

EBAA IRON Connections™

TECHNICAL DATA FOR THE WATER & WASTEWATER PROFESSIONAL

GI - 8

Megabond® Restraint Coating System

This bulletin provides information that shows that a properly applied coating involves more than simply spraying or dipping a part in paint or epoxy. In order to provide the protection and performance desired consideration must be given to the compatibility of the coating with the product, the environment in which the product is stored and used, preparation of the surface of the product, and the correct application of the coating. The Megabond restraint coating system has been purposefully selected and is meticulously applied to protect EBAA Iron's restraint products from corrosion in order to provide long and reliable service through 1) enhanced corrosion resistance; 2) improved threaded part performance and protection; 3) increased storage life; and 4) simple application identification.

Enhanced Corrosion Resistance

The effects of corrosion impose a significant cost on the water and sewer industry. In a 2001 study administered by the Federal Highway Administration it was estimated that in the US the total direct cost of corrosion was \$279 billion per year with indirect costs approximately equal to that amount. At the publication of the study the direct and indirect costs were equated to "as much as six percent of the (US) GDP." The study included costs in all facets of the US economy. Of the 25 sectors listed in the summary of the study the greatest costs for any single segment could be attributed to drinking water and sewer systems at \$36 billion per year.

The tightly adherent coatings associated with the Megabond process provide significantly improved corrosion protection when compared to conventional asphaltic coatings or conventional enamel paint. Part of the discussion in Connections™ Bulletin GI-1 "Corrosion and Cathodic Protection in Underground Piping Systems" indicates that corrosion requires electrically connected, dissimilar metals in a common electrolyte. Remove one of the three elements and you eliminate corrosion. Tightly adherent coatings, as pointed out in Connections™ Bulletin GI-3 "Use Of Coatings And Polyethylene For Corrosion Protection", can provide this by separating the metal from the electrolyte and, in some cases, insulating the dissimilar metals from electrical contact.

Coating Compatibility

The Megabond® Restraint Coating System is comprised of two distinct coatings for the different restraint components and functions.

The first is a fluoropolymer coating for the wedges and threaded components. This coating is a fastener class, thermally cured coating specifically formulated for EBAA to prevent corrosion and provide lubricity for the threaded surfaces to enhance consistent actuation forces from the application of torque and the wedging action critical to the gripping on the pipe surface.

The second is a modified TGIC polyester coating for the primary restraint castings. One of the features of this modified coating is its resistance

to out-gassing. When castings are heated small amounts of gas can be generated from the microstructure. This out-gassing can cause pinholes or blistering of a coating. This is true for all castings and is something that must be addressed for thermoset coatings. A second feature involves a modification that allows the coating to be applied in a more uniform fashion on irregular surfaces. Most coatings are designed for use on uniform and smooth surfaces such as steel pipe and water storage tanks not the complicated geometries found with restraints. A lack of attention to proper coating selection and application leads to inconsistent coating and potential flaws in the coating surface that will allow corrosion to gain a foothold.

Finally, both of the coatings are VOC compliant for the protection of our employees and the environment.

Environment for Storage and Use

EBAA Iron restraints are not intended to be treated with kid gloves or installed in pristine environments. They are often stored out of doors for extended periods of time and subjected to extremes of temperature, weather, and abuse. Circumstances in the field subject the product to rough handling and installation in abusive surroundings such as continuously wet or hot soils. These conditions demand coatings with significant impact strengths, a high level of UV resistance, consistent performance in wide ranging operating temperatures, and superior corrosion and chemical resistance.

The fluoropolymer coating for EBAA Iron's application has excellent chemical and salt-spray resistance. It performs well in caustic environments, and resists almost all solvents and acids. This coating provides excellent impact resistance and UV resistance and has an operating temperature range of -40°F to 400°F.

The polyester coating is specifically formulated to provide additional resistance to UV exposure and increased impact resistance. It has been tested to the extremes demanded by more than 500 hours of salt spray, more than 1000 hours of humidity, weatherability testing, solvent resistance, and abrasion resistance in accordance with national standards such as QUV-A-340 UV exposure and ASTM D2794, D3359, B117, D2247, and D4060.

Surface Preparation and Coating Application

The proper application of these superior coating materials is only made possible by the construction and use of the state of the art coating facility at our manufacturing location in Eastland, TX. EBAA consulted with coating experts to design and oversee the implementation of this facility in order to provide the best quality coatings available.

Proper surface preparation is essential to enable the coatings to provide the maximum protection capability. All coated surfaces are initially cleaned with shot blasting. While blasting cleans the sand and other debris from the casting surfaces it does not render the casting ready for coating. Additional handling, grinding, and storage allow a variety of

deposits of oils, dirt, and moisture to accumulate on the surfaces. No matter how good the coating or coating system is, if these deposits are not removed, the coating will not adhere properly and, as a result, will flake away and leave the casting vulnerable to corrosion.

The Megabond® coating process incorporates cleaning and “washing” to render the castings clean and ready for immediate coating. (Immediate because a delay can allow moisture or dirt from the atmosphere and handling to again contaminate the surface and prevent coating adhesion.) The cleaning is from shot blasting and the “washing” process involves a rinse and an iron phosphate spray.

At this point the wedges, actuating screws, and collar bolts receive two heat cured applications of fluoropolymer material to ensure thorough and complete coverage. The dry film thickness is approximately 0.7 mils.



Figure 1.1
Series 2000PV Wedges exiting the curing oven

To obtain the optimum coating quality the primary castings go through an additional step of surface preparation with the application of a sealer. The castings are dried and air cooled for the next step in the coating process. The fusion bonded coating powder is applied via an electrostatic process. The positively charged powder particles are directed toward and attracted to the negatively charged castings. The electrostatic coating method encourages uniform application on all surfaces and prevents runs and thick and thin areas that can develop with some liquid materials. The powder coated castings are then heated to cause the coating to fuse and cure to a nominal thickness of 3 mils.



Figure 1.2
Series 2000PV primary casting body exiting powder coat booth

Identification

The coatings on the main EBAA castings provide color differentiation for different piping materials on which the restraints are used. The restraints intended for use on ductile iron pipe are black in color and those for use with PVC pipe are red in color.



Figure 1.3
Background ‘Red’ Restraints: Series 2000PV MEGALUG® Mechanical Joint Restraint for AWWA PVC pipe.
Foreground ‘Black’ Restraints: Series 1100 MEGALUG® Mechanical Joint Restraints for Ductile Iron pipe.

Conclusion

The Megabond® Restraint Coating System is more than the application of any type of coating on our castings. It is a process that incorporates coatings specifically formulated for the rigorous and wide ranging handling, storage, and application requirements of the restraint products. It also involves specific casting preparation and coating application procedures to ensure that the coating is tightly adherent. This is all done in order to provide you with the best coating available on the best restraints available.

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CORROSION COSTS AND PREVENTIVE STRATEGIES IN THE UNITED STATES, authored by Gerhardus H. Koch, Ph.D. et.al, (Report by CC Technologies Laboratories, Inc. to Federal Highway Administration (FHWA), Office of Infrastructure Research and Development, Report FHWA-RD-01-156, September 2001)