“Confirm”

Chief engineer

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«___» _____ 2019y.

TECHNICAL SPECIFICATIONS

to supply a complete production line for PE based polymer part of a drip irrigation system

Shurtan GCC LLC - 2019

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1. GENERAL DATA

1.1. The Present technical assignment is developed to receive the offers from potential suppliers for delivery of a complete line for production of emitter drip tape (extrusion line) and fittings (injection molding machine) from polyethylene. During preparation of technical commercial offers, additional demands and conditions can be made to potential suppliers directed to detailing and unification of the given offers.

1.2. The purchase of complete lines for production of polymer parts of the drip irrigation system is carried out on the basis of paragraph No. 9 of the Decree of the President of the Republic of Uzbekistan dated December 27, 2018 #PP-4087 "On high priority measures to create favorable conditions for wide use of drip irrigation technology in production of raw cotton"

1.3. Worksite- Karshithermoplast shop, LLC ShurtanGCC

1.4. Work schedule: Two shifts, 12 hours per day, no less than 8000 hours per year

1.5. The equipment is intended for industrial production of emitter drip tape and fittings made of polyethylene using a polymeric dye.

2. TECHNICAL SPECIFICATIONS OF RAW MATERIALS AND EXPENDABLE

2.1. For the basic raw material will be used 1st, 2nd and 3rd grades of HDPE, LDPE and LLDPE produced by LLC "Shurtan GCC", technical characteristics are given in Appendix No1.

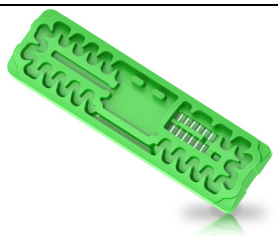
2.2. For black dye will be used the corresponding grades of black masterbatch. Masterbatch with carbon black content in PE is in the range of 30-40%.

3. TECHNICAL SPECIFICATIONS AND REQUIREMENTS TO FINISHED PRODUCTS.

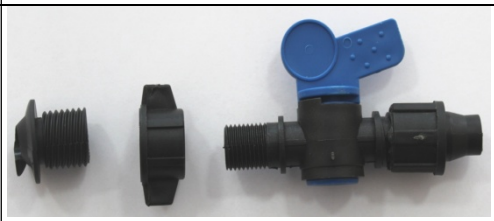
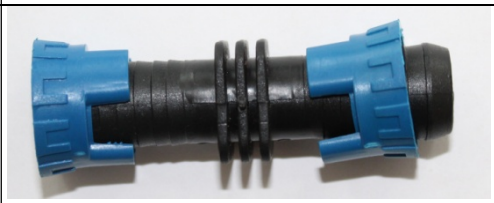
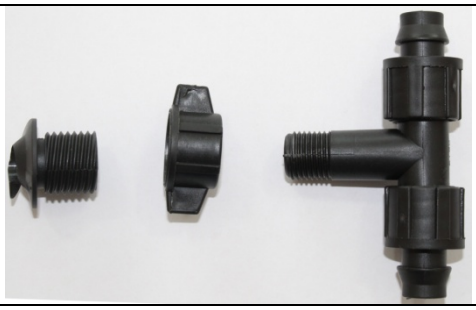
3.1. *Specification of emitter drip tape*

No.	Name	Technical characteristics			
		Nominal outside diameter, mm	Thickness, mm	Distance between orifices, mm	Appearance
1	Drip tape	12,16,20,25 (± 0,3)	0,12-1,0 (± 0,02)	100-1500 (± 0,5)	
The drip tape must withstand a constant internal pressure of 0.2MPa and a temperature of 20^0C for 1 hour.					

