TOKEM

CATALOGUE OF THE PRODUCTS

FOR PRODUCING POTABLE AND ULTRAPURE WATER

2019

TOKEM

HIGH-TECH PRODUCTION OF ION EXCHANGE RESINS

Dear colleagues ad partners,

I am pleased to introduce here the general information on ion exchange resins produced by “TOKEM” Production Association LLC (OOO).

A.L. Tikhomirov

Director General
“TOKEM” Production Association LLC (OOO)

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The history of our company dates back to February 3, 1942, when the plant "Karbolit" evacuated from Orekhovo-Zuevo (Moscow region) rearwards to Kuzbass put out its first products. This day is considered the birthday of Kemerovo company "Karbolit". In 1991, in the course of corporatization Kemerovo Research and Production Association "Karbolit" was converted into JSC Company "TOKEM", and since August 2004 we are "TOKEM" Production Association LLC (OOO). Applying the results of our own research and experience, the company "TOKEM" provides commercial supply of ion exchange resins for various applications in accordance with the wishes and requirements of customers.

The most significant of all existing technological problems is, undoubtedly, the problem of water supply and efficient use of water resources for population and industry needs. One can neither live nor can carry out production processes without quality water. Water is a key strategic product, thus technology aimed at obtaining high-quality water is becoming increasingly more important. Ion exchange resins are used not only in water treatment, but also in virtually all industries.

Our company possesses a state-of-the-art technology of production of monodisperse ion exchange resins that allows us to produce and deliver to the market the most effective and demanded materials.

Development and production of ion exchange resins is fully consistent with our forward strategy, namely, to be a leading Russian company in the field of ion exchange.

Products supplied by our company are the outcomes of our own research center providing the implementation of innovation and development of production. Our main goal is to satisfy the requests, wishes, and requirements of customers, which is ensured by a professional team of experienced engineers and researchers.

A.L. Tikhomirov

Honoured Chemist of the Russian Federation
Director General of “TOKEM” Production Association LLC (OOO)

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TOKEM

CATALOGUE CONTENTS

REGISTERED
Russian Standard Register
ISO 9001

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TOKEM | PRODUCTION ASSOCIATION

CATION EXCHANGE RESIN TOKEM-150

TR 2227-023-72285630-2011

High capacity strong acid cation exchange resin of gel type. It is characterized with high chemical and osmotic stability. Its specific production technology minimizes mineral and organic impurities.

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	Sulfonic acid
Polymer structure	gel
Ionic form	Na^+ Sodium

Application area:

- treatment of residential and potable water.

Physical and Chemical Characteristics :

CHARACTERISTICS	STANDARD VALUE
Appearance	Spherical beads, yellow to dark brown in colour
Particle size range, mm	0.315-1.250
Effective particle size, mm	0.40-0.55
Volume of effective size fraction, % min	96
Uniformity coefficient, max	1.7
Moisture retention, %	43-53
Total capacity, mmol/cm^3 (mg-eq/cm^3), min	1.9
Osmotic stability, %, min	96
Permanganate demand of aqueous extract in oxygen equivalent, mg/dm^3, max: at 20 ° C at 80 ° C	 4 10
Odour intensity of water filter at 100 °C, units, max	1
Colour, degree, max	20
Turbidity, FTU, max	2.6
Hydrogen index, pH units	7-9

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Table con'd (Physical and Chemical Characteristics)

Shipping weight, g/cm^3	0.80-0.85
Particle density, g/cm^3	1.25-1.29

Processing Characteristics:

SUGGESTED OPERATING CONDITIONS AND MODES:	
Bed depth min, mm	800
Pressure drop coefficient, kPa·h/m^2	1.35
Temperature limit, ° C	120
pH limit	0-14
Swelling at $H^+ \rightarrow Na^+$, % at $Na^+ \rightarrow Ca^+$, %	 5-8 3-4
Regenerant, %	(6-10) NaCl
Total rinse requirement, BV	3-5
Backwashing bed expansion, %	50-80

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TOKEM | PRODUCTION ASSOCIATION

CATION EXCHANGE RESIN TOKEM-250

TR 2227-019-72285630-2009

High capacity weak acid cation exchange resin (porous type). Its features are improved particle range composition, osmotic stability and high total and dynamic exchange capacities. The resin contains minimum mineral and organic impurities.

