

TECHNICAL TASK
for procurement of new equipment (SSP - batch reactor
for solid-state postcondensation of PA66 (PA6) chips)

1. General information

1.1. Information on the customer

JSC "Grodno Azot", legal address: prospect Kosmonavtov, 100, 230013 Grodno.

1.2. Purpose of the equipment, spare parts, installation site

Purpose of the equipment.

SSP- batch reactor for solid-state postcondensation of PA66 (PA6) chips):

- production of high-viscosity PA 66 chips with relative viscosity

$\eta = (3,30 - 3,40)$ rel. units from low-viscosity PA 66 chips with relative viscosity

$\eta = (2,50 - 2,70)$ rel. units using solid-state postcondensation stage followed by

processing of high-viscosity PA 66 chips into a new type of products – PA 66 industrial high-tenacity yarn to manufacture PA 66 cord dipped fabrics.

- production of high-viscosity PA 6 chips with relative viscosity

$\eta = (3,70 - 3,80)$ rel. units for making films from own-produced high-viscosity PA

6 chips with relative viscosity $\eta = (3,25 - 3,40)$ rel. units. Installation site – Industrial

Yarn and Cord Fabric Production Facilities, Spinning Workshop of Branch

“Khimvolokno Plant” JSC "Grodno Azot" (more detailed site for equipment layout

with binding to the existing building will be determined after submission of equipment overall dimensions and weight by a supplier of equipment).

1.3. Purpose of procurement

Ensure reducing the production cost of PA 66 cord dipped fabrics, increase the use of existing manufacturing capacities, ensure new product production – of high-viscosity PA 6 chips for making films as well as new jobs creation.

2. Technical specifications

2.1. Technical specifications of the equipment, spare parts.

Capacity of SSP- batch reactor for solid-state postcondensation of PA66 (PA6) chips is minimum 5400 t/year.

Operating conditions: uninterrupted two-shift four-brigade schedule (working hours of shift - 12 h).

2.2. Medium, operating parameters

Medium name –PA 66 (PA 6) chips.

Operating parameters – technological parameters of solid-state postcondensation of PA66 (PA6) chips are determined by the equipment supplier.

2.3. Other data

2.3.1 Quality parameters of low-viscosity PA 66 chips (chips at SSP- reactor inlet):

Required Testing Parameters	Technical parameters with tolerance limits
Appearance	undyed granules
Granule size, mm	2,0 × 2,5 × 3,0
Relative viscosity, rel. units	(2,50 - 2,70) ± 0,05
Moisture content, %, max	0,5
Weight of granules, g/100	1,7 - 2,1
Melting point, °C	258 - 262
Ash, %, max	0,2
Black inclusions, pcs/1000 g, max	10

2.3.2 Quality parameters of high-viscosity PA 66 chips (chips at SSP- reactor outlet):

Required Testing Parameters	Technical parameters with tolerance limits
Appearance	undyed granules
Granule size, mm	2,0 × 2,5 × 3,0
Relative viscosity, rel. units	(3,30 - 3,40) ± 0,05
Moisture content, %, max	0,05
Melting point, °C	258 - 262
Black inclusions, pcs/1000 g, max	10

**2.3.3 Quality parameters of high-viscosity PA 6 chips
(chips at SSP- reactor inlet):**

Required Testing Parameters	Technical parameters with tolerance limits
1. Granule size, mm	
- length	1,5 - 3,5
- diameter	2,0 - 3,0
2. Relative viscosity, rel. units	$(3,25 - 3,40) \pm 0,05$
3. Extractables content (Soxhlet apparatus), %, max	0,50
4. Water content, %, max	0,06
5. Number of oxidized granules, pcs., max	
- in a sample $(2,00 \pm 0,01)$ kg	0
6. Yellowness index in the system - Cie L*a*b*, rel. units	
(using Colorflex device), max	(- 3)
7. Content of long granules with length up to 15 mm %, max	0,1
8. Number of granules with foreign spot inclusions to be detected	
under magnifying glass, pcs., max	3
- in a sample $(100,0 \pm 0,1)$ g	
8.1 Number of granules with foreign spot inclusions to be detected	
with the unaided eye, pcs., max	1
- in a sample $(2,00 \pm 0,01)$ kg	
9. Number of granules with foreign inclusions to be detected with	
the unaided eye, pcs., max	0
- in a sample $(2,00 \pm 0,01)$ kg	
10. Dust content, %, max	0,006

2.3.4 Quality parameters of high-viscosity PA 6 chips (chips at SSP- reactor outlet):

Required Testing Parameters	Technical parameters with tolerance limits
1. Granule shape	Cylindrical
2. Granule size (length), mm	1,5 - 3,5
3. Relative viscosity, rel. units	3,75 ± 0,05
4. Extractables content (Soxhlet apparatus), %, max	0,5
5. Water content, %, max	0,05
6. Yellowness index in the system - Cie L*a*b*, rel. units (using Colorflex device), max	(- 3)
7. Dust content, %, max	0,006

2.3.5 Packing of finished product, information on semifinished product

Finished product (high-viscosity PA 6 chips with relative viscosity $\eta = (3,70 - 3,80)$ rel. units) is packed into bags or BIG-BAG-like soft special containers for bulk products according to the requirements of contracts and TS&LA.

