

# Balloon Flight Manual Supplement

## *Aerostar (Raven) Baskets and Burners*

This Balloon Flight Manual Supplement is initially approved by EASA under major change approval number 10070614, dated 26 July 2019.

Subsequent revisions are approved either by EASA or by authority of DOA, no. EASA.21J.277 as detailed on page 2.

This Balloon Flight Manual Supplement is approved in accordance with 14 CFR Section 21.29 for U.S. registered aircraft and is approved by the Federal Aviation Administration.

Initial date of approval: 31 July 2019

**This balloon is to be operated in compliance with information and limitations contained herein.  
The Balloon Flight Manual (and all applicable Balloon Flight Manual Supplements) has to be placed in the basket during flight.**

## 0.1 Record of Revisions

Any revision of this Balloon Flight Manual Supplement must be recorded in the following table. The new or amended text in the revised page will be indicated by a black vertical line in the outer margin, and the Revision No. and the date will be shown on the bottom of the page.

All changes to this Balloon Flight Manual Supplement, which were made before the date of the issue stated on the title page, have been incorporated into this supplement.

Revision Number	Affected Section	Affected Pages	Date of Issue	Approval	Date of Approval

## 0.2 List of Effective Pages

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## SECTION 1 - GENERAL

### 1.1 Introduction

This Balloon Flight Manual Supplement describes installation of Aerostar (Raven) baskets and burners defined under FAA Type Certificate #A15CE to a Kubicek Balloons envelope. The arrangement and numbering of sections in this Balloon Flight Supplement is the same as in the balloon Flight Manual. If any section is influenced, only the different or additional information is stated in this Balloon Flight Manual Supplement, all other remain without any change.

### 1.4 Definitions and Abbreviations

#### Abbreviations

- Aer – Aerostar (Raven)
- BFM – balloon Flight Manual
- BFMS – balloon Flight Manual Supplement
- MTOW – Maximum Takeoff Weight
- RMTOW – Reduced Maximum Takeoff Weight
- AMSL – Above Mean Sea Level
- VFR / IFR – Visual Flight Rules / Instrument Flight Rules

## SECTION 2 - OPERATIONAL LIMITATIONS

Before EACH flight in which the Aerostar basket, burner and fuel tanks are flown, check that the logbook shows the installation of the basket, burner and fuel tanks by part number and serial number. If the balloon is flown regularly with the same basket, burner and fuel tanks, the entry needs to be made only before the first flight with such combination, and each subsequent change from Kubicek to Aerostar equipment, using the same set of equipment need say only “equipped as per entry on (DATE)” referring back to date entered for the first installation.

### 2.3 Fuel

The minimum quantity of fuel required at take-off is 1 full fuel tank per each burner unit.

Aerostar fuel pressure range:

- Maximum admissible fuel pressure: 11 bar (160 psi).
- When pressurizing fuel tanks with nitrogen, care must be taken not to exceed 10 bar (145 psi).
- Minimum admissible fuel pressure: 4 bar (60 psi).

#### **CAUTION**

*Using of Whisper Burner is less efficient for fuel burn, so it will cause increase in fuel consumption (comparing to using of main burner).*

### 2.9 Weight Range

#### RMTOW

For certain combinations of KB envelope and Aerostar bottom-end a reduced MTOW is applicable. For list of these combinations refer to Section 5-Weight of this Balloon Flight Manual Supplement.

## 2.10 Basket Occupancy

### Basket Limitations:

Basket	Minimum floor area		MTOW for combination with the largest applicable envelope		Max. Number of Occupants (including pilot)
	[m2]	[sq.ft]	[kg]	[lbs]	
RWS	1.25	13.5	816	1800	4
RWSW (RWSW-AFX)	1.26	13.6	816	1800	4
CW (CW-AFX)	1.67	18.0	907	2000	5
CWS	1.94	20.9	907	2000	6
RB5	1.96	21.0	1075	2370	6
RB6	2.19	23.5	1302	2870	7
RB8	2.84	30.6	1574	3470	11
RB12	3.49	37.6	1723	3800	13

### Occupancy of Compartmentalized Baskets:

Basket	Max.Occupancy of Each Passenger Compartment	Max. Occupancy of Pilot Compartment	Pilot Compartment Floor Area	
			[m2]	[sq.ft]
RB5	3	pilot + 2	0.98	10.5
RB6	2	pilot	0.65	7.05
RB8	long comp. 3 short comp. 2	pilot	0.82	8.85
RB12	3	pilot	1.03	11.08

## 2.11 Fitment Interchangeability

Aerostar equipment can be used in following configurations only.

