

Изм. № подл.	Подп. и дата	Взам. инв. №	Инв. № дубл.	Подп. и дата
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# Technological Instructions

General requirements to preservation and storage of marine diesel engines delivered in dismantled condition

И-03-322-211-01

Инд. № подл.	Подп. и дата	Взам. инв. №	Инв. № дубл.	Подп. и дата
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Rev. Sheet	Docum. No.	Sign.	Date	
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И-03-322-211-01				

# Contents

1.	Field of application	3
2.	References	4
3.	Terms, designations and abbreviations	5
4.	General directions on preservation	6
5.	Preparation of surfaces for preservation	7
6.	Preservation	9
7.	Internal packing	10
8.	Transport packing	11
9.	Storage	12
10.	De-preservation	13
11.	Preservation during mounting	14
12.	Materials for preservation, internal packing and de-preservation	16
13.	Safety measures	17
14.	Enclosure A. Requirements to preservation, internal packing and storage of parts and assembly units	18
	Revision Sheet	34
	Acquaintance Sheet	35

# 1 FIELD OF APPLICATION

The present instructions cover the preservation and storage of diesel engine products of the JSC of closed type "Bryansk Engineering Works" acc. to GOST 9.014.

The diesel engine products mean parts and assembly units of marine diesel engines, also the spare parts, special devices and tools.

The present instructions is valid for the following subdivisions of the JSC of closed type "Bryansk Engineering Works" (BEW):

Two-Stroke Engine Design Department, Diesel Engine Technological Department, Technical Department, Diesel Service Department, Diesel Testing

Workshop, Diesel Machining Workshop-1, Diesel Machining Workshop-2, Diesel Machining Workshop-3, Diesel Welding Workshop, Central Works Laboratory.

The present instruction is introduced as replacement for ДИ-46-1.

Инв. № подл.	Подпись и дата	Взам. инв. №	Инв. № дубл.	Подпись и дата
--------------	----------------	--------------	--------------	----------------

Rev	Sheet	Docum. No.	Sign.	Date

И-03-322-211-01

## 2 REFERENCES

In the present Technological Instructions the references to the following documents are used:

- GOST 9.010-80 - Compressed air for spraying paintwork materials;
- GOST 9.014-78 - Temporary anti-corrosion protection of products;
- GOST 9.028-74 - Blanks, parts and assembly units made of metal. Inter-operation protection;
- GOST 12.3.002-75 - Production processes;
- GOST 12.4.009-83 - Fire technique. Main kinds. Location and maintenance;
- GOST 12.4.026-76 - Signal colours and safety marks;
- GOST 1012-72 - Aviation petrols;
- GOST 1510-84 - Oil and oil products;
- GOST 3134-78 - White-spirit;
- GOST 8828-89 - Base paper and two-layer water-resistant packing paper. Specifications;
- GOST 9569-79 - Paraffined paper. Specifications;
- GOST 10354-82 - Polyethylene film;
- GOST 10877-76 - Preservation oil K-17;
- GOST 12337-84 - Motor oils for marine diesel engines;
- GOST 18188-72 - Solvents of makes 645, 646, 647, ...
- GOST 19537-83 - Gun grease;
- GOST 20429-84 - Aluminium foil with "isol" coating;
- GOST 2712-75 - Lubrication AMC-1;
- STP 02.02.01-04 - Abbreviated designation of structural subdivisions and higher management of the JSC of closed type "Bryansk Engineering Works".

Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № дубл.	Подпись и дата
Rev.				
Sheet				
Docum. No.				
Sign.				
Date				
И-03-322-211-01				
Sheet 4				

### 3 TERMS, DESIGNATIONS AND ABBREVIATIONS

In the present instructions the following terms, designations and abbreviations are used:

- ITBK – gun grease;
- ИФХАН-30 – inhibited coating;
- К-17 – preservation oil;
- АМС-1 – lubrication.

The abbreviated designation of structural subdivisions of the JSC of closed type “Bryansk Engineering Works” is in accordance with STP 02.02.04.

Изм. № подл.	Подпись и дата	Взам. инж. №	Изм. № инж.	Подпись и дата

Rev.	Sheet	Docum. No.	Sign.	Date

И-03-322-211-01

## 4 GENERAL INSTRUCTIONS ON PRESERVATION

4.1 Preservation of diesel products is carried out according to the present instructions developed in accordance with GOST 9.014 and documents of MAN B&W Diesel A/S (MBD).

4.2 Preservation of diesel products is made with the purpose of their protection against atmospheric corrosion. To preservation are subjected non-painted and other surfaces not protected with permanent anti-corrosion coating.

4.3 Preservation protects diesel products against corrosion beginning with the day of dispatch for 12 months, and for 24 months - in case of re-preservation after 12 months and fulfillments of requirements of the present instructions.

