

# ® Mowital

## Technical data sheet

### Characteristics

Polyvinyl butyral (PVB) grades with different molecular weights, and varying degrees of acetalization.

### Recommended Uses

Binder for coatings (adhesion promotion/ corrosion protection primers, shop primers, wash primers, stoving enamels, varnishes and lacquers for different substrates). Binder for printing inks. Co-binder for powder coatings. Temporary binder for ceramics. Binder for textile printing and non-woven. Wetting agent for grindings, esp. of organic pigments. Adhesives, pressure-sensitive adhesives and hotmelts.

### Form supplied

Fine-grained, free-flowing white powder

### Specification Data

The data are determined by our quality control for each lot prior to release.

grade	Non-volatile content (DIN 53216)	Content of polyvinyl alcohol <sup>1)</sup>	Content of polyvinyl acetate <sup>2)</sup>	Dynamic viscosity <sup>3)</sup> 10 % solution in Ethanol <sup>4)</sup>
	wt-%	wt-%	wt-%	mPa · s
Mowital LP B 16 H	≥ 97.5	18-21	1-4	14-20
Mowital B 20 H	≥ 97.5	18-21	1-4	20-30
Mowital B 30 T	≥ 97.5	24-27	1-4	30-55
Mowital B 30 H	≥ 97.5	18-21	1-4	35-60
Mowital B 30 HH	≥ 97.5	11-14	1-4	35-60
Mowital B 45 M	≥ 97.5	21-24	1-4	80-110
Mowital B 45 H	≥ 97.5	18-21	1-4	60-90
Mowital B 60 T	≥ 97.5	24-27	1-4	180-280
Mowital B 60 H	≥ 97.5	18-21	1-4	160-260
Mowital B 60 HH	≥ 97.5	12-16	1-4	120-280
Mowital B 75 H	≥ 97.5	18-21	0-4	60-100 <sup>5)</sup>

<sup>1)</sup> Hydroxyl groups in terms of polyvinyl alcohol

<sup>2)</sup> Acetyl groups in terms of polyvinyl acetate

<sup>3)</sup> according to Hoeppler, DIN 53015, at 20 °C

<sup>4)</sup> containing 5 % water

<sup>5)</sup> viscosity of a 5 % solution

## Additional Data

Grade	Dynamic viscosity <sup>1)</sup>	Dynamic viscosity <sup>1)</sup>	Glass transition temperature (DSC, ISO 11357-1)	Water up-take after 24 h water immersion <sup>2)</sup>	Bulk density (DIN EN 543, Dec. 1991)
	5 % solution in n-Butanol	10 % solution in-n-Butanol		at 20 °C	
	mPa · s	mPa · s	°C	wt-%	g / l
Mowital LP B 16 H	-	-	63	4-6	330
Mowital B 20 H	-	50-70	64	4-6	330
Mowital B 30 T	-	90-150	70	6-10	300
Mowital B 30 H	-	90-150	68	4-6	320
Mowital B 30 HH	-	90-150	63	4-6	210
Mowital B 45 M	-	-	70	5-8	250
Mowital B 45 H	-	160-280	69	4-6	240
Mowital B 60 T	60-90	-	72	6-10	270
Mowital B 60 H	45-80	-	70	4-6	250
Mowital B 60 HH	40-80	-	65	3-5	210
Mowital B 75 H	-	-	73	4-6	200

*These data are used solely to describe the product. They are not subject to constant monitoring or part of the specification.*

<sup>1)</sup> according to Hoeppler, DIN 53015, at 20 °C

<sup>2)</sup> dry film thickness of test specimen: 0.1 mm

## Nomenclature

Our Mowital grades are named using a self explaining nomenclature. The trade-name Mowital is followed by a capital B stating the aldehyde used. In this case the products are based on butyraldehyde. The numbers refer to the degree of polymerization, the higher the number the higher the degree of polymerization (viscosity). The suffixes T, M, H and HH indicate the degree of acetalization, T being the lowest and HH being the highest.

