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white paper edition

Whitepaper PMB Series

What is a PMB mount and how does it work?

PMB-series mounts offers a fixing solution wherever screw fixing is not allowed. Due to the design the mounts can even be installed onto uneven surfaces. PMB paste mounts are used in many industries, such as shipbuilding, aerospace, railway and in the renewable energy industry. Further applications are in the electrical industry and the production of switching cabinets. PMB-Series are designed to be used in combination with paste/liquid adhesive.

The origin of this mounts lies in the aerospace and railway industry, where cable management inside structures and outer shells was required but drilling holes for cable retainers was no option. Consider sensor wires, cable feed for position lights and any kind of auxiliary cable system to run along inside these usually aerodynamic shells. Assuming that an adequate adhesive is applied, the mounts can be positioned on any surface, even onto composite parts.

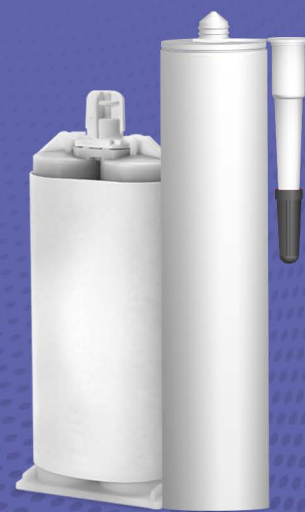
In highly dynamic applications, such as structural aerodynamic parts and rotor blades of wind turbines, the surface can even bend slightly and will require a solution that will not break. Deploying a highly flexible adhesive, the such applied mount will not break apart in this application. This will give the PMB solution an structural integrity advantage over other rigid mounting solutions.

In most applications, certain paste/liquid adhesives are already deployed and can usually also be used. They are applied with applicators, either manually or electrical/air tools. Proposals for known adhesives will be provided later in this paper.

Once the paste/liquid adhesive is applied onto the mount, it can be positioned at its final location and pushed onto the previously cleaned surface by hand. Depending on the curing properties of the paste/liquid adhesive, the mount can be loaded with cables even after 5 minutes until 48 hours.

In the next chapter 1-component and 2-component adhesives will be discussed.

**1K vs 2K adhesives;
what is the difference,
and which is best for you?**



Paste/liquid adhesives and properties

1 or single component adhesives

This means that the product will be ready to use as a single unit and will require an external factor (such as moisture or heat) to initiate the curing process. It is essential to ensure that there is sufficient moisture in the air and that the temperature is correct in order to guarantee the effectiveness of the cure. If the curing environment is characterised by low humidity and freezing temperatures, the curing process will either take significantly longer or may not be effective.

As a general rule, one-component adhesives require a longer curing time than two-component adhesives. Please ensure that you check the specifications to ascertain whether they are suitable for your intended application process.

While it is challenging to quantify the cost difference between the two, we can assert with confidence that 1-component adhesives will typically be more cost-effective. It is not necessary to use specialised equipment such as static mixers to ensure the adhesive is mixed correctly.

Single-component adhesives may have a shorter shelf life and require care to protect against moisture, heat or light.

When a single-component adhesive is applied to the PMB mount, please consider that the curing process will begin from the exposed surface and take time to cure the entire area underneath the PMB mounts.

2 component adhesives

The two components are frequently designated as „Part A“ and „Part B,“ or „resin“ and „hardener.“ The two components will mix together as they are applied through a static mixer, triggering a chemical reaction which then initiates the curing process. This process does not require moisture, but the application of heat will accelerate the curing process. It is imperative that the datasheet is consulted at all times to ensure that the adhesive is not applied in temperatures that are too low. This will result in an unnecessarily prolonged curing process, which may take up to several days instead of minutes.

2K adhesives are available in a variety of ratios. The typical ratio is 1:1 between parts A and B, although other ratios, including 2:1, 4:1 and 10:1, are also available. The provision of different ratios is designed to offer versatility. The desired application will determine the required mix ratio.

The versatility of two-component adhesives allows users to adjust the speed of the curing process. However, there is no need to be concerned that the adhesive has not undergone complete curing. This is because two-component adhesives do not require external conditions (such as temperature and moisture) to initiate the curing process. The hardener component of 2K adhesives initiates the curing process and ensures that the adhesive cures completely.

As previously mentioned, 2 component adhesives are more expensive than other types of adhesives. This is due to the specialized equipment, such as dispensers and static mixers, required for their application. Additionally, the packaging for 2K adhesives is more costly.

When such an adhesive is applied together with an PMB mount, make sure that the mixed adhesive is non-sagging and will carry the weight of the PMB mount when positioned in overhead or vertical position.

