

**Instructions for the packing and use
of container and harness MarS I
OP – 087**

**Technical description
of a container and harness MarS I
(OP – 087)**

P-001-01



11th issue

in Jevíčko 04/2018

List of Changes

In case of necessity to change or amend this manual, the holder will be notified by means of bulletins. New (corrected) sheets will be enclosed to such bulletins. The holder of the manual is obliged to record all obtained changes into the List of Changes and replace out-of-date sheets with valid sheets. Changed or amended manual parts will be marked with a vertical line on sides, they will be further marked with the number and issue date of the change at the bottom of the page.

Sequence No. of the Change	Chapter	Sheet nos. with Changes	Date of Issue of New Sheets	No. of the Bulletin with Issued Changes	Date of the Bulletin Approval	Date of execution Signature

WARNING!

It is necessary to pass appropriate parachutist training program to minimize the risk of serious injury or death or destruction or damage of the parachute set MarS I.

Never use this parachute set in case that you have not read this warning, have not finished the prescribed training program, and you have not understood all appropriate handbooks for operating of this parachute set.

To prevent the risk of death, serious injury, destruction of the canopy or its damage, we recommend to meet following:

MAX. PARACHUTING VELOCITY	240 km/hour (130 KNOTS)
MAX. LOAD WEIGHT (parachutist + equipment + gear) M O D E L	100 kg / 220 lb OP-087 / PS-034 UU
MAX. LOAD WEIGHT (parachutist + equipment + gear) M O D E L	116 kg / 255 lb OP-087 / PS-034 U

This parachute is certified under TSO C 23d.

MarS a.s.

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CHAPTER I.

Technical description (TD) of the MarS I (OP-087) container

1. Purpose

- 1.1. The aim of this technical description is to provide basic parameters, parts and guidelines for the use of the container/harness.
- 1.2. The container/harness is designed for sports jumps, mostly RW disciplines and it is used only for free falls.

2. Tactical and Technical Parameters

2.1. Basic parameters

SIZE OF MARS I CONTAINER	RESERVE PARACHUTE VOLUME (cm ³ / cu.in)	MAIN PARACHUTE VOLUME (cm ³ /cu.in)	MAX. VELOCITY AT CONTAINER OPENING (km/hour/knots)
01 N	4070/248	4594/280	240/130
02 N	4810/293	5546/338	240/130
03 N	5550/339	6096/372	240/130
04 N	5850/357	6718/410	240/130
05 N	6290/384	8357/510	240/130
3 N	7780/474	10109/615	240/130
4 N	7770/474	8480/517	240/130

2.2. Functional parameters of the container

The container assures proper functioning on condition that:

- The weight of the parachutist including gear is in accordance with data in the chart no. 2.1
- Flight speed ranges between 90 to 240 km.h⁻¹
- The canopy is disconnected from the harness by means of the cutaway release
- Freefalls last 3 seconds in minimum.

2.3. Operational Conditions

- Main and reserve parachutes can be packed for jumps for 180 days in maximum, unless the manufacturer of the main and reserve parachutes do not specify a different period.
- The functioning of the container/harness is assured when stored between - 40 to + 93.7 °C at relative air humidity corresponding to such temperatures.
- The gear of the parachutist must be attached to the parachutist 's body in such a manner that assures the proper functioning of the container

2.4. Parameters Assuring Reliability

Warranty period

- a) Lasts 24 months on condition that repairs and replacements of used parts are carried out, storage conditions are maintained and regular inspections connected with the airing of the parachute are performed
- b) Begins with the date of the shipment of the parachute
- c) During warranty period the manufacturer will not accept claims in the following cases of:
 - Damage of parachute parts caused by their catching on gear
 - Violation of conditions of packing, storage and maintenance of the parachute by the user
 - Missing parachute log book or its improper records
 - Failure to follow the instructions of this technical description
 - Any unskilled handling with the parachute

2.5. General Overhaul

- Parachutes are accepted for general overhaul if a user/a representative of the user evaluates further use of such a parachute as not suitable.
- General overhaul is performed either directly by the manufacturer or by a organization or person authorized by the manufacturer.

