



CATALOGUE

2010



**LOW-ADHESION
SUBMERSIBLE
CENTRIFUGAL PUMPS**

GENERAL

The IZHNEFTEPLAST LLC produces low-adhesion electric submersible centrifugal pumps (ESP) with stages made with the use heat- and acid resistant polymeric composite materials (PCM).

Areas of effective application

1. Oil production in low flow rate well stock;
2. High water content in formation fluid (more than 85%);
3. Oil production in conditions with high intensity deposits of salts and asphaltene-resin-paraffin formation;
4. High non-abrasive mechanical impurities content in formation fluid.

Local liquid parameters

Parameters	ESP Type			
	B	A	G	GA
1. Maximum density of liquid, kg/m ³	1400			
2. Maximum kinematic viscosity of single-phase fluid which provides pump operation without any changes of head pressure and efficiency, mm ² /s	1			
3. pH value	from 5 to 8,5 inclusive			
4. The maximum concentration of suspended abrasive particles with a hardness of up to 7 points by Mohs scale, g / l	0,1	0,5	0,1	0,5
5. The maximum concentration of suspended nonabrasive particles with a hardness of up to 4 points by Mohs scale, g / l	2			
6. Associated water content, max, %	99,9			
7. Maximum content (volume content) of associated gas on pump intake (without gas separator / with gas separator), %	35·(1 – B) ^{0,5}		55·(1–B) ^{0,5}	
	where B - relative water content			
8. H ₂ S content, max, g/l	0,01			
9. Temperature of pumped liquid on pump intake, max, °C	120			
10. Operating environment temperature (PCM heat stability), max, °C	270			

ESP Design Features

Applications areas are supported by the following design features:

1. Application of the impellers made of PCM (Fig.1) provides the following advantages:
 - High corrosion resistance and cleanliness of the flowing channels, the low adhesion and non-magnetic properties of the material, as well as the lack of possibility of the formation of galvanic couples slow down the deposition of salts and asphaltene-resin-paraffin deposits no less than 3 times as compared with the metal stages, as well as reduce probability of clogging non-abrasive mechanical impurities.
 - Low weight (4-5 times less than that of impeller made of cast iron) decreases rotor weight which is significant for high-capacity pumps and provides reduced-current as well as smooth start of rotors.
 - High precision of manufacturing and low weight provide decreasing disbalance and vibration level of a rotor and reduces wear of bore protectors, bearing surfaces of diffuser and shaft. Risk if equipment parting is also reduced;
 - High flowing channels cleanliness and low material adhesion provide coefficient of efficiency (Eff) increase by 2-4%;
 - Application of PCM impellers with the dispersive element provides the efficiency of ESP when is available the content of associated gas at the pump intake to 35% due to dispersion and hinders the process of precipitation of salts in the sediment;
 - Application of impellers with PCM elongated hub and shaft bore protectors of PCM due to the low adhesion of the polymer surface to salts and asphaltene-resin-paraffin deposits, significantly reduces the likelihood of jamming of the radial friction pairs, especially during periodic operating mode ESP, as well as reduces wear of the radial friction pairs at high (more than 85%) water content in formation fluid.

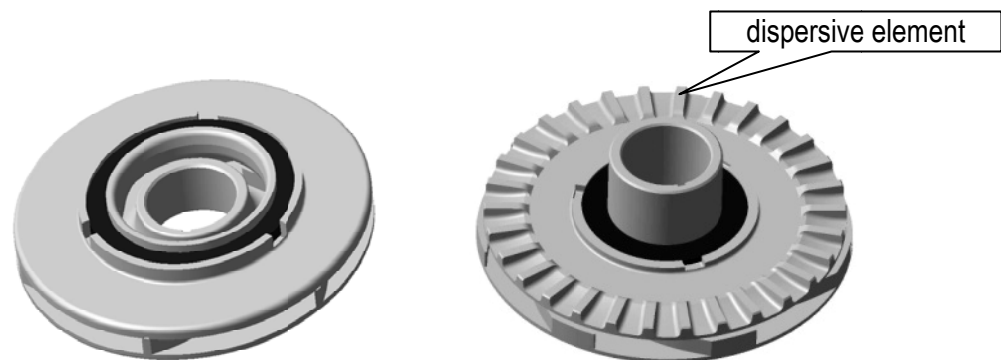


Fig.1 Impellers made of PCM

2. Application of combined diffusers with flowing channels made of PCM (Fig.2) provides the following advantages:

- High corrosion resistance and cleanliness of the flowing channels, the low adhesion and non-magnetic properties of the material, as well as the lack of possibility of the formation of galvanic couples slow down the deposition of salts and asphaltene-resin-paraffin deposits no less than 3 times as compared with the metal stages, as well as reducing probability of clogging non-abrasive mechanical impurities.
- Unit weight decreasing by 15...25% due to PCM using;
- High cleanliness of the flowing channels and low material adhesion provides efficiency (Eff) increase by 2-4%.