3.2. Specification of the nano emitter

No.	Name	Technical characteristics			
		Water discharge at 0.1 MPa,l/h	Minimum value, MPa	Maximum allow able pressure, MPa	Appearance
1	Flat drip (emitter)	2,0 (± 0,4)	0,05	0,35	

3.3. Specification of fittings with diameters of 16 mm

No	Name	Technical characteristics		
		Diameter, mm	Type	Appearance
1	Tap	16	female	
2	Connector	16	lock	
3	Tee	16	female	

Notes: The concentration of carbon black in the finished product should be 1-1.5%;

4. SCOPE OF SUPPLY OF EQUIPMENT AND SERVICES

4.1. Preliminary list of components and parts of a complete production line:

The above list of parts and components is preliminary. The actual completeness of the line is determined by the manufacturer based on the requirements for end products.

4.1.1. Equipment for production of emitter drip tape:

4.1.1.1. Emitter feed system

4.1.1.2. Vacuum loader

4.1.1.3. Single-screw extruder

4.1.1.4. Co-extruder for applying a blue strip to a drip hose during production

4.1.1.5. Die (including filter)

4.1.1.6. Vacuum water bath

4.1.1.7. Water cooling bath

4.1.1.8. Puller

4.1.1.9. Laser printer for marking finished products according to the requirements of an organization standard

4.1.1.10. Hole punchingsystem

4.1.1.11. Spool

4.1.1.12. Electronics case

4.1.1.13. Separate cooling system (chiller);

4.1.1.14. Measuring devices (Micrometer, ruler, etc.)

4.1.1.15. Tools and equipment (special tools) for repair work;

4.1.1.16. A set of spare parts for commissioning;

4.1.1.17. Required quick-wearing spare parts for 2 year operation

4.1.2. Equipment for production of fittings for drip and flexible hoses with a diameter of 16 mm - emitter, tap, connector, tee:

The above list of parts and components is preliminary. The actual completeness of the line is determined by the manufacturer based on the requirements for end products.

4.1.2.1. Autoloader for feeding raw materials;

4.1.2.2. Gravimetric dosing system;

4.1.2.3. Injection molding machine - high-speed injection;

4.1.2.4. Molding die;

4.1.2.5. Separate cooling system (chiller);

4.1.2.6. Tools and equipment (special tools) for repair work;

4.1.2.7. A set of spare parts for commissioning;

4.1.2.8. Required quick-wearing spare parts for 2 year operation

4.1.3. Based on the common engineering practice, potential suppliers can offer the necessary additional and auxiliary equipment

4.2. Technical specifications of equipment

4.2.1. Standard power 220/380V with frequency 50Hz;

4.2.2. Stable guaranteed performance:

No	Name of product	Capacity
1	Drip tape with internal emitters	min. 250 m/min
2	Emitter	Min 1000 pcs/min
3	Tap set	Min 220000pcs/year
4	Connector set	Min 220000 pcs/year
5	Tee set	min1300000 pcs/year

4.2.3. Automatic local control of the main parameters (area temperature, pressure, flow rate, level, screw speed, puller speed, regular monitoring of the sleeve diameter and etc.);

4.2.4. Control of drives by equipment of well-known manufacturers;

4.2.5. Availability of protection system(interlock) and alarm;

4.2.6. Provide the possibility of further maintenance and monitoring of software of automatic process control and visualization system by a programmer or a special computer (the open architecture principle);

4.2.7. Instrumentation for monitoring and management of all parts of the complete line should be from well-known advanced manufacturers with the modern technology;

4.2.8. Requirements for extrusion equipment for production of an emitter type drip hose:

4.2.8.1. Screw -

- Screw material: 38CrMoAl or similar materials (high-temperature resistant steel, heat-treated, nitrided surface);
- Hardness treatment of extruder screw –Nitriding at depth > 0.6 mm, nitriding hardness> = 700;
- Barrel temperature control: auto control of constant temperature.
- Barrel heating method: ceramic heaters
- Barrel cooling method: air, water

4.2.8.2. Barrel -

- Barrel material: 38CrMoAl or similar materials (high-temperature resistant steel, heat-treated, nitrided surface);
- Hardness treatment of extruder screw – Nitriding at depth > 0.6 mm, nitriding hardness> = 700;