2.6. Total Time Life

The total time life of the parachute is set to 20 years since the production date in maximum. However, it depends on the technical condition of each container. Therefore it is required to meet the following conditions:

- a) Replace damaged parts in time and without any delay. Any replacement of parts must be recorded in the parachute log book.
- b) Repair the parachute and its parts in time and without any delay, always according to technical conditions of repairs. Each and every repair must be recorded in the parachute log book.
- c) After the elapse of 5 years carry out overall technical inspections (validity - 2 years inmaximum, result to be recorded in the parachute log book) till its unworthiness for jumps.
- d) In Main Risers VK – 33/ ... (mini-system) replace the Main Risers at the latest upon completing 300 dives or after 5 years of use.
- e) In Main Risers VK – 44/ ..., the Main Risers must be sent to the manufacturer or person authorised by the manufacturer (parachute technician, senior parachute technician with valid authorization) to perform specialist inspection and evaluate the actual condition of Main Risers at the latest upon completing 300 dives or after 5 years of use.

The evaluation of the technical condition of the parachute (technical inspection) is performed directly by the manufacturer or by an authorized organization or person.

3. Functions of the Container

Free falls with manual opening

After the exit out of the aircraft and after 3 seconds have passed in minimum, the parachutist throws away the pilot chute. The parachute container opens and the pilot chute withdraws the container with a stowed canopy. Suspension lines are unlaced from rubber loops on the container and the closing flap of the container becomes released. ATTENTION use only loops that encircle the bundle with lines tightly.

After the lines are extended in full length, the container is pulled off the canopy and canopy cells are gradually inflated with air.

The spreading of the canopy is slowed down by the slider, which is anchored on four bundles of suspension lines.

After all cells of the canopy are inflated with air and the slider moves to the risers of the supporting harness, the parachute is opened. The parachutist releases the steering loops and by their pulling (to their chest), steering lines are released from brake rings at risers. After all these operations are completed, the canopy begins gliding in the air. The parachutist controls the parachute with steering lines to a set place for landing.

4. Parts of the Container/Harness

4.1	Container (OP – 087)	1 piece
4.2	Harness (type PS – 034 U, or PS – 034 UU)	1 piece
4.3	Ripcord Handle Reserve (U – 051)	1 piece
4.4	Three Ring Release Ripcord (U – 053)	1 piece
4.5	Reserve pilot chute	1 piece
4.6	Free bag (VV – 050 or VV – 051)	1 piece
4.7	Reserve steering toggles (RP – 006 or RP – 007)	1 pair
4.8	Main parachute risers (mini-system) (VK – 33/430/17 Jh, VK – 33/510/20 Jh)	1 pair
	Main steering toggles (RP – 008 Jh)	1 pair
	or	
	Main parachute risers (VK – 44/400/K, VK – 44/500/K)	1 pair
	or	
	Main parachute risers (VK – 44/400/RP, VK – 44/500/RP)	1 pair
	Main steering toggles (RP – 002)	1 pair
4.9	Main Deployment bag (VV – 041)	1 piece
4.10	Kill line pilot chute PV-042 / PV-043 / PV-052 / PV-053	1 piece

5. List of replaceable parts

Except for the packing and the harness, all other parts can be replaced.

6. Technical description harness packing parts

6.1 OP – 087 Container (picture 1 a, b)

The parachute packing contains both the main parachute and the back-up parachute. The packing is trapezoidal, its edges are round, and is made of polyamide fabric. When sewn together the back strap, the main parachute's packing, and the reserve parachute's packing form one whole unit. The main parachute's packing is made of the back strap on the bottom and with the peripheral piece of the main parachute's packing along its circumference. This is sewn with a bottom flap and with the left and right side flaps of the reserve parachute's packing. The looser part of the central flap overlaps the upper part of the main parachute's packing and overhangs this same upper part as far as the reserve parachute's packing. The packing of the reserve parachute consists of a main part that changes into the left and right flaps of the reserve parachute. The neck section of the back strap is sewn with the reserve parachute's upper flap and closing flap, the former being inserted in the upper part of the central flap. The bottom of the reserve parachute is fitted with the closing line of the reserve parachute packing. The closing lines of the main parachute packing is sewn onto the bottom of the reserve parachute in the area of the main parachute packing.



picture 1 a



picture 1 b

6.2. Supporting harness (picture 2)

This packing can be complemented with the PS – 034 U harness (Picture 2).



picture 2

Is made of a PAD strap and is designed for the attachment of the parachute container to the body of the parachutist. The harness consists of main straps, leg straps, chest straps, back straps and a lumbar strap.