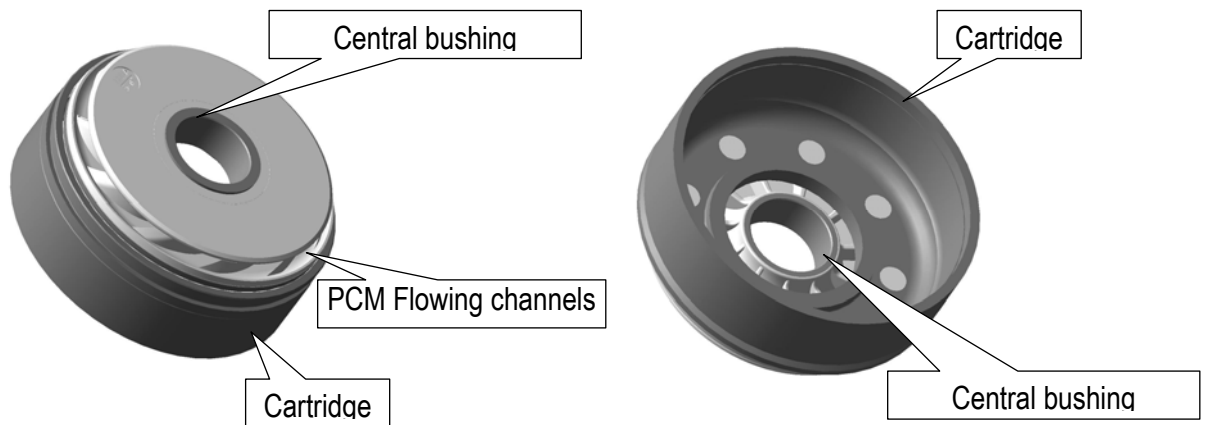


Fig.2 Combined diffuser

3. Application of impellers with dispersive elements in conjunction with series dispersive stages at the beginning of the first section provides the efficiency of ESP when is available the content of associated gas at the pump intake up to 55% without the use of gas separator.

4. The use of intermediate bearings as well as upper and lower supports carbide ensures efficiency ESP at a concentration of abrasive particles to 500 mg/l and hardness of particles up to 7 points by Mohs scale.

5. All ESP types are provided with:

- Stages (impeller, diffuser), which are made of polymer composite materials (PCM). Impellers are made with an elongated hub;
- Intermediate supports (bearings) of the shaft;
- The lower section with an intake module (the presence of an intake module on request);
- Joints of sections on type "flange-case" or "flange-flange";
- Resource fixture of a class of strength 10.9 in accordance with GOST 1759.4-87
- Key of stainless steel alloys.

PUMP TYPES

(Materials applied)

a) Basic Pumps (B)

- Diffusers have combined design: flowing channels are made of PCM, cartridge and central bushing are made of iron based powder material (herein after referred to as "metal powder"). Permitted to use all-metal diffusers of metal powder;
- Impellers are made of PCM;
- Standard strength shaft;
- Axial support washers are made of belting or silicon carbide;
- Intermediate bearings with a pair of friction "bronze-steel" are set through each meter of assembly.

b) Abrasion Resistant Pumps (A)

- Diffusers have combined design: flowing channels are made of PCM, cartridge is made of metal powder or corrosion and abrasion resistant cast iron (herein after referred to as Ni-resist cast iron) and central bushing is made of Ni-resist cast iron or corrosion and abrasion resistant metal powder. Permitted to use all-metal diffusers of metal powder or Ni-resist cast iron;
- Impellers are made of PCM;
- High strength shafts;
- Axial support washers are made of silicon carbide;
- Intermediate bearings with a pair of friction from hard alloys are set through each meter of assembly.

c) Gas Resistant Pumps (G)

- Based on the basic type (B);
- At the bottom of the module-section at the entrance set dispersing stages DS that would eliminate from the ESP gas separator. Next, set the main stages according to the basic type (B);
- Between the dispersing and main stages installed intermediate bearing with a pair of friction "bronze-steel" type.

d) Gas and Abrasion Resistant Pumps (GA)

- Based on the abrasion resistant type (A);
- At the bottom of the module-section at the entrance set dispersing stages DS that would eliminate from the ESP gas separator. Next, set the main stages according to the abrasion resistant type (A);
- Between the dispersing stages and main stages installed intermediate bearing with a pair of friction from hard alloys.

