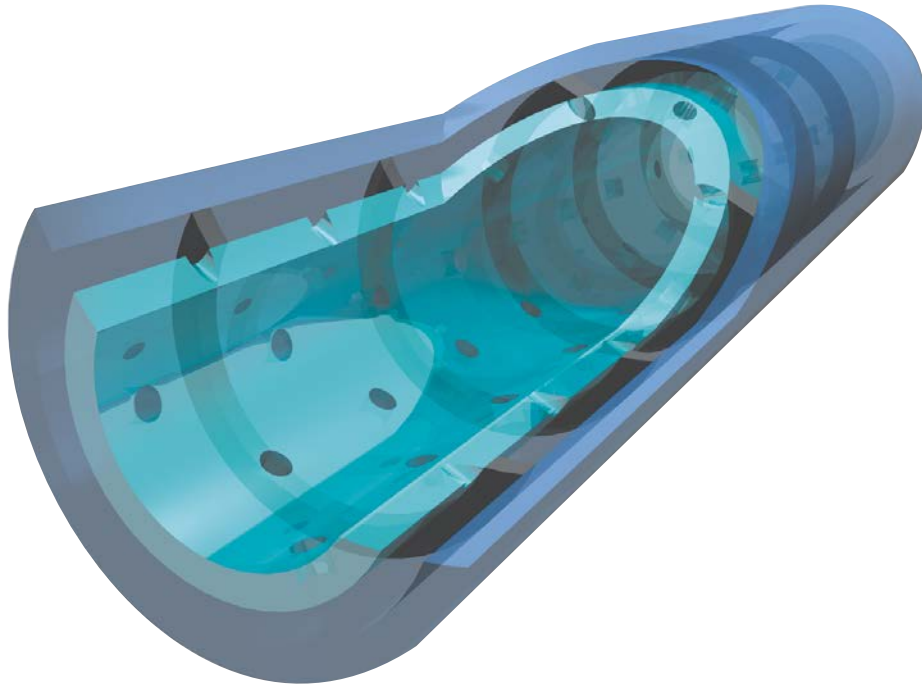




**POLYMER AERATORS APKV SERIES**  
**ORIGINAL INSTRUCTIONS OPERATION MANUAL**  
**(APKV 00.000.OM)**



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## 1. INTRODUCTION

### 1.1 How to use the present manual

The present operation manual (hereinafter OM) is intended for polymer wireframe aerators with air space (hereinafter – aerators) manufactured by “Eko-Invest” Company. The manual was written referring to Pressure Equipment Directive 97/23/EC and is integral part at equipment selling.

In the present manual the symbols «WARNING!», «CAUTION!» are used to point you about necessity to accept all safety measures at mounting, setup, operation and device repair.



Symbol «**WARNING!**» points you to possibility of receiving serious traumas or death at ignoring recommendations!



Symbol «**CAUTION!**» points you to possibility of equipment damage at ignoring recommendations!



**CAUTION! Before the beginning of the aerator operation, representatives of the Customer should familiarize this manual attentively.**

**This document should be always available for any consultation in the case of necessity. Please, contact our representation and request the duplicate in the case of the manual loss.**

### 1.2 Information containing in the manual

You will find all necessary information on mounting, service, setup, operation and repair of the aerator and personnel safety in this manual. For more information or in the case of the problems which have not been considered here in detail, address directly to “Eko-Invest” Company, please. The manual was written according to the rules of technical documentation “EN 12100-2:2003” for supplying of equipment integrity and personal safety involved at its using. The qualified personnel of the aerator maintenance should be acquainted with information about aerator service.

Due to the continuous work about aerator perfecting so can be made the design changes which have not been shown in the present document. The producer reserves the right to itself of making changes in the manual at any time. Changes don't demand the notification in advance.

### 1.3 Responsibility and guarantee of the manufacturer

- **Responsibility** Information, data and instructions containing in the operation manual, corresponded to the last version at the moment of the manual print. Data, figures and describing cannot be used as the basis for recovery of claims to already put devices.
- **Producer doesn't bear responsibility** for actions carrying out by costumer, without following the safety measures contained on this manual and described in the Pressure Equipment Directive 97/23/EC;
- **Producer doesn't bear responsibility** for a damage and the outage of production caused by the following reasons:
  - Misuse;
  - Connection errors at device installation;
  - Unwarranted changes in the aerator;
  - Maintenance and repair by unqualified and unskilled personnel;
  - Incorrect operation, maintenance and repair of the aerator;
  - Incorrect transportation and storage of the aerator;
  - Inobservance of the operation manual requirements.

## Warranty

- Warranty conditions are specified in the Contract of delivery of the concrete device;
- It is necessary to prefer claims about warranty service to “Eko-Invest” Company right after detection of defect or device malfunction.
- The warranty becomes invalid also in all those cases in which responsibility of the manufacturer is excluded.



**CAUTION! Warranty package doesn't extend on the purchased products which have failed because of nonobservance of service conditions and requirements of this manual.**

## 2 SAFETY MEASURES

### 2.1 General safety measures instructions

The aerator of "EKO-INVEST" company is made and designed subject to international safety requirements and with using it destination and implementation of the manual requirements provides the maximum safety level for the service personnel.

This operation manual contains the main instructions of the safety which should be carried out at mounting, operation and aerator maintenance. Please, address to "Eko-Invest" representative office if you have any questions or difficulties.