GENERAL DESCRIPTION	
Matrix	acryl-DVB
Functional group	carboxyl
Polymer structure	macroporous
Ionic form	H^+ Hydrogen Na^+ Sodium

Application area:

- purification of residential and potable water.

Physical and Chemical Characteristics :

CHARACTERISTICS	STANDARD VALUE	
Appearance	Spherical opaque beads, white to light yellow in colour	
Ionic form	H^+	Na^+
Particle size range, mm	0.315-1.600	
Uniformity coefficient, max	1.6	
Volume of effective size fraction, % min	98	
Effective particle size, mm	0.4-0.6	
Moisture retention, %	45-55	55-65
Osmotic stability, %, min	98	
Total capacity, mmol/cm^3 (mg-eq/cm^3), min	4.3	
Dynamic exchange capacity with regenerant requirement target, mmol/m^3 (g-eq/m^3), min	2300	
Mass fraction of ammonium ions in water product, mg/dm^3, max	0.4	

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Table con'd (Physical and Chemical Characteristics)

Permanganate demand of aqueous extract in oxygen equivalent, mg/dm^3, max: at 20 °C at 80 °C	 4 6	
Odour intensity of water filter at 100 °C, units, max	1	
Shipping weight, g/cm^3	0.74-0,80	0.78-0.88
Particle density, g/cm^3	1.14-1.20	1.20-1.25

Processing Characteristics:

SUGGESTED OPERATING CONDITIONS AND MODES:	
Bed depth, mm min	600
Temperature limit, ° C	120
pH limit	5-14
Swelling at $H^+ \rightarrow Na^+$, % $Na^+ \rightarrow Ca^+$, %	 40-60 7
Regenerant, % H^+ form	(0.3-0.8) H_2SO_4 (4-5) HCl
Total rinse requirement, BV	6-10
Backwashing bed expansion, %	80-100

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CATION EXCHANGE RESIN TOKEM-140/99

TR 20.16.59-044-72285630-2016

Strong acid cation exchange resin (gel type). It is characterized with uniform particle range composition and high purity.
Conversion to shipping ionic form is over 99%. High monodispersity and the absence of small fraction significantly decreases pressure drop across the bed height. This, in turn, enables high flow rates, enhances regeneration effectiveness and reduces reagent and rinsing water requirements.
Uniform particle composition, compact bed packing, and no dead zones increase diffusion rate and contact area. These features improve ion exchange kinetics.
The cation exchange resin is stable to chemical and mechanical stress. Its high osmotic stability results in doubling its service life compared to that of polydispersed cation exchange resins.

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	sulfonic acid
Polymer structure	gel
Ionic form	H^+ Hydrogen Na^+ Sodium

Application area:

Monodispersed cation exchange resin TOKEM-140/99 can be applied in such processes as:
In H^+ form:
- deep water purification;
- separation of various elements;
- process media treatment;
- production of ultrapure materials for food, health and pharmaceutical industries;

In Na^+ form:
- potable water purification.

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Physical and Chemical Characteristics:

CHARACTERISTICS	STANDARD VALUE
Appearance	Spherical beads, yellow to dark brown in colour
PARTICLE SIZE DISTRIBUTION	
Mean particle size, mm	0.60±0.05
Uniformity coefficient, max	1.1
Osmotic stability, %, min	96
Moisture retention, % H^+ form Na^+ form	 48-58 43-53
Total capacity, mmol/cm^3 (mg-eq/cm^3), min	1.8
Product pH value, pH units H^+ form, min Na^+ form	 4.5 7-9
Iron mass fraction, % max	0.03
Mass fraction of chloride ions, mg/cm^3, max	0.0015
Water product oxidation in oxygen equivalent, mg/g max	0.5
Dynamic exchange capacity with full regeneration, mmol/m^3 (g-eq/m^3), min	1600
Total uncracked beads as shipped, %, min	95
Shipping weight, g/cm^3 H^+ form Na^+ form	 0.75-0.80 0.80-0.85
Particle density, g/cm^3	1.20-1.25