At the request of any customer pumps may be equipped with a drain and check valve, as well as sludge trap with a pipe of any required length.

PUMP DESIGNATION STRUCTURE

Pumps are designated as follows:

1 **0** **3** **ESP(PM)** **A** **5-** **50-** **1600** Technical Specifications **TU 3665-002-24476500-2007**
a b c d e f g h

where:

a) check valve embodiment type:

- 0 – type KOG-73 (disc valve).
- 1 – type KOSH-73 (ball valve).

b) section connection:

- 0 – six screws (M12×1,25), joint on type "flange-case";
- 1 – eight screws (M10×1), joint on type "flange-case";
- 2 – eight screws (M12×1,25), joint on type "flange-case";
- 3 – six screws (M12×1,25), joint on type "flange-flange";
- 4 – eight screws (M10×1), joint on type "flange-flange";
- 5 – eight screws (M12×1,25), joint on type "flange-flange".

c) stage embodiment:

- 1 – stages with combined diffusers and PCM impellers with elongated hub;
- 3 – stages with metal power diffusers and PCM impellers with elongated hub;
- 5 – double-pad stages with metal powder diffusers and PCM impellers.

Note: if first figures are zeros, it's allowed not to show them.

d) ESP(PM) – electric centrifugal pump (ESP) with stages made of polymeric materials (PM).

e) Type of pump:

- A – abrasion resistant pump;
- G – gas resistant pump;
- GA – gas and abrasion resistant pump;

Note: Basic pump type is not indicated.

f) Pump size designation.

g) Capacity, m³/day.

h) Pump head, m.

Other variants of pump design made in accordance with customer's specification and supply contract are also available.

EXAMPLES OF PUMP DESIGNATION

35ESP(PM)A5-50-1800 series TECHNICAL SPECIFICATIONS TU 3665-002-24476500-2007 – electric centrifugal pump (ESP) of abrasion resistant type (A), 5th size, with stages made of polymeric materials (PM), capacity 50 m³/day, nominal pump head 1800 m. Disk type check valve, 6-screw section connection, joint on type "flange-flange". Double-pad stages with metal powder diffusers and PCM impellers.

113ESP(PM)5-30-2200 series TECHNICAL SPECIFICATIONS TU 3665-002-24476500-2007 – electric centrifugal pump (ESP) of basic type, 5th size, with stages made of polymeric materials (PM), capacity 30 m³/day, nominal pump head 2200 m. Ball type check valve, 8-screw (M10x1) section connection, joint on type "flange-case". Single-pad stages with metal powder diffusers and PCM impellers.

141ESP(PM)G5-30-1500 series TECHNICAL SPECIFICATIONS TU 3665-002-24476500-2007 – electric centrifugal pump (ESP) of gas resistant type (G), 5th size, with stages made of polymeric materials (PM), capacity 30 m³/day, nominal pump head 1500 m. Ball type check valve, 8-screw (M10x1) section connection, joint on type "flange-flange". Single-pad stages with combined diffusers and PCM impellers.

