3M Technical Bulletin

3M™ VHB™ Tapes For Pre- Powder Coat Bonding Applications

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Summary

3M offer a number of tapes that are suitable for use within powder coating lines as follows:

- 3M GPH Family

3M™ VHB™ GPH 110-GF = 1.10 mm thick
3M™ VHB™ GPH 060-GF = 0.60 mm thick
3M™ VHB™ GPH 160-GF = 1.60 mm thick

- 3M 4611 Family

3M™ VHB™ 4611 = 1.10 mm thick
3M™ VHB™ 4646 = 0.60 mm thick
3M™ VHB™ 4655 = 1.50 mm thick

- Other Tapes

3M™ VHB™ 4912 = 2.00 mm thick
3M™ VHB™ 9473 = 0.25 mm thick

All of the above tapes are capable of withstanding the temperatures usually experienced in a powder coating oven up to a maximum of 220ºC for a short period , with GPH family going to 230ºC.

All the above tapes should be suitable for most powder coat applications. We have experienced success and have found no problem to date with any of the cleaning and pre-coating phosphate / chromate process. This bulletin is designed to give guidance on the use of these tapes in pre-powder coat applications.

General procedure

Generally the operating temperatures of powder coat plants range from 180°C for epoxy to 200°C for epoxy polyester and 220°C for polyester. The powder coat process varies considerably and no two plants are exactly the same, hence each application should be evaluated individually. However, in order to obtain the maximum performance from the tapes the following procedure should be observed.

1. Ensure the surfaces are completely free from grease, rust and oil by cleaning with VHB™ surface cleaner. Aluminium can be particularly difficult to clean due to the oxide layer but perseverance here is the key. The bond can be improved by cleaning, then abrading the surface with 3M 7447 Scotch Brite purple abrasion pad and then cleaning again.
2. Try to use as much tape as possible in each application. Remember the narrower the tape width , the quicker the heat will build up under the bond area which will reduce the holding

capability of the tape during the process. Therefore stress on the bond line should be minimised by avoid direct loading on the tape.

3. Be aware of thermal expansion and mismatch especially when using the thinner tapes. Both of these will be particularly important at higher temperatures.
4. Apply pressure to the bond area and **leave to dwell for at least ½ hour before** the assembly is suspended on the powder coat line. This is **critical**, if the unit is suspended too early the bond strength will not have built up sufficiently and it will fail. Again, make sure that the loading on the tape is minimal and that the tape does not support the weight of the unit.
5. Try to ensure that there are no areas where moisture from the pre-cleaning process or air can become entrapped behind the tape, otherwise, during the drying process the moisture may expand and cause the tape to lift off. (i.e. tape not rolled down properly , mismatch etc)
6. When actually in the oven the tape should be exposed to high temperatures for no more than **45 minutes maximum** ideally shorter. Most ovens have a cycle that is around 30 minutes. In the case of a 'static walk in 'oven an element of control must be introduced to ensure that the unit is not in the oven for too long.
7. When the unit is finished it must be allowed to cool completely before the bond is stressed. The tape is still soft when the unit is warm and it can be very easy to weaken the bond by unnecessary handling and failure will probably occur. Care should be taken not to twist large panels prematurely.

Notes on the powder coat method

There are two methods of automatic electrostatic powder coating systems, either paint charged or unit charged. In the case of unit charged systems, it is necessary to ensure that areas insulated by the tape are electrically connected to ensure an even charge over the entire the unit. In the case of paint charged systems it is unnecessary to electrically connect the entire unit , also the powder tends to bond to the edge of the tape leaving a 'filleted' attractive paint line, hence no tape is visible on the finished unit.

Important Notice

All statements, technical information and recommendations contained in this document are based upon tests or experience that 3M believes are reliable. However, many factors beyond 3M’s control can affect the use and performance of a 3M product in a particular application, including the conditions under which the product is used and the time and environmental conditions in which the product is expected to perform. Since these factors are uniquely within the user’s knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user’s method or application. All questions of liability relating to this product are governed by the terms of the sale subject, where applicable, to the prevailing law.

Note

Values presented have been determined by standard test methods and are average values not to be used for specification purposes. Our recommendations on the use of our products are based on tests believed to be reliable but we would ask that you conduct your own tests to determine their suitability for your applications. This is because 3M cannot accept any responsibility or liability direct or consequential for loss or damage caused as a result of our recommendations.

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