

**SIMONA**



**SIMONA® PP-DWU AlphaPlus®**

Added value in chemical tank and equipment engineering

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

**With SIMONA® PP-DWU AlphaPlus® companies operating within the field of chemical tank and equipment engineering have at their disposal a homopolymeric polypropylene (PP-H) that opens up a host of new opportunities for production at industrial level.**

**Only manufacturer of semi-finished plastics with DIBt certification for a PP-H compound**

SIMONA® PP-DWU AlphaPlus® is a PP-H compound registered by SIMONA with the DIBt (Deutsches Institut für Bautechnik Berlin). As part of the official approval process, the company is required to furnish extensive documentation relating to the quality of the raw material and the actual semi-finished products manufac-

tured therefrom. To date, SIMONA is the only manufacturer of semi-finished plastics to have been granted DIBt certification for a PP-H material. The approval procedures include far-reaching QC tests, which are conducted as part of the relevant inspection plans. What is more, the provisions stipulate external monitoring by an independent, certified testing laboratory.

**SIMONA® PP-DWU AlphaPlus® offers the following benefits:**

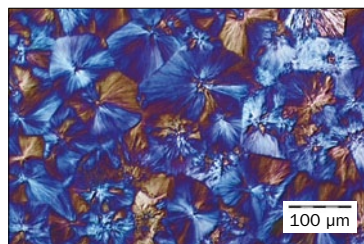
- Finer and more stable alphacrystalline structure
- Superior notched impact strength and enhanced rigidity
- Excellent welding properties
- Longer service life

- Improved chemical resistance and superior stress crack resistance

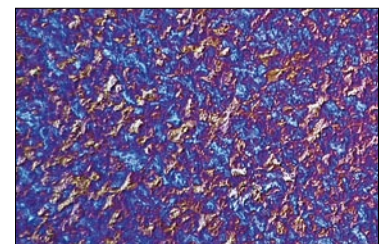
**Finer and more stable alphacrystalline structure**

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®**.

As well as delivering added value to customers, SIMONA® PP-DWU AlphaPlus® sets new standards within this segment of the market.