The personnel responsible for installation, operation, maintenance and supervision of the aerator should possess the corresponding qualification. Persons at the age from 16 till 18 years should work under the direction of skilled experts.

During the any above – listed operations should follow the operation manual. The operation manual should be situated next to the aerator.

The service personnel should pass test of safety engineering stated in this operation manual isn't more than two times a year. It is forbidden to allow operating with aerator the personnel who have not passed testing of safety measures, stated in this operation manual.

It is necessary to observe not only the general safety measures mentioned in this chapter but also the special instructions provided in the main sections.

Application of the aerator should be designed so that at mounting, proper use and it continuously carried out the functions and don't create danger to people.

### 2.2 Instructions according to the safety measures during operation

All works such as transporting, storage, installation, commissioning, maintenance and repair should be carried out only by qualified personnel.

Qualified personnel are faces who have education, experience, instructing and also have been looked through the corresponding standards, provisions, safety regulations and the labor relations and have received from the employee responsible for safety of installation work permit of required actions and also are capable to identify possible emergencies and avoid it (qualified personnel definition on IEC 60364).



**WARNING!** Don't startup aerators at troubleshooting, maintenance and repair works. Restart without prior warning can lead to serious traumas of the personnel.



**WARNING!** It is strictly forbidden to be on and under the lifted equipment at removing, lifting and lowering.



**WARNING!** It is forbidden to carry out repair and adjusting work at operating aerator.



**CAUTION!** It is forbidden to continue aerator operation at failure detection.



**CAUTION!** It is forbidden aerator's operation installed with warps. Aerators should be installed with horizontal deviation along height not more than 12 mm for 10 m of the joint length.



**WARNING!** At necessity of carrying out of welding works and works with open fire it is necessary to provide the fireproof protection.



**WARNING!** On certain conditions at oxidation of polymeric materials in the issue of burning it can become the source of highly toxic materials.



**WARNING!** It is forbidden for maintenance staff to carry out works connected with non-manufacturing contact with wastewater without protective clothing: overall, gloves, coverall.

It is necessary to follow the safety measures existing at this enterprise at maintenance of the aerator.

There is a possibility of inhalation of steams and gases containing in wastewater during the maintenance of aerator. Therefore it is necessary to put on means of individual protection of respiratory organs and mucous membranes of body and allow the personnel which have no allergic reaction to evaporations from wastewater to such works.

After carrying out any works on aerator service the service personnel should wash up hands by special disinfectant detergents.

Despite all accepted safety measures there are other risks which can result from aerator operation. Possible risks and measures for their elimination:

- for prevention of traumas as a result of a creeping it is necessary to have means of room and equipment cleaning;
- for prevention of an allergy and irritation as a result of contact to sewage or waste it is necessary to provide the service personnel with special working clothes, footwear, gloves, a headdress and means of individual protection;
- for prevention of traumas because of falling into open aeration tank it is necessary to install the barriers.
- for rendering of the first medical care it is necessary to have the first-aid kit.



**WARNING!** It is strictly forbidden to perform works and to be near with equipment drunken persons and persons with feeling sick.

### **2.3 Unauthorized changes in installation and designing of spare parts**

Original spare parts of operating company are met to all requirements of the safety measures. In the case of using of other spare parts that can lead to damage or traumas, the manufacturing company doesn't bear responsibility.

Equipping of aerator, changing of construction or alteration without written agreement is forbidden.

Use product only according to its intended purpose. Abuse of the aerator is forbidden.

### **2.4 Duties of the Customer**

The customer must obtain a local license to operate the devices and act in accordance with directive 97/23/EC.

In addition, the consumer must comply with local laws regarding:

- safety of the personnel (the Regulations for the Prevention of Accidents);
- ensure the safety of production equipment (safety devices and maintenance);
- utilization of products (Law on waste management);
- utilization of materials (Law on waste management);
- cleaning (cleaning products and its disposal);
- environment protection.



**CAUTION!** The customer is responsible for:

- instruction of service personnel;
- prompt maintenance.

Communications: Before the aerator startup if the installation and commissioning is carried out with the Costumer it must make sure that you meet the requirements of local standards.

### 3. TECHNICAL DATA

#### 3.1 Purpose

Aerators are intended for uniform distribution of air supplied through the dispersive layer to the treated liquid.

Aerator is used in the aeration systems on the different types of household and industrial treatment. The main consumers are enterprises of a water and sewer branch.

It is forbidden to use the aerator in wastewater with pH less than 6,5 and more than 8,5.

Intended use also includes:

- observance of the commissioning conditions ordered by the producer, maintenance, repair as it is stated in this maintenance instruction;
- take into account the predictable malpractice ;
- equipment operation only by qualified personnel (which have learned the rules of operation and have been informed about danger situations).

Aerator is intended for using only in the field mentioned above.



**CAUTION! Manufacturer does not bear responsibility for damages in result of abuse of the aerator and in the case of unauthorized changes of construction not coordinated with manufacturer.**

#### 3.2 Delivery set

Standard delivery set includes:

1. Aerator.  
Aerator's delivery set includes:
  - dispersive component of aerator;
  - perforated framework of aerator;
  - coupling with internal thread;
  - coupling with external thread;
  - joining steel coupling;
  - polyethylene stopper;
  - fastening of aerators;
  - uncontrolled fastening with cantledge;
  - controlled fastening;
  - uncontrolled fastening without cantledge.
2. Documentation

#### 3.3 Information about aerator acceptance

Before delivery the manufacturer carries out technical control and the aerator's acceptance for readiness to operation, namely:

1. General inspection of aerator's complete parts;
2. Check of presence of all components from delivery set;
3. Check of package used for product delivery.

