

Material Product Data Sheet

Ferritic Stainless Steel Powders for Clad Deposits

Powder Products: Metco™ 1020A, Metco 1020B

Patent pending.

1 Introduction

Metco 1020x family of products are proprietary ferritic stainless steel powders with a composition similar to a 400 series stainless steel. They have been optimized for higher wear resistance, while maintaining a similar level of corrosion resistance to a type 431 stainless steel.

The Metco 1020x family was designed for laser cladding processes to produce an overlay that combines good wear and corrosion resistance, especially where a crack-free coating is necessary. It is recommended for applications where the corrosion resistance of a type 431 stainless steel is sufficient, but better wear resistance is required.

The stable ferritic structure of the Metco 1020x series is less susceptible to performance variations that could result from varied processing conditions and cooling rates than typical martensitic steels. While the ferrite structure of Metco 1020x deposits does yield lower hardness than martensitic steels, the wear resistance is actually higher than martensitic steels resulting from the formation of hard precipitates during the cladding process.

These materials can be clad in multiple layers crack-free, allowing for the overlay to be utilized for rebuild or salvage of under-sized parts. The overlay can be ground to a very good finish using silicon carbide wheels.

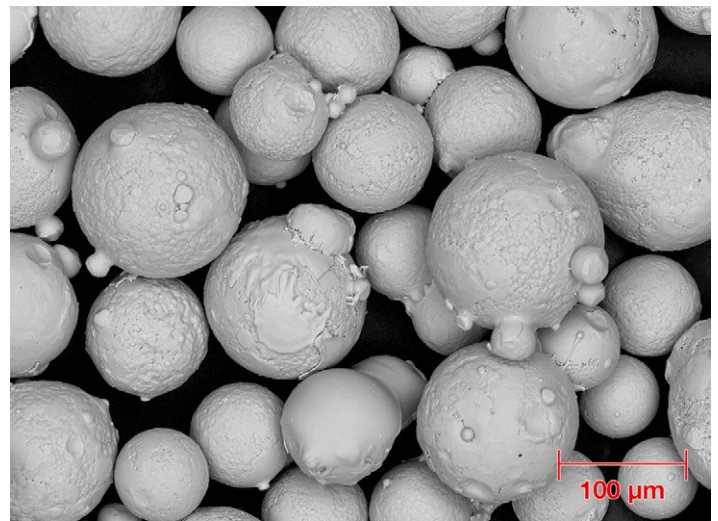
1.1 Typical Uses and Applications

- Hydraulic cylinder rods
- Replacement of hard chromium plating
- Hard bearing surfaces: bearing journals, fuel pump rotors, sleeves
- Resist abrasive grains (low temperature): cylinder liners, pistons, pump plungers, hydraulic rams, crankshaft bearings
- Resist hard surfaces (low temperature): wire drawing capstans, pump seals, mechanical seals
- Resist fretting (intended or non-intended motion): machine bedways, wear rings, press-fit bearing seats
- Resist particle erosion (low temperature): exhaust fans, hydroelectric valves
- Salvage and build-up of grindable steels: mis-machined parts, worn parts

Quick Facts

Classification	Alloy, iron-based
Chemistry	Proprietary
Manufacture	Gas atomized
Morphology	Spherical
Overlay hardness	35 HRC (approx.)
Wear resistance ^a	90 to 95 mm ³ (per ASTM G65-A)
Purpose	Corrosion and Wear Resistance
Process	Laser Cladding, EHLA, PTA, HVOF

^a Abrasion resistance is better than 431 stainless steel despite lower hardness



SEM photomicrograph of Metco 1020 showing morphology that is typical of these products.

2 Material Information

2.1 Composition, Particle Size Distribution and Other Physical Properties

Product	Composition	Nominal Range (µm)	Morphology	Manufacturing Method
Metco 1020A	Proprietary	-150 +53	Spherical	Gas Atomized
Metco 1020B	Proprietary	-53 +20	Spherical	Gas Atomized

Screen analysis per ASTM Standard B214 for particle sizes 45 µm and above; sieve analysis for particles sizes below 45 µm via laser diffraction (Microtrac)

2.2 Recommended Application Process

Product	Laser Cladding	High-Speed Laser Cladding (EHLA)	Plasma Transferred Arc (PTA)	High-Velocity Oxygen Fuel Spray (HVOF)
Metco 1020A	✓	✗	✓	✗
Metco 1020B	✗	✓	✗	✓

2.3 Key Selection Criteria

- Choose the Metco 1020x family of products when one or more of the following requirements are true:
 - Corrosion resistance: Overlays of Metco 1020x series provide good corrosion resistance comparable to that of type 431 stainless steel. Metco 1020x coatings survive 1,000+ hours in salt fog corrosion testing.
 - Wear Resistance: Coatings produced using the Metco 1020x series of products provide more than 50% additional wear resistance when compared to 431 stainless steel.
 - Crack Resistance: Metco 1020x products can deliver multiple layer, crack-free coatings in laser, EHLA, and PTA processes
 - Finish: Metco 1020x deposits can be finished as well as a 400 series stainless steel
 - Wide Application Window: The ferritic structure of Metco 1020x deposits are stable throughout the entire temperature range, from initial weld solidification to room temperature, enabling more stable properties than martensitic steels
 - Preheat: For the majority of applications, a preheat is not required in order to produce a crack-free coating