## Properties and uses

The Mowital grades are thermoplastic polyvinyl butyral resins which are supplied as fine-grained, free-flowing powders.

The properties of the various grades are mainly determined by their molecular weights and their degree of acetalization. Mowital grades are soluble in a broad variety of organic solvents. They show good compatibility with plasticizers and other resins. Mowital grades are able to cross-link with other resins such as phenolic, epoxide and melamine resins. The network density may be adjusted depending on the degree of residual OH

groups which is determined by the degree of acetalization (see Stoving enamels).

Mowital films are resistant to light and heat-sealable at temperatures above 120 °C. Toughness and elasticity are influenced by their molecular weight. Properties like water resistance and solubility in non-polar solvents mainly depend on their degree of acetalization. So the highly acetalized Mowital HH grades show the highest water resistance and best solubility in non-polar solvents such as toluene.

## Food contact status

The use of Mowital is sanctioned by: EC plastics directive 2002/72/EC, as last amended by 2004/19/EC - all monomers and starting substances authorized by listing in Annex II, Section A.

Council of Europe, Resolution AP 96(5) on surface coatings intended to come into contact with foodstuffs - all monomers and starting substances authorized by listing in appendix 2, list 1.

US Food and Drug Administration 21 CFR § 175.105 Adhesives, 21 CFR § 175.300 Resinous and polymeric coatings, 21 CFR § 176.170 Components of paper and paperboard in contact with aqueous and fatty foods.

## Stoving enamels

Due to their medium to high content of hydroxyl groups Mowital H, M and T grades are particularly suitable for cross-linking with phenol formaldehyde, epoxide and melamine resins, respectively. In stoving enamels the Mowital content should be between 10 and 40% based on total binder content. Generally, stoving conditions are temperatures between 160 and 200 °C for 10 to 20 minutes. In the case of multi-layer coatings the first layer should not be fully stoved before application of the second layer in order to avoid adhesion faults of the succeeding coating.

Mowital H grades provide better plasticizing properties in above mentioned binder combinations. However, they are less cross-linkable due to the lower number of non-acetalized OH-groups.

## Shop and wash primers

In combination with orthophosphoric acid Mowital H and HH grades are generally used to manufacture shop and wash primers (1K and 2K primers). The films adhere extremely well to steel, iron, zinc, aluminum and other metals.

To achieve further improvement in anti-corrosion protection as well as adhesion Mowital can be combined with low-molecular weight phenolic, epoxide or urea resins as well as corrosion protection pigments.

The good anchorage of the primer on metal is caused by a binder/pigment/orthophosphoric acid/metal complex.

In one-pack primers the orthophosphoric acid was already added to the primer during its manufacture. The amount of acid used is relatively small and should not exceed 5%. One-pack primers must always be supplied in containers suitable for orthophosphoric acid.

In the case of two-pack primers the orthophosphoric acid (diluted with solvent) is supplied in a second container separately.

Two-pack primers contain higher amounts of acid. However, if the level exceeds 10% the coating becomes less water resistant. Upon mixing the pot life of the two-pack primer is limited to a few hours.

## Strippable lacquers

Although Mowital H grades exhibit very good adhesion properties they may also be used successfully as strippable lacquers. Strippability has to be adjusted using common additives and will retain for several months.

## Foil lacquers

Mowital H grades are especially suitable as binders for lacquers on aluminum, tin, brass, lead and steel foils. With a dry film thickness of 2 to 10 µm the films have a very good flexibility. Their adhesive strength can be improved by stoving at temperatures of up to 140 °C. If necessary, gloss and flexibility can be improved by addition of plasticizers.

## Printing inks

Low-viscosity Mowital grades are suitable binders for flexographic and gravure printing inks which exhibit very good adhesion to substrates like polyolefins, metals, cellulose acetate, polyester, cellophane, polyamide, and polystyrene films. If necessary, the adhesion to problematic substrates like OPP foil can be improved by way of coronal discharge and chemical adhesion promoters.

