HELICOPTER АК 1-3

STANDARD SPECIFICATION

Ukraine, Poltava 2014

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CONTENT

INTRODUCTION

1. This Standard Specification for helicopter AK1-3 is developed and compiled by DB Aerocopter Ltd. On this basis the content of the document in whole and any information contained herein shall be the property (owned) of DB Aerocopter Ltd. and shall not be changed without the written consent of the LLC "CD Aerocopter".

2. Helicopter AK1-3, as described in this Standard specification is regarded as a standard one. Standard specification for helicopter AK1-3 defines the basic requirements for the helicopter.

3. Changes to Specification (hereinafter referred to as Options) offered to the Buyer at choice can be made in terms of manufacturing of the helicopter on the specific request of the Customer for the additional payment over the price of the standard helicopter and must be executed in the form of "Additional technical requirements of the Customer for the manufacture of the helicopter", which constitute the annex to the Agreement for helicopter production. Summary list of options is given in Annex H.

SECTION 01

GENERAL INFORMATION ON HELICOPTER

SECTION 01. GENERAL INFORMATION ON HELICOPTER

01.10.00 General provisions

Helicopter AK1-3 is made according to single-rotor configuration c 3-blade lifting and 2-blade anti-torque (anti-torque tail) propellers.

Helicopter's appearance is given on Photo 01-01 and 01-02.

General arrangement drawing of the helicopter in three dimensions is given in Fig. 01-01.

01.20.00 Type and application of the helicopter

Helicopter AK1-3 is designed for the airborne surveillance, one passenger transportation, and helicopter flight technique initial training for pilots.

01.30.00 Type and number of engines

There is one piston liquid-cooled engine EJ25 installed on the helicopter, adapted and worked out in accordance with design documentation AK1-3.12.00.00.00.000.

01.40.00 Developer. Manufacturer and model.

Developer and manufacturer – DB Aerocopter Ltd., Ukraine.

Model - helicopter AK1-3.

01.50.00 Composition of a crew and helicopter transportation facilities

Minimum composition of a crew – one person:

- aircraft commander (pilot).

Depending on task performed the composition of helicopter's crew may include additionally one observer or trainee.

Transportation facilities – transportation of one passenger.

01.60.00 Top coat

Coating and protective treatment of helicopter external surfaces, engine and components provide for operation under different climatic conditions.

Photo 01-01 Head-on view

Photo 01-02 Back view

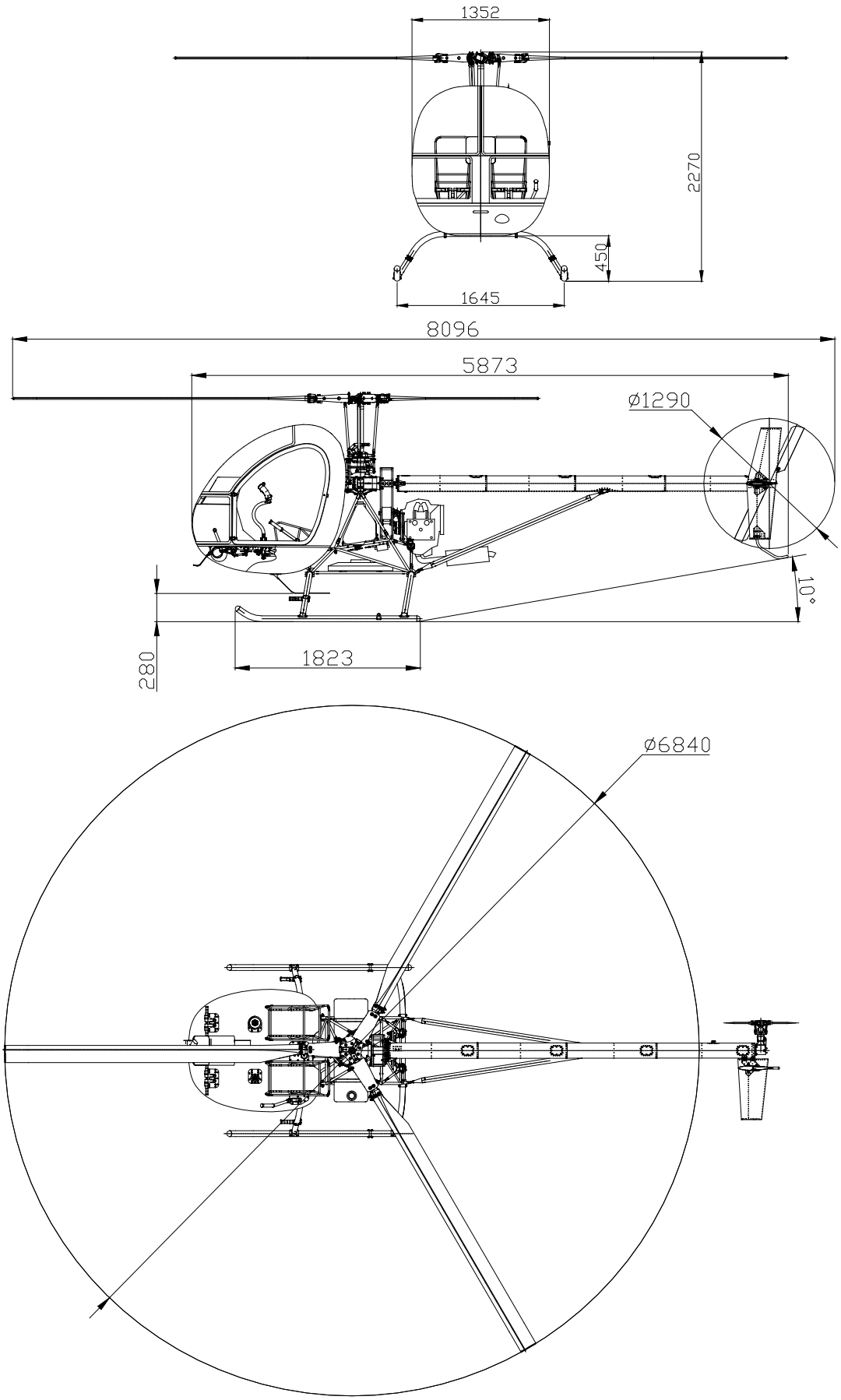

Fig. 01-01 General view of the helicopter AK1-3

SECTION 02

GENERAL REQUIREMENTS

SECTION 02. GENERAL REQUIREMENTS

02.10.00 Standard specification function

Standard specification for the helicopter type (hereinafter referred to as specification) defines the basic requirements for the helicopter and constitutes an Annex to the Agreement for supply of helicopter and basic document for acceptance-delivery.

02.20.00 Changes to specification

02.20.01 Changes with regard to the helicopter type have the following classification:

– major changes;

– secondary changes;

– sonic and emissive changes.

02.20.02 In the course of the helicopter production the Manufacturer reserves the right to make changes aimed at :

– improvement of aircraft performance, flights safety, reliability, operational performance and overhaulability;

– elimination of design deficiencies, improvements, prevention of supply delays, assurance of supplied helicopter compliance with terms of Agreement for helicopter production.

02.20.03 The Customer shall receive information regarding changes on time within the period as of the signature of the Agreement for helicopter production prior transfer of the helicopter to the Customer out of the list of changes made by the Manufacturer to this Specification.

02.20.04 Supplied helicopter shall include the following modifications:

– according to the bulletins with BA and BD indexes issued by the Manufacturer prior transfer of the helicopter to the Customer;

– according to all other bulletins issued by the Manufacturer, except for those issued for the last three months prior transfer of the helicopter to the Customer.

02.30.00 Specification legal force

In the event of any discrepancy between this Specification and the Agreement for production of the helicopter, the conditions specified in the Agreement shall prevail.

In the event of any conflict upon discrepancy between the specification and other documents attached to the helicopter, specification shall have legal force prior issuance of bulletins concerning improvements.

The Manufacturer shall supply to the Customer a helicopter with all latest modifications. In case the Manufacturer fails to fulfill these requirements, all necessary modification works in order to improve the helicopter, engine, avionics, spare parts shall be carried out by the Manufacturer at his cost.

Specification complies with OST 1 00057-80 standard.

Illustrations related to description of the helicopter design and systems shall be included into specification for illustrative purposes only.

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02.40.00 Certification

02.40.01 Helicopter АК1-3 is designed in accordance with the certification basis СБ АК1-3, developed on the basis of:

– Standard category helicopters flight worthiness provision of Aviation regulations, Part 27 (АП-27);

– Aircraft engine flight worthiness provision of Aviation regulations, Part 33 (АП-33).

02.40.02 Helicopter type certification was performed by the State Service of Ukraine for Aviation Safety in accordance with the aircraft certification procedure, Part 21 of the Aviation Regulations of Ukraine (ARU-21), with the issuance of Certificate of type № ТП 0008 dd. 30.06.2006 г.

02.50.00 Quality and control methods

02.50.01 Quality of work, materials and manufacturing techniques

In the course of helicopter manufacturing the quality of materials and manufacturing techniques meet the requirements of the current aviation and regulatory and technical documentation standards of Ukraine.

