

Polyamide 6/46

Akulon IG-HG5 & -HG7

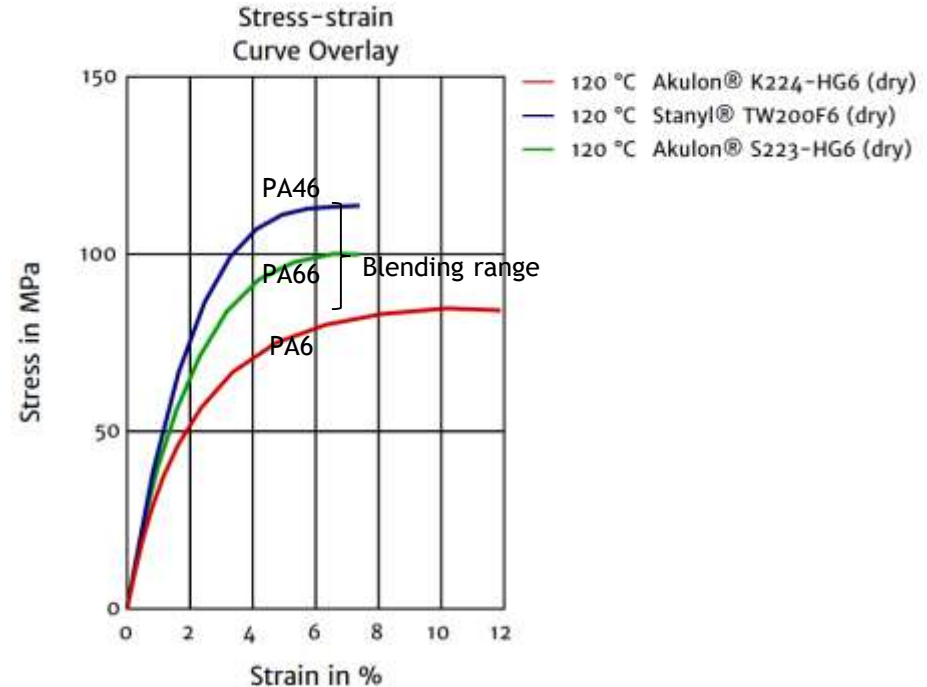
Polyamide 66 replacement

The supply chain of polyamide 66 (PA66) has experienced significant challenges over the last year, and will most likely last another year, if not longer. Are there other materials that would be a suitable alternative to PA66?

- **PA6** is a very good alternative in many cases, **independent of the ADN and HMDA** supply chain, however with a significantly lower melting point (220 °C vs. 260 °C)
- **PA46** outperforms PA66 on many aspects and is a good candidate, also **fully independent of the ADN and HMDA** value chain, however the cost position of this material is not always favorable and is over specified.
- Joining forces of PA6 and PA46 might be the right answer.

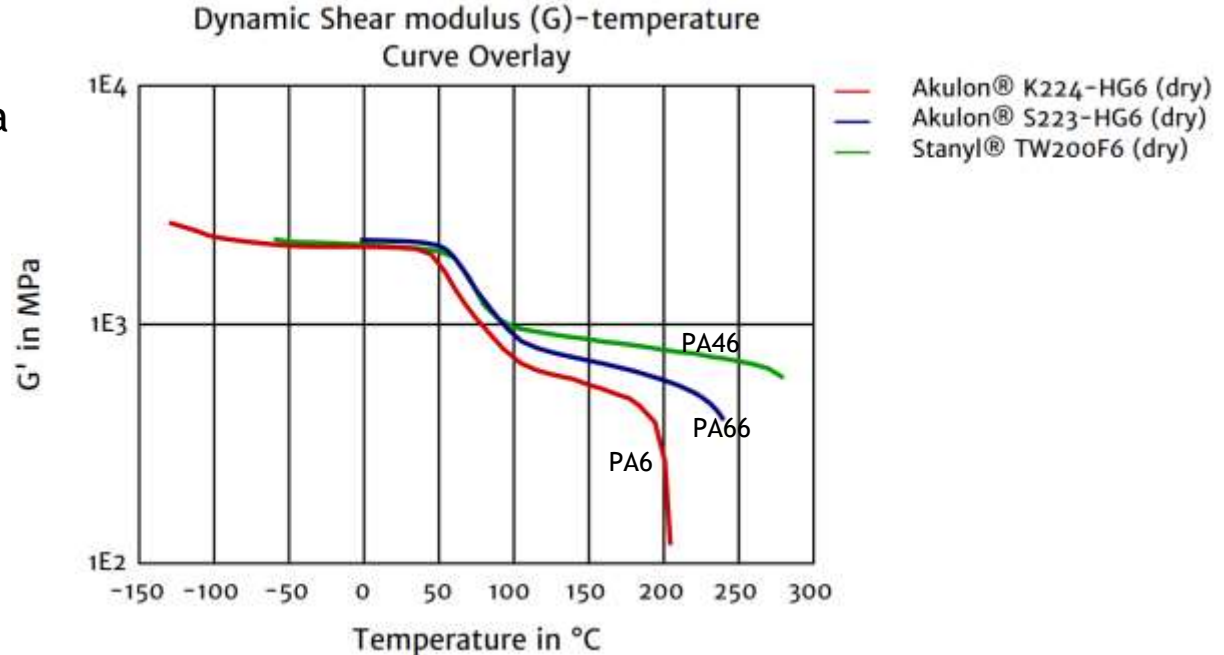
Polyamide 6/46 blends

- PA6/46 blends can be produced in such way that they have a property profile alike PA66 (E-mod, Yield stress, Elongation at break)
- Fully independent of ADN/HMDA supply chain
- Application field where higher temperature performance is required (Air/Oil environment)
- Drop-in replacement in PA66 tools
- Not suitable for water/glycol applications



