



Pasha Balloons Flight Manual

*Issue 4
Revision 1*

Date: 28 Nov 2022

HOT AIR BALLOON FLIGHT MANUAL

fill with reg. nr.

**THIS MANUAL CONTAINS THE INFORMATION RELATED TO HOT AIR
BALLOONS CERTIFIED UNDER TYPE CERTIFICATE TR.BA.001**

**THE TECHNICAL CONTENT OF THIS DOCUMENT IS APPROVED UNDER
THE AUTHORITY OF DOA REF. TR.21J.003**

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BALLOON CONFIGURATION

REGISTRATION:
MTOM:
MLM:
EMPTY MASS:

ENVELOPE

MODEL:
VOLUME:
SERIAL NUMBER:
MANUFACTURING YEAR:
MASS:

BURNER

MANUFACTURER:
MODEL:
SERIAL NUMBER:
MASS:

BASKET

MANUFACTURER:
MODEL:
SERIAL NUMBER:
MASS:

CYLINDERS

MANUFACTURER:
MODEL:
SERIAL NUMBER:
MASS:

APPLICABLE SUPPLEMENTS (see Section 8)

The technical content of this document is approved under the authority of DOA ref. TR.21J.003

This hot air balloons is to be operated with information and limitations contained herein.

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AMENDMENT LIST

Issue Number	Changes Description	Affected Pages	Issue Date
1	Initial issue	ALL	13-03-2019
2	New envelope models added	ALL	30-08-2020
3	New basket models added	ALL	30-09-2020
4	New envelopes, baskets and burners model added	ALL	19-03-2021
4.1	Section 2.7 is updated to reflect volumes stated in the TCDS. Permitted damage, volumes and weights clarification. Section 6.4 burner figures are updated. Section 6.5 is updated. All pages header logo has changed	ALL	28-11-2022
4.2	Section 5.2 updated	4,5,17	10-08-2023

LIST OF EFFECTIVE PAGES

Page	Issue number	Issue date
1	4.1	28-11-2022
2	4.1	28-11-2022
3	4.1	28-11-2022
4	4.2	10-08-2023
5	4.2	10-08-2023
6	4.1	28-11-2022
7	4.1	28-11-2022
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16	4.1	28-11-2022
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18	4.1	28-11-2022
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23	4.1	28-11-2022
24	4.1	28-11-2022
25	4.1	28-11-2022
26	4.1	28-11-2022

1. GENERAL

1.1. Introduction

This balloon flight manual has been prepared to provide pilots and instructors with information for the safe operation of all Pasha Balloons hot air balloons.

Revisions to this Manual are published on the Pasha Balloons website at www.pashaballoons.com.

Email notification of revisions can be received by subscribing to the Technical Update Service on this website.

1.2. Certification Basis

The hot air balloons flown under this Flight Manual has been certified by Directorate General of Civil Aviation (DGCA- Turkish Civil Aviation Authority) under EASA Certification Specifications CS-31HB Amdt. 1

1.3. Applicability

This Flight Manual is the recommended one for all the balloons manufactured by Pasha Balloons under its Type Certificate.

1.4. Warning, Cautions and Notes

The following definitions apply to warnings, cautions and notes used in the Flight Manual.

WARNING: Means that the non-observations of the corresponding procedure leads to an immediate or important degradation of the flight safety.

CAUTION: Means that the non-observation of the corresponding procedure leads to a minor or to a more or less term degradation of the flight safety.

NOTE: Draws the attention on any special item not directly related to safety but which is important or unusual.

2.LIMITATIONS (Approved Section)

2.1. Introduction

Section 2 of this Manual details the limitations approved by Turkish DGCA for Pasha Balloons hot air balloon and approved equipment.

2.2. Weather

For free flight, surface wind must not exceed 15 km/h or 10 knots gusting above mean. Free flight must not take place if forecast indicates a significant probability of surface wind to exceed limitations.

For tethered flight, surface wind must not exceed 7,2km/h for envelopes with bigger volume than 120.000 cu.ft (excluding this volume).

Thermal activity cannot be present in the vicinity of take-off place.

2.3. Minimum Burner Requirements

Minimum burner requirements set for Pasha Balloons envelopes are contained in the following table.

Envelope Volume	Minimum Burner Required
Volume up to 120.000 cu.ft	Single burner
Bigger than 120.000 up to 180.000 cu.ft	Double burner
Bigger than 180.000 up to 335.000 cu.ft	Triple burner
Bigger than 335.000 cu.ft	Quadruple burner

2.4. Permitted Damage

Maximum permitted damage is a tear of 100mm in two different panels on the lower third of the envelope. Holes below 10mm of diameter are not considered as damage.

