

**SIMONA**



**SIMONA® PP-DWU AlphaPlus**

Added value in chemical equipment and tank engineering

# SIMONA® PP-DWU AlphaPlus – Added value in chemical equipment and tank engineering

In developing SIMONA® PP-DWU AlphaPlus, we have successfully transferred the outstanding properties associated with SIMONA® PP-H AlphaPlus pipes to the product segment of extruded sheets. Thus, companies operating within the field of chemical equipment and tank engineering now have at their disposal a homopolymeric polypropylene (PP-H) that opens up a host of new opportunities for production at industrial level. Whereas the various types of polypropylene used until recently had their individual material-related strengths and weaknesses, PP-DWU AlphaPlus delivers uncompromising functionality.

## **SIMONA® PP-DWU AlphaPlus combines all the key strengths known from other materials:**

- Finer and more stable alpha-crystalline structure
- Superior notched impact strength and enhanced rigidity
- Excellent welding properties
- Longer service life
- Improved chemical resistance and superior stress crack resistance

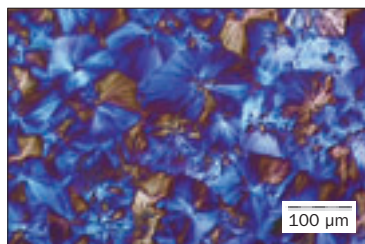
## **Finer and more stable alpha-crystalline structure**

By adjusting key elements within the area of process engineering and incorporating special nucleating agents, SIMONA has

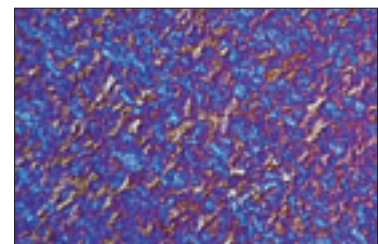
been able to develop a PP-H with  $\alpha$ -crystalline properties –

## **SIMONA® PP-DWU AlphaPlus.**

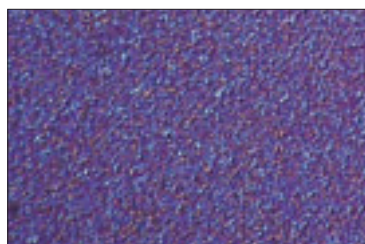
It offers a range of benefits even under extremely difficult processing conditions. Next-generation sheets made of SIMONA® PP-DWU AlphaPlus are a tribute to our research and development activities on the basis of SIMONA® PP-DWU sheets, which have an extensive track record within the field of chemical tank and equipment engineering. As well as delivering added value to customers, SIMONA® PP-DWU AlphaPlus sets new standards within this segment of the market.