DMTA-plot of PA46, PA66 and PA6

- Also the DMTA curves show that by blending a PA66-alike product can be made



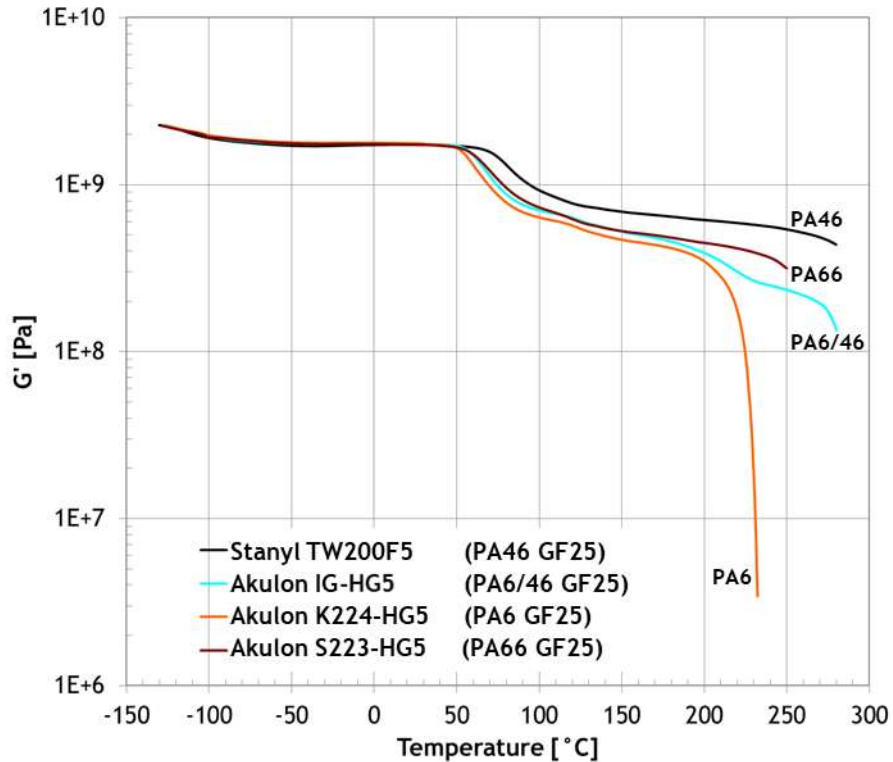
PA6/46 blends: Akulon IG-HG5 & IG-HG7

- DMTA curves
- Room temperature tensile properties (23 °C)
- High temperature tensile properties (180 °C)
- Charpy notched and unnotched
- Mold Shrinkage
- Heat Aging in Air and Oil

PA6/46 blend, heat stabilized, 25% glass fiber reinforced

AKULON IG-HG5

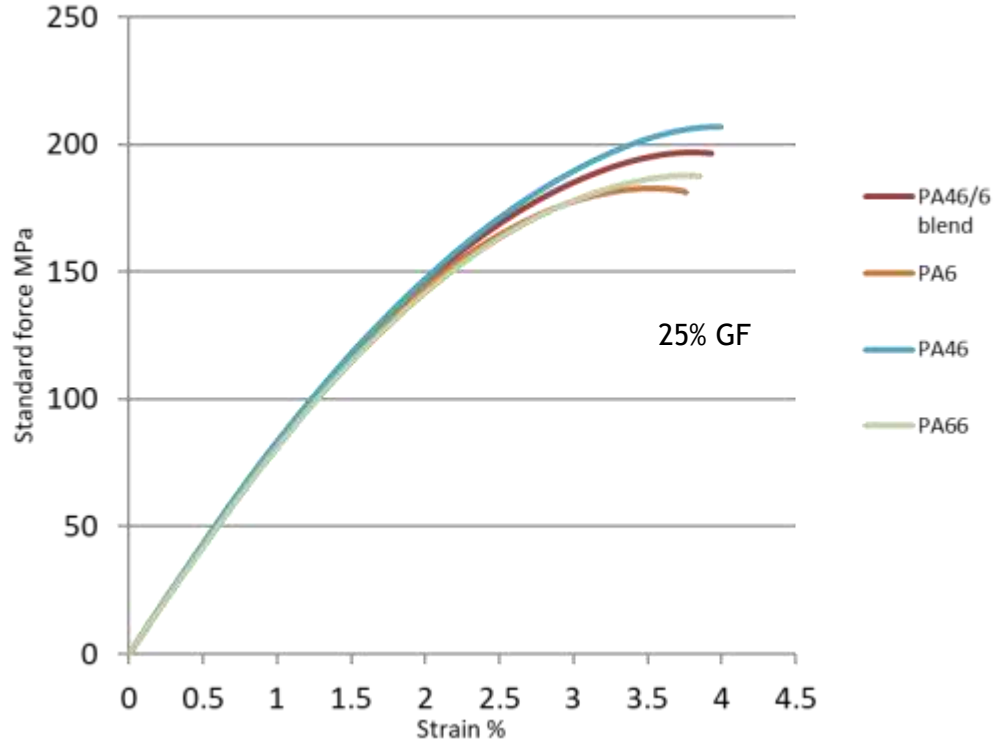
DMTA Akulon IG-HG5 (PA6/46 blend 25% GF)