2.5. Safety Equipment

The following equipment must be carried:

- Protective gloves for pilot and crew.
- Independent means of ignition.
- 2kg fire extinguisher.
- Variometer.
- Altimeter.
- Fuel level indicator for every cylinder.
- Handheld anemometer (tether flights only).

- 2 Anchor ropes with minimum strength of 12kN with 40kN karabiners at each end (tether flight only).
- Envelope temperature indicator
- Envelope temperature flag

2.6. Crew

Minimum crew is one pilot.

2.7. Loading

MTOM shown at configuration page must not be exceeded. Minimum Landing Mass (MLM) is set in the following table. Envelope weight refers to certification prototype weight and give a reference value, but page 1 empty weight must be used to calculate TOM.

Model	Volume [cu.m]	Volume [cu.ft]	MTOM [kg]	MLM [kg]	Standard Envelope Weight [kg]
PH-60	1.700	60.035	500	282	118
PH-65S	1.850	65.332	600	306	130
PH-70	1.985	70.100	600	328	127
PH-75S	2.125	75.044	700	350	130
PH-80	2.270	80.164	700	376	138
PH-90	2.550	90.052	800	422	145
PH-105	2.975	105.061	925	492	158
PH-120	3.400	120.070	1126	561	174
PH-135	3.825	135.079	1150	633	179
PH-150	4.250	150.087	1300	704	195
PH-165	4.675	165.096	1500	774	196
PH-180	5.100	180.105	1550	845	209
PH-210	5.950	210.122	1971	952	223
PH-240	6.800	240.140	2250	1.215	271
PH-270	7.650	270.157	2530	1.366	285
PH-300	8.495	299.998	2810	1.515	300
PH-335	9.490	335.136	3140	1.695	313
PH-370	10.480	370.098	3591	1.700	329
PH-425	12.050	425.542	3992	1.830	369
PH-460	13.025	459.974	4315	2.050	387
PH-500	14.160	500.056	4691	2.120	423
PH-525	14.870	525.129	4925	2.650	451

Pasha Balloons basket maximum payload is stated in the following table and must not be exceeded when loading the balloon.

Model	Maximum Payload [kg]	Standard Basket Weight [kg] ¹
S-10	525	77
S-12	590	81
S-14	755	99
S-15	950	129
S-16	1.015	139
S-20N	1.120	176
S-20W	1.120	191
S-22	1.350	224
S-26N	1.240	266
S-26W	1.240	293
S-30N	1.850	292
S-30W	1.850	310
S-34	1.920	396
S-38	2.480	408
S-42	2.260	480
S-48	2.600	560
S-54	2.940	600
S-58	3.280	635

¹ The Standard Basket Weight includes load frame, fire extinguisher, fire blanket, first aid kit

2.8. Envelope Temperature

Envelope temperature must never exceed 120°C.

2.9. Vertical Velocities

Maximum vertical speed is 5 m/s ascending or descending.

2.10. Other Manufacturers Equipment

Pasha Balloons envelopes can be operated in combination with other manufacturers equipment (basket, burner, tanks) if the following conditions are met:

- All the equipment is certified with valid type certificate in the operation/registration country.
- All the equipment is in airworthy conditions according to updated manufacturer's maintenance instructions.
- All the equipment is included and compatible according to Pasha Balloons HABFM Supplement 1 or written approval from Pasha Balloons.

Limitations of this equipment remains applicable when not superseded by HABFM supplement 1.

2.11. Basket Capacity

Basket capacity is limited by the minimum free space of 0.25 m²/person (cylinders usage of space must be accounted). The following table specify how many passengers and tanks can be loaded.