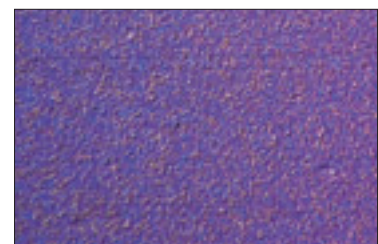
*PP-H, non-nucleated*



*PP-H, mildly  $\alpha$ -nucleated*

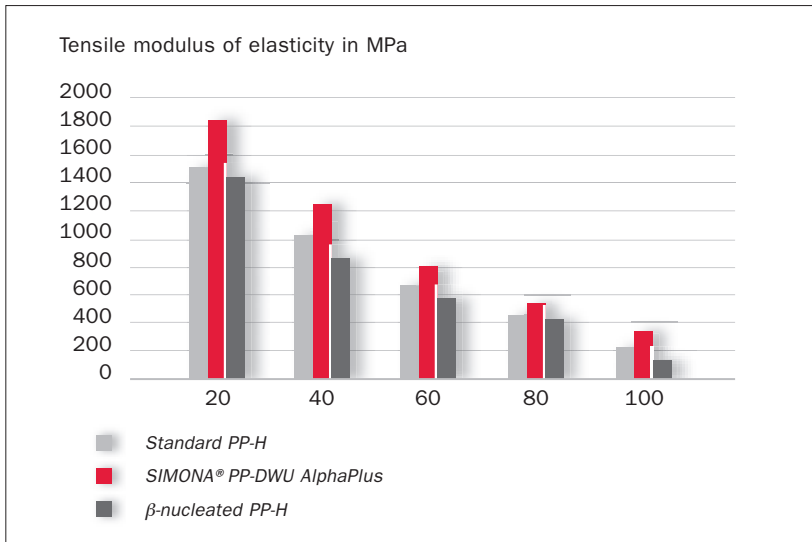


*PP-H,  $\beta$ -nucleated*



*SIMONA® PP-DWU AlphaPlus*

*Photographs of PP-H types taken under an optical microscope*

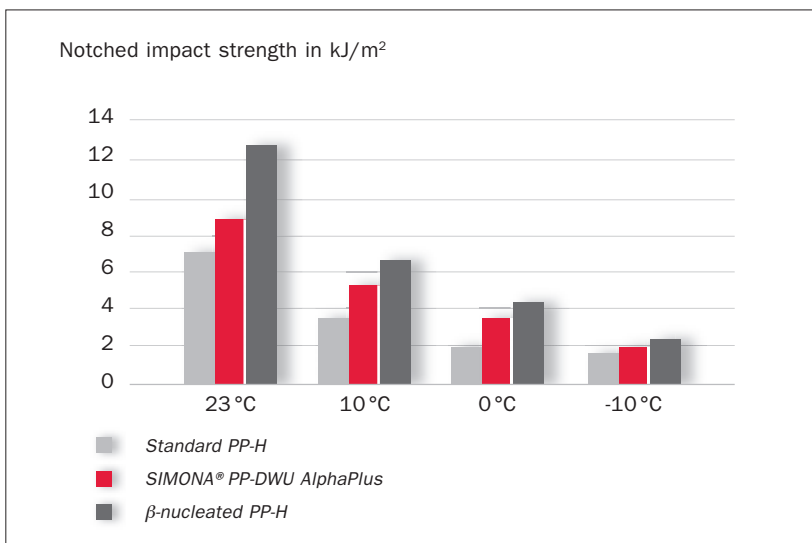


Modulus of elasticity in various types of PP (single measurement on pressed sheets)

**Superior notched impact strength and enhanced rigidity**

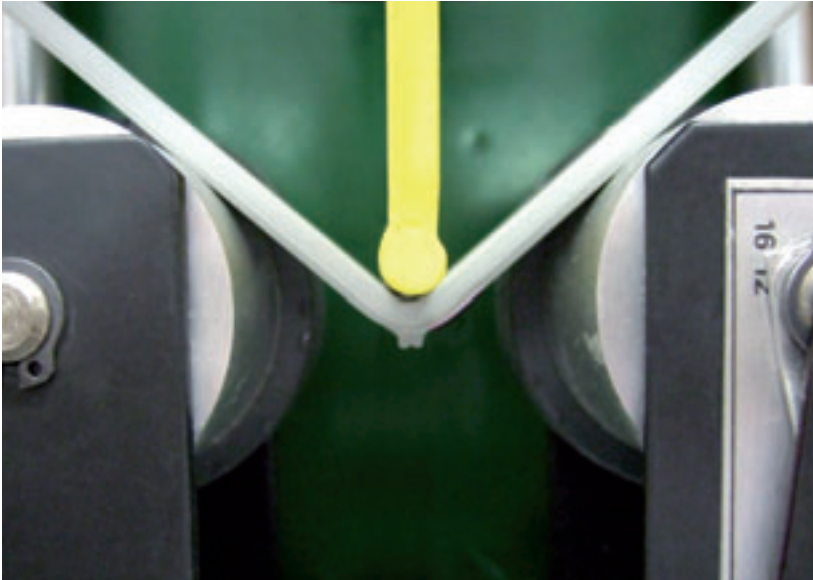
SIMONA® PP-DWU AlphaPlus offers users considerably improved rigidity, in addition to increased toughness. In fact, the level of rigidity measured at 100 °C is twice as high as that of β-nucleated PP.

At low temperatures, in particular, SIMONA® PP-DWU AlphaPlus displays higher impact resistance than standard PP-H, thus combining greater functionality with improved safety.



