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Resin Flooring Materials: Alternative System Build-ups

There are basically three main ways of building-up a resin flooring system on site from its component resin floor products. The best build-up method for each project is determined by the substrate profile after surface preparation has been completed, the total resin floor system thickness required, the specific resin flooring materials selected and their consistency and flow properties, plus any solvent or water content of any of these components.

These resin flooring system build-ups can be summarized as follows below:

Multiple Roller Coat Resin Flooring System Build-up:

The resin flooring system is built up from a combination of layers of the same or compatible resin flooring products or components, that are generally roller or squeegee applied, as thick-layer or 'high build' coatings, which have a typical layer thickness of around 150 to 200 microns (dft) per coat. Then the freshly applied resin floor layers are broadcast with additional graded sands or aggregates, between coats and whilst they are still 'wet', to 'build-up' and create the additional system thickness and structure required. This resin flooring system build-up is normally used for resin floors with a total thickness of from 500 microns to from 2-3mm (Resin Floor Type Classifications 3,4 and 5); the broadcasting of suitable aggregates into the freshly applied resin flooring materials is also used to provide the required levels of slip or skid resistance.

Self-Smoothing Resin Flooring System Build-up:

The resin flooring material is trowel or squeegee blade applied, as a 'self-smoothing', 'self-smoothing' (the current 'trend' in their description), or 'self-levelling' resin flooring systems. All of which are basically the same thing, flowable blends of synthetic resin and fine inert fillers, pigments and sand or fine aggregates as the floor screed (these are also known as the Resin Floor Type Classifications 5 and 7).

Self-smoothing resin floors are usually applied in 1 – 3 layers, including resin priming where required on porous substrates, and at thicknesses of from 2-6 mm in total, according to the floor system specification and site conditions and requirements, onto the prepared concrete or cement screed substrate. The resin floor material is then 'spiked-rollered' whilst it is still 'wet', to remove any entrained air, then the surface can either be left smooth as an easy to clean, hygienic and Decontaminable floor finish. Alternatively, it can be broadcast with fine graded sand or synthetic aggregates, with or without an additional sealer coat of the resin flooring material, which is used to provide an increased level of slip or skid resistance, such as is frequently required in wet process areas for example.

Trowel Applied Resin Flooring Screed System Build-up:

The highest mechanical and abrasion / thermal shock resistant resin flooring systems are produced with trowel applied resin floor systems that are usually based on solvent free resins

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and highly filled with selected and graded special sands or other aggregates to provide the high impact, wear and shock resistance demanded from the resin floor.

Therefore trowel applied resin flooring screed system build-ups are normally laid with traditional 'floor-screeding' techniques, or including machine mortar screeding and power-float finishing techniques, (these are also known as the Resin Floor Type Classification 8). The thickness of trowel applied resin flooring systems is normally recommended and specified to be from a minimum of 4mm and more frequently from 6 to 9mm in total, in order to get the maximum advantages and benefits from this type of resin floor system i.e. the increased mechanical impact, wear and thermal shock resistance etc. There may also then be an additional requirement for a final resin floor sealer coat of the same pigmented resin floor binder or another resin based floor sealing coating where total impermeability and high chemical resistance is also required from the resin floor system build-up. This additional sealer coating is applied on top of the trowelled / screeded material (this resin floor system build-up is then known as the Resin Floor System Type Classification 6).

For additional help and assistance in selecting the right type of resin flooring materials and the right resin floor system 'build- up' for your project, with specific advice and guidance on any aspect of your resin flooring requirements – no matter what sized area or your performance demands, then **please call any of our offices and one of our Resin Flooring specialists will be delighted to assist you.**

Resin Flooring Materials: The Alternative Resin Types Available

Resin Flooring Materials are produced from several different synthetic resin based floor finishing technologies that are predominantly reaction hardening, which means as the result of mixing two or more components together. This is usually done with low speed mechanical mixing equipment and in a defined mix ratio, for a defined time, shortly before they are applied. One or single component resin flooring materials are not generally suitable for use in industrial and commercial flooring applications, due to their lower inherent strength, mechanical and chemical resistance.