4.4 Preservation should be carried out in the premises at the ambient air temperature not lower 288 K (+15°C) and relative humidity not higher 70%. The increase of humidity up to 80% is allowed in the course of the period when temperature drops in the premises do not exceed 5 K (5°C).

4.5 Diesel products coming for preservation should have the temperature equal to the air temperature in the premises or somewhat higher.

4.6 The diesel products should come for preservation without corrosion damages of metal, also without any damages of paintwork, metal and other permanent coatings.

4.7 It is prohibited to interrupt the preservation at some stage. Preservation is a continuous technological process and includes the preparation of the surface for preservation, preservation itself and internal packing.

4.8 All the materials used in the process of preservation should have certificates and should be stored in accordance with the Specifications and State Standards for these materials.

4.9 In case of application for preservation of other materials not specified in the present Instructions they should be tested in operation and should be of a good quality.

4.10 To prevent corrosion of the parts and assembly units during manufacture, the inter-operation preservation of unprotected surfaces should be prescribed acc. to GOST 9.028.

4.11 Preservation and de-preservation should be carried out in accordance with the Safety Rules and should be provided with fire extinguishing means acc. to the requirements of p.13, GOSTT 9.014, also to the corresponding standards for the materials used.

4.12 The packing lists for every package should contain the information concerning the date of preservation, the signature of executor, the signature of the Quality Assurance Inspector who accepted preservation.

Изм. № подл.

Подпись и дата

Взам. инв. №

Изм. № дубл.

Подпись и дата

И-03-322-211-01

6  
Sheet

## 5 PREPARATION OF SURFACES FOR PRESERVATION

### 5.1 Initial Degreasing.

5.1.1 The initial degreasing of diesel products is carried out with the purpose to remove a temporary preservation, dirt (dust, oil) and to provide favourable conditions for thorough inspection of surfaces.

5.1.2 Dependent on the responsibility of a part or an assembly unit, as well as materials they are made of, the initial degreasing is made with alkaline solutions and white spirit. Benzine is used to degrease only responsible diesel parts.

5.1.3 Parts and assembly units made of ferrous metal and of simple form are degreased in an alkaline solution.

Complicated diesel parts and assembly units made of ferrous and non-ferrous metal, as well as partially painted parts are degreased with napkins wet with white spirit or benzine.

### 5.2 Checking of Surface Condition.

5.2.1 The quality of surface preparation is checked visually.

5.2.2 The surface is checked immediately before preservation, and the results are recorded into the inspection log-book.

### 5.2.3 The presence of corrosion is determined by the following indications:

a) on steel and cast iron parts corrosion appears as deposits of orange-brown colour, which in case of significant spreading develops into a solid mass of a dark-brown or brown colour, as well as dark spots and dots;

b) on parts made of aluminium and magnesium alloys corrosion appears as spots or powder-like deposits of white colour; later cavities are formed, and usually they are filled with corrosion products of white and grey colour;

c) on copper alloys corrosion appears as dark spots or deposits of green and black colour; in case of copper-lead alloys deposits can be of black, white, dark- and light-green colour;

d) on steel oxidized and phosphated parts the corrosion appears as deposits of orange-brown colour or spots and dots the colour of which does not differ from the colour of the surface;

e) the corroded painted and varnished spots on diesel parts are swollen and then flaked;

f) on cadmium- and zinc-plated parts the corrosion appears as white, grey and black colour or as white powder-like deposits.

If the bade metal is corroded, the corrosion products are of the colour similar to the colour of the corrosion products of this metal.

5.2.4 After inspection the parts which are free of corrosion are subjected to second degreasing and drying.

5.2.5 The corroded parts should be cleaned of corrosion products by mechanical or chemical means, and then they are also subjected to the second degreasing and drying.

### 5.3 Removal of Corrosion Products

5.3.1 The corrosion products are removed mechanically or chemically.

5.3.2 The mechanical way is used when there are single or insignificant damages caused by corrosion, or when it is impossible to use a chemical way (diesel

Изм. № подл.

Подпись и дата

Взам. инв. №

Изм. № дубл.

Подпись и дата

И-03-322-211-01

Sheet

7

parts and assemblies of large size, complicated form with clearances and spaces from which it is difficult to drain chemical solutions; diesel parts and assemblies made of ferrous metal in combination with non-ferrous ones, painted partially and with high roughness class).

The corrosion products are removed mechanically with a grinding cloth, powder pumice, diamond compound etc. The fineness of grinding cloth is chosen so that the surface roughness shown on drawings and in Standards is not disturbed.

5.3.3 The parts made of ferrous metal are cleaned with a grinding cloth, steel brushes etc. The corrosion products are removed from the surfaces with high roughness class with a fine grinding cloth and industrial oil, with subsequent polishing with fine diamond compound and oil: one weight part of oil and three weight parts of compound.

5.3.4 The corrosion products are removed from surfaces of aluminium and magnesium alloys with a glass grinding cloth with subsequent machining with fine pumice powder.