02.50.02 Control and test methods

Control and testing in the course of helicopter manufacturing are performed in accordance with the current regulatory and technical documentation.

02.60.00 Terms for the helicopter transfer to the Customer

The helicopter delivery-acceptance shall be performed at the Manufacturer's territory in the presence of the Customer upon execution of the delivery and acceptance certificate by the authorized representatives of both parties.

Title transfer point for the helicopter from the Manufacturer to the Customer shall be the date of signing the delivery and acceptance certificate, after which all the risks with regard to the helicopter shall be transferred from the Manufacturer to the Customer.

In order to perform additional Customer's requirements adopted by the Manufacturer the Agreement for helicopter production should be observed.

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02.70.00 Special requirements

02.70.01 Helicopter protective treatment

Protective treatment of the helicopter external and internal surfaces shall be performed in accordance with the current design documentation.

02.70.04 Smoking

Smoking in the helicopter is forbidden.

SECTION 03

BASIC AK 1-3 AIRCRAFT PERFORMANCE.

SECTION 03. BASIC AIRCRAFT PERFORMANCE

03.10.00 Aircraft performance

All aircraft characteristics are given for the helicopter gross weight of 650 kg.

- Maximum forward flight never-exceed velocity, km/h	180
- Cruise speed, km/h	160
- Hover ceiling, m	1300
- Service ceiling, m	3000
- Maximum climb capability, m/s	8,5
- Rate of descent upon planning in autorotation regime, Vсн , km/h	90
- Minimum descent velocity upon planning in autorotation regime, m/s	8,4
- Maximum descent velocity upon planning in autorotation regime, m/s	10
- Maximum endurance fora H=0… 500 m with account for 10% of en-route fuel reserve, h	2,6
- Maximum flying distance with account for 10% of en-route fuel reserve, km	320
- Maneuvering envelope	0,0 … +2,5

03.20.00 Weight solution

Maximum take-off mass, kg	650
Maximum laden aircraft without fuel mass, kg	596
Maximum disposable load mass (including pilot and fuel), kg	252
Empty weight, kg	398
Helicopter crew and equipment weight:	
– crew (2 persons), kg	150
– unusable fuel, l	1,0
– oil for engine, l	4,5
– cooling liquid, l	10

NOTE: Empty weight shall be elaborated based on the helicopter weighting results.

03.30.00 Regulation characteristics

Table 1

Name	Deviation name	Deviation value		Note
		Rated	Limit	
Rotor-blade angle	Minimum Maximum	-1° 12°	-1° +1°	Slide stroke 21 $_{-0,3}$ mm
Swash plate oblique angle and corresponding actuating lever strokes	Forward Backward Rightwards Leftwards	5° АП corresponds 14° РЦШ	±20′ ±20′	From neutral position
Swash plate disc initial slope corresponding to the pilot's lever neutral position		0°	±0,5°	
Antitorque rotor blade angle (radius $\bar{r}$ =0.7)	Latching right footplate Latching left footplate	+20° -10°	±20′ ±20′	
Footplate	Forward Backward	22,5° 22,5°	±20′ ±20′	From neutral position

03.40.00 Centering characteristics

Longitudinal center-of-gravity permissible range:

- extreme forward (in front of rotor axis), mm 80
- extreme aft (behind the rotor axis), mm -45

Empty helicopter longitudinal center-of-gravity, mm -161

03.50.00 Engine data

Number, type and identification of engines: a four-stroke four-cylinder piston engine EJ-25 with opposed cylinders and liquid cooling, adapted and modified according to the design documentation АК1-3.12.00.00.00.000.

03.50.01 Basic engine data:

Cubic capacity, cm^3 2457

Engine base weight, kg 110

Maximum rating:

Power, kW (hp) 115 (156)

Speed, rot/min 5600

Specific fuel consumption, g /(hph) 260

Maximum continuous power:

Power, hp, not less than 110

Speed, rot/min 5200-5500

Specific fuel consumption, g /(hph), not more than 270

Idle conditions:

Speed, rot/min 1000-1500

	Engine overall dimensions:	
	- length, m	0,8
	- height, m	0,7
	- width, m	0,5
03.50.02	Engine operating limitations:	
	Engine continuous run time:	
	- under maximum rating, s, not more than	60
	- under maximum continuous power	not limited
	- under idle conditions	not limited
	Cooling liquid temperature:	
	- minimum, °C	60
	- maximum, °C	100
03.60.00	**Geometric characteristics of the airscrews**	
03.60.01	Rotor geometric characteristics (R):	
	- rotor diameter, m	6,84
	- number of blades, pcs	3
	- lifting blade chord, m	0,17
	- blade section, (section type)	NACA 63A012 / NACA 63A015
	- blade configuration in plan	rectangular
03.60.02	Antitorque rotor geometric characteristics (AR):	
	- rotor diameter, m	1,29
	- number of blades, pcs.	2
	- tail blade chord, m	0,115
	- blade section, (section type)	NACA 63012
03.70.00	**Altitude envelope and operating temperature range**	
	Service temperature range, °C	-5… +35
	Flight altitude envelope (ASL), m	0… 3000
03.80.00	**Meteorological conditions**	
03.80.01	The helicopter is designed for day operation under visual meteorological conditions in accordance with visual flights rules at all latitudes outside the icing zone.	
03.80.02	Maximum permitted wind values at the ground level:	
	- tailwind component, m/s	5
	- headwind component, m/s	15
	- crosswind component, m/s	8

SECTION 05

RESOURCES AND SERVICE LIFE. MAINTENANCE

SECTION 05. RESOURCES AND SERVICE LIFE. MAINTENANCE

05.10.00 Resources and service life

05.10.01 Helicopter AK1-3 includes the following resources:

- resource until 1st repair ..... 2000 h.

- basic overhaul time ..... 2000 h.

Running time accountability is carried out in accordance with engine hour meter.

05.10.02 Engine EJ25 includes the following resources:

- assigned life ..... 2000 h.

- resource until 1st repair ..... 1000 h.

- basic overhaul time ..... 1000 h.

Running time accountability is carried out in accordance with engine hour meter.

While operation the resources may be elaborated by corresponding bulletins of manufacturing company.

Running hours are recorded by operating organization in helicopter and engine history sheet.

05.10.03 Manufacturer's standard warranty for helicopter and integrated parts is 100 flight hours within 1 year.

05.10.04 List of life limited components (service life).

All helicopter and engine component parts are divided by operation methods into two groups:

- products operated according to technical condition until pre-failure condition (TEP). These products are operated within the helicopter assigned resource until they reach the pre-failure condition, after which the product should be replaced or recovered. The frequency of products control, which is operated according to TEP in order to identify their pre-failure condition, is specified in the Regulations for helicopter AK1 -3 maintenance. In case the product is detected in a pre-failure condition, the Operator repairs or replaces it.

- products operated according to TER resource. These products upon the end of the assigned resources values (service life) must be repaired or replaced regardless of their technical condition subject to registration of the relevant documentation.

Products operated according to TER have a resource (service life) established for the helicopter AK1 -3 (Engine EJ25), except for products that have a limited life (service life). A list of such components is given in Table 1.

Table 1

Product name and code	Q-ty	$T_{р.1}$ (h.)	$T_{р.м}$ (h.)	$T_{р.н}$ (h.)
		$T_{с.1}$ (years)	$T_{с.м}$ (years)	$T_{с.н}$ (years)
Electrical battery Varley RedTop 25	1	-	-	- / 2 years (under date of battery production)
Fire extinguisher ВП-1	1	According to data sheet for fire extinguisher		
Fuel pump ТН	2	-	-	2000 / -
Tail boom БХ-10	1	2000 / -	2000 / -	4000 / -
Tail unit ГВО	1	2000 / -	2000 / -	4000 / -
Blade ЛНВ-7	3	-	-	2000 / -
Swash plate АП-5	1	2000 / -	2000 / -	4000 / -
Rotor hub ВНВ-6	1	1000 / -	1000 / -	4000 / -
Main gearbox ГР-4	1	1000 / -	1000 / -	4000 / -
Blade ЛРВ-11	2	-	-	2000 / -
Anti-torque rotor hub ВРВ-8	1	2000 / -	2000 / -	4000 / -
Tail gearbox ХР-9	1	2000 / -	2000 / -	4000 / -
Torque tube ВТ	1	-	-	2000 / -
High tension lead 22451AA	4	-	-	1000 / -
Main pulley clutch Mercedes Benz 1234110015	1	-	-	1000 / -
Discharge manifold ВК-1	1	-	-	500 / -
Dumper Г-1	1	-	-	500 / -

Тр.1 - resource until 1st repair

Тс.1 - service life until 1st repair

Тр.м – basic overhaul time

Тс.м - overhaul period

Тр.н - assigned life

Тс.н - assigned service life

h. - hours

In addition, part of the helicopter components should be replaced in the course of regular maintenance with frequency specified in Regulations for helicopter АК1-3 maintenance. List of these components is given in Table 2.

