni
<0.02	21.5	<2.0	<0.5	16.0	<0.04	<0.95	0.07	3.8	Bal

Forms Available:

Colmonoy® 686 is available in powder sizes tailored to suit PTA, Laser Cladding, and HVOF applications.

Alloy	Mesh Size	Application
P2	53 - 150 micron	PTA
P3	45 - 125 micron	Laser
H1	20 - 63 micron	HVOF
H2	20 - 53 micron	
H3	20 - 45 micron	

Additional mesh sizes are available on request

Properties (Approximate):

Solid Density	8.73 gms/cm ³ (0.315 lb/in ³)
Apparent Density	4.4 - 4.7 gms/cm ³ (0.159 - 0.170 lb/in ³)
Melting Range	1306 - 1344°C (2383 - 2451°F)

Application by PTA Welding:

There are numerous PTA welding systems on the market and a wide range of welding parameters can be used with Colmonoy® 686 to produce excellent weld overlays. 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 and surface condition as well as the desired properties / geometry, metallurgical and surface of the weld overlay and the type of PTA equipment being used (Consult [Technical Services](#) for further details).

Application by Laser Cladding:

Laser Cladding utilises 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 powder feeder with an inert gas carrier. The power level of the laser, powder feedrate, pre-heat of the base metal, and 3-dimensional movement speeds must be balanced to produce a metallurgically bonded, low dilution, crack free, minimised porosity 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 gas with argon and / or helium shielding gas is recommended. Nitrogen is not an inert gas and it is not recommended for general use in Laser Cladding.

Safety:

When handling powders do so in such a way to avoid creation of a dust cloud; avoid inhalation or contact with skin or eyes. Conduct coating operations in a properly ventilated area. For more information, consult 11.8 (Ventilation), AWS Thermal Spraying: Practice, Theory, and Application available from American Welding Society, OSHA Safety and Health Standards available from U.S. Government Printing Office, and the manufacturer's Material Safety Data Sheet (MSDS).

Danger: Plasma Transferred Arc (PTA) welding is a welding process used for application of this product. Follow your employers safety procedures and the equipment manufacturers 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.

Warning: Laser Cladding processes may use high power levels when applying this product. Follow your safety manual, or a safe process of work.

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 has adsorbed from the atmosphere it can be removed and flowability 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.

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