Processing Characteristics:

SUGGESTED OPERATING CONDITIONS AND MODES:	
Bed depth, mm min	800
Pressure drop coefficient, kPa·h/m^2	1.0
Temperature limit, ° C	120
pH limit	0-14
Swelling at H^+- → Na^+, %	5-8
Regenerant, % H^+ form Na^+ form	 (1-1.5-3.0) H_2SO_4 (4-5) HCl (6-10) NaCl
Total rinse requirement, BV	2-4
Backwashing bed expansion, %	50-80

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ANION EXCHANGE RESIN TOKEM-840/95

TR 20.16.59-044-72285630-2016

Strong base anion exchange resin (gel type) with uniform particle range composition and high purity.
The resin is manufactured in OH^- form. Conversion to OH^- form is not less than 95%. High monodispersity and the total absence of small fraction significantly decreases pressure drop across the bed height. This, in turn, enables high flow rates, enhancing regeneration effectiveness, reducing reagent and rinsing water requirements. Uniform particle range composition, compact bed packing, and no dead zones increase diffusion rate and contact area. These features improve ion exchange kinetics.
High osmotic stability of the anion exchange resin results in doubling its service life compared to that of polydispersed products.

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	quaternary ammonium basic groups (type 1)
Polymer structure	gel
Ionic form	OH^- hydroxyl

Application area:

Monodispersed anion exchange resin TOKEM-840/95 can be applied in such processes as:
- deep water purification;
- separation of various elements;
- process media treatment;
- production of ultrapure substances in food, health and pharmaceutical industries.

Physical and Chemical Characteristics:

CHARACTERISTICS	STANDARD VALUE
Appearance	Spherical beads, light yellow to brown in colour
PARTICLE SIZE DISTRIBUTION	
Mean particle size, mm	0.60±0.05

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Table con'd (Physical and Chemical Characteristics)

Uniformity coefficient, max	1.1
Osmotic stability, %, min	91
Total uncracked beads as shipped, %, min	95
Total capacity, mmol/cm^3 (mg-eq/cm^3), min	1.1
Equilibrium static exchange capacity, mmol/cm^3 (mg-eq/cm^3), min	1.0
Dynamic exchange capacity with full regeneration, mmol/m^3 (g-eq/m^3), min	1000
Iron mass fraction, % max	0.03
Mass fraction of chloride ions, mg/cm^3, max	0.40
Water product oxidation in oxygen equivalent, mg/dm^3, max	0.5
Alkali mass fraction, mmol/g (mg-eq/g), max	0.0005
Anion exchange resin content in CO_3^{2-} form, %, max	5.0
Shipping weight, g/cm^3	0.64-0.74
Particle density, g/cm^3	1.06-1.10

Processing Characteristics:

SUGGESTED OPERATING CONDITIONS AND MODES:	
Bed depth, mm min	800
Pressure drop coefficient, kPa·h/m^2	1.0
Temperature limit, ° C OH^- form	60
pH limit	1-14
Swelling at $Cl^- \rightarrow OH^-$, %	20
Regenerant, %	(3-4) NaOH
Total rinse requirement, BV	2-4
Backwashing bed expansion, %	80-100

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CATION EXCHANGE RESIN KU-2-8 chS

GOST 20298-74

Top grade strong acid cation exchange resin (gel type). It is characterized with high chemical stability and mechanical strength. The resin is manufactured in H^+ form. Conversion to H^+ form is not less than 99%. It contains minimum amounts of chloride and iron ions and organic substances. Its high purity allows using the cation exchange resin for deep water demineralization.

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	sulfonic group
Polymer structure	gel
Ionic form	H^+- Hydrogen

Application area:

- peep purification of water;
- separation of various elements;
- production of ultrapure substances in food, health and pharmaceutical industries.

