Curdled Consistency by Back Extrusion

**TVT Texture Analyzer**
The TVT Texture Analyzer (Figure 1) offers rapid and objective analysis for different products. The following parameters can be characterized for your product category:

- Firmness
- Consistency
- Cohesiveness
- Index of viscosity

Both international standard methods as well as customer tailor-made profiles are available.

**Scope**
- Determination of firmness, cohesiveness, consistency and index of viscosity of curdled by back extrusion.

**Method Description**
The recording of the measurement data commences once the probe reaches the pre-set trigger force. The probe will then compress/penetrate the sample to a pre-defined distance of the sample height. After compression, the probe returns to its starting position.

**Calibration**
Make sure the instrument is correct calibrated before the measurements. How to perform the calibration can be found in the User’s Manual.

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**Load cell (recommended)** 5 – 10 kg

**Probe**
Compression plate 45 mm diameter, stainless steel
(Figure 2a) Part number: 67.20.45

**Rig**
Back extrusion container and holder (Figure 2b)
Part number: R-BECH: 67.50.31; RA-C-H50D: 67.50.65

**Back Extrusion set**
Part number set: 67.50.60
Profile settings

*Note The trigger force may need to be adjusted due to irregularities of the product surface; the probe should have full contact with the product surface during the test.*

<table>
<thead>
<tr>
<th>Setting Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Cycle Compression</td>
<td></td>
</tr>
<tr>
<td>Sample height [mm]</td>
<td>35.0</td>
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<tr>
<td>Starting distance from sample [mm]</td>
<td>45.0</td>
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<tr>
<td>Compression [mm]</td>
<td>15.00</td>
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<tr>
<td>Initial speed [mm/s]</td>
<td>1.0</td>
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<tr>
<td>Test speed [mm/s]</td>
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</tr>
<tr>
<td>Retract speed [mm/s]</td>
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</tr>
<tr>
<td>Trigger force [g]</td>
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</tr>
<tr>
<td>Data rate [pps]</td>
<td>333</td>
</tr>
<tr>
<td>Adhesiveness</td>
<td>Marked ✔</td>
</tr>
</tbody>
</table>

Sample preparation

Take the sample from the place of storage just before testing. Fill the container to 35mm and place it centrally below the probe. Attach the container to the base plate by using the container holder to avoid lifting during the return of the probe, Figure 3. The container size and volume of product should be kept constant for comparing the samples. Storage conditions and temperature might also influence the result and should thereby be kept constant. *NOTE The sample amount can be increased up to 75% of the container. And if the penetration distance needs to be increased make sure it does not exceed 75% of the sample height.*

Figure 3: Sample set-up
Curve Description
In Figure 4 a typical Force-Distance curve is illustrated. The maximum peak force indicates the sample firmness at the pre-set penetration depth. Area\(^+\) is a consistency measurement where a higher value represents a thicker sample, while area is a characterization of the index of viscosity. The maximum peak\(^+\) is the cohesiveness of the sample. In addition, the surface slope and the distance between the trigger point and the slope change could also be of interest to look into.

![Curve Description Diagram](image)

Figure 4: Back extrusion of curdled (filmjölk).

Data Analysis
The force required to compress the sample to a certain distance is here defined as firmness. Both firmness and cohesiveness can be measured in the units [g] or [N]. Distances are given in [mm]. Except raw data (force, time and distance) the program also directly provides calculated results such as mean value and standard deviation.