Notched impact strength according to Charpy method

## SIMONA® PP-DWU AlphaPlus – Outstanding material properties



*SIMONA® PP-DWU AlphaPlus in  
bend test according to DVS 2203-5*

### **Excellent welding properties**

The various welding methods applied within the area of plastics processing can often result in changes to the morphology of a specific material. This has a significant impact on the properties of welded joints and thus also on the overall quality of plastic parts and assemblies, particularly in the case of polypropylene. A prime example is heated-tool butt welding, which generally produces welding beads in the joint

zone. In this case, a notch is formed in the area of the weld seam, potentially causing stress concentration under increasing mechanical loads. In turn, stress concentration in the notch root of a weld seam can induce stress cracks under tensile loading or when exposed to chemicals. The ultra-fine structure of SIMONA® PP-DWU AlphaPlus is thermodynamically stable and remains intact during welding; this feature applies to a range of

different welding methods. The thus resulting toughness significantly reduces the level of stress concentration in the notch root. Technological bend tests have shown a considerable increase in the bend angle achievable with this material.

### Longer service life

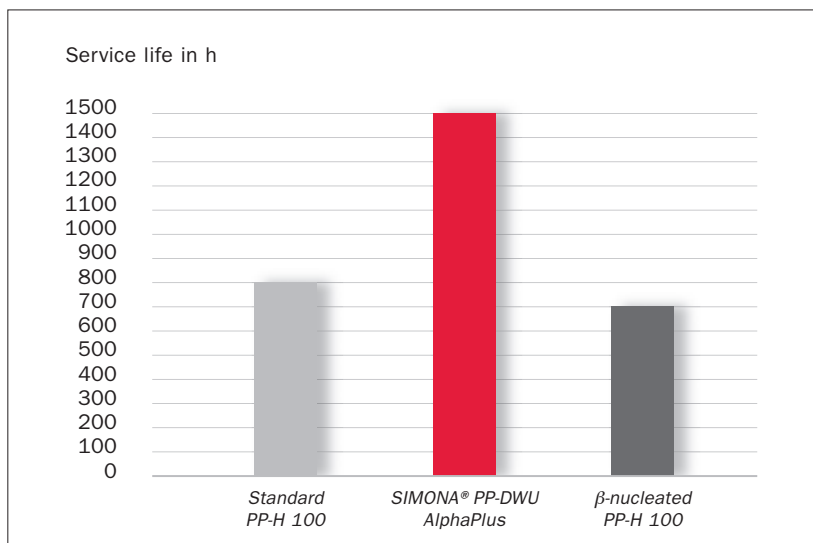
The superior safety properties of SIMONA® PP-DWU AlphaPlus are reflected in its higher resistance to slow crack growth – as demonstrated by means of full-notch creep testing (FNCT). Compared to a mildly  $\alpha$ -nucleated standard PP-H with a useful life of between 700 and 800 hours, SIMONA® PP-DWU AlphaPlus is capable of achieving a service life of more than 1500 hours. In contrast,  $\beta$ -nucleated PP-H is usually associated with a maximum life of 700 hours.

These benefits are also demonstrated as part of creep-depending-on-time tests under internal compression. At 95 °C and a pressure/stress of 4.4 MPa, the useful life of SIMONA® PP-DWU AlphaPlus was in excess of 3000 hours. This represents a significant increase compared with the minimum requirement of 100 hours specified by DIN 8078.

### Improved chemical resistance and superior stress crack resistance

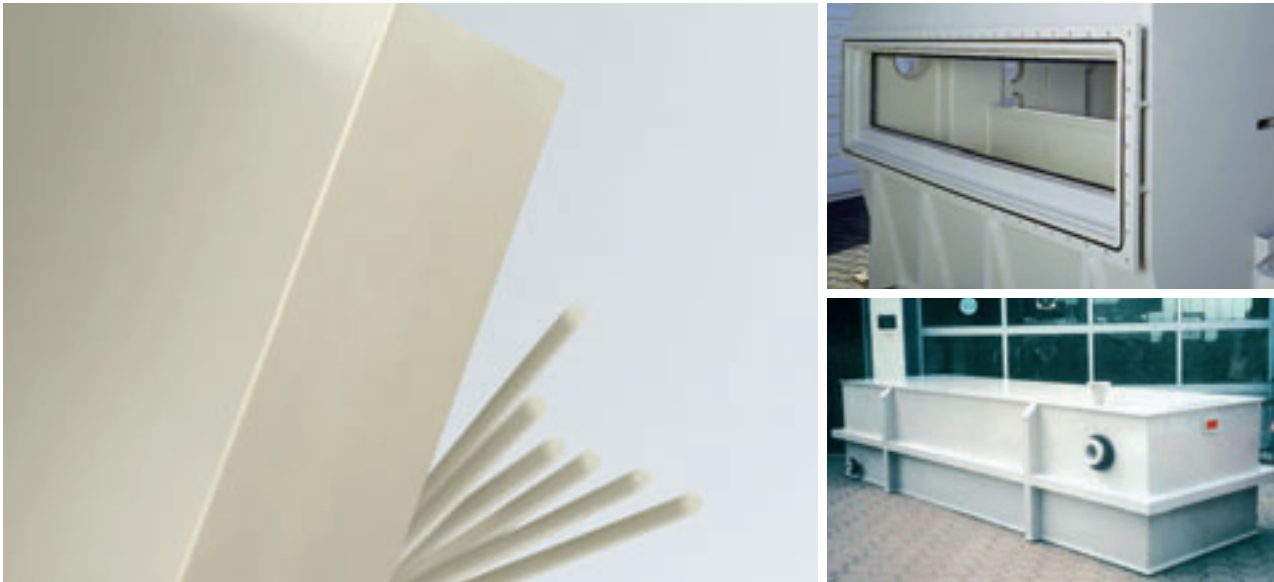
The fine morphology and increased toughness of SIMONA® PP-DWU AlphaPlus also have a positive effect on its chemical resistance. Alongside improved welding properties, tests have shown that the

