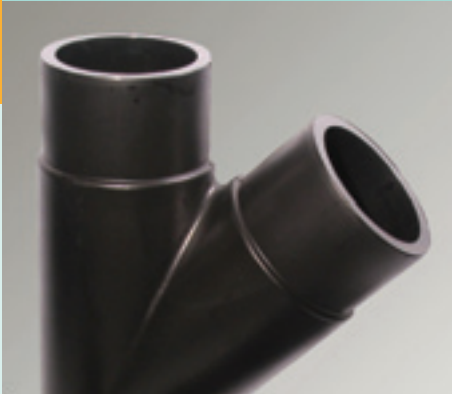


Product News

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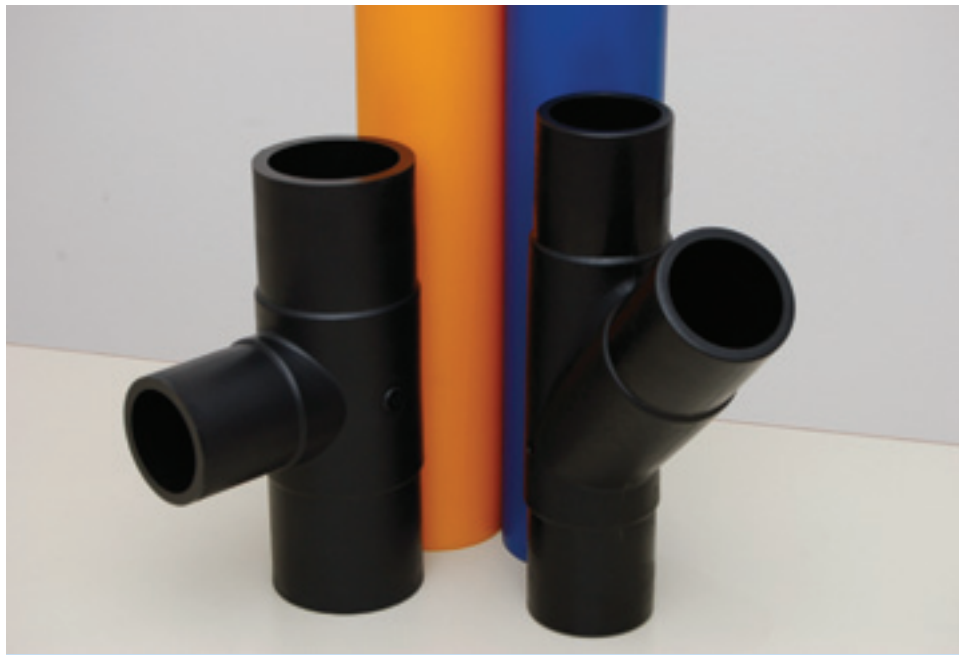
Branched spigot fitting made of BorSafe HE3490-IM

BorSafe™ HE3490-IM

Solving problems with PE100 pressure fittings manufacture

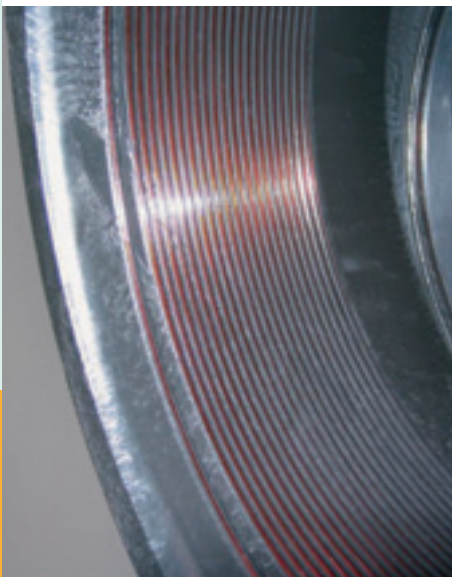


A very large bend and a small 90° bend made from BorSafe HE3490-IM



Top quality PE100 fittings made from BorSafe HE3490-IM

Wires of an electrofusion fitting embedded in BorSafe HE3490-IM



Borealis and Borouge have launched BorSafe HE3490-IM, a new hexene based PE100 material specifically designed to produce injection-moulded pressure fittings. This material can help alleviate the problems facing pipe fitting manufacturers when processing what are essentially extrusion grade PE100 materials.

Following in the footsteps of BorSafe HE3490-LS with its proven track record particularly in the manufacturing of extruded large dimension pipes, Borealis and Borouge have now responded to market needs by developing a further process-friendly PE100 material, this time specifically for the injection-moulding process.