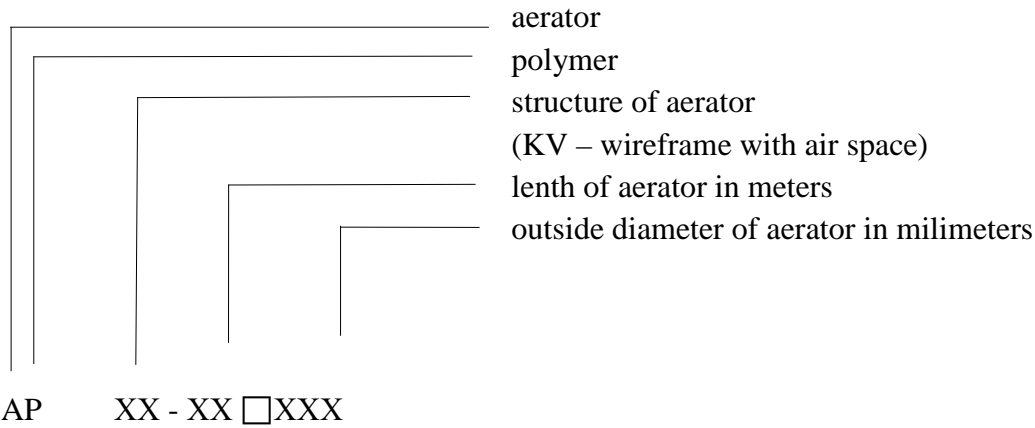
Information about acceptance of the aerator is pointed in the list of technical data for specific product (Attachment 4).

#### 3.4 Technical characteristics of the mechanical part of equipment

The aerator is made of polyethylene of low and high pressure with different dimensions. Dimension of aerator selects depending from geometrical sizes of tank where it will be installed. Data for aerator selection is pointed by Customer or developer in the questionnaire (Attachment 2).

The aerator conforms to standard safety requirements and environmental protection, public health.

The aerator designation code structure:



Example:

Aerator polymeric, wireframe with air space, with length 2,0 m and outside diameter 120 mm:

Aerator AP KV - 2.0 □ 120

Technical data of the aerators is presented in table 3.1.

**Table 3.1- Technical characteristics of the aerators**

№	Parameter	Measuring unit	Value
1	2	3	4
1.	Dispersive component of the aerator -outside diameter -inside diameter -density -porosity	mm mm g/cm <sup>3</sup> %	120 100 0.45-0.60 35-50
2.	Perforated framework of the aerator -outside diameter	mm	90
3.	Joining polyethylene coupling -with internal thread -with external thread	kg kg	0.23 0.2
4.	Weight of ready-assembled aerator - AP KV -1.0 - AP KV -2.0	kg kg	to 4 to 7
5.	Hydraulic resistance for 1 r.m. of the aerator at air consumption 5÷30 m <sup>3</sup> /h for 1 r. m. of the aerator	mm.w.p	to 400
6.	Air permeability for 1 r.m. of the aerator	l/min	To 900
7.	Polyethylene stopper with internal thread	kg	0.4
8.	Joining steel coupling with external thread M105x4	kg	1.7
9.	Steel component of fastening	kg	0.9

Concrete values of characteristic, dimensional sizes and total weight are determined according to accepted dimensions and are pointed in the product passport delivered to Customer.

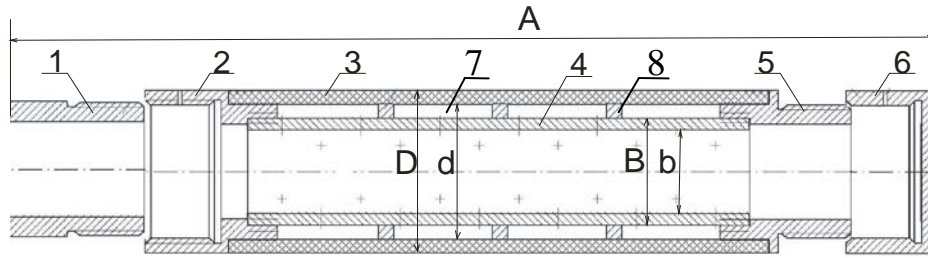
### 3.5 Dimensions of the aerators

Dimensions and weight of the aerators are presented in table 3.2 (fig. 3.1)

**Table 3.2 – Dimensions and weight of the aerators**

Parameter	Length A mm	Weight kg	D (mm)	d (mm)	B (mm)	b (mm)
APKV – 1	1035	4 kg	120	100	90	79,6
APKV – 2	2035	8 kg	120	100	90	79,6





1. Steel coupling.
2. Coupling with internal thread.
3. Tubular air disperser.
4. Perforated framework.
5. Pipe with external thread.
6. Stopper.
7. Air space.
8. Spacing washer.

