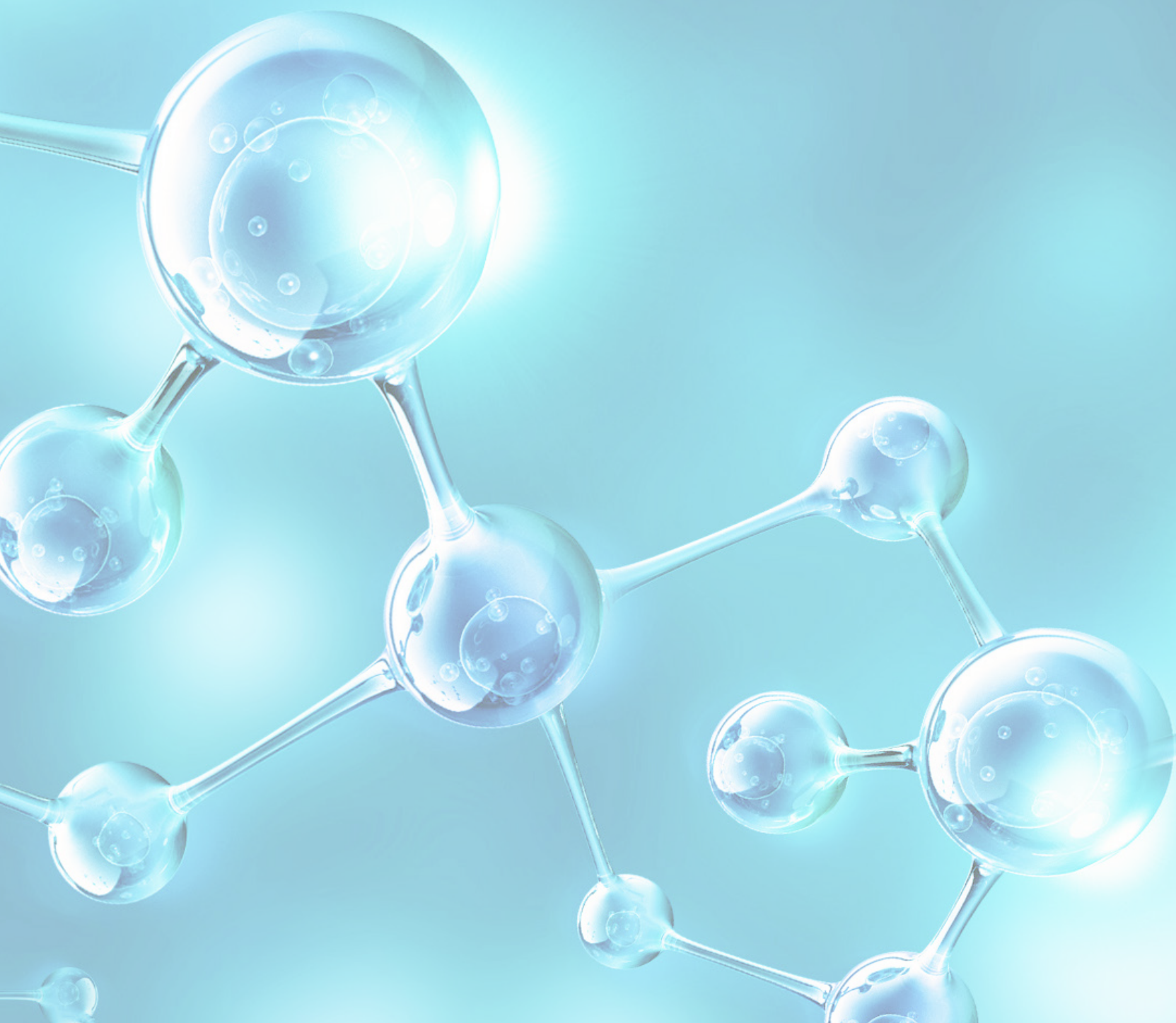




Bonding Pastes EMEA





GRAVICOL® AND NORPOL®

The globally recognised names in Bonding Pastes

The Gravicol® and Norpol® Bonding Paste ranges are based on our Unsaturated Polyester Resin, Vinyl Ester Resin and Urethane Acrylate Resin systems to give the best possible end use characteristics.

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Production Sites



EMEA
Polynt Composites France S.A.
Reichhold AS
Polynt SpA



Polynt Reichhold Group

After the merger on May 2017 the new Polynt-Reichhold Group is a global Company in the Intermediates, Coating and Composite Resins, Thermoset Compounds, Gel-coats and niche Specialties.