Physical and Chemical Characteristics:

CHARACTERISTICS	STANDARD VALUE
Appearance	Spherical beads, yellow to dark brown in colour
PARTICLE SIZE DISTRIBUTION	
Particle size range, mm	0.40-1.25
Effective particle size, mm max	0.45-0.65
Volume of effective size fraction, % min	96
Uniformity coefficient, max	1.7
Moisture retention, %	48-58
Specific volume, $см^3/g$, в H^+ form, max	2.7
Total capacity, $mmol/cm^3$ ($mg\text{-}eq/cm^3$), min	1.80

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Table con'd (Physical and Chemical Characteristics)

Dynamic exchange capacity with full regeneration, mmol/m^3 (g-eq/m^3), min	1600
Water product oxidation in oxygen equivalent, mg/g max	0.5
Osmotic stability, %, min	96
Product pH value, min	4.5
Iron mass fraction, % max	0.03
Mass fraction of chloride ions, mg/cm^3, max	0.0015

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ANION EXCHANGE RESIN AB-17-8 chS

GOST 20301-74

Strong base anion exchange resin (gel type) with high chemical stability and mechanical strength. The resin is manufactured in OH^- form. Conversion to OH^- form is not less than 94%. It contains minimum amounts of residual chloride and iron ions and organic compounds. Its high purity enables using the anion exchange resin for deep water demineralization.

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	quaternary trimethylammonium groups
Polymer structure	gel
Ionic form	OH^- hydroxyl

Application area:

- deep water treatment;
- chemical, pharmaceutical and food industries.

Physical and Chemical Characteristics:

CHARACTERISTICS	STANDARD VALUE
Appearance	Spherical beads, light yellow to dark brown in colour
PARTICLE SIZE DISTRIBUTION	
Particle size range, mm	0.40-1.25
Effective particle size, mm max	0.6
Volume of effective size fraction, % min	95
Uniformity coefficient, max	1.6
Specific volume in OH^- form, cm^3/g	3.0 ± 0.3
Total capacity, $mmol/cm^3$ ($mg\text{-}eq/cm^3$), min	1.20
Equilibrium static exchange capacity, $mmol/cm^3$ ($mg\text{-}eq/cm^3$), min	1.10
Dynamic exchange capacity with full regeneration, $mmol/m^3$ ($g\text{-}eq/m^3$), min	1050
Water product oxidation in oxygen equivalent, mg/l max	0.60

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Table con'd (Physical and Chemical Characteristics)

Osmotic stability, %, min	91
Mass fraction of chloride ions, mg/cm^3, max	0.400
Alkali mass fraction, mmol/g (mg-eq), max	0.0005
Iron mass fraction, % max	0.03
Anion exchange resin content in CO_3^{2-} form, % max	6.0

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CATION EXCHANGE RESIN TOKEM-160

TR 2227-023-72285630-2011

High capacity strong acid cation exchange resin (gel type). It is characterized with high chemical stability and mechanical strength. It is manufactured in H^+ form. Conversion to H^+ form is not less than 99%. It contains minimum amounts of iron and chloride ions and organic compounds. Its high purity allows using the cation exchange resin for deep water demineralization.

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	sulfonic group
Polymer structure	gel
Ionic form	H^+ Hydrogen

Application area:

- deep water purification;
- separation of various elements;
- production of ultrapure materials for food, health and pharmaceutical industries.

Physical and Chemical Characteristics:

CHARACTERISTICS	STANDARD VALUE
Appearance	Spherical beads, yellow to dark brown in colour
PARTICLE SIZE DISTRIBUTION	
Particle size range, mm	0.40-1.25
Volume of effective size fraction, % min	98
Effective particle size, mm	0.45-0.65
Uniformity coefficient, max	1.6
Moisture retention, %	48-58
Osmotic stability, %, min	96
Total capacity, mmol/cm^3 (mg-eq/cm^3), min	1.9

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Table con'd (Physical and Chemical Characteristics)

Hydrogen index, pH units min	4.5
Iron mass fraction, % max	0.03
Mass fraction of chloride ions, mg/cm^3, max	0.0015
Water product oxidation in oxygen equivalent, mg/g max	0.5
Total uncracked beads as shipped, %, min	97
Dynamic exchange capacity with full regeneration, mmol/m^3 (g-eq/m^3), min	1600
Shipping weight, g/cm^3	0.75-0.80
Particle density, g/cm^3	1.17-1.25