Similar modulus and T_g behavior as PA66

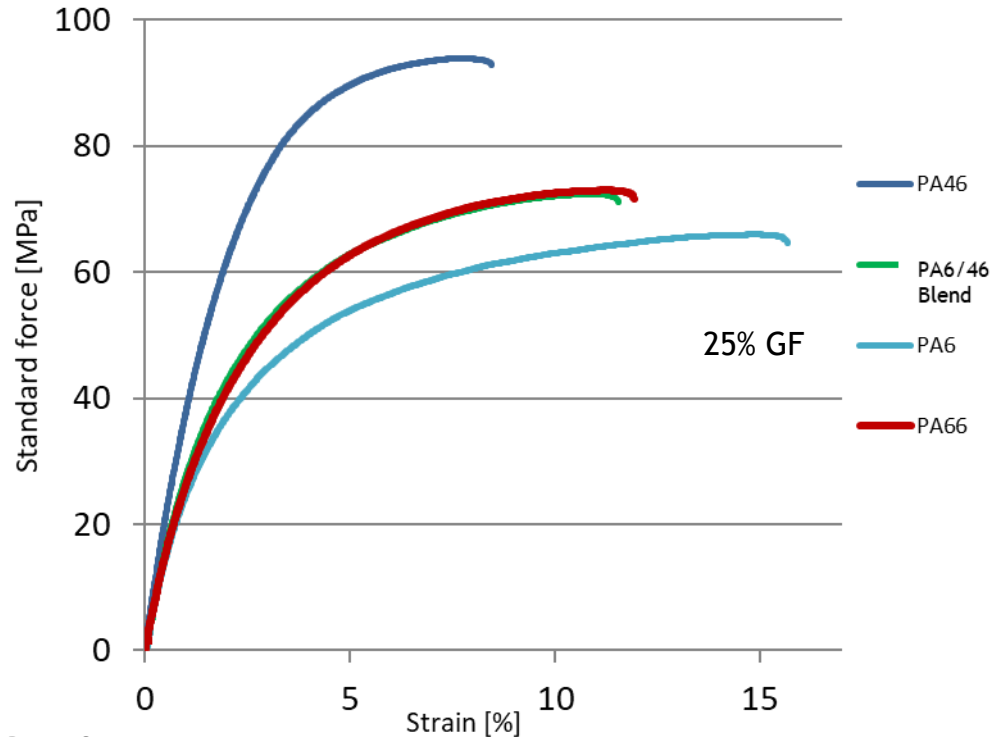
Description	$G'_{T=23\text{ }^\circ\text{C}}$ (MPa)	$G'_{T=150\text{ }^\circ\text{C}}$ (MPa)	T_g ($^\circ\text{C}$)
Stanyl TW200F5 (PA46 GF25)	1736	689	82
Akulon IG-HG5 (PA6/46 GF25)	1762	524	68
Akulon K224-HG5 (PA6 GF25)	1769	468	64
Akulon S223-HG5 (PA66 GF25)	1739	528	71

Mechanical properties at RT (23 °C)



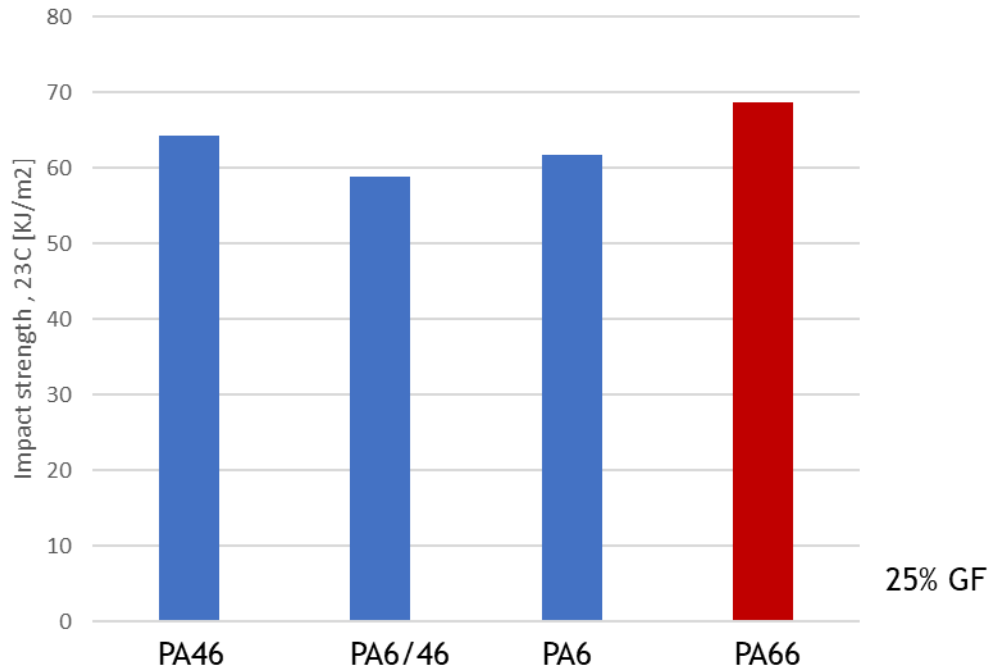
- At room temperature conditions PA6/46 blend shows comparable to better performance over PA66