<b>Envelope</b>	<b>BB18E</b>
<b>Burner</b>	HPII Dual, HPIII Dual
<b>Basket</b>	RWS, RWSW, RWSW-AFX, CW, CW-AFX
<b>Minimum number of fuel tanks</b>	2

<b>Envelope</b>	<b>BB20, BB20ED, BB20E, BB20GP, BB20XR</b>
<b>Burner</b>	HPII Dual, HPIII Dual
<b>Basket</b>	RWS, RWSW, RWSW-AFX, CW, CW-AFX
<b>Minimum number of fuel tanks</b>	2

<b>Envelope</b>	<b>BB22, BB22D, BB22ED, BB22E, BB22N, BB22Z, BB22XR</b>
<b>Burner</b>	HPII Dual, HPIII Dual)
<b>Basket</b>	RWS, RWSW, RWSW-AFX, CW, CW-AFX
<b>Minimum number of fuel tanks</b>	2

<b>Envelope</b>	<b>BB26E, BB26ED</b>
<b>Burner</b>	HPII Dual, HPIII Dual
<b>Basket</b>	RWS, RWSW, RWSW-AFX, CW, CW-AFX, CWS
<b>Minimum number of fuel tanks</b>	2

<b>Envelope</b>	<b>BB26, BB26D, BB26N, BB26Z, BB26XR</b>
<b>Burner</b>	HPII Dual, HPIII Dual
<b>Basket</b>	RWS°, RWSW°, RWSW-AFX°, CW, CW-AFX, CWS ° MTOW is reduced to 1800 lb (816 kg)
<b>Minimum number of fuel tanks</b>	2

<b>Envelope</b>	<b>BB30E, BB30ED</b>
<b>Burner</b>	HPII Dual, HPIII Dual
<b>Basket</b>	RWS*, RWSW*, RWSW-AFX*, CW, CW-AFX, CWS * MTOW is reduced to 1800 lb (816 kg)
<b>Minimum number of fuel tanks</b>	2

<b>Envelope</b>	<b>BB30D, BB30N, BB30Z, BB30XR</b>
<b>Burner</b>	HPII Dual, HPIII Dual
<b>Basket</b>	RWS*, RWSW*, RWSW-AFX*, CW°, CW-AFX°, CWS° * MTOW is reduced to 1800 lb (816 kg) ° MTOW is reduced to 2000 lb (907 kg)
<b>Minimum number of fuel tanks</b>	2

<b>Envelope</b>	<b>BB34D, BB34ED, BB34E, BB34Z</b>
<b>Burner</b>	HPII Dual, HPIII Dual, HPIII Triple
<b>Basket</b>	CW*, CW-AFX*, CWS*, RB5, RB6 * MTOW is reduced to 2000 lb (907 kg)
<b>Minimum number of fuel tanks</b>	2 burner units = 2 fuel tanks 3 burner units = 3 fuel tanks

<b>Envelope</b>	<b>BB37D, BB37N, BB37Z</b>
<b>Burner</b>	HPII Dual, HPIII Dual, HPIII Triple
<b>Basket</b>	CW*, CW-AFX*, CWS*, RB5°, RB6 * MTOW is reduced to 2000 lb (907 kg) ° MTOW is reduced to 2370 lb (1075 kg)
<b>Minimum number of fuel tanks</b>	2 burner units = 2 fuel tanks 3 burner units = 3 fuel tanks

<b>Envelope</b>	<b>BB40D, BB40Z</b>
<b>Burner</b>	HPII Dual, HPIII Dual, HPIII Triple
<b>Basket</b>	CWS*, RB5°, RB6~ * MTOW is reduced to 2000 lb (907 kg) ° MTOW is reduced to 2370 lb (1075 kg) ~ MTOW is reduced to 2870 lb (1302 kg)
<b>Minimum number of fuel tanks</b>	2 burner units = 2 fuel tanks 3 burner units = 3 fuel tanks

<b>Envelope</b>	<b>BB42D, BB42Z</b>
<b>Burner</b>	HPII Dual, HPIII Dual, HPIII Triple
<b>Basket</b>	CWS*, RB5°, RB6~ * MTOW is reduced to 2000 lb (907 kg) ° MTOW is reduced to 2370 lb (1075 kg) ~ MTOW is reduced to 2870 lb (1302 kg)
<b>Minimum number of fuel tanks</b>	2 burner units = 2 fuel tanks 3 burner units = 3 fuel tanks