5.3.5 The surfaces of copper and copper alloys are cleaned with fine pumice powder and wiping waste wet in benzine.

5.3.6 In case of parts of simple configuration made of ferrous metals, the corrosion products are removed chemically according to the process existing at the plant.

5.4 Second Degreasing

5.4.1 The second degreasing is carried out similar to the first one and serves to remove possible residues of mechanical cleaning and accidental oil contamination.

5.4.2 The second degreasing is performed with means similar to the initial one.

5.5 Drying and Preheating

5.5.1 The diesel parts and assemblies are dried with clean dry compressed air, passed through an oil-water-separator, or with clean dry air at temperature not less 288 K (15 deg.C) in the open room.

The diesel parts and assemblies washed with white spirit are prohibited to be dried in electric boxes.

5.5.2 If temperature in the workshop is lower than the temperature mentioned in p. 4.4 of the present Instructions, before starting the preservation the crankshaft should be pre-heated.



## 6 PRESERVATION

6.1 It is strictly prohibited to touch the surfaces prepared to preserving, with unprotected hands.

6.2. It is not allowed to make an interval more than two hours between the preparation and preservation.

6.3 The preservation materials are applied to large-size parts with airless spraying and spraying with the air (The latter should correspond to GOST 9.010).

6.4 Small parts and assemblies are preserved with a brush and by submerging them into a bath, then the parts are taken away and hanged above the bath to flow

6.5 While applying to the surface, the temperature of preservation oil K-17, the excess of the preservation material off.

grease ALMC-1 and coating containing inhibitor NPXAH-29A is 291 K...298 K (18...25°C), and the temperature of gun grease (TTBK) is 353 K...413 K (80...140°C).

6.6 Compound IPXAH-30 is coated two layers (on crankshaft in three lay-

6.7 The preservation materials should be coated continuously, uniformly and

without gaps.  
6.8 After

clean tables covered with vinylplast or paraffined paper, medium and large-size parts are laid on wooden platforms covered with paraffined paper. It is important that the preservation layer is not disturbed and that dust is not settled down.

6.9 The requirements to the preservation are listed in the Appendix.

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Инв. № подл.	Подпись и дата	Взам. инв. №	Инв. № дубл.	Подпись и дата

Rev.	Sheet	Docum. No.	Sign.	Date

## 7 INTERNAL PACKING

- 7.1 The internal packing serves to prevent or to slow down the access of vapors of water and aggressive gases to the diesel part, to decrease the diffusion of inhibitor vapours to the open air, and to keep the preservation material on the surface of the part.
- 7.2 All packing operations should be carried out carefully in order not to damage the preservation layer. The crankshaft is packed in 24 hours after of the final layer of МФХАН-30 is applied.
- 7.3 The preserved surfaces which are in contact with wooden shields, plugs, support beams, plates or steel bands, should be wrapped with paraffined and waterproof paper, and, if necessary, with polyethylene film (ref. Appendix A).
- 7.4 Measuring devices and fuel oil apparatus should be wrapped with paraffined paper and polyethylene film (cover) and thoroughly interlaid with cardboard and cotton wool.
- 7.5 Just after cleaning and preserving, the diesel parts and assemblies with holes machined, including the pipes, except smooth telescopic pipes, should be plugged with wooden plugs wet in grease for the mentioned part. The plugs are soaked for 3 hours. The humidity of the materials which are used for plugs should not be more 12%.
- 7.6 Requirements to the internal packing of individual parts and assemblies are given in Appendix A.

Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № дубл.	Подпись и дата
Rev.				
Sheet				
Docum. No.				
Sign.				
Date				
И-03-322-211-01				
Sheet	10			

# 8 TRANSPORT PACKING

8.1 The transport packing prevents the diesel parts from mechanical damages and atmospheric precipitation during transporting. It is carried out in compliance with drawings for packing the diesel parts.

Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № дубл.	Подпись и дата	Rev.	Sheet	Docum. No.	Sign.	Date
					И-03-322-211-01				
					Sheet 11				