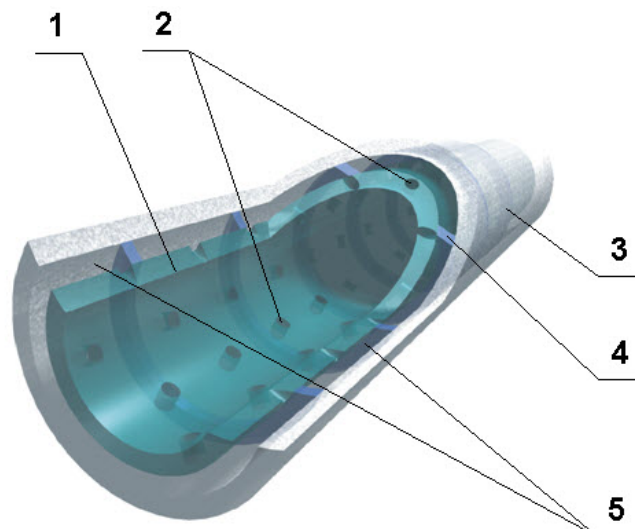
Fig. 3.1 – Overall figure  
Ready-fitted aerator

Parameter	A (mm)	Weight	D (mm)	d (mm)	B (mm)	b (mm)
<b>APKV – 1</b>	1035	4 kg	120	100	90	79,6
<b>APKV – 2</b>	2035	8 kg	120	100	90	79,6

### 3.6 Structure of aerators

#### 3.6.1 Layout of the main zones

The wireframe aerator with air space (fig.3.2) structurally is the fibro porous pipe (fig.3.2, pos.3). Inside of it the perforated PVC pipe (fig.3.2, pos.1) is situated with fewer diameters and with forming of air space (fig.3.2, pos.5) between both pipes. The joining polyethylene couplings (fig.3.2, pos.4) with internal and external thread are provided on the bearing face of aerators.



- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. Perforated pipe</li> <li>2. Pope perforation</li> <li>3. Fibro porous pipe</li> </ol> | <ol style="list-style-type: none"> <li>4. Polyethylene pipe</li> <li>5. Air space</li> </ol> |
|---|--|

Fig. 3.2 – Layout of the main zones and elements of the aerator

### 3.6.2 Dispersive component of the aerator.

Tubular air dispersant (fibro porous pipe) is made of polyethylene of high pressure (PHP) by air-to-extrusion method the main point of which is in the putting of fibrous of polyethylene fusion onto form-builder under air pressure (fig.3.3).



Figure 3.3 – Structure of the aerator’s disperse elements

The technical characteristics of the aerator’s disperse component are presented in table 3.3.

**Table 3.3 – The technical characteristics of the aerator’s disperse component**

Parameter	Measuring unit	Value
Feed stock	-	PHP
Density	g/cm <sup>3</sup>	0,45-0,60
Porosity	%	35-50
External diameter	mm	120
Internal diameter	mm	100

### 3.6.3 Perforated framework of the aerator.

Perforation (fig.3.4) of PVC pipe is intended for air passing. It is made by drilling or saw cut of set calculated total area.



Figure 3.4 – Structure of aerator’s perforated framework.

The technical data of the aerator’s perforated framework are presented in table 3.4

**Table 3.4 – Technical characteristics of aerator’s perforated framework**

Parameter	Measuring unit	Value
Feed stock	-	PVC-U
Outside diameter	mm	90
Inside diameter	mm	79,6

### 3.6.4 Joint member of the aerators

#### Coupling with internal thread

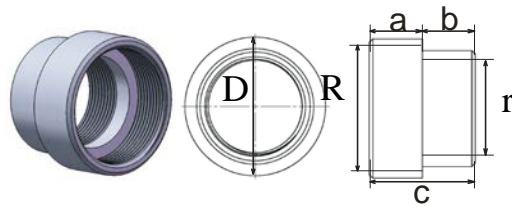


Fig.3.5 – Structure of coupling with internal thread  
The dimensional sizes of coupling with internal thread are presented in table.3.5

**Table 3.5 – Dimensional sizes of coupling with internal thread**

Parameter	Measuring unit	Value
a	mm	40
b	mm	50
c	mm	90
D	mm	120
R	mm	∅ 108x8
r	mm	M 90x3

#### Coupling with external thread

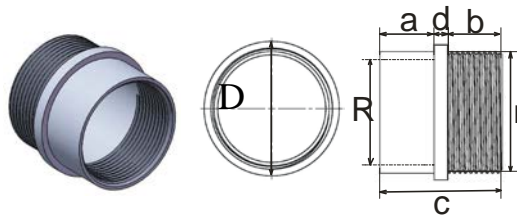


Fig.3.6 – Structure of coupling with external thread

The dimensional sizes of coupling with external thread are presented in table.3.6

**Table 3.6 – Dimensional sizes of coupling with external thread**

Parameter	Measuring unit	Value
a	mm	40
b	mm	40
c	mm	90
D	mm	10
d	mm	120
R	mm	M 90x3
r	mm	M 105x4

**Steel joining coupling**

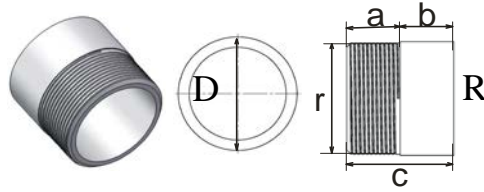


Fig.3.7 – Structure of steel joining coupling

The dimensional sizes of steel joining coupling are presented in table 3.7

**Table 3.7 – Dimensional sizes of steel joining coupling**

Parameter	Measuring unit	Value
a	mm	50
b	mm	50
c	mm	100
D	mm	108
R	mm	ø 108x8
r	mm	M 105x4

