



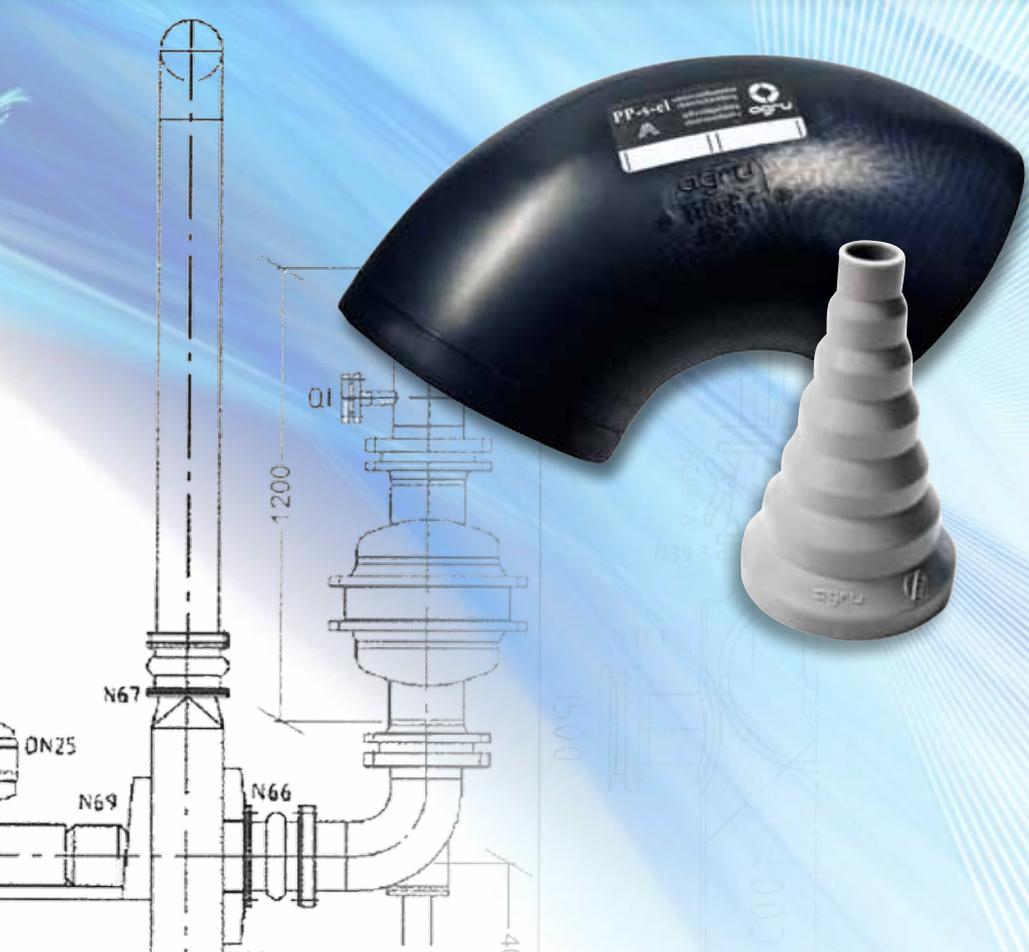
# MODIFIED MATERIALS IN HDPE AND PP

FOR SPECIAL APPLICATIONS



**agru**

Worldwide Competence  
in Plastics



## Worldwide Competence in Plastics

AGRU Kunststofftechnik GmbH is a family-owned, highly productive enterprise headquartered in Austria with worldwide activities. These include the production and sales of high-quality thermoplastic polymer products.

The INDUSTRIAL PIPING SYSTEMS product group offers a wide range of pipes, fittings, valves and special components for the transport of aggressive media. To fulfill the requirements of the different operating conditions in the field of industrial applications AGRU manufactures products made of various thermoplastic materials such as PE, PP, PVDF and ECTFE to offer technical solutions for each application.

## PE, PP SPECIAL TYPES

### HDPE-el

(High Density Polyethylene, electro conductive)

HDPE-el is a material which can discharge electrical charges due to the addition of conductive particles (special carbon black).

Because of the carbon black in the material this PE type is stabilised against UV radiation and therefore can be used for outdoor applications.

HDPE-el is a modified polyethylene, which due to the particular electrical properties, can be used for the transport of flammable media, powders or dust, as these piping systems can be grounded.

HDPE-el can be used in areas with the risk of starting sparking caused by electrostatic charges.