Semifinished product (high-viscosity PA 66 chips) is handed over for further processing into PA66 industrial high-tenacity yarn to manufacture PA66 dipped cord fabrics.

2.3.6 Information on the Customer's utilities and their reserve

No./ No.	Name	Parameters	Value
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
1.	<i>Electric power</i>	Voltage	~ 380V ± 5%
		Frequency, Hz	50
2.	<i>Compressed air (6 kg)</i>	Pressure, MPa	0,45 - 0,6
		Dew point, °C	minus 40
		Dust, oil, condensate	None
3.	<i>Compressed air (8 kg)</i>	Pressure, MPa	0,6 - 0,75
		Dew point, °C	minus 40
		Dust, oil, condensate	None

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
4.	<i>Compressed air (14 kg) (no reserve)</i>	Pressure, MPa	1,2 - 1,4
		Dew point, °C	minus 40
		Dust, oil, condensate	None
5.	<i>Compressed air (12 kg) (no reserve)</i>	Pressure, MPa	1,1 - 1,3
		Dew point, °C	plus 3
		Dust, oil, condensate	None
6.	<i>Nitrogen</i>	Pressure at workshop outlet, MPa	0,4
		Volume concentration of oxygen in nitrogen, % (mln ⁻¹), max	0,0005 (5,0)
		Oil and mechanical impurities, mass %	None
7.	<i>Cold (cooled water is used in summer time) (no reserve)</i>	Temperature, °C	plus 7
		Pressure, MPa	0,46 - 0,56
		Total microbial count (number of micro-organisms in 1 cm ³), max	10 ⁴
		Mass concentration of suspended substances, mg/dm ³ , max	30
8.	<i>Filtered water (used in winter time)</i>	Temperature, °C	plus (7 - 9)
		Chroma, degree, max	30
		Hydrogen index (pH)	6,5 - 8,5
		Molar ratio of hardness equivalent, mmol/dm ³	3,5 - 4,4
		Mass concentration of suspended substances, mg/dm ³ , max	5,0
		Mass concentration of total iron, mg/dm ³ , max	0,3
		Manganese mass concentration, mg/dm ³ , max	0,1
		Molar ratio of alkalinity equivalent, mmol/dm ³	1,0 - 4,0
		Mass concentration of chlorides, mg/dm ³ , max	35,0
9.	<i>Softened water</i>	Temperature, °C	plus (11 - 20)
		Chroma, degree, max	30
		Hydrogen index (pH)	6,5 - 8,5

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
		Molar ratio of hardness equivalent, mmol/dm ³	0,035
		Mass concentration of total iron, mg/dm ³ , max	0,05 - 0,1
		Manganese mass concentration, mg/dm ³ , max	0,03
		Molar ratio of alkalinity equivalent, mmol/dm ³	1,0 - 4,5
		Mass concentration of chlorides, mg/dm ³ , max	35,0
10.	<i>Circulating water</i>	Temperature, °C	plus (18 - 25)
		Hydrogen index (pH), min	6
		Molar ratio of hardness equivalent, mmol/dm ³ , max	10
		Mass concentration of suspended substances, mg/dm ³ , max	30
		Molar ratio of alkalinity equivalent, mmol/dm ³ , max	7,5
		Mass concentration of chlorides, mg/dm ³ , max	150

3. Set of procurement

Complete delivery shall include:

- SSP-reactor – 1 pc.;
- system of low-viscosity chips discharge (unloading, delivery and loading) from BIG-BAG-like soft special containers for bulk products into low-viscosity chips storage silo – 1 pc.;
- low-viscosity chips storage silo – 1 pc.;
- system of low-viscosity chips loading into SSP- reactor from low-viscosity chips storage silo – 1 pc.;
- cooling system for high-viscosity chips coming out of SSP- reactor, which maintains the chips temperature of max 70 °C;
- system of high-viscosity chips unloading from SSP-reactor into high-viscosity chips storage silo – 1 pc.;
- high-viscosity chips storage silo– 1 pc.;
- system of high-viscosity chips delivery from storage silo into charging hoppers of spinning plants – 1 pc.;
- necessary process, special, auxiliary equipment for product manufacturing in accordance with this Task;

