PERFORMANCE TESTING DEFINITION

VISCOSITY Measurement is through a No: 1. Zahn Cup at a controlled temperature of 20°C. The viscosity of a liquid provides some indication as to its impregnation ability and consumability. Low viscosity is therefore considered an important factor.

GEL TIMES Apart from the cure temperature, the gel time is probably one of the most critical requirements of an impregnant. To obtain a cure in a test tube does not guarantee effective curing within the porosity. The test tube, unlike the porosity provides a clean and sterile environment. The porosity on the other hand is of an unknown condition. The risk of contamination **is** therefore high, often containing the residue of corrosion inhibitors, cutting oil etc that can effect curing of the sealant. It follows therefore, that the reactivity of the sealant should be sufficient to over-ride any negative influence that could prevail. The presence of an excess of catalyst within the sealant ensures some leeway in establishing the cure within the porosity. Unlike High quality impregnants that can carry high levels of catalyst and remain stable, the danger with some competitive sealants is that it can lead to pot life instability. As a guide, gel time should be read relative to stability.

SPECIFIC GRAVITY This is a good cross reference with Viscosity and provides a useful check for polymer formation, resulting in a density change in the product.

DRAG OUT Over 70% of sealant consumed during processing of metal components is discharged as trade effluent. Surface drag-out of sealant from the Autoclave can have a major effect on plant consumption. A cheap low cost sealant with high viscosity can be costly in terms of consumption. Reducing the surface tension of a sealant is also an important factor, while improving impregnation characteristics, surface drag-out can also be greatly improved as claimed by some sealant suppliers.

The results are calculated from dipping a clean, weighed, special aluminium spatula into the sealant solution, at 20°C. (68°F) allowing to drain for a specific period of time and re-weighing. Each test is conducted a number of times to establish a fair average.

WASHABILITY It is important that emulsifiable sealants wash from the surface of the component with minimal effort. This is important in ensuring that the sealant remains undisturbed in the porosity which otherwise over aggressive washing could dislodge. Test procedure is with a special aluminium spatula, dipped in sealant and reciprocated slowly, by hand in water at room temperature. The time taken for complete removal of sealant is recorded.

RELATIVE ABSORPTION This is a test method to distinguish relative penetration capability of the sealant at atmospheric pressure. To achieve reliable sealing of porous components, effective and positive penetration is essential. The natural penetration characteristic of a sealant is therefore considered of some importance An inorganic substance **is** the test media onto which the product is absorbed, this is then calculated against that of performances of water within a specified time. The test is carried out at 20°C.

SEALANT RECYCLE This is a system by which sealant can be recovered from the wash water which can be re-used without detriment to its sealing/chemical and temperature performance. The equipment required to be installed to support sealant recovery, is most beneficial to high users of sealant.

STABILITY The sealant with the catalyst present has an accelerated 'pot life' at 35°C. Often these tests are carried out in sterile laboratory conditions which can lead to over optimistic results. All such tests carried out to Ultraseal standards are conducted in the presence of ferrous and non-ferrous metals making the test more realistic and meaningful to working conditions.

ORGANIC PEROXIDE The state of the art in obtaining good pot life stability with matching sealing performance has traditionally necessitated a trade off between the catalyst employed and stability of the liquid sealant. The use of peroxide catalyst would produce excellent sealing ability but would risk a gel up in the autoclave. Low storage temperatures would increase storage stability but increase humidity condensation and moisture build up in the sealant. Azodiisobutyro-Nitrile on the other hand produced pot life stability but reduced sealability due to the liberation of nitrogen during polymerisation. A mixture of the two **catalysts** produced even greater pot life instability. Ultraseal's latest sealants exhibit both excellent pot life and sealability due to unique tailoring of sealant formulation to Azodiisobutyro-Nitrile.

CURE SHRINKAGE All methacrylate sealants shrink on curing and range between 10 and 15%. The greater the shrinkage the greater the chance of post treatment leakage. Lower molecular weight methacrylate monomers producing high shrinkage, often indicates a hard/brittle product. Whilst such sealants, cured in test tubes, appear to perform well in slug form to chemical and heat resistance tests, they do not generally perform so well when impregnated into the porosity of a component.

SWELLING Contrary to that sometimes claimed, there is considerable evidence to show that it is advantageous for sealants, as with gasket products, to have the ability to swell in the presence of moisture and application liquids such as Gasoline, Hydraulic Oil, Water, Transmission Fluid, Brake Fluid etc. This ensures tightening of the impregnant within the porosity. Normal sealants that show little or no post treatment swelling should be considered suspect. The exception to this rule is the new recycle sealants, being hydrophobic and do not swell when in contact with water. These sealants have low shrinkage and do not part from the walls of the porosity during curing. It is therefore not reliant on swelling effect.

ADHESIVE STRENGTH The adhesive strength of an impregnant is recognised **as** an important characteristic in as much that it reflects the integrity of the chemical formulation and the ability of the sealant to adhere to the porosity surface. This is especially important during the polymerisation phase, to induce shrinkage and delimitation of the sealant from the walls of the porosity. This is especially problematic with sealants that become hard and non elastic.