4.2.8.3. Gear –

- Gear material: high-quality alloy steel

4.2.8.4. Reducer -

- Reducer material - high-grade steel alloy (GC20 or similar grades), with surface treatment by high-frequency currents;
- At development of reducer design, supplier must take into account axial and radial loads;
- Gearbox oil lubrication method: forced circulating oil lubrication
- Gears: thermal treatment, nitride surface, accurate grinding
- Gear material: steel alloy

4.2.8.5. The extruder motor must be AC type with frequency control and manufactured by well-known manufacturers with improved ability meet the standards and specifications of IEC, DIN, ISO, VDE, EN, API.

4.2.8.6. Die –

- Type of die: screw, ring-shaped, with replaceable nozzles.
- Material of calibration sleeve: particularly high-strength, wear-resistant copper sleeve.

4.2.8.7. Vacuum calibration bath–

- Bath material: stainless steel
- Bath length: standard.
- Center height: minimum 1 m

4.2.8.8. Water cooling bath

- Type: immersion type (immersion)
- Bath material: stainless steel
- Bath length: standard.
- Center height: minimum 1 m

4.2.8.9. High speed puller

- Type of puller: high speed, with roller
- Clamping method: pneumatic
- Pulling speed: ≤ 300 m/min
- Type: AC, with frequency control

4.2.8.10. Hole punching system

- Hole punching method: using a servo device
- Hole punching speed: ≤ 3000 times/min

4.2.8.11. Spool

- Winding method: 2-position winding, automatic
- Winding method: automatic control
- Roll unloading method: manual
- Winding length: ≤2000m
- Availability of a length counter.

4.2.8.12. Finished product packing machine

- Packing method: automatic control
- Packing speed: at least 10 roll per hour
- Material used for packing: PE film.

4.2.8.13. Water cooling machine

4.2.8.14. Feeding system -

- Pneumatic/vacuum loading of PE pellets + milled waste;
- Presence of PE pellets and polymeric dye for uniform mixing;

4.2.8.15. Requirements for injection molding machine for production of fittings:

- Injection unit –
  - Screw -
    - Screw material: 38CrMoAl or similar materials (high-temperature resistant steel, heat-treated, nitrided surface);
    - Hardness treatment of extruder screw – Nitriding at depth > 0.6 mm, nitriding hardness> = 700;
  - Barrel -
    - Barrel material: 38CrMoAl or similar materials (high-temperature resistant steel, heat-treated, nitrided surface);
    - Hardness treatment of extruder screw – Nitriding at depth > 0.6 mm, nitriding hardness> = 700;

- Cylinder temperature control: automatic control of constant temperature;
- Cylinder heating method: ceramic heaters
- Cooling Method: Air, Water

- Closing mechanism
  - Guaranteed closing cycle - at least 1.000.000 pcs
  - Material of a die mold should be hardness - 45-55 HRC
  - Clearances should ensure the production of parts without casting materials
  - Cooling system should be tight and withstand liquid pressure up to 0.6 MPa.
  - On a surface should be no traces of corrosion cracks and other mechanical damages.
  - Surface roughness - 0.20 mkm.
  - Surface of die mold parts should be finished by galvanic, chemical or thermochemical treatment.
  - Effective cooling to avoid of hotspots;
  - Pressure distribution during filling for quality cast molding and decrease of underfilling;

4.2.8.16. Emitter feed system

- Loading method: automatic
- Feeding method: vibrating conveyor

4.2.8.17. Filtration unit of an emitter head:

- Filtration method: automatic filtration
- Filtration speed: 3000 pcs/min.

4.2.8.18. Rotation drive motor:

- Type: AC, with frequency control
- Type of inlet: synchronized, tape

4.2.8.19. Vacuum loader

- Material loading method: vacuum suction
- Drying method: air drying with automatic heating control

4.3. Services provided by equipment supplier

4.3.1. The scope of Supplier's services within concluded contract for supply of complete equipment is included:

4.3.1.1. Delivery of all components and parts of complete production lines on the terms of CIP- therailway station Kengsoy (station code - 732602), SSRC (stock state railway company) “Uzbekistan Railways. Truck Delivery: CIP – 180300, the Republic of Uzbekistan, Kashkadarya region, Guzar district, Shurtan settlement.