Table 2

Product name and code	Q-ty	Form of maintenance when the replacement is made
Oil filter	1	after (50 ± 5) h.
Engine crankcase air ventilation system filter	1	
Intake air filter	1	after (100 ± 10) h.
Fuel filter	1	
Igniter	4	
Gas-distributing belt	1	after (500 ± 50) h.
Upper support roller	1	
Lower support roller	1	
Idle gear	1	
Automatic gas-distributing belt tensioning device assembly	1	
Alternator belt	1	

05.10.05 ***Option***. It is possible to extend the Manufacturer's warranty liabilities term in excess of Standard warranty upon agreement with the Customer.

05.20.00 Maintenance

05.20.01 Scope and frequency of helicopter maintenance are set forth in Regulations for helicopter AK1-3 maintenance.

Regulations provide for the following types of maintenance:

05.20.02 Operative maintenance. Includes:

a). Pre-flight maintenance. Should be performed immediately prior to flight in accordance with flight day tasks and includes the helicopter inspection, conformance inspection of filling procedure, tanking, and aircraft availability verification.

b). Maintenance prior reflights. Should be performed immediately prior each next flight within starting time in accordance with flight task and includes helicopter inspection, fault handling, conformance inspection of filling procedure, tanking, and aircraft availability verification.

c). Postflight maintenance. Should be performed at the end of each flight day and includes helicopter inspection and fault handling.

05.20.03 Regular maintenance. Consists of scheduled tasks performance after 50±5, 100±10, 500±50 running hours of helicopter (helicopter running time should be accounted according to engine hour meter). Component with limited life replacement should be performed in accordance with assigned life completion. Each form of regular maintenance should be performed every 50±5 hours of helicopter flight hours (Table 13.1). Counting should be performed from operation start or after last repair against base figures.

05.20.04 Helicopter maintenance during storage. Should be performed depending on storage time limits and includes works on preparing helicopter for storage and works performed during storage.

05.20.05 On-season maintenance. Should be performed for the helicopter upon preparation for operation during fall-winter and spring-summer periods.

05.20.06 Special maintenance. Should be performed after helicopter heavy landing, hitting the high turbulence zone, upon helicopter transportation.

SECTION 06

DIMENSIONS AND AREAS

SECTION 06. DIMENSIONS AND AREAS

06.10.00 Dimensions and areas. General part

This section provides for information on basic overall dimensions and areas of the helicopter and its components.

06.20.00 Dimensions and areas

06.20.01	Helicopter	
	- helicopter length, both rotors turning, m	8,096
	- helicopter length without blades, m	5,873
	- helicopter height, m	2,27
	- clearance (distance from the ground to antenna), m	0,28
06.20.02	Cabin	
	- length, m	1,52
	- width, m	1,352
	- height, m	1,49
06.20.03	Empennage	
	- stabilizer rigging angle, degrees	0
	- horizontal tail surfaces area, m^2	0,15
	- vertical tail surfaces area, m^2	0,267
06.20.04	Landing wheels	
	- main wheel track, m	1,645
	- wheel base, m	1,823
	- clearance, m	0,45
06.20.05	Lifting propeller	
	- diameter, m	6,84
	- rotor disc area, m2	36,74
	- number of lifting propeller blades	3
06.20.06	Anti-torque rotor	
	- diameter, m	1,29
	- number of anti-torque rotor blades	2

SECTION 11

WRITING AND STENCIL

SECTION 11. WRITING AND STENCIL

11.00.00 General information

This section provides for information about the helicopter coloring scheme, as well as information about the location of writing and stencils.

11.00.01 Helicopter coloring scheme

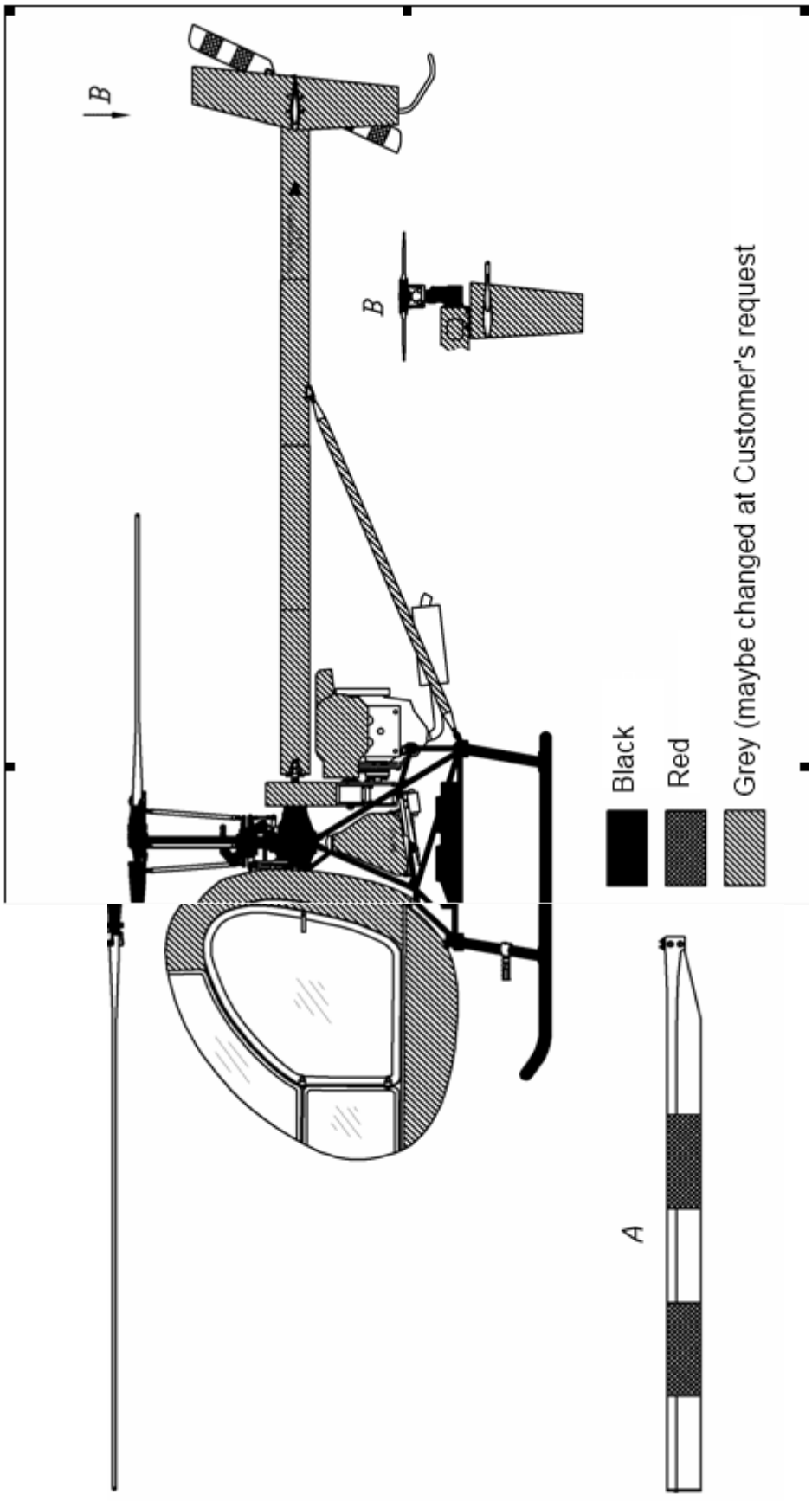
Exterior painting, markings, writing and stencils are made in the helicopter in accordance with current regulatory and technical documentation and constitute a standard. The exterior coloring scheme and markings are given in Fig. 11-01.

Interior crew cabin equipment (crew seats, helicopter controls, instrument boards and panels) are colored in black.

Separate helicopter surfaces (discharge manifold, noise muffler, and blades drop stops) are not colored.

Option. Color of the separate helicopter surfaces can be changed at Customer's request. Surfaces that can be painted in the color desired by the Customer are shown in Fig. 11-01. Exterior painting project scheme with application of identification and other signs should be developed by the Manufacturer based on the required input data from the Customer and should be agreed between the Customer and Manufacturer on the stage of signing Agreement for helicopter production. The agreed scheme shall be attached to the Agreement.

Fig. 11-01 External colouring and marking scheme



11.00.02 Writing and stencils

Arrangement diagram on informational writing and stencils is given in Fig. 11-02.

Writings on the helicopter external surface, stencils and writings in the crew cabin are made in Russian.

Writings and stencils on the devices and purchased components are made in Russian, except for products having writings in English on the internal surfaces.