Two Component Resin Flooring Materials:

The most commonly and widely used resin flooring material technologies used in the UK include 2-part epoxy resin flooring systems, 2-part polyurethane resin flooring systems and 2-part acrylic (MMA type) resin flooring systems.

All of these different '2-part' synthetic resin flooring systems, or '2-component' resin flooring materials as they are more correctly known, are all supplied to site in two separate pre-batched or bulk containers. These components of the system commonly referred to as the 'resin floor base' and the 'resin floor hardener' or 'resin floor catalyst' are then required to be thoroughly mixed together on site. Then the prepared resin floor material is applied onto the prepared concrete floor substrate within the products defined 'pot-life', meaning its 'working time', before it

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has become too thick or otherwise unworkable and so can no longer be applied.

The two components of the products begin to react together as soon as they are mixed and then harden in a defined time period (at given ambient and substrate temperatures and humidity's) to form a durable resin floor system build-up component or the complete resin floor system. This reaction / hardening time is also referred to as the resin floor materials 'curing' time and this is the length of time before the floor can be put into use. This curing time also, varies according to the type of resin and the specific resin flooring products formulation and the environmental conditions, particularly again the temperature and the humidity.

Typically this initial curing time can be , from 1 to 24 hours, with the products full chemical and mechanical / abrasion resistance being achieved in from 1 to 7 days curing time – again dependent on the resin type and the specific product formulation. A full understanding of the site, the environmental conditions, and the resin flooring materials application and performance is therefore essential for a resin floor system's successful installation.

The resin flooring specialists at NCC's Resin Flooring Site can advise you on the most suitable resin flooring type and the best specific resin flooring product(s) for your specific project needs. **Please call any of our offices for specific assistance from our resin flooring experts.**

This generic information on the different types of resin flooring materials technologies, is intended to provide you with an overview of the typical and characteristic properties of each of these different type of synthetic resin flooring materials and help you to understand the alternative possibilities available. In the following pages we will review and discuss each of these resin flooring materials technologies in more detail, together with their main advantages and any limitations in relation to their use in the resin flooring system solution for your project.

If you would like any additional advice or assistance for your resin flooring project then please call any of our offices and one of our resin flooring experts will be delighted to assist you. At Resin Flooring Site we provide detailed advice and can supply a full range of the best performing resin flooring technologies and systems that are available today.

Epoxy Resin Flooring Materials

Epoxy resin flooring is probably the best known and most commonly used type of resin flooring throughout industry facilities and in commercial premises in the UK. However it must be understood that there are actually many different types of epoxy resin based flooring systems with greatly different application characteristics and performance properties. These include, water dispersed epoxy resin floor systems, solvent containing epoxy resin floor systems and solvent free epoxy resin floor systems. As always with resin flooring material technologies, these different types of epoxy resin flooring materials all have their own characteristic advantages, disadvantages, limitations and benefits as resin floors, which we have tried to summarise below and in the following pages to assist you.

The nature and chemistry of most epoxy resin flooring products generally, makes them amongst

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the easiest and reliable resin flooring materials to mix and apply on site, where they will provide a durable industrial flooring system that can last for many years. The mixing ratio of the base epoxy resin parts to the hardener components, is usually formulated to be around 4 : 1, which makes the materials relatively easy to control and ensure thorough and homogenous mixing – This is unlike some other synthetic resins that have much more difficult mix ratios of up to around 20 : 1 and which therefore makes complete and thorough mixing much more critical, and thereby increasing the risk of problems on site.

Today the UK resin flooring industry widely accepts that epoxy resin based flooring systems are the safe and reliable option, for all but the most critical and onerous installation and performance requirements i.e. their hardness means they are not sufficiently crack-bridging for exposed car park decks for example, plus they are not ideal for installation over existing wet concrete floors in the food and beverage industries.

