

UHU plus endfest 300

UHU plus endfest 300 is a solvent-free two-component adhesive based on epoxy resin that allows extremely firm assemblies using a wide range of materials.

Specification of UHU plus endfest 300	
Chemical basis	epoxy resin
Adhesive technique	wet adhesion
Temperature range for use	between -40 and + 80°C (dependent on material and construction; higher temperatures may also be possible)
Consistency	binder: High viscosity hardener: medium viscosity
Viscosity [mPa.sec]	binder: 40000 hardener: 30000
Basis	binder: epoxy resin hardener: aliphatic amines
Solvent	none
Solid body content [%]	100
Density [gm/cm³]	binder: approx. 1.2 hardener: approx. 0.96
Flame point [°C]	binder: approx. 210 hardener: approx. 110
Danger category under German legislation	none
Indication(s) according to legislation on dangerous substances	binder: irritant; contains epoxy resin hardener: irritant; contains amines
Danger symbol(s)	Xi; N
Working life (at 20°C)	90 mins.
Mechanical strength values:	Mixing ratio (by volume) 1:1; testing at room temperature
Firm to the touch:	6 hours
Firm enough to use:	12 hours
Final firmness:	24 hours
Combined tension and shear resistance (aluminium)	Mixing ratio (by volume) 1:1; testing at room temperature
	10 hours: 500N/cm ² 24 hours: 1200N/cm ² 5 days: 1700N/cm ² 1 month: 1700N/cm ²
Mixing ratio (by volume)	1:1 (other mixing ratios possible)
Optimum temperature for use	between +18 and +20°C
Resistance	many solvents, dilute acids and alkalis
Unsuitable materials	polyethylene, polypropylene, Teflon®, polystyrene, soft PVC and various other materials
Colour	binder: opaque hardener: honey coloured

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Properties:

After the two components have been mixed, UHU plus hardens with almost no loss of volume to form a duroplastic synthetic resin. The parts to be assembled usually need to be fixed under pressure. It is not necessary to apply extreme pressure. Hardening takes place by evaporation. The working consistency is so designed that a good bond is achieved at room temperature with a minimal amount of movement.

The UHU plus system enables the user to achieve a harder or softer final product by varying the quantity of hardener used:

a) The mixing ratio 100 parts binder by weight
+ 50 parts hardener by weight
produces a harder end product with slightly greater resistance to heat, water and chemical substances.

b) The mixing ratio 100 parts binder by weight
+ 80 parts hardener by weight
(equal lengths of strips from the tubes) is the normal mixing ratio for universal applications.

c) The mixing ratio 100 parts binder by weight
+ 120 parts hardener by weight
produces an end product that is flexible and resists peeling better, although it is less resistant to heat, water and chemical substances.

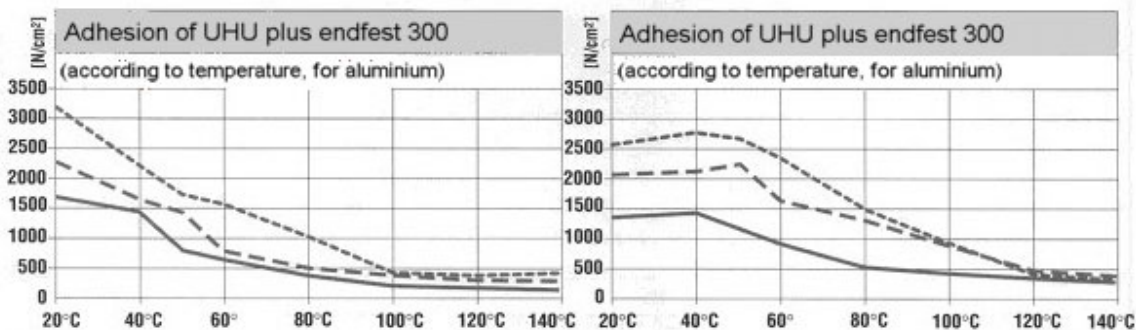
Within these limits, any mixing ratio is possible depending on requirements. A higher proportion of hardener reduces the working life of the mixture and its hardness.

