

# MasterBrace ADH 4000

Formerly: MBrace Laminate Adhesive HT

**High performance epoxy adhesive for structural bonding of construction materials**

## DESCRIPTION

MasterBrace ADH 4000 is a two component, thixotropic/pasty high performance epoxy adhesive for structural bonding of various construction materials. It is also suitable for bonding FRP plates and bars on concrete and steel substrates. High glass transition temperature allows structural bonding under high service temperatures.

## FIELD OF APPLICATION

MasterBrace ADH 4000 is suitable for:

- Vertical, horizontal and overhead applications.
- Repair and insulating of wide (crack width over 5mm) cracks on concrete elements.
- Bonding MasterBrace laminates and bars on concrete and steel substrates.
- Bonding various types of construction materials such as steel, concrete, brick, natural stone etc. to each other.
- Cap seal and entry ports installation in epoxy-polyurethane injection works.
- Fixing the guard bars and seismic isolators to the bridges and viaducts.
- Bonding MasterSeal 930 tape on concrete or steel substrates.

## FEATURES AND BENEFITS

- Non-sag adhesive for vertical and overhead applications.
- High glass transition temperature allows structural bonding under high service temperatures.
- Provides strong adhesion between the FRP laminates and concrete/steel substrates for perfect load transmitting.
- Limited chemical resistance provided due to its polymer structure (epoxy base).
- Impact resistant.
- Non – shrink adhesive guarantees ultimate use of bonding surface.
- Pasty consistency makes it easy to use.
- Does not require primer.
- Does not contain solvent. Suitable for both indoor and outdoor applications.
- Excellent adhesion guarantees durable bond to substrates
- High strength material for durable repair

	
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<b>BASF Bautechnik GmbH</b> <b>Dr.-Albert-Frank-Str. 32</b> <b>D-83308 Trostberg</b>	
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<b>EN 1504-4</b>	
Structural bonding product for bonded plate reinforcement for uses other than low performance requirements EN 1504-4 Principle 4.3	
Bond/ adhesion strength	Pull off strength $\geq 14 \text{ N/mm}^2$ Slant shear strength at 50° $\geq 50 \text{ N/mm}^2$ 60° $\geq 60 \text{ N/mm}^2$ 70° $\geq 70 \text{ N/mm}^2$
Shear strength	$\geq 12 \text{ N/mm}^2$
Shrinkage/ expansion	$\leq 0,1 \%$
Workability	138 minutes at 8°C 97 minutes at 22°C 39 minutes at 33°C
Modulus of elasticity	$\geq 2000 \text{ N/mm}^2$
Coefficient of thermal expansion	$\leq 100 \times 10^{-6} \text{ per K}$
Glass transition temperature	$\geq 40 \text{ °C}$
Reaction to fire	Class E
Durability	Pass
Dangerous substances	Comply with 5.4 (EN 1504-4)

## APPLICATION METHOD

### (a) Surface Preparation

Mineral based substrates (concrete, stone, brick, etc.) must be sound, clean and dry. The concrete should be free of frost, curing membranes, waterproofing treatments, oil stains, laitance, friable material and dust. The loose cement paste and other loose particles have to be removed by sand blasting, grinding, shot blasting or hydro demolition methods and sound concrete substrate has to be exposed as shown in fig. 1.

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Figure 1. Grinded concrete surface prior to adhesive application.

If there is a water leakage, it must be drained or properly plugged. In case of low strength concrete ( $\sigma_{tc} < 1.5 \text{ N/mm}^2$ ), the loose parts of concrete must be broken and the surfaces should be repaired with MasterEmaco structural repair mortars. Before the adhesive application let the repair mortar cure at least 3 days at 20 °C.

Steel surfaces should be cleaned from rust by sand blasting, or wire brushing. The substrate must have a minimum temperature of +5 °C and must be at least 3 °C above the dew point. The substrate humidity must be less than 4 %.

## (b) Mixing

MasterBrace ADH 4000 is supplied as a kit of two components in the correct quantities. Add part B into part A, ensuring to completely empty the pack of the part B, and mix with a slow speed drill and paddle (maximum 400 rpm) for 3 minutes until a smooth and homogeneous mixture is obtained.

## (c) Application

### Bonding different construction materials to each other

Apply one layer of MasterBrace ADH 4000 between 1 – 3 mm (depending on the roughness of the substrates and the levelling need, adhesive thickness can be increased up to 20mm) thick on both substrates and press the elements. In vertical and overhead applications, support the bonded elements min. 24 hours at 20 °C in order to eliminate possible downfalls.

