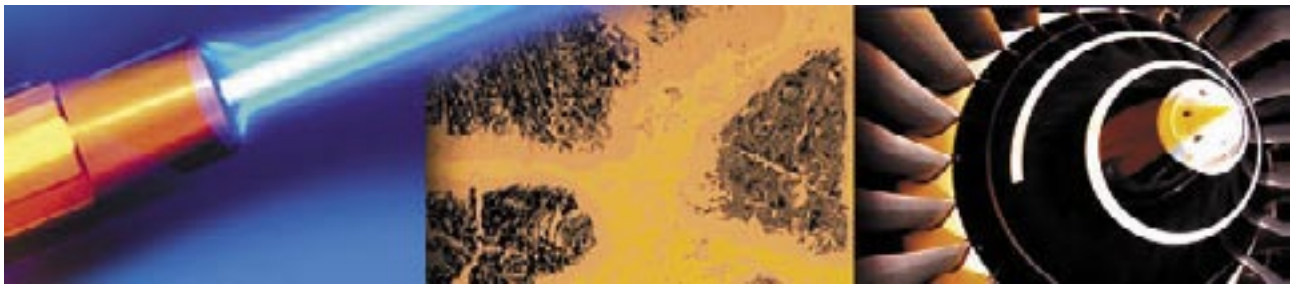
H.C.Starck



AMPERIT® and *AMPERWELD*®

Powders for Surface Technology and more…

AMPERIT® 707

Chromium Oxide

Cr_2O_3

Fused

(Replacement for *AMPERIT*® 704)

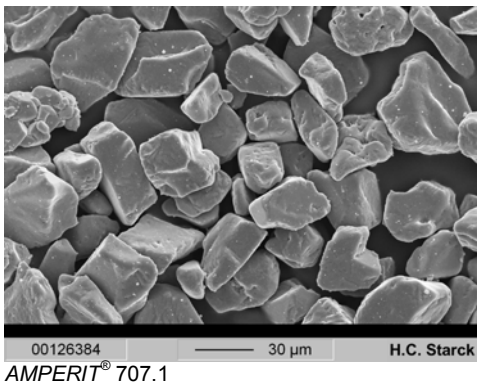
Technical Bulletin
07-707-1
Issued October 2007-01-10

General Information

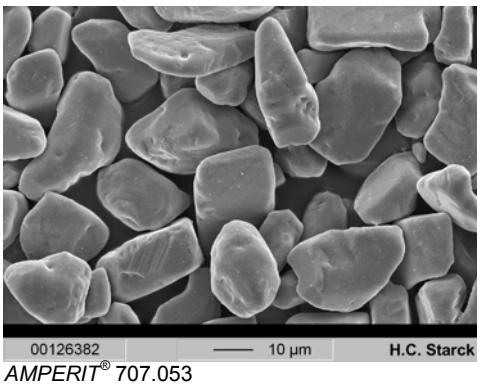
Chromium oxide materials are generally recommended for corrosion and wear protection in many industrial applications. In addition, chromium oxide materials are insoluble in acids, alkalis and alcohol. Typical applications include laser engraved printing rolls, pump seal areas, wear rings, etc. High quality coatings can be achieved using plasma spray processes.

Technical Data

***AMPERIT*® 707** is designed to replace ***AMPERIT*® 704** offering outstanding sprayability and coating characteristics.



AMPERIT® 707.1



AMPERIT® 707.053

***AMPERIT*® 707** has been developed to offer improved flow characteristics and reduced wear of the plasma spray equipment, whilst retaining the dense and blocky morphology of ***AMPERIT*® 704**. This has been achieved by subtle modification of the morphology, primarily by softening the edges of the particles.

The exceptional reproducibility of ***AMPERIT*® 704** remains unaltered making ***AMPERIT*® 707** especially suitable for laser engraved printing rolls.