This combination enhances the Group's leading position as a global vertically integrated specialty chemicals player, with significant global presence in Europe, North America and Asia, a strategy initiated by Polynt with the successful integration of PCCR and CCP in the last years and now further reinforced by Reichhold's global scale, extensive product portfolio and R&D competencies.

Polynt-Reichhold Group is known for its superior quality and impressive range of products and with its excellent distribution network it can provide first-class service to customers whatever their market. Customer Service and Technical Service teams are renowned for their customer focus, offering the best service even after products have left manufacturing.

The Group strives to keep customers satisfied, assisting them in producing premium quality products every time they use its products.

Product innovation is important for the Group's business and it's the reason for which it constantly works with customers to find solutions to problems.

Introducing new or improved products ensures that Polynt-Reichhold Group continue not only to deliver what the market wants and needs, but also when it is wanted and needed.

Bonding Pastes

Gravicol and Norpol Bonding Pastes are specifically formulated for bonding Fiberglass components, imbedding of inserts, core materials or panels into laminates and bonding wood to Fiberglass structures. They are also designed for assembly, cavity filling and as an aid to lamination. A comprehensive range is available with a spectrum of properties to suit various applications.

A good bond is characterized by adequate adhesion and physical properties to accept stresses placed upon the final composite component. The best indicator that bonding paste has achieved a strong bond is when failure is seen within the laminate and not within the bonding paste. When designing the bonding pastes there are several key areas we look at to suit the numerous application areas of the pastes:

- **Gel/Cure times** - A range of Gel and cure times, designed with low exotherm peak, assuring no deformation of the parts being bonded.
- **Low Shrinkage levels** - The low shrink properties of the pastes assure that there will be "no pull through" on the parts to be bonded. Full Bond strength will be retained as the paste does not pull away from where it is intended to be, this allows the bond to form a water/air tight seal.
- **Applications methods** - The physical characteristics of the pastes vary across the range to suit the different application techniques, which are typically, by hand - comb or spatula - or by application equipment which can dispense catalyzed material in a bead of adjustable diameter or in a spray pattern to cover larger areas more quickly.
- **Mechanical properties** - The different mechanical properties in the range allow you to choose a paste specific to your bond requirements. Within the range of pastes there are grades with and without glass fibre to suit the different types of application within the construction of composite parts.

The use of glass fibre or lightweight fillers help to provide useful properties of additional strength, low density and improved flexibility and fatigue resistance.

Some specialty formula enable more specific applications like model surfacing, repair of concrete and use in vacuum bagging processes.

Main advantages and applications

In many composite applications individual components are combined or attached with other parts, while surfaces may need treatment and finishing. Dedicated material systems that are easy to use at a competitive overall cost can help you to manufacture composite parts with improved performance.

The Bonding Paste range can be divided into the following main areas.

Assembly

A wide group of bonding pastes primarily developed to obtain optimum adhesion to GRP laminates.

Our products cover a broad spectrum of strength properties, tensile elongation, temperature tolerances and curing characteristics. Assembly can often be a complex process involving several parts and different material types. In these structures the bond must have the correct strengths and properties to adhere well with all the materials used and to cope with the stresses of the composite part end-use.

A good bond does not only depend on the selected type of Paste but it is also seriously influenced by the joint preparation and its specific geometry.

The Bonding Paste choice depends on the joint thickness and on the level of stress to be endured.

- Joints over 5mm thickness: glass filled bonding paste is the best option, as the glass fibre will add strength.
- Joints below 5mm thickness: the presence of glass fibre is not needed. Flexible or semi flexible bonding pastes are a good solution, depending on the stress applied to the joint;