## Bonding FRP elements on concrete and steel surfaces

Remove protective peel ply film from the surface of MasterBrace Laminate and avoid any contaminations on the surface. Apply one layer of MasterBrace ADH 4000 1 – 3 mm thick on the substrate as well as on MasterBrace Laminate, fig. 2.



Figure 2. MasterBrace ADH 4000 is applied on to the concrete surface by using a steel spatula.

Then apply MasterBrace Laminate carefully by hand pressure on the substrate. The thixotropic adhesive will hold the MasterBrace Laminate in place. Press the MasterBrace Laminate with a hard rubber roller into the adhesive. When doing this exert a constant pressure by moving the roller both ways along the laminate.

In order to release entrapped air voids, make sure that adhesive is pushed out from the sides of MasterBrace Laminate. Remove any expelled material with a spatula. The adhesive layer should be 2 mm in average. Assure a minimum spacing of 5 mm between MasterBrace Laminates.

## COVERAGE

1.7 kg/m<sup>2</sup> per 1 mm thickness of adhesive.

## FINISHING AND CLEANING

Tools and mixer must be cleaned immediately after use with suitable solvents. Cured material can only be removed mechanically.

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## CURING

Full cure is reached in 7 days after the application at a constant temperature of 21 °C. Minimize any large vibrations during this time.

## WORKING TIME

Approx. 60 minutes at 22 °C.

## PACKAGING

MasterBrace ADH 4000 is available in 10 kg kits.

## STORAGE

Store at ambient temperatures, out of direct sunlight, in cool, dry warehouse conditions and clear of the ground on pallets protected from rainfall prior to application.

## SHELF LIFE

12 months if stored at above mentioned storage conditions.

## WATCH POINTS

- Design and application should be carried out by appropriately qualified and competent person(s).
- Do not apply at temperatures below +5 °C nor above +30 °C. Be sure about the mixing ratios while making

partial mixtures for low amount of use. Do not add any other substance that could affect the properties of the product. In case of hot weather, the product should be stored in fresh site and should be protected from sunlight.

- Protection clothing and equipment are mandatory for the application of this product. See Material Safety Data Sheet for details.
- Do not add any other substance that could affect the properties of the product.

## HANDLING AND TRANSPORT

Usual preventive measures for the handling of chemical products should be observed when using this product, for example do not eat, smoke or drink while working and wash hands when taking a break or when the job is completed.

Specific safety information referring the handling and transport of this product can be found in the Material Safety Data Sheet. For full information on Health and Safety matters regarding this product the relevant Health and Safety Data Sheet should be consulted.

Disposal of product and its container should be carried out according to the local legislation in force. Responsibility for this lies with the final owner of the product.

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Product Data				
Property		Standard	Data	Unit
Chemical Base		-	Epoxy	-
Colour (mixed)		-	Light grey	-
Density (23 °C)	Mixed	DIN 52713 / ISO 2811-1	1.70	g/cm <sup>3</sup>
E – Modulus (7 days)	in compression in tension	EN 13412	Approx. 8700 Approx. 4300	N/mm <sup>2</sup>
Slant Shear Strength (7 days)	50 °C slope 60 °C slope 70 °C slope	EN 12188	78 78 86	N/mm <sup>2</sup>
T <sub>g</sub> (Glass Transition Temperature) (7 days)		ISO 6271 EN 12614	62.6 68.4	°C
Adhesion to (7 days)	concrete concrete steel	EN 1542 EN 12636 EN 12188	Concrete Failure Concrete Failure 16	- - N/mm <sup>2</sup>
Application Thickness		-	1 – 40	mm
Application Temperature (ambient and substrate)		-	+5 - +30	°C

**Note:** Unless otherwise noted, test samples were cured 7 days at 23 °C and 50 % relative humidity

#### Disclaimer:

In view of widely varying site conditions and fields of application of our products, this technical data sheet is meant to provide general application guidelines only. This information is based on our present knowledge and experience. The customer is not released from the obligation to conduct careful testing of suitability and possible application for the intended use. The customer is obliged to contact the technical help-line for fields of application not expressly stated in the technical data sheet under "Fields of Application". Use of the product beyond the fields of application as stated in the technical data sheet without previous consultation with BASF and possible resulting damages are in the sole responsibility of the customer.

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#### BASF Construction Chemicals

c/o PCI Augsburg GmbH  
Piccardstrasse 11  
D-86159 Augsburg  
Tel. +49 (0)821 5901 357  
Fax +49 (0)821 5901 317

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