**Polyethylene stopper**

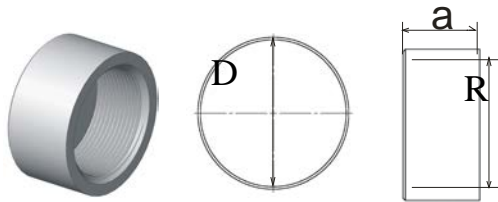


Fig.3.8 – Structure of polyethylene stopper

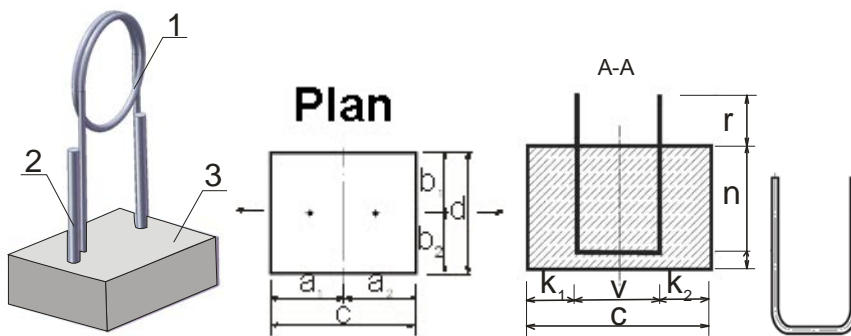
The dimensional sizes of polyethylene stopper are pointed in table 3.8

**Table 3.8 – Dimensional sizes of polyethylene stopper**

Parameter	Measuring unit	Value
a	mm	50
D	mm	120
R	mm	M 105x4

**3.6.5 Fast of the aerators.**

**Uncontrolled fastening with cantledge**



- 1. Fastening component
- 2. Inset component

3. Concrete cantledge

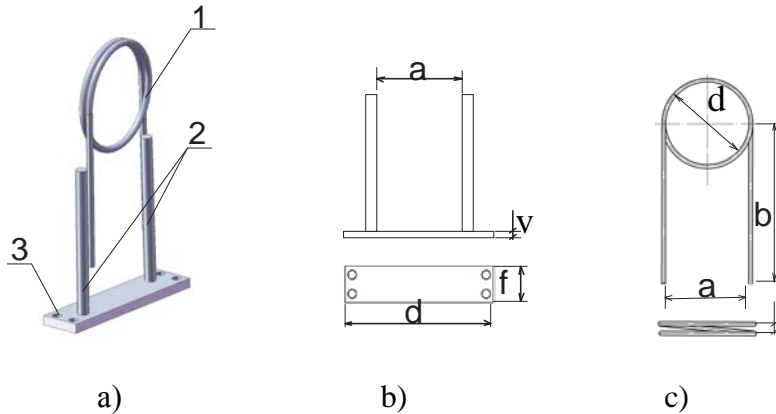
Fig. 3.9 – Structure of uncontrolled fastening with cantledge

The main technical characteristics of uncontrolled fastening with cantledge are presented in table 3.9

**Table 3.9 – Technical characteristics of uncontrolled fastening with cantledge**

Weight (kg)	$a_1=a_2$ (mm)	c (mm)	$b_1=b_2$ (mm)	d (mm)	$k_1=k_2$ (mm)	v (mm)	n (mm)	r (mm)	t (mm)	l (mm)
72	250	500	150	300	180	140	160	100	140	260

**Uncontrolled fastening without cantledge**



- 1. Fastening component
- 2. Studs

- 3. Fastening for anchor bolts

Figure 3.10 – Structure of uncontrolled fastening without cantledge

The dimensional sizes of uncontrolled fastening without cantledge are presented in tables 3.10, 3.11

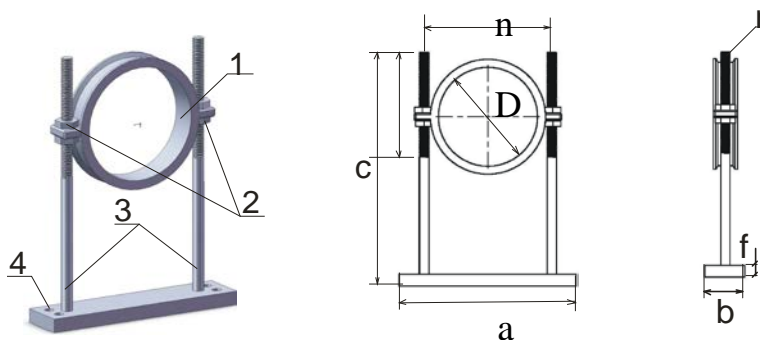
**Table 3.10 – Dimensional sizes of uncontrolled fastening without cantledge (fig.3.10 b)**

Parameter	Measuring unit	Value
a	mm	140
d	mm	200
f	mm	40
v	mm	4

**Table 3.11 – Dimensional sizes of uncontrolled fastening without cantledge (fig.3.10 c)**

Parameter	Measuring unit	Value
a	mm	130
d	mm	140
b	mm	250

**Controlled fastening**



- 1. Fastening component
- 2. Adjusting nuts

- 3. Studs
- 4. Fastening for anchor bolts

Fig 3.11 – Structure of controlled fastening

The dimensional sizes of controlled fastening are presented in table 3.12

**Table 3.12 – Dimensional sizes of controlled fastening**

<b>Parameter</b>	<b>Measuring unit</b>	<b>Unit</b>
D	mm	130
a	mm	200
b	mm	40
c	mm	300
n	mm	165
f	mm	4

### **3.7 Principle of operation**

The air supplied by air distributing system passes inside of wire-frame pipe by means of radial openings and air space is evenly distributed through the dispersant surface of aerator into the treated fluid forming small beads.

