

Repair of damaged porcelain insulator

Product information



This product information gives a description how to repair a damaged porcelain insulator. Recommendations are given for how the repair is made and acceptable damages for repair. ABB Components is not responsible for the quality of the repairs and does not provide porcelain repair materials.

The glaze

The glaze on the insulators is primarily intended to give a good surface appearance which is smooth and rejects dirt and is therefore also easy to keep clean. The glazing is not needed to stop moisture entering the insulator since the porcelain itself after firing is nonporous and does not absorb moisture.

Due to manufacturing techniques, glaze defects cannot always be avoided and standards allow minor defects within certain limits.

Glaze faults, not exceeding the limits according to IEC 60168 and IEC 60233, are permitted on porcelain insulators used by ABB on bushings. The ABB acceptance rules are, however, more stringent especially regarding the upper side of the sheds and especially the top shed.

Unglazed spots and small chipped areas do not impair the function or the life of the insulator because the porcelain body is completely vitrified and non-porous.

Evaluation of faults

Faults which may effect the function of the insulator shall not be repaired an further the acceptance for repair shall be limited depending on the visual appearance. The defect surface shall be free from cracks.

Porcelain damage

Acceptable damages for repair are:

1. Glaze defects, scratches and scraping in the glazing.
Only faults which exceed the requirements according to the relevant IEC publication are repaired.
2. Smaller damages on the sheds.
When the broken piece exists, the size of the damage must be below:
Length = 10 % of shed diameter
Width = 5 % of shed diameter
Depth = 1.5 % of shed diameter

When the broken piece is missing the size of the damage must be below:
Length = 5 % of shed diameter
Width = 3 % of shed diameter
Depth = 1 % of shed diameter
3. Smaller damages on the porcelain body and smaller chips broken out from the flange surface.
The size of the damage must not exceed:
Length = 4 % of shed diameter
Width = 4 % of shed diameter
Depth = 3 mm for shed diameter > 500 mm
Depth = 2 mm for shed diameter < 500 mm

Safety information

Keep this instruction available to those responsible for the installation, maintenance, and operation of the bushing.

The installation, operation, and maintenance of a bushing present numerous potential unsafe conditions, including, but not limited to, the following:

- High pressures
- Lethal voltages
- Moving machinery
- Heavy components
- Slip, stumble or fall

Specialised procedures and instructions are required and must be adhered to when working on such apparatus. Failure to follow the instructions could result in severe personal injury, death, and/or product or property damage.

Additionally, all applicable safety procedures such as regional or local safety rules and regulations, safe working practices, and good judgement must be used by the personnel when installing, operating, maintaining and/or disposing such equipment.

Safety, as defined in this instruction, involves two conditions:

1. Personal injury or death.
2. Product or property damage (includes damage to the bushing or other property, and reduced bushing life).



WARNING

General personal protection:
The epoxy products are irritating to eyes and skin. May cause sensitization by skin contact. Provide sufficient air exchange and/or exhaust in work rooms.
Handle and open container with care.
Avoid contact with skin, eyes and clothing.



WARNING

Disposal considerations:
The epoxy products must be incinerated, when in compliance with local regulations. Empty containers can be landfilled after cleaning, when in compliance with the Environmental Protections (Duty of Care) Regulations.

Repairs

The repair must be done by personnel with a good knowledge about the material used. The repaired part shall be free from pores.

ABB does not provide any porcelain repair materials.

Repair of porcelain with the broken piece available

1. The damaged surface of the porcelain must be cleaned with ethyl acetate.
2. The solvent used, must be of a pure quality, with no grease residuals. Use clean clothes.
3. To attach a broken piece of porcelain use epoxy resin, e.g. CIBA GEIGY Araldite F with hardener HY 956.
4. Mix 100 parts by weight (p.b.w) epoxy resin and 20 p.b.w. hardener (the mix shall be used within 45 minutes).
5. Brush the adhesive in a thin layer on both surfaces. The joint is hardened under contact pressure at room temperature for 15 hours or at 70–80 °C for three hours.
Note: If the broken piece consists of several smaller porcelain pieces a polyacrylate adhesive can be used e.g. Loctite 401.
6. After cleaning, brush the adhesive on one piece in a thin, covering layer. Place the two pieces in exact position and handpress the two pieces together for one minute. Excess adhesive is cleaned off. If needed fill voids with epoxy paste, as described below.

Filling of chips and voids where the piece is missing

Procedure: Brown porcelain

1. The damaged surface must be cleaned with ethyl acetate.
2. This repair is made with epoxy resin, e.g. Araldite 121P, brown coloured paste. If necessary the paste is mixed with Araldite colouring agent, DW 0133 (red) to get the colour of the porcelain.
3. The colour mix must be mixed with Araldite hardener HY 956 mix ratio: 100 p.b.w. epoxy resin, 10 p.b.w. hardener and must be used within 45 minutes. The compound is applied in layers (1–5 mm) and can be held in position with tape.
4. After hardening at room-temperature for 15 hours or at 70–80 °C for three hours, remove the tape, wash the resin surface clean and sandpaper the surface smooth. Apply more compound if necessary - sandpaper and clean the surface.
5. Apply with a brush a mix of polyurethane varnish and hardener. The mix ratio shall be two p.b.w. varnish and 1 p.b.w. hardener. Apply the varnish coating twice with hardening for two hours at room-temperature after the first coating and a finish hardening of 24–48 hours or at 70–80 °C for three hours after the last coating.

Procedure: Grey porcelain**Old repair system:**

This repair is made with epoxy resin e.g. Araldite AV 121 B mixed with black epoxy paste, e.g. Araldite DW 0117 to a light grey colour. Then mix with some blue paint paste e.g. Araldite DW 0115 to get the colour of the porcelain. The compounds is mixed with hardener, e.g. HY 956, mix ratio 100 p.b.w epoxy resin and 10 p.b.w. hardener.

New repair system:

This repair is made with epoxy resin e.g. Araldite 2014 mixed with white epoxy paste, e.g. Araldite DW 0131 to a light grey colour. The Araldite 2014 is a two component epoxy in a 200 ml cartridge and is applied with a handgun with a mixer. Then mix with some blue paint paste e.g. Araldite DW 0135 to get the colour of the porcelain.

The resin is applied in layers and can be held in position with tape.

After hardening at room-temperature for 15 hours or at 70–80 °C for three hours, remove the tape, wash the resin surface clean and sandpaper the surface. Apply more compound if necessary, sandpaper and clean the surface.

Varnish with polyurethane in the same way as described for brown-glazed porcelain.

Procedure: Unglazed surface**Old repair system:**

This repair is made with epoxy resin e.g. Araldite 121B mixed with hardener HY 956. The mixing ratio 100 p.b.w. epoxy and 10 p.b.w. hardener.

New repair system:

This repair is made with epoxy resin e.g. Araldite 2014. The Araldite 2014 is a two component epoxy in a 200 ml cartridge and is applied with a handgun with a mixer.

The resin is applied in layers and can be held in position with tape.

After hardening at room-temperature for 15 hours or at 70–80 °C for three hours remove the tape, wash the resin surface clean and sandpaper the surface. Apply more compound if necessary, sandpaper and clean the surface.