

Effective Leak Sealing

by

Pressure Impregnation with Acrylic-120T

The use of vacuum impregnation is well known within the global automotive industry for sealing porous cast metal engine components such as cylinder blocks, transmission casings etc.

In comparison with used engine components, these are virgin castings, in that they are clean and free from contamination as a result, high levels of sealability are assured. With castings that have been in service any defects become contaminated with oil and antifreeze making it virtually impossible for vacuum impregnation to achieve the same level of success.

The problem is that the vacuum can only remove vapour and that does not include the contaminants as they normally have a high boiling point and remain within the defect. This blocks penetration of the impregnant and the reason why so many aged castings fail to respond to vacuum impregnation.

This leads us onto alternative options for impregnation which are gravity, internal vacuum or internal pressure.

Many of the proprietary sealing solutions on the market are generally water based silicates that contain fillers such as ceramic powder to bulk the solution that gets deposited as a silt within the void to form a barrier to leakage. The downside is that unlike an acrylic sealant that solidify within the defect, they do not form a cohesive bond and can be vulnerable to being washed out especially when using

antifreeze. For this reason, Ford Motor Company banned using this method of sealing in the 1960s

The UK Patented GB 621776 (17-Aug-1976) acrylic thermal curing impregnant has from that time on become the accepted standard within the automotive industry for the sealing of all cast metal components requiring to be leak tight. Unlike the aqueous based sealers mentioned above, this is 100% solids in a natural low viscosity state with rapid natural penetration and rapid curing.

Following on from this development, in 2008, X-Seal produced the first cold cure variation to this impregnation standard known as Acrylic120C. This has proved successful in eliminating leakage where defects are generally free of contamination, however it becomes difficult for the impregnant to operate effectively when faced with stubborn contaminated such as oil.

As a result, X-Seal decided to reproduce the industrial standard thermal curing impregnant known as Acrylic-120T suitable for both pressure and vacuum applications. The benefits of Acrylic-120T are that the application now has the advantage to flush out the contaminants from the leaking defect using the impregnant itself. The impregnant within the defect will remain fluid until the casting is heated to 100°C when it instantly cures into an insoluble cohesive plug within the cavity.

APPLICATION

For simplicity we will assume a leaking defect from the water jacket as the graphics below show. It may be preferable, in some cases, for the cylinder block to be removed from the car in order that it may be orientated.



PROCEDURE:

Ensure that the casting is clean and dry. Do not fettle or use cleaning agents.

Close off all openings with the exception of one which must be at the highest point relative to the defect.

Gently pressurise with compressed air to a safe level reflecting the method of closures and state of the casting.

Wet the defective area with soapy water and observe the level of leakage.

Leave the air pressure on for as long as it may seem necessary to help remove contaminants.

The casting may be heated during this period to encourage cleansing of the defect.

Remove air pressure and allow the casting to cool to a comfortable warm touch.

Pour the impregnant Acrylic-120T into the cavity (water jacket?) and rotate the casting so as to ensure that the defect is below the surface of the impregnant. see fig 2

Close off the water jacket and gradually pressurise with air, watching the defect for impregnant exudation.

Note the colour of the impregnant for signs of contamination and continue to purge until the impregnant becomes clear.

Discard purged sealant.

Some heat, using a hot air gun or gas torch, may be used to warm the defective area to help to draw the impregnant through (Note that temperatures in excess of 80°C will commence to cure the sealant).

Remove air pressure and drain impregnant

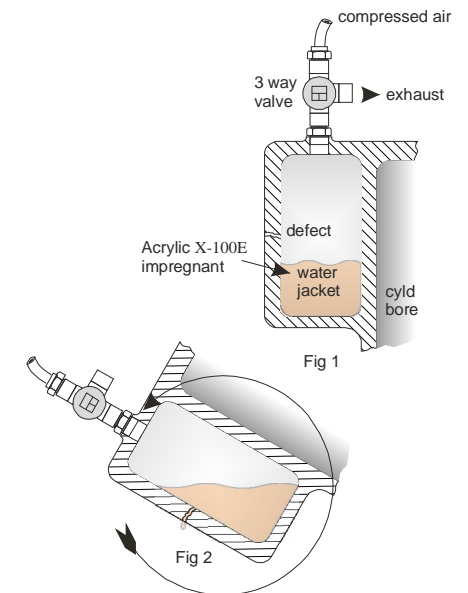
from the casting and leave in drain position. Gently heat the defective area up to water sizzle temperature (100°C) and leave to cool down to a lukewarm temperature.

The impregnant should have now cured within the defect.

Re pressurise with air and apply soapy water to the defective area. If some leakage remains, repeat the process.

The treatment can be carried out as many times as is necessary but a single treatment correctly applied is often all that will be necessary.

Finally, flush out the jacket with cold water.



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