surface is much less susceptible to chemical attack. This results in a longer service life and greater operational reliability. Again, one of the key factors is the fine and highly stable crystalline structure associated with SIMONA® PP-DWU AlphaPlus, which helps to reduce material-related stress. Within this context, resistance to stress-crack-inducing chemicals is particularly high in critical regions such as weld seams or anchor points, which are subjected to internal stress or stress from external sources.



Service life of various types of PP in FNCT (Full-Notch Creep Test) at 80 °C and 4.0 MPa

# Key benefits



## Your benefits at a glance

- Next generation of proven SIMONA® PP-DWU
- Significantly improved welding properties
- Superior notched impact strength and enhanced rigidity
- Improved chemical resistance and superior stress crack resistance
- Longer service life
- Excellent processing properties
- Additional safety reserves even for critical applications
- Excellent value and highly cost-effective

## Processing versatility

SIMONA® PP-DWU AlphaPlus can be processed using various methods.

For specific details, please feel free to contact our Technical Service Centre:

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# Material specifications/Product range

## SIMONA® PP-DWU AlphaPlus

Properties	Test standard	Unit	SIMONA® PP-DWU AlphaPlus
<b>Mechanical properties</b>			
Density	ISO 1183	g/cm <sup>3</sup>	0.915
<b>Tensile test</b>	DIN EN ISO 527		
Yield stress		MPa	33
Elongation at yield		%	8
Elongation at break		%	70
Tensile modulus of elasticity		MPa	1700
<b>Impact bending test</b>	DIN EN ISO 179		
Impact strength		kJ/m <sup>2</sup>	no break
Notched impact strength		kJ/m <sup>2</sup>	9
<b>Surface hardness</b>			
Ball indentation hardness	DIN EN ISO 2039-1	MPa	70
Shore hardness	DIN EN ISO 868	D	72
<b>Thermal properties</b>			
Mean coefficient of linear thermal expansion	DIN 53752	K <sup>-1</sup>	1.6 · 10 <sup>-4</sup>
Thermal conductivity	DIN 52612	W/m · K	0.22
<b>Electrical properties</b>			
Dielectric strength	DIN IEC 60167	kV/mm	52
Surface resistivity	IEC 60093	Ohm	10 <sup>14</sup>
<b>Other properties</b>			
Fire behaviour	DIN 4102		normal flammability
Temperature range	°C		0 to +100
Physiologically safe	BfR		yes
Chemical resistance			excellent in contact with various acids, alkalis and solvents

### Product range (data in mm)

	PP-DWU AlphaPlus	PP-DWU-SK AlphaPlus (polyester-backed)	PP-DWU-GK AlphaPlus (glass-fibre-backed)
<b>Extruded sheets (size/thickness)</b>			
	2000 x 1000	0.8–50	2–8
	3000 x 1500	1.5–40	2–8
	4000 x 2000	2–50	
	20000 x 1500		2–6
	Colours	grey	grey
<b>Welding rods</b>			
	Types	○○▽♡○○∞	
	Thickness	3–7	
	Colours	grey	

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