2.4 Related Products

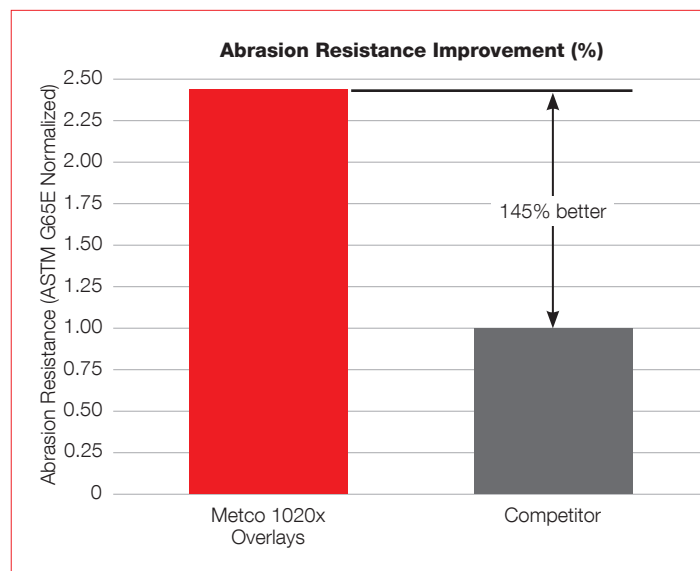
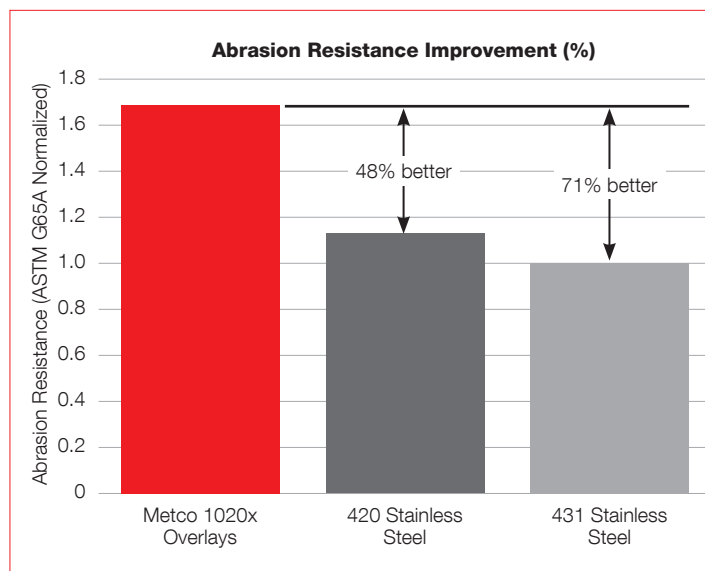
- If better corrosion resistance is required and wear resistance is not a critical factor, austenitic steel powders such as Metco 41C and Diamalloy 1003 should be used.
- For aggressive aqueous acidic or alkaline media, Hastelloy-type materials such as Diamalloy 4276, Metco 1700, or Metco 1720x should be considered. Coatings of these materials also offer sliding wear protection, high hot hardness, scuffing and galling resistance.
- If significantly higher wear resistance is required for applications below 500 °C (930 °F), tungsten carbide nickel powders such as MetcoClad 52025 should be chosen.

3 Key Processing Information

3.1 Abrasion Resistance

Although the hardness of overlays produced using the Metco 1020x family of products are generally significantly lower than that of 400-series stainless steels, the abrasion resistance is far better per ASTM G65A volume loss testing. In

addition, the abrasion resistance compared to a popular competitor for this applications indicate that overlays of the Metco 1020x family of products provides significantly better performance per ASTM G65E volume loss testing.



3.2 Recommended Spray Guns

When thermal spraying these products, the following spray guns are recommended:

Recommended HVOF Spray Guns

- WokaStar series
- WokaJet series
- DiamondJet series

3.3 Coating Parameters

Please contact your Oerlikon Metco Account Representative for parameter availability. For specific coating application requirements, the services of Oerlikon Metco's Coating Solution Centers are available.

4 Commercial Information

4.1 Ordering Information and Availability

Product	Order No.	Package Size	Availability	Distribution
Metco 1020A	1533800	5 kg (approx. 11 lb)	Stock	Global
Metco 1020B	1533807	5 kg (approx. 11 lb)	Stock	Global

4.2 Handling Recommendations

- Store in the original container in a dry location.
- Open containers should be stored in a drying oven to prevent moisture pickup.
- Tumble contents prior to use to prevent segregation.

4.3 Safety Recommendations

See SDS 50-2670 (Safety Data Sheet) in the localized version applicable to the country where the material will be used. SDS are available from the Oerlikon web site at www.oerlikon.com/metco (Resources – Safety Data Sheets).

Information is subject to change without prior notice.