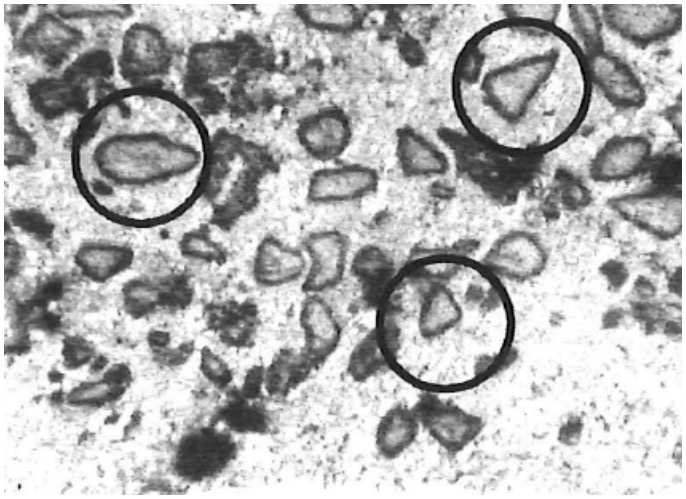
WALLCOLMONOY
SURFACING ALLOYS

WALLCOLMONOY CORP. (USA)
TECHNICAL DATA SHEET

Wallex™ 55 & 505



50X photomicrograph of Wallex 55 showing tungsten carbide (circled).

Cobalt-Based Composite Hard-Surfacing Alloys with High Abrasion and Corrosion Resistance

Description:

Wallex 55 and 505 are composite hard-surfacing alloys containing both atomised and crushed powders. The matrix is a highly abrasion and corrosion resistant cobalt-nickel alloy. Wallex 50 and 505 are enriched with extremely hard tungsten carbide particles. The alloys cannot be forged or heat treated. The alloy's room temperature hardness is unaffected by repeated heating and cooling. The alloys have excellent resistance to metal-to-metal wear and abrasion. Wallex 55 and 505 maintain their hardness at high temperatures (high red hardness). Impact resistance is good. Oxidation and corrosion resistance properties are excellent. Wallex 55 and 505 are spray deposited and fused to achieve a hardness range of **Rockwell C 58 min**.

Applications include shaft sleeves, various pump components, bushings, buffing fixtures, cutting tool chip breakers and high temperature (900°F (482°C)) unlubricated sleeve bearing operating in liquid sodium, liquid potassium, and NaK.

Nominal Composition - % by Weight:

B	C	Cr	Fe	Ni	Si	W	Co
2.0	2.3	12.0	1.2	12.6	1.7	34.8	Bal

Forms Available:

Wallex 55 and 505 are supplied as composite powders for application with Wall Colmonoy's Spraywelder™ System. Also available as ingot and concast bare rod.

Alloy	Mesh Size	Application
Wallex 55	140 mesh - 500 mesh	Spray-n-Fuse
Wallex 505	140 mesh - 635 mesh	Spray-n-Fuse

Wallex 55:

Wallex 55 is designed for spray and fuse applications, using combustion thermal spray systems such as the Wall Colmonoy J-3 Spraywelder.

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.

Wallex 505:

Wallex 505 is designed for use in the Wall Colmonoy's Fusewelder® Torch and other similarly type torches.

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Properties:

Table 1: Physical Properties (approximate):

Specific Gravity	10.00
Melting Point	2050°F (1120°C)

Application Methods:

Wallex 55 and 505 are easily applied to all steels having less than .25% carbon, gray cast iron; Meehanite, malleable, ingot and wrought iron; nickel, Monel[a] alloy 400, Inconel[a] alloy 600, Nichrome, Chromel[b]. 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 Wallex 55 and 505. Hardenable base metals may be overlayed, but must be annealed isothermally after uniform austenitizing to prevent cracking of the deposits of Wallex 55 and 505. (Consult Technical Services for further details).

Application by Spraywelder:

Wallex 55 is applied by use of the Spraywelder, which is the recommended Thermal Spray system designed by Wall Colmonoy to produce dense coatings. The powder is sprayed on the part to be hard surfaced as in ordinary metal spraying procedure, and the overlay is then fused to the base metal by torch, induction or furnace. This is ideal when deposits of uniform thickness are being applied over a large area. Reference Spraywelder Brochure and Manual for more information.

Application by Fusewelder:

Wallex 505 is 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 Wallex 55 and 505. Apply with a steady pressure and avoid overheating. If the lapping compounds are used loose, they will cut the cobalt 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

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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 employers 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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