Model	Cylinders	Number of occupants (pax compartment + pilot compartment)
S-10 (1,0x1,0m)	2	3
	3 to 5	2
S-12 (1,2x1,0m)	2	4
	3 to 4	3
	4 to 6	2
S-14 (1,4x1,1m)	2	5
	3 to 5	4
	5 to 7	3
S-15 (1,5x1,2m)	2 or 3	6
	4 to 5	5
	6 to 8	4
	9 to 10	3
	10 or 11	2
S-16 (1,6x1,2m)	2 to 4	6
	5 to 6	5
	7 to 9	4
	10 or 11	3
S-20N (2,0x1,25m)	2 to 6	5 + 2
	7 to 8	5 + 1
S-20W (2,0x1,4m)	2 to 7	6 + 2
	8 to 10	6 + 1
S-22 (2,2x1,5m)	2 to 8	6 + 2
	9 to 11	6 + 1
S-26N (2,6x1,5m)	2 or 3	8 + 2
	4 to 6	8 + 1
S-26W (2,6x1,6m)	2 or 3	8 + 2
	4 to 6	8 + 1
S-30N (3,0x1,5m)	2 to 8	12 + 2
	9 to 11	12 + 1
S-30W (3,0x1,6m)	2 to 8	12 + 2
	9 to 11	12 + 1
S-34 (3,4x1,6m)	2 to 6	16 + 2
S-38 (3,8x1,7m)	2 to 6	16 + 2
S-42 (4,2x1,7m)	2 to 6	20 + 2
S-48 (4,8x1,7m)	2 to 6	24 + 2
S-54 (5,4x1,7m)	2 to 6	28 + 2
S-58 (5,8x1,8m)	2 to 6	32 + 2

Refer to other manufacturers HABFM if basket is not produced by Pasha Balloons.

3. EMERGENCY PROCEDURES (Approved Section)

Section 3 gives detailed procedures for coping with emergency situations that may occur during the flight. This section is approved by Turkish DGCA.

3.1 Fire in the Air

When fire is notice in the air, the next steps must be followed by Pilot in Command:

- Shut off liquid valve of cylinder and vent hoses of the burner connected to this cylinder.
- Use the fire extinguisher.
- When fire is extinguished, relit pilot lights and land as soon as possible. If not possible to relight the burner, follow Emergency Landing procedure.

3.2 Fire on the Ground

When fire is noticed on the ground, the next steps must be followed by Pilot in Command.

- Shut off all valves of affected cylinder.
- Send all the people to a safe distance without delaying the next steps.
- Use the fire extinguisher.
- If fire is not under control immediately, prevent all the people around the basket from an imminent explosion.
- If balloon is inflated, pull parachute control line to avoid it taking off.

3.3 Envelope Damage In Flight

When Pilot in Command becomes aware of envelope damage, the next steps must be followed:

- Heat to replace lost lift while controlling descent. If descent cannot be controlled by increasing burning frequency, consider the option to jettisoning some ballast taking into account people and properties on ground.
- Land as soon as possible.

3.4 Emergency Landing

When emergency landing is anticipated, the next steps must be followed:

- Warn all passengers to adopt landing position.
- Warn all passengers to remain inside the basket until Pilot in Command orders to leave it.
- Warn all passengers about second impact may occur.
- Extinguish pilot lights and firmly get parachute control line before touchdown.

3.5 Contact with Powerlines

When contact with powerlines cannot be avoided, Pilot in Command should remember that envelope contact with powerlines may be less harmful than basket touch.

When contact with powerlines happen, the next steps must be followed:

- Shut off pilot lights, close cylinder valves and empty hoses.
- Warn passengers to remain inside the basket until Pilot in Command orders to leave the basket.
- Call emergency services

3.6 Equipment Emergency Procedures

Emergency procedures for other manufacturers equipment is considered in the Supplement 1 of this Manual.

4. NORMAL PROCEDURES (Approved Section)

4.1 Introduction

This section provides the information to safely operate the balloon. Information may be completed with applicable supplement standard procedures section.

4.2 Preparation of the Balloon

Site selection

A clear area must be chosen without powerlines or obstacles present in the downwind direction. Laying down area for the balloon must be free of rocks and sharp objects.

Basket rigging

Position the basket with longer sides perpendicular to wind direction.

Strap all cylinders tightly and make sure liquid valve will be located at the bottom part of the cylinder when basket lays down. When using vapour valves for pilot light, they must be in the upper part of the cylinder when laying down (different cylinders may be used in some cases).

Burner rigging

Insert nylon poles on basket socket poles and place load frame in top of nylon poles.

Attach basket cables with karabiner to load frame lung and install pole covers with hoses inside. Check flight manual supplements when other manufacturers' equipment is used.

Connect burner hoses to fuel cylinders and make burner test (all valves must be working correctly and no leak is present).

Envelope rigging

Before envelope is rigged to basket, basket and burner must lay down in the field allowing proper distance with retrieve car to attach restraint rope. Once restrain rope is correctly attached to the car, envelope can be rigged to the basket.