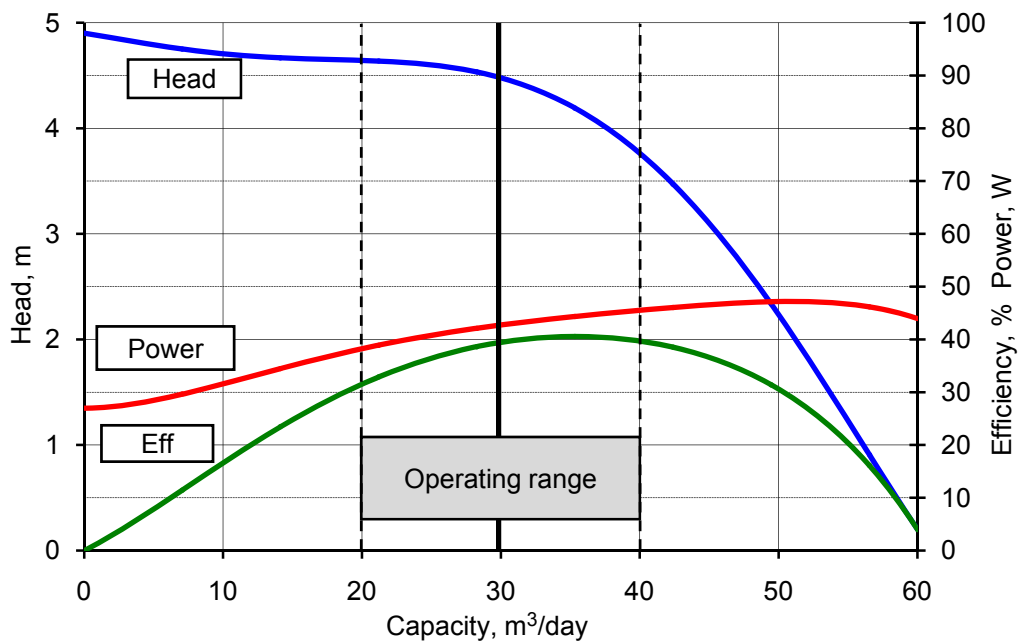
SINGLE-PAD PUMP 5-30 series

1ESP(PM)5-30
101ESP(PM)5-30

11ESP(PM)5-30
111ESP(PM)5-30

Nominal pump head, m	Section number, pcs. (section length, m)	Stage number, pcs.	Power, kW
- 550	1 (3)	123	5,2
- 745	1 (4)	166	6,9
- 940	1 (5)	209	8,8
-1100	2 (3+3)	246	10,3
-1300	2 (3+4)	289	12,1
-1500	2 (4+4)	332	13,9
-1650	2 (4+5)	375	15,8
-1850	2 (5+5)	418	17,6
-2050	3 (3+4+4)	455	19,1
-2250	3 (4+4+4)	498	20,9
-2400	3 (4+4+5)	541	22,7
-2600	3 (4+5+5)	584	24,5
-2800	3 (5+5+5)	627	26,3

Characteristics of pump stage
1ESP(PM)5-30 series pump type
at water density $\rho=1000 \text{ kg/m}^3$ and shaft speed 2910 rpm.



Capacity, m ³ /day	Head, m	Power, W	Efficiency, %
0	4,90	27	0
14	4,68	34	23
20	4,62	39	32
30	4,50	42	39
40	3,75	46	40
52	1,85	47	27
60	0,20	44	4

DOUBLE-PAD PUMP 5-30 series

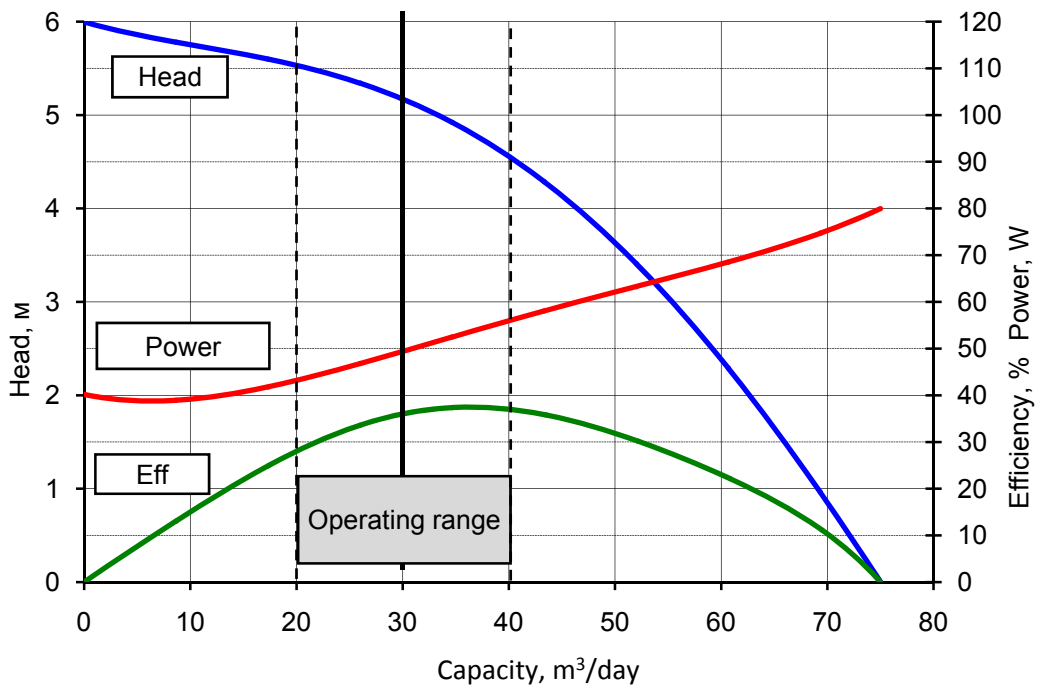
5ESP(PM)5-30
15ESP(PM)5-30

105ESP(PM)5-30
115ESP(PM)5-30

25ESP(PM)5-30
125ESP(PM)5-30

Nominal pump head, m	Section number, pcs. (section length, m)	Stage number, pcs.	Power, kW
- 645	1 (3)	123	6,1
- 870	1 (4)	166	8,3
- 1095	1 (5)	209	10,4
-1250	2 (3+3)	246	12,3
-1500	2 (3+4)	289	14,4
-1700	2 (4+4)	332	16,6
-1950	2 (4+5)	375	18,7
-2150	2 (5+5)	418	20,9
-2350	3 (3+4+4)	455	22,7
-2600	3 (4+4+4)	498	24,9
-2800	3 (4+4+5)	541	27,0

Characteristics of pump stage
5ESP(PM)5-30 series pump type
at water density $\rho=1000 \text{ kg/m}^3$ and shaft speed 2910 rpm.