4.3.1.2. Installation supervision and commissioning at Customer's site of the equipment of supplied main equipment;

4.3.1.3. Installation supervision and commissioning at Customer's site of auxiliary equipment supplied by sub-supplier;

4.3.1.4. Training of Customer's personnel on site;

4.3.1.5. Start-up of installed equipment;

4.3.1.6. Coordination of work with supplier and sub-suppliers in the equipment package;

4.3.1.7. Organize at his own expense of familiarization Customer’s 3 (three) technical specialists for inspection of the complete equipment at Manufacturer’s factory and study the main production cycles, technical parameters of raw materials and consumables, variety of finished products, as well as determining the basic requirements for production buildings and facilities;

4.3.1.8. Carry out complex warranty tests at Customer's site after installation of the complete equipment and outputting to a stable operation mode;

4.3.1.9. Provide qualified manufacturer personnel and sub-suppliers (if necessary) during commissioning and comprehensive performance tests;

4.3.1.10. Technical support (guaranteed support of spare parts) for 2 years of further operation;

4.3.2. The warranty period of operation of a set of equipment is 8.000 machine hours or 12 months (whichever comes first) after completion of a comprehensive operation test for guaranteed performance and signing of an equipment acceptance certificate;

4.3.3. During the warranty period, Supplier must send qualified specialists to eliminate any malfunctions of the equipment that occurred as a result of defective quality of the supplied equipment or hidden equipment defects that could not be detected during guarantee performance tests;

4.3.4. The period between the notification receipt of warranty and the arrival of Supplier's specialists to the Customer's site should not exceed 21 calendar days;

4.3.5. If it is necessary to replace any defective component or part of the equipment, the replacement of the part and elimination of the detected defect should not exceed more than 1 (one) month unless otherwise stated by production run for manufacture of the replaced part and/or component;

4.3.6. After the conclusion of a contract with winner, Supplier provides to a Customer within 2 (two) weeks:

4.3.6.1. General layout plan of process equipmentspecifying demand for utilities for each equipment in production chain;

4.3.6.2. Overall dimensions of the supplied process equipment;

4.3.6.3. Drawings for location of the line, foundations

4.3.6.4. Overall dimensions of underground channels for laying utilities;

4.3.6.5. Technical parameters of cables and pipelines (pipe diameter and length, cable cross-sections) for connection to a chiller, compressor and switchgear;

4.3.6.6. Technical parameters and international standards used in the production of raw materials and list of Suppliers of these materials to purchase by Customer;

4.3.6.7. Technical parameters and international standards of used lubricants (oil and lubricants) and a list of suppliers of these materials to purchase by Customer;

4.3.6.8. Supplier agrees with Customer the color of the supplied process equipment until the manufacturing equipment is completed. In any case, the color should be selected from the RAL standard color palette;

4.4. Requirements to the technical documentation supplied with the equipment

4.4.1. A set of documentation supplied with the equipment should consist of, but not be limited to, the following list of documentation, provided in Russian and English in 2 copies, in paper and electronic versions for each type and unit of equipment:

4.4.1.1. Installation, commissioning and setup manual;

4.4.1.2. Detailed general drawings and outline layouts of the main and auxiliary equipment, specifying specific properties and detailed utility requirements;

4.4.1.3. Detailed technical characteristics (plasticizing - kg/h, power - kW, overall dimensions for each equipment;

4.4.1.4. Productivity in linear meters per hour on drip tapes taking into account the raw materials used;

4.4.1.5. Production plan with a uniform layout in lm/min and kg/h;

4.4.1.6. Drawing and detailed description of the parts used, bolt sizes;

4.4.1.7. Operating manual and maintenance method;

4.4.1.8. Electrical connections (all types), loop diagram for instrumentation.

4.4.1.9. Instrumentation equipment and instruments (SAUTP, PAZ, etc.) with certificates and conformity certificates

4.4.1.10. Description of interlocks (flow diagrams) with reasons for possible emergency shutdowns (cause-and-effect diagram) and their effect on the instruments;