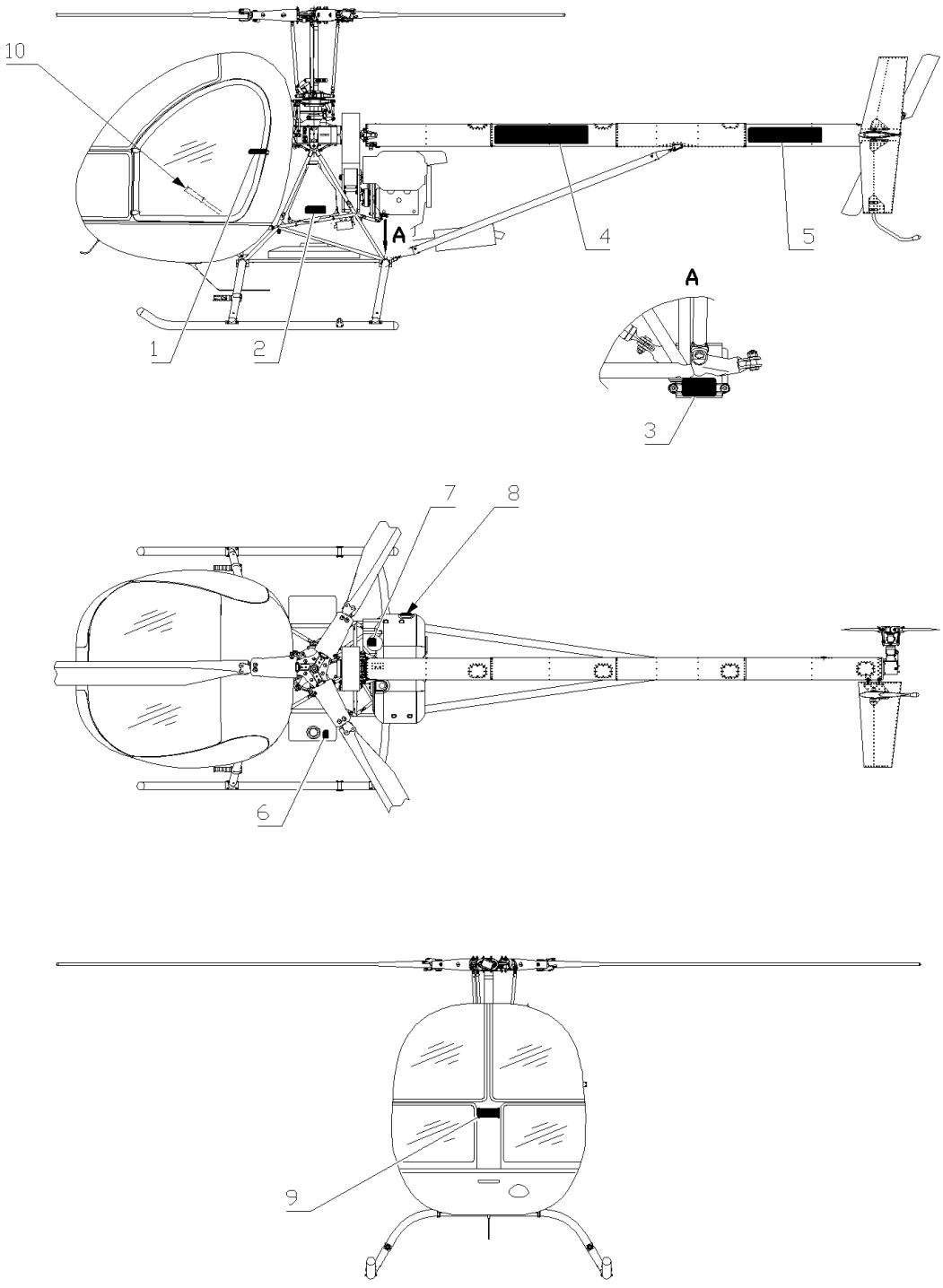


Fig.11-02 Writing and stencils

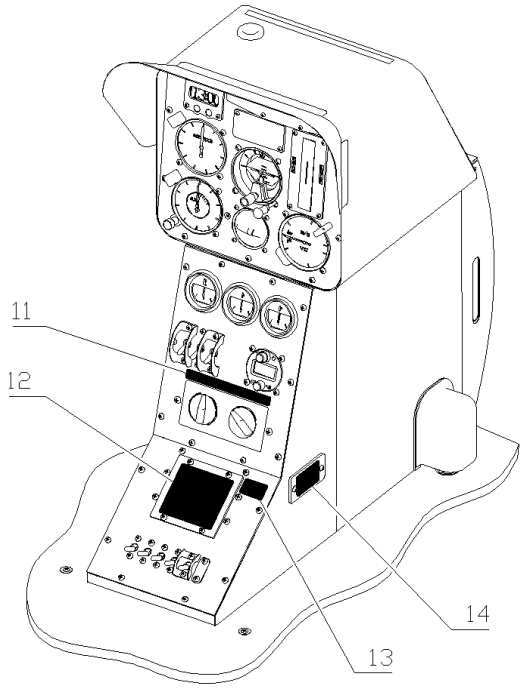


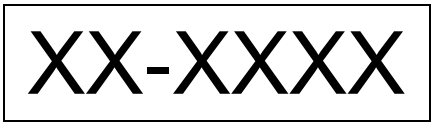
Fig.11-02 Writing and stencils (continued)

1. Explanatory text. Indicates the direction for handle rotation to open the cabin door. Located on the exterior cabin door handles.

2. Helicopter type. Writing is located on the left and right wall of the fuel tank.

3. Helicopter identification plate. Located on the rear main bearing assembly on the portside.

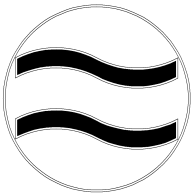
4. Place for state and registration marks application. To be applied by the Operator on both sides of the tail boom second section.



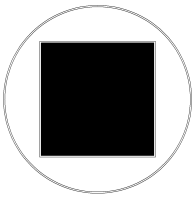
5. Warning writing. Located on both sides of the tail boom fourth section.

6. Ground handling onboard point - fueling. Located on the rear wall of the fuel tank near the filler cap.

7. Ground handling onboard point – adding coolant. Located on the engine cooling system overflow reservoir neck hatch cover.

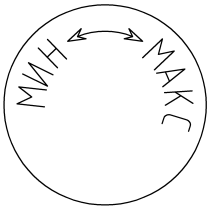


8. Ground handling onboard point – oil filling. Located on the engine oil filler neck hatch lid.



9. Logo of the manufacturer. Located on the front of the upper cockpit cowl.

10. Explanatory text. Indicates the direction of gas adjustment handle rotation.
The writing is located on the ends of "stroke-gas" levers.



11. Writing limiting the terms of operation.
Located at the lower instrument board.

Вертолет эксплуатировать только днем по ПВП!

12. Adjustment data plates.
Located on the instrument board electrical panel fuse block cover.

Указатель воздушной скорости ВК240 №_____

V	40	60	80	100	120	140	160	180
ΔV								

«___» _____ 20___ г. Проверил_____

Высотомер BG6-2 №_____

H	0	500	1000	2000	3000
Δh					

«___» _____ 20___ г. Проверил_____

Магнитный компас PAI-700 №_____

МК	360°	90°	180°	270°
Δк				

«___» _____ 20___ г. Проверил_____

13. Warning writing.
Located at the upper right angle of the instrument board electrical panel.

НЕ КУРИТЬ!
NO SMOKING!

14. Warning writing.
Located at the diagnostic outlet cover on the instrument board right wall.

В ПОЛЕТЕ НЕ ИСПОЛЬЗОВАТЬ
DO NOT USE IN FLIGHT

SECTION 12

HELICOPTER MAINTENANCE

SECTION 12. MAINTENANCE

12.00.00 Maintenance. General part

Helicopter design provides for easy access from the ground to all service points.

Filling points location is given in Fig. 12-01.

Discharge points location is given in Fig. 12-02.

To access the closed service points the following access hatches and covers are provided:

- four inspection hatches on the tail boom to inspect the transmission shaft , its bearings and directional system cable circuit;

- three access hatches on the engine cowl to access to the air filter of the crankcase ventilation system, engine filling with oil and coolant;

- removable lower cockpit cowl to access the electrical equipment and brackets, tie rods and control system cable circuit;

- removable cover on the instrumentation board to access the instruments;

- two removable pulley drive protective cover to inspect the belts and pulleys.

12.10.00 Aviation fuels grades applied

12.10.01 Fuel grades applied

As a fuel the helicopter uses the automobile lead-free fuel with octane grade of not less than 95 according to research method (RON) or 85 according to motor method (MON) or 91 according to AKI.

- brands (grades) recommended:

Ukraine	A-95 DSTU 4063-2001
Russia	АИ-95 GOST 2084-77
Europe	min RON 95 EN228
Canada	min AKI 91 CAN/CGSB-3.5
USA	min AKI 91 ASTM D4814

12.10.02 Oils brands applied

Engine oiling systems -	Synthetic motor oil for gasoline motors of grade not less than SL according to API classification with viscosity number 5W-50 according to SAE. Oil brand recommended – **Mobil 1 5W-50**
Main and tail gear boxes -	Synthetic gear oil of GL-4, Gl-5, MT-1 categories according to API classification with viscosity number 75W-90 or 80W-90 according to SAE. Oil brand recommended – **Mobil 75W-90**

12.10.03 Coolant type

The engine water-cooling system uses mono-ethylene glycol-based coolant that meets GOST 28084-89 requirements for ОЖ-40 liquid.

