



# Safety Document

## KUBE PIR Plastics: Material Safety Data Sheet

Granulates for molding of Passive-Infrared-Lenses,  
Types

20490, 21820, 21820a, 21821, 21821a, 21821c, 22300,  
22302, 22310, 22312, 22378, 22380, 22400, 22400a,  
22400b, 22401, 22402, 22403, 22404, 22405, 22414,  
30302, 40253, 40700, 40702, 40703, 40704

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## 1 DESIGNATION OF MATERIALS AND COMPANY

Trade names:	KUBE PIR Plastics
Designation:	20490, 21820, 21820a, 21821, 21821a, 22300, 22302, 22310, 22312, 22378, 22380, 22400, 22400a, 22401, 22402, 22403, 22404, 22405, 22414, 30302, 40253, 40700, 40703
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## 2 COMPOSITION

Trivial name:	High Density Polyethylene (HDPE) as Granulate
Chem. Characterization:	Polyolefine
IUPAC designation:	Ethan Ethen-buten –1 Copolymer Ethen-hexen –1 Copolymer with small amounts of antioxidation agents, UV-additives and, depending on the type, inert pigments with a content of up to 5%.

(International Union of Pure and Applied Chemistry)

## 3 POTENTIAL HAZARDS

### 3.1 Toxicity

HDPE is not chemically reactive and is generally considered to be biologically inert.

### 3.2 Inhalation

#### 3.2.1 Generation of gases and smoke

HDPE does not generate harmful gases at room temperature.

#### 3.2.2 Powder Form

If KUBE Plastics are processed into powder form they do not represent a danger by themselves. However, when handling these powders, all measures should be taken to keep the particle content in the air as low as possible by means of efficient work methods and sufficient ventilation. During work, the general upper particle limit of  $6\text{mg}/\text{m}^3$  should not be exceeded (maximum concentration at the work bench, maximum exposure limit MEL).



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### 3.3 Swallow

Swallowing of HDPE is to be avoided even though the material is inert and can be considered as harmless. However, some types contain additives which could show a hazardous effect if swallowed.

### 3.4 Skin and Eye Contact

It is not known that HDPE leads to skin irritation. However, uneven and hard particles can show an emery effect on the skin, specially in the case of powder. Powder particles can lead to irritation if they get into the eyes.

### 3.5 Fire, Ignition and Burning Characteristics

If HDPE is heated up in free air, the melting point is at 130-135°C, and decomposition takes place at about 300°C. If this temperature is exceeded, HDPE oxydizes and disintegrates into carbon monoxide, water and small amounts of aldehydes and other carbon hydrogens.

The gases released are flammable and produce heat which accelerates further decomposition of Polyethylene or other combustible materials in the close vicinity. As a consequence, carbonizing may take place, and part of the carbon may be released as soot. In case of flames, the major combustion product is carbon dioxide. But, at a lack of oxigene or if the flames get extinguished, the smoke can contain seizable amounts of carbon monoxide, acroeline or other aldehydes. This sequence corresponds to that of wood or other cellulose products. In addition, during the fire, molten and burning drops of Polymer can be released which, in turn, can ignit adjacent inflammable materials.

These statements just are of general nature because the conditions at the occurence of a fire can not be predicted precisely. They depend on numerous factors like fire location, amount of oxigene available, and the presence of other inflammable materials.

### 3.6 Dust Generation

KUBE Plastics are being sold in granulate form. During handling of HDPE granulate or processing into powder, adequate precautions are appropriate because there is a danger of dust explosion. The level of hazard is comparable to the risk which exists with other inflammable dusts and heavily depends on the particle size distribution. The danger is increased with decreasing particle sizes.

Special care is advisable in case of extensive processing and all work during which powder gets mixed with air or a cloud of dust is generated. Examples are pneumatic conveyance, bulk containers and feeding hoppers. The fine dust generated can float in the air for some time after. The separation of material from air in a bag filter may constitute a special hazard. Metal parts which are not grounded or non-conducting elements which can initiate an electrostatic spark-over should not be used. If there is a danger of fire or explosion, dedicated equipment is normally protected by means of overpressure relief valves etc. Such equipment is designed according to the regulations related to the handling of hazardous powders and dusts. It is to be noted that any accumulation of powder can lead to a cloud of dust which must be prevented because this would constitute a latent feed for a secondary explosion. During simple working cycles like filling of extruders and feeding hoppers, the main measure is preventing the accumulation of spilled powder.