The main strap is doubled and bifurcated into two parts above the cutaway ring. The bifurcated strap forms ends with loops for the attachment of the reserve parachute. Pockets for the release of the reserve parachute and cutaway are sewn on the main straps. Another cutaway ring is sewn in the bottom part of the main strap. The lumbar strap, a part of the leg strap with a tightening buckle and part of the leg strap for drawing through the buckle lead from the cutaway ring. Chest straps are sewn on main straps.

Reserve parachute brakes are sewn on the straps to secure the attachment of the reserve parachute.

The back strap leads from the cutaway ring placed after the bifurcated main strap.

Leg pads are sewn on leg straps.

6.3. The Ripcord Handle Reserve U – 051 (picture 3)

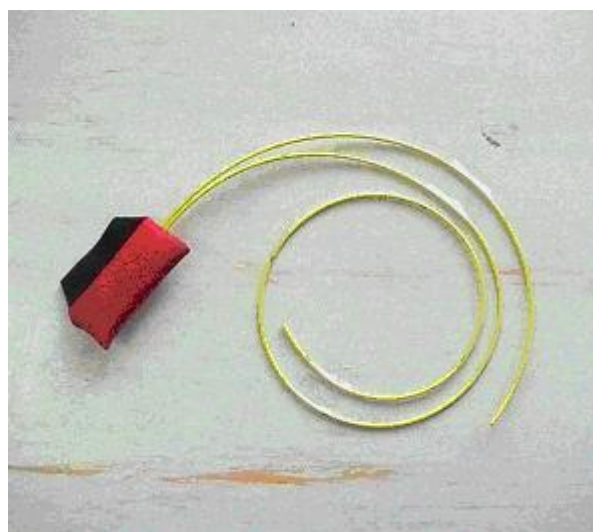
The U-051 opening of the reserve parachute container. It consists of a handle and a cable with a needle. The handle is made of a trapezoidal stainless-steel tube.



picture 3

6.4. The Three Ring Release Ripcord U – 053 (picture 4)

The U-053 the disconnecting of the main parachute canopy from the harness. It consists of a handle and a plastic-coated steel cable. A Velcro strap is sewn on the release handle, which helps fix the release in the pocket on the harness.



picture 4

6.5. The Reserve pilot chute (picture 5)

The pilot chute secures the opening of the reserve container and pulling the free bag (with a stowed reserve parachute canopy) out of the reserve parachute container.

It is made of PAD fabric and net. The bottom is reinforced with duralumin sheet.

The PV-028 chute is equipped with a coiled spring with the minimal ejection strength of 100 N.

The PV-055 chute is equipped with a coiled spring with the minimal ejection strength of 180 N.



picture 5

6.6. The Free bag VV – 051 or VV – 050 (picture 6)

Is designed for stowing a packed canopy of the reserve parachute into the reserve parachute container. It is made of PAD fabric. A bushing is pressed-on in the middle of the container for leading the closing line of the reserve parachute. A loop for the attachment of the pilot chute is sewn on the other end of the webbing.



picture 6

6.7. Reserve steering toggles (RP-006, RP-007) picture 7a, b

Are made of a 20mm-wide PAD strap, is designed to control the Wing reserve parachute (The RP – 006 without reinforcement, RP – 007 with reinforcement). Forms an eye with a pressed-on bushing at its end, which secures the connection of the main steering line.



picture 7a (RP – 006)



picture 7b (RP – 007)

6.8. Main steering toggles

The RP-008 Jh (pic. 7c) are made of a 25mm-wide PAD strap, is designed to control the main parachute. Forms an eye with a pressed-on bushing at its end, which secures the connection of the main steering line. The RP- 008 Jh are used as a set with the VK-33/430/17 Jh or with the VK-33/510/20 Jh risers.