- brand recommended **Tosol-A40M** ТУ 6-02-751-86

12.20.00 Maintenance facilities

12.20.01 The helicopter is completed with single set of tools and accessories in accordance with list, Annex **D**.

12.20.02 ***Option***. The group set of spare tools and accessories may be supplied with the helicopter (Annex **E**).

12.20.03 ***Option***. A set of instruments and devices recommended for helicopter maintenance may be supplied (Annex **F**).

12.20.04 ***Option***. One or several spare tools and accessories pcss may be supplied with the helicopter to ensure 100 of running hours for one helicopter (Annex **G**).

12.20.05 ***Option***. One or several spare tools and accessories kits may be supplied with the helicopter to ensure 500 of running hours for one helicopter (Annex **G**).

12.30.00 After-sale maintenance

12.30.01 Helicopter after-sale maintenance within the warranty period should be performed under conditions specified in the Agreement for helicopter production.

12.30.02 Manufacturer shall transfer to the Customer along with the helicopter the recommendations on range and quantity of spare parts and integrated components required for helicopter standard operation.

12.30.03 Manufacturer shall within the entire helicopter life circle transfer to the Customer for free and as soon as possible the information on hazardous failure and/or damage occurred in aircraft fleet of this type and recommendations on such hazardous failure and/or damage occurrence prevention in the Customer's helicopter.

12.30.04 Manufacturer shall once a year within the entire helicopter service life transfer to the Buyer the information list of service bulletins enacted related to changes to the helicopter design, integration, equipment and operation of the helicopter, and changes to the operation documentation supplied by the Manufacturer.

12.30.05 Manufacturer shall within the entire helicopter service life transfer to the Buyer for free and as soon as possible the urgent changes to the operation documentation supplied by the Manufacturer as well as bulletins of BA/BD codes related to assurance of flight worthiness and /or aircraft fleet safety.

12.30.06 The Customer shall as soon as possible after helicopter registration with aviation administration bodies send at the Manufacturer's address the information regarding received State and Registration marks and place of helicopter permanent dislocation (deployment).

12.30.07 In case of helicopter letting or sale the Customer shall immediately notify the Manufacturer and send at the Manufacturer's address the contact information of the new helicopter owner (contact person, telephones, addresses, e-mail, etc.).

12.30.08 The Customer shall within the entire helicopter service life on a monthly basis send to the Manufacturer's address the information regarding all failures and/or defects and/or damages in established form. The Customer shall notify the Manufacturer immediately as for the hazardous failures and/or defects and/or damages.

12.30.09 Based on separate agreements with the Customer the Manufacturer shall provide within the entire helicopter service life on Customer's requests:

- supply of spare parts and materials required for helicopter maintenance, renewal of the same in the course of helicopter operation in accordance with agreed lists;

- repair and recovery of air-technical property supplied with each helicopter;

- repair of helicopter and integrated components of own production occurred due to the Operator's fault, including during warranty period;

- repair of purchased integrated parts on Manufacturer's site within the powers provided by purchased integrated parts suppliers;

- technical support of the Customer after warranty period expiry in troubleshooting regarding failures, defects and/or damages on the supplied helicopter;

- performance of works on the helicopter in accordance with service bulletins;

- performance of maintenance forms in accordance with maintenance regulations;

- operation documentation control verifications;

12.40.00 Helicopter maintenance points

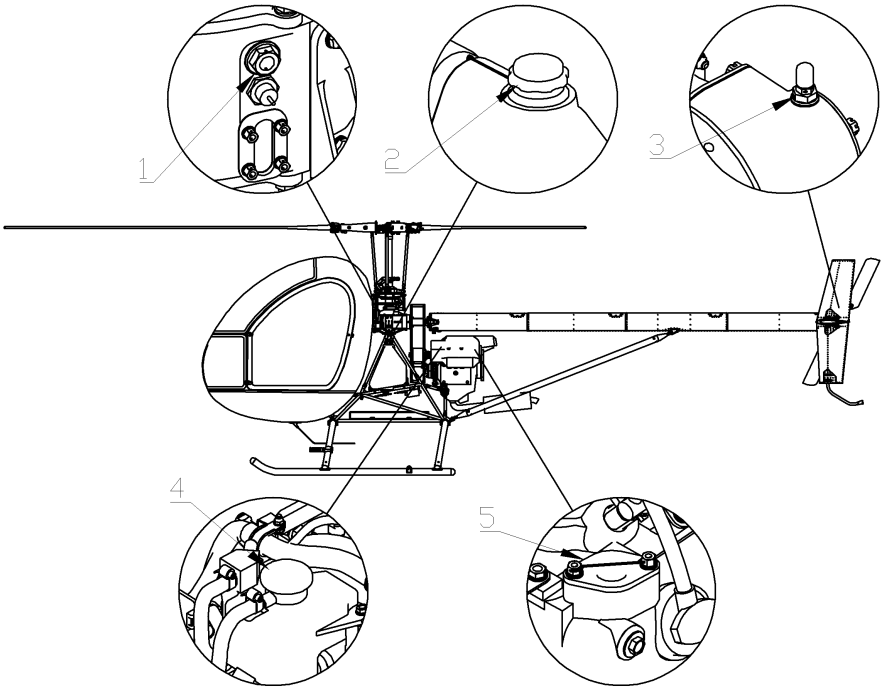


Fig. 12-01 Filling points

1. Main gear box neck.
2. Fuel tank neck.
3. Tail gearbox neck.
4. Cooling system overflow reservoir neck.
5. Engine oil tank neck.

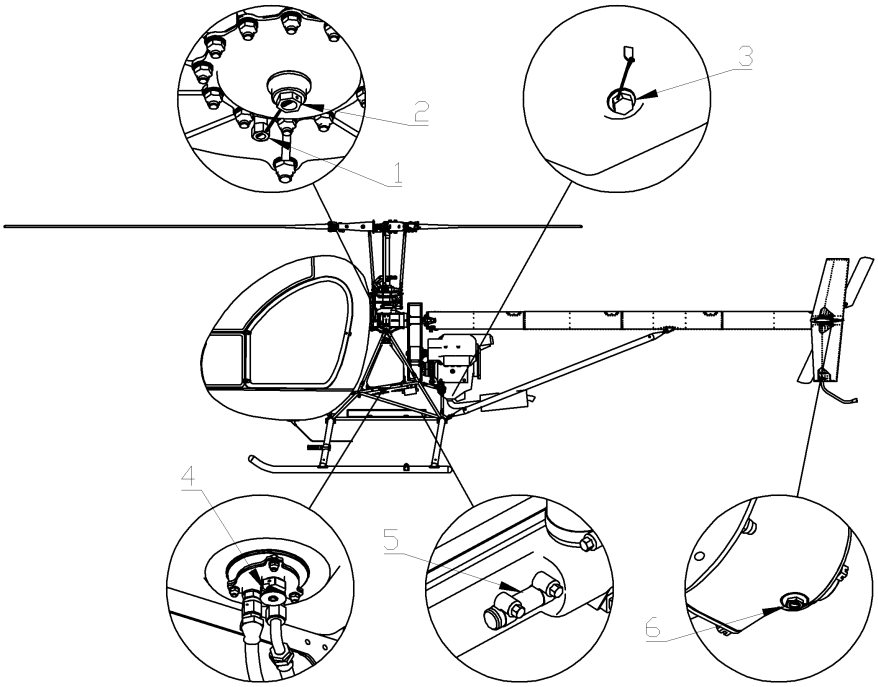


Fig. 12-02 Discharge points

1. Drainage plug (main gear box).
2. Drainage plug (main gear box).
3. Drainage plug (engine oil drip pan).
4. Fuel tank dump (fuel sediment) valve.
5. Heat dissipater coolant drainage connection.
6. Drainage plug (tail gearbox).