Figure 1 Overview of adhesive characteristics

	1 component	2 component
Curing time	about 8 hrs to 48 hrs	5-30 min
Curing environment	Special care needed	No care needed
Cost	Lower	higher
Equipment needed	Simple applicator	Special applicator + static mixer nozzle
Shelf life	Shorter shelf life and cannot be left open after opening	Long shelf life and can be left open after opening
Bonding	Limited application	Very wide application on most surfaces, some versions tolerant to slight surface contaminants like oil
Recommended PMB	Only PMB3 and PMB5	All series PMB 3/5/6 and 8

Preparation of the adhesive surfaces

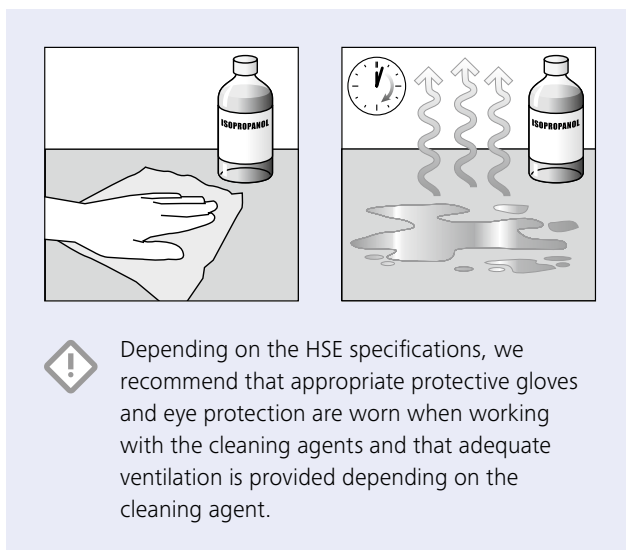
The pre-cleaning of the surface is important, because the adhesive should create an optimal adhesion here later. Varnishes that are not yet completely dried out, surface sealants such as waxes or oil films, as well as parts that have been stored for a long time and are covered by dust, dirt and rain/ice, are not suitable for bonding without pre-treatment.

We recommend marking the areas to be bonded with laying templates or laying aids (e.g. chalk line), alternatively with other markings (e.g. permanent marker, chalk pencil).

Bonding temperature: Depending on the composition of the adhesive, paste/liquid adhesives usually cross-link or cure at ambient temperatures of +10°C or higher. Heat accelerates the cross-linking or curing process. We recommend processing in a machine shop.

Thoroughly clean an area slightly larger diameter than the used PMB mounts at the points where the paste adhesive mount is to be bonded. Quick-drying cleaning agents such as IPA (isopropyl alcohol) are particularly suitable for this.

Figure 2 Cleaning Instruction



The surface can be smooth, rough and curved inwards or outwards. The adhesive will later even out any unevenness.

The paste adhesive mount base does not need to be pre-cleaned when it is removed from its original packaging. If the paste adhesive mount is stored in an open box or similar, then pre-cleaning is also necessary.

Please observe any drying times for the cleaning agents. With IPA these are in the range of approx. 30 seconds.

Apply adhesive



Depending on HSE requirements, wear protective gloves and eye protection and ensure that the workplace is adequately ventilated.

Depending on the type of adhesive, prepare the application equipment. For 2K adhesives, this means removing the sealing plug, putting on the static mixing nozzle and inserting the adhesive cartridge into the application tool. For 2-component adhesives, please

make sure that the adhesive ingredients are mixed in an optimum ratio at the mixer outlet. When filling the mixer for the first time, press out some adhesive if necessary until the adhesive colour is uniform. See also the instructions for using the adhesive.



Use the application tool to apply 3 spots of adhesive in a pile on the surface to be bonded.

Please pay attention to the amount of adhesive. For a PMB5/6 about 3,3ml of adhesive (depending on density about 2.3g) is required when applied to a flat surface. In practice this is usually 3-3.5 strokes

on the 2K 50ml application tool and one stroke of a standard 300ml press cartridge for 1K adhesives. If the surface is not even, more adhesive is required depending on the installation situation.

Figure 3 PMB Comparison

Table header neg.	PMB3	PMB5	PMB8
Weight	0,8 g	2,3 g	7,7 g
Tensile Strength	400 N	650 N	1000 N
Adhesive volume	800 mm ³ (0,8 ml)	3300 mm ³ (3,3 ml)	6500 mm ³ (6,5 ml)

Please notice: These values are only approximate values, as they may differ depending on the customer's circumstances.



If the amount of adhesive is too small, the base will not be bonded properly. A tight fit is very important for an optimal result.

Too much adhesive is only visually disturbing and does not have a negative effect on the result. However, care should be taken to ensure that not too

high mushroom heads form at the upper holes of the paste adhesive mount and that the later laying path for cables and wires is not affected.

Grasp the paste adhesive mount by the cable tie holder and place the paste adhesive mount centrally on the piled up adhesive dots and press the paste adhesive mount to the surface completely with your thumb or index finger on the cable tie holder. The adhesive base has spacers on the underside of the base that should be fully in contact with the (flat) surface.

Adhesive will come out at the sides and at the top openings. This is intentional and ensures a positive fit of the base. Please make sure that adhesive is coming out of all upper openings and all sides of the paste adhesive mount.

Depending on the nature of the adhesive, a slight circular movement of the paste adhesive mount during the setting process allows the adhesive to be better distributed under the base.



