

APPLICATION INFORMATION
**ADDITIVES FOR CHEMICAL ANCHORING
AND FIXING PRODUCTS**



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Introduction

Chemical anchors, also called chemical fixings, resin anchors, injection mortars, or adhesive anchors, are names for systems used for fixing a bolt or other anchorage in a substrate with the aid of a reactive polymer. Various thermoset resin systems are used, which bond and polymerize with the aid of a hardener after being placed in the substrate.

Originally developed for demanding professional applications such as mining and tunneling, these systems are increasingly being used in the DIY market.

Special requirements are placed on mechanical properties, adhesive strength, durability, and chemical resistance. However, the stability of the usually highly filled, still liquid resin mixture before curing is also extremely important.

This brochure summarizes our additive recommendation for this application.

For additional information
on additives and technical
topics please contact us:
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Note

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Additives for chemical anchoring and fixing products

In chemical anchoring, generally highly filled, two-component reaction resins are used to permanently bond anchors made of metal or reinforced plastics to mineral materials (e.g., concrete, masonry, and stone). The use of this technique permits stress-free, substance-to-substance bonding of an anchor to the material surrounding the drill hole.

The reaction resins are usually epoxides, unsaturated polyesters, vinyl esters, acrylates, and modifications of these. In practice, the reaction resins are either injected from two-component cartridges or inserted as capsules into the drill hole.

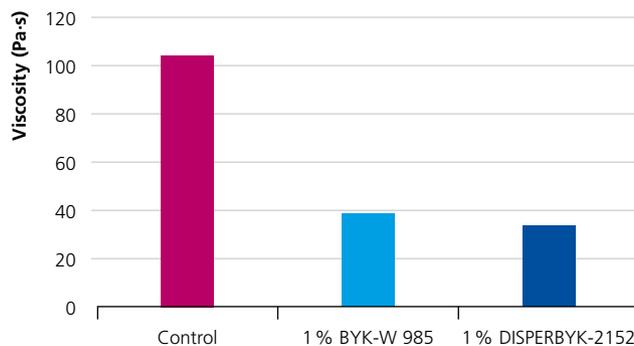
Important properties of the chemical anchors are: high mechanical resilience, excellent adhesion to the substrate, good storage stability before the chemical reaction, and easy processability with low raw material costs.



Wetting and dispersing additives

Fillers are used to improve the mechanical properties of the system and to reduce costs. However, they increase the viscosity of the formulation and, in doing so, can make processability more difficult. Suitable wetting and dispersing additives improve the wetting of the solid particles, which significantly reduces viscosity (G.01). Alternatively, the filler content can be increased while holding the viscosity constant. Moreover, wetting and dispersing additives stabilize the fillers against sedimentation (G.02).

Viscosity reduction (orthophthalic resin with 70 % quartz)



Brookfield RVT, #7 spindle, 5 rpm

G.01

Stabilization against sedimentation



G.02

Additive recommendations

| System | Viscosity reduction | Stabilization against sedimentation |
|--|---|---|
| Epoxy | <ul style="list-style-type: none"> BYK-W 985 ● BYK-W 980 ○ BYK-W 996 ○ DISPERBYK-2152 ○ | <ul style="list-style-type: none"> ANTI-TERRA-204 ● BYK-W 940 ○ |
| Unsaturated polyester/vinylester (also monomer-free) | <ul style="list-style-type: none"> BYK-W 985 ● BYK-W 908 ○ BYK-W 909* ○ BYK-W 966 ○ DISPERBYK-2152 ○ | <ul style="list-style-type: none"> BYK-W 940 ● |
| Acrylate | <ul style="list-style-type: none"> BYK-W 969 ● BYK-W 9010 ○ | <ul style="list-style-type: none"> BYK-P 105 ● |

● First recommendation ○ Second recommendation * Not available in EU

T.01

Air release agents/defoamers

Mechanical strength and chemical resistance are extremely important for composite anchors. Air entrapment in the cured system could negatively affect these properties. To achieve optimal deaeration, resin-specific additives are added that spontaneously deaerate the resin during preparation and improve application.