However they are the ideal solution for the majority of situations, where the extremely 'sticky' nature of the freshly mixed epoxy flooring materials also helps to ensure a good and strong bond to the concrete substrate. The hardened 'pull-off' strength being higher than the cohesive strength of concrete, i.e. meaning it is only removed by a break in the concrete itself, the potential for delamination is minimised and the concrete is reliably protected against impact, wear and abrasion or ingress and attack from water and many other aggressive chemical liquids

Finally another general advantage is obtained through the tight cross-linking nature of the epoxy resin and hardener reaction, which can be visualised as being like a 'clamping' effect which closes the hardened surface of the floor. This means that once they have fully hardened or cured, the epoxy resin flooring materials are extremely watertight and many will have excellent resistance to immersion and a wide range of oil and chemical spillages, or aggressive industrial cleaning products – such as strong industrial disinfectants and detergents.

The resin flooring specialists at NCC's Resin Flooring Site can advise you on the most suitable resin flooring type and the best specific resin flooring product(s) for your specific project needs. **Please call any of our offices for specific assistance from our experts.**

In the following sections and pages we have also provided more specific information on the particular advantages and disadvantages of each of the different types of epoxy resin flooring.

Water Based Epoxy Resin Flooring Materials

Water Based Epoxy Resin Flooring materials and systems are now becoming increasingly popular as the technology of 'water based', or as it should more correctly be known 'water dispersed' epoxy resin flooring technology, has greatly improved in recent years. – Remmers from Germany, is a clear technology leader in this field, which

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is why we generally prefer their advanced range of extremely durable and colourfast, water dispersed epoxy resin flooring products. Sika is also a major international producer of good water dispersed epoxy resin flooring that we can also recommend.

Advantages of Water Based Epoxy Resin Flooring Materials:

The main advantages of the water based / water dispersed epoxy resin floor materials, is that they contain no dangerous solvents, or VOC's (Volatile Organic Compounds) as they are also now referred to, so therefore they can be used safely in occupied areas, or where people and other trades are working immediately adjacent to the area being treated. Plus they are not sensitive to naked flames and very importantly for many industries and businesses, they will not contaminate foodstuffs or beverages.

The performance of all water based epoxy floors against mechanical abrasion and chemical attack, whilst now good for the Sika and Remmers products, is still somewhat lower than that provided by good quality and higher build, solvent free epoxy resin products (normal dry film thickness applied >300 Microns per coat versus the 100 to 150 microns applied with water based epoxy resin flooring products) – However the high quality Remmers and Sika water based epoxy resin products are very definitely ideal for many domestic, commercial and light industrial, high build resin floor coating jobs (Resin Floor Classification Types 1, 2 and 3) - These can include all kinds of garage floors, workshop floors and factory assembly, storage and distribution areas etc.

Water based epoxy resin flooring materials have another distinct and important advantage over other solvent and solvent free epoxy flooring materials, which is that whenever their refurbishment and over-coating is eventually necessary, then only minimal surface preparation (cleaning) of the existing surface is necessary. As opposed to the thorough mechanical surface preparation (keying) that is necessary to overcoat solvent containing and solvent free epoxy resin floors. Additionally due to their non-taint and no VOC contents, water based epoxy resin floor coatings can again be maintained and overlaid without disruption or danger; this is particularly important when there are any other trades and people working in the same or adjacent areas.

Therefore in many instances the best water based epoxy resin floor coatings are advantageous and have considerable advantages over any solvent containing products, including using a much safer product and one that is readily available in almost any colour. Additionally for projects where a resin floor coating and / or broadcast system is perfectly adequate to meet the service performance requirements, then these water based epoxy resin flooring materials will perform extremely well for a long time, they will

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allow easy over-coating with refresher coatings of the same product to be applied, whenever they are required - And all with the minimum of surface preparation, disruption and cost.