Processing Characteristics:

SUGGESTED OPERATING CONDITIONS AND MODES:	
Bed depth, mm min	800
Pressure drop coefficient, kPa·h/m^2	1.35
Temperature limit, ^{o} C	120
pH limit	0-14
Swelling at $H^+ \rightarrow Na^+$, %	5-8
Regenerant, %	(1-1.5-3.0) H_2SO_4 (4-5) HCl
Total rinse requirement, BV	3-5
Backwashing bed expansion, %	50-80

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ANION EXCHANGE RESIN TOKEM-860

TR 2227-025-72285630-2011

Strong base anion exchange resin (gel type) with high chemical stability and mechanical strength.
It is produced in OH^- form. Conversion to OH^- form is not less than 95%. It contains minimum amounts of iron and chloride ions and organic compounds. Its high purity allows using the anion exchange resin for deep water demineralization.

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	quaternary ammonium base groups (type 1)
Polymer structure	gel
Ionic form	OH^- hydroxyl

Application area:

Anion exchange resin TOKEM-860 can be applied in such processes as:
- process medium treatment
- deep water purification;
- production of ultrapure materials for food, health and pharmaceutical industries;
- separation and extraction of non-ferrous metals.

Physical and Chemical Characteristics:

CHARACTERISTICS	STANDARD VALUE
Appearance	Spherical beads, light yellow to brown in colour
PARTICLE SIZE DISTRIBUTION	
Particle size range, mm	0.40-1.25
Volume of effective size fraction, % min	97
Effective particle size, mm max	0.6
Uniformity coefficient, max	1.6
Volume factor in OH^- form, cm^3/g	2.7-3.3
Osmotic stability, %, min	94
Total uncracked beads as shipped, %, min	97

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Table con'd (Physical and Chemical Characteristics)

Total capacity, mmol/cm^3 (mg-eq/cm^3), min	1.20
Equilibrium static exchange capacity, mmol/cm^3 (mg-eq/cm^3), min	1.10
Dynamic exchange capacity with full regeneration, mmol/m^3 (g-eq/m^3), min	1050
Water product oxidation in oxygen equivalent, mg/l max	0.60
Iron mass fraction, % max	0.03
Mass fraction of chloride ions, mg/cm^3, max	0.400
Alkali mass fraction, mmol/g, max	0.0005
Anion exchange resin content in CO_3^{2-} form, % max	6.0
Shipping weight, g/cm^3	0.64-0.74
Particle density, g/cm^3	1.06-1.10

Processing Characteristics:

SUGGESTED OPERATING CONDITIONS AND MODES:	
Bed depth, mm min	800
Pressure drop coefficient, kPa·h/m^2	1.35
Temperature limit, ° C in OH^- form	60
pH limit	1-14
Swelling at $Cl^- \rightarrow OH^-$, %	20
Regenerant, %	(3-4) NaOH
Total rinse requirement, BV	3-6
Backwashing bed expansion, %	80-100

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TOKEM MB-65

TR 20.16.59-039-72283630-2016

TOKEM MB-65 is a ready equimolar mixture to be used in nonregenerable mix bed filters. It consists of high purity monodisperse strong base anion exchange resin and monodisperse strong acid cation exchange resin (1 : 1 in capacity).

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	Sulfonic acid/quaternary amine (type1)
Polymer structure	gel
Ionic form	H^+ / OH^- Hydrogen / hydroxyl

Application area:

- for mix bed filters and cartridges to produce ultrapure water with electric conductivity of up to 0.056 μ S/sm; it is applied in manufacturing electronics, in medicine and other fields of industry and science;
- for purification of potable water.