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High quality T-pieces moulded from BorSafe HE3490-IM



Small electrofusion coupler produced from BorSafe HE3490-IM



Comparison of surface finishes between extrusion grade PE100 (left) and BorSafe HE3490-IM



Angled fittings made from BorSafe HE3490-IM

The new material enables the fittings manufacturers to change their injection moulding process to lower temperatures and pressures similar to those used on the easier flowing PE80 materials. This allows manufacturers to produce fittings with lower internal stresses, less warpage and better looking surfaces. Most important of all, it leads to a cost reduction due to the lower scrap rates and lower cycle times.

Industrial trials carried out using BorSafe HE3490-IM in direct comparison with existing extrusion products for PE100 materials have emphasised the benefits of this material to the industry.

BorSafe HE3490-IM offers a wide range of production and end-product advantages

Shorter cycle times

- BorSafe HE3490-IM can be injected at lower temperatures in comparison to conventional PE100 extrusion grade materials. The lower melt temperatures allow considerably shorter cycle times to be achieved, thus delivering cost benefits to the fittings manufacturer.

Less scrap

- Industrial trials have shown that scrap rates can be reduced dramatically on fittings with intricate design. This reduces the complexity of the moulding and inspection schemes, which translates into improved production efficiency and cost-effectiveness for the manufacturer.

Improved mechanical properties

- For small and complex fittings, considerable improvements to mechanical properties in the critical areas such as intersections and flow-front interfaces can be achieved enhancing the performance of the finished fitting.

Improved surface finish

- Due to the easy-flow properties of BorSafe HE3490-IM, the surface quality of fittings is greatly improved when compared to fittings manufactured from conventional PE100 materials.

Less warpage

- Less ovalisation and warpage of the fittings results from the lower molecular weight of BorSafe HE3490-IM, leading to greater consistency in quality and more reliable, better performing finished fittings.

Easy processing

- BorSafe HE3490-IM processes like a PE80 material but the fitting performs as a PE100 product, which is exactly what manufacturers of fittings have been searching for since the introduction of PE100.

CAED analysis

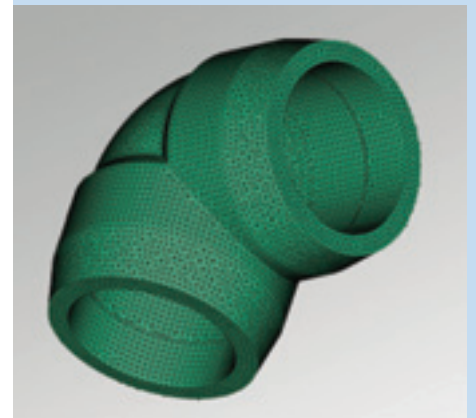
Borealis and Borouge have a long experience of using CAED techniques to analyse the injection moulding process for the engineering polymers used in automobiles and white goods components. This knowledge has been extended to the moulding of relatively thick-walled PE pressure fittings to help our customers get the best out of the new BorSafe HE3490-IM material.

In its simplest form 'Moldflow' can help visualise the way the material flows into the mould under different processing conditions. The simulation can be extended to study the packing and cooling phases and also used to estimate the overall cycle time. Using the computer simulation to optimise the moulding process parameters can save considerable experimental time on the machine.

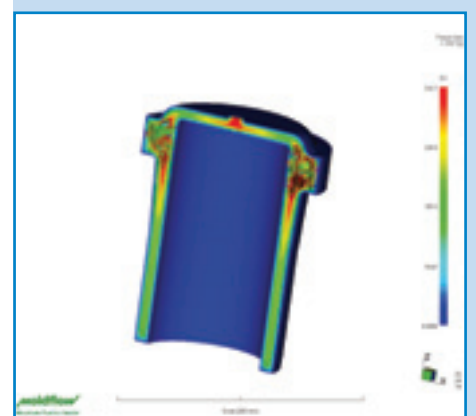
The filling phase is critical and in complex products needs to be carefully controlled - filling the mould too fast can result in orientation and internal stresses, filling too slowly can allow the melt fronts to cool to a level where welding of the two flow-fronts becomes difficult. The improved flow characteristics of BorSafe HE3490-IM means that the injection speed can be increased even in thick fittings with less orientation and shear induced stresses to ensure improved weld line properties (i.e. opens up the processing window).