4.4.1.11. Printout of flow chart of PLC;

4.4.1.12. Specification, description of instruments and other technical information;

4.4.1.13. Detailed technical characteristics of spare parts for the whole line with description and specifying of drawings

5. GENERAL REQUIREMENTS FOR EQUIPMENT TESTS ON GUARANTEE INDEXES

5.1. In order to confirm the equipment after installation, commissioning and start-up will be subjected to a comprehensive operational test for guaranteed performance:

5.1.1. Operability;

5.1.2. Uninterrupted power of the equipment within 72 hours of continuous operation with the following parameters:

5.1.2.1. For an emitter type drip hose production line with capacity of at least 250 m/min:

- Diameter of a drip hose– 16mm;
- Drip hose thickness – 1.0 mm;
- Distance between orifices - 200 mm

5.1.2.2. For production of fittings:

No	Name of product	Capacity
1	Emitter	min1000 pcs/min
2	Tap	Min 220 000 pcs/year
3	Connector	Min 220 000 pcs/year
4	Tee	min1 300 000 pcs/year

5.1.3. The quality of the products produced during the warranty tests must comply with the quality indexes stated in item 3 of this technical assignment.

5.1.4. Operational test of the production line for guaranteed output is carried out no more than 3 (three) times.

6. REQUIREMENTS TO TECHNICAL PART OF THE TECHNICAL AND COMMERCIAL OFFERS OF POTENTIAL SUPPLIERS

6.1. Technical part of the technical and commercial offers of potential suppliers should at least consist of the following documents:

6.1.1. Specifications of the main and auxiliary equipment, specifying the guaranteed capacity of the equipment of products, special properties and detailed requirements to utilities;

6.1.2. Basic configuration and all possible options;

6.1.3. Information about the materials used for manufacture of the casing and screw of the main and auxiliary extruders with application of the certificate of conformity

6.1.4. Detailed drawings of general arrangement of the main and auxiliary equipment;

6.1.5. Detailed technical specifications;

6.1.6. Productivity in linear meters per hour on drip tapes taking into account the raw materials used;

6.1.7. Production plan with a uniform layout in lm/min and kg/h;

6.1.8. Reference list of supplies of similar equipment for the last 3 years with the Customers contact details

- Scope of supply: 1 complete set
- Delivery date: from 3 to 6 months
- Source of financing: Own funds of «Shurtan GCC» LLC

Terms of delivery

Railway wagon shipping:	*CIP- therailway station Kengsoy (station code - 732602), SSRC (stock state railway company) "Uzbekistan Railways*
Truck delivery:	*CIP – 180300, the Republic of Uzbekistan, Kashkadarya region, Guzar district, Shurtan settlement.*
Container delivery:	*CIP- therailway station Kengsoy (station code - 732602), SSRC (stock state railway company) "Uzbekistan Railways*

Appendex 1.