## PPs

(Polypropylene, self extinguishing)

PPs is a PP homo polymer (PP-H), which contains flame retardants. These additives decelerate or hinder the flame propagation. Flame retardants and materials containing flame retardants are used in applications with potential ignition sources.

Due to the addition of these special additives PPs is classified as a material with higher flame resistance in the relevant standards (DIN 4102, UL94). PPs is not recommended for outdoor applications, as it is not stabilised against UV radiation.

For outdoor applications, PPs components must be protected (e.g. protective coat). Pipes made from PPs are characterised by a high stiffness and are very suitable for exhaust and ventilation applications and for chimney systems.



## FOR SPECIAL APPLICATIONS



## PPs-el

(Polypropylene, self extinguishing, electro conductive)

PPs-el is polypropylene copolymer (PP-R). It combines the special properties of flame resistant and electrically conductive PP grades. PPs-el is an electrically dissipative polypropylene with flame retardant additives. Products made from this material are especially used for the transportation of easy flammable media and can often replace expensive stainless steel pipes.

Due to the carbon black PPs-el can be used for outdoor applications.



## Dissipative properties (HDPE el, PPs-el)

As described in the relevant standards, such as in the EN 13463-1, an electrostatic charge is avoided, provided that the specific surface resistance is  $<10.9$  ohms.

Pipes, fittings and semi-finished products of AGRU Kunststofftechnik made from the electro conductive polyethylene (PE-el) and flame retardant, electro conductive PP(PPs-el) are products without potential ignition energy and are suitable for use in areas with hazardous explosive atmosphere in critical zones due to the low surface resistance ( $<10^6 \Omega$ ).

Electro conductive plastics offer optimum chemical and corrosion resistance with additionally antistatic properties which in many areas are an excellent alternative to steel pipes.

Products from the electrically conductive materials must be grounded in order to dissipate an electrostatic charge.



## Classification of hazardous areas

### Gase

<p><b>Zone 0</b> is an area with an explosive atmosphere consisting of a mixture of air and flammable gases and vapours (for long periods or only frequently).</p>	<p><b>Zone 1</b> is an area, in which during normal operation an explosive atmosphere as a mixture of air and flammable gases and vapour may develop at times</p>	<p><b>Zone 2</b> is an area, in which under normal operation conditions a dangerous explosive atmosphere as a mixture of air and flammable gases and vapours is not normal, occurs only briefly</p>
--	---	---

## PE, PP SPECIAL TYPES



### Use of HDPE-el and PPs el in potentially explosive areas (ATEX zones)

The term ATEX is derived from the French abbreviation for ATmosphère EXplosive.

The directive currently covers two guidelines in the field of explosion protection, namely the ATEX Directive 94/9/EC and the ATEX Workplace Directive 1999/92/EC.

The ATEX Directive 94/9/EC of the European Parliament defines the guidelines for the responsible use of the products („market“), which are used in hazardous areas.

The ATEX Workplace Directive 1999/92/EC defines the minimum requirements for improving the safety and health protection of workers potentially at risk from explosive atmospheres.

### Dust

<p><b>Zone 20</b> is an area with a permanent explosive atmosphere in form of a cloud of combustible dusts in the air (for long periods or frequently)</p>	<p><b>Zone 21</b> is an area, in which during normal operation an explosive atmosphere in the form of a cloud of a combustible dust in the air may develop at times</p>	<p><b>Zone 22</b> is an area, in which under normal operation a potentially explosive atmosphere in form of a cloud of a combustible dust in air is not normal, occur or only briefly</p>
--	---	---

The directive defines essential safety requirements, that have to be implemented by the operators and employers.

**Among these security requirements:**

- Prevent or reduce the development of an explosive atmosphere (primary explosion protection)
- Prevention of ignition sources (secondary explosion protection)
- Limitation of the effect of a possible explosion to non hazardous level (tertiary or constructive measures)

Employers have to make (as part of their risk assessment) an explosion protection document and classify areas with hazardous explosive atmosphere in different zones.

# PROPERTIES



## Flammability (PPs and PPs-el)

All polypropylenes without the addition of flame retardants are classified as flammable materials (B2 according to DIN 4102), which means that a flame spreads, even if the cause of the fire is absent or removed.

Due to the adding of flame retardants PPs and PPs-el have self-extinguishing properties.

## Storage and Transport

For products made of electro conductive materials a storage in dry conditions highly recommended, as they are due to the increased percentage of carbon black hygroscopic materials.

During transport impact load, bending stresses and temperatures <0 °C must be avoided.