Mechanical properties at 180 °C



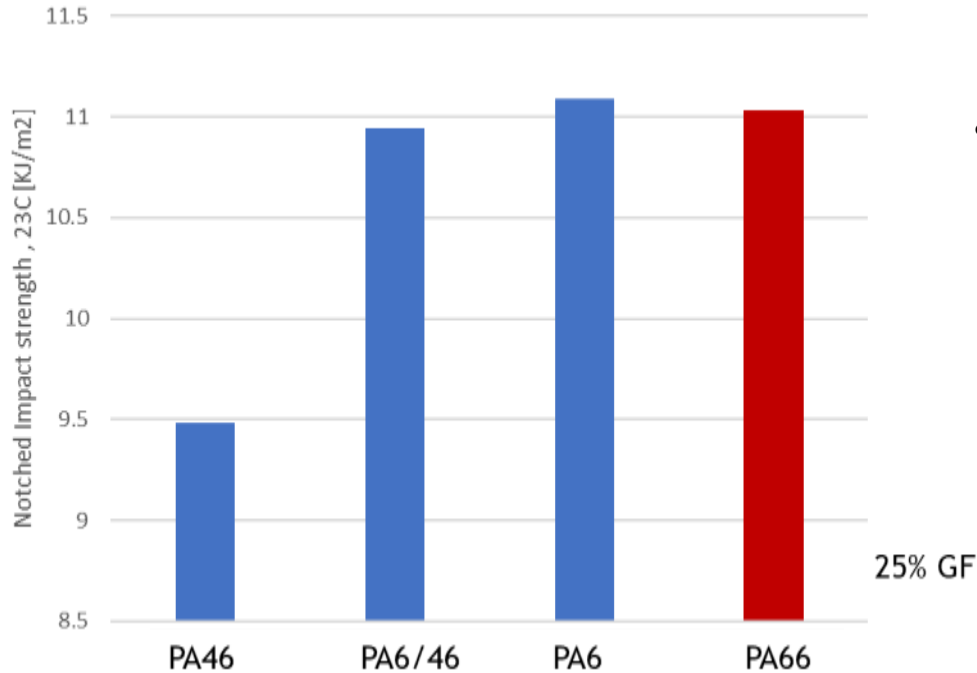
- At high temperature (180 °C) mechanical performance PA6/46 equal to PA66 (curves fully overlaying)

Impact strength at RT (23 °C)



- Impact strength of the PA6/46 blend is slightly lower than PA66

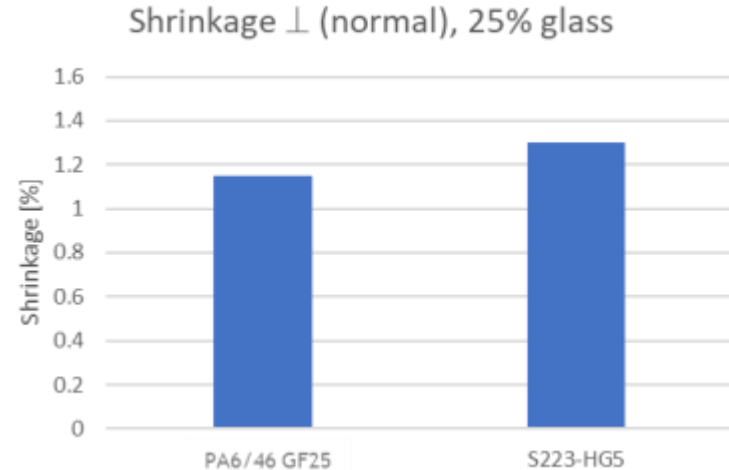
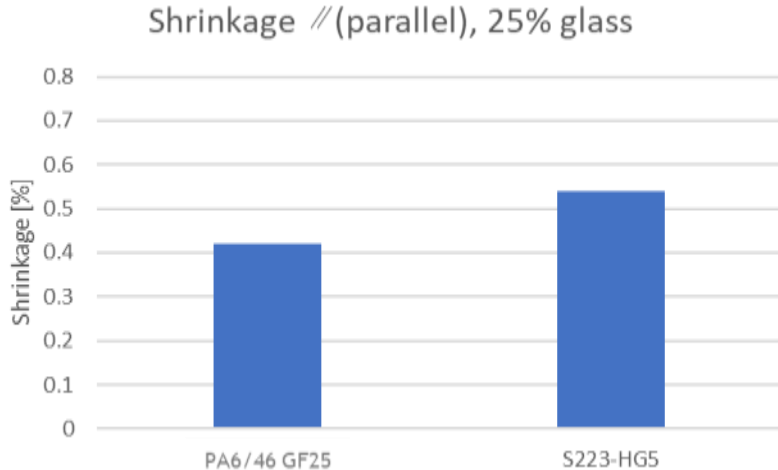
Notched impact strength at RT (23 °C)