## 9 STORAGE

- 9.1 After arriving and placing the goods the Customer in presence of the Supplier is to check the condition of external packing in time of 10 days/ In case the external packing is damaged, cases are opened and the internal packing is inspected. If the internal packing is damaged, diesel parts and assemblies should be re-preserved.
- 9.2 The diesel parts should be stored in dry heated room at ambient air temperature of not lower 283 K (10°C), relative humidity not more 70%, hereby the day temperature drop should not exceed 10 K (10°C).
- 9.3 Instruments and fuel oil apparatus should be stored on special shelves. Some parts and assemblies are allowed to be stored in rooms without heating or in the open air under a thick wooden or tarpaulin shelter, which prevent the parts from precipitation and sunrays.
- 9.4 When the diesel parts and assemblies are stored in unheated rooms or under shelters, they should be inspected not less once a month to check the packing of rust-prevented surfaces; in case damages are found, the surfaces should be re-preserved.
- 9.5 All parts and assemblies in open packing while storing are laid on pads so that their deformation is excluded and they are accessible for checking.
- 9.6 All parts and assemblies which are dismantled for transportation and storage should be inspected not less once a month to check the packing. In case the packing is damaged, inspection and re-preservation, if necessary, should be carried out in accordance with Appendix A.
- 9.7 It is not allowed to keep the diesel parts and assemblies in the same room with chemicals, acids, alkali, etc.
- 9.8 Inspections made in compliance with the requirements of the given Section should be written and marked with the Quality Assurance and the Manufacturer representative.
- 9.8 The requirements regarding storage of individual parts and assembly units are given in Appendix A.

Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № дубл.	Подпись и дата
Rev.	Sheet	Docum. No.	Sign.	Date
И-03-322-211-01				
12	Sheet			

# 10 DE-PRESERVATION

10.1 The de-preservation is performed in the following cases::

a) damages of the internal packing;

б) re-preservation when the guarantee time is over;

б) preparations before mounting;

10.2 The de-preservation starts with removal of the internal packing.

Then preservation materials are taken off:

a) grease ТБК, АМС-1— by heating in a bath filled with mineral oils at temperature 378 K...383 K (105°C...110°C), or they can removed with wooden or plastic scrapers with subsequent washing in white spirit, benzine, light diesel oil.

б) ИФХАВ-30 are removed with white spirit, with the solvent , benzine and light diesel oil.

Изм. № подл.	Подпись и дата	Взам. инв. №	Инв. № дубл.	Подпись и дата	Rev.	Sheet	Docum. No.	Sign.	Date	И-03-322-211-01	Sheet	

# 11 PRESERVATION DURING MOUNTING

11.1 Before mounting, diesel parts and assemblies should be de-preserved, inspected, cleaned of corrosion traces, if necessary, and then preserved again, as mentioned in Sections 5 and 6 of the present Instructions.

The preservation before mounting aims to prevent the surfaces from corrosion during the whole mounting.

11.2 De-preservation, inspection and preservation before mounting should

be carried out in the same sequence as the parts are mounted.

11.3 Before mounting the diesel parts and assemblies are preserved with oil

K-17. This oil can remain on the parts after mounting, except for the parts of the

compressed air system.

ATTENTION! To avoid explosions, the parts of the compressed air system

should be thoroughly de-preserved before starting the diesel

engine.

The oil K-17 is used for preservation of engine seatings, main shells, dampers

(from the side of steel surface), main bearing caps.

11.4 Other preservation materials which have the same quality as the recom-

mended ones can be used after this matter is agreed with the diesel engine Manufactur-

er.

11.5 All unpainted surfaces as well as surfaces without stable anticorrosive

coatings are subjected to preservation.

If necessary, by the opinion of the shipyard, to keep the preservation coating,

the internal packing should be used.

11.6 The condition of surfaces preserved should be checked not less once a

month, but the surfaces of the responsible parts – not less twice a week; the results of

checkings should be noted in the special log signed by specialists of the Quality As-

surance and the Manufacturer representative.

The responsible parts and assemblies include, as follows:

crankshaft, journals;

thrust shaft, flange and journals;

piston rods;

crossheads, pins;

chains and chainwheels of camshaft and chain drive;

reversing mechanism;

cams and camshaft pins;

fuel pump and exhaust valve roller guides;

telescopic pipes;

high pressure fuel pumps, fuel valves;

TC rotor, journals;

lub.oil and fuel oil pipelines;

automation and control instruments.

Изм. № докум.	Подпись и дата	Взам. инв. №	Изм. № докум.	Подпись и дата
Rev.	Sheet	Docum. No.	Sign.	Date
N-03-322-211-01				
Sheet	14			

Изм. № докум.	Подпись и дата	Взам. инв. №	Изм. № инв.	Подпись и дата
Rev. Sheet				
Docum. No.				
Sign.				
Date				
И-03-322-211-01				
Sheet 15				

If during de-preservation corrosion is found on surfaces, it should be removed, and surfaces should be again preserved according to Sections 5 and 6 of the present Instructions.

11.7 To avoid damaging of high pressure fuel pumps, distribution boxes, speed governors and governor drives, they should be installed just before starting.

11.8 Main chains are laid upon after they have been boiled in oil according to the drawing (ЛБ...220.00.000СВ). After this the diesel engine should be turned not less 10 times with switched oil pumps.

11.9 During the whole time of assembling, the crankshaft should be turned (1...2 revolutions) not less twice a week. Before turning the bearings should be filled with anti-corrosive oil as follows:

crosshead bearings – through holes in upper halves;  
 crank bearings – through technological holes in lower halves from a special pump until oil appears from oil clearance;

main bearings – through a hole or an inlet oil pipe in the upper shell until oil appears from the oil clearance from both sides ("fore" and "aft").