Capacity, m ³ /day	Head, m	Power, W	Efficiency, %
0	6,00	40	0
10	5,75	40	15
20	5,50	42	28
30	5,25	50	36
40	4,50	56	37
60	2,40	68	23
75	0	80	0

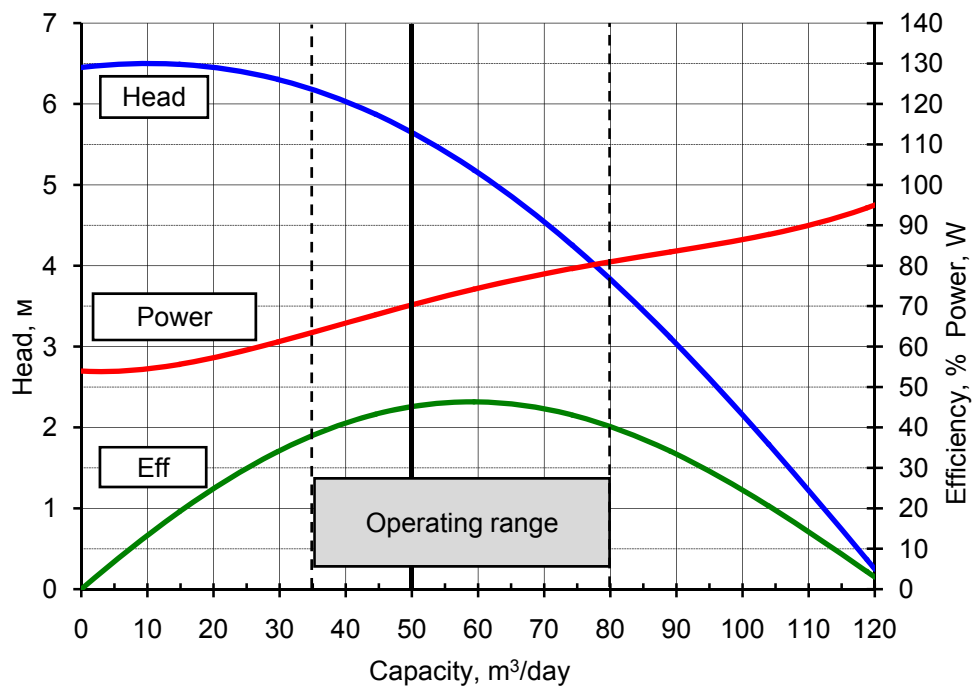
SINGLE-PAD PUMP 5-50 series

1ESP(PM)5-50
101ESP(PM)5-50

11ESP(PM)5-50
111ESP(PM)5-50

Nominal pump head, m	Section number, pcs. (section length, m)	Stage number, pcs.	Power, kW
-605	1 (3)	108	7,6
-815	1 (4)	146	10,2
-1030	1 (5)	184	12,9
-1200	2 (3+3)	216	15,2
-1400	2 (3+4)	254	17,8
-1600	2 (4+4)	292	20,4
-1850	2 (4+5)	330	23,1
-2050	2 (5+5)	368	25,7
-2200	3 (3+4+4)	400	28,0
-2450	3 (4+4+4)	438	30,6
-2650	3 (4+4+5)	476	33,3
-2850	3 (4+5+5)	514	36,0

Characteristics of pump stage
1ESP(PM)5-50 series pump type
at water density $\rho=1000 \text{ kg/m}^3$ and shaft speed 2910 rpm.



