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**SIMONA**

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Product Information  
PE-HWU / PE-HWST

08/95

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## **1. General information**

SIMONA® PE-HWU (black) and PE-HWST (natural) belong to the polyethylene group with high density, i. e. with a specific gravity of  $> 0,94 \text{ g/cm}^3$ . These 2 types of the material group named PE-HD (PE-High Density) show a molecular weight of about 200,000.

### **1.1 Characteristic properties**

- very tough, even at low temperatures
- low density (as compared to other materials)
- high chemical resistance
- high corrosion resistance
- good sliding properties
- anti-adhesive properties, i. e. no incrustation
- wear resistance
- long life
- physiologically acceptable
- very low water absorption
- universal application
- very good electrical isolation features
- good processing and machining characteristics

also for PE-HWU (black)

- high UV-protection

### **1.2 Application examples**

#### **Building industry**

concrete moulds  
shuttering for special concrete structures  
window frames (roof windows)  
wash-basins

#### **Apparatus, devices, machines**

suction plants  
drip pans  
battery cells  
etching baths  
pipes for chemicals  
fans

**Storage technology**

- sorting boxes
- pallets
- packing
- boxes for tools
- partitions

**Vehicle sector**

- trunk linings
- motor cycle mudflaps
- seats
- vehicle wheel arches

**Use where physiological safety is required**

- use in freezers
- staging boxes for deep-freeze companies
- linings in deep-freeze vehicles
- moulds (such as for ice cream, chocolate, cheese)
- protheses and ortheses

## 2. Production range

	<b>SIMONA® PE-HWU</b>	<b>SIMONA® PE-HWST</b>
Standard colours other colours possible	black no	natural yes
	thickness of sheets in mm	
<b>Extruded sheets</b>		
size 2000 x 1000 mm	0,5 - 50	0,5 - 30
3000 x 1500 mm	2 - 30	2 - 20
4000 x 2000 mm	6 - 25	—
<b>Pressed sheets</b>		
size 2000 x 1000 mm	10 - 200	10 - 120
4120 x 2010 mm*	15 - 80	15 - 80
	diameter in mm	
<b>Welding wires</b>		
Round wire	3 - 5	3 - 4
Triangular 90°	5 - 6	—
Three core	5	—
<b>Solid rods</b>	8 - 500	8 - 500
<b>Pipes</b>	10 - 1000	—
<b>Square pipes</b>	35 x 35 x 3 mm 50 x 50 x 4 mm	— —

\* not in stock

Other dimensions on request

Other PE-materials in the SIMONA programme:

**For the construction of apparatus which need a test mark**  
**SIMONA® PE-HWU-B**

Is produced from a moulding compound authorized by the Institut für Bautechnik (IfBt) (Institute for Construction Technics) in Berlin. Under certain qualifications it may be used in the field of tank construction requiring a test mark.

For this reason SIMONA has entered into an exterior control agreement with the Bavarian TÜV (Technical Control Authority) for the following semi-finished products: sheets, solid rods and welding wire.

**Electrically conductive**  
**SIMONA® PE-EL**

By means of a special formula a surface resistance of  $\leq 10^6$  Ohm is achieved. The material is mainly used in explosion-proof areas, in which spark formation by static charges has to be prevented.

**For nuclear technology**  
**SIMONA® PE-HWB**

The high concentration of hydrogen atoms combined with boron additives (in different concentrations) in PE provides radiation shielding. Thermal neutrons are intercepted. Examples of application: Mobile and permanent reactor installations, test rooms and laboratories.

**For the deep-draw technology**  
**SIMONA® PE-HWV**

This special type meets the extreme demands of stretching, required in deep-drawing processes, also for the use in the orthopaedic sector. For further information on the fabrication please see our product information "Vacuum Shaping, Hot Shaping, Bending".

### 3. Technical information

#### 3.1 Characteristic values of material

	Test method DIN	Dimension	SIMONA® PE-HWST	SIMONA® PE-HWU
Density, method C	53479	g/cm <sup>3</sup>	0,945	0,950
Yield stress, Test piece 3	53455	N/mm <sup>2</sup>	22	22
Elongation at yield stress	53455	%	9	9
Elongation at tear	53455	%	500	300
Tensile-E-module	53457	N/mm <sup>2</sup>	800	800
Impact strength (Std. small bar)	53453	kJ/m <sup>2</sup>	without break	without break
Impact strength when notched (U-notch)	53453	kJ/m <sup>2</sup>	13	12
Indentation hardness H 132/30	53456	N/mm <sup>2</sup>	43	40
Shore hardness D	53505	N/mm <sup>2</sup>	62	63
Crystalline melting range calorimetric	52328	K (°C)	399-403 (126-130)	
Mean coefficient of thermal expansion	53752	K <sup>-1</sup>	1,8 · 10 <sup>-4</sup>	1,8 · 10 <sup>-4</sup>
Heat conductivity*	52612	W/mK	0,38	0,38
Behaviour in fire	4102		B2	B2
Dielectric strength** Method K 20/P 50	53481	kV/mm	50	47
Volume resistivity Annular electrode	53482	Ohm · cm	>10 <sup>16</sup>	>10 <sup>16</sup>
Surface resistance Electrode A	53482	Ohm	10 <sup>14</sup>	10 <sup>14</sup>
Creep resistance Method KC	53480	V	600	600
Dielectric constant at 300-1000 Hz at 3 · 10 <sup>5</sup> Hz	53483	—	2,3 2,3	2,3 2,3
Dielectric loss factor at 300 Hz at 1000 Hz at 3 · 10 <sup>5</sup> Hz	53483	—	< 3 · 10 <sup>-4</sup> 1 · 10 <sup>-4</sup> < 3 · 10 <sup>-4</sup>	< 3 · 10 <sup>-4</sup> 5 · 10 <sup>-4</sup> < 3 · 10 <sup>-4</sup>
Physiological safety	BGA		yes***	yes

