HOT STUFF DEGALAN® HEAT SEAL BINDER FROM EVONIK

Food packaging must be securely sealed and keep the product fresh. At the same time, it must be quick and easy to open. That means the lid of a yogurt cup must be sealed firmly enough to keep the yogurt well protected, but should still be easily removable from the cup. Lids are coated with heat seal lacquers and sealed onto the cup to keep this connection clean and secure. With DEGALAN® brand methacrylate-based binders, Evonik offers the ideal solution for formulating these heat seal lacquers.

Functional polymers on the basis of methacrylate chemicals, which Evonik sells under the brand name DEGALAN®, are an essential component of heat seal lacquers. These methacrylate binders possess excellent properties for formulating heat seal lacquers and offer a wide range of possibilities for sealing yogurt packages. Aside from yogurt cups, DEGALAN® products also ensure a particularly strong seal in blister packs for pharmaceuticals.

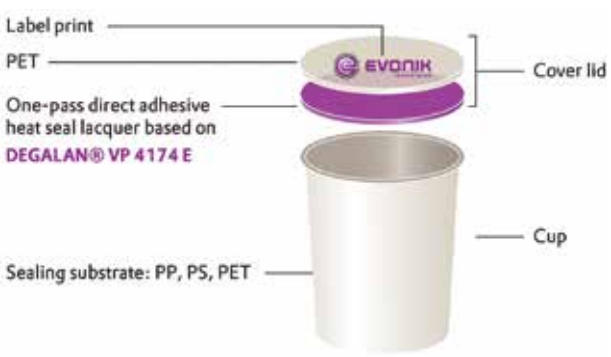
DEGALAN® – a varied product portfolio

There are numerous requirements for lacquers used in packaging: Yogurt cup lids made of aluminum or plastic must form a seal with a variety of cup materials, such as polypropylene (PP), polystyrene (PS), polyethylene terephthalate (PET) or vinyl (PVC) with varying parameters such as sealing temperature or manufacturing technology. Of course, the material may not represent any health or environmental risks.

Evonik offers four different groups of DEGALAN® binders. These include 100% solids, so-called bead polymers, organic solutions and dispersions, as well as aqueous dispersions. The great bandwidth of the portfolio allows for formulating a large variety of heat seal lacquers for sealing most commonly used cup/lid combinations.

Heat seal coatings formulated with a DEGALAN® organic dispersion can be universally used for sealing any cup. That means every DEGALAN® organic dispersion forms a seal with all conventional cup materials, such as polystyrene, PET, and polypropylene. Special PVC-based adhesion promoters are often needed in addition to the heat seal binder for coating aluminum lids. These are either applied in advance as an additional primer or directly included in the formulation of the heat seal lacquer. Polyesters also are generally used as a primer for lid materials made of PET. DEGALAN® VP 4174 E by Evonik is an organic dispersion that allows for direct adhesion on both PET and AL lids. The product eliminates the need for the previously required PVC-based adhesion promoters, making DEGALAN®-based heat seal coatings highly environmentally friendly. The elimination of adhesion promoters also reduces the complexity of production processes for lacquer formulators as well as film/foil converters, which has interesting cost benefits.

DEGALAN® heat seal binders meet the requirements of international foods regulations such as Commission Regulation (EU) No. 202/2014 and FDA 21 CFR § 175 for materials that are intended to come into contact with foods.



Yoghurt cups with DEGALAN Heat Seal Binders are smoothly and easy to open.

Direct adhesion created with bead polymers

Even though bead polymers are used for sealing yogurt cups, their most frequent application is found in blister packs for pharmaceuticals. Until now, manufacturers had to use a combination of PVC-based adhesion promoters and DEGALAN® P24 or DEGALAN® Al 23 heat seal coatings for pharmaceutical blister packs. The new generation of heat seal-capable bead polymers developed by Evonik methacrylate experts therefore represents a major breakthrough.

The new product, **DEGALAN® VP P 34**, is dissolved, for example, in ethyl acetate and can then be applied directly

DEGALAN Binders are also a excellent solution for pharmaceutical blister packs.

to the aluminum foil. This eliminates the previously required priming or inclusion of PVC-based adhesion promoters in the formulation. DEGALAN® VP P 34 meets the requirements for adhesion on aluminum foil and for forming seals with blister packs in heat seal coating. At the same time, the fact that the new DEGALAN® VP P 34 replaces the two previously required binders reduces the complexity of the lacquer formulation. This reduction, in turn, has a positive effect on the use of the required solvents in the overall formulation. DEGALAN® VP P 34 is a bead polymerizate that can easily be dissolved in ethyl acetate, a common, relatively cost-effective, highly volatile solvent for heat seal formulations. As long as the other formulation components are suitable for this solvent, the overall formulation can therefore be reduced to the use of a single solvent.