With Glass Fiber



Without Glass Fiber

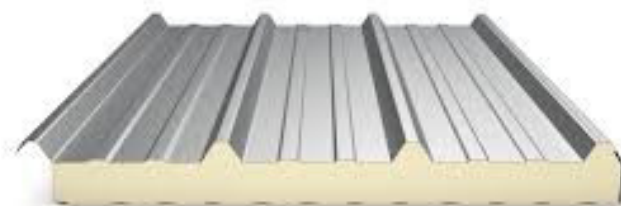
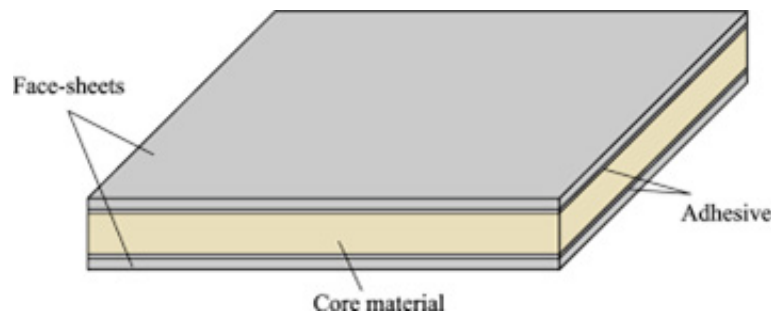
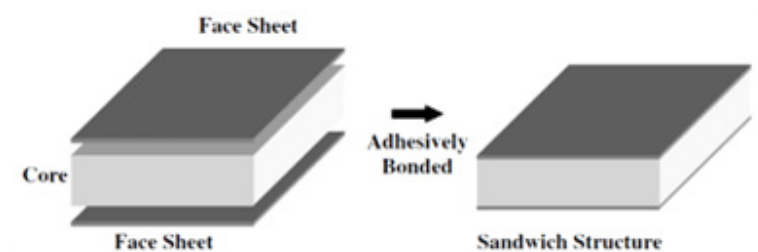
- Joints exposed to stress require a more flexible grade of bonding paste. Static joints need a semi flexible paste.

According to Industry best practices, it is suggested that the contact surfaces are prepared with some light abrasion and then solvent wiped to remove grease, oil and other contaminants in order to optimize the overall bonding performance.

Sandwich Adhesive

Sandwich adhesive is used to bond core materials to core materials and to GRP laminates aimed at adding both strength and thermal insulation to parts whilst retaining overall lower weight. These products are characterized by low specific weight, high tensile elongation and a low exotherm during cure in order to provide low shrinkage and ensure a low surface distortion impact. Most bonding pastes tend to be without glass fibre and are typically applied with a comb or notched spatula.

Special care should be taken in product selection and application because there are a number of different core materials used in sandwich composites, i.e. metals, wood, thermoplastics and parts made from SMC/BMC, which can severely impact the bonding performance.



Laminating aids

Hard to laminate and complex shapes may have the bonding paste applied into them before being laminated over or having inserts or core materials placed over them. Bonding Pastes used for these purposes must have low exotherm and shrinkage properties to avoid distortions in the surface of the laminates and facilitate the elimination of air bubbles in the laminates.

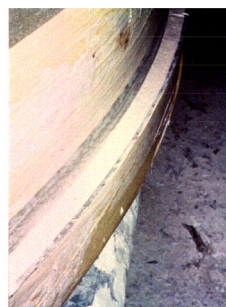


Gap Filling/ Surface fillers

Some Bonding Pastes can be used as gap fillers and sealants for certain applications. Surface fillers have a high content of fillers, rapid curing characteristics and are easy to sand.

Polynt Group supplies surface fillers that are recommended for filling larger irregularities and grooves, leaving a coarse surface. Additional surface fillers are recommended when a smooth and pore-free surface is required. Surface fillers are also used in model work for filling grooves and irregular surfaces.

In many cases the key requirements are the absence of sagging when applied in thick joints and the achievement of smooth and accurate surfaces because tolerances are often narrow.



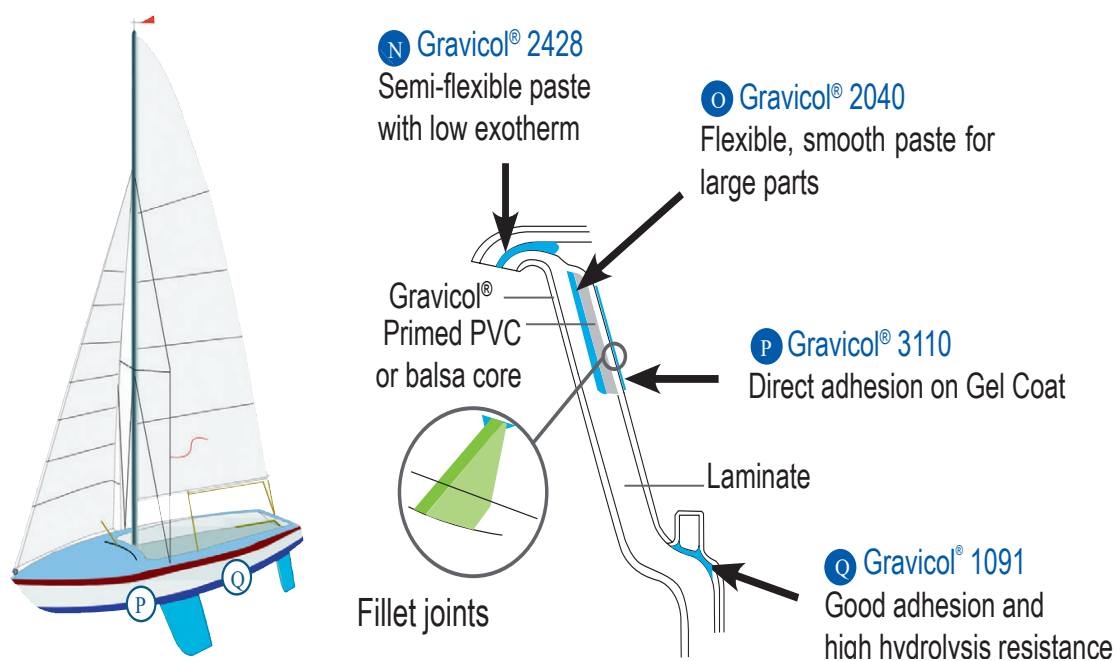
Surface fillers offer quick curing characteristics, easy sanding and low shrink properties. In this surface filler range, Polynt Composites has products recommended for both the basic or first application layer and for the top layer where a smooth surface is required. These products offer a nice and even surface with very few pores.