\* measured on test pieces 10 mm thick

\*\* measured on test pieces 1 mm thick

\*\*\* please ask about specific colours

The data specified here are guide values and may vary depending on the processing method and the production of test pieces. Unless specified otherwise, these are average values taken from measurements on extruded sheets 4 mm thick. This information cannot be automatically transferred to finished components. The manufacturer or user must check the suitability of our materials for a specific application.

Moulding compounds designation (DIN 16776, 12/84)

PE-HWST	natural	FM	DIN	16776-PE, EN	45	T	003/6
PE-HWST	dyed	FM	DIN	16776-PE, EC	45	T	003/6
PE-HWST	pressed	FM	DIN	16776-PE, QN	45	T	003/6
PE-HWU	dyed	FM	DIN	16776-PE, ECLH	45	T	003/6
PE-HWU	pressed	FM	DIN	16776-PE, QCLH	45	T	003/6

### **3.2 Behaviour in fire**

SIMONA® PE-HWU/HWST are normally inflammable structural materials (in accordance with DIN 4102 B2).

- Self-ignition temperature approximately 350 °C
- Oxygen index approximately 18 %  
(Minimum oxygen concentration which is necessary for combustion)

### **3.3 Behaviour in exterior use**

- SIMONA® PE-HWU, especially stabilized for exterior use
- SIMONA® PE-HWST, only destined for interior use

The life span of the product is not only due to the formula.  
Further considerations are:

- the processing procedure
- the conditions of processing
- the forming of fittings

and any resulting stresses.

For years SIMONA® PE-HWU has proved completely satisfactory for exterior use. With the addition of special carbon black (approximately 2 %) the light and weather resistance can be effectively increased and counteracts the damaging force of the UV-rays in the sunlight aided by atmospheric oxygen.

Exterior applications north of the Central Alps and below 1,500 m sea level normally permits parts constructed from PE-HWU to a life span of 10 or more years (when stress is avoided).

### **3.4 Physiological behaviour**

In accordance with BGA recommendation III (187th statement of the Federal Health Department's information leaflet 34, 1991) SIMONA® PE-HWU/HWST semi-finished products are physiologically acceptable and may be used in direct contact with food. As this recommendation is only applicable for the semi-finished products, the physiological safety of the finished part should, when required, be tested before processing begins.



### **3.5 Chemical resistance**

The non-polar characteristics of SIMONA® PE-HWU/HWST gives this thermoplastic (at temperatures of approx. 20 °C)

- a very high chemical resistance
  - against
    - salts (aqueous solutions)
    - acids (aqueous solutions)
    - alkalis (aqueous solutions)
    - alcohol
    - many solvents
  - against
    - greases
    - oils
    - waxes

In permanent contact with these mediums there can be a slight swelling reaction, which in general does not affect the use of these material.

- a limited chemical resistance (swelling reaction)
  - against
    - aromates
    - halogenated hydrocarbons
- not resistant against strong oxidation agents like
  - nitric acid
  - chromic acid
  - halogens

Especially with welded joints, there is the danger of stress cracking.

For detailed information please see our catalogue "Chemical resistance".

### **3.6 Water absorption**

Generally, SIMONA® PE-HWU/HWST only absorbs very small amounts of water, and therefore, it does not swell when stored in water.

As to the special application of extrusion welding, humidity can influence the welding result. Due to geometry (surface compared to volume) and working conditions with the extruder, already very small quantities of water are sufficient in order to deter optimal welding seams (see product information „Welding“, point 5.6 „Extrusion welding“).

### **3.7 Application range concerning temperatures**

Due to its molecular construction SIMONA® PE-HWU/HWST is very tough at a wide range of temperatures. The crystallite melting range is at 130 °C.

- Temperature of permanent use -50 to +70 °C
- Without significant mechanical stresses and up to +80 °C  
with air as environmental medium

### **3.8 Resistance to microorganisms and rodents**

SIMONA® PE-HWU/HWST will not be eroded by the following

- microorganisms
- bacteria
- fungus
- spores
- insects
- rodents

### **3.9 Aspects concerning health**

As far as its chemical composition is concerned, PE consists mainly of carbon and hydrogen. When it is burned, almost only carbon dioxide, carbon monoxide and water are produced, as well as small amounts of low-molecular parts of the corresponding plastics and carbon black.