<b>Envelope</b>	<b>BB45D, BB45N, BB45Z</b>
<b>Burner</b>	HPII Dual, HPIII Dual, HPIII Triple
<b>Basket</b>	CWS*, RB5°, RB6~, RB8~, RB12~ * MTOW is reduced to 2000 lb (907 kg) ° MTOW is reduced to 2370 lb (1075 kg) ~ MTOW is reduced to 2870 lb (1302 kg)
<b>Minimum number of fuel tanks</b>	2 burner units = 2 fuel tanks 3 burner units = 3 fuel tanks

<b>Envelope</b>	<b>BB51D, BB51Z</b>
<b>Burner</b>	HPII Dual, HPIII Dual, HPIII Triple
<b>Basket</b>	RB6*, RB8°, RB12~ * MTOW is reduced to 2870 lb (1302 kg) ° MTOW is reduced to 3470 lb (1574 kg) ~ MTOW is reduced to 3470 lb (1574 kg) [3800 lb (1723 kg) if 3 units burner is used]
<b>Minimum number of fuel tanks</b>	2 burner units = 2 fuel tanks 3 burner units = 3 fuel tanks

<b>Envelope</b>	<b>BB60D, BB60N, BB60Z</b>
<b>Burner</b>	HPII Dual, HPIII Dual, HPIII Triple
<b>Basket</b>	RB6*, RB8°, RB12~ * MTOW is reduced to 2870 lb (1302 kg) ° MTOW is reduced to 3470 lb (1574 kg) ~ MTOW is reduced to 3470 lb (1574 kg) [3800 lb (1723 kg) if 3 units burner is used]
<b>Minimum number of fuel tanks</b>	2 burner units = 2 fuel tanks 3 burner units = 3 fuel tanks



<b>Envelope</b>	<b>BB64Z</b>
<b>Burner</b>	HPII Dual, HPIII Dual, HPIII Triple
<b>Basket</b>	RB6*, RB8°, RB12~ * MTOW is reduced to 2870 lb (1302 kg) ° MTOW is reduced to 3470 lb (1574 kg) ~ MTOW is reduced to 3470 lb (1574 kg) [3800 lb (1723 kg) if 3 units burner is used]
<b>Minimum number of fuel tanks</b>	2 burner units = 2 fuel tanks 3 burner units = 3 fuel tanks

<b>Envelope</b>	<b>BB70D, BB70Z</b>
<b>Burner</b>	HPII Dual, HPIII Dual, HPIII Triple
<b>Basket</b>	RB6*, RB8°, RB12~ * MTOW is reduced to 2870 lb (1302 kg) ° MTOW is reduced to 3470 lb (1574 kg) ~ MTOW is reduced to 3470 lb (1574 kg) [3800 lb (1723 kg) if 3 units burner is used]
<b>Minimum number of fuel tanks</b>	2 burner units = 2 fuel tanks 3 burner units = 3 fuel tanks

### Additional Limitations

Rotation Vent must be fitter when:

- any Cameron Balloons US partitioned basket, basket with door and/or seats is used

Different frame dimensions:

- before changing a combination of envelope and basket to another approved combination, care needs to be taken of the suitability of the flying wires. If the new frame has different dimensions than the original one, the flying wires need to be replaced following the instructions provided in Maintenance Manual Supplement (B.3205-MMS\_USBEC). If in doubt, ask KB for further assistance and technical support.

Single burner assemblies:

- are NOT PERMITTED for combinations of KB envelopes and Aerostar/Raven bottom-ends.

### Fuel tanks

#### FUEL PRESSURE SUPPLEMENTATION

If any pressure supplementation is used for cold weather flying, such as Nitrogen pressure supplementation, heat tapes, or other heating technique, ensure that maximum system operation pressure of 160 psi is not exceeded.

If pressure supplementation techniques are used, perform them only in open area. If heat tapes are used, inspect them periodically for wear through the electrical insulation to preclude the possibility of arc to the fuel cylinder or electrical shock.

If a Nitrogen gas pressure supplemented fuel cylinder has not been discharged of nitrogen saturated fuel, DO NOT store in temperatures warmer than 30F higher than the temperature it was most recently pressurized at. Dangerous over-pressure may occur due to increase of propane vapor pressure and Nitrogen evaporation from liquid propane in the cylinder.

DO NOT use a Nitrogen gas pressure supplemented fuel cylinder with a vapor pilot light.

DO NOT OVER-SERVICE a fuel cylinder, especially when nitrogen supplementation is to be used, reduced expansion volume can result in tank over-pressure when heated. Reduced vapor volume will also reduce the affectivity of Nitrogen pressure supplementation and will result in rapid loss of fuel pressure during the flight.