- Notched impact of Stanyl improved upon blending and is on par with PA66

Mold Shrinkage

- Glass loading: 25%, mid pressure

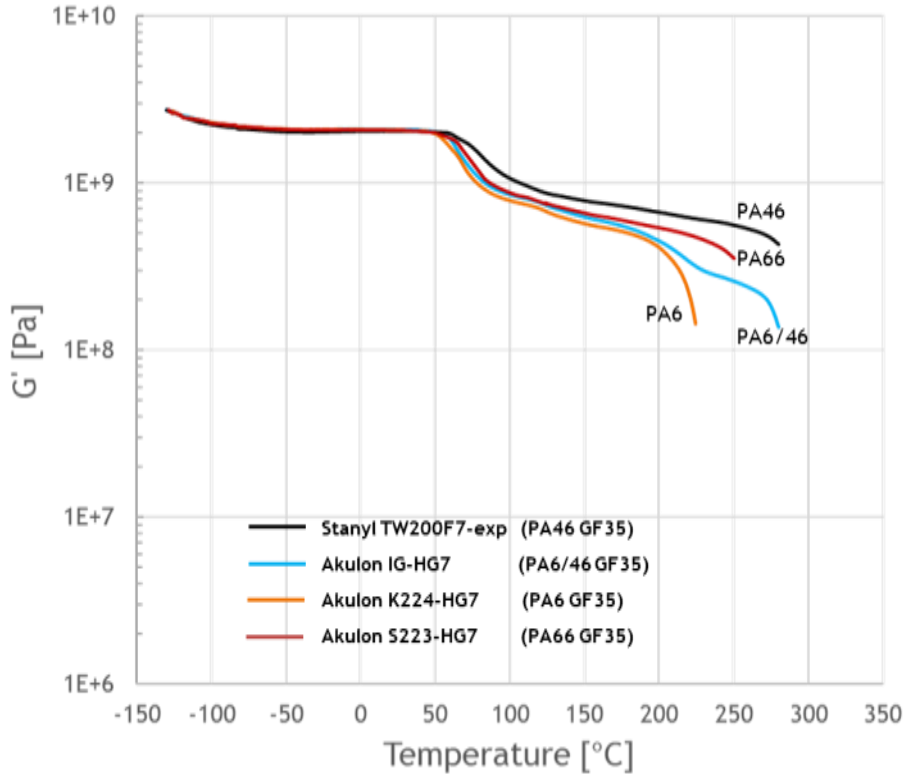


- PA6/46 blend has comparable to somewhat lower shrinkage to PA66

PA6/46 blend, heat stabilized, 35% glass fiber reinforced

AKULON IG-HG7

DMTA Akulon IG-HG7 (PA6/46 blend 35% GF)