11.10 To keep the preservation coating on piston rods during turning the oil crankshaft, piston rod stuffing boxes should be installed just before pumping the oil system of the diesel engine.

11.11 Bearings of chain drive, camshaft and reversing mechanism should be filled with preservation oil.

11.12 Before pumping the turbine oil, turbocharger bearings should be thoroughly de-preserved.

11.13 Pumping of lubricators with the cylinder oil should be made not less twice a month.

11.14 Automation and control devices should be rust-prevented in compliance with the recommendations given in the instructions for them.

# 12 MATERIALS FOR PRESERVATION, DE-PRESERVATION AND INTERNAL PACKING

12.1 Materials should be stored in special rooms, ref. GOST 1510 and State Standards for materials available.

12.2 It is not allowed to use the same tare for various materials.

12.3 Materials are given just before their usage.

12.4 Rust-preventive materials the storage time of which is over, should be analysed and can be used if they meet the requirements of State Standards and

## Technical Specifications.

While coating, materials should be checked once every 5...8 days for mechanical impurities, water, water-soluble acids, as well as acid number.

12.5 The grease IIBK should be dewatered by heating up to the temperature

1.5...2 hours until the foam stops to appear. The foam should be removed from the surface of the dried grease. To avoid gum formation, the grease should not be heated above 413 K (140°C).

12.6 Materials which are used for conservation are, as follows:

a) oil K-17 TOCT10877;

b) gun greases (IIBK) GOST 19537;

c) wax emulsion with corrosion inhibitor ИФХАМ-30 TV37-110-30-2007;

12.7 Materials which are used for the internal packing are, as follows:

a) paraffined paper GOST 9569;

b) two-layer packing paper GOST 8828;

c) polyethylene film GOST 10354;

d) aluminium foil with "isol" coating GOST 20429;

e) grease AMC-1 GOST 2712-75;

12.8 Materials which are used for de-preservation and preparing of surfaces for preservation are, as follows:

④ a) benzine B-70 GOST 1012;

b) white spirit GOST 3134;

c) solvent 646 GOST 18188;

④ d) benzine C 50/170 GOST 8505. C2-80/120 TV 38-401-67-108-92.

e) lubrication AMC-1 GOST 2712-75.

12.9 The requirements which should be met by materials are given in the Appendix A.

Инт. № подл.	Подпись и дата	Взам. инв. №	Инт. № дубл.	Подпись и дата
--------------	----------------	--------------	--------------	----------------

Rev.	Sheet	Docum. No.	Sign.	Date

И-03-322-211-01

16

Sheet



# 13 SAFETY REQUIREMENTS

- 13.1 The specific operations of preservation and re-preservation should be organized and performed in compliance with the requirements of GOST 12.3.002, "Instructions on Safety Measures for the Personnel of Preservation Shop M-OT-420-136-01", "Sanitary Rules for Technological Processes and Sanitary requirements to Production Equipment", "Instructions on Improvement of Labour Conditions in Production and During Application of Inhibitors of Atmospheric Corrosion of Metals and Inhibited Paper", developed and approved by the Ministry of Health Protection of Russian Federation.
- 13.2 It is not allowed as follows:
- a) to wrap food or personal things in anti-corrosive paper;
  - b) to use open fire (torch, welding etc.) in preservation and de-preservation shops;
  - c) to keep and take food in preservation and de-preservation shops.
- 13.3 In the premises in the visible place a first-aid set should be kept for giving first aid in case of accidents.
- 13.4 The workers and engineers should be allowed for independent work after passing the training, instructing and checking of their knowledge of safety rules.
- 13.5 The preservation and de-preservation shops should be equipped with anti-fire means in compliance with requirements of GOST 12.4.009.
- 13.6 All the electric equipment should be explosion-proof.
- 13.7 In preservation and de-preservation shops the safety marks should be envisaged in compliance with requirements of GOST 12.4.026.
- 13.8 During development of technological processes for preservation and internal packing one should be guided also with the safety requirements stated in GOST 9.014.
- 13.9 In case of spread of the oil K-17 it is necessary to collect it in a separate tare and to wipe the place of spread with a dry cleaning cloth. In case of the spread in the open place the place of spread should be covered with sand with its subsequent removal.

Подпись и дата

Имя, № дубл.

Взам. инв. №

Подпись и дата

Таб. № подл.