ANNEXES

AIRCRAFT PERFORMANCE

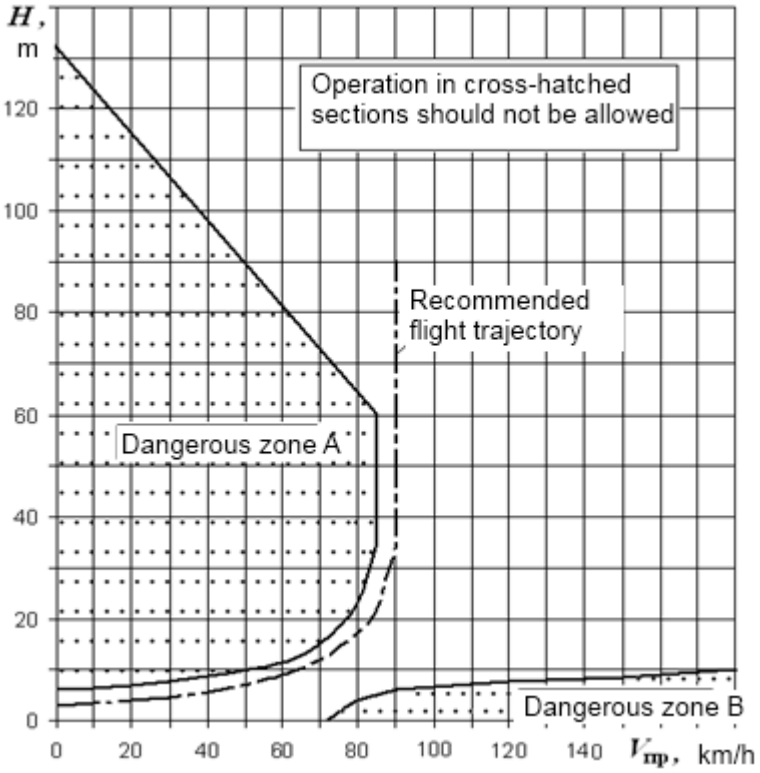


Fig. A-01 Dangerous flight zones

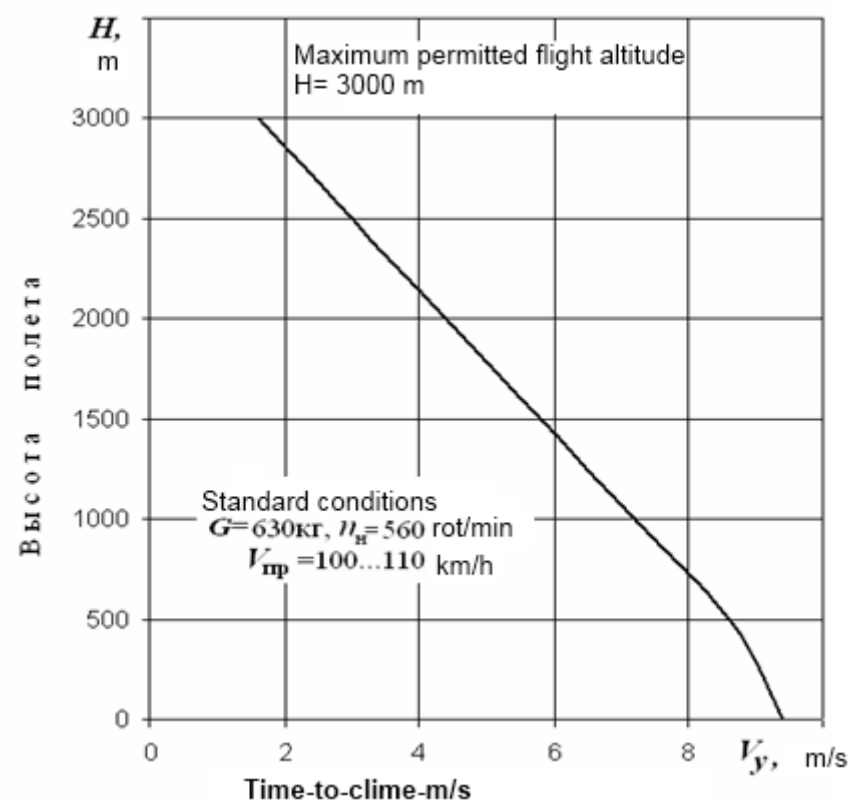


Fig. A-02 Helicopter time-to-clime dependency on flight altitude

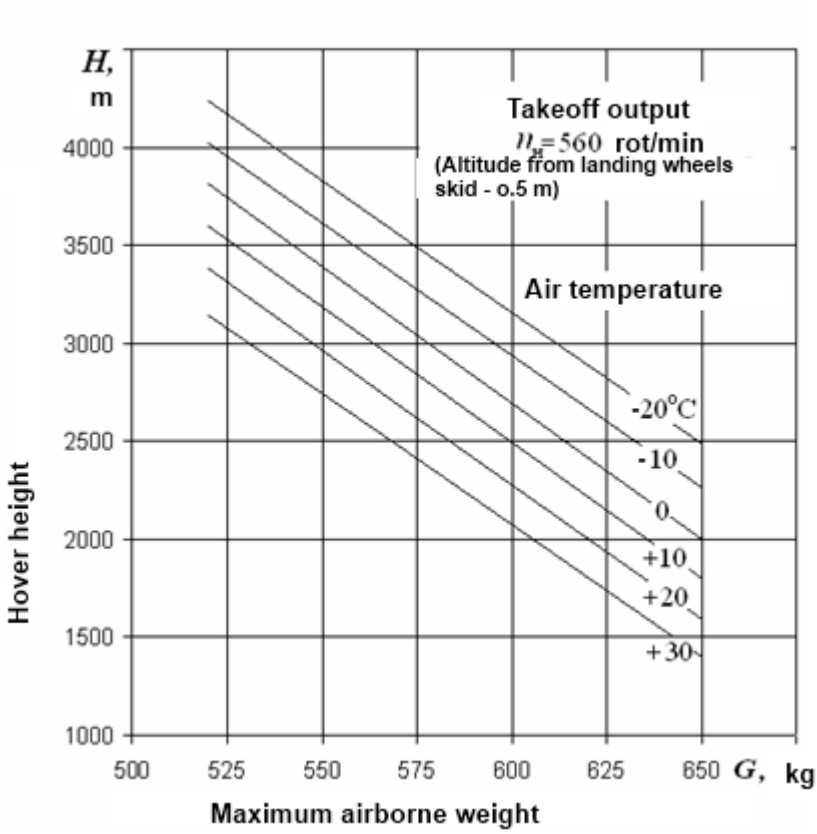


Fig. A-03 Helicopter hover ceiling without including ground induced effect

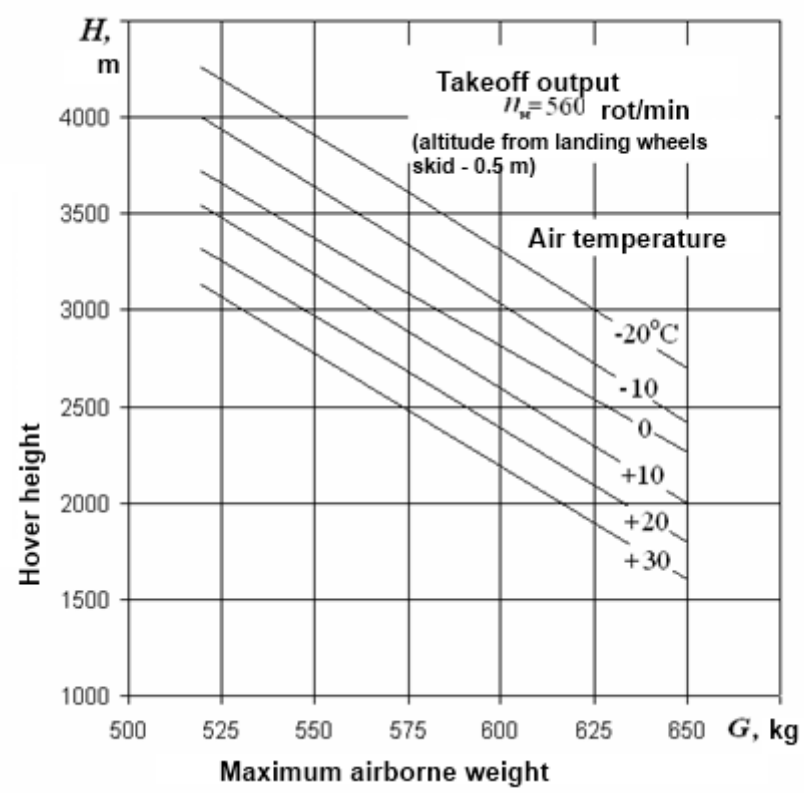


Fig. A-04 Helicopter hover ceiling including ground induced effect

ANNEX B

LIST OF BASIC PURCHASED INTEGRATED PARTS

Index No	Name	Q-ty	Identification	Note
Engine unit and instrumentation				
1.	Engine	1	EJ25	
2.	Electronic engine control system controller January 5.1	1	261.3763 000	
3.	Booster coil	1	22433AA410	
4.	Plug	4	NGK BKR6E-11	
5.	Butterfly plate	1	16114AA813	
6.	Alternator belt	1	Gates “Micro-V XF” 5PK778	
7.	Engine hour meter	1	873 IB	
8.	Electric fan	2	45121PA001	
9.	Fuel level indicator	1	УБ-193	
10.	Engine temperature indicator	1	УК-193	
11.	Ambient temperature sensor	1	2115-3828210	
12.	Overflow reservoir	1	21132AA075	
13.	Fuel atomizer	4	16611AA350	
14.	Air engine filter	1	Jacky Auto Sport B-005 p/n 06733	
15.	Crankcase ventilation air system filter	1	Pro.Sport RS-03584	
16.	Oil filter	1	Mann W814/80	
17.	Fuel filter	1	Mann WK612/5	
18.	Pressure sensor	3	MM126	
19.	Pressure sensor	1	25240KA080	
20.	Detonation sensor	1	18.3855	
21.	Butterfly plate position sensor	1	22633AA151	
22.	Rotation inductive sensor	1	191.3847	
23.	Oxygen sensor	1	Bosch 0258005133	
24.	Temperature sensor	1	23.3828	
25.	Temperature sensor	1	TM106	
26.	Breather air temperature and pressure sensor	1	22634AA000	
27.	Idle adjuster	1	2112-1148300-02	
28.	Fuel pressure adjuster	1	22670AA240	
29.	Drive pulley clutch	1	Mercedes Benz 1234110015	
Instrumentation				
1.	Horizon indicator	1	GH025	
2.	Climb indicator	1	BC10-1B	
3.	Altimeter	1	BG6-2	
4.	Magnet compass	1	PAI-700	
5.	Airspeed indicator	1	BK240	
6.	Slip indicator	1	CHY-1	
Communications equipment				
1.	Radio station	1	Microair Avionics M760	
2.	Antenna	1	CI-122	
Electrical equipment				