Chemical Characteristics

(Mass fraction in %)

SiO_2	max. 0.25 %	Acid soluble chromium	max. 0.15 %
TiO_2	max. 0.15 %	Cr_2O_3	balance
Fe_2O_3	max. 0.10 %		

Physical Characteristics

Particle size distribution (by Laser light diffraction per ASTM C 1070)

	707.1 **45/22 µm**	**707.054** **45/10 µm**	**707.072** **38/10 µm**	**707.053** **25/10 µm**
- 88 µm	100 %	100 %		
- 62 µm	min. 95 %	min. 95 %	100 %	100 %
- 44 µm			min. 95 %	
- 31 µm				min. 85 %
- 15 µm	max. 5 %			
- 11 µm		max. 10 %	max. 10 %	max. 10 %

Additional grain sizes/specifications:

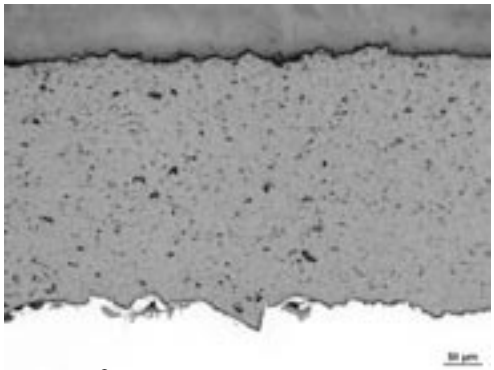
***AMPERIT*® 707.0**	22/5 µm
***AMPERIT*® 707.092**	75/25 µm

Coating Properties (and comparison to *AMPERIT*® 704)

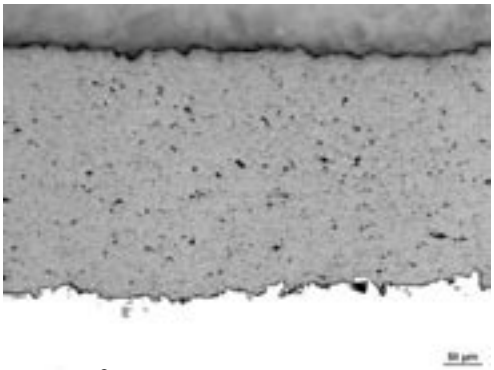
Coatings sprayed from ***AMPERIT***® **707** exhibit comparable porosity, microstructure and microhardness to ***AMPERIT***® **704**. Coating parameters require little or no changes when upgrading from ***AMPERIT***® **704** to ***AMPERIT***® **707**. The outstanding repeatability of the powder production process results in the highly reliable coating properties demanded by the producers of laser engraved rolls.

Typical Properties of Plasma Sprayed Coatings:

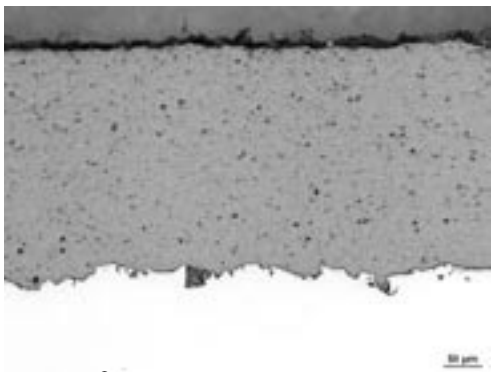
	AMPERIT® **707**	***AMPERIT***® **704**
Microhardness:	1150 – 1400 HV0.3	1150 – 1350 HV0.3
Bond strength: (Depending on bond coat and surface roughness)	40 – 55 MPa	40 – 55 MPa
Surface Roughness Ra: (As sprayed)	2.1 – 5.0 µm	2.3 – 5.5 µm
Porosity:	< 2 – 3 %	< 2 – 3 %
Deposition efficiency:	40 – 48 %	35 – 45 %
Coating Structure:		



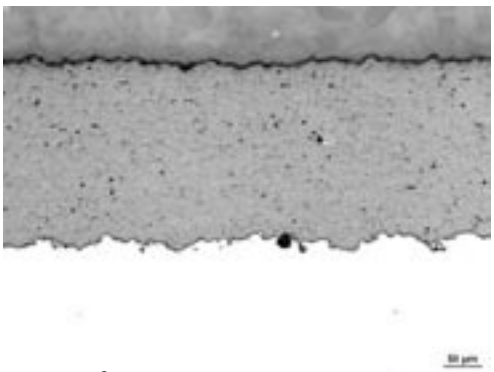
AMPERIT® 707.1



AMPERIT® 704.1



AMPERIT® 707.053



AMPERIT® 704.053

Please note: The values and characteristics in this Product Bulletin are typical values only and do not constitute a specification.