Such design of aerator allows providing with uniform air distribution in the aerated liquid and to achieve the maximal efficiency of aeration.

The total perforation area of the internal pipe is optimum for distribution of all volume of submitted air. Perforation provides a uniform exit and air distribution in the air spaces between the perforated pipe and the dispersing layer of the aerator. Existence of the air spaces of the aerator allows distributing the air stream along all length of the aeration beam.

Passing through the dispergator the air flow is split up for small vials that promote liquid saturation by oxygen and effective use of all volume of submitted air.

## 4. TRANSPORTATION AND STORAGE

### 4.1 Storage

To provide the next storage conditions for all components of the delivery set:

- To store in the dry premises;
- Temperature without large fluctuations in the range from – 5°C till + 40°C;
- Relative air humidity lower than 60%;
- Don't allow a direct hit of solar or ultra-violet radiation;
- To place from heating devices at distance not less than 1 meter;
- Absence in the medium of aggressive, corrosive substances (polluted air, ozone, gases, solutions, acids, alkali, salt, radioactivity etc);
- Absence of shakings and vibration.

Technical documentation should be stored together with aerator.

Maintenance for storage time should include periodic check of package and conservation.

### 4.2 Transportation

Transportation and unloading of the aerator should be carried out only by qualified personnel.

Don't drug the aerator at transporting. Avoid its mechanical blows for prevention of dispersive layer damaging.

Loading and unloading of the aerators should be manual without using of mechanical loading means for avoiding its mechanical damages.

Aerators are put at each other into plane surface at transporting. The layer of the laid aerators should be fixed for prevention of impact of aerators. The height of the layer of aerators laid at each other at transportation shouldn't exceed 3 m.



**WARNING! It is forbidden to be in the zone of handling operations for unauthorized people**



**WARNING! At handling operations it is forbidden to carry out any other operations near with zone of handling operations.**

## 5 MOUNTING

### 5.1 General safety measures

Track performance of the following safety measures for mounting of the aerator in order to avoid damages.

- Maintenance should be carried out only by qualified personnel with observance of all safety measures;
- Check the aerator for any damages before performance of mounting works;
- Make sure that only authorized personnel have access to the pathway and nobody is endangered during carrying out of mounting works;
- Pay attention to instructions for the working environments, applied auxiliary materials.



**WARNING!** It is necessary to carry out the mounting works with using of personal protection equipment (helmet, work gloves, at welding works – helmet shield; at operation with perforator – respirator and safety glass).

### 5.2 Requirements to the ground

To block all channels unnecessary for the aerator mounting and to fence the open sites. To observe the safety requirements mentioned in this manual.

Requirements for tank where the aerator is installed:

- The tank must be dry and clean;
- Dimensions of tank must conform to dimensions pointed in the installation drawing of the aerator.

The installation drawing is delivered together with aerator individually for every concrete order. Installation drawing is designed from completed questionnaire.



**CAUTION!** The angle between basement and walls of the aeration tank should be equal to  $90^{\circ}$ .



**CAUTION!** Installation and fastening of the aerators in aeration tank should be carried out after complete hardening of the concrete basis and tank walls.

### 5.3 Preparation works

For the aerator unpacking and contract supervision works – it is necessary to direct the formal request for a call of the representative of the company – manufacturer.

#### Operations carried out by Customer

- Check and repair (if it is necessary) of lifting equipment, lighting system. Electric power supply for performance of electric welding and other works with using of the electric tool.
- Studying of technical documentation, preparation of necessary materials and equipment, development and coordination of the schedule of works.
- Check of completeness and preparation of mounting and fixing materials at necessity.
- Emptying of the aeration tanks where the aerators will be installed, checkup of the bottom and walls (repair of walls and the bottom of aeration tank should be carried out at necessity);
- Check of the aerators for absence of cracks, mechanical damages, holes on the dispersive layer and couplings;
- To carry out the mounting of the aeration system according to the scheme of manufacturer concerning to specific facilities;



### 5.4 Mounting of the mechanical equipment

The concrete cantledges are installed on the bottom of the aeration tanks. Marking for anchor bolts is performed at using of uncontrolled fastening without cantledge or controlled fastening.

Steel transitional coupling is welded onto air feeding riser tube strictly horizontal.

End of the aerator is twirled onto steel coupling by coupling with internal thread.

Onto the aerator in a junction of couplings put on the fixing element at the rate of 1 fixing element through each two meters (fig. 5.2).

Aerators are assembled into joint of required length (fig.5.1). During this the coupling with internal thread of the following aerator (fig.5.1, pos.2) is twirled on coupling with external thread of the previous aerator (fig.5.1, pos.1).