Physical and Chemical Characteristics:

CHARACTERISTICS	STANDARD VALUE	
Appearance	Spherical grains, yellow to dark brown in colour	
Components	Cation exchange resin	Anion exchange resin
Component content in the mixture, volume %	35±5	65±5
Total capacity, mmol/cm^3 (mg-eq/cm^3), min	1.8	1.1
Moisture retention, %	48-58	55-60
Water product oxidation in oxygen equivalent, max	0.5 mg/g	0.5 mg/l
Mass fraction of chloride ions, mg/cm^3, max	0.15	

PARTICLE SIZE DISTRIBUTION		
Mean particle size, mm	0.55±0.05	0.65±0.05
Volume of effective size fraction, % min	98	

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Table con'd (Physical and Chemical Characteristics)

Total uncracked beads as shipped, %, min	97
Uniformity coefficient, max	1.1
MECHANICAL STRENGTH (M)	
Average, g/bead, min	400
Number of beads with M<200 g/bead, %, max	5
Difference between settling times of anion and cation resins, sec, max	6
Electrostatic coefficient, % max	15

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TOKEM MB-65 (P)

TR 20.16.59-039-72283630-2016

TOKEM MB-65 (P) is a ready equimolar mixture for nonregenerable mix bed filters. It consists of high purity strong base anion exchange resin and strong acid cation exchange resin (1 : 1 in capacity).

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	Sulfonic acid/quaternary amine (type 1)
Polymer structure	gel
Ionic form	H^+ / OH^- Hydrogen / hydroxyl

Application area:

- for mix bed filters and cartridges to produce ultrapure water with electric conductivity of up to 0.056 μ S/sm; it is applied in manufacturing electronics, in medicine and other fields of industry and science;
- for purification of potable water.

Physical and Chemical Characteristics:

CHARACTERISTICS	STANDARD VALUE	
Appearance	Spherical grains, light yellow to brown in colour	
Components	Cation exchange resin	Anion exchange resin
Component content in the mixture, volume %	35±5	65±5
Total capacity, mmol/cm^3 (mg-eq/cm^3), min	1.9	1.15
Mass fraction of chloride ions, mg/cm^3, max	0.01	0.40
Water product oxidation in oxygen equivalent, max	0.5 mg/g	0.5 mg/dm^3
Moisture retention, %	50-60	
Difference between settling times of anion and cation resins, sec, max	6	
Electrostatic coefficient, % max	20	
PARTICLE SIZE DISTRIBUTION		
Mean particle size, mm	0.40-1.25	
Volume of effective size fraction, % min	98	
Total uncracked beads as shipped, %, min	97	

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TOKEM MB-45 (P)

TR 20.16.59-039-72283630-2016

TOKEM MB-45 (P) is a ready mixture to be used in nonregenerable mix bed filters. It consists of high purity strong base anion exchange resin and strong acid cation exchange resin.

GENERAL DESCRIPTION	
Matrix	styrene-DVB
Functional group	Sulfonic acid/quaternary amine (type1)
Polymer structure	gel
Ionic form	H^+ / OH^- Hydrogen / hydroxyl

Application area:

- for mix bed filters and cartridges to produce ultrapure water with electric conductivity of up to 0.056 μ S/sm; it is applied in manufacturing electronics, in medicine and other fields of industry and science;
- for purification of potable water.

Physical and Chemical Characteristics:

CHARACTERISTICS	STANDARD VALUE	
Appearance	Spherical grains, light yellow to brown in colour	
Components	Cation exchange resin	Anion exchange resin
Component content in the mixture, volume %	60±5	40±5
Total capacity, mmol/cm^3 (mg-eq/cm^3), min	1.9	1.15
Mass fraction of chloride ions, mg/cm^3, max	0.01	0.40
Water product oxidation in oxygen equivalent, max	0.5 mg/g	0.5 mg/dm^3
Moisture retention, %	50-60	
Difference between settling times of anion and cation resins, sec, max	6	
Electrostatic coefficient, % max	20	
PARTICLE SIZE DISTRIBUTION		
Mean particle size, mm	0.40-1.25	
Volume of effective size fraction, % min	98	
Total uncracked beads as shipped, %, min	97	

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"TOKEM" Production Association LLC (OOO) has implemented quality management system with regard to development and production of chemical products in accordance with GOST ISO 9001 – 2015
(ISO 9001 : 2015). Registration N ROSS RU.AC13.K00030

REGISTERED
Russian Standard Register
ISO 9001

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