Fusion Bond Epoxy (FBE) Coating Repairs

1. Coating repairs – minor damage

Minor coating repairs in the field are usually done at two phases of the pipe laying operation – the first being done after the pipe sections have been welded together and the field joint coating has been completed; and the second and final repairs being done just before lowering the pipe into the ditch.

For the initial repairs, Jotun 46F640 or Jotun 120T640 100% solids two-component epoxy repair products from Jotun Powder Coatings are the most suitable. Experience has shown that in most situations there is sufficient cure time prior to handling the pipe again. The setting and cure of the two-component epoxy can be accelerated by exposure to a heat source. This may be essential in cold climate application areas.

Most fittings used for pipeline construction have some sort of factory applied coating; often a bituminous mastic material or a shop primer. Since fittings may be outsourced from several suppliers, it is quite possible that the coatings used by the various suppliers and the coating composition may differ considerably.

The below field repairs guidelines provide a simple, but effective, protective coating system to accommodate most conditions existing on natural gas pipeline or oil pipeline construction sites

1. Remove any contaminants from the area requiring repair using suitable means.

2. Blast the weld joints and other bare metal with an abrasive to a Near White Metal blast. Lightly abrade the surface with 80 grit sandpaper. If any exposed metal exists, abrade to Near White Metal Blast, SSPC-SP10 quality.

3. Apply 500 to 625µ (20 - 25 mils) of suitable two-component epoxy over all bare metal and factory primed surfaces.

4. If the factory coating is of bituminous type, it must be established whether or not applying epoxy over it will lead to bleeding. Should this occur, carry out a sealing operation before applying a finish coat. It is recommended to use 75 - 100µ of 75-Al, Alumapoxy for sealing purposes.

5. For above-ground pipes and fittings, it is recommended to apply 50 - 75µ (2 - 3 mil) of urethane coating over the two-component epoxy. This will provide a good and long lasting appearance.
2. Installed lines repairs

The first step in establishing the most appropriate coating repair procedure is to identify the reason for coating failure:

- Is it simply a mechanical damage from handling during installations?
- Is the coating failing to resist the exposure environment?
- Was the coating properly applied and cured?
- Was the surface preparation performed properly?

Some simple tests will help assessing the situation

1. Check the coating adhesion with a knife. Make a V cut and peel back from the apex.

2. With the aid of an 8 - 10 power magnifying glass, look at a coating cross section, and find out if the coating peels off easily at the coating/substrate interface on the back of the coating. This simple operation will provide an assessment of the film formation and the surface preparation quality.

3. Measure the film thickness.

4. Rub the coating with MEK to assess the cure. A cured coating will not soften or wear significantly.

5. Check the bared pipe surface for ferrous salt contamination by using a Potassium Ferricyanide paper.
3. Pipe coating repairs

**Jotun 46F640 or Jotun 120T640**

In the search for optimizing FBE pipe coating repairs, Jotun Powder Coatings has developed a cartridge packaging and dispensing system. This system makes it possible to use fast setting two-component repair materials. In addition to this important feature, the system has many other advantages over existing methods:

**Advantages**

- ✔ Accurate dispensing
- ✔ Fast setting
- ✔ High quality
- ✔ Economical
- ✔ No waste
- ✔ No mess

The cartridge packaged system can be used in different ways to suit particular needs.

**For instance**

1. To make in-plant coating repairs (pinhole type faults detected when jeeping), it is recommended to dispense and mix about 10 - 20 cc into a small paper cup. In general a patch requires 0.5 - 1cc of material. With such a mix, approximately 20 - 30 patches can be made.

2. To make larger repairs (usually from mechanical damage), use the same approach. The patches may require a larger quantity of material. As an alternative, dispense the appropriate amount onto the surface, near the repair site, mix and then transfer to the repair point.

3. While repairing, a small static mixer (disposable) can be attached to the dispensing nozzle. The mixer will mix the two components while dispensing. This method may be particularly useful on cad-weld test lead connections.

4. Jotun 46F640 and Jotun 120T640 are particularly well suited for application to hot surfaces (65°C to 105°C).
4. Directions to use Jotun 46F640 and Jotun 120T640
Fast cure epoxy repair compounds

To obtain a high quality pipe coating repair system, some basic steps are necessary

1) Prepare the surface. Abrade the surface from existing coating with an 80 grit sand paper to remove the surface skin along with any accumulated contaminants. To remove contaminants such as corrosion products, salts, and dirt from exposed metal surfaces, the surface must be treated. This may entail using water or organic solvents. In most instances, using an 80 grit sand paper is satisfactory, but the use of a power grinder (with flexible medium support) might be necessary in extreme cases.

Remember the old axiom “if it ain’t broken, don’t fix it.” For instance, if a pinhole requires repair, just abrade the area surrounding the pinhole with an 80 grit sand paper and apply the patching material. If possible, work some repair compound into the pinhole with a knife. DO NOT use a file or a grinder as this can inflict more damage to the area around the original pinhole.

2) Prepare the compound. The repair compound will better perform when it is accurately proportioned, thoroughly mixed, and spread out in a uniformly smooth film. The optimum patch thickness is about 10 - 50 % thicker than the original coating. ‘MORE’ is not better. In fact, making a thick blob of a patch is very poor practice as the patch is prone to getting knocked off during handling. To helping make a smooth patch, use a small polyethylene sheet by pressing over the patched area. The polyethylene is easily detachable when the repair material has set.

The Epoxy repair compound setting and cure can be accelerated by using a heat source. At room temperature, the repair compound will require one to two hours to set. It is fully cured after 24 hours. By applying an external heat source, the set and cure times can be shortened considerably. A blow dryer, or a gas torch fitted with a special infrared diffuser attachment, are acceptable heat sources for this application.

Preheating the surface will also speed up the set time. The most effective way to achieve fast set is by holding the heat source about 15 cm (6 inches) away from the surface. It is possible to obtain a patch ready for handling in two minutes. However, avoid excessive direct heating. If the wet patch bubbles, that is an indication that the temperature is too high.

An enclosed hot air box surrounding the pipe is also an effective way to obtain fast cure in large patches and, if necessary, it can be used to make girth weld repairs effectively.