Additive recommendations

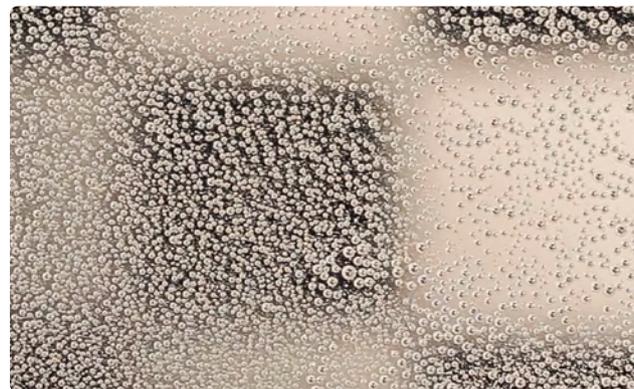
| System | Product |
|-----------------------------------|--|
| Epoxy | BYK-A 530 ● BYK-1790 ○ BYK-A 501 ○ |
| Unsaturated polyester | BYK-A 555 ● BYK-A 515 ○ |
| Vinylester | BYK-A 515 ● |
| Styrene-free polyester/vinylester | BYK-A 530 ● BYK-A 555 ○ |
| Acrylate | BYK-A 515 ● BYK-070 ○ |

● First recommendation ○ Second recommendation

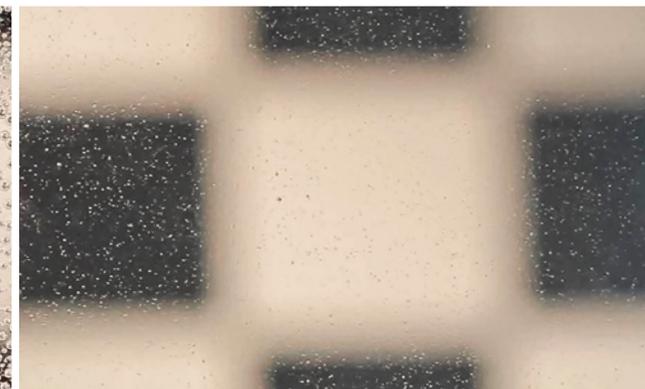
T.02

Deaeration of an unsaturated polyester

Without additive



With additive



G.03

Surface-active additives

The often dusty surface of the mineral substrate makes wetting and saturation of the substrate difficult, and the consequence is that the resin and substrate are not sufficiently bonded together. The use of surface-active additives, which are generally based on modified polysiloxanes, significantly reduces the surface tension of the resin (G.04). The penetration of the resin into the substrate occurs more readily since the cohesion to the wall of the drilled hole becomes stronger than the adhesion of the liquid particles to each other.

Additive recommendations

| System | Product |
|--|-------------------------------------|
| Epoxy | BYK-306 ● BYK-310 ○ |
| Unsaturated polyester/vinylester (also monomer-free) | BYK-330 ● BYK-306 ○ BYK-310 ○ |
| Acrylate | BYK-306 ● BYK-378 ○ |

● First recommendation ○ Second recommendation

T.03

Reduction of surface tension

Without additive



With additive



G.04

Rheology additives

The flow behavior of the resin mixture is a critical factor for composite anchors. The system must be simple to prepare and as stable as possible against sedimentation during storage. Good flow properties are required during application so that all space between the anchor and the wall of the drilled hole is filled; on the other hand, the resin should remain in the hole until it has cured and not leak out of the hole. To adjust the thixotropy of chemical fixing systems BYK offers liquid as well as solid thixotropes. The two thixotropy boosters must always be used in combination with a solid thixotrope such as GARAMITE or fumed silica.

Additive recommendations

| System | Thixotropy booster | Liquid thixotrope | Solid thixotrope |
|--|-------------------------------------|-------------------|------------------------------------|
| Epoxy | RHEOBYK-R 605 ● RHEOBYK-R 607* ● | RHEOBYK-410 ● | GARAMITE-7305 ● |
| Unsaturated polyester/vinylester (also monomer-free) | RHEOBYK-R 605 ● | RHEOBYK-410** ● | GARAMITE-1958 ● GARAMITE-1210 ○ |
| Acrylate | RHEOBYK-R 605 ● | RHEOBYK-410** ● | GARAMITE-1958 ● GARAMITE-1210 ○ |

● First recommendation ○ Second recommendation * For the hardener ** Only for cobalt-free systems

T.04

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This issue replaces all previous versions.