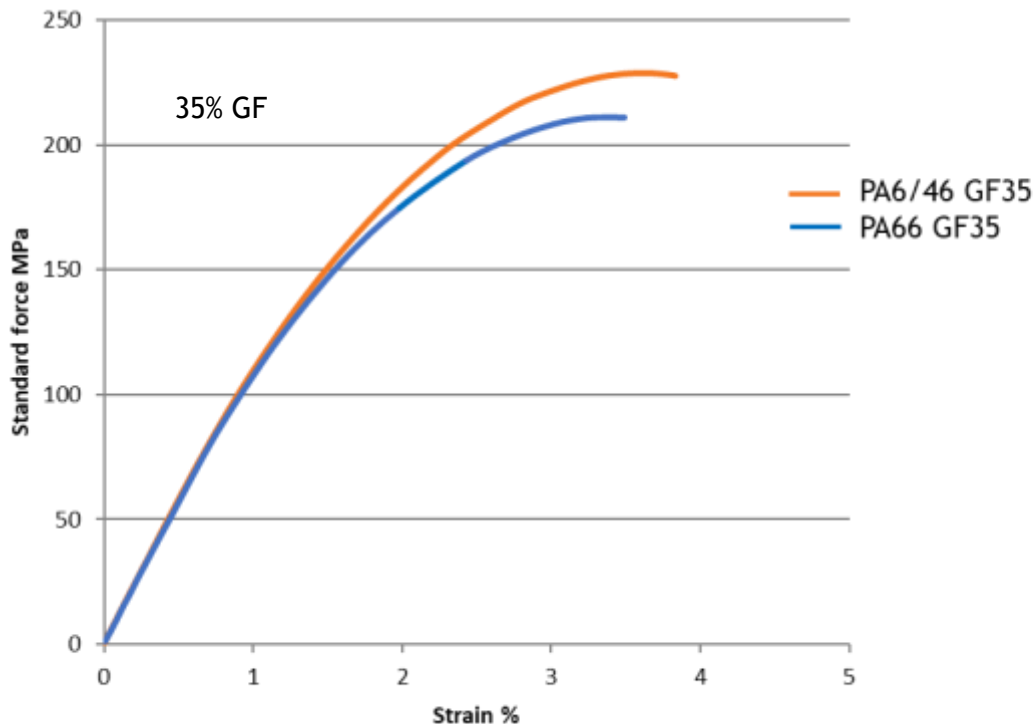


Similar modulus and T_g behavior as PA66

Description	$G'_{T=23\text{ °C}}$ (MPa)	$G'_{T=150\text{ °C}}$ (MPa)	T_g (°C)
Stanyl TW200F7-exp (PA46 GF35)	2055	789	82
Akulon IG-HG7 (PA6/46 GF35)	2089	627	68
Akulon K224-HG7 (PA6 GF35)	2069	591	64
Akulon S223-HG7 (PA66 GF35)	2039	638	71

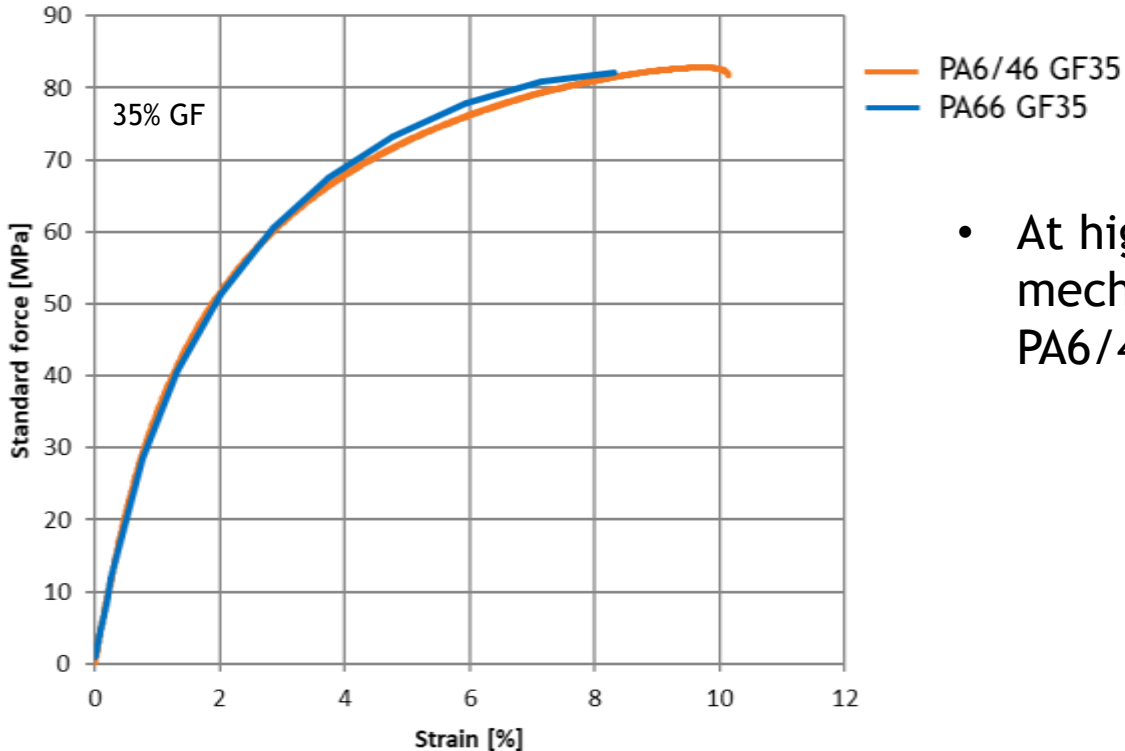


Mechanical properties at RT (23 °C)



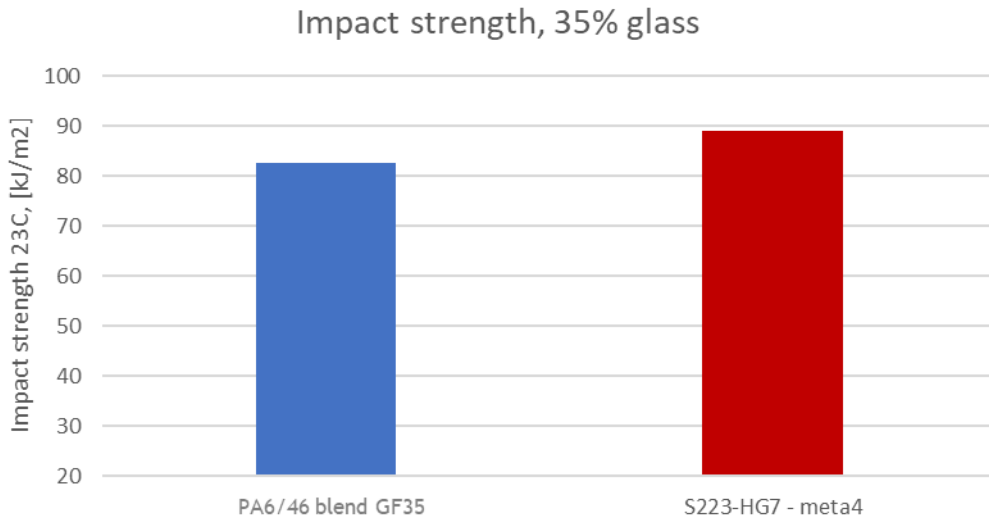
- At room temperature conditions PA6/46 blend shows behavior comparable to PA66
- Tensile Strength of PA6/46 slightly higher than PA66