- process flow control system including measuring and control devices, executive regulating devices, programmable logic controllers, necessary diagnostic and programming hardware tools, operator's workstation based on Industrial Personal Computers (all the sensors and instruments must be included into State Register of Measuring Instruments of the Republic of Belarus);
- all the necessary auxiliary materials (oils, lubricants, filters and/or filtering materials, sealing materials, quick - wearing parts and etc.) for initial start-up, commissioning and successful carrying out of guarantee tests;
- spare parts (including maintenance and repair works) of auxiliary equipment in quantities enabling reliable operation of main equipment;
- spare parts (including maintenance and repair works) of control and measuring instruments and automation equipment as well as controller modules in quantities enabling reliable operation of main and auxiliary equipment.

4. Technical requirements

Designing and manufacturing of the equipment will be done as per standards and norms of the producer.

Purchased equipment shall ensure the manufacturing of high-viscosity chips of the required quality (i. 2.3.2, i. 2.3.4), in the quantity of minimum 5400 t/year (i. 2.1) hereof.

5. Requirements to documents

5.1 List of technical documents to be provided

- process flow diagrams with points of hazardous substances emissions into environment;
- description of process flow, selection and setting of equipment operating parameters;
- layout of equipment, sketches of general views of the offered equipment with overall dimensions and its technical characteristics (mechanical capacity, material, equipment mass, dimensions, consumed power, noise characteristics and other specific data).
- values of equipment efficiency;
- type of repair, number of repairs per year, standard norms for equipment repair downtime;
- equipment capacity calculations;

- raw and auxiliary materials consumption to manufacture 1000 kg of products (with number of wastes generated during every stage);
- calculation of energy resources consumption (electric energy, compressed air, nitrogen, water and etc.) to manufacture 1000 kg of products;
- calculation of the required quantity of operating personnel (proposal on required quantity and structure of operating personnel (per shift, per day));
- volumes of emissions and drainage (with reference to process flow diagram) and their quantity as well as concentration of all types of pollutants, ways of their disposal or measures to decrease the volumes of emissions (in accordance with the requirements of ISO 14001:2004);
- requirements to microclimate quality parameters in industrial premises;
- type of used heat transfer medium and its technical characteristics;
- short information on labour protection with explosion/fire hazard and toxic properties of substances used in technological process. Copies of Harmful Substances Safety Data Sheets.

Paper-based documents are submitted in four copies (two – in Russian, two – in English/German).

5.2 Technical documents, to be submitted before the delivery time of equipment, which are required for development of construction drawings and equipment installation, technical documents, to be submitted with equipment, which confirm quality and completeness of the delivery, additional requirements and volume of supplied technical documents are detailed in Tender (Competitive) Documents and in a Contract.

6. Requirements to Bidders

6.1 Qualification requirements

A Bidder may be any legal entity or natural person, individual entrepreneur among them, regardless of business legal structure, form of ownership, place of funds origin and location, that meets the qualification, technical and other requirements specified by the Customer.

Qualification requirements:

- experience in sales of SSP-reactors;
- creditworthiness supposing that the value of Bidder's assets shall be higher than value of the subject of procurement;
- presence of guarantee bonds for the equipment to be delivered.

6.1.1 Mandatory documents to be submitted by a Bidder to confirm its qualification data are as follows:

- copy of state registration certificate of participating organization (extract from trade register) verified by participating organization;
- written confirmation signed by top manager and affixed by participating organization's stamp concerning organization location at its legal address and in case of participating organization location at the other address – information on actual location of participating organization;
- information on financial state of participating organization (accounting reports for the previous 2 (two) years) signed by top manager and affixed by participating organization's stamp;
- guarantee obligations for the equipment to be delivered;
- information confirming experience in sales of SSP-reactors with submission of reference list over the last 10 (ten) years;
- written confirmation signed by top manager and affixed by Bidder's stamp that the Bidder is not in the process of liquidation;
- written confirmation signed by top manager and affixed by Bidder's stamp that the Bidder is a manufacturer of equipment or an official participant of the manufacturer's distribution network (a Bidder that is not a manufacturer shall provide documents to evidence its relations with the manufacturer).

7. Special requirements.

Equipment should be new one.

Equipment shall be supplied assembled.

Packing, preservation of the product and its component parts shall ensure completely undamaged state of cargo and protection against damages or corrosion during transportation and storage within min 12 months. The Seller shall provide Instructions for Equipment Depreservation.

