

## 2. Technical Data

### 2.1. Prerequisites and initial data of PET-chips

#### 2.1.1. Process Equipment

The guarantee specifications contained in this appendix are subject to the provision that all equipment shall be delivered by BUHLER, or, if purchased locally by the Buyer, shall be in accordance with BUHLER's specification.

BUHLER has the right to inspect such equipment. Appropriate storing of the delivered equipment until the installation has to be provided by the Buyer.

#### 2.1.2. Production Plant and Laboratories

BUHLER's personnel has unrestricted admittance to the plant under construction and for the total period of time from the preparation of start-up until the complete acceptance of the plant by the Buyer.

BUHLER's personnel may also enter those laboratories of the Buyer, where the precursor material and the final product is analysed. During the time period of commissioning the plant, BUHLER shall receive all the test results concerning polymer chips from the SSP plant.

#### 2.1.3. Energies and Utilities

For the start-up period and the test run the Buyer shall provide energies and utilities conforming to BUHLER's specifications (see corresponding technical section of the contract).

#### 2.1.4. Personnel and Spare Parts

To ensure a trouble-free commissioning and operation of the plant, the required qualified personnel must be available timely before start-up.

The Supplier will make available the necessary parts to allow for a smooth execution of the test run.

## 2.4. Guarantee for capacity and raw material consumption

### Capacity

The plant is designed for a production of

60 t/day = 2'500 kg/hour

bottle grade PET pellets with a final intrinsic viscosity of min. 0.78 dl/g.

### Raw Material Consumption

For the production of 1.000 kg bottle grade chips the consumption of amorphous raw material will not exceed 1.015 kg material in the steady state. Humidity content of the raw material is max. 0.5%.

The loss of 0.015 kg/kg includes the incoming dust (which is removed significantly in the fluidised bed), the removal of acetaldehyde, the split off of ethylene glycol by the polycondensation reaction as well as the sublimation of oligomers and the evaporation of water.

## 2.5. Utilities - Specifications, Consumption

### 2.5.1. Electrical power

Power voltage:	380 V AC $\pm$ 10%
Frequency:	50 Hz
Phases:	3 PEN + neutral is ground
Control voltage:	220 V AC / 50 Hz
Lamp voltage:	24 V DC
Signals:	4-20 mA

#### Electrical motors

Installed:	275 kW
Consumption:	195 kW

Control system: approx. 10 kW

#### Electrical heaters

Installed:	550 kW
Consumption:	380 kW

Moc zainstalowana 925kW + 10kW + 10kW *oswiadczenie potrz. instalacje*

### 2.3. Guarantee for PET bottle grade chips (final data)

Viscosity

mean value (I.V.)	min. 0.78 dl/g (at nominal capacity)
variance (s.d.)	max. 0.020 dl/g (excluding amorphous chips variance)

Acetaldehyde content

max. 1.5 ppm by weight  
(for a viscosity enhancement of min. 0.20 dl/g I.V. units)

Colour

b* (with light type D65/10)	max. 2.0
(for a viscosity enhancement of 0.20 dl/g I.V. units)	

Temperature after Cooler

max. 60°C

Carboxyl groups

content	max 26 mmol/kg
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Dust content

max. 100 ppm by weight

Agglomerates (multiple pellets)

max. 1% by weight  
(plus agglomerates already present in feed material)

## 2.2. Raw Material (PET bottle grade precursor, amorphous)

For the start-up period and the test run, the Buyer shall provide PET bottle grade precursor chips conforming to the following specifications.

### Polymer

Polyethyleneterephthalate (PET) based Copolyester

### Pellets geometry

oval shape

range for average dimensions:

- length	approx. 2.5 mm
- diameter (oval)	approx. 3.0...2.0 mm
- size variance (SD)	max. 0.25 mm

### Density

material density approx.	approx. 1335 kg/m <sup>3</sup>
bulk density	approx. 800...920 kg/m <sup>3</sup>

### Melting point

DSC peak temperature	min. 257 °C
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(differential scanning calorimetry at a rate of 10 deg.C/min.)

### Glass Transition point

DSC midpoint	min. 75°C
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### Viscosity (Buhler Method)

range for mean value (I.V.)	0.615 dl/g
standard deviation (3 s.d.)	max. 0.010 dl/g

<u>Acetaldehyde content</u>	max. 100 ppm by weight
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### Colour

b* (with light type D65/10)	max. 0.5
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<u>Carboxyl end groups</u>	max. 35 mmol/kg
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<u>Dust content</u>	max. 300 ppm by weight
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### Feed conditions to crystalliser

moisture content	max. 0.5 % by weight water
temperature	min. 20°C                      max. 50°C

### Ambient temperature

minimum	10°C
maximum	25°C (pellet cooler air inlet)

### 2.5.2. Cooling water

Pressure:	min. 5 bar gauge
Consumption:	7.6 kg/s
Max. consumption:	10 kg/s
Water temperature in:	30°C
Water temperature out:	37°C

### 2.5.3. Nitrogen ( 99.5 % )

Pressure:	min. 4.5 bar gauge
Temperature:	ambient
Dew point:	approx. -20°C
Consumption in operation:	20 Nm <sup>3</sup> /h (max. 30 Nm <sup>3</sup> /min)

### 2.5.4. Instrument air

Pressure:	min. 4.5 bar gauge
Temperature:	ambient
Dew point:	approx. -20°C

#### Pt-Catalyst

Consumption in operation:	11 Nm <sup>3</sup> /h
Consumption max.:	13 Nm <sup>3</sup> /h

#### Conveying Group 500

Capacity PET pellets:	2.5 t/h
Consumption, normal operation:	130 Nm <sup>3</sup> /min

#### Conveying Group 700

Capacity PET pellets:	2.5 t/h
Consumption, normal operation:	130 Nm <sup>3</sup> /min