



# TECHNICAL DATA

## SULAPAC UNIVERSAL INJECTION MOLDING

Version No. 1.0  
Updated 25.02.2019

### RAW MATERIALS

Sulapac Universal Injection Molding material is made of renewable, sustainable, 100 % biodegradable and microplastic-free raw materials. The main components of Sulapac Universal Injection Molding material are wood chips from sustainably managed Nordic forests and natural binders.

The raw materials used are REACH and Proposition 65 compliant and meet the framework regulation (EC) No. 1223/2009 for cosmetic products.

MECHANICAL PROPERTIES		
MATERIAL	SULAPAC UNIVERSAL INJECTION MOLDING	POLYPROPYLENE
<b>PHYSICAL PROPERTIES</b>		
Hardness (Shore D)	79-81	55-75
Material density (g/cm <sup>3</sup> )	1.27	0.90
<b>TENSILE PROPERTIES (ISO 527-1)</b>		
Tensile strength (MPa)	50-55	20
Tensile modulus (GPa)	4-6	1.20
Tensile strain (%)	1.4-1.5	100-600 (typical)
<b>FLEXURAL PROPERTIES (ISO 178)</b>		
Flexural strength (MPa)	80-85	25
Flexural modulus (GPa)	4-6	1.25
Flexural strain (%)	2.0-2.1	-
<b>IMPACT PROPERTIES (UNNOTCHED, ISO 179-1)</b>		
Charpy impact strength (kJ/m <sup>2</sup> )	7-11	165
<b>RHEOLOGICAL PROPERTIES (ISO 1133)</b>		
MFI (190°C/2.16 kg)	15-19 g/10 min	5-35 (typical)

FIRE PROPERTIES			
MATERIAL	SULAPAC UNIVERSAL INJECTION MOLDING	POLYPROPYLENE	SAFETY LIMIT
<b>ISO 1716</b>			
Heat of combustion (MJ/kg)	19.0-19.5	45.1	-
<b>ISO 5659-2</b>			
Time to ignition (s)	20-22	32	-
Maximum heat release rate (kW/m <sup>2</sup> )	500-550	1672	-
Average smoke production ( $\cdot 10^{-3} \text{ m}^2/\text{s}$ )	4.5-5.0	98.7	-
CIT <sub>g</sub> (240 s)	0.04	0.09	1
CIT <sub>g</sub> (480 s)	0.04	0.91	1
D <sub>s</sub> (10)	46.4	755.1	-
<b>RELEASE OF CERTAIN TOXIC GASES DURING COMBUSTION**</b>			
Concentration (mg/m <sup>3</sup> )	(at 480 s)		
CO <sub>2</sub>	49 856	82 439	72 000
CO	107	1 583	1 380
HBr	0	0	99
HCl	0	0	75
HCN	0	46	55
HF	0	0	25
NO <sub>x</sub>	0	310	38
SO <sub>2</sub>	0	29	262

CIT = *Conventional index of toxicity* (The toxic effect is reached when CIT<sub>g</sub> = 1)

D<sub>s</sub> (10) = Specific optical density (the lower, the better)

\*\* Values are based on IDLH (Immediately Dangerous to Life and Health) recognized as a limit for personal exposure to the gas component by NIOSH (National Institute for Occupational Safety and Health) (1997 version). If the concentration of harmful substances is IDLH, the worker must use the most reliable respirators.

## PROCESSING INSTRUCTIONS FOR INJECTION MOLDING

### MOISTURE AND DRYING – SULAPAC UNIVERSAL INJECTION MOLDING

- Before processing, the granules should be dried using a dehumidifying or vacuum dryer.
- If a dehumidifying dryer is used, the granules should be dried for at least 4 hours at 105 °C.
- If a vacuum drying system is used, the granules should be first dried for at least 20 minutes at 105 °C and then kept in the vacuum for at least 40 minutes.
- Avoid exposing the material to the ambient conditions after drying.
- Moisture content can lead to hydrolysis.
- Dried granules should be mixed with the color masterbatch after the granules have cooled down in order to avoid the agglomeration of color masterbatch granules.

### PROCESSING CONDITIONS – SULAPAC UNIVERSAL INJECTION MOLDING

	TEMPERATURE	GENERAL INSTRUCTIONS
Throat	40-60°C	<ul style="list-style-type: none"> <li>- Typical settings may require optimization.</li> <li>- Both cold and hot runner systems are suitable for this material.</li> <li>- Valve gate systems can be used.</li> <li>- Avoid using temperatures above 200°C in order to lower the risk of wood and polymer degradation.</li> <li>- The dwell time of the material inside the machine shall be reduced to a minimum in order to lower the risk of thermal degradation.</li> </ul>
Feed zone	150-160°C	
Compression zone	160-170°C	
Homogenizing zone	175-190°C	
Machine nozzle	175-190°C	
Back pressure	50-100 bar	
Hot runner nozzle and pushing	200-220°C	
T <sub>mold, front</sub>	30-40°C	
T <sub>mold, back</sub>	20-30°C	

### PURGING INSTRUCTIONS - SULAPAC UNIVERSAL INJECTION MOLDING

BEFORE PRODUCTION	DURING PRODUCTION	AFTER PRODUCTION
<ul style="list-style-type: none"> <li>- Purge the plastification unit and, if existing, the hot runner with PP or PE.</li> <li>- To purge the plastification unit and hot runner from residual PP, PE or previous production recipes, at least 30 pieces should be produced from Sulapac material before starting the actual production.</li> <li>- The operator must ensure that the quality of the products corresponds with the reference samples.</li> </ul>	<ul style="list-style-type: none"> <li>- Material has a tendency to degrade and therefore needs a constant melt flow.</li> <li>- The condition of the mold should be regularly monitored and, if necessary, the mold should be cleaned using, e.g., a glass fiber brush or mold cleaning agents.</li> <li>- If an extensive amount of burned polymer or wood fibers start to appear in the products, purge the plastification and hot runner system with PP or PE.</li> </ul>	<ul style="list-style-type: none"> <li>- Purge the plastification unit and, if existing, the hot runner with PP or PE.</li> </ul>