Capacity, m ³ /day	Head, m	Power, W	Efficiency, %
0	6,45	54	0
20	6,45	57	25
35	6,2	64	38
50	5,6	70	45
70	4,6	78	45
80	3,8	81	40
120	0,25	95	3

DOUBLE-PAD PUMP 5-60 series

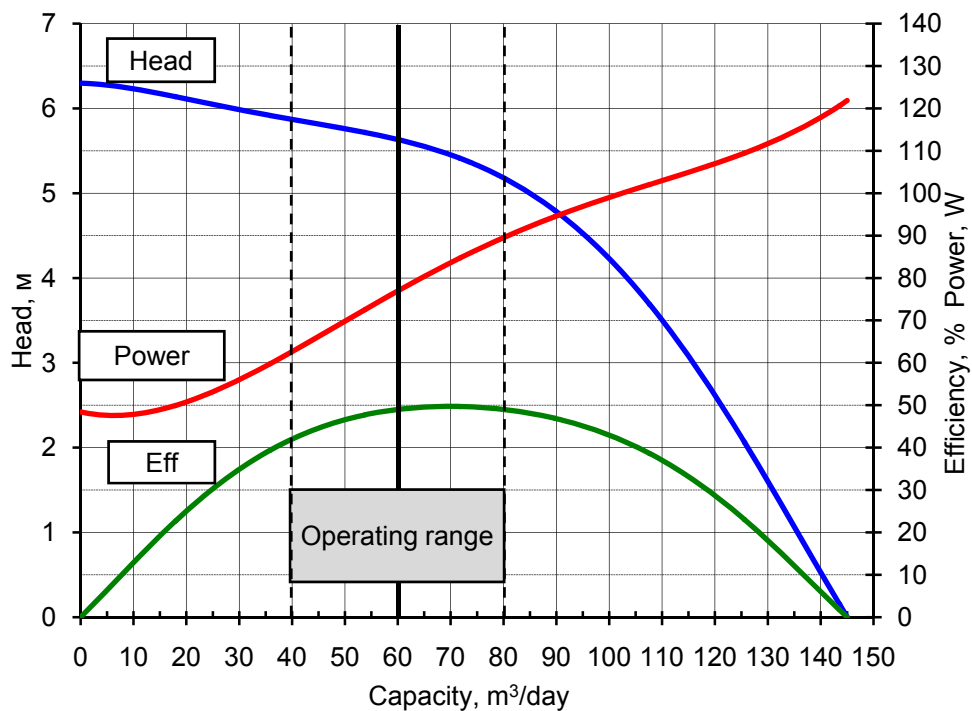
5ESP(PM)5-60
15ESP(PM)5-60

105ESP(PM)5-60
115ESP(PM)5-60

25ESP(PM)5-60
125ESP(PM)5-60

Nominal pump head, m	Section number, pcs. (section length, m)	Stage number, pcs.	Power, kW
- 625	1 (3)	112	8,6
- 850	1 (4)	152	11,7
- 1075	1 (5)	192	14,8
-1250	2 (3+3)	224	17,2
-1450	2 (3+4)	264	20,3
-1700	2 (4+4)	304	23,4
-1900	2 (4+5)	344	26,5
-2150	2 (5+5)	384	29,6
-2300	3 (3+4+4)	416	32,0
-2550	3 (4+4+4)	456	35,1
-2750	3 (4+4+5)	496	38,2

Characteristics of pump stage
5ESP(PM)5-60 series pump type
at water density $\rho=1000 \text{ kg/m}^3$ and shaft speed 2910 rpm.



Capacity, m ³ /day	Head, m	Power, W	Efficiency, %
0	6,3	48	0
20	6,1	52	25
40	5,9	62	42
60	5,6	77	49
80	5,2	92	49
110	3,5	102	37
145	0	122	0