picture 7c

The RP-002 (pic. 7d) are made of a 30mm-wide PAD strap, is designed to control the main parachute. Forms an eye with a pressed-on bushing at its end, which secures the connection of the main steering line. The RP- 002 are used as a set with the VK-44/400/RP or with VK-44/500/RP.



picture 7d

6.9. Main Risers of the harness

Risers of the supporting harness of the main parachute are designed for the connection of the main parachute canopy to the PS-034 harnesses by means of a three-ring system.

a) VK – 33/430/17 Jh, VK – 33/510/20 Jh, (mini-system), picture 8a

They are made of a 26mm-wide PAD strap. The bottom part of the division is equipped with a three-ring system securing the connection to the harness. There are loops at the end of the straps, into which suspension lines of the main parachute canopy are connected by means of bolt clips. A 15-mm ring is sewn on the back of the straps securing the leading of the main steering line.

The number under the slash – 430 or 510 shows the strap lengths from the division.



picture 8a

b) .VK – 44/400 K, VK – 44/500 K, picture 8b

They are made of a 43 mm wide PAD strap. The bottom (divided) part is made of the set of three rings that serve to fasten the parachute to the harness. The tapes end with loops into which the screwing clips introduce the supporting lines of the main parachute canopy.

The number under the slash – 400 or 500 shows the strap lengths from the division.



picture 8b

c) VK – 44/400 RP, VK – 44/500 RP picture 8c

They are made of a 43 mm wide PAD strap.

The bottom (divided) part is made of the set of three rings that serve to fasten the parachute to the harness. The tapes end with loops into which the screwing clips introduce the supporting lines of the main parachute canopy.

The number under the slash – 400 or 500 shows the strap lengths from the division.



picture 8c

Caution:

The strap near the rings, which are a part of a three-ring system, must remain slightly flexible. Therefore it is required to bend it at least once a month to prevent it from hardening which could result in worsening of its proper functions during the disconnection from the three-ring system. This caution applies to all types of risers of the harness.

6.10 Kill line Pilot Chute PV – 042, 043, 052, 053, picture 9

Serves to open the main parachute case and to draw the container of the main parachute canopy from the packaging segment. It is sewn of the PAD fabric, lower part of the canopy is sewn of the porous fabric – micromesh, and it is strengthened with the binding that ends in loops for connecting the connecting binding, that forms a hollow, in which the intermediate line moves freely, with the help of this line the pilot chute is collapsed. On the end of the hollow there is a buffer made of the folded bindings and softlink SFL BP-01, with the help of which the placing of the container on the connecting binding is fixated. Above this buffer a closing needle is sewn. On the end of the connecting line there is a loop made, with which the auxiliary parachute is fastened to the main parachute canopy.

Types: A) With a anchorage (leather ball – hackey sack):

Ø of the auxiliary parachute PV-042 is 700 mm, PV-043 is 800 mm.

B) With textile anchorage (free fly handle):

Ø of the auxiliary parachute PV-052 is 700 mm, PV-053 is 800 mm.



picture 9

CHAPTER II.

Instructions for the packing of the container

1. General Instructions

- a) Before packing the parachute, it is necessary to check the entirety and technical condition of the parachute. Damaged parts are either replaced or repaired.
- b) It is not recommended to expose the parachute to direct sunlight during packing.
- c) The parachute is packed by one person. Each packing of the reserve parachute is to be recorded into the log book.
- d) The MarS I container is used generally as a set with the canopies of the WP, each canopy size of the reserve parachute must correspond to a suitable container size.
- e) No adjustment of the parachute container/harness is acceptable.

2. Inspection of the Container before Use

Prior to packing, the user must perform visual inspection of all parts of the parachute set, if the parts are not damaged, the sewing is not interrupted, fabric, binding, straps, race closing, and metal parts. Damaged parts must be repaired or replaced.

In designated parts it is necessary to record the replacement into the parachute log.

Release ripcords

The ripcords surface must be undamaged, both ends must equally protrude from the tubes; the visible length must be at least 160 mm.