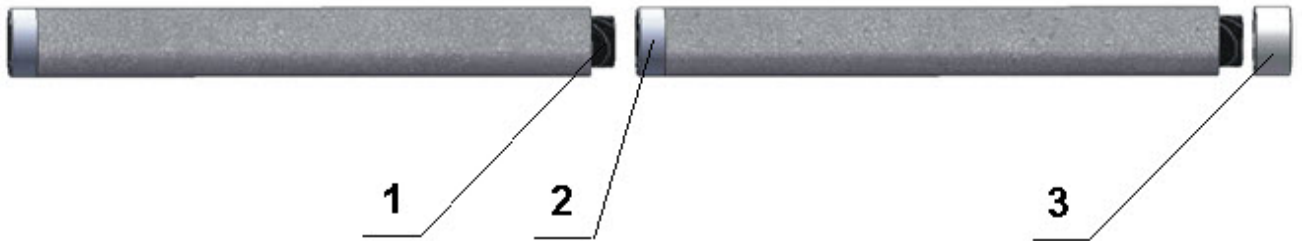


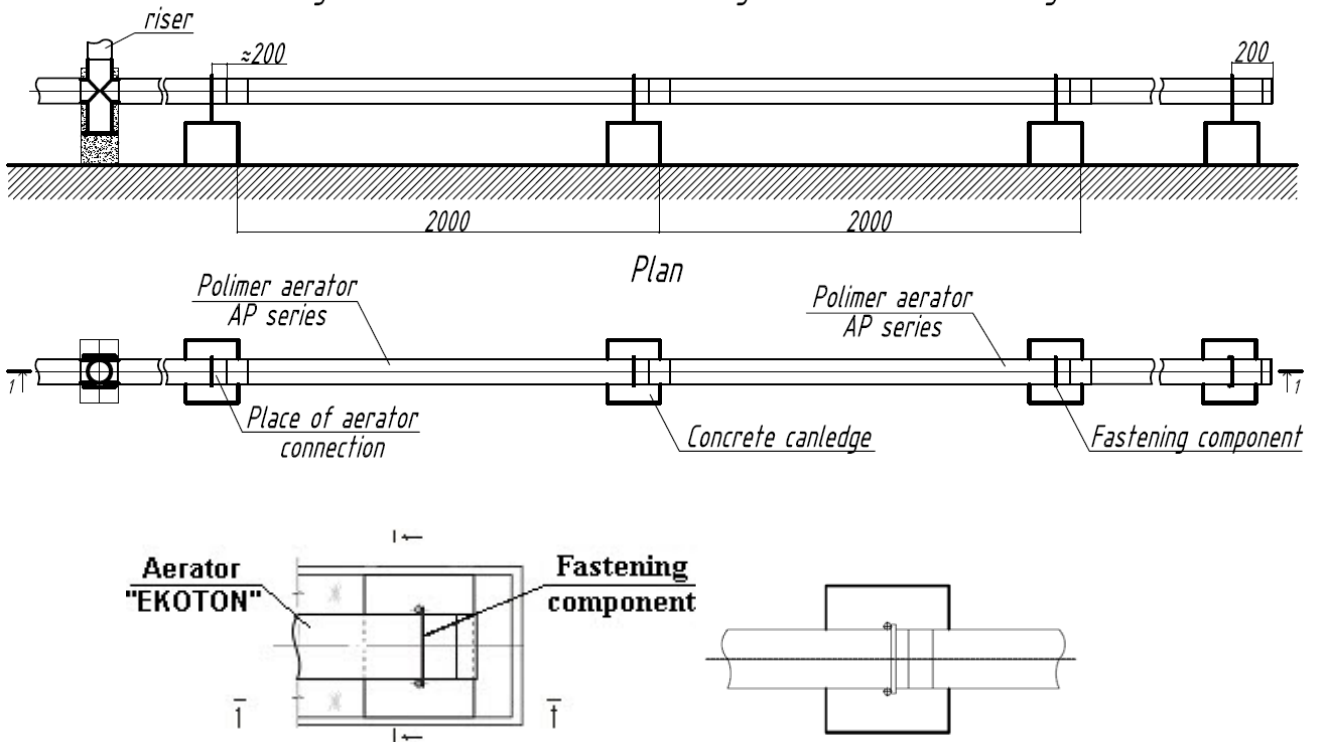
Fig. 5.1 – Assembling diagram of the aeration joint.

The free butt of the aerator is screwed down by polyethylene stopper (fig.5.1, pos.3). The fast is fitted on the butt of the aerator onto distance of 200mm from edge of polyethylene stopper (fig.5.2).

The all joint is installed in strictly horizontal position with using of level.

After installation of the aeration joint in strictly horizontal position the fasts are welded on (the length of welded joint should be 50-70 mm) (fig. 5.2) to embedded items by turns in the line of from airfeeding pipe riser to the end of joint (fig.5.2).

#### Arrangement scheme of concrete cantlages of aerators fastening



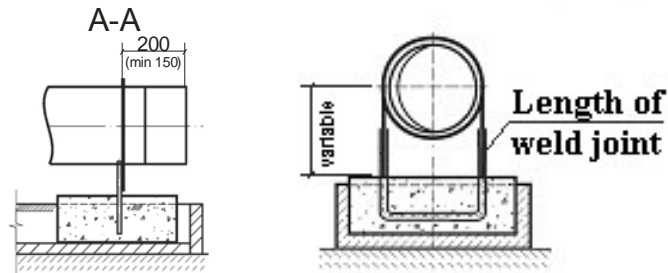


Fig. 5.2 – Succession of the fasts welding

Joining of the aerators (joint of the aerators) to the air feeding rising pipe is carried out by means of the welded steel branch pipe with external thread M105x4.



**CAUTION!** At mounting the aerators within one air-distributing pipe should be installed horizontally with deflection on height not more than 10 mm.



