SIMONA

Product Information
PE-HWU / PE-HWST

08/95

SIMONA

Contents

10/94 d
8/95 e
This product information replaces all former editions.

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 g/cm³. 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
staking boxes for deep-freeze companies
linings in deep-freeze vehicles
moulds (such as for ice cream, chocolate, cheese)
protheses and ortheses

2. Production range

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

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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^3	0,945	0,950
Yield stress, Test piece 3	53455	N/mm^2	22	22
Elongation at yield stress	53455	%	9	9
Elongation at tear	53455	%	500	300
Tensile-E-module	53457	N/mm^2	800	800
Impact strength (Std. small bar)	53453	kJ/m^2	without break	without break
Impact strength when notched (U-notch)	53453	kJ/m^2	13	12
Indentation hardness H 132/30	53456	N/mm^2	43	40
Shore hardness D	53505	N/mm^2	62	63
Crystalline melting range calorimetric	52328	K (°C)	399-403 (126-130)	
Mean coefficient of thermal expansion	53752	K^{-1}	$1{,}8 \cdot 10^{-4}$	$1{,}8 \cdot 10^{-4}$
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	$>10^{16}$	$>10^{16}$
Surface resistance Electrode A	53482	Ohm	10^{14}	10^{14}
Creep resistance Method KC	53480	V	600	600
Dielectric constant	53483	—		
at 300-1000 Hz			2,3	2,3
at $3 \cdot 10^5$ Hz			2,3	2,3
Dielectric loss factor	53483	—		
at 300 Hz			$< 3 \cdot 10^{-4}$	$< 3 \cdot 10^{-4}$
at 1000 Hz			$1 \cdot 10^{-4}$	$5 \cdot 10^{-4}$
at $3 \cdot 10^5$ Hz			$< 3 \cdot 10^{-4}$	$< 3 \cdot 10^{-4}$
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 with air as environmental medium up to +80 °C

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 chemial 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.

SIMONA

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

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:		Change of state:	
form:	semi-finished product	crystallite melting point:	126 - 130 °C
colour:	black	fire point:	not applicable
smell:	not distinguishable	inflammation temperature:	appr. 350 °C (value indicated in literature)
		density:	0.95 g/cm³

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.

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11. Toxic indications

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

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12. Ecological indications

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

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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

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14. Transport indications

No dangerous product in respect to / according to transport regulations

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15. Instructions

Marking according to GefStoffV/EG: no obligation for marking
Water danger class: class 0 (self classification)

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16. Further indications

The indications are based on our todays 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.

SIMONA

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

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

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:		Change of state:	
form:	semi-finished product	crystallite melting point:	126 - 130 °C
colour:	different	fire point:	not applicable
smell:	not distinguishable	inflammation temperature:	appr. 350 °C (value indicated in literature)
		density:	0.94 - 0.95 g/cm³

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.

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