## **4 RECOMMENDED SAFETY PRECAUTIONS FOR TRANSPORT, PROCESSING AND STORAGE**

### **4.1 Health and Hygiene**

#### **4.1.1 Granulate**

During processing, KUBE granulates do not represent a special danger.

#### **4.1.2 Work and storage area**

The whole storage and working area should be kept clean and tidy. Spilled material lying on the floor, specially granulate, must be cleaned away immediately because there is a danger of slipping when walking around. HDPE granules are small, roundish and slippery. Therefore, keeping the working area clean prevents from the risk of tumbling.

#### **4.1.3 Material processing**

Processing systems should be designed in a way such that the generation of dust is kept to an absolute minimum. Wearing a protection mask and glasses is recommended when doing milling, grinding, chipping or granulating work (see powder form) or if the particle concentration in the air approaches the OES limits (Occupational Exposure Standards).

#### **4.1.4 Ventilation**

Sufficient forced ventilation is a significant factor with regards to reduction of emitted dust and gases. An efficient exhaust of the air from the vicinity of the processing equipment will further help.

#### **4.1.5 Skin contact**

Direct contact with HDPE material normally does not lead to skin irritation. Nevertheless, the common precaution measures must be respected. Employees who have experienced skin complaints or allergies in the past should undergo a medical examination prior to perform a work implying direct skin contact. Suitable washing facilities with skin-friendly soap and hand paste must be present at all working areas. Do not use solvents to clean the skin.

#### **4.1.6 Smoking, eating, drinking**

Smoking, eating and drinking in the working areas is not desirable and should be forbidden.

#### **4.1.7 Warning instructions and safety equipment**

At all places of work, warning signs must be present. They must be clearly visible and show the recommended precaution measures. Personal protection equipment like glasses, gloves and dust masks should be available in sufficient quantities. The staff involved must get adequate instructions concerning the use of protective equipment (see regulations on hazardous materials).



## 4.2 Behavior in case of fire in the presence of Polyethylene

In case of a fire and in the presence of HDPE material, all standard fire-extinguishers can be used. Powder fire-extinguishers are very efficient to fight against the flames, but they do not show the power to cool down hidden flames and hot spots. Water sprayers are very efficient in fast cooling and damming the fire, however, the use of a water stream jet is not recommended in an early stage of a fire because the flames will be distributed even more widely. In certain situations, specific types of fire-extinguishers must not be used. For example, never use water in the presence of live electrical equipment.

In general, the local fire fighters can give advice concerning suitable extinguishing equipment and methods.

It is not likely that only HDPE alone is present at a fire location. Other materials can present different hazards. Do not inhale smoke or gases. The persons who are fighting the fire should wear autonomous respirators. In case of injuries, qualified medical help must be obtained.

## 4.3 Explosion

When handling HDPE, specially in the form or powder, there exists the danger of dust explosions. Therefore, sufficient precaution measures should be set up.

## 4.4 Storage

KUBE HDPE in granulate form is normally supplied in plastic bags. Indoor storage in unheated rooms is preferred, ideally with natural ventilation. Palletts must be piled up correctly, otherwise they can get out of place, fall down and cause injuries to persons. Regular inspection of the stocks is recommended.

# 5 ADDITIONAL RECOMMENDED SAFETY PRECAUTIONS AT PROCESSING

## 5.1 Effect of heat

KUBE HDPE is intended for the use in molding machines. At about 225°C, a gradually increasing generation of gas and smoke in small quantities is observed. At about 300°C, decomposition and oxydation come in. Above that temperature, the oxydation heat leads to a sudden temperature rise which accelerates decomposition. Under these circumstances, hazardous substances can be generated: Carbon Monoxide (30ppm MEL, 50ppm OES), Formaldehyde (max 0.5ppm MEL, 1ppm TLV (Threshold Limit Value)) and Acroleine (0.1ppm MEL, peak limit Cat.1, 0.1ppm OES).

The self ignition temperature of HDPE is around 350°C, measured according ASTM D 1929-77 (American Society for Testing and Materials). This is a laboratory test, the result of which greatly depends on the instrument used. It is not known to what extent conclusions may be drawn from this measurement with regards to a real fire situation. Normal processing should not cause any problems. However, at full operating temperature, the equipment filled with HDPE should not stand still for more than one minute.



## 5.2 Ventilation

As mentioned in the above paragraph, small amounts of smoke containing Carbon Monoxide and Aldehydes can be generated at high processing temperatures. In addition, with certain granulate types, decomposition gases can be generated. They have their origin in antioxidant or stabilizing agents.

