



A Glass Container Mould being repaired with Colmonoy® 225.

## Colmonoy® 200-Series: (225, 226, 227, 228, 229, 234)

Nickel-Based Hard-Surfacing Alloys For the Repair and Protection of Castings & Mould Parts For the Glass Container Industry

### Description:

Colmonoy® 200-Series include 225, 226, 227, 228, 229, and 234. The hard-surfacing alloys are nickel-based and can be deposited using the Wall Colmonoy Fusewelder™ Torch. Deposits of Colmonoy® 200-Series have high oxidation resistance and are easily furnished with a file or by grinding.

Colmonoy® 200-Series have the following Rockwell C hardness ranges:

Alloy	Rockwell C
225	13-17
226	16-21
227	22-27
228	28-33
229	25-32
234	32-36

Colmonoy® 200-Series are used extensively in the Glass Container industry for repair and/or protection of castings or mould parts.

### Nominal Composition - % by Weight:

Alloy	B	C	Cr	P	Mo	Si	Ni
225	0.5	-	-	1.9	-	2.2	Bal
226	0.8	-	-	1.9	-	2.2	Bal
227	0.9	-	-	2.1	-	2.7	Bal
228	1.0	-	-	2.0	-	3.7	Bal
229	0.9	-	3.0	2.0	-	2.7	Bal
234	1.0	0.1	4.0	2.0	3.0	2.8	Bal

### Forms Available:

Colmonoy® 200-Series are supplied as atomized powder for application with Wall Colmonoy Fusewelder™ Torch. Also available as sintered bare rod.

Alloy	Mesh Size	Application
225	140 mesh - 635 mesh 106µm - 20µm	Fusewelder
226	140 mesh - 635 mesh 106µm - 20µm	
227	140 mesh - 635 mesh 106µm - 20µm	
228	140 mesh - 635 mesh 106µm - 20µm	
229	140 mesh - 635 mesh 106µm - 20µm	
234	140 mesh - 635 mesh 106µm - 20µm	

### Colmonoy® 200-Series:

Colmonoy® 200-Series are designed for spray and fuse applications, using combustion thermal spray systems such as the Wall Colmonoy Fusewelder™ Torch.

Fused coatings form a metallurgical bond with the substrate providing inter-particle cohesive strength and substrate-to-coating adhesive strength with very low porosity. The coatings show good resistance to wear and impact, and their hot hardness is excellent.

### Properties:

**Table 1: Physical Properties (approximate):**

Alloy	Specific Gravity	Melting Point
Colmonoy® 225	8.45	1805°F (985°C)
Colmonoy® 226	8.43	1787°F (975°C)
Colmonoy® 227	8.40	1742°F (950°C)
Colmonoy® 228	8.40	1724°F (940°C)
Colmonoy® 229	8.40	1710°F (932°C)
Colmonoy® 234	8.50	1724°F (940°C)

### Application Methods:

Colmonoy® 200-Series 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 Colmonoy® 200 Alloys. Hardenable base metals may be overlaid, but must be annealed isothermally after uniform austenitizing to prevent cracking of the deposits of Colmonoy® 200-Series. (Consult [Technical Services](#) for further details).

### Application by Fusewelder® Torch:

Colmonoy® 200-Series are applied by Fusewelder™ or similar torch. The Fuseweld Process is a coating application method to apply metallurgically bonded coatings to the edges and corners of molds and blanks. Small shafts, the leading edge of flights for augers and centrifuge scrolls, keyways, splines, and cams can all be efficiently coated or rebuilt with this process.

### Machining, Grinding and Lapping:

There are several techniques used for material removal that produce high quality finished products.

Machining can be done, using cubic boron nitride tooling. Use GE's BZN compacts (such as BRNG-43T) or Kennametal's CNMA 433KC-210. Use a negative rake tool, with a 15-degree lead angle. It should have a 3/64-in. radius and T-land edge preparation. Set tool at centerline of work. Feed at 0.005-0.010 IPR, with depth of cut up to 0.125-in., at 200-300 SFM or higher.

The coatings can be machined with difficulty by carbide-tipped tools, such as Kennametal K6, Carboloy 883 or equivalent. For roughing, grind the tool with a slight lead and rake angle, and a slight radius (approx. 1/32"). Use a fine feed, about 0.003" per revolution, with a depth of cut about 0.015" at 15 SFPM. Set tool about 1/32" below center.

For finishing, grind the tool with the same slight lead and rake angles and with about a 1/16" radius. Use a fine feed, about 0.003" per revolution, with a maximum cut of 0.005" at approximately 45 SFPM.

Grinding is used after machining to remove the last 0.005-0.006" of material. Actually, the entire finishing is most commonly done by grinding, which eliminates machining. Grinding produces a near-frictionless mirror finish. Such smooth surfaces usually wear better, because they generate less heat and friction. Whereas a diamond wheel is preferred, green silicon carbide wheels (hardness H to K) can

be used. Use 24 to 36 grit for roughing and 60 grit or finer for finishing. Grind wet when possible; do not let the wheel get loaded; dress frequently. Take light, fast cuts. (Manufacturer can provide full details for grinding.)

Dry lapping can be used to give the alloy an excellent finish. Silicon carbide, boron carbide and diamond dust are all capable of cutting the Colmonoy® coating, but they must be embedded in a cast iron or steel wheel to properly lap fused deposits of Colmonoy® 200-Series. Apply with a steady pressure and avoid overheating. If the lapping compounds are used loose, they will cut the nickel matrix before the chromium carbides, giving the surface an etched appearance.

### Safety:

When handling powders do so in such a way to avoid creating 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).

**Warning: Thermal spray torches and heating torches used for application of this product utilize compressed gases including oxygen and a flammable fuel gas. 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. 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 flowability can be restored by drying the powder, with the seal removed and lid loosened, at 150-200°F (66-93°C) 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 Corporation (USA) 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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*b Registered trademark of Concept Alloys.*

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