Range of reducer fittings made from BorSafe HE3490-IM

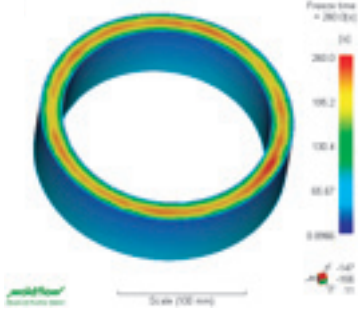


CAED visualisation of a 90° bend

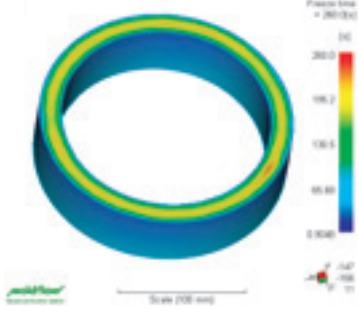


CAED image of a stub flange fitting during moulding showing the temperature distribution at various positions

Injection temperature = 250°C
Cooling time to 115°C = 230 seconds

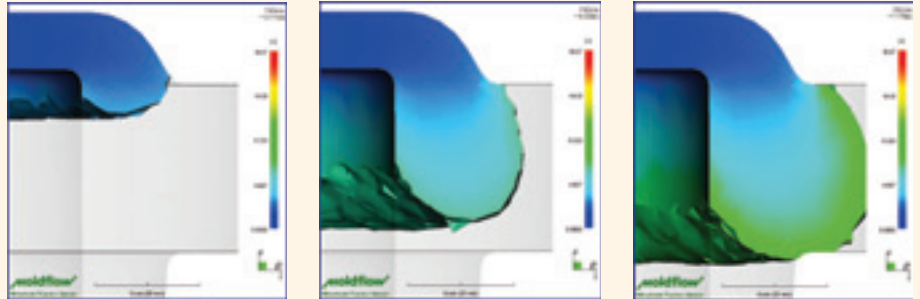


Injection temperature = 210°C
Cooling time to 115°C = 190 seconds

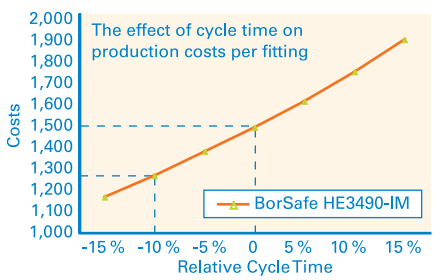


Material temperature versus time for outer and mid sections - indicate ejection time

Following the filling of the mould cavity the all important 'packing' part of the cycle can be simulated. Using the Pressure-Volume-Temperature (P.V.T.) relationship for the specific material, it is possible to model the process and ensure that the gate remains open long enough for additional material to be injected into the tool to compensate for material shrinkage. Failure to do so leads to excessive shrinkage or the presence of voids in the end product.



Visualisation of the melt front filling a thick section of the tool



An example of fittings costs versus cycle time for standard and BorSafe materials indicating lower fitting costs with BorSafe despite marginally higher price

Cooling in the moulding tool must be continued until all the material has cooled sufficiently and the outer surface attains a temperature and stiffness such that the product will accurately retain its shape when it is ejected from the mould. In thick walled fittings this is a complex heat transfer and material science problem which up to now has been established by trial and error, but Borealis and Borouge are in the process of developing this software.

The better flow properties of BorSafe HE3490-IM mean that lower injection temperatures can be used which significantly reduce cooling times and thereby overall cycle times. Since the majority of the fittings cost is related to the machine cycle time this results in significantly lower product costs even though this specialist injection moulding material is marginally more expensive than standard extrusion grades (refer to figure above).

Summary

Thus, BorSafe HE3490-IM is more than a new material, it is a complete package specifically designed for the producers of high quality PE100 pressure fittings. The material itself has better flow characteristics in the mould that can provide a better quality product at lower overall cost. This is supported by the most complete analysis and support package to ensure that you get the best out of the material in your own production process.

Borealis and Borouge are leading providers of innovative, value creating plastics solutions. With more than 40 years of experience in polyolefins and using our unique Borstar® technology, we focus on the infrastructure, automotive and advanced packaging markets across Europe, the Middle East and Asia. Our production facilities, innovation

centres and service centres work with customers in more than 170 countries to provide materials that make an essential contribution to society and sustainable development. We are committed to the principles of Responsible Care® and to leading the way in 'Shaping the Future with Plastics'™.

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