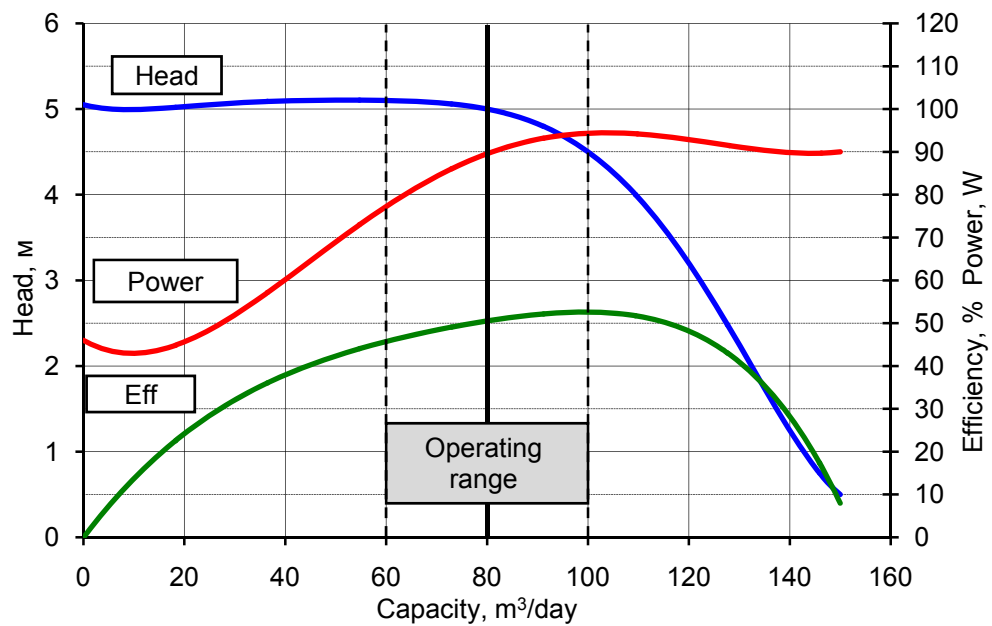
SINGLE-PAD PUMP 5-80 series

1ESP(PM)5-80
101ESP(PM)5-80

11ESP(PM)5-80
111ESP(PM)5-80

Nominal pump head, m	Section number, pcs. (section length, m)	Stage number, pcs.	Power, kW
- 550	1 (3)	110	9,9
- 745	1 (4)	149	13,4
- 940	1 (5)	188	16,9
-1100	2 (3+3)	220	19,8
-1250	2 (3+4)	259	23,3
-1450	2 (4+4)	298	26,8
-1650	2 (4+5)	337	30,3
-1850	2 (5+5)	376	33,8
-2000	3 (3+4+4)	408	36,7
-2200	3 (4+4+4)	447	40,2
-2400	3 (4+4+5)	486	43,7
-2600	3 (4+5+5)	525	47,3
-2800	3 (5+5+5)	564	50,8

Characteristics of pump stage
1ESP(PM)5-80 series pump type
at water density $\rho=1000 \text{ kg/m}^3$ and shaft speed 2910 rpm.



Capacity, m ³ /day	Head, m	Power, W	Efficiency, %
0	5,05	46	0
30	5,07	52	32
60	5,10	77	46
80	5,00	90	50
100	4,50	94	53
120	3,20	93	48
150	0,50	90	8

DOUBLE-PAD PUMP 5-80 series

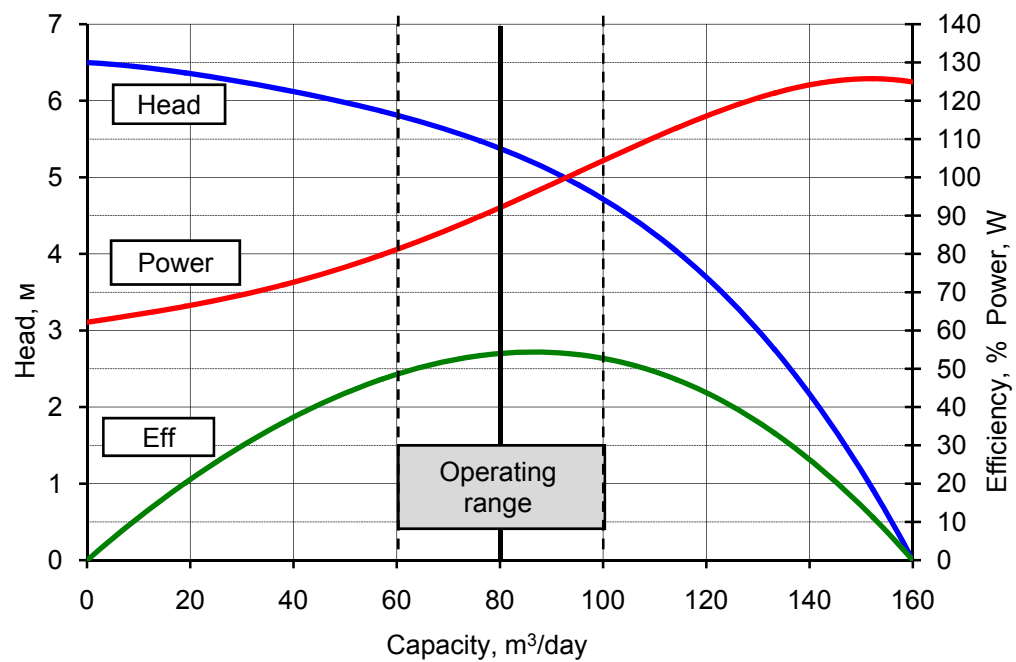
**5ESP(PM)5-80
15ESP(PM)5-80**

**105ESP(PM)5-80
115ESP(PM)5-80**

**25ESP(PM)5-80
125ESP(PM)5-80**

Nominal pump head, m	Section number, pcs. (section length, m)	Stage number, pcs.	Power, kW
- 570	1 (3)	106	9,7
- 772	1 (4)	143	13,1
- 972	1 (5)	180	16,6
-1100	2 (3+3)	212	19,5
-1300	2 (3+4)	249	22,9
-1500	2 (4+4)	286	26,3
-1700	2 (4+5)	323	29,7
-1900	2 (5+5)	360	33,1
-2100	3 (3+4+4)	392	36,1
-2300	3 (4+4+4)	429	39,5
-2500	3 (4+4+5)	466	42,8
-2700	3 (4+5+5)	503	46,3
-2900	3 (5+5+5)	540	49,7

Characteristics of pump stage
5ESP(PM)5-80 series pump type
at water density $\rho=1000 \text{ kg/m}^3$ and shaft speed 2910 rpm.