Mechanical properties at 180 °C



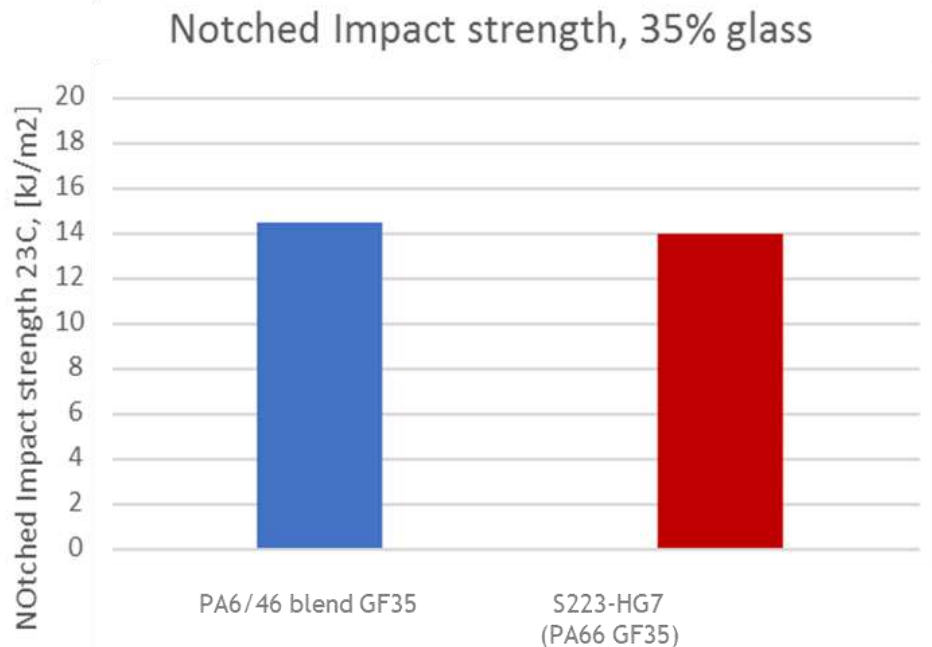
- At high temperature (180 °C) mechanical performance PA6/46 equal to PA66

Impact strength at RT (23 °C)



- Impact strength of the PA6/46 blend is slightly lower than PA66

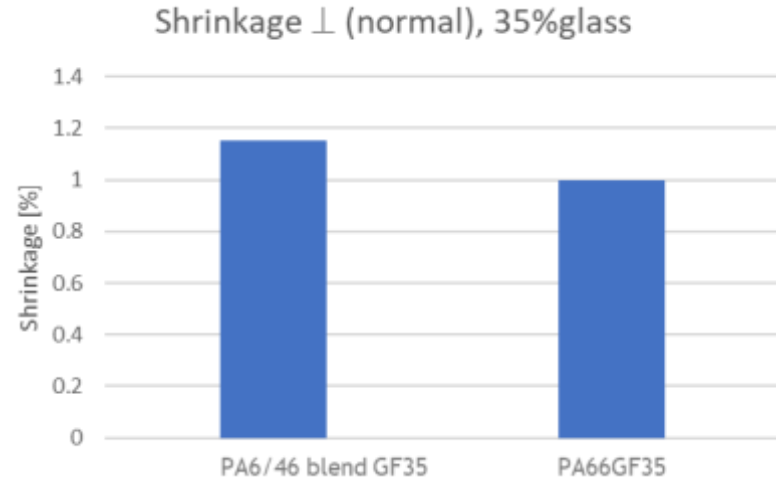
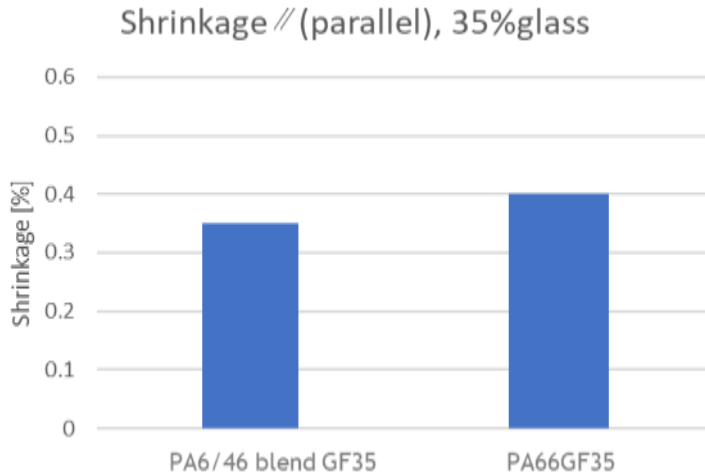
Notched impact strength at RT (23 °C)