The proportions of carbon dioxide to carbon monoxide depends on the nature of the fire — temperature, ventilation, unlimited access of atmospheric oxygen. So there are fire gases, which are similar to those of wood or stearin.

When discussing the toxicity of plastic fire gases it is often overlooked, that all gases are toxic. Therefore it cannot be said that plastics would produce especially toxic gases in the event of fire. Water is the most suitable extinguisher with regard to burning PE.

#### **4. Processing**

You will receive advice for:

- Machining
- Welding
- Thermoforming
- Bonding

by means of separated product information. Please contact us.

#### **5. Advice**

Our Sales Department and Technical Application Department are experienced in the use and processing of thermoplastic semi-finished products. We look forward to assisting you.

**CEE-Safety Data Sheet** according to 91/155/EWG

Page 1 of 2

Trade name: **SIMONA® PE-HWU / PE-HWU-B / PE-HD pipe**

11/2000

**1. Indications to the manufacturer**

SIMONA AG  
Teichweg 16  
D-55606 Kirn

Phone (0 67 52) 14-0  
Fax (0 67 52) 14-211

**2. Composition / Indications to components**

Chemical characteristics: polymer of ethylene  
CAS-number: not necessary

**3. Possible dangers**

unknown

**4. First-aid measures**

General comment: medical aid is not necessary

**5. Fire-fighting measures**

Suitable fire-fighting appliance: water fog, foam, fire fighting powder, carbon dioxide

**6. Measures in case of unintended release**

not applicable

**7. Handling and storage**

Handling: no special regulations must be observed  
Storage: unlimited good storage property

**8. Limitation of exposition**

Personal protective equipment: not necessary

**9. Physical and chemical characteristics**Phenotype:

form: semi-finished product  
colour: black  
smell: not distinguishable

Change of state:

crystallite melting point: 126 - 130 °C  
fire point: not applicable  
inflammation temperature: appr. 350 °C  
(value indicated in literature)  
density: 0.95 g/cm<sup>3</sup>

**CEE-Safety Data Sheet** according to 91/155/EWG

Page 2 of 2

Trade name: **SIMONA® PE-HWU / PE-HWU-B / PE-HD pipe**

11/2000

**10. Stability and reactivity**

Thermal decomposition: above appr. 300 °C

Dangerous decomposition products:

Besides carbon black also carbon dioxide and water as well as low molecular parts of PE will develop during the burning process. In case of incomplete burning also carbon monoxide may arise.

**11. Toxic indications**

During several years of usage no effects being harmful for the health were observed.

**12. Ecological indications**

No biodegradation, no solubility in water, no effects being harmful to the environment must be expected.

**13. Waste-disposal indications**

Can be recycled or can be disposed of together with household rubbish (acc. to local regulations).

Waste key for the unused product: EAK-Code 120 105

Waste name: waste of polyolefine

**14. Transport indications**

No dangerous product in respect to / according to transport regulations

**15. Instructions**

Marking according to GefStoffV/EG: no obligation for marking

Water danger class: class 0 (self classification)

**16. Further indications**

The indications are based on our today's knowledge.

They are meant to describe our products in respect to safety requirements. They do not represent any guarantee of the described product in the sense of the legal guarantee regulations.

**CEE-Safety Data Sheet** according to 91/155/EWG

Page 1 of 2

Trade name: **SIMONA® PE-HWST / PE-HWV / PE-HWVM /  
SIMONA® 2000 / PE-HML 500 / PE-HMG 1000**

11/2000

**1. Indications to the manufacturer**

SIMONA AG  
Teichweg 16  
D-55606 Kirn

Phone (0 67 52) 14-0  
Fax (0 67 52) 14-211

**2. Composition / Indications to components**

Chemical characteristics: polymer of ethylene  
CAS-number: not necessary

**3. Possible dangers**

unknown

**4. First-aid measures**

General comment: medical aid is not necessary

**5. Fire-fighting measures**

Suitable fire-fighting appliance: water fog, foam, fire fighting powder, carbon dioxide

**6. Measures in case of unintended release**

not applicable

**7. Handling and storage**

Handling: no special regulations must be observed

Storage: unlimited good storage property

**8. Limitation of exposition**

Personal protective equipment: not necessary

**9. Physical and chemical characteristics**Phenotype:

form: semi-finished product  
colour: different  
smell: not distinguishable

Change of state:

crystallite melting point:  
fire point:  
inflammation temperature:

126 - 130 °C  
not applicable  
appr. 350 °C  
(value indicated in literature)  
0.94 - 0.95 g/cm<sup>3</sup>

density:

**CEE-Safety Data Sheet** according to 91/155/EWG

Page 2 of 2

Trade name: **SIMONA® PE-HWST / PE-HWV / PE-HWVM /  
SIMONA® 2000 / PE-HML 500 / PE-HMG 1000**

11/2000

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Thermal decomposition: above appr. 300 °C

Dangerous decomposition products:

Besides carbon black also carbon dioxide and water as well as low molecular parts of PE will develop during the burning process. In case of incomplete burning also carbon monoxide may arise.

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During several years of usage no effects being harmful for the health were observed.

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