M-03-322-211-01

Sheet

17

Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № лубл.	Подпись и дата

# APPENDIX A REQUIREMENTS TO PRESERVATION, INTERNAL PACKING AND STORAGE OF PARTS AND ASSEMBLY UNITS

Pos. №	Description of Parts and Assembly Units	Preservation materials	Packing materials	Requirements to storage *	Additional requirements to preservation, packing and storage	Note
1	1 Bedplate: a) machined planes of bedplate (top, bottom, end ones) б) main bearing and support bearing supports, damper seatings B) caps, shells (machined surface)	AMC-1 ИФХАН-30***  K-17, AMC-1  K-17 AMC-1	Paraffined or two-layer packing paper  -“-  -“-	Type 3  Type 1	In case of delivery in bedplate the surfaces of shells which are in contact with supports should be preserved with K-17	
2	2 Parts of thrust bearing: a) clamps, housings, segments б) fasteners, studs	AMC-1 K-17 K-17	Paraffined paper, polyethylene film -“-	Type 1 Type 2		

M-03-322-211-01

Инт. № подл.	Подпись и дата	Взам. инт. №	Инт. № дубл.	Подпись и дата

# APPENDIX A, continued

1	2	3	4	5	6	7
3	Crankshaft, thrust shaft:			Type 1	Working surfaces of journals should be protected from mechanical damages acc. to drawing for packing	
	a) end surfaces	ИФХАН-30	2 layers of paraffined paper, 2-layer packing paper, aluminium foil with "isol" coating	Type 1		
	b) working surfaces and journals fillets	ИФХАН-30				
	c)**crankshaft flanges	ИФХАН-30				
	d)**chainwheels	ИФХАН-30	Paraffined paper, 2 layers of polyethylene film	Type 1		
	e)**fasteners	ИФХАН-30				
	h)** machined surfaces of crankthrows	ИФХАН-30				
4	f) crossheads machined surfaces	ИФХАН-30	Paraffined paper, 2-layer packing paper	Type 3		
	Framebox					
	a) machined surfaces (bottom, side, top, intermediate shafts, chainwheels, chain tightener)	АМС-1				
	b) crosshead guides	АМС-1				
	c) fasteners (in bulk)	K-17	Paraffined paper, polyethylene film	Type 3		
	d) machined surfaces (lower, upper )	АМС-1 ИФХАН-30***				

M-03-322-211-01

Изм. № подл.	Подпись и дата	Взам. инв. №	Инв. № дубл.	Подпись и дата

APPENDIX A, continued

1	2	3	4	5	6	7
5	**Stay bolts (only heads and nuts)	AMC-1	Paraffined paper, 2 layers of polyethylene film	Type 3		
7	Chain wheel frame: a) machined surfaces b) chainwheels c) bearing supports d) shells, caps e) parts of fasteners f) safety valve g) lower machined surfaces	AMC-1  K-17 K-17 K-17 K-17 K-17 K-17	Paraffined paper and 2-layer packing paper -- -- -- Paraffined paper and polyethylene film --	Type 2 Type 2 Type 2 Type 1 Type 2 Type 2		
8	**Piston rod stuffing box	K-17	Paraffined paper, 2 layers of polyethylene film	Type 1		
9	Drive chains	K-17	Paraffined paper and 2-layer packing paper	Type 1		

M-03-322-211-01

Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № докум.	Подпись и дата

APPENDIX A, continued

Rev.	Sheet	Docum. No.	Sign.	Date	1	2	3	4	5	6	7
					10	Cylinder cover:			Type 2		
						a) machined surfaces	AMC-1	Paraffined paper and 2-layer packing paper			
						b) holes for fuel valves, safety and starting valves, indicator cock, exhaust valve	K-17	Wooden plugs			
					11	Indicator cock with bend pipe	K-17	Paraffined paper and polyethylene film	Type 2		
					12	Cylinder frame:			Type 3		
						a) working surfaces of cylinder liner	ИФХАН-30				Ends of liners should be covered with paraffined paper
						b) machined surfaces of liners and jackets	K-17 AMC-1	Paraffined paper and 2-layer packing paper			
						c) parts of fasteners	K-17	Paraffined paper and polyethylene film			
						d) studs for fastening cylinder covers	K-17	Paraffined paper, 2 layers of polyethylene film			
						e) lower machined surfaces	ИФХАН-30***				

M-03-322-211-01

Инт. № подл.	Подпись и дата	Взам. инт. №	Инт. № дубл.	Подпись и дата

APPENDIX A, continued

1	2	3	4	5	6	7
13	Fuel pump and exhaust valve gears: a) outside machined surfaces b) inside machined surfaces	AMC-1  K-17	Paraffined paper and 2-layer packing paper	Type 3		
14	Exhaust valve:  a) outside machined surfaces b) inside machined surfaces and oil ducts	AMC-1  K-17	Paraffined paper	Type 1	Bottom and top parts of valve are wrapped	
15	Exhaust valve hydraulic gear:  a) outside machined surfaces b) high pressure lub.oil pipes, machined inside and outside surfaces	AMC-1  K-17	Paraffined paper  End parts should be plugged, wrapped with paraffined paper and polyethylene film	Type 1		

