

POLYURETHANE ELASTOMERS
BASIC INFORMATION. SURFACE PREPARATION. APPLICATION.
APPLICATION EXAMPLES.

Use of elastomers is an economic alternative for vulcanization and hot application of rubber layers in repairs related to re-shaping and protecting of surfaces against unfavourable and aggressive external factors.

The Chester Molecular company offers a complete range of two-component polyurethane elastomers that allow for a protection of both metal and rubber surfaces and a repair of worn rubber elements.

The elastomers manufactured by Chester Molecular feature very high strength performances and an excellent chemical resistance. Their preparation is very easy, they show an outstanding adhesion to metal and rubber surfaces, and they do not change their volume during setting-up (polymerisation). They feature a high corrosion resistance and a low erosion wear even in highly abrasive environments. In many applications the elastomer abrasion resistance exceeds that of steel. They are chemically resistant to many aggressive media.

After mixing two components, the Base and the Reactor, these materials are cold-cured within several to several dozen minutes. They achieve the full mechanical strength after several dozen hours.

We offer a full range of elastomers for a variety of applications in two basic forms: thixotropic (non-dripping soft paste) and liquid one.

Advantages of reconditioning by means of elastomers

- Low costs comparing to other comparable repair methods.
- Possibility of conducting the repair without dismantling or with only a partial dismantling of the equipment under repair.
- On-site repair capability.
- Simple technology that does not require any dedicated equipment.
- Very good water-tightness of the connections and fillings.
- Good look of the repaired areas.

Surface preparation

A surface on which the Chester Molecular elastomer will to be applied must be adequately prepared and treated. A correct surface preparation has a key effect on properties of the application. The surface preparation is aimed at cleaning of the surface and then providing it with the right geometric structure – roughness.

Metal surface

Any kind of a contamination, dust, scale, oil, grease, loose corrosion products as well as paint remnants should be removed from the surface. It is recommended to use the Chester Molecular Cleanrex, Cleanrex II, Cleanrex JG, Cleaner F-3 or Cleaner F-7 cleaners for the preliminary cleaning. Selection of the cleaner depends on both an extent and nature of a contamination on the elements to be

repaired. If there are ion impurities, i.e. water-soluble salts, they must be removed with the Cleanrex, warm water or a steam jet.

The next operation is surface roughing. The goal of this is to „develop” the elastomer interface area and thus the total adhesion force and shaping the right profile of the surface.

The most suitable method is an abrasive blasting. This kind of treatment provides both an excellent cleaning and adequate roughness of the surfaces. The surface condition should correspond to the class Sa 3, Sa 2 ½ or Sa 2 according to the ISO 8501-1 [2] standard.

Below a brief surface cleanliness condition is presented according to the standard referred to.

Sa 3 – Abrasive blasting to a visually clean steel condition.

There must not be any oil, grease, dust, rolling scale, rust, paint coating or foreign matter on the surface seen without a magnification. The surface must have a uniform metallic colour.

Sa 2 ½ - More extensive abrasive blasting.

There must not be any oil, grease, dust, rolling scale, rust, paint coating or foreign matter on the surface seen without a magnification. The only traces of contaminants remained in the form of droplet- or streak-shaped stains.

Sa 2 – Coarse abrasive blasting.

There must not be any oil, grease, dust, major traces of rolling scale, rust, paint coating or foreign matter on the surface seen without a magnification. Any residual contaminants are bonded with the substrate.

For the Chester Molecular elastomers the most desirable surface profile is the fine G one according to ISO 8503-2, featuring R_{y5} of 30 to 60 μm . Make sure that the abradant is not contaminated by salts.

Whenever it is possible the abrasive blasting, i.e. sand blasting, shot blasting, ball peening, etc. should be used. This is the most efficient and the best method that allows for achieving the maximum adhesion.

If this kind of treatment is not available, hand power tools using grinding disks, profile corundum cutters, or abrasive paper discs. The surface condition should correspond to the class St 3 or St 2 according to the ISO 8501-1 standard. Also hand tools can be used, e.g. scrapers, files, wire brushes or abrasive paper.

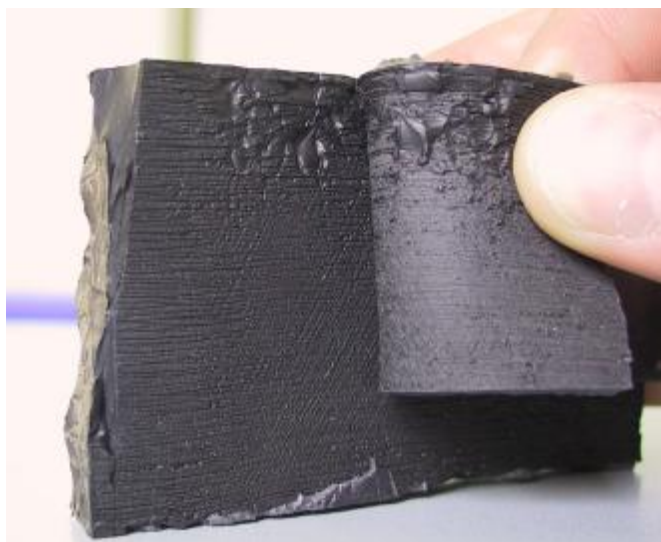
Time after which the coating is applied is as much important as an adequate surface preparation. A surface that has been cleaned by means of the abrasive blasting is very active and soon it gets oxidized becoming covered not only with a visible rust bloom but also very easily it accepts impurities from the atmosphere.

