

BOND COATING

Technical Bulletin 5.2.4

Bond Coats are used in the following circumstances:-

- To improve adhesion when basis materials have been prepared mechanically.
- Where the substrate material is too hard for mechanical preparation.
- Where mechanical preparation would damage the substrate material.
- Where mechanical preparation is uneconomic.
- Where the chosen coating will not adhere to the substrate material.
- As a buffer where brittle coatings may be subjected to shock loading or excessive mechanical strains.
- As a buffer between coatings and basis materials where elevated temperatures may lead to excessive strains due to mis-match of thermal expansion co-efficient.

Selection of Material

Choice of bonding material depends on basis material and spraying process and may be influenced by corrosion considerations. In some cases, it may be necessary to experiment with different materials to obtain optimum selection.

99E Molybdenum

This is applied by flame spraying as a bond for steels and aluminium materials. It does not bond to copper and its alloys. It should not be used above 400°C.

T405/1 Ni alloy

This is applied by flame spraying as a bond for steels. It may improve coating adhesion on aluminium alloys but it will not bond to copper and its alloys.

85E Ni chrome

This is used as a high temperature bonding material (up to 1000°C) and as a buffer layer beneath ceramic coatings. It adheres well to steels but does not bond to copper and its alloys. It may be arc or flame sprayed.

10E Aluminium Bronze

This is used as a bond coat for steel substrates and may be used on copper alloy substrates. Arc sprayed aluminium bronze gives better results than when flame sprayed.

05E Copper

This is sometimes used as a bond when spraying on to copper and copper alloy substrates. Mechanical preparation is also necessary.

02E Zinc

This is frequently used as a bond coating on to plastics, paper and wooden substrates. Sometimes, it is effective as a bond onto ceramics and glasses. It may be arc or flame sprayed.

01E Aluminium

Bonds well to steel and may be used for certain ceramic and glass substrates. It should not be used for plastics. Arc spraying gives the best results but ceramics and glass substrates may need pre-heating to prevent thermal damage.

75E Ni alloy

Gives the best adhesion on steels and good adhesion to aluminium alloys. It is not suitable for copper and bronzes. It should be applied only by arc spraying.

Application of Bond Coats

Bond coats should be applied thinly to produce a roughened surface to which the subsequent coat can adhere. For most purposes 0.002-0.004" (50-100µm) is adequate; thicker coatings are not only more expensive but often less effective. Where the bond coat is applied as a buffer beneath ceramics which may be subjected to excessive mechanical or thermal strains, thicker deposits are necessary. Depending on application, the buffer layer may be between 0.005"-0.15" (125 - 375µm).

The bond coat must be applied to a clean, and preferably grit blasted surface as soon as possible after the surface has been prepared and before there is any visible contamination. Subsequent coatings should be applied immediately after bond coating.

Summary of Bond Coat Section

SUBSTRATE MATERIAL	ARC SPRAY	COMBUSTION GAS SPRAY
Steels	75E Ni alloy	99E Molybdenum, T405/1 Ni alloy
Copper ¹	05E Copper	05E Copper
Copper Alloys ¹	10E Aluminium Bronze	10E Aluminium Bronze
Aluminium Alloys	75E Ni Alloy	99E Molybdenum
Plastics ²	02E Zinc	02E Zinc
Ceramics/Glasses	02E Zinc 01E Aluminium ³	02E Zinc 01E Aluminium

- 1 Gritblasting essential
- 2 Light gritblasting advisable
- 3 Pre-heating may be necessary

✦ REFERENCE INFORMATION :-

- 5.2.1 Preparation for Spraying
- 5.2.2 Surface Preparation by Gritblasting