Remmers BS 3000 or Sikafloor 2530W water based, epoxy resin based floor coating systems are both therefore absolutely ideal to meet the higher performance floor painting and high build floor coating requirements of garages, workshops, light traffic production assembly and storage areas - together with many other applications.

If you would like help and assistance with your water based epoxy resin flooring, **please call any of our offices and one of our Resin Flooring specialists will be pleased to assist you.**

Solvented Epoxy Resin Based Flooring Materials

Solvented Epoxy Resin Flooring materials are now normally regarded as the old fashioned and rather out-dated epoxy resin flooring technology and only available as 'floor paint types' (Resin Flooring Classification Type 1), which must contain a volatile hydrocarbon based 'solvent' to help the epoxy resin material penetrate and bond into the surface of the concrete. This relatively large quantity of solvent also encourages ease of application and produces the optimum coverage in terms of the highest m²/litre, not necessarily for the finished resin floors performance though. Solvented resin flooring materials are relatively fast curing (drying and hardening) and they can also have good abrasion and chemical resistance, for their comparatively low thickness (approx. 50-80 microns per coat), which was historically why this type of material was once widely used to provide economic and effective floor painting solutions.

However, the highly aggressive solvent content of these solvented epoxy resin flooring products (usually from 50 to >80% solvent) means that today, these products are all now classified as having unacceptably high VOC levels (volatile organic compounds). These VOC's are released into the atmosphere during the products application and curing, so they are increasingly restricted, or even banned on many industrial sites and commercial premises. Additionally this solvent content always requires that considerable ventilation must be provided, otherwise people working in adjacent areas may also be disturbed or inconvenienced by the smell and odour. Some foodstuffs (particularly dairy products) and other materials can also be sensitive and tainted by these solvents.

Finally, these high levels of these solvents are dangerously flammable, so solvented epoxy

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resin flooring products must never be used near any sources of ignition, naked flames or where welding operations take place etc.

However it should be added that for some commercial applications such as sealing exposed concrete or cement screed floors in large open spaces in factories and warehouses, these materials can sometimes still seem to be ideal. This is usually due to their tolerance of cooler application conditions, or their initially apparent low price, but this should always be viewed together with the cost of the necessary additional restrictions and limitations, plus the risks for the Flooring Contractor, other Trades and the Facilities Owner – Then the real cost is frequently not so attractive.

Fortunately today, in almost all situations, NCC Resin Flooring Experts are able to recommend a much safer, more environmentally friendly and all round better performing water dispersed epoxy, or solvent-free epoxy products as an alternative, **please call any of our offices and one of our resin flooring specialists will be pleased to assist you in the selection of the best resin flooring solution for your project.**

Solvent-Free Epoxy Resin Based Flooring Materials

Solvent-Free Epoxy Resin Flooring materials contain no solvents or water as diluents and are therefore 100% solids, consisting solely of the epoxy resin and other special ingredients that react to form a high build, dense, vapour-tight and extremely water-proof film when cured. This means that solvent-free epoxy resin flooring products have much higher epoxy resin contents and so they can also be used in much thicker layers and therefore will provide higher performance and protection for the floor.

Unfortunately, perhaps the one disadvantage is that as a consequence of this much higher epoxy resin content, solvent-free epoxy flooring products are more expensive and generally only used for professionally applied flooring projects. They are designed for use in areas with more demanding and higher performance requirements i.e. in factory process and production areas with increased traffic, abrasion or liquid chemical exposure for example.

Resin Flooring systems with Solvent-free Epoxy Resin Materials:

Due to a generally higher viscosity and thicker consistency, solvent free epoxy resin products require very thorough 'compulsory' mixing prior to their application. This lack of solvent or other diluent that has to escape from the material during curing, solvent-free epoxy resin flooring materials can be applied by several different methods and system build-ups as well as high build coatings and broadcast systems. These flooring system build-ups include, applications as self-smoothing / self-levelling flow applied floors, or as more highly aggregate filled, trowel applied floor screeds.