Use 4 karabiners to attach the envelope to 4 load frame corners karabiner. Red ribbon in the mouth of the envelope must be placed on the ground to be sure connection will be correct. Avoid any entanglement between flying cables.

Proceed to unpack the envelope by pulling the protection bag downwind. When completely out of the basket, crown line must be deployed following the same direction.

4.3 Inflation

When the envelope is completely unpacked, inflation can start and inflation fan should be started at medium or low power depending on pilot preference. While envelope fabric starts to get balloon shape, parachute velcros must be attached matching number on hook and loop velcros.

Crown line end must be attached to load frame and crown line should be operated by crew at pilot discretion depending on wind conditions.

When envelope is fully inflated, proceed with burner to hot inflation. Short firings are recommended at the beginning to help the fabric fully inflate before start rising up. Inflation fan should be operated by one crew or placed where easy access for pilot is guaranteed in order to close it quickly.

4.4 Take-off

Once the balloon is fully inflated, passengers on board and none of the available forecasts provide information about unsafe operation, pilot can take off increasing burning frequency. Sufficient rate of climb must be checked to avoid turbulence and pilot in command must be ready to keep burning to avoid descent.

4.5 Control during the Flight

Flight path is controlled by burner operation increasing or decreasing burning frequency when climbing or descending is desired.

4.6 Landing

For the landing, a field must be chosen in the line of flight. A free-obstacle area must be chosen, and field size should be evaluated based on surface wind.

When landing is going to be performed, pilot must fly low and actuate the parachute control line to allow final descent and touchdown. Descent path is decided by pilot in command according to wind conditions and field characteristics.

4.7 Pilot Restraint Harness

Pilot restraint harness must be used, at least, for the landing.

4.8 Fuel

Fuel cylinders are refuelled by volume and purge valve is set at 80% of water level capacity to allow propane expansion inside the empty volume.

For refuelling, connect refuelling hose to liquid valve, open the purge valve and open the liquid valve to allow fuel to go inside the cylinder. When liquid level reach 80% of water capacity level, liquid fuel is going through purge valve, then fuel supply and purge valve must be closed.

4.9 Tether Operations

For tether operations, wind condition must be considered to decide how many anchoring ropes are needed. When wind conditions are calm or small breeze, two anchor points are enough, but for a third point can be used downwind if pilot consider it as useful.

During envelope rigging, two anchor points must be installed at 45° degrees each side of upwind direction. It may restrict most of the movement when balloon is anchored. Once the balloon is inflated, a third anchor point must be installed if winds is strong enough (at pilot discretion). When third anchor point is used it must be following downwind direction.

If at any moment the wind speed exceeds the limitations set at this Flight Manual, the balloon must be deflated immediately keeping safety of the passengers and people around the balloon.

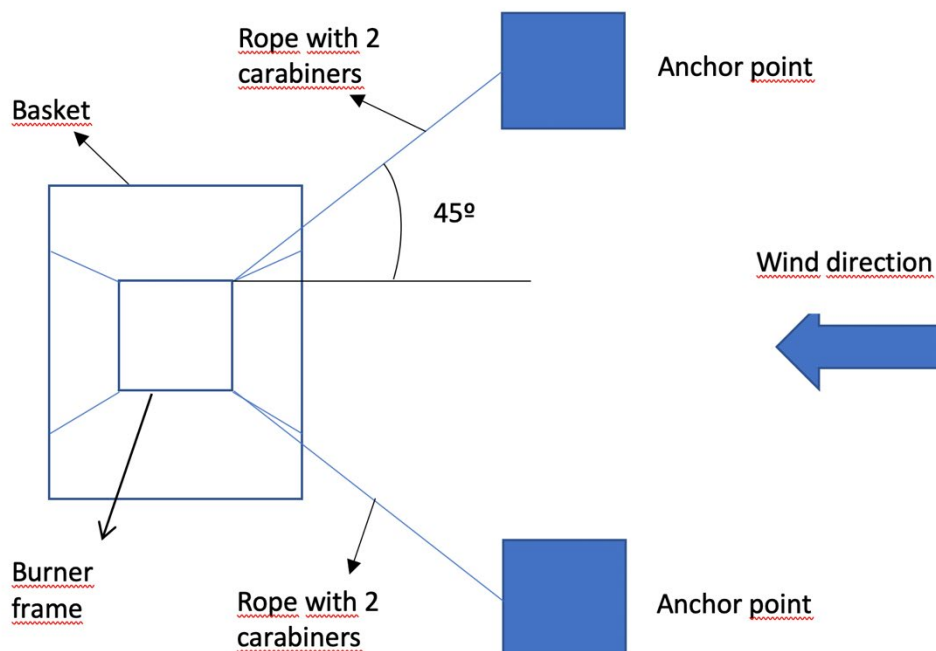


Figure 1. Tether Diagram

5. LOADING (Approved Section)

5.1 Introduction

This section gives the information to calculate the maximum weight that the balloon can carry for safe operation