Make sure that the prepared surface is not covered with a dust generated during the abrasive blasting or other roughening methods used. Any dust and deposit should be removed, preferably by means of a vacuum cleaner. Frequently used cleaning with compressed air is not effective enough, in particular on large surfaces. After some time, the blown-off dust deposits in another place.

Rubber surface

Oils, greases and fats should be removed from the surface by means of the Chester Fast Cleaner F-7. The next operation is surface roughing. The goal of this is to „develop” the elastomer interface area and thus the total adhesion force and shaping the right profile of the surface. The most suitable method

of preparing the surface the right way is use of a power drill with a rigid wire brush or a disk with a coarse abrasive paper.



Next the dust generated during roughening should be removed and the prepared areas should be very carefully degreased again. The roughened surface should be very carefully wiped several times with a clean cloth dipped in the Chester Fast Cleaner F-7 and let it dry.

Another operation is an application of the Primer EL20M (under preparation) by rubbing it in.

Mixing

The elastomers are supplied in kits consisting of two components: the Base and the Reactor. In order to obtain the compound ready for application both components should be combined and carefully mixed.

Preparation of the elastomers requires mixing the whole package in the same time in the Base container. Due to this faults resulting from leaving some part of the components on the walls of their containers are avoided and the right mixing proportions are always obtained.

The above does not apply to the Chester Elastomer 80TR. Mixing of this product must take place outside of the packaging, on a flat, dry and clean surface, e.g. on a rigid plastic film.

As colours of the Base and the Reactor are different, it is easy to assess visually whether the mixing is thoroughly enough. The paste is correctly mixed if the whole mass prepared is of a uniform colour and no streaks are visible.

Air bubbles may penetrate into the material during mixing. This will result in porosity and a strength performance decline. Therefore it is very important to remove the trapped air or “deaerate” the mixed mass. This is done by applying thin layers of the mixed paste on a flat, clean and dry surface and pressing the air bubbles out. This can be done also upon application provided the surface shape allows for that.

Application

Having made sure the paste is mixed correctly, the surface is adequately prepared, ambient temperature is higher than 5°C (41°F) and relative humidity is lower than 85%, it may be applied.

The most convenient way of application is by means of the Chester Molecular paddles and spatulas. They are flexible to an adequate degree and the type of plastics well as their smoothness prevents sticking of the paste being spread. Fluid materials can be also applied with a rigid brush with a short-cut hair.

During application care should be given to a careful rubbing of the paste into the substrate and to removal of air bubbles.

Please keep in mind that the polymerization process starts immediately after mixing the Reactor with the Base. In the Technical Data Sheets the *Maximum Time of Usability after Mixing (at 20° C = 68°F)* is specified for each product. This is the time measured from combining both components to a moment when the curing process is so much advanced the paste application is not recommended or very difficult. This time (“pot life”) is longer in lower temperatures and shorter in higher ones. The pot life can be extended by placing a thin layer of the mixed elastomer on a piece of a clean dry plastic film or sheet metal.

APPLICATION EXAMPLES

Repair of belt conveyors

Damaged conveyor belts are repaired with the Chester’s two-component polyurethane elastomers. The damage occurs as material losses and tears, often in the form of several meter long grooves.



Areas to be repaired should be thoroughly cleaned and degreased, preferably with the Fast Cleaner F-7 cleaner/degreaser. Next they should be roughened by means of hard disk-shaped wire brushes chucked on a power drill. Any roughening direction can be used – traces left by the brush may be parallel to the belt's centerline. The next operation is a very careful wiping of the roughened surface several times with the F-7 cleaner/degreaser. Rub-in the F-7 with a moistened clean cloth until a clear coloration (blackening) appears on the cloth surface.

After approximately 30 minutes (at 20°C = 68°F) the elastomer application may begin. Hardness of the elastomers should be selected accordingly to that of the conveyor belt rubber. Usually this will be the Chester Elastomer 75F (fluid, hardness of 75 °ShA).

When damaged belt edges are repaired it is recommended to fabricate an adequate boarding. It is preferable to reinforce the repaired area with the Chester reinforcing tape.

A conveyor repaired this way can be operated again after approximately 36 hours while a full mechanical strength is obtained after approximately 72 hours from the moment of elastomer application.

Repair of a rubber-lined return drum

Damage of a surface of conveyor return drums has the form of circumferential grooves cut by hard and sharp debris that penetrate between the belt and the drum.



The area of the grooves should be cleaned from mud, degreased with the Fast Cleaner F-7 and roughened with rotary wire brushes. Next, the areas to be repaired should be cleaned again and the F-7 cleaner/degreaser should be rubbed once more into the roughened surface. Rub-in the F-7 with a moistened clean cloth until a clear blackening appears on the cloth surface.

Once the area has dried, i.e. after approximately 30 minutes at 20°C (68°F), an application of the thoroughly mixed and deaerated elastomer may begin. In a repair of this type the easiest option is to apply the thixotropic elastomer. The elastomer should be carefully rubbed into the substrate until the filling reaches the real lining thickness. The last operation is a smoothing of the elastomer surface with a spatula.



The repaired drum can be put back in operation after approximately 24 hours (at 20° C = 68°F).