Each time the reserve parachute is repacked, the cord surface must be checked and dirt and dust must be removed. If the dirt is visibly present inside the tubes, it is necessary to clean the tubes.

The surface of the ripcords must be clean (in case of dirt, it is necessary to wipe the surface properly). To remove dirt it is possible to use silicone oil. However, after such cleaning, the cord must be wiped dry.

WARNING:

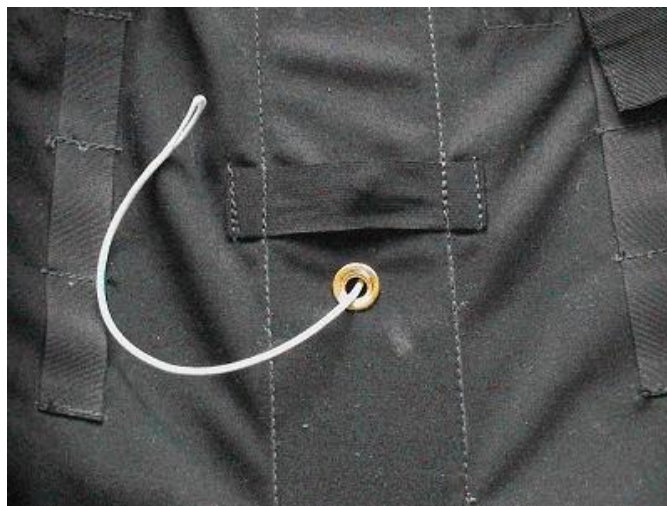
It is prohibited to perform diving with a parachute set with damaged or worn function parts!

3. Removal of Faults/Troubleshooting

- a) Removal of faults is carried out by an exchange of damaged parts or a repair according to instructions stated in Technical Conditions of Repairs.
- b) Parts that are permitted to be exchanged during the operation:
 - Ripcord Handle Reserve
 - Three Ring Release Ripcord
 - Exchange of risers of the main parachute harness
 - Closing line of the main and reserve parachute
 - Steering toggles of the reserve and main parachute
 - Free bag
 - Main Deployment bag
 - Reserve Pilot chute
 - Kill line Pilot Chute.

4. Guidelines for the replacement (assembly) of parachute parts

- a) Replacement of the reserve parachute packing string



b) Replacement of the main parachute packing string



c) Attachment of the pilot chute to the deployment bag webbing



d) Connection of the RP – 006 steering toggle to the main steering line



e) Reserve parachute braking



f) Connection of the Main riser of the harness of the main parachute to the harness



5. General conditions for assembling the safety devices into the reserve parachute package:

Installation of the safety device into the package part can be performed **solely** by a trained person with authorization of ‘Senior parachute Technician’.

The safety device **must be installed** only in the original set supplied by MarS and installed into the package directly by the manufacturer or another authorized person.

WARNING:

The closing cord designed for closing the reserve parachute package must always pass through the aperture in the cutter of the safety device!

6. Assembly of AAD an m2 device

The assembly is carried out according to Instructions for use
- the Users’ Manual of m².

7. Assembly of AAD an CYPRES device

The assembly is carried out according to Instructions for use
- the Users’ Manual of CYPRES.

8. Assembly of AAD an VIGIL device

The assembly is carried out according to Instructions for use
- the Users’ Manual of VIGIL.

9. Packing Tools

We use the following tools for packing reserve parachutes:

- a) Accessory needle with a webbing
- b) Line for the limitation of the container extension
- c) Packing line

10.Packing of the Container

10.1. The packing of the reserve parachute WP is carried out according to instructions for the packing of the reserve parachute canopy. Step: packing of the canopy of the reserve parachute into the container.

The flap is closed according to the numbering, i.e. no.1 – 6.









When the reserve parachute container is closed, seal the ripcord pin using a green sealing thread, strength $4.5 \div 7.5$ N.



Packing the Main risers

Must be fitted with a loop RSL for connection of the Reserve static line RSL with the stainless carbine.



Connecting the connection binding of the kill line pilot chute with the main deployment bag

Soft link SFL (with a strap) is made from Microline cord with minimum strength 1300 lb. One end of the cord includes a sewn strap, and the injected cord passes through the strap lug creating another lug.