Printing inks based on Mowital exhibit low solvent retention, and good flow, as well as good resistance to water. Mowital can be used as a sole binder or in combination with alcohol-soluble nitro-cellulose or other resins, like ketone condensation resins, alkyds, maleic resins, and some natural polymers.

The low viscosities as well as the excellent pigment wetting properties of Mowital LP B 16 H, B 20 H and B 30 H make these grades highly suitable for the manufacture of pigment concentrates and preparations.

## Temporary binder for ceramics

Mowital is an excellent binder for the production of ceramics and ceramic tape cast materials. It shows remarkably good green strength and flexibility of the

ceramic tapes. Mowital provides good dimensional stability and decomposes cleanly during sintering.

## Adhesives and hotmelts

Owing to the excellent adhesion of Mowital to glass and metals, it is used to bond or laminate these materials. It may also be employed for binding other polar substrates. Mowital can be applied in solution or as a part of hotmelt.

For hotmelts Mowital is compounded in heated kneaders or extruders with plasticizers and adequate additives. These compounds are applied by heated rollers, nozzles or spray guns on to one of the substrates and subsequently submitted applying heat and pressure.

## Processing

Mowital can be processed thermoplastically or in solution of organic solvents.

## Preparation of Mowital solutions

Mowital is soluble in a wide range of organic solvents and mixtures thereof. It can be dissolved in single solvents but to obtain low solution viscosities it is recommended to dissolve Mowital in solvent mixtures (e.g. 1:1 mixture of ethanol and toluene).

Mowital is not soluble in water. However, a water content of up to 10% in the solvent mixture is possible and can be used to influence solution viscosity. Increase or decrease of viscosity depends on the type of solvents (e.g. increase in ethanolic solution) and must be tested in advance.

To dissolve Mowital, stir the solvent or solvent mixture and add Mowital in portions at ambient temperature. The stirrer speed during addition of Mowital should be low to medium to ensure good dispersion of Mowital powder in the solvent and to avoid dusting. After Mowital is wetted by the solvent the stirring speed can be increased. Sometimes heat may be necessary for dissolving Mowital. In this case do not apply heat until Mowital is wetted to avoid agglomeration. For preparation of a solution with mixed solvents first add Mowital to the solvent which does not dissolve Mowital alone (e.g. aromatic solvent) in order to form a slurry. Then add the alcoholic solvent which normally dissolves Mowital best.

The final solution viscosity as well as the speed of dissolution depend on the type(s) of solvent(s) used, the temperature and the speed of stirring.

Mowital can be processed and applied by the usual equipment of the printing ink and lacquer industry.

### Overpaintability

Virtually all commonly used paints adhere to hardened coatings of Mowital based primers. Problems may be encountered using some special nitro-cellulose or 2-component epoxy resin paints.

### Precautions

Static electricity has to be avoided applying the appropriate safety measures while handling Mowital as well as organic solvents.

### Oxidation stabilization

The Mowital T-, H-, and HH-grades are normally stabilized against oxidation by 3.5-di-tert.-butyl-4-hydroxytoluene (BHT). Upon special request some of these grades are also available without stabilization. The Mowital M-grade is free of BHT.

### Storage

In its original packaging Mowital may be stored under dry and cool conditions for at least 12 months.

### Waste disposal

In accordance with current regulations and/or after consultation with site operator and/or with the responsible authorities Mowital may be taken to waste disposal sites or incineration plants.

### Industrial Safety and Environmental Protection

Not classified as a dangerous substance or preparation according to the current criteria of chemical legislation, or of the EU Directives 67/548/EEC and 1999/45/EEC.

A safety data sheet is available upon request.

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*This information is based on our present state of knowledge and is intended to provide general notes on our products and their uses. It should therefore not be construed as guaranteeing specific properties of the products described or their suitability for a particular application. Any existing industrial property rights must be observed. The quality of our products is subject to our General Conditions of Sale.*

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