M-03-322-211-01

Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № дубл.	Подпись и дата

APPENDIX A, continued

1	2	3	4	5	6	7
16	Connecting rod:			Type 2		
	a) connecting rod end, upper	AMC-1	Paraffined paper			
	b) stem of connecting rod	AMC-1	-“-			
	c) connecting rod end, lower	AMC-1	-“-			
	d) the rest machined surfaces (including borings in ends and stem of connecting rod)	K-17				
17	Piston:			Type 1		
	a) the whole piston	ИФХАН-30	Paraffined paper and 2-layer packing paper			Holes and oil ducts should be plugged with wooden plugs
	b) piston rings	K-17	Paraffined paper, polyethylene film	Type 1		Packed in packages by 2...3 pcs.
	c) inside surfaces	K-17				
18	Crosshead	ИФХАН-30	Paraffined paper and 2-layer packing paper	Type 1		
19	Flywheel (all machined surfaces)	ИБК	Paraffined paper and 2-layer packing paper	Type 3		

И-03-322-211-01

Ишр. № подл.	Подпись и дата	Взам. инв. №	Ишр. № дубл.	Подпись и дата

# APPENDIX A, continued

1	2	3	4	5	6	7
20	Shaft-turning device. a) machined outside surfaces b) fasteneres	AMC-1  K-17	Paraffined paper, poly-ethylene film --	Type 1  Type 1	After shop tests the inside space is washed with white spirit, blown with compressed air and filled with fresh dewa-tered oil, according to the drawing Oil in geared motors being imported should be changed in compliance with Maintenance Instructions for them	
21	Piston cooling pipeline a) telescopic pipe and liner b) telescopic bend pipe c) the rest parts	K-17  K-17  K-17	Paraffined paper, poly-ethylene film Paraffined paper, poly-ethylene film --	Type 1 Type 1 Type 1		
22	Roller guides of fuel pumps and exhaust valves	K-17	Paraffined paper, poly-ethylene film	Type 1		

M-03-322-211-01



Имя, № подл.	Подпись и дата	Взам. инв. №	Инв. № дубл.	Подпись и дата

# APPENDIX A, continued

1	2	3	4	5	6	7
23	Indicator drive	K-17	“-“	Type 1	Lubricator should be filled with oil M20E60 ГОСТ12337 up to minimal level according to the drawing and pumped manually. Lubricator should be sealed with one seal, and bound preliminary outside with a wire along the bottom perimeter	
24	Lubricator drive	K-17	“-“	Type 1		
25	Camschaft complete with cylinder frame	K-17		Type 1		
26	Lubricator. Outside machined surfaces	K-17	Paraffined paper	Type 1		
27	Fuel oil filter a) inside machined surfaces б) outside machined surfaces	K-17  ПБК	Paraffined paper	Type 2		

M-03-322-211-01

Имв. № подл.	Подпись и дата	Взам. имв. №	Имв. № дубл.	Подпись и дата

APPENDIX A, continued

1	2	3	4	5	6	7
28	High pressure fuel pump (outside and inside surfaces)	K-17	Paraffined paper, poly- ethylene film	Type 1	Inlet and outlet holes should be plugged or glued up with paraffined paper on flange surfaces	
29	Fuel valves  Outside and inside surfaces	K-17		Type 1		
30	Regulating shaft	AMC-1 K-17	Paraffined paper	Type 2		
31	Speed governor of "Wood- ward" type. Outside machined surfaces	K-17	Paraffined paper. Poly- ethylene case	Type 1	After tests fresh de-watered working oil should be poured in. Governor is packed in a separate box in vertical posi- tion. This box should be fixed in the main packing casing.	
32	Emergency panel	K-17	Paraffined paper, poly- ethylene film	Type 1		

M-03-322-211-01

Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № дубл.	Подпись и дата

APPENDIX A, continued

1	2	3	4	5	6	7
33	Manoeuvring panel for engines and control panel for auxiliary blowers		Paraffined paper, polyethylene film	Type 1		
34	Parts for starting regulating device		Paraffined paper, polyethylene film	Type 1	Paper is glued up only on nameplates and handles	
35	Valves: Stop, main, starting, locking for turning gear (outside and inside surfaces)	K-17	Wooden plugs, paraffined paper, polyethylene film	Type 1		
36	Rods and levers of manoeuvring system	K-17	Paraffined paper	Type 2		
37	Air distributor	K-17	Paraffined paper, polyethylene film	Type 1		
38	Instruments panel	K-17	—“—	Type 1		

M-03-322-211-01

Изн. № подл.	Подпись и дата	Взам. инв. №	Инв. № дубл.	Подпись и дата

# APPENDIX A, continued

1	2	3	4	5	6	7
39	Automation and control devices	K-17	—	Type 1		
40	Scavenging air receiver (machined surfaces)	ИБК	Paraffined 2-layer packing paper	Type 3		
41	Air coolers (machined surfaces)	ИБК	—	Type 3		
42	Compensators	K-17	Paraffined paper, polyethylene film	Type 2		
43	Turbocharger (outside surfaces)	ИБК		Type 1	Turbocharger is preserved acc. to Operation Instructions	
44	Exhaust receiver (machined surfaces)	ИБК	Paraffined paper	Type 3		
45	Platforms, stairs, brackets, stanchions (machined surfaces)	K-17	—	Type 3	Painted surfaces are not preserved.	