Technical specification of UZCLEAR Polyethylene

Технические характеристики марок ПЭ

№	PE Grade & Type Марка и Вид ПЭ		Density, g/cm^3	MFI, g/10min	Kind of processing Вид переработки	Recommended end use Рекомендуемая область применения
			Range / Диапазон			
INJECTION GRADES / ЛИТЬЕВЫЕ МАРКИ						
1.	**I-0754**	**HDPE**	0,952 – 0,956	5,0 – 8,0	Injection moulding Литье под давлением	House wares, Industrial & G.P. pails, pallets Для изделий культурно бытового назначения и хозяйственного обихода.
2.	**I-0760**	**HDPE**	0,958 – 0,962	5,50 – 8,50		General purpose injection moulding Для общего назначения
3.	**I-1561**	**HDPE**	0,958 – 0,962	13,0 – 18,0		For manufacturing grates, totes, boxes. Для изготовления тары, корзин, ящиков и т.д.
4.	**I-2560**	**HDPE**	0,958 – 0,962	20,0 – 30,0		G. P. injection moulding, container – baskets Для общего назначения, тара, корзина
5.	**I-1625**	**LLDPE**	0,922 – 0.928	12,0 – 20,0		Garbage bins Ящики для отходов
6.	**I-0525**	**LLDPE**	0,923 – 0.927	4,00 – 6,00		Closures Для мелко объемных изделий (крышки, цветы)
FILM GRADES / ПЛЕНОЧНЫЕ МАРКИ						
7.	**F-Y720**	**LLDPE**	0,918 – 0,922	0,60 – 0,90	Extrusion Экструзия	Industrial bag (heavy duty film) Промышленная упаковка (толстая плёнка).
8.	**F-0120**	**LLDPE**	0,918 – 0,922	0,80 – 1,50		General purpose film Пленка общего назначения
9.	**F-0220**	**LLDPE**	0,918 – 0,922	1,50 – 2,50		Very thin film (mulch film) Для изготовления особо тонкой

						пленки (плёнка мульчирования)
10.	**F-0320**	**LLDPE**	0,918 – 0,922	2,50 – 3,50		Thin film (stretch wrap) Тонкая пленка (основной слой стретч плёнок)
11.	**F-Y336**	**MDPE**	0,934 – 0,938	0,24 – 0,30		Merchandise bag Для пленок и пленочных изделий (пакеты).
12.	**F-Y240**	**HDPE**	0,936 – 0,942	0,19 – 0,31		Merchandise bag Для пленок и пленочных изделий (пакеты).
13.	**F-Y346**	**HDPE**	0,942 – 0,948	0,19 – 0,31		Merchandise bag (rustling film) Шуршащая пленка и пленочных изделий (пакеты).

WIRE & CABLE / КАБЕЛЬНЫЕ МАРКИ

14.	**WC-Y434**	**MDPE**	0,932 – 0,936	0,30 – 0,46	Extrusion Экструзия	Wire insulation Для изоляции проводов и кабеля.
15.	**WC-Y734**	**MDPE**	0,932 – 0,936	0,60 – 0,85		Cable jacketing Для оболочек кабеля (жесткий шланг).

PIPE GRADES / ТРУБНЫЕ МАРКИ

16.	**P-Y337**	**MDPE**	0,936 – 0,940	0,21 – 0,33	Extrusion Экструзия	Base resin- gas pipe базовая марка для газопроводных труб
17.	**P-Y342**	**HDPE**	0,940 – 0,944	0,24 – 0,36		Base resin- pressure pipe, Трубные изделия, базовая марка для напорных трубопроводов
18.	**P-Y456**	**HDPE**	0,952 – 0,958	0,31 – 0,51		large diameter pipe drainage profile трубы большого диаметра (дренаж)

BLOW GRADES / ВЫДУВНЫЕ МАРКИ

19.	**B-Y250**	**HDPE**	0,948 – 0,952	0,19 – 0,30	Blow moulding Выдувное формование	Gasoline jerry cans, designed for continuous-extrusion machines Канистры, предназначенные для непрерывных экструзионных машин.
20.	**B-Y456**	**HDPE**	0,954 – 0,958	0,33 – 0,43		G.P. blow moulding Выдувные изделия общего назначения.