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Priming for Solvent-free Epoxy Resin Flooring Materials:

For solvent-free epoxy resin flooring systems on porous concrete floor substrates may first need to be sealed or 'primed' with clear grades of the same or similar solvent free epoxy resin product as the primer. This is to seal the prepared surface and prevent any blistering or bubbling in the finished resin floor due to rising air and / moisture from the substrate. The clear grade of the solvent-free epoxy resin flooring material is used to obtain adequate penetration and adhesion without wasting expensive colour pigments in the substrate where they will not be seen.

Solvent Free Epoxy Resin Flooring products are usually only recommended for use by professional Resin Flooring Contractors, however where appropriate for specific project requirements, we can also provide guidance and support for their use by competent general contractors and facilities maintenance crews.

As with all resin flooring solutions, we can also provide you with the names of experienced resin flooring contractors (Our network of National, Regional and Locally operating resin flooring specialists are located throughout the UK), who will be pleased to provide you with a quotation and guarantee for carrying out all of your resin flooring works professionally and to our agreed specifications. Please also refer to the [Specialist Resin Flooring Contractors](#) page of this website.

NCC Resin Flooring Site also provide specialist advice and can supply special solvent free epoxy resin floor products for a number of very specific applications and industries, such as for use on concrete floor surfaces in contact with potable (drinking) water. We also provide 'tailor-made' resin flooring systems with extreme and specific chemical resistance, such as for ultra-hygienic process areas and clean room production buildings, or even to be provide decontaminable resin floors for use in nuclear power plants and resin floors for other nuclear processing facilities.

If you would like help and assistance with your specific project requirements, **please call any of our offices and one of our resin flooring specialists will be pleased to advise and assist you.**

Polyurethane Resin Based Flooring Materials

Polyurethane Resin Flooring Systems or PU Resin Floors, as they are often also known, are available in different types: there are both one and two component materials

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and these can both also include solvent-free, solvent based and water based polyurethane resin flooring products.

One-component PU Flooring Products:

The one-component / single pack, water based PU resin floor products are not of sufficiently good performance and durability for Resin Flooring Site to recommend them over the now excellent water based epoxy resin flooring products for example. These one-component, polyurethane resin floor materials are of relatively low mechanical strength, limited adhesion, and are problematic to apply on concrete floors due to their moisture-sensitivity. Many PU Flooring Products sold to the domestic and trade markets are also not really PU resin materials, but they are actually cheaper and lower performance acrylic and alkyd resins, blended with a small amount of polyurethane resin – Do not use for any industrial or commercial flooring application.

Solvented One-pack Polyurethane Resin Floors:

The solvent based polyurethane resin floors do perform well in service, but they have all of the same application difficulties and restrictions for their use as the solvented epoxy resin based flooring products. i.e. high levels of VOC's released into the air, that are potentially dangerous or at best very inconvenient; plus they require extensive preparation for maintenance and over-coating. Therefore at this time we do not recommend solvented polyurethane resin floors for most internal applications on floors. - Although we regularly recommend and supply them for external use in the joint sand stabilising and sealing of block paving for example – Please visit our sister site www.nccstreetscape.co.uk/BlockPavingSealers.

Two-Pack PU Resin Flooring Materials:

Two component PU Resin flooring materials are predominantly high build coatings, which themselves are now nearly all of the modern solvent-free type, which have excellent wear and chemical resistance. Solvent-free two-pack PU Coatings can also need a pre-treatment to ensure that they bond to dense substrates – In fact these PU resin floors are usually applied to concrete substrate surfaces that have first been sealed with a clear, penetrative epoxy primer that penetrates and ensures adhesion of the material.

High Performance PU Resin Screed Materials:

The best known 2 component polyurethane flooring systems are actually the highly filled PU resin and cement based trowelled screed types, such as the excellent Ucrete and

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Sikafloor Purcem, which are both normally applied at 6 to 9 mm thickness to produce heavy duty PU resin screed floors, with high impact and abrasion resistance, excellent chemical resistance and also high thermal shock resistance i.e. to frequent steam cleaning for example.

