

15 Questions To Ask When Selecting An Adhesive

It can be difficult to select the right adhesive from the large number of choices that are available. Usually there are other factors to consider besides simply mechanical strength. Electrical, thermal, environmental, and process issues often are critical for final product design. In light of this, a design engineer should consider the following questions to begin whittling down the options and clarifying priorities.

1. **What materials are being bonded?** It is important to identify whether same or different materials are to be bonded. Frequently, one or both materials will have a thin coating (such as a plated metal) covering a bulk material. All of these must be identified.
2. **Is the application primarily bonding or encapsulating?** An adhesive used for encapsulation usually has different requirements than one for bonding.
3. **What are the dimensions of the bond area?** In addition to the overall X, Y dimensions, the bond line thickness (Z axis) can be a critical design factor. Is the bonding area a simple geometry or does it include features? Are there critical locations where adhesive must, or must not, be located?
4. **What are mechanical needs?** Anticipate stresses (shear, peel, etc.) that will be imposed during operational temperature and humidity.
5. **Are electrical parameters important?** Adhesive formulations can be created at both extremes of electrical performance, either very high resistivity or very high conductivity.
6. **Are thermal parameters important?** Most neat adhesives have a thermal conductivity of about 0.2 W/mK. This can be enhanced up to a factor of ten or so with selected fillers. On the other end of the spectrum where thermal insulation is needed, foamed materials containing air are available.
7. **Are there optical requirements?** This can range from very clear to translucent to opaque, or even a specific color.
8. **What is the end product operating environment?** Factors to be considered here include the temperature range (and cycling frequency), environment (space, air, water, etc.), and any unusual stresses. Identification of the business sector (automotive, aerospace, computer, medical, etc.) frequently helps with this question.
9. **What are the reliability requirements?** Is the final product a one-use disposable or is it expected to last 50 years? What testing will be used to verify reliability?
10. **What are the process limit parameters?** Is there an upper limit on cure temperature due to other materials in the assembly? Is there an upper time limit for the cure cycle?
11. **What are the flow or viscosity requirements?** Viscosity to consider includes both room temperature and elevated temperature for heat cured materials.
12. **What product packaging is required?** Small liquid volumes are provided in syringes or twin-packs and larger volumes in pails or drums.
13. **What storage conditions are available?** Some adhesives require cold storage down to -40°C.
14. **Are there rework requirements?** As a strong thermoset material, removal of epoxy is best accomplished by mechanical means (i.e., breaking the bond), frequently at elevated temperature. At the other end of the spectrum, a pressure sensitive adhesive (PSA) has low bond strength and can be peeled off.
15. **Are there any other application specific requirements not covered?** This question might address regulatory needs as well as process or design considerations.

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