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## PRODUCT ANALYSIS OF THE PROJECT GRAFTALEN™ MP-UHHD

*Producing PE125 using GRAFTALEN™ MP-UHHD.*

Consumer properties, which should be taken into consideration:

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- 1) The unique toughness of the material (the highest rate of all known polymers), namely, Over 160 kJ / m<sup>2</sup>*
  - 2) High abrasion resistance*
  - 3) Low friction coefficient (self-lubricating)*
  - 4) High resistance to chemically aggressive reagents (media)*
  - 5) High creep resistance (geometric stability)*
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*Ordinary way - This type of process is quite expensive.*

Production of PE125, in compounding with bimodal PE100, from 8 to 45% of supermolecular polyethylene is injected, reaching dispersion by multiple compounding (4 stages) in an extruder cascade (XXXXX technology). *This type of process is quite expensive.*

**GRAFTALEN™ MP-UHHD (alloy)** is a MELT-PROCESSABLE concentrate of UHMWPE on an HDPE matrix.

As HDPE, you can choose the most affordable HDPE (pipe) grade.

To obtain polyethylene according to the standards **PE125** (with a minimum strength indicator **MRS > 13.8-14 MPa**, in comparison PE100 has MRS only 10 MPa), a significant improvement in the resistance against hydrostatic pressure is required. For a conventional bimodal HDPE, this indicator is difficult to achieve, since it directly correlates with the impact strength/density indicators and with simple extrapolation, it turns out that the required indicator for PE125 simply does not reach the bimodal HDPE matrix.

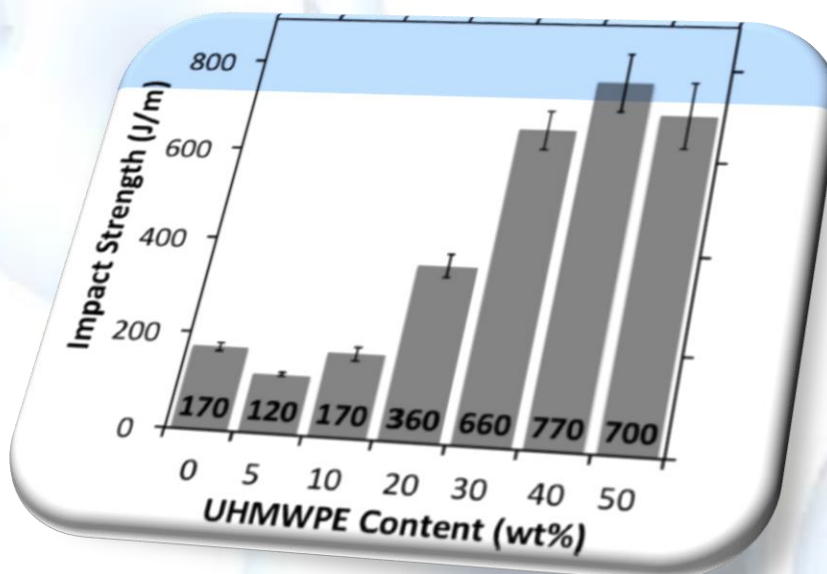
Another problem - the difficulty in maintaining the geometric stability of the pipe (the thickness at the top of the pipe is often less than at the bottom) due to the **sagging effect** (the phenomenon of the gravitational flow of a polymer melt). This phenomenon is more pronounced for thick-walled pipes.

**The specific blend of HDPE with UHMWPE allows solving these problems above.**

### Requirements for PE125 Blend

Indicator	Optimal value
Density of ISO 1183 at 23C.	950-960 kg / m <sup>3</sup> (max 980)
Melt flow index ISO 1133 at 21 kg load	0.2-5 g / 10 min
Melt flow index ISO 1133 at 5 kg load	less than 0.2 g / 10 min
The content of UHMWPE in the blend (2-3,5 mil g / mol)	<b>8-15% (optimal), 45% (max)</b>
Soot content	1.5-3% w
Pressure test ISO 1167-1: 2006 (Min required MRS strength)	2000 hours at 13.9
MPa100 hours at 14.5 MPa	100 hours at 14.5 MPa
Resistance against "Sagging" (creep) - so-called. "Eta747 value"	Ten times more than HDPE

Achieving maximum properties in terms of MRS, up to 40% of UHMWPE must be entered.



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