These high performance PU resin screed materials are therefore ideal for use in high performance resin flooring applications for the food and beverage industries in particular. Another of these PU screed advantages is their tolerance of damp substrates for application, which therefore also makes them extremely suitable for the essential maintenance and upgrading of facilities which are still in production, as well as for the resin floors on new construction projects.

If you would like help and assistance with your specific PU screed flooring project requirements, **please call any of our offices and one of our resin flooring specialists will be pleased to advise and assist you.**

Acrylic Resin Based Flooring Materials

Acrylic Resin Based Flooring Materials are not all to be confused with the widely available and always inferior, 1-component acrylic floor paints, the modern 2 component, acrylic resin flooring systems can also provide durable, chemically resistant and hard wearing industrial resin floors, plus they are also particularly excellent for carrying out emergency concrete floor repairs.

These 2 pack acrylic resin based flooring products are also sometimes known as PMMA Resin Floors (Poly- Methyl- Meth Acrylic), or simply just a MMA resin floors. The primary advantage of PMMA Acrylic resin floors is their ability to be applied and cure quickly, even at low temperatures, including when they are applied in environments and conditions at well below 0°C. Therefore these acrylic resin flooring products and systems floors are very commonly used for producing and maintaining high performance resin floors in Cold Stores, Chillers and Freezer rooms; in these areas the low temperatures in the base concrete are often in a state of 'permafrost'. These same characteristics also make them ideal for use to make overnight and emergency concrete floor repairs in many industries. incidentally they are also widely used for emergency repairs on busy airfields and runways.

If you think that the high performance characteristics of any of these special 2 component, solvent free, acrylic resin flooring systems may be advantageous for your project, particularly if you are in the owners of cold stores and chiller rooms for fresh produce, **please call any of our offices and one of our resin flooring specialists will be pleased to assist and advise you.**

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6) Polyurea Resins

This class of resin flooring materials is technically a type of elastomeric resin derived from the original chemical reaction product of a polyol and an isocyanate component through a relatively new process called stepped polymerization. It was only a relatively few years ago in the 1990's that the current type of advanced two-component polyurea resins suitable for flooring and coating systems were first introduced. The rapid and relatively straightforward (with the right equipment!) application characteristics and cure rates, together with their advantages of reduced environmental and handling limitations compared to some established resins such as epoxies and PU materials, made them attractive for many applications – but the limited number of specialist contractors with expertise and experience, plus the restrictive cost of the hot-spray airless equipment, means that it will be some time before the Polyurea resins ever take a major share of the resin flooring market.

This is despite the fact that Polyurea resin floors do have some more distinct advantages and increased performance in terms of their mechanical properties and chemical resistance over traditional resin materials, especially for more demanding area projects. Specifically their fast reaction curing and hardening (significantly better than epoxy resin systems), with relative low sensitivity to moisture (significantly better than polyurethane resin systems), make them very useful protective coating systems. They are also mixed at the nozzle, making them especially cost effective with machine application on large surface areas.

Polyurea systems have already been used in the USA for over 20 years, where large areas quickly made investment in the expensive spray equipment a good option. In the UK and other European countries, their use and market share has been much slower, but is also now growing steadily for the best products (VIP Chemie GmbH Quickcoat range) for many different industrial (bunds and containment lining) and difficult car parking decks and even structural waterproofing applications. Related products are also now widely used for truck beds and the like by vehicle manufacturers in their factories and workshops.