**WARNING** Do not refuel tanks while in a polyethylene or lined wicker basket.

## SECTION 3 - EMERGENCY PROCEDURES

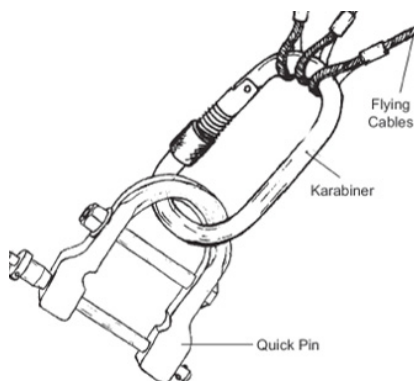
No change

## SECTION 4 - NORMAL PROCEDURES

### 4.3.5 Unpacking and Assembly of the Balloon

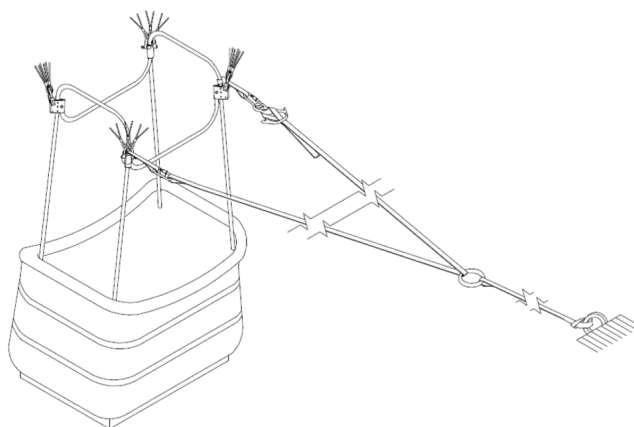
#### Additional information for assembling the balloon:

The envelope carabiners with appropriate number of flying wires must be attached to the Quick Pins according to the following picture:



### 4.3.6 Quick release

Launch harness must be attached at the envelope load blocks. Attaching a launch restraint to the gondola uprights (other than at the load blocks), the interface between the uprights and the lower frames, steps or skids is not authorized. Improper launch techniques are liable to induce damage to the structure of the gondola and must be avoided. The correct way of attaching the Quick Release is shown on the following picture:



## SECTION 5 - WEIGHT

For the following combinations a reduced MTOW is applicable.

Envelopes	Baskets	RMTOW
BB26, BB26D, BB26N, BB26Z, BB26XR, BB30E, BB30ED, BB30D, BB30N, BB30Z, BB30XR	RWS, RWSR, RWSW-AFX	1800 lbs (816 kg)
BB30D, BB30N, BB30Z, BB30XR, BB34D, BB34ED, BB34E, BB34Z, BB37D, BB37N, BB37Z	CW, CW-AFX	2000 lbs (907 kg)
BB30D, BB30N, BB30Z, BB30XR, BB34D, BB34ED, BB34E, BB34Z, BB37D, BB37N, BB37Z, BB40D, BB40Z, BB42D, BB42Z, BB45D, BB45N, BB45Z	CWS	2000 lbs (907 kg)
BB37D, BB37N, BB37Z, BB40D, BB40Z, BB42D, BB42Z, BB45D, BB45N, BB45Z	RB5	2370 lbs (1075 kg)
BB40D, BB40Z, BB42D, BB42Z, BB45D, BB45N, BB45Z, BB51D, BB51Z, BB60D, BB60N, BB60Z, BB64Z, BB70D, BB70Z	RB6	2870 lbs (1302 kg)
BB45D, BB45N, BB45Z	RB8, RB12	2870 lbs (1302 kg)
BB51D, BB51Z, BB60D, BB60N, BB60Z, BB64Z, BB70D, BB70Z	RB8, RB12 (when 2-unit burner is used)	3470 lbs (1574 kg)
BB51D, BB51Z, BB60D, BB60N, BB60Z, BB64Z, BB70D, BB70Z	RB12 (when 3-unit burner is used)	3800 lbs (1723 kg)

For combinations other than those stated in this table, the standard MTOW stated in Envelope Weight Limits chart in KB balloon Flight Manual (B.3105) applies.

### 5.1 Introduction

As stated in the Section 2, chapter 2.9 Weight Range of the balloon Flight Manual (B.3105), the actual weight of the balloon must be kept between the upper limit weight (MTOW, lowered MTOW, RMTOW and Maximum Balloon Lifting Capacity – whichever is lesser) and lower limit weight (MLW) during the entire flight.

