

CHOCOLATE VISCOSITY



Viscosity is a measurement of a fluid's resistance to flow. It is a quantity expressing the magnitude of friction between particles which are moving at different velocities. Viscosity is very important because it directly affects chocolate utility in certain applications. In order to achieve certain quality parameters, chocolate or confectionery coating products must have specific flow properties. In general, **lower viscosity samples are ideal for dipping/enrobing** applications in which a thin layer of coating is desired for flavor or economical purposes. **Higher viscosity samples are ideal for molding** applications in which it is important for the sample to maintain its shape.

At Blommer Chocolate,

viscosity is measured using a Brookfield Viscometer (Model HATDV-I, HATDV-II, DV-III Plus) using specific parameters. The data gathered using this instrument is considered "Brookfield value" and while this unit is used frequently throughout the industry, it can be converted to other units (NCA and centipoise).

Viscosity can be characterized by **3** measurements:

1. APPARENT VISCOSITY
2. YIELD VALUE
3. PLASTIC VISCOSITY

APPARENT VISCOSITY

Definition:

The viscosity at a particular shear rate (20 RPM), measured at a standardized temperature (40° C for real chocolate and 50° C for compound coating).

Apparent viscosity is a relative measurement used as a singular data point throughout the confectionery industry.

In application, the chocolate may be utilized with different shear rates. Chocolate is **shear thinning**, which means the viscosity decreases as the rate of shear increases. Therefore, to get a more complete picture of the product, viscosity is measured at multiple shear speeds. This allows us to calculate the other two important viscosity measurements: **yield value** and **plastic viscosity**.

CRITICAL PARAMETERS WHICH IMPACT VISCOSITY

- Temperature
- Melting point (of oils in sample)
- Temper state (over vs. under)
- Total fat
- Fat with unique crystallizing structures
- Particle size/distribution
- Degree of lecithination
- Moisture
- Heat sensitive ingredients
- Emulsifier

YIELD VALUE

Definition:

The shear stress required to *initiate* flow of chocolate and relates to the coating or decorating characteristics, such as thickness.

Impact on chocolate:

Higher yield value leads to a product which resists flow and thus would be utilized well for something like a chocolate drop.



A visualization of different relative levels of yield values from high (left) to low (right)

CHOCOLATE TEMPERING CHART

	TEMPERATURE 1 HEAT	TEMPERATURE 2 COOL	TEMPERATURE 3 HEAT
Dark Chocolate	120°F	82°F	86/87°F
Dark Chocolate w/AMF	120°F	81.5°F	86/87°F
Milk Chocolate	115°F	80°F	85°F
White Chocolate	115°F	80°F	84°F
Cocoa Butter	120°F	78/79°F	82°F

Heat to Temperature 1, cool to Temperature 2 with agitation, carefully heat to Temperature 3 with agitation. Maintain Temperature 3±2°F for usage.



WHY DOES VISCOSITY MATTER FOR CHOCOLATE PRODUCTS?

In order for certain applications to function properly, a specific viscosity is often needed. If a product has a viscosity that is too high or too low, it can cause issues with production and affect quality of the application. Viscosity can also have an economic impact by influencing the amount of coverage on a product.

With proper understanding, the property of viscosity can be utilized to create a superior product, whether it be molded, enrobed, or drizzled.

PLASTIC VISCOSITY

Definition:

Function of the shear stress required to *maintain* constant flow.

Impact on chocolate:

Determines how well the chocolate will flow into a mold.

In utilizing yield value and plastic viscosity, a general guideline for products is created.

Viscosity related to application usage in chocolate confectionery industry