**CAUTION!** Jamming of aeration system elements in the supports are strictly forbidden. Clearance needed between aerator and support.



**CAUTION!** All steel sections and fastening details of the aeration joint should be covered by two layers of anticorrosive protection.

## 6. COMMISSIONING

### 6.1 Check before start up

Before start up it is necessary to carry out the check of mounting correctness of the aerators.

Check is made for detection and elimination of faults and nonconformance appeared on the mounting type of the aerators which can effect to aerator functioning in consequence.

At check the following provisions are estimated:

1. Absence of warps of the aerator relative to the bottom of the aeration tank.
2. Airlines should be subjected to foreblow into atmosphere.
3. Uniformity of the air outlet through the aerators is checked after foreblow.

#### It is necessary before first start-up:

1. Checking of the horizontal installation of the aerators;
2. Make sure in the correctness of mounting of the aerators joints;
3. Check the proofness of coupling joining;
4. Check the correctness of pipelines of air-blowers to the aerators;
5. Check the dust concentration in the air supplied into aeration system. It should not exceed  $10 \text{ mg/m}^3$ ;
6. Check that the intake system would be equipped with filters.



**CAUTION!** Air using with high dust concentration will lead to pollution and decrease of life time of the aerators.



**CAUTION!** The qualified personnel observing safety rules are allowed to start-up only.

### 6.2 Starting up and adjustment under load

The uniformity of air outlet through aerators is checked after blowing off. For this the aeration tank is filled by treated wastewater till level of 0,2-0,3 m above the top point of surface of the aerators. Then air feeds into system gradually increasing its expense before complete blowing off of the joint. Make visually sure of uniformity of an exit of small air vials onto all area of the water plane over the aerators and in lack of an exit of large air bubbles (torches) in places of threaded connections. A uniform layer of small air bubbles appearance on the surface of the water indicates a uniform distribution of air. The appearance of large air bubbles or water-air torches indicates that aerators are loose or installed with deviations from the horizontal. In such case you should stop the air distribution, empty the tank and eliminate the defects.

At reaching of uniform distribution of the air should to continue to fill the aerotank with water at the same time increasing supply of air to settlement productivity. The active sludge should be supplied after the aeration tank filling by water.

## 7. OPERATION

### 7.1 Operational requirements

**CAUTION!** Correct operation of the aerators in conformity with requirements of the present operation manual guarantees the long-term no-failure operation of the aerators and effective goal achievement of the wastewater treatment.

It is necessary before start up:

To look through all points of the present operation manual;

According to the points of this operation manual to carry out the mounting and preparatory works with obligatory check of aerator operation and elimination of possible malfunctions;

To carry out the start-up and adjustment works in accordance with chapter 6.

It is necessary at the operation:

1. To follow the safety rules at maintenance of the aerators;
2. To carry out obligatory maintenance in accordance with schedule of maintenance (ch.8);
3. To write down all performed operations of maintenance into the maintenance book
4. Inform the specialists of Manufacturer Company of the aerators in the case of appearance unrecoverable failures or failures which haven't been described in the present manual.
5. Don't interrupt the air feeding into system for a long time (more than 20 days);
6. The thermal stress onto aerators is forbidden;
7. It is forbidden to effect to the aerators by concentrated solutions of acid, alkalis, fuels and lubricants;
8. At shutdown of the aeration system the stop valves on the air feeding downgates should be closed;
9. At shutdown of the aeration system the aerator should be in more thickly waters not less than 1,5 m in summer and 2,5 m in winter periods.
10. At full discharge of aeration tank in winter period don't interrupt the air feeding for avoiding of freezing of the aerators.



**CAUTION!** It is strictly forbidden to allow water freezing in aeration system.

## 8. MAINTENANCE OF THE AERATOR



**WARNING!** At maintenance of the aerator it is necessary to observe strictly rules according to the safety measures and follow the recommendations of this manual.

Maintenance of the aeration system, replacement, regeneration and restoration of the aerator is made after system inspection and failures detection in operation.



**CAUTION!** Inspection of the aeration system for existence of malfunctions is recommended to carry out 1 time per 2 years.

At detection of the dysfunctions in the system as a result of mechanical damages of the aerators, the damaged aerators must be replaced.

If the discrepancy reason in work of all system is the fouling of the aerators it is necessary to carry out the regeneration of the aerators for the system recovery.

In many cases, the system operation is restored by cleaning aerators with pressurized water.

In case of strong mudding, cleaning of the aerator's surface maybe done with 20-30 % solution of caustic soda with SAM addition by means of dauber and washing with clean water.

Regeneration of the aerators should be carried out in the following order:

1. Demounting of regenerated aerator.

2. Aerator immersion in capacity with 30 % solution of hydrochloric acid for 2-3 o'clock.
3. Washing with running water provides pH restoration;
4. Commissioning in accordance to requirements of chapter 6.2 of this manual.



**CAUTION!** Using of more concentrated solution of acid for regeneration of the aerator isn't allowed. It can lead to destruction of chemical structure of the aerator's material.



**CAUTION!** About all carried-out works it is **OBLIGATORY** to do a mark in the maintenance book at the enclosed form (Attachment 3).

## 9. UTILIZATION

Shutdown should be carried out only by qualified personnel with permission for performance of these works.

Before the final shutdown to observe the following additional instructions:

Into structure of this product consists of:

- steel;
- plastic.

Utilize details in conformity with operating standards.

Observe standards for ecologically admissible waste disposal!

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