

Hot Melt Adhesives Viscosity Analysis

Viscosity testing for hot melt adhesives is crucial for various industrial applications, such as crafts, electronic board manufacturing, parts assembly, and packaging. By measuring the viscosity at high temperatures, manufacturers can assess the adhesive's performance under molten conditions, ensuring reliable bonding and stability in diverse applications.

Test Equipment:

- Instrument: Brookfield RVDV2T Rotational Viscometer
- Spring Torque Range: RV
- Spindle and Chamber: Disposable SC4-27 spindle with HT-2DB sample chamber
- Speed Settings: 5, 10, 15, 20 rpm
- Temperature: 175°C

Accessory:

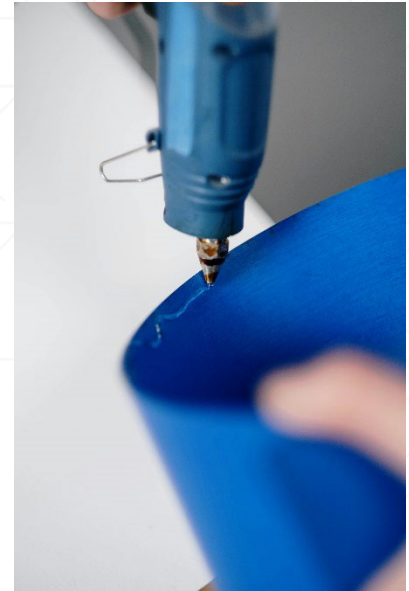
- Thermosel Temperature Controller

Test Method:

- Testing follows ASTM Standard D 3236-88 for apparent viscosity measurement of hot melt adhesives.
- The method involves heating the solid adhesive to a molten state at 175°C, then measuring apparent viscosity with a Brookfield Rotational Viscometer.
- Procedures include setting-controlled speeds and temperatures using Brookfield RheocalcT software, ensuring shear rates remain consistent and within the specified 10-95% scale range.

Procedure:

1. Heat the adhesive samples in the Thermosel chamber to 175°C.
2. Insert the SC4-27 spindle and set the viscometer to the first speed (5 rpm).
3. Stabilize and record the viscosity, then increase speed sequentially to 10, 15, and 20 rpm, recording each reading.
4. Use Brookfield RheocalcT software to control and document all settings and data.



Observations:

- Figure 1: Displays viscosity differences between adhesives from two manufacturers.
 - The more viscous adhesive is shear-thinning, showing a decrease in viscosity with increasing shear rate.
 - The less viscous adhesive displays minimal shear-thinning, maintaining more consistent viscosity across speeds.

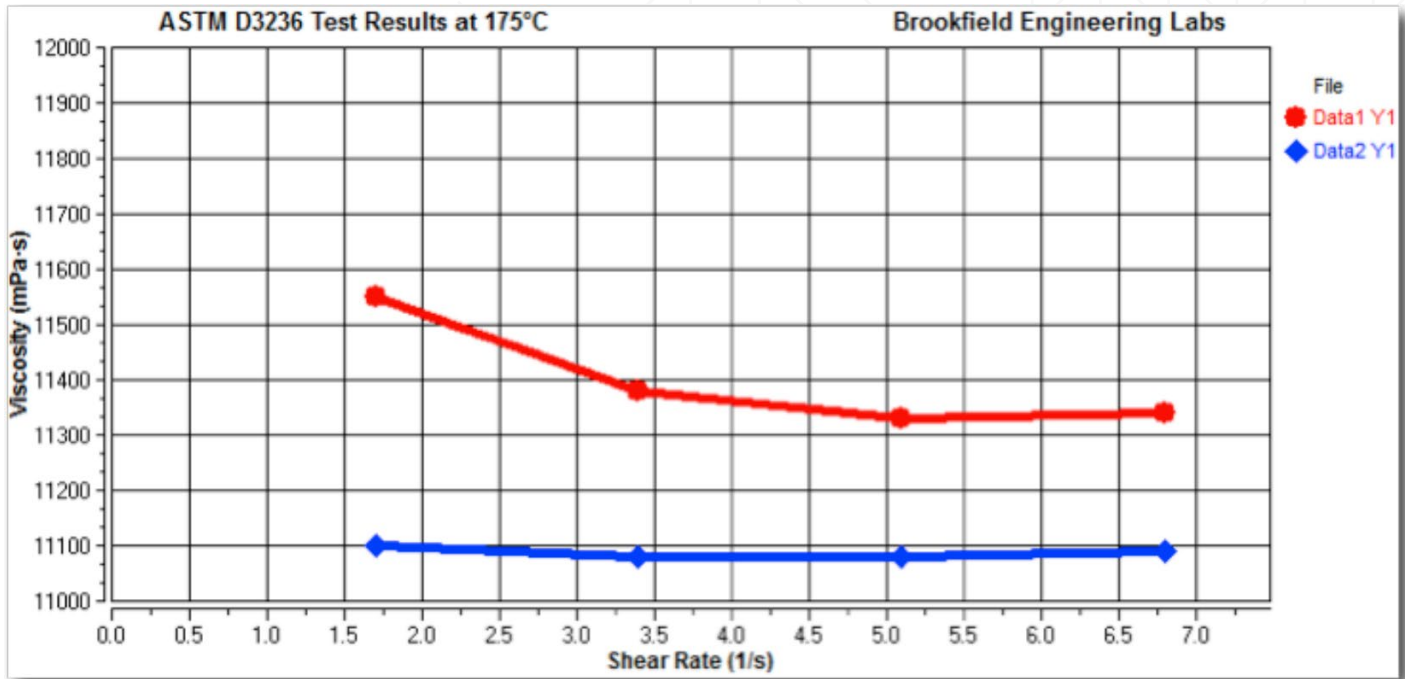


Figure 1

Results:

- The test identifies notable differences in viscosity and shear-thinning behavior between the two adhesives.
- The higher-viscosity adhesive may be better suited for applications requiring thicker application layers, while the less viscous adhesive may be preferable for smoother, more even application.

Discussion:

Viscosity testing ensures that hot melt adhesives meet performance standards for specific applications. Shear-thinning behavior is beneficial for applications requiring flow under stress but high stability at rest. This testing approach allows manufacturers to select adhesives based on precise performance characteristics.