Temperatures below 18°C slow down the hardening process and result in poor adhesion; extra warmth (heater, infrared radiator or similar) is therefore needed when working in cold places or in the open air.

Particularly strong adhesion is achieved if hardening takes place at a higher temperature, in the region of 70 to 180°C. The following table shows the relationship between time and temperature for minimum hardening times:

45 minutes at 70 °C
30 minutes at 80 °C
20 minutes at 90 °C
10 minutes at 100 °C
7 minutes at 120 °C
6 minutes at 140 °C
5 minutes at 150 - 180 °C

Temperatures should not exceed 200°C either during hardening or when the assembly is subsequently put under pressure, as this would affect firmness and the stability of the substance.



Mixing ratio
(binder and hardener,
by volume) 1:1
= mixing ratio (by weight)
100:80

Hardening at room
temperature
Hardening: 20 mins. at 100°C
Hardening: 5 mins. at 180°C

Mixing ratio (by weight)
100:50

Hardening at room
temperature
Hardening: 20 mins. at 100°C
Hardening: 5 mins. at 180°C

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Testing: In accordance with DIN 53286; testing fixed at pressure of 1 bar; seven days' storage at 20°C/65% relative humidity prior to testing; Zwick testing machine with temperature chamber (testing speed: 50mm/min.).

Test conditions: Application surface: 25 x 10mm = 250 mm²
Test piece: AlCuMg 1, sandblasted (Korund ELK 90):
82,5 x 25 x 1,5mm

Adhesion of UHU plus endfest 300 according to temperature		
Temperature	Hardening time	Bond strength*
20°C	12 hrs.	approx. 1200 N/cm ²
40°C	3 hrs.	approx. 1800 N/cm ²
70°C	45 mins.	approx. 2000 N/cm ²
100°C	10 mins.	approx. 2500 N/cm ²
180°C	5 mins.	approx. 3000 N/cm ²

* at combined tension and shear strain for aluminium

When sticking together materials with different coefficients of the thermal expansion, care must be taken that the adhesive makes only a small difference in length if the temperature varies. In such cases it is therefore recommended that the proportion of hardener in the mix should be increased, rendering the end product more flexible.
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Relatively large metal parts, such as signs, are extremely difficult to remove subsequently from glass surfaces as resin solvent can only reach the adhesive near the edges.

UHU plus endfest 300 should therefore not be used for sticking signs, letters and similar items to large glass surfaces such as shop windows, since the bond is so strong that dimensional changes in the metal could result in the glass breaking under unfavourable conditions.

Resistance:

UHU plus joins are resistant to moisture, oil, dilute acids and alkalis and many solvents. Moisture, dilute acids and alkalis have very little effect on bond strength, even in the event of lengthy exposure. No universally valid data can be given as there are always many factors, such as the possibility of corrosion, duration of exposure and temperature, that affect the assembly.

Some solvents, such as methylene chloride and trichloroethylene (Warning! Precautions must always be taken when using these substances!), soften the adhesive over a period of time. This effect can be made use of for dissolving adhesive joins.

UHU plus is resistant to ageing and weathering. The adhesive is not affected by even extremely low temperatures. At temperatures below -60°C, resistance to combined tension and shearing is reduced to approximately 75-80% of the value measured at room temperature; if the samples are heated up to room temperature once more, the original bond strength is also regained.

Physical Properties:

Hardened UHU plus has exceptional electrical insulation properties:

Specific resistance: 5.6 - 5.8; 10¹³ Ω.cm at 100 V and 21 °C.

Heat Conductivity according to DIN 52612 is 0.249 W/m.K at 28.3 °C.

The linear coefficient of thermal expansion is 90.10⁻⁶ K⁻¹ at 20°C.

Compression resistance (according to DIN 53454 measured using cubes measuring 10 mm)

100 : 50 parts weight approx.	69 N/mm ²
100 : 80 parts weight approx.	45 N/mm ²
100 : 100 parts weight approx.	16 N/mm ²

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Application:

Preliminary treatment of surfaces to be stuck together.