- Notched impact of Stanyl improved upon blending and is on par with PA66

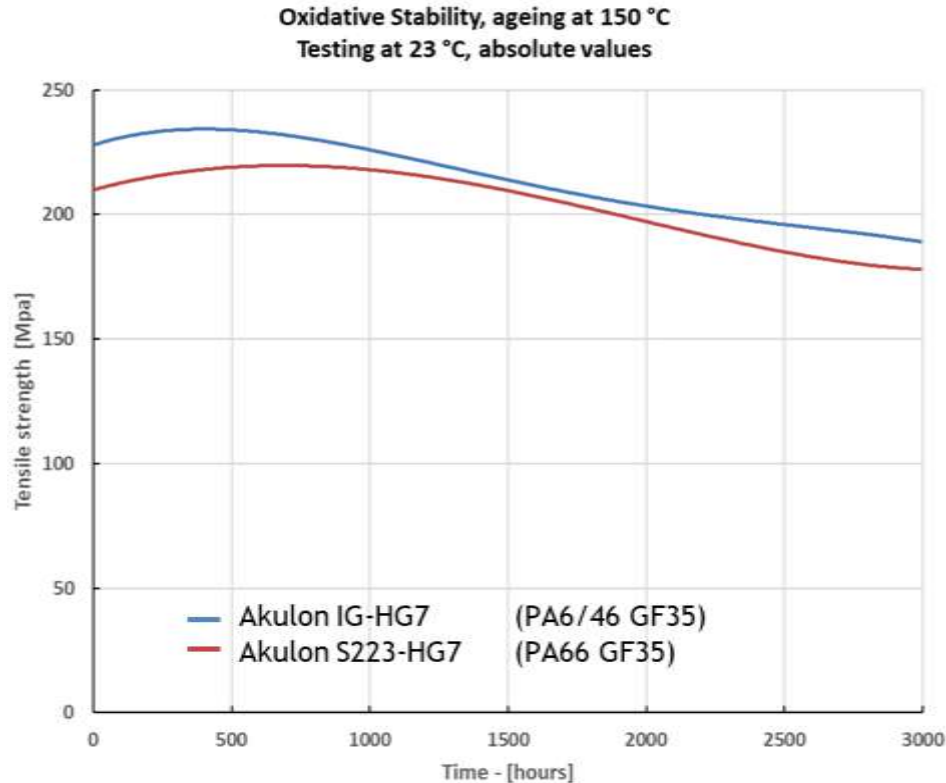
Mold Shrinkage

- Glass loading: 35%, mid pressure



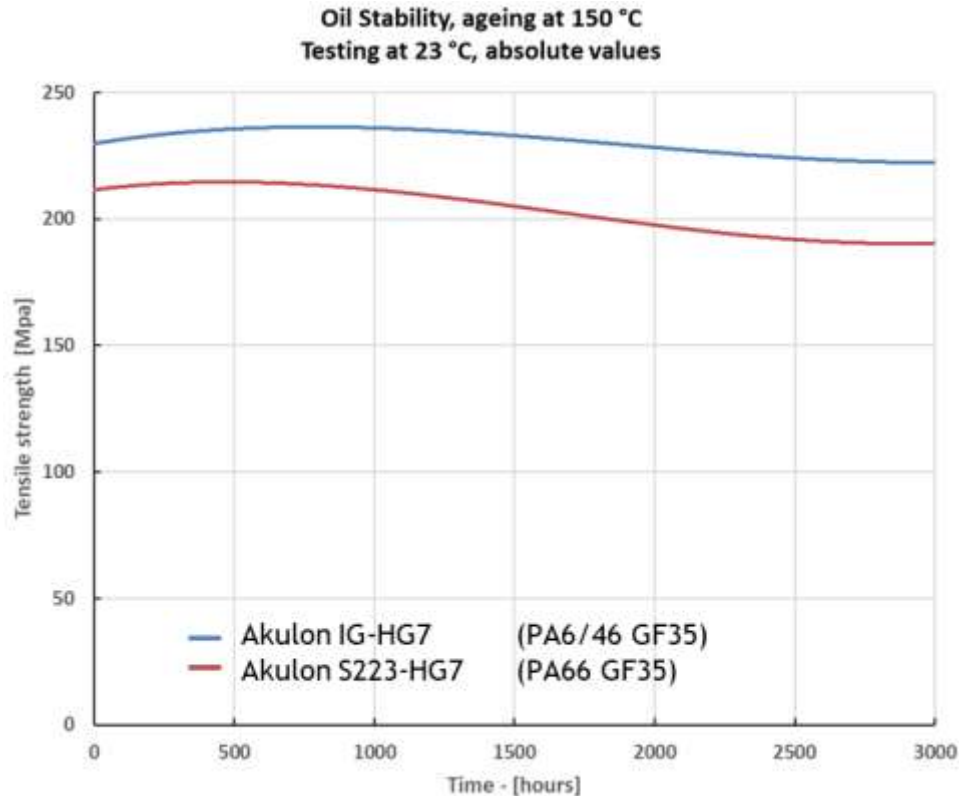
- PA6/46 blend GF35 has comparable shrinkage to PA66 GF35

Ageing in air @150 °C



Air ageing of PA6/46 blend
is in line with PA66

Oil ageing



Oil ageing of PA6/46 blend is in line with PA66

Tested in mineral Engine oil SHELL 10W40



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