Polyurea Resin Flooring Systems

Advantages of Polyurea Resin Floor Coating Systems

In summary the VIP Quickcoat advanced polyurea Resin Floor Coating Systems are spray-applied, very fast curing, can be applied in thick layers in one application (usually 1 - 5mm) and is touch dry in 5-10 seconds, allowing complete systems to be installed extremely quickly ensuring a rapid return to service. There are a number of important advantages that can be obtained by using these latest Polyurea Resin linings and coating systems that include:

- Rapid curing
- Moisture Tolerant
- Excellent Adhesion

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- Environmentally Friendly
- High Abrasion Resistance
- Excellent Heat Resistance
- High Tensile Strength
- VOC, plasticiser and heavy metal-free
- Extremely durable

Disadvantages and Limitations of Polyurea Systems

Some of the beneficial properties offered by polyurea elastomeric coatings can also pose some issues that may be a disadvantage for some projects such as:

- Application can be nozzle operator dependent and must be monitored closely.
- Fast curing can mean insufficient 'wetting' of the substrate is a risk.
- Tolerant of damp, but not 'wet' surfaces so good Quality Control required.
- Polyurea requires specialist application techniques and expensive equipment.
- Designed to be protective rather than aesthetic, so the finish can have an 'orange-peel' effect and in UV light they can discolour.

Therefore considering all of the above advantages and for the prevention of any issues on site, getting the right advice and support from the polyurea specialists at NCC Resin Flooring is an essential pre-requisite for successful completion.

Application Requirements and Characteristics of Polyurea Resin Floors

Substrate condition - the concrete substrate must be sound and of sufficient compressive strength (minimum 25 MPa), with a minimum pull-off strength of 1.5 N/mm². Any unsound or damaged concrete must be removed and repaired, plus any surface defects must be fully exposed and repaired with suitable compatible products.

Moisture content - Prior to application of polyurea resin systems the substrate moisture content must be < 4% , the relative humidity should also be checked and recorded, so that dew point conditions can be avoided. If the moisture content is more than > 4%, then application of the polyurea coating can only proceed when the moisture level reaches an acceptable level, or a temporary moisture barrier such as Sika EpoCem technology, is applied and then the work will be able to proceed the next day, once this barrier layer has hardened sufficiently.

Substrate Preparation - Concrete substrates must be cleaned and then mechanically prepared using abrasive blast cleaning for example, to remove any cement laitance, existing coatings and to achieve a fine gripping profile that is clean, dry and free from laitance, dirt, grease, oil and any other form of surface contamination.

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Application - Polyurea systems require installation by trained and experienced contractors as in the end, the person at the spray gun is mostly responsible for the quality level that is achieved, which is why the whole process must be monitored. The selected contractor's operatives must all be adequately trained and instructed in a project specific Quality Control process that will lead to the best possible results.

The specialists at NCC can advise you on the most suitable polyurea resin systems, trained Specialist Contractors (please also see the 'Specialist Contractors' Page of this website), for your specific bund lining project needs. Please call any of our offices for assistance from our experts.

7) Polyaspartic Resin Flooring Systems

Polyaspartic resins are similar and related to the Polyurea resins and technically they are also a type of elastomeric resin derived from the original chemical reaction product of a polyol and an isocyanate component through stepped polymerization. It was again only in the 1990's that the current type of advanced two-component Polyaspartic resins i.e. they are also VOC-Free Polyaspartic Aliphatic Polyurea resins, - So in essence, all polyaspartics are a polyurea, but not all polyureas are a polyaspartic – The class of these materials promoted for flooring applications basically slows down the really rapid cure rate of a polyurea, so that the Polyaspartic systems allow more time for application and finishing – generally with a reaction time adjustable from around 10 to 120 minutes. Thus making them significantly faster than typical epoxies and PU's, but they are not so rapid and somewhat 'uncontrollable' as the polyurea's – equally importantly meaning that: POLYASPARTIC RESIN FLOOR SYSTEMS DO NOT NEED EXPENSIVE AND SPECIALIST EQUIPMENT FOR APPLICATION.

These Polyaspartic resin flooring systems were first introduced after the polyureas developed by Texaco (now Huntsman Chemicals) in the 00's and their application for industrial flooring is becoming increasingly more widespread. Specifically due to their fast reaction curing and hardening (significantly better than epoxy resin systems), with relative low sensitivity to moisture (significantly better than polyurethane resin systems), the ability to be brush or roller applied as well as by spray, then resulting in a fast curing, abrasion and chemically resistant floor.