Applications

***AMPERIT*® 707** produces dense, wear and corrosion resistant coatings which are suitable for a wide variety of applications. These applications include resistance to wear by hard surfaces, abrasive grains, cavitation and particle erosion. In addition, coatings are insoluble in acids, alkalis and alcohol. Furthermore, ***AMPERIT*® 707** produces coatings which are resistant to wear and chemical attack by printing inks and aggressive cleaning agents.

Examples:

» Anilox rolls
» Pump seals
» Pump seats
» Wear rings
» Rolls subject to abrasive and sliding wear

Spray parameters for common plasma systems

The spray parameters for commonly used plasma spray equipment can be found below. H.C. Starck recommends these settings as good starting points. Whilst applications and equipment vary, modifications to and/or optimization of the spray parameters may further enhance the coating quality.

F4

Grain sizes: 45/22 µm (.1) 45/10 µm (.054) 38/10 µm (.072)

Settings		**Baseline**	**Alternative**
Nozzle:		6 mm	6 mm
Powder Injector:	Size	1.5 mm	1.5 mm
	Angle	90°	90°
	Gauge	6 mm	6 mm
Gases:	Primary Ar	36.0 Nl/min	42.0 Nl/min
	Secondary H_2	13.0 Nl/min	12.0 Nl/min
	Carrier Ar	2.5 – 4.0 Nl/min	2.5 – 4.0 Nl/min
Amperage:		630 A	630 A
Voltage:		72 V	77 V
Powder Feed Rate, max.		1 x 50 / 2 x 35 g/min	1 x 50 / 2 x 35 g/min
Spreader / Suction Plate:		L / L (NL / NL)	L / L / (NL / NL)
Spray distance:		90 - 110 mm	90 – 110 mm

Grain sizes: 25/10 µm (.053) 22/5 µm (.0)

Settings		**Baseline**	**Alternative**
Nozzle:		6 mm	6 mm
Powder Injector:	Size	1.5 mm	1.5 mm
	Angle	90°	90°
	Gauge	6 mm	6 mm
Gases:	Primary Ar	38.0 Nl/min	42.0 Nl/min
	Secondary H_2	13.0 Nl/min	12.0 Nl/min
	Carrier Ar	3.0 – 4.5 Nl/min	3.0 – 4.5 Nl/min
Amperage:		630 A	630 A
Voltage:		72 V	77 V
Powder Feed Rate, max.		1 x 50 / 2 x 35 g/min	1 x 50 / 2 x 35 g/min
Spreader / Suction Plate:		L / L (NL / NL)	L / L / (NL / NL)
Spray distance:		90 – 110 mm	90 – 110 mm

Spray parameters for common Plasma systems (cont´d)

7MB / 9MB

Grain sizes: 45/22 µm (.1) 45/10 µm (.054)

System	7MB	9MB
Nozzle:	700	720
Powder Injector Type:	No. 2	No. 2
Gases: Primary Ar	37 Nl/min	37 Nl/min
Secondary H_2	12 Nl/min	12 Nl/min
Carrier Ar	7 Nl/min	7 Nl/min
Amperage:	630 A	630 A
Voltage:	62 V	62 V
Powder Fee Rate, max.	38 g/min	38 g/min
Spreader / Suction Piece:	L / L	L / L
Spray Distance:	65 mm	65 mm

Safety*, Handling and Storage Recommendations

Safety*:

***AMPERIT*® 707** is a non-hazardous material.

Nevertheless, in the event of contact with the skin, rinse off with water and soap. Contamination of the eyes must be treated by thorough irrigation with water, with eyelids held open. Eventually a doctor (or eye specialist) should be consulted.
If product is swallowed consult a doctor.

*The complete Material Safety Data Sheet (MSDS) for ***AMPERIT*® 707** is available on request.

Handling:

Avoid formation and deposition of dust. During processing, ensure efficient exhaust ventilation in the working area. Wear always eye and hand protection.

Storage:

Store ***AMPERIT*® 707** in dry and closed containers. Powder containers shall be tumbled before using the powder. Powders can pick up moisture, which may affect the flowability of the powder. Flowability may be improved by storing the powder in a warm cabinet and/or by drying the powder by heating the open container at 93 °C for 2 hours prior use.

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