Capacity, m ³ /day	Head, m	Power, W	Efficiency, %
0	6,5	62	0
30	6,2	70	30
60	5,8	80	48
80	5,4	92	55
100	4,7	106	52
120	3,7	115	44
160	0	125	0

DOUBLE-PAD PUMP 5-125 series

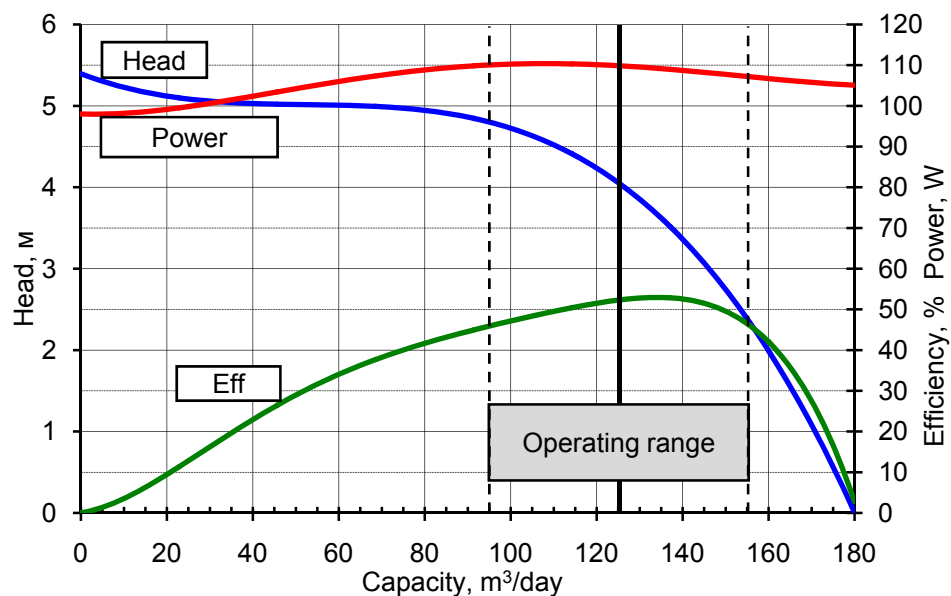
**5ESP(PM)5-125
15ESP(PM)5-125**

**105ESP(PM)5-125
115ESP(PM)5-125**

**25ESP(PM)5-125
125ESP(PM)5-125**

Nominal pump head, m	Section number, pcs. (section length, m)	Stage number, pcs.	Power, kW
- 385	1 (3)	92	10,1
- 525	1 (4)	125	13,8
- 660	1 (5)	158	17,4
-1050	2 (4+4)	250	27,5
-1150	2 (4+5)	283	31,3
-1300	2 (5+5)	316	34,8
-1400	3 (3+4+4)	342	37,6
-1550	3 (4+4+4)	375	41,2
-1700	3 (4+4+5)	408	44,5
-1850	3 (4+5+5)	441	48,5
-1950	3 (5+5+5)	474	52,1
-2100	4 (4+4+4+4)	500	55,0
-2200	4 (4+4+4+5)	533	58,6
-2350	4 (4+4+5+5)	566	62,3
-2500	4 (4+5+5+5)	599	65,9
-2650	4 (5+5+5+5)	632	69,5
-2750	5 (4+4+4+4+5)	658	72,4
-2900	5 (4+4+4+5+5)	691	76,0

Characteristics of pump stage
5ESP(PM)5-125 series pump type
at water density $\rho=1000 \text{ kg/m}^3$ and shaft speed 2910 rpm.



Capacity, m ³ /day	Head, m	Power, W	Efficiency, %
0	5,40	98	0
60	5,00	106	34
95	4,75	110	46
125	4,20	110	52
155	2,30	107	47
170	1,00	106	27
180	0,10	105	3



Avtozavodskaya str. 7, Izhevsk, Udmurt Republic
426065, Russian Federation

Phone: +7 (3412) 46-46-62

Fax: +7 (3412) 20-27-84

office@izhnefteplast.ru

<http://www.izhnefteplast.ru>