И-03-322-211-01

Изм. № подл.	Подпись и дата	Взам. инв. №	Инд. № дубл.	Подпись и дата

APPENDIX A, continued

1	2	3	4	5	6	7
46	Oil filter and magnet filter:			Type 3	Holes of oil supply and discharge should be plugged	
	a) machined outside surfaces	ИБК	Paraffined paper			
	b) machined inside surfaces	K-17	—			
47	Oil and water coolers. Outside unpainted surfaces	ИБК	Paraffined paper and 2-layer packing paper	Type 3	Oil and water holes should be plugged	
48	Heavy fuel oil preheater:			Type 3		
	a) outside unpainted surfaces	ИБК	Paraffined paper			
	b) inside unpainted surfaces	K-17	Wooden plugs			
49	Starting air receiver:			Type 3		
	a) flanges and bosses for fittings	ИБК	Paraffined paper, polyethylene film			
	b) fittings for starting air receivers	K-17	Wooden plugs	Type 2		

M-03-322-211-01

Rev.				
Sheet				
Docum. No.				
Sign.				
Date				

Изм. № подл.	Исчисл. и дата	Взам. инв. №	Изм. № дубл.	Исчисл. и дата

# APPENDIX A, continued

1	2	3	4	5	6	7
50	Pipelines of all systems (fuel, lub.oil, cooling water), except for pipes made of non-ferrous metals: a) unpainted outside surfaces  b) inside surfaces	K-17	Paraffined paper and 2-layer packing paper. Polyethylene film. Wooden plugs.	Type 2	Before preservation the second etching and phosphate treatment of starting air, fuel and lub.oil pipelines should be performed. Maximal duration of storage without preservation should not exceed 24 hours.	
51	High pressure fuel pipes (outside and inside surfaces)	K-17	Paraffined paper and 2-layer packing paper. Polyethylene film.	Type 1		
52	Fittings of pipelines	K-17	-"-	Type 2		
53	Fastening parts of pipelines	K-17	-"-	Type 3		

M-03-322-211-01

Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № дубл.	Подпись и дата

# APPENDIX A, continued

1	2	3	4	5	6	7
54	Instruments		Paraffined paper, polyethylene film	Type 1	Be preserved and packed according to suppliers' instructions or delivered in suppliers' packing.	
55	Spare cylinder liner a) machined surfaces b) contact surfaces	AMC-1	Paraffined paper. Wooden plugs	Type 2		
56	Spare cylinder cover: a) machined surfaces b) Holes for fuel valves, safety valve, indicator cock, exhaust valve c) fasteners	AMC-1  K-17  K-17	Paraffined paper  Wooden plugs  Paraffined paper	Type 1		
57	Spare exhaust valve	K-17 AMC-1		Type 1		

M-03-322-211-01

Инт. № подл.	Подпись и дата	Взам. инт. №	Инт. № дубл.	Подпись и дата

Rev.	Sheet	Docum. No.	Sign.	Date

M-03-322-211-01

Appendix A, continued

1	2	3	4	5	6	7
58	Spare bearing shells, thrust segments	ИБК	Paraffined paper	Type 1		
59	Spare small parts and assembly units	K-17	Paraffined paper, polyethylene film	Type 2		
60	Spare TC rotor (journals)	K-17	Paraffined paper and 2-layer packing paper	Type 1		
61	Spare parts and assembly units of fuel oil equipment	K-17	-"-	Type 1		
62	Tools and accessories	K-17	-"-	Type 1		

Spare parts delivered according to order-naijads are preserved and packed similar to standard parts and assemblies of the diesel engine.



Изм. № подл.	Подпись и дата	Взам. инв. №	Изм. № дубл.	Подпись и дата

Rev.	Sheet	Docum. No.	Sign.	Date

M-03-322-211-01

Sheet 33

\*Note: I Storage requirements are as follows:

Storage type : 1) – storage in heated room;

2) – storage in room without heating;

3) – storage in the open air under thick wooden or tarpaulin shelter.

2 Small parts and fasteners not included in the list should be preserved with oil K-17.

3 While packing parts and assembly units the requirements to packing stated in drawings should be followed.

4 When parts are packed in cases, polyethylene film for parts which have been preserved with ИБК, is not used.

\*\*5 The polyethylene film which is used for the internal packing should be provided with holes for ventilation to avoid accumulation of moisture.

\*\*\*6 When transporting by sea.



## Date \_\_\_\_\_

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