Applications of Bonding GRP Laminates

Marine

In the construction of boats and vessels, decks and hulls have to be bonded together, as well as single components to the hull or deck. Polynt Composites offers a range of bonding pastes that allow for reliable bonding of GRP laminates in various Polymer chemistries and densities. Some of these have a white colour, and therefore are preferred for Marine applications. Vinyl ester based bonding pastes provide higher toughness and are currently being used for bonding stringers and the engine bed on to the hull. Using bonding pastes for the bonding of GRP laminates has proven to simplify manufacturing processes and hence save time. Besides that, the workshop logistics are easier and give operators better control.

In many applications the strength of the bond is at least as high as the strength of the laminate it is supposed to adhere to. Both and Gravicool and Norpol bonding paste series are formulated to obtain optimum bonding properties to GRP laminates.

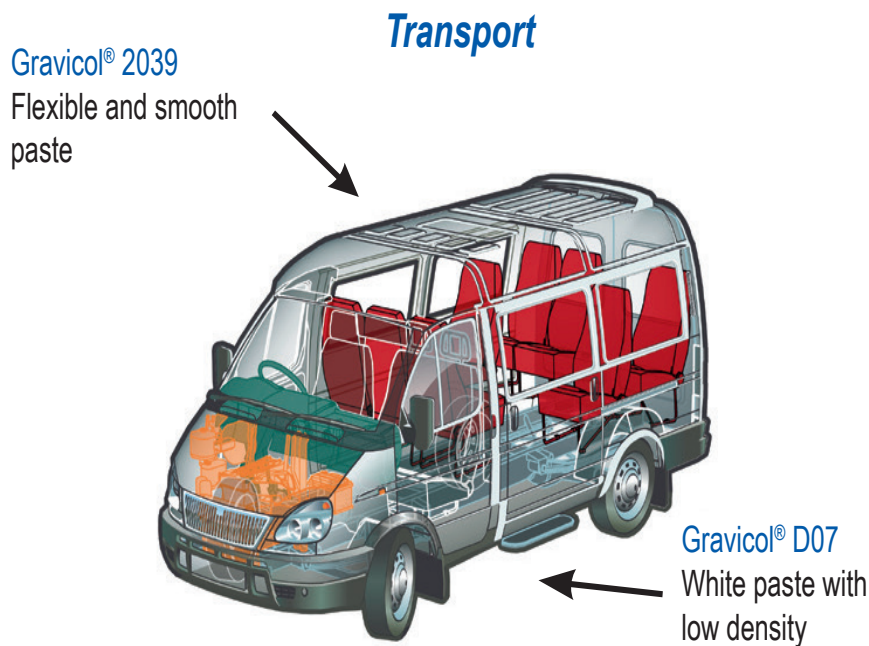


If the laminates are “green” and do not contain wax, it is possible to directly bond the laminates together. Otherwise, it is recommended to abrade the surfaces in advance in order to obtain maximum adhesion. Bonding paste intended for bonding GRP laminates should have a tensile elongation of at least 1.5%. The actual bonding property can be checked with a simple adhesion test. High tensile elongation is vital for a high-quality bonding paste. This ensures a tough joint with high tolerance to dynamic loads. For manufacturers of lifeboats the slogan Safety First is the guiding principle in product development. Several free-fall lifeboat manufacturers use bonding pastes from the Norpol FI- Series mainly to bond the inner liner/ interior parts to the lifeboats. All vessels have to pass the strongest quality and strength tests before they are released to the market. Here, there is no room for compromise. Lifeboat free fall systems provide cutting-edge technology, particularly developed for the rough seas in the North Sea, including the world’s largest lifeboat for vertical free-fall. Together with the lifeboats’ other components, the Norpol FI- Series has passed numerous tests, and been proven over time to meet service requirements.