5.2 Load Chart

Before each flight, maximum take-off mass must be calculated as it depends on weather conditions and operation altitudes. Pasha Balloons load chart is used following these steps:

- Get take-off temperature and follow vertical until take-off altitude is crossed (put a mark on the intersection of both lines)
- Continue horizontal line until your vertical axis where you will get lift per 1 cubic meter.
- Calculate maximum lift with envelope volume stated at configuration page of this manual.

Only the Load charts provided by Pasha Balloons must be used for load calculations. It is available at Pasha Balloons website for higher resolution.

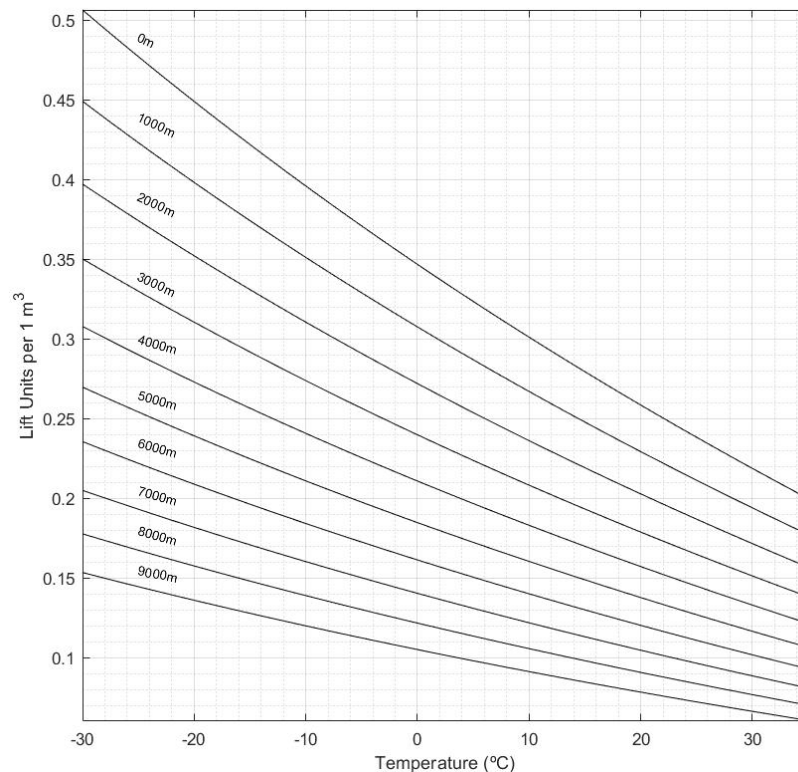


Figure 2. Load Chart

6. SYSTEMS DESCRIPTION

6.1 General

This section provides a description of the systems manufactured by Pasha Balloons. Other Manufacturers equipment used with Pasha Balloons envelope will be describe in its applicable supplement.

6.2 Envelope Description

Envelopes are made of high tenacity nylon fabric sewn in panels. The fabric is coated to make it airtight inside. All the main loads on the envelopes are carried by polyester load tapes. Horizontal tapes act as rip stoppers so that any damage to the envelope will be limited in extent.

The base panels of the balloon are made from Nomex heat resistant fabric so that the nylon is kept at a sufficient distance from the flame to prevent heat damage. The lower ends of the load tapes are formed into rigging loops to which stainless steel cables, called flying cables, are attached.

Envelope is fitted with a 'Parachute' deflation system operated by a control line from the basket to release hot air outside, 'Fast deflation system' operated by a control line from the basket to release massive quantities of hot air outside and it must be used only below 10m height and for landing procedure. Envelope may also be fitted with rotation vents, which allow envelope to rotate left or right side from vertical axis. Ropes for rotation vents are differentiated as left rotation corresponds to black cord and right rotation corresponds to green rope.

The base of the balloon may be fitted with a Scoop. This improves the performance of the balloon when taking off or tethering in wind, and during flight in turbulent conditions.

Envelope is equipped with temperature flag link that melts when internal temperature exceeds 120°C. Refer to Maintenance Manual in case that temperature flag drops (envelope overheating).