1.	Starter	1	M000T30471	
2.	Accumulator	1	Varley RedTop 25	
3.	High voltage wire	2	22451AA810 «4»	
4.	High voltage wire	1	22451AA720 «3»	
5.	High voltage wire	1	22451AA800 «1»	
6.	Navigation lights	2	БАНО-45	
7.	Floodlight	1	Bosch Compact 100	
Heating and ventilation system				
1.	Damper electrical motor	1	2110-8127200-10	
2.	Autopilot system controller	1	2110-8128020	
Fire protection equipment				
1.	Fire extinguisher	1	ВП-1	
Transmission				
1.	Belt	6	XPA67 1532 DIN7753	
2.	Gear assembly temperature indicator	1	УК-193	
3.	Temperature sensor	1	ТМ106	
4.	Inductive rotation sensor	1	191.3847	
Control				
1.	Angular position transducer	1	РЮИБ.401263.501	

ANNEX C

LIST OF TECHNICAL DOCUMENTATION ATTACHED TO THE HELICOPTER

Index no	Name	Q-ty	Note
1.	Helicopter history sheet	1	
2.	Engine history sheet	1	
3.	Helicopter flight operation manual (РЛЭ АК1-3)	1	
4.	Helicopter maintenance manual (РЭ АК1-3)	1	
5.	Helicopter maintenance regulations (РО АК1-3)	1	
6.	Maintenance checklists (set)	1	

Note. Documentation language - English.

ANNEX D

SINGLE SET OF SPARE TOOLS AND ACCESSORIES
(supplied with the helicopter)

	Name	Identification	Q-ty
1.	Spare tools and accessories case:		
1	Case		1 pcs.
2	Combination wrench 8X8	7811-0252 ГОСТ 16983-80	2 pcs.
3	Combination wrench 22X22	7811-0259 ГОСТ 16983-80	2 pcs.
4	Slip-joint pliers L = 180 mm	7814-0259И ГОСТ 5547-93	1 pcs.
5	Cutter pliers L = 160 mm	7814-0137 ГОСТ 28037-89	1 pcs.
6	Straight-edge screwdriver L = 190 mm	7810-0922 ГОСТ 17199-88	1 pcs.
7	Cross head screwdriver L = 200 mm	7810-0982 ГОСТ 17199-88	1 pcs.
8	Straightener (for blades installation НВ)	И9-005	1 pcs.
9	Eye-bolt	Н3-003	1 pcs.
10	Device (to check tank oil level)	М7-001	1 pcs.
11	Device (to check coolant level in overflow reservoir)	М7-003	1 pcs.
12	Bootstrap system	АЗУ 12В/5А	1 kit
13	Testing motor	S7000	1 pcs.
14	Lifting propeller flexbeam plate	АК1-3.06.01.00.00.004	9 pcs.
15	Anti-vibration damper	793-901	1 pcs.
16	Sealing (fuel tank neck cover)	АК1-3.13.07.00.00.004	1 pcs.
17	Locking wire	КО 0,8 ГОСТ 792-67	100 г
18	Combined gloves		1 пара
19	Attaching parts pcs (polyethylene container):		
1	Adjusting washer pcs (crankshaft position sensor)	АК1-3.12.00.00.00.072	1 kit
2	Mail screw (lower cowling securing)	5-14-Кд ОСТ1.31538-80	5 pcs.
3	Mail screw (tail boom hatches securing)	4-11Кд ОСТ1.31195-80	5 pcs.
4	Bolt (cowling securing)	5-12-Кд ОСТ1.331103-80	5 pcs.
5	Mail screw (cockpit panel securing)	А2.М4-6gх12 ISO 4762	4 pcs.
6	Female screw (self-checking, high)	5-Кд ОСТ 1.33055-80	2 pcs.
7	Female screw (self-checking, high)	6-Кд ОСТ 1.33055-80	2 pcs.

	Name	Identification	Q-ty
8	Female screw (self-checking, low)	6-Кд ОСТ 1.33059-80	2 pcs.
9	Female screw (self-checking, low)	8-Кд ОСТ 1.33059-80	2 pcs.
10	Plain washer (cowling securing)	АК1-3.12.00.00.00.027	2 pcs.
11	Plain washer (cowling securing)	АК1-3.12.00.00.00.028	2 pcs.
12	Locking pin	1,2х20х210 ГОСТ 397-79	5 pcs.
13	Locking pin	1,6х20х210 ГОСТ 397-79	5 pcs.
14	Locking pin	2х25х210 ГОСТ 397-79	5 pcs.
15	Locking pin	2,5х30х210 ГОСТ 397-79	5 pcs.
16	Safety pin (to lock rotation blade securing bolt)	АК1-3.00.00.00.00.002	2 pcs.
2.	Dismountable beaching devices	АК1-РР.01.00.00.000/ АК1-РР.02.00.00.000	1 kit
3.	Funnel (for helicopter tanking with fuel)	Н7-008	1 pcs.
4.	Funnel (for helicopter tanking with oil)	Н7-006	1 pcs.
5.	Funnel (for helicopter tanking with coolant)	Н7-010	1 pcs.
6.	Container (for lifting propeller blades)	Н7-004	1 pcs.
7.	Blanking cover (on total pressure probe)	П8-001	1 pcs.
8.	Blanking cover (to be mounted on the lower lever upon control handle removed)	П8-006	1 pcs.

***** Note: List of spare parts shall be agreed with the Customer at the stage of signing the Agreement depending on guaranteed resource value.

ANNEX E

GROUP SET OF SPARE TOOLS AND ACCESSORIES
(option)

Index No	Name	Identification	Q-ty
1.	Box (for special tools)		1 pcs.
2.	Spreader bars (to assemble-disassemble the engine)	Н3-001	1 pcs.
3.	Bearer (for tail boom)	Н9-001	2 pcs.
4.	Bearer (for engine)	Н9-002	1 pcs.
5.	Reservoir (for oil discharge from the tail gearbox upon drainage)	Н7-002	1 pcs.
6.	Catch lock (pulley gear lower flange adaptor)	И9-002	1 pcs.
7.	Wrench (for securing female screw of the pulley gear upper flange adaptor)	И9-003	1 pcs.
8.	Device (to hold the lifting propeller)	И9-004	1 pcs.
9.	Extracting screw (to remove rear pulley gear wall, lower)	П9-005	1 pcs.
10.	Extracting screw (to remove rear pulley gear wall, upper)	П9-024	1 pcs.
11.	Rest assy (Ø22, for extracting screw)	П9-020	1 pcs.
12.	Rest assy (Ø24, for extracting screw)	П9-077	1 pcs.
13.	Catch lock (pulley gear upper flange adaptor)	П9-021	1 pcs.
14.	Catch lock (anti-torque rotor attach fitting)	И9-006	1 pcs.
15.	Wrench for anti-torque rotor attach fitting female screw	И9-007	1 pcs.
16.	3-gripping extracting screw (to remove main rotor hub)	СВ3	1 pcs.
17.	Device (to check lifting propeller in-track condition)	М7-002	1 pcs.
18.	Device (for assembly/disassembly of pressure mechanism lever bearing)	П9-049	1 pcs.
19.	Device (for assembly/disassembly of pressure mechanism drum bearing)	П9-058	1 pcs.
20.	Wrench (for pressure mechanism drum axis retaining nut)	П9-059	1 pcs.
21.	Catch lock (pressure mechanism drum axis)	П9-060	1 pcs.
22.	Device (for assembly/disassembly of anti-torque rotor attach fitting bearings)	П9-061	1 pcs.
23.	Device (to hold engine crankshaft pulley)	И9-009	1 pcs.
24.	Device (to hold left distributor shaft cog-wheel)	И9-010	1 pcs.
25.	Device (to hold right distributor shaft cog-wheel)	И9-011	1 pcs.
26.	Device (to rotate engine crankshaft pulley)	И9-012	1 pcs.
27.	Catch lock (for foot pedal)	П9-001	1 pcs.
28.	Catch lock (АК1-3.10.08.00.00.000 anti-torque rotor throttle)	П9-003	1 pcs.
29.	Lock pin (to lock elevator transmitter automatic belt tensioner)	И9-015	1 pcs.
30.	Device (for engine oil drainage)	Н7-007	1 pcs.