21.	**B-Y460**	**HDPE**	0,958 – 0,962	0,33 – 0,43		Mild stress crack applications, bottles for bleach & detergents, industrial chemicals Формование бутылок для упаковки и хранения жидкостей.
ROTATIONAL TAPES / РОТАЦИОННЫЕ МАРКИ						
22.	**R-0333**	**MDPE**	0,931 – 0,935	2,5 – 3,3	Rotational moulding Ротационное формование	AG tanks, fuel tanks, fish boxes, Septic tanks Для крупногабаритных изделий (резервуары и ящики для агрохимической продукции, горючего).
23.	**R-0338**	**MDPE**	0,935 – 0,940	2,0 – 3,0		
24.	**R-0448**	**HDPE**	0,946 – 0,950	3,1 – 4,1		
ORIENTED TAPES / ОРИЕНТАЦИОННЫЕ ЛЕНТЫ						
25.	**O-Y446**	**HDPE**	0,944 – 0,948	0,33 – 0,43	Extrusion Экструзия	Oriented tapes, monofilaments, Shoe lasts Для лент, мононитей для промышленных мешков, ориентированных пленок.
26.	**O-Y750**	**HDPE**	0,948 – 0,952	0,55 – 0,75		
27.	**O-Y762**	**HDPE**	≥ 0,958	0,58 – 0,72		

Recommended end use Рекомендуемая область применения			INJECTION MOULDING ЛИТЬЁ ПОД ДАВЛЕНИЕМ						ROTO MOULDING РОТАЦИОННОЕ ФОРМОВАНИЕ		
Property / Свойства	**Test method Метод испытания**	**Unit Единица**	**I-0754**	**I--0760**	**I--1561**	**I-0525**	**I-1625**	**I-2560**	**R-0333**	**R-0338**	**R-0448**
Density / Плотность	ASTM D792	g/cm3	0,954	0,960	0,961	0,925	0,925	0,96	0,933	0,937	0,948
MFI / ПТР (190@2.16)	ASTM D1238	g/10 min	6,70	7	15,3	4,9	16	25	2,90	2,70	4,00
Tensile strength at yield Прочность при растяж.	ASTM D638	MPa	25	25	26	10	10	10	15	18	20,00
Tensile strength at break Прочность при разрыве	ASTM D638	MPa	26	26	27						
Elongation at break Относитель удлинение	ASTM D638	%	1200	1200	500	700	650	650	800	800	800
Ударная прочность IZOD Impact strength	ASTM D256	J/m	40	26	18				68	68	
Твердость по Шору Shore Hardness	ASTM D2240	Shore D	63	65	65	52	52	52	56	58	
Точка смягчения Vicat Softening point	ASTM D1525	^{0}C	124	129	128	91	85	85	110	114	
ESCR	ASTM D1693/B	hour	10	10	10	10	< 10	< 10	>100	250	
Flexural modulus Модуль упругости	ASTM D790	MPa	1070	1280	1280	345	345	345	524	655	
Распред. мол веса Molecular weight distrib.			Узкий Narrow	Узкий Narrow	Узкий Narrow	Узкий Narrow	Узкий Narrow	Узкий Narrow	Узкий Narrow	Узкий Narrow	Узкий Narrow