The following sketch shows all parts of the balloon:

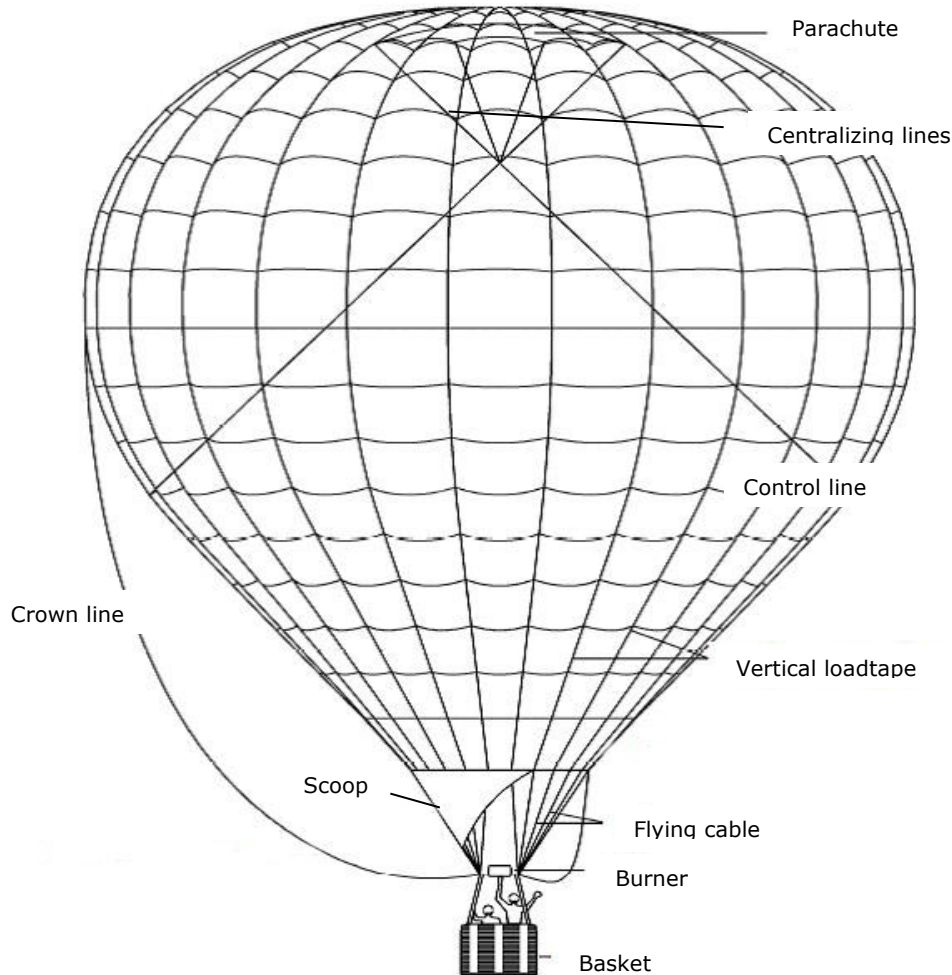


Figure 3. Envelope general view

6.3 Basket Description

Pasha Balloons baskets are wicker woven baskets designed to fly under hot air balloons. These are classical baskets used in the industry for many years.

Baskets are manufactured using a plywood base attached to metallic structure and wooden poles creating a mesh. This mesh is "woven" with wicker due to flexibility of the material. Suspension structure is placed inside the woven wicker and pass beneath the basket being protected of any wear or abrasion. Leather and foam are used to protect passenger of metallic and plastic parts.

Nylon poles are used to keep load frame in position during inflation and landing. They are covered with padded leather to protect passengers and pilot during landing.

Basket is fitted with handholds for pilot and all passengers. Also it is equipped with restraint system fitting point for pilot and all passengers.