Equipment shall be in compliance with the requirements of Technical Regulations of Customs Union: TR CU 010/2011 "On safety of machines and equipment", TR CU 032/2013 «On safety of the equipment operating under excessive pressure», TR CU 012/2011 «On safety of the equipment for work in explosive atmospheres», requirements of Pressurized Equipment Operation Industrial Safety Regulations applicable in the Republic of Belarus and have certificates of conformity to the requirements of the respective Technical Regulations of Customs Union.

A Bidder is obliged to provide for delivery of the whole electric equipment to be installed in the production premises (outside the explosion hazardous zone) with min/ IP-54 ingress protection rating (including control and measuring devices, sensors, automation equipment, terminal boxes, cabinets).

8. General requirements

None

9. Requirements to an offer

9.1 The obligatory required Offer items (documents) should be as follows:

9.1.1 Information on a Bidder:

- organization name;

- location information (post details);
- bank details;
- information on state registration of Bidder in the country of residence with a copy of document confirming Bidder's state registration.

9.1.1.1 Documents to confirm qualification data (in accordance with Section 6 herein).

9.1.2 Equipment model with indication of its manufacturer (should the equipment is offered by a non-manufacturer).

9.1.3 Offered equipment price

9.1.3.1 Way of Offer price calculation and expression.

Offer price shall contain the below expenses (with groups allocation):

- cost of main and auxiliary equipment (both full set of equipment included in complete delivery and every separate item of equipment of complete delivery);
- transport charges;
- expenses on performance of erection supervision, start-up and adjustment works, guarantee tests;
- other expenses (duties, charges, taxes, etc.) depending on offered delivery terms;
- A Bidder - resident of the Republic of Belarus shall provide an Offer with indication of equipment price including VAT, meantime VAT amount is to be shown separately.

9.1.3.2 A Bidder is to quote a price:

- for residents of the Republic of Belarus – on terms DDP Grodno (under Incoterms 2010);
- for non-residents of the Republic of Belarus – on terms DAP Grodno (under Incoterms 2010).

9.1.3.3 Currency or currencies in which Offer price shall be calculated and expressed.

Currency to express Offer price: for residents of the Republic of Belarus - Belarusian rouble, for non-residents of the Republic of Belarus – Euro.

9.1.4 Delivery time and terms.

9.1.5 Payment terms

The Customer recommends to work out payment terms by means of Letter of Credit payment method. Meantime there are recommended the following payment terms:

- 80% of the value shall be payable after equipment delivery to Grodno;
- 20% of the value shall be payable after signing the Equipment Commissioning Report.

Should a Bidder insist on advance payment then the amount of advance payment shall not exceed 15% of the value of complete delivery. In such a case a Bidder is obliged to provide an advance payment bank guarantee to the amount of advance payment.

9.1.6 Financing scheme

Bidder's Offer shall contain proposals on equipment purchase financing from foreign banks without using guarantees of Government of the Republic of Belarus for the period of min. 5 years (credit, post financed letters of credit).

9.1.7 Information on provision of Performance Bond, Warranty Guarantee bank guarantees.

9.1.8 Warranty and post-warranty obligations for supplied equipment.

9.1.9 Conditions to perform erection supervision, adjustment work, equipment tests to meet guaranteed values.

9.1.10 Procedure of JSC "Grodno Azot" personnel industrial training.

9.1.11 Technical documents mentioned in i. 5.1 herein.

9.1.12 An offer must be signed by top manager or an authorized representative of Bidder (with provision of the documentary proof of authority) and affixed with the Bidder's seal.

9.1.13 A Bidder that was announced a winner shall have or obtain from Gospromnadzor (Department for Supervision of Industrial Safety) of MES (Ministry of Emergency Situations) of the Republic of Belarus a Permit giving the right to develop projects for process flows and production plants where there are available high-toxic, toxic and superpotent substances including their storage as well as process flows and production plants where explosive atmospheres may be created. Validity period of Permit shall be longer than the time period required for equipment commissioning.

9.1.14 A Bidder that was announced a winner shall have available respective Certificates (Licenses or Permits from Gospromnadzor of MES of the Republic of Belarus) for all types of activity subject to mandatory certification in the Republic of Belarus with period of their validity longer than the time period required for commissioning. Equipment shall have certificates developed according to the requirements of legislation of the Republic of Belarus.

9.1.15 Bidder's Offer shall correspond to all the requirements stated herein otherwise the Bidder's Offer shall be rejected.

9.1.16 Additional requirements to Bidders Offers are detailed in Tender (Competitive) documents.