Voelkel Industrie Produkte GmbH. (VIP), which has focused more on the site application of these systems and developed their range of products, specifically for this purpose, over the last 10 years. VIP now work exclusively with NCC as their agents and distributors of their Polyurea and Polyaspartic resin flooring products in the UK.

The specialists at NCC can advise you on the most suitable polyurea and polyaspartic resin systems, advise on trained Specialist Contractors (please also see the 'Specialist Contractors' Page of this website), for your specific resin flooring project. Please call any of our offices for

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assistance from our experts.

8) Vinyl Ester Resins

Vinyl Ester Resin, or Vinylester as it was originally called, is a synthetic resin produced by the 'esterification' of an epoxy resin with an unsaturated monocarboxylic acid. 'Esterification' is the chemical term for a process involving the interaction of a compound possessing a hydroxyl group with an acid, and the elimination of water. The reaction product when the base compound used is an epoxide material is known as a 'Vinyl Ester', which is a solid that is then dissolved in a reactive solvent, usually styrene and by around 35 – 45% by weight.

There are also some compounds that are marketed by chemical companies as 'Epoxy Vinyl Ester Resins' and/or 'Novolac Epoxy Vinyl Ester Resins' – although these particular formulations / grades of vinyl ester resin are not for site use as they are extremely sensitive in mixing and application, so can only be used in strictly controlled factory environments, and for moulding applications generally.

Vinyl Ester Resin Flooring

The vinyl ester resins that are suitable for use in formulating floor finishes and protective coating products for secondary containment areas such as bund linings can be used where their performance, particularly in terms of their chemical resistance is an advantage. They also have an extremely free-flowing viscosity and are therefore easy to apply in the build up of laminated Fibre / Fabric Reinforced Plastic (FRP) systems and for filled screeds and renders where additional impact and abrasion or thermal shock resistance is required.

Additionally they are also fast curing and hardening in comparison with most epoxies and PU systems, which is often also an advantage because of the shorter downtimes in refurbishment flooring.

There is also now a so called 'new generation' of styrene-free vinyl ester resins or epoxy vinyl resin products that have started to be promoted, but this is mostly marketing speak and these materials should correctly be called Epoxy Acrylate Resins, and these products have significantly inferior properties

So to summarise the advantages, disadvantages and limitations of vinyl ester resins:

Vinyl Ester Resin Flooring Advantages

Good resistance to acids and alkalis, including strong nitric acid

Good resistance to hydrocarbon solvents

Excellent resistance to strong oxidising agents i.e. chlorine bleach

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Fast to very fast curing and hardening

Vinyl Ester Resin Flooring Disadvantages

Solvent containing components on site

Difficult to apply at lower temperatures

Cannot be stored for long periods or used at higher temperatures

Typical Uses of Vinyl Ester Flooring

The chemical processing and waste water treatment sectors of industry are now increasingly using vinyl ester resin floors and coatings to withstand corrosive chemical attack. Vinyl ester resins have a long history of this type of application, for example they are also used to fabricate components for Flue Gas De-Sulphurisation (FGD) processes in the Power Industry.

Mortars and screed can be produced with vinyl ester resins incorporating silicate and other acid / chemically resistant fillers and aggregates, to produce chemically resistant screeds and brick / tile bedding and jointing materials.

This type of vinyl ester resin such as in the Atako ATB-300 range of systems is also used for multi-layer Glass Flake system build-ups, which are widely used in industrial and waste processing or storage areas with high concentrations of strong acids and strong oxidising agents.

NCC Resin Flooring Specialists can advise you on the most suitable vinyl ester or other resin coating system solution, together with appropriately experienced specialist contractors for your specific project needs. Please call any of our offices for assistance from our resin flooring experts.