The second end of the soft links forms a lug which provides a connecting connection upon assembly by means of passing through the binding.

The connecting binding of the kill line pilot chute passes through the bushing in the bag upper part so the lugs on the connecting binding are passed into the bag internal part.



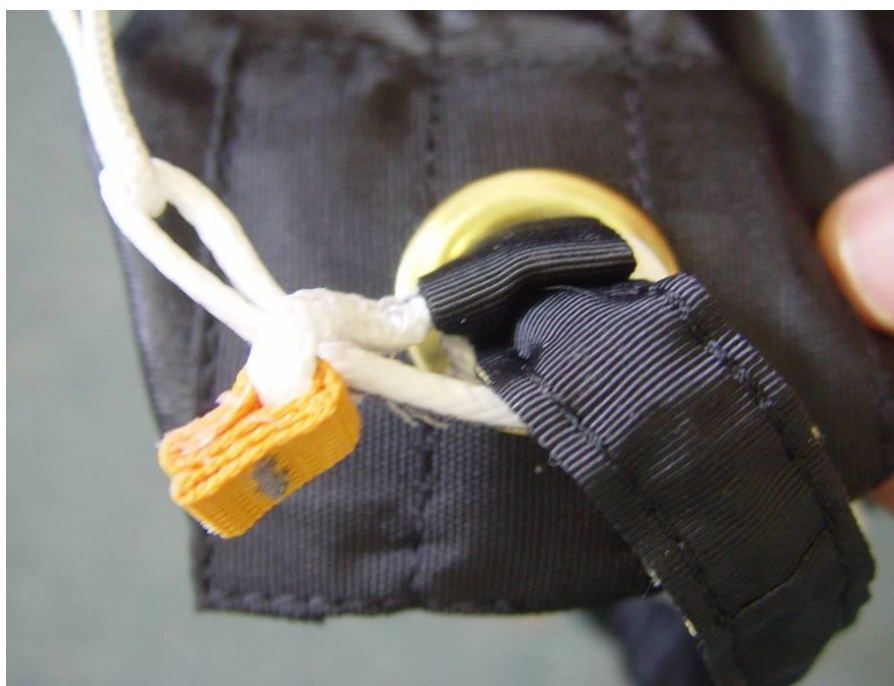
Loose lug of soft link passes through the lugs created on the connecting binding of the kill line pilot chute.



Then pass the lug through once again around



The loose end of soft link passes through the lug formed by the injected cord of the soft link passing through the binding on the opposite end of soft link.



Pass the opposite end of soft link with binding through the loose end lug, and fasten the connection until it is sufficiently solid. Pull the formed connection to fasten by means of pulling the connecting binding of the kill line pilot chute and the bag.

WARNING:

Prior to each use, it is necessary to check if the soft link connection is not damaged!

10.2. Packing of the main canopy is carried out according to technical description of the main parachute packing.

When the main canopy container is closed and main canopy lines are placed on it, the pilot chute has to be decollapsed in such way to see green mark of middle line in the control window of the connecting webbing.



Warning! In case that the red mark is in the control window, the pilot chute has not been decollapsed, so the main container will not be opened!

The flaps close in the following sequence: lower, upper, left, and right.

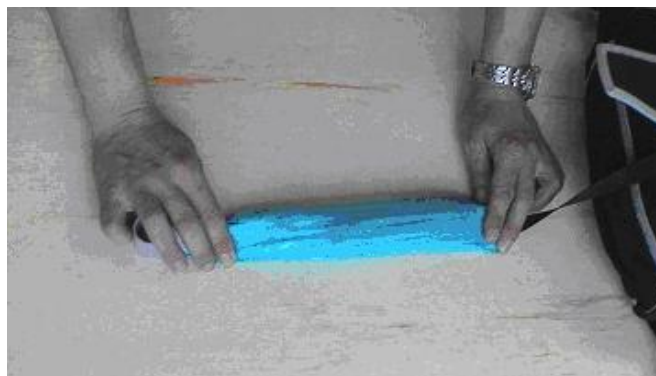


Special caution:

The Main Deployment bag with the main canopy is always placed with its lines away from the reserve parachute.