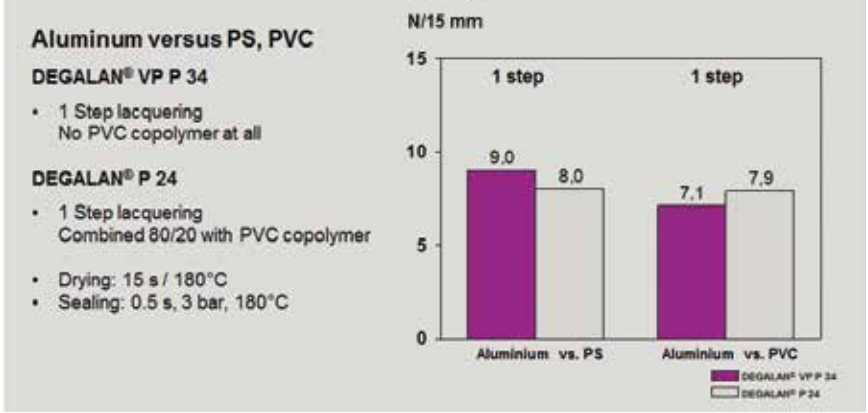
Excellent properties confirmed

DEGALAN® VP P 34 is characterized by its high heat seal strength on different substrates.

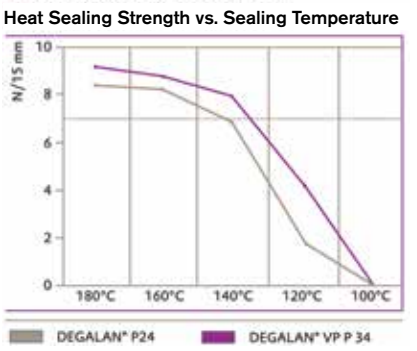
The heat seal strength was tested* and documented in the applications technology laboratory. For this purpose, two comparable formulations were created. In one formulation, the binder DEGALAN® VP P 34 was dissolved in ethyl acetate. In the comparison formulation, DEGALAN® P 24 was dissolved in methyl ethyl ketone (MEK), together with a PVC copolymer, in a ratio of 80 to 20.

Both lacquer formulations were then applied to aluminum foil and dried at 180°C for 15 seconds. This resulted in a dried heat seal layer of approx. six µm.

Subsequently, the coated aluminum foil was sealed on PVC and also on polystyrene, under laboratory conditions,



Heat Sealing Strength – Comparison DEGALAN P 24 & VP P 34



using a strip seal device** at a temperature of 180°C and a pressure of three bar, for 0.5 seconds.

Measurement of the heat seal strength took place at an angle of 90°. Five repetitions with measurement strips having a width of 15 mm were carried out for the evaluation. The average value of these measurements shows that DEGALAN® VP P 34 on aluminum foil forms a seal with PVC blister film, achieving a heat seal strength of more than 7 N/15 mm at a temperature of 180°C. A comparable value is also achieved with the combination of DEGALAN® P24 and PVC copolymer in the formulation of 80 to 20.

Yogurt packaging, i.e. coated aluminum foil sealed on polystyrene, has a tendency to show higher strength values with DEGALAN® VP P 34 than in the combination of DEGALAN® P24 with PVC copolymers. In the formulation with DEGALAN® VP P 34, a value of 9 N/15 mm was determined at a sealing temperature of 180°C. A heat seal strength of more than 7 N/15 mm is already achieved at a temperature of 140°C.

These application technology studies illustrate that the new DEGALAN® VP P 34 is able to replace the previously used binder combinations of DEGALAN® P24 and PVC adhesion promoters in existing formulations. Due to the direct-adhesion properties of DEGALAN® VP P 34, no additional adhesion promoter is needed in the formulation, which leads to further simplification in formulating heat seal lacquer. **FP**

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* according to DIN 55529, "Packaging: Determination of the seal seam strength of seals made from flexible packaging materials"
** Type: HSG-C, Brugger company