For safe working conditions, an adequate ventilation system must be installed with regards to the following processes: melting of HDPE, cutting or pulverizing of solid Polymer, deflagrating at machine parts like feeder screws and nozzles. The contamination in the air should not exceed the concentration limit as recommended by HSE (1) (British Health and Safety Executive), ACGIH (1) MEL-List (American Conference of Governmental Industrial Hygienists), or publications by other national authorities.

## 5.3 Protective clothes

When handling HDPE it is recommended to consider extensive industrial hygiene measures. Protective clothes including gloves, glasses and filter masks should be at hand as required, specially in areas where powder processing takes place.

## 5.4 Handling of molten material

At skin contact, molten HDPE causes severe burnings and keeps strongly clinged to the skin. Burnings represent the most frequent accidents when processing molds of thermoplast materials. Therefore it is urged to use extreme caution. Gloves and face protection must be worn when working with hot material or if there is a risk of splashes. These can occur when emptying extruders or injection mold machines, or putting them into operation. Polymers show a low thermal conductivity. Therefore, while cooling down, the material may still be hot inside and can cause burnings. Because of that, after emptying a machine, the plastics must be handled with caution. In addition, if the initial melting temperature was very high, decomposition may take place, followed by the generation of inflammable gases.

## 5.5 Additional precautions

### 5.5.1 Processing and handling at room temperature

Observe the provisions given in "Health and Hygiene".

### 5.5.2 Cut and granulate

When doing cutting or granulating work, gloves, glasses and dust masks must be worn. Prevent any accumulation of dust and keep an eye on order, discipline and tidiness.

## 6 RECOMMENDED FIRST AID

### 6.1 Eye contact

Immediately rinse the eyes with plenty of water for at least 10 minutes, while keeping the eyes opened. In case of continuing irritation and redding, call for medical help.



## 6.2 Skin contact

Powder/Granulate: wash with soap and water. Dirty clothes should be washed or dry cleaned prior to the next use.

Molten Material: immediately rinse the skin region affected with water to cool down the molten Polymer. Do NOT try to remove the molten or solidified material from the skin, but rather get medical help.

## 6.3 Swallow of the product

Wash the mouth with water and get medical help.

## 6.4 Inhalation of gases / smoke

Immediately go outside to breath fresh air. Keep warm and calm. In case of difficulty of breathing, inhale oxygen. If you suffer from discontinued breath or similar indications, artificial respiration must be applied. Call for immediate medical help.

### Comment

The rescue staff must fully get informed about the character of the material involved and the possible thermal decomposition products.

# 7 KUBE PLASTICS AND THE ENVIRONMENT

At the end of their life cycle, KUBE Plastics can be recycled, burned to generate energy, or disposed of as waste.

For quality reasons, we do not recommend to re-use the material for PIR lenses or optical parts. However, it can be used as a base material for many less demanding applications, alone or mixed with other types of HDPE.

When burned in a well controlled and efficient incinerator, KUBE Plastics, thanks to their large energy contents, can help the burning of other waste. Such incinerators should be coupled to heating or energy recovery systems.

Waste dumps certainly are not the best way to dispose of any technical materials.

However, HDPE will not get disintegrated, does not build hollow spaces, does not generate hazardous gases and does not contribute to ground water pollution.

The composition of the pigments used in KUBE plastics is similar to the types used in common packing and household articles. As a rule, products like PIR lenses or windows are made of just a few grams of KUBE plastics and normally can get disposed of together with the household waste (the IR characteristics are controlled not only by the chemical substances, but also by the particle size distribution).

Ashes resulting from the incineration of large amounts of pigmented material must be treated according to special waste regulations.

The packing bags are made of LDPE and can be recycled. Except for palletts, packing material is not taken back by KUBE.



## **8 UTILIZATION IN MEDICAL EQUIPMENT AND FOOD CONTACT**

Special KUBE plastics types are available for applications in medical systems like respiration analyzers or glucose testers, and in situations of direct skin or food contact. In such case, the prior written consent of KUBE is required. No liability can be claimed following damages, losses or injuries which result from not getting a consent or not considering given information or additional recommendations.

## **9 MATERIALS OF OTHER SUPPLIERS**

When using KUBE plastics in combination with third party materials, the customer is obliged to get all technical data concerning every type involved. KUBE cannot be made liable in case of problems resulting from mixed material applications.

## **10 LIABILITY**

The information given in that paper is compiled according to best knowledge and represents the know-how of the producer. It does not imply any assurance of product properties.

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