The following drawing shows all parts of the basket:

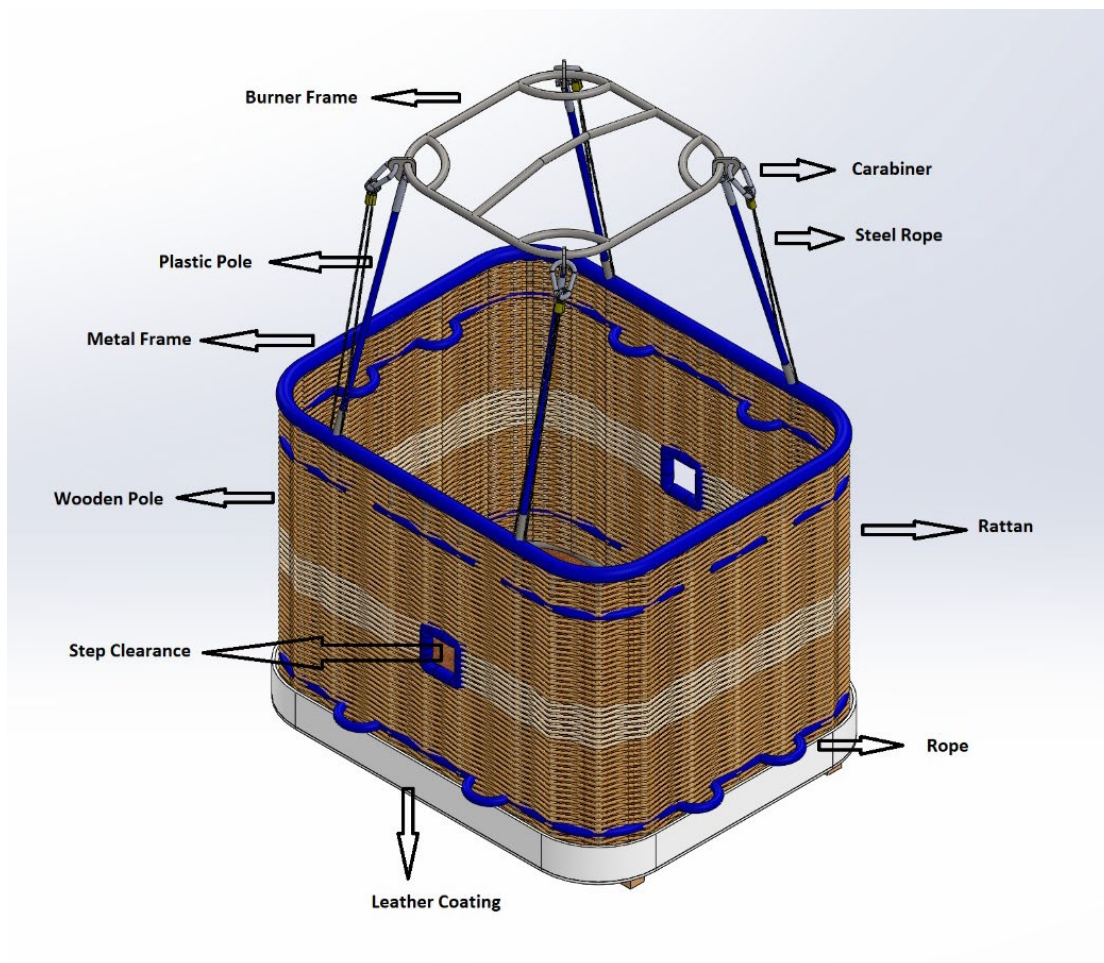


Figure 4. Basket general view

6.4 Burner Description

Burner is the source of heat for hot air balloons. Liquid propane is used to heat air inside the hot air balloon envelope. Pasha Balloons burner are available in double, triple and quadruple configurations. Recommended working pressure for burners are as follows:

- Minimum: 5 bar
- Maximum: 10 bar

The pictures below show general views of Pasha Balloons burners.



Figure 5. Double burner general view



Figure 6. Triple burner general view



Figure 7. Quadruple burner general view

Burner consist in a group of valves and subassemblies. These subassemblies are:

Main burner

Main valve (on/off) controls the flow of fuel. This fuel passes through burner coil to increase the temperature of the fuel and through jets ring before combustion. Main valve has flat or rugged surface to differentiate fuel flow input.

Whisper burner

Whisper valve (on/off) controls the flow of fuel directly burnt without going through burner coil. The flame produced is less powerful but more silent. When continuous use of whisper burner, frozen droplets of propane may appear at the jet nozzle, STOP usage of whisper burner when it is advertised.

Pilot light

Pilot light provides continuous flame for burner ignition. Fuel passes through pilot light valve (rotary valve) and through pilot light regulator to provide a continuous vapour fuel flow. Every pilot light has its own piezo igniter which allows pilot light relighting in case of flame out.

Pressure gauge

Pressure gauge is fitted to every fuel supply to indicate the pressure of the fuel inside the block.

Fuel supply

One fuel supply is fitted to every burner unit (two, three or four fuel supplies depending on burner configuration). These fuel hoses are coloured at both ends to easily determine fuel tank source for each burner.