Index No	Name	Identification	Q-ty
31.	Reservoir (to collect oil from main gear box upon drainage)	Н7-001	1 pcs.
32.	Lanyard	Н3-005	1 pcs.
33.	Temporary cover (to prevent fuel flow system stoppage upon fuel fittings demate)	П8-003	3 pcs.
34.	Temporary cover (to prevent fuel flow system stoppage upon fuel fittings demate)	П8-004	3 pcs.
35.	Straightener	И9-021	1 pcs.
36.	Wrench (to install anti-torque rotor hub attachment pin)	И9-023	1 pcs.
37.	Hydraulic elevator (min. Weight-lift 500 kg)		1 pcs.
38.	Syringe 500 cm^3 (for oil filling)		1 pcs.
39.	Oil filter chain lifter		1 pcs.
40.	Multimeter	DT9208A	1 kit
41.	Socket head (for main rotor head attachment pin)	S=46 □19	1 pcs.
42.	Socket head (for pulley gear lower flange retaining nut)	S=41 □19	1 pcs.
43.	Extension bar for socket heads	1/2"F x 3/4"M	1 pcs.
44.	Torque wrench	25 Нм □6.3	1 pcs.
45.	Torque wrench	250 Нм □12.5	1 pcs.
46.	Torque wrench	450 Нм □19	1 pcs.
47.	Tensimeter	ИН-11	1 pcs.
48.	Checkout unit	КПУ-3	1 pcs.
49.	Compression gauge	TOYA 81720	1 pcs.
50.	Device for dynamic trim balance	DSS MicroVib II	1 kit

ANNEX F

TOOLS AND DEVICES KIT RECOMMENDED FOR HELICOPTER MAINTENANCE

(OPTION)

Index No	Name	Identification	Q-ty
Tools equipment according to PID			
1.	Tool kit (94 items)	Apelas CS-4094PMQ	1 kit
2.	Wrench set 6-32	YATO YT-0152	1 kit
3.	Edge sticks kit	0,05 – 1	1 kit
4.	Bench hammer	G=500 г	1 pcs.
5.	Bench hammer	G=300 г	1 pcs.
6.	Rubber mallet	G=500 г	1 pcs.
7.	Pincer	L=200 mm	1 pcs.
8.	Wire pliers	L=200 mm	1 pcs.
9.	Combination wrench kit	6-24	1 kit
10.	Pin punch kit	Ø2-8 mm	1 kit
11.	Screwdrivers kit	YATO YT-2784	1 kit
12.	Combination magnifier (3x, 10x)	ЛП-10-3^{x}	1 pcs.
13.	Telescopic mirror	YATO YT-0660	1 pcs.
14.	Telescopic magnetic pick-up tool	YATO YT-0661	1 pcs.
15.	Slide gage	ЩЦ 1-125-0.1	1 pcs.
Tools equipment according to avionics			
1.	Combination wrench kit	8-24	1 kit
2.	Pincer	L=200 mm	1 pcs.
3.	Pliers	L=180 mm	1 pcs.
4.	Nippers	L=160 mm	1 pcs.
5.	Wire pliers	L=200 mm	1 pcs.
6.	Screwdrivers kit	YATO YT-2784	1 kit
7.	Plug-and-socket connector wrench		1 pcs.
Devices for helicopter maintenance			
1.	Creeper	ANDRMAX 777-2509	1 pcs.
2.	Dismountable scaling ladder H = 600 - 1500 mm		2 pcs.
3.	Airframe case kit	H7-005	1 kit
4.	Aluminum oilcan, 20 l		1 pcs.

ANNEX G

SPARE PARTS KIT TO ENSURE
100 RUNNING HOURS OF ONE HELICOPTER
(Option)

Index No	Name	Identification	Q-ty
1.	Oil filter	Mann W814/80	2 pcs.
2.	Fuel filter	Mann WK612/5	1 pcs.
3.	Crankcase ventilation system air filter	Pro.Sport RS-03584	2 pcs.
4.	Engine air filter	Jacky Auto Sport B-005 p/n 06733	1 pcs.
5.	Spark plug	NGK BKR6E-11	4 pcs.

SPARE PARTS KIT TO ENSURE
500 RUNNING HOURS OF ONE HELICOPTER
(Option)

Index No	Name	Identification	Q-ty
1.	Oil filter	Mann W814/80	10
2.	Fuel filter	Mann WK612/5	5
3.	Crankcase ventilation system air filter	Pro.Sport RS-03584	10
4.	Engine air filter	Jacky Auto Sport B-005 p/n 06733	5
5.	Spark plug	NGK BKR6E-11	20
6.	Generator drive belt	Gates “Micro-V XF” 5PK778	1
7.	Timing belt	13028AA181	1
8.	Lower belt idler	13073AA190	1
9.	Upper belt idler	13073AA142	1
10.	Intermediate gear	13085AA080	1
11.	Automatic belt tension adjuster assembly	13033AA042	1
12.	Exhaust manifold ВК-1	АК1-3.19.02.00.00.000	1
13.	Muffler Г1	АК1-3.19.01.00.00.000	1
14.	Bearing	FLURO GXSW 12	3
15.	Bearing	"ШС-10Ю"	2
16.	Bearing	61904-2RS1	2
17.	Bearing	АК1-3.09.05.00.00.000	2
18.	Bearing	6207-2z	2
19.	Drive pulley belt	XPA1532	6
20.	Exhaust valve	13202AA371	8
21.	Intake manifold gasket	14035AA383	2

22.	Exhaust manifold gasket	44022AA020	2
23.	Nut M10-Cp3, 12-edges.	"M10-Cp3", OST 1.11493-74	6
24.	Retaining ring	AK1-3.04.00.00.00.033	1
25.	Exhaust valve oil-guard cap	13211AA050/110	8
26.	Intake valve oil-guard cap	13207AA050/120	8
27.	Cylinder-head gasket	11044AA632	1
28.	Adjusting plates kit	AK1-3.06.00.00.00.012	3
29.	Push-pull rod of tail rotor blade (incl. 2 bearings CXSW6)	AK1-3.14.34.00.00.000	2
30.	Upper rod end of main rotor push-pull tube (incl. bearing CXSW8)	AK1-3.14.13.01.00.000	3
31.	Pin	AK1-3.06.00.00.00.011	3
32.	Drive pulley	AK1-3.04.04.00.00.000	1
33.	Torsion plates kit (plates 57 pcs)	AK1-3.06.01.00.00.004	1
34.	Splice plate	AK1-3.06.01.00.00.010	6
35.	Splice plate	AK1-3.06.01.00.00.011	3
36.	Boot	AK1-3.06.00.00.00.016	3

ANNEX H

SUMMARY LIST OF HELICOPTER AK1-3 OPTIONS

Section No	Item No	Option content	Note
05	05.10.04	Manufacturer's warranty liability term extension in excess of Standard warranty	
11	11.10.00	Helicopter coloring scheme may be changed	
-	-	It is possible to install sliding windows on the cabin's doors for additional cabin ventilation	
-	-	It is possible to supply with the helicopter two aviation antinoise headsets DenCom AH-501/511	
12	12.20.02	Group set of tools and accessories may be supplied with the helicopter (Annex **E**)	
12	12.20.03	The tools and devices kit recommended for helicopter maintenance may be supplied with the helicopter (Annex **F**)	
12	12.20.04	One or several spare parts kit may be supplied with the helicopter to ensure 100 running hours of one helicopter (Annex **G**)	
12	12.20.05	One or several spare parts kit may be supplied with the helicopter to ensure 500 running hours of one helicopter (Annex **G**)	

ANNEX I

COMPARISON OF AK1-3 WITH R22 AND SCHWEIZER 300C ANALOGUES.

Aircraft performance		Models of helicopters		
		AK1-3	R22 Beta II	Schweizer 300C
Basic:				
Manufacturing company		Ukraine	USA	USA
Manufacturer		DB Aerocopter Ltd.	Robinson Helicopter Company	Schweizer Aircraft Corporations
Crew + passengers	number	1+1	1+1	1+2
Dimensions:				
Fuselage length	m	5.806	6.58	6.76
Fuselage with rotors length	m	8.096	8.76	9.40
Maximum cabin width at the shoulders level	m	1.35	1.12	1.30
Helicopter height	m	2.27	2.72	2.65
Lifting propeller diameter	m	6.84	7.68	8.18
Disc area	m^2	36.74	46.21	52.49
Anti-torque rotor diameter	m	1.28	1.00	1.30
Main wheel track	m	1.65	2.00	1.99
Engine:				
Type and model		SUBARU EJ25	Textron Lycoming O-360	Textron Lycoming HO-360-DIA
Fuel type		A 95	L 100	L 100
Takeoff output	kW/hp	115/156	93/124	142/190
Standard fuel range	L	72	72.6	82
Fuel flow rate	l/h	24-35	30-38	35-45
Weight data:				
Gross weight	kg	650	621.5	930
Empty helicopter weight	kg	398	391.5	499
Disposable load	kg	252	230	431
Performance:				
Maximum speed	km/h	186	189	176
Course speed	km/h	160	177	159
Maximum rate-of-climb	m/s	8.5	5	7
Dynamic ceiling	m	3000	3000	3000
Hover ceiling (without ground effect)	m	1300	1350	1700
Maximal flying distance	km	350	320	354
Maximum endurance	h	2.6	2.2	3.3
Minimum vertical sink rate upon planning in autorotation regime	m/s	8.4	8	9