

Description

TOTAL HDPE SB 1359 resin, dedicated to the packaging market of bottles and containers such as dairy, household and personal care applications, is specifically designed to be processed using ISBM technology. It is seen as a real premiere for Polyethylene, as it offers an easy processing on standard ISBM machines, allowing converters to reach a new and wide range of applications and features. SB 1359 can be used for both symmetrical and asymmetrical bottles, in different sizes up to about 5 L, with strongly reduced bottle weight in comparison to traditional HDPE EBM (Extrusion Blow Moulding) solutions, without compromising the mechanical performance.

TOTAL HDPE SB 1359 combines smooth injection moulding into preforms with excellent surface aspect and outstanding melt strength for the stretching/blowing phase.

Indicative parameters for the processing of TOTAL HDPE SB 1359 in ISBM process

First stage: Injection

Different types of preforms with different shapes can be produced. Thickness may vary along the preform in order to produce different types of bottles. The preforms can be produced combining TOTAL HDPE SB 1359 with or without masterbatches (white, yellow, pearlescent effect, ...) in order to target wide range of applications and features.

Design of the preform is to be considered as a key parameter in order to obtain bottles with a correct thickness wall side distribution. Generally it is observed that PE gives better result with PP like design preform (straight and parallel walls) in comparison with PET like preform design (with pronounced taper).

Typically polyethylene resin is injected into the injection mould at an injection temperature of at least 220°C and at most 260°C. If the temperature is too low, the pressure could be too high and exceed the maximum pressure accepted by the extruder. If the temperature is too high, the degradation of polyethylene could happen.

Smooth preform surface is a requirement to achieve a good thickness bottle distribution with a good surface aspect. In fact, the blowing process cannot attenuate any defects already present in the preform surface.

Globally moderate conditions (injection speed for example) ensure to minimize stress in the preform which allows the production of optimized bottles (optics, thickness repartition, mechanical properties...). So generally the flow rate should be of at most about 15 cm³/s.

As polyolefins, polyethylene especially, present a non-strain hardening behavior, it is recommended to minimize the eccentricity of the preform to achieve optimized bottle.

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Second stage: stretching and blowing

With optimized preform design and optimized injection process, a wide range of bottles can be yielded with TOTAL HDPE SB 1359 : different shapes (cylindrical, squared, ...) and also different capacities (small and large capacity...). In fact it is possible to achieve bottles with simple and complex design from TOTAL HDPE SB 1359. Thanks to its specific molecular design, it is generally possible to reach the maximum throughput of the blowing machine.

Naturally the better the homogeneity of the heating, the better the thickness distribution of the bottle as PE does not present a strain-hardening behavior. Moreover in case the preform wall does not have a uniform thickness distribution or if the design of the bottle requires it, additional heat can be brought locally through a fine regulation of the heating system.

For optimal stretching and blowing, the preform temperature should be around 120°C (skin temperature measured before blow mould closing). This temperature has to be adapted taking into account the design of the bottle especially. If the temperature is too low, then the bottle/preform could be hard to stretch and to blow; if the temperature is too high, then the polyethylene could melt in the machine.

The stretch rod speed can go up to 2000 mm/s. Preferably it should be comprised in the range from 500 mm/s to 1500 mm/s.

Pre-blow pressure is of about a few bars (preferably up to 10 bars). The preform is blown into its final shape using gas with a pressure up to 40 bars generally. A blowing pressure of about 15 bars is recommended. Higher pressure may be needed to ensure sharp details engravings. As polyolefins and so polyethylene does not have a strain hardening behavior, it is recommended to use a gentle airflow during blowing stages.

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