Recommended end use Рекомендуемая область применения			FILM ПЛЕНКА							WARE & CABLE ИЗОЛЯЦИЯ И КАБЕЛЬ	
Property / Свойства	**Test method** **Метод испытания**	**Unit** **Единица**	**F-Y720**	**F-0120**	**F-0220**	**F- 0320**	**F-Y336**	**F-Y240**	**F-Y346**	**WC-Y434**	**WC-Y734**
Density / Плотность	ASTM D792	g/cm3	0,920	0,920	0,920	0,920	0,936	0,940	0,946	0,934	0,934
MFI / ПТР (190@2.16)	ASTM D1238	g/10 min	0,70	1,00	2,00	3,00	0,27	0,21	0,23	0,38	0,72
Tensile strength at yield **Прочность при растяж.**	ASTM D638 / D882-Film)	MPa	MD/TD 10 / 11	MD/TD 9 / 10	MD/TD 8 / 9	MD/TD 6 / 7	MD/TD 12 / 13	MD/TD 21 / 23	MD/TD 18 / 18	15	14
Tensile strength at break **Прочность при разрыве**	ASTM D638 / D882-Film)	MPa	MD/TD 26 / 28	MD/ TD 25 / 28	MD/ TD 18 / 32	MD/TD 25 / 28	MD/TD 40 / 37	MD/TD 40 / 38	MD/TD 18/51	16	16
Elongation at break **Относитель удлинение**	ASTM D638 / D882-Film)	%	MD/TD 800/900	MD/ TD 750/800	MD/ TD 700/850	MD/ TD 650/700	MD/TD 500/600	MD/TD 450/450	MD/TD 350/250	500	600
Ударная прочность **IZOD impact strength**	ASTM D256	J/m					нет	нет	нет		
Твердость по Шору **Shore hardness**	ASTM D2240	Shore D					59	59	60	64	62
Точка смягчения **Vicat softening point**	ASTM D1525	^{0}C	98	84	84	98	112	119	121	109	121
ESCR	ASTM D1693/B	hour					1000	1000	1000	>1000	>1000
Flexural modulus **Модуль упругости**	ASTM D790	MPa								800	690
Прочн. при прокал. **Dart drop F-50**	ASTM D1709 Film)	g/mil	100	140	110	170	75	15	15		
Прочн при раздир **Tear strength Elmendorf)**	ASTM D1922 Film)	g/m2	MD/TD 115/300	MD/TD 130/340	MD/TD 120/350	MD/TD 150/380	MD/TD 25/500	MD/TD 25/575	MD/TD 25/575		
Распред. мол веса **Molecular weight distrib.**			Узкий Narrow	Узкий Narrow	Узкий Narrow	Узкий Narrow	Широкий Wide	Широкий Wide	Широкий Wide	Широкий Wide	Широкий Wide

Recommended end use Рекомендуемая область применения			PIPES ТРУБЫ			BLOW MOLDING ВЫДУВНОЕ ФОРМОВАНИЕ			ORIENTED TIPES МОНОНИТИ (ВОЛОКНА)		
Property / Свойства	**Test method Метод испытания**	**Unit Единица**	**P-Y337**	**P-Y342**	**P-Y456**	**B-Y250**	**B-Y456**	**B-Y460**	**O-Y446**	**O-Y750**	**O-Y762**
Density / Плотность	ASTM D792	g/cm3	0,939	0,941	0,956	0,950	0,956	0,960	0,946	0,950	0,962
MFI / ПТР (190@2.16)	ASTM D1238	g/10 min	0,27	0,38	0,41	0,21	0,41	0,40	0,38	0,67	0,65
Tensile strength at yield Прочность при растяж.	ASTM D638 / (D882-Film)	MPa	16	21	30	24	30	30	25	24	30
Tensile strength at break Прочность при разрыве	ASTM D638 / (D882-Film)	MPa	30	21	31	30	31	31	21	15	22
Elongation at break Относитель удлинение	ASTM D638 / (D882-Film)	%	600	750	860 / 50	675	860/50	1000/50	950*	900*	>600
Ударная прочность IZOD impact strength	ASTM D256	J/m	нет	нет	нет	нет	80	70			
Твердость по Шору Shore hardness	ASTM D2240	Shore D	62	62	67	63	67	69	62	64,6	69
Точка смягчения Vicat softening point	ASTM D1525	^{0}C	121	122	125	124	125	127	124	124	127
ESCR	ASTM D1693/B	hour	1000	1000	100	1000	100	50	>1000	48	50
Flexural modulus Модуль упругости	ASTM D790	MPa	565	590	1210	1000	1170	1345	500	758	1650
Прочн. при прокал. Dart drop F-50	ASTM D1709 (Film)	g/mil	Широкий Wide	Широкий Wide	Широкий Wide	Широкий Wide	Широкий Wide	Широкий Wide	Широкий Wide	Широкий Wide	Широкий Wide
Прочн при раздир Tear strength (Elmendorf)	ASTM D1922 (Film)	g/m2									
Распред. мол веса Molecular weight distrib.											