### Brandschutzklassen:

Standard	PPs	PPs-el
DIN 4102 (part 1)	B1 (for wall thickness >2 mm)	B1
EN 13501	E (d2)	
UL 94	V2	V0

B1: Flammable building material, but classified as flame retardant  
E (d2): Flammable building material, but classified as a flame retardant  
V2: Extinction of a vertically clamped test within 30 seconds  
V0: Extinction of a vertically clamped sample within 10 seconds, no flaming droplets





## Mechanical properties and chemical resistance of the products made of special materials



The flame retardants and the carbon black have an influence on the mechanical, thermal and chemical properties. They are different from those of the standard polyolefins. Due to the modified mechanical properties of special materials additional safety factors for the dimensioning of the maximum permitted inside and buckling pressure have to be used. Concerning the maximum permitted working pressure and the support distances for the special pipes it is recommended to contact the technical department of AGRU to clarify the technical requirements.



The additives also have an influence on the chemical properties of the special materials (for instance swelling media have a stronger influence on the special types of PE and PP), due to this fact the suitability for chemical applications has always to be checked with the technical department of the company AGRU.

## PE, PP SPECIAL TYPES



### Physiological properties of special materials

HDPE and PP materials with flame retardants and electro conductive particles (carbon black) are considered as inactive regarding toxicological and dermatological aspects, thus harmless.

During the heating of materials (for example, during the welding process according to the DVS guidelines) no harmful fumes develop.

The special materials HDPE-el, PPs and PPs-el are not in compliance with the relevant guidelines/directives for the use in the food industry. Pipes, fittings and semi-finished products the modified materials are not suitable for applications with direct food contact.



## Quality

In course of the internal quality control and the external controls by state authorised testing institutes (TÜV, LKT-TGM, IIP. etc) a constant high quality of pipes, fittings and semi-finished products produced by AGRU is guaranteed.

## Applications

- Industrial piping systems for the transport of flammable chemical media
- Suction and exhaust lines, transport of solids
- Piping systems and vessels/tanks in explosion protected areas
- Lining of containers and tanks
- Ventilation systems
- Pipes in the mining industry



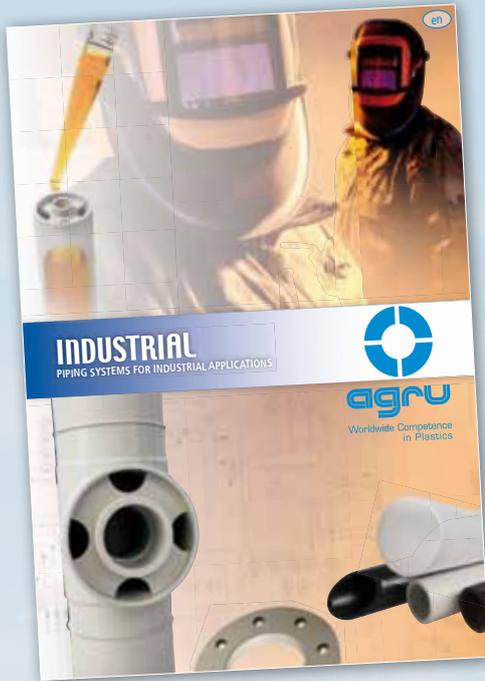
# SUPPLY PROGRAMME



## Supply programme for pipes, fittings and semi finished products

Description	PPs	PPs-el	HDPE-el
Pipes	Ventilation, SDR41, SDR33, SDR11	Ventilation, SDR33, SDR17, SDR11	SDR33, SDR17, SDR11
Fittings	SDR33, SDR11	SDR33, SDR17, SDR11	SDR17, SDR11
Thickness of the sheets	3-40 mm	3-20 mm	3-60 mm
Round bars	Ø 20-100 mm	Ø 20-80 mm	Ø 50-160 mm
Welding rod	Ø 3 mm	Ø 3 mm	Ø 3 mm





# INDUSTRIAL PIPING SYSTEMS

Piping systems for industrial applications

- High operation reliability
- Good long-term pressure resistance
- No corrosion / resistant to chemicals
- Sustainable solutions



## INDUSTRIAL PIPING SYSTEMS PIPING SYSTEMS FOR INDUSTRIAL APPLICATIONS

Y21004020413 0,5 GUT

Subject to errors of typesetting, misprints and modifications.  
Pictures are partly reference photos.

Your distributor:



**AGRU Kunststofftechnik GmbH**

Ing. Pesendorfer-Straße 31

A - 4540 Bad Hall

T +43 (0) 7258 790 - 0

F +43 (0) 7258 3863

office@agru.at

www.agru.at