The closing line of the main parachute must not be shortened by making knots on the string!







**Special caution:**

The Main Deployment bag with the main canopy is always placed with its lines away from the reserve parachute; i.e. facing the lower packaging part and going to the upper, left and right parts.

The closing line of the main parachute must not be shortened by making knots on the string!





WARNING:

Prior to entering the airplane, check the complete arrangement in the parachute:

- **Correct fastening of the bearing harness buckles**
- **Correct connection of loose ends with the bearing harness (three-ring system)**
- **Correct inserting of the reserve parachute releaser needle**
- **Correct connection of Reserve static line (RSL) if applicable**
- **Activation of applied safety device AAD (m2, CYPRES, VIGIL).**

CHAPTER III.

Storage and Transportation of the Parachute

1. Preparation of the parachute for storage

Before the parachute is stored, its inspection must be carried out, if necessary its repair, replacement of damaged parts and airing. The parachute is stored inside a portable bag either packed (for 180 days in maximum) or unpacked. The parachute log-book is put into the portable bag pocket.

2. Storage of the parachute

Before storing the parachute set carry out its check and the check of its completeness.

Before storing the parachute in the bag, fold the unpacked canopy of the main parachute in the following way: smooth the canopy field, draw the slider with its intermediate part to the canopy, roll the back part of the canopy on the front part (leading edge), and fold the canopy from the top to the bottom edge. Braid the carrying line in a chain. Store the packed canopy in such way that it is not in direct contact with metal parts. Put the parachute in the bag and close the bag.

Put the parachute logbooks in the pocket on the portable bag.

Store the parachute set and all its parts in shelves in dry, dark, well ventilated room without direct sunlight. The parachute sets must not touch the walls, floor, or heating units. Parachute sets may be stored in shelves in two layers maximally. In rooms, where parachute sets are stored, it is not allowed to store metal objects which do not belong to the stored parachutes, nor oils, acids or substances evolving active gases. Smoking is forbidden here.

If the parachute set is stored for a longer period of time, it must be aired at least once in 6 months for at least 24 hours. Airing is done in shade.

The record of the carried-out airing is made in the parachute logbook.

During long-term storing of the parachute sets, these climatic conditions must be kept in the storage rooms:

- temperature + 14 to + 25°C
- relative humidity 35 to 73 %

Storability of the parachute sets and their accessories in storage room is for their whole operating life, when fulfilling the storage conditions above.

3. Transportation of the parachute

On operational conditions, parachutes are transported in portable bags. During the transportation it is required to prevent:

- a. Moistening of the container
- b. Contamination of the container with oils and chemicals
- c. Mechanical damage

CHAPTER IV.

Dirt Removal, Washing, Cleaning

Dirt (sand, soil, mud, etc.) on the parachute container and supporting harness contaminated during the use can be cleaned mechanically (e.g. by brushing, shaking or rubbing off).

Dirt that cannot be removed mechanically, can be removed with a damp piece of cloth moistened in lukewarm water with soap or cleaning detergents. After such cleaning the container with the harness are to be dried on a place designated for such purposes.

The manufacturer warns the user that using a larger amount of water with detergents may cause the occurrence of stains of various colours or soaking of colours from the inside layer of material into the outside layer of material, in particular with containers of light colours. The warranty does not apply to such cases.

Washing of containers/harnesses manually or in any washing machines **is forbidden**.

Cleaning of containers/harnesses using chemical agents containing chlorine or organic solvents **is forbidden**.

CHAPTER V.

Ecological disposal instructions

Upon the total service life completion or due to wear and tear, terminate the parachute set.

Disposal of terminated parachute sets is performed as follows:

Metal parts

- Useable metal parts can be used within manufacturing upon inspection and repair work;
- Unused metal parts shall be delivered to the waste metal collection.

Textile parts can be disposed of as follows:

- Placing in the waste collection centre suitable for PAD, PES waste;
- Burning whilst complying with the conditions required for the waste disposal type, in cooperation with companies performing the disposal method.



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