Please pay attention to the orientation of the paste adhesive mount with regard to the desired cable routing direction. The paste adhesive mount's cable tie holder can be used in 90° steps.

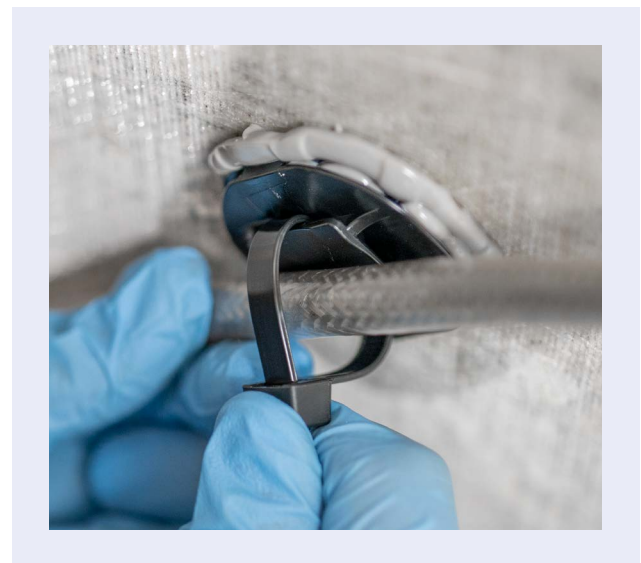
Curing

Depending on the composition of the adhesive, the adhesive needs approx. 15 minutes curing time for 2K adhesives before it can be further processed. If 1K adhesives are used, the cross-linking process at 20°C usually takes at least 48 hours. The paste adhesive mount must not be loaded or moved during this time.

During this time, the adhesive must not run off (e.g. when applying vertically or overhead) and the base must not flow away. This is ensured by using the correct adhesive.

Please pay attention to the open time of the 1- or 2K adhesive. If this time is exceeded, the adhesive hardens in the static mixer and can no longer be used. A new static mixer nozzle can then be fitted here and the rest of the adhesive can be used in the cartridge.

Please do not smear or remove mushroom-shaped heads above the paste adhesive mount base or excess adhesive on the side. These ensure a form fit and thus optimum adhesion of the base. An exception is the formation of too high mushroom-



shaped heads at the upper holes, which may prevent a cable tie from being threaded into the tie holder. This way can be cut freely with a side cutter after the mushroom heads have cured.

Processing control

We recommend a random sample test on a similar surface. The base cannot be pulled off when properly processed, the threaded cable tie breaks or the receptacle for the cable tie breaks out first. If the glued socket detaches from the surface, this can have the following reasons:

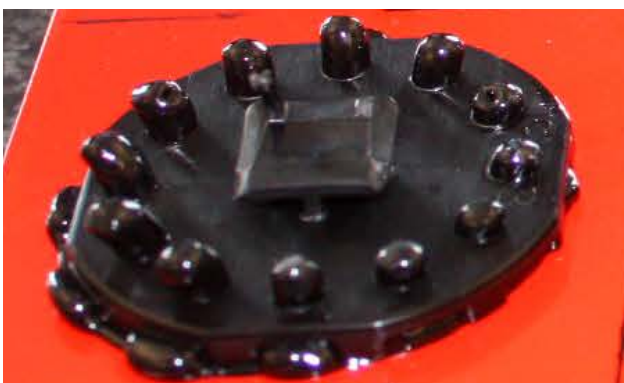
- Surfaces have not been cleaned (e.g. long stored open paste adhesive mount)
- Adhesive is not fully cured
- Adhesive is not suitable or shelf life has expired
- Adhesive partially cured in static mixer
- Wrong static mixer, mixing ratio not adjusted to adhesive
- Adhesion breakage of lacquer: adhesion of lacquer and surface insufficient, lacquer residues are on the glued base underside

Examples The following illustrations show possible situations:

Acceptable



Unacceptable



Some testing results with 2K adhesives

As mentioned at the beginning, there are many adhesives on the market and they differ a lot. Also some adhesives might not be available in some regions of the world, but there are for sure replacements with similar properties possible.

Overview of testing results

Curing time	Tensile strength (average in N)				Shear strength (average in N)			
	Metal with powder coating	PE	Glass fiber	Alu	Metal with powder coating	PE	Glass fiber	Alu
3M Scotch Weld DP 8805	630	375	612	601	531	193	529	535
3M Scotch Weld 7270 B/A	652	422	654	608	574	335	571	577
Weicon PU-240	271	271	666	664	575	314	574	546
Weicon PU-90	659	248	678	568	587	199	583	583
Sikafast 5211 NT now called Sikafast 555-L05	668	256	601	651	568	156	555	567

Note: Performance differs depending on the substrate material. Typical to all tested adhesives is a much lower performance on low energy Polyethylene (PE) material.

Samples

If you would like to test our PMB mounts, please contact our sales team for samples (part number UNS 905-50077)

www.HellermannTyton.com/contact