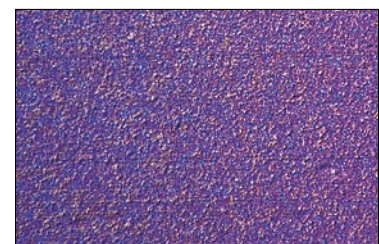
*PP-H, non-nucleated*



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

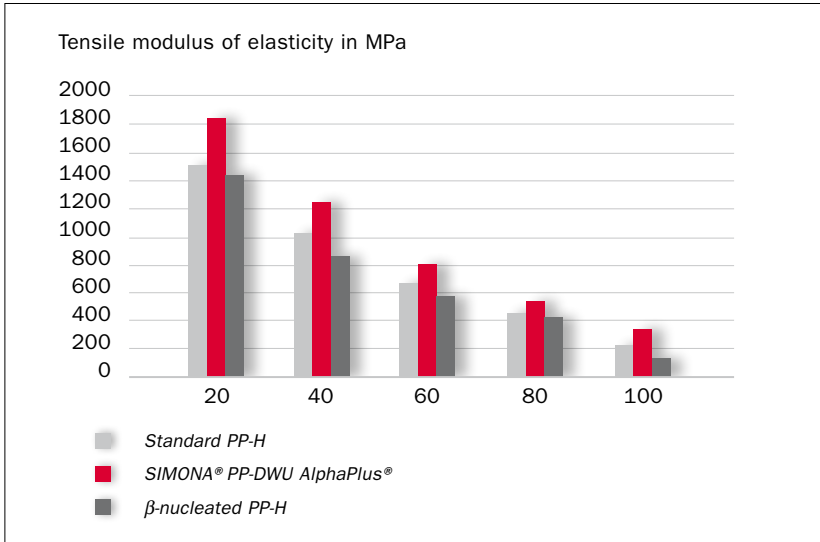


*PP-H,  $\beta$ -nucleated*



*SIMONA® PP-DWU AlphaPlus®*

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

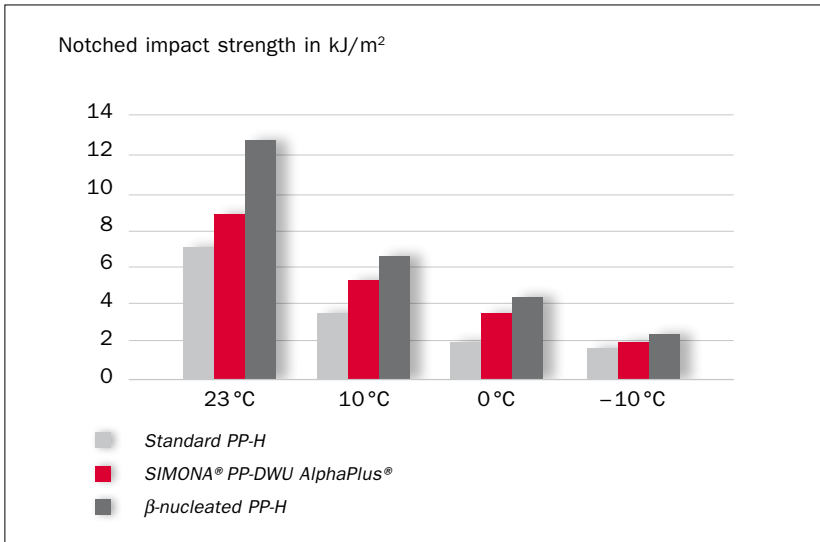


Modulus of elasticity in various types of PP (single measurement on pressed sheets)

**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 element 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 signifi-

cantly 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.

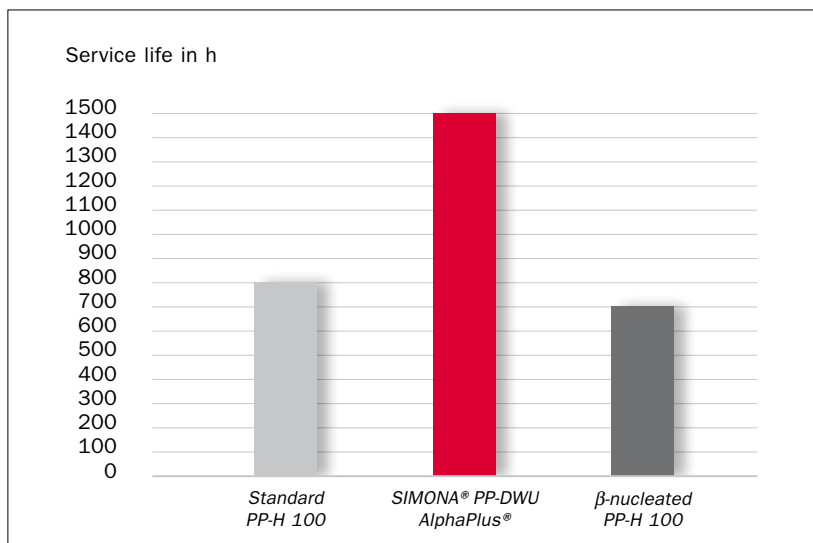
### Longer service life

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 Notched Creep Test (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.

The superior properties associated with this material have also been confirmed by Hessel Engineering as part of tensile creep tests on sheets made of SIMONA® PP-DWU AlphaPlus® and joined by means of heated element butt welding. The required minimum service life of a welded joint, as defined in the certification guidelines of the DIBt (Deutsches Institut für Bautechnik Berlin) for polypropylene compounds were met by SIMONA® PP-DWU AlphaPlus® – with a substantial safety margin.

### 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, 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 Notched Creep Test) at 80 °C and 4.0 MPa

## Key benefits at a glance



### Key benefits at a glance

- 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
- Only manufacturer of semi-finished plastics with official DIBt approval for a PP-H compound (Registration Notice Z.40.25-424)
- 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.

TECHNICAL SUPPORT





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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	DIN EN 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 60243-1	kV/mm	52
Specific surface resistance	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>Pressed sheets (size/thickness)</b>			
	2000 x 1000	10–200	
	4120 x 2010	10–150	
	6200 x 2010	12–80	
	Colours	grey	
<b>Welding rods</b>			
	Types	○▽▽▽○∞	
	Thickness	3–7	
	Colours	grey	
<b>Solid rods (length/diameter)</b>			
	1000	8–800	
	2000	8–500	
	Colours	grey	



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