Transportation

The Gravicol and Norpol bonding paste series has proved very well-suited to the transportation sector. The products are used for bonding and filling styling parts on cars where the chassis or parts of the chassis have been made out of GRP laminates. Some of the bonding paste ranges have also been successfully used for attaching metal parts to GRP laminates.

Another application area is filling corners, voids and areas where there is a risk of air pockets forming when laminating. When it comes to surface treatment, Polynt Composites offers products ideal for smoothing the surface before a suitable primer and coating system is applied.



Industrial

There are numerous industrial process and application areas where the Norpol FI- Series and Norpol Colle- Series have proved most appropriate, such as in the production of containers, vessels and pipes. The products are very versatile and have proved suitable for filling grooves and corners.

For surface treatment of GRP laminates, such as leveling uneven surfaces, the Norpol surface filler recommended is one that builds well, is easy to apply, offers quick curing and is easy to abrade.

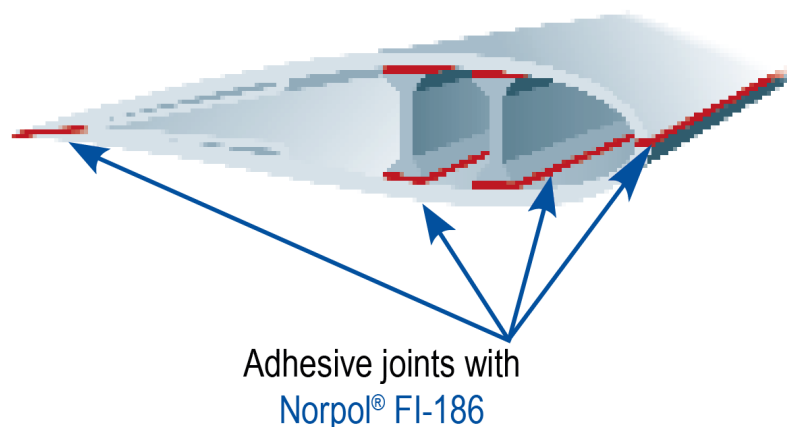
To obtain a smooth surface that needs less finishing treatment, selected Norpol surface fillers are recommended as a top layer.

For general applications such as joining pipes, securing sleeves, bonding laminates or bonding single GRP details, the Gravicol and Norpol bonding paste range offers a selection of products. Tests carried out with advanced testing equipment have proved that bonding pastes from the FI- Series have high strength. Tensile tests, in accordance with ASTM C287-80, reveal that it is the GRP laminates, and not the bond itself, that will start to crack. This proves the excellent strength and bond properties of these products.

SPECIAL TYPES

Wind Rotor blades

The rotor blades' light constructions are typically moulded in a vacuum infusion process as two individual shells and then bonded together. The blades, often more than 70 meters long and now even exceeding 100 meters, are subjected to extreme loads and tremendous dynamic stresses in service. Rotor blade bonding is an especially demanding area where bonding paste used for this application requires thorough testing. Specific end-product requirements as well as directions given by the classification authorities, has led to focused R&D resources and the use of advanced test-equipment which has made it possible to develop products that comply with the highest quality standards.



The Norpol FI-186 bonding paste recommended for use on rotor blades is approved by DNV GL. Some of the tests performed for wind blades bonding paste include :

- Tensile testing from - 50°C to + 60°C
- Fatigue testing
- Creep lap-shear
- Shear test from - 40°C to + 50°C
- DCB testing of adhesion properties

Packaging Sizes

The Gravicol, Norpol FI- and Colle- Series is generally supplied in 20 kg or 225 kg packages. A limited range are also supplied in 9 kg package sizes. Some product types have minimum order sizes.

Curing Systems

For the major part of range standard MEKP can be utilized, however some specific BPO cured systems are available.

Application

The ideal application temperature range in the workshop is the same as the general recommendation for polyester, 18–23°C.

Lower temperatures give increased viscosity and longer gel time, and will require increased attention when the peroxide is mixed.

All the products are pre-accelerated and therefore easier to work with.

In general, most of the have high viscosity. This means thorough mixing of the peroxide is required in order to obtain even and correct curing characteristics. In most types a colour indicator has been added, this enables the user to see when the peroxide has been properly mixed.

The surfaces of the parts to be bonded should be free of dust and contaminants to ensure the best levels of adherence. The surface of the parts should be abraded and solvent wiped if/as needed.

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