The surfaces to be stuck together must be cleaned very thoroughly before the adhesive is applied.

It is worth first using abrasive cloth (abrasive rating 100), then degreasing using cellulose moistened with a grease solvent such as acetone. Special preliminary treatments to achieve the best possible bond strengths are described in DIN Regulation 53281 (Sheet 1). (This may be obtained from Beuth-Verlag GmbH in Berlin.)

Aluminium and its alloys should be pre-treated using the "pickling" process. The cleaned parts are dipped in a caustic solution at 60 - 65 °C for 30 minutes.

This solution has the following composition:

27.5 parts by weight of concentrated sulphuric acid (density: 1.82 g/cm³)

7.5 parts by weight of dichromate of sodium (Na₂Cr₂O₇ · 2H₂O)

65.0 parts by weight of water

After pickling, the parts should be rinsed thoroughly and left to dry in a warm air current.

For other metals, see DIN 53281, Sheet 1.

Rubber: Surfaces made of vulcanised natural or synthetic rubber should be treated with concentrated sulphuric acid (density 1.82 g/cm³) for between 2 and 10 minutes, depending on the quality of the rubber. The parts should then be very thoroughly rinsed to remove all trace of acid, and dried. If hairline cracks are visible on the treated surface when the part is flexed, this indicates that the surface has been sufficiently pre-treated.

Glass, porcelain and similar materials normally only need to be degreased using solvent. For wood, care must be taken to ensure that the surface is free of dust.

Hardened plastics (duroplasts) such as phenolic resin (Bakelite), melamine, urea, resorcin, polyester and epoxy resins should be roughened with an abrasive cloth (abrasive rating 100) and degreased as above.

UHU plus is not suitable for use with **thermoplastic plastics** such as polyethylene, polypropylene, polystyrene and soft PVC.

Dosing and mixing:

Precise dosing and thorough mixing are essential for good bonding and even joins.

The normal mixing ratio is **1:1 by volume** (equal lengths of strands from the tube), which is equivalent to 100 parts binder by weight + 80 parts hardener by weight.

Small variations in the proportions of binder and hardener make virtually no difference.

For mixing it is best to use a plastic cup (in polyethylene, for example) or an unwaxed paper cup. Alternatively, small quantities may be mixed on a glass plate or something similar, using a wooden or metal spatula. Mixing should continue until the paste is of an even colour and the components are thoroughly combined.

As soon as possible after mixing, the paste should be applied to the surfaces to be stuck together in order to achieve the best possible bond. The adhesive is applied using a wooden or metal spatula, or a short-haired brush. For large areas, a fine-toothed spatula should be used as this ensures an even application. For use in mass production, we will be pleased to point out manufactures of dosing, mixing and processing machinery.

Application time (period of usability):

At room temperature approximately 1 to 1 1/2 hours.

Cleaning:

Apparatus should be cleaned before the adhesive has hardened – acetone and nitro thinners are suitable solvents for this. The same applies to soiled clothing.



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Protective precautions:

When using UHU plus endfest 300, contact of the adhesive with the skin should be avoided as much as possible. Cleanliness makes the work easier. The hands should be cleaned using soap and water – never solvent – as soon as possible. For mass production, the workplace must be well ventilated. Once hardened, UHU plus is, like most synthetic materials, physiologically safe and has no smell or taste. It is not recommended that this product is used to stick together parts that are likely to come into contact with foodstuffs, as it has not been authorised for this by appropriate American or German authorities.

Package sizes: Tube of binder, tube of hardener, 15g, 33g, 163g
Tin of binder, 915g/tin of hardener, 740g
Double-barrelled cartridge, 50ml/54.4g
Tub of binder, 5kg/tub of hardener 4kg

Note:

This information is the result of carefully executed tests. This Technical Data Sheet has been prepared to the best of our knowledge to provide you with advice when gluing. We cannot be held responsible for the results or any damage suffered, as the variety of factors involved (type and combination of materials and working method) are beyond our control. Users have to carry out their own checks and trials. Liability can only be accepted for the consistently high quality of our product.