6.5 Dimensions and Weights

General dimensions of the balloon are stated in the Type Certificate datasheet and reproduced below. The weights of the envelopes and the baskets are given in Section 2.7. The weight of the burners are stated in the below table.

Envelopes:

Model	PH-60	PH-65S	PH-70	PH-75S	PH-80	PH-90	PH-105	PH-120
Volume [m3]	1700	1850	1985	2125	2270	2550	2975	3400
Max diameter [m]	15,8	15	16,3	15,8	17,1	17,7	18,5	19,6
Total height [m]	19,0	22,2	19,8	21,2	20,7	21,4	22,6	21,2

Model	PH-135	PH-150	PH-165	PH-180	PH-210	PH-240	PH-270	PH-300
Volume [m3]	3825	4250	4675	5100	5950	6800	7650	8495
Max diameter [m]	20,2	21,3	21,6	22,4	23,7	24,6	25,6	26,6
Total height [m]	24,2	24,6	24,9	25,8	27,4	26,2	27,3	28,5

Model	PH-335	PH-370	PH-425	PH-460	PH-500	PH-525
Volume [m3]	9490	10480	12050	13025	14160	14870
Max diameter [m]	27,6	28,8	29,6	30,2	31,2	31,8
Total height [m]	29,5	32,4	33,4	31,9	35,0	33,3

Baskets:

Model	S-10	S-12	S-14	S-15	S-16	S-20N	S-20W	S-22	S-26N
Width [m]	1,0	1,2	1,4	1,5	1,6	2,0	2,0	2,2	2,6
Length [m]	1,0	1,0	1,1	1,2	1,2	1,25	1,40	1,5	1,5
Top frame height [m]	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Total height [m]	2,05	2,05	2,05	2,05	2,05	2,05	2,05	2,05	2,05

Model	S-26W	S-30N	S-30W	S-34	S-38	S-42	S-48	S-54	S-58
Width [m]	2,6	3,0	3,0	3,4	3,8	4,2	4,8	5,4	5,8
Length [m]	1,6	1,5	1,6	1,6	1,7	1,7	1,7	1,7	1,8
Top frame height [m]	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2	1,2
Total height [m]	2,05	2,05	2,05	2,05	2,05	2,05	2,05	2,05	2,05

Burners (with hoses):

Model	Double	Triple	Quadruple
Width [m]	0,2	0,5	0,5
Length [m]	0,5	0,5	0,5
Height [m]	0,5	0,5	0,5
Weight [kg]	16	25	32

7. BALLOON HANDLING

7.1 Introduction

This Section contains the recommended procedures for proper ground handling and servicing of the balloon.

7.2 Ground Handling and Transportation

Some points must be considered when transporting the balloon by road:

- Envelope must be carried in its protective bag
- Load frame must be carried unriggered from basket and with burner hoses vented. Load frame must rely on top frame cushion or additional foam supports.
- Cylinders must be carried vertical and firmly attached to the basket or trailer.
- Basket must be securely attached to the trailer. Attachment ropes may damage the basket if too much stress is applied to them. It is recommended to transport the basket with a protective cover for rain and dust.
- Burner must be securely attached during transport. Special care must be taken to keep fuel hoses free of abrasion and avoiding small radius bends. Always check that burner fuel lines are empty before packing in a closed place.

7.3 Storage

Balloon should be stored in a clean and dry place. If balloon is wet because of wet landing field or condensation, it should be vented in the following days. Moisture may generate mold and deteriorate envelope fabric or basket wicker. Salt contamination should be avoided, especially for cylinders as it may start corrosion attack.

A vented storage place is required for fuel cylinders

7.4 Cleaning

Balloon can be cleaned with water. Never use cleaning agents or soap as it may deteriorate materials. After cleaning it should be completely dried.

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8.SUPPLEMENTS

8.1 Introduction

This Section of the Manual contains the appropriate supplements and additional approved data necessary to safely and efficiently operate the balloon when equipped with various optional systems and equipment not included in this manual.

The balloon must be operated in accordance with the applicable supplement and/or additional approved data when appropriate, but the content of the base Flight Manual will also apply.

Where a conflict arises between the information given in a Supplement and/or additional approved data and the information given in the base Flight Manual, the information given in a supplement takes precedence.

A complete list of Supplements is available on Pasha Balloons website. Supplements are updated independently of the flight manual.

8.2 Applicable Supplements

See configuration page for applicable supplements for this hot air balloon.