## SECTION 6 - BALLOON AND SYSTEMS DESCRIPTION

Aerostar burners applicable for combining with KB envelopes are the double and triple configurations (allowed combinations are described in chapter 2.11 of this BFMS). It consists of two or three burner units and a burner frame. Double and triple models use a central gimbal block that makes an inner frame redundant. Within the burner, liquid gas is vaporized and burnt to heat the air within the envelope. The fuel is ignited by a pilot light (liquid pilot lights are standard) that runs all the time that the balloon is inflated. Both the main burner and whisper burner have an “off” or “on” mode. The amount of heat is controlled by duration of the heating and number of burner units engaged. All burners are controlled by means of the valves placed on the underside of the burner on the manifold block. The heat of the burner is greatly influenced by the fuel pressure that is affected by the ambient temperature. In lower temperatures pressurization of the fuel tanks is recommended.

<b>CAUTION</b>	<i>Burner malfunction due to oxygen insufficiency in the ambient air may appear in altitudes above 6 000 m (20 000 ft) AMSL.</i>
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### 6.5.2 Whisper Burner

Whisper burner (AKA glow burner, cow burner or liquid fire) is option available for HP III burners only. It is an auxiliary burner with separate fuel path (fully redundant). Opening the glow valve allows fuel to flow to the whisper burner head located at the top of the heat exchange coils, which is then ignited by the pilot light. This provides a quieter but less powerful flame. It is intended for use when reduction of burner noise is desired (flying over livestock etc.).

**CAUTION** *Using of Whisper Burner is less efficient for fuel burn, so it will cause increase in fuel consumption (comparing to using of main burner).*

### 6.5.3 Pilot Light

Burner ignition is provided by a pilot light (AKA pilot flame or pilot burner). A pilot light is fuelled either by liquid propane (standard option) taken from the burner block and vaporized in the vapor convertor or by vapor phase taken by a separate hose from the top of the fuel cylinder. Each pilot light has its own piezo igniter (controlled by a red button).

### 6.5.6 Fuel Supplies

For double or triple burners each burner unit has its own independent fuel supply. Single burner assemblies are not permitted for combinations of KB envelopes and Aerostar bottom-ends. The liquid fuel hoses on double, triple and quad burners are identified by matching colored bands at each end of a hose.

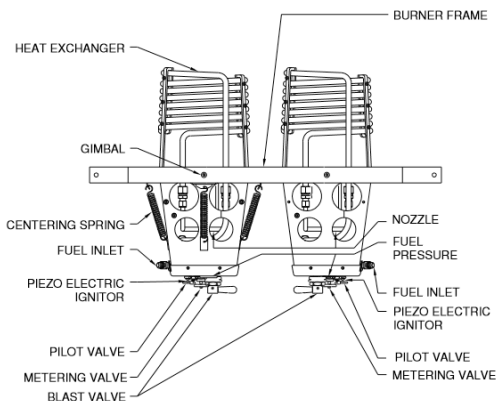
Fuel should always be vented from fuel hoses when the burner is not in use. The remaining fuel can cause damage to the fuel hoses due to heat expansion.

### 6.5.7 Burner Frame

The burner frame is made either as a superstructure - from stainless-steel or aluminium tubing creating the frame and its support and connection to the basket as well, or as a metal burner frame carried by synthetic rods. The burner units are swivel-mounted on a gimbal block on a horizontal bar that runs across the burner frame (this provides a two-axis gimbaled system). At each corner the burner frame has lugs, where the basket carabiners hook up. The support system of the burner frame (the carrying rods) is covered by removable padded sleeves.

### 6.5.12 HP II Burner

Applicable burners from this group are the double burner assemblies. Each burner has Main Burner, but the HP II series do not offer the Whisper Burner (glow burner).

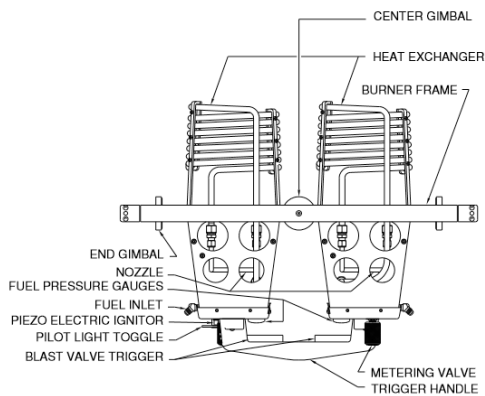


#### HP II dual burner

Source: AEROSTAR CONTINUED AIRWORTHINESS INSTRUCTIONS FOR AEROSTAR (RAVEN) HOT AIR BALLOONS, ACAI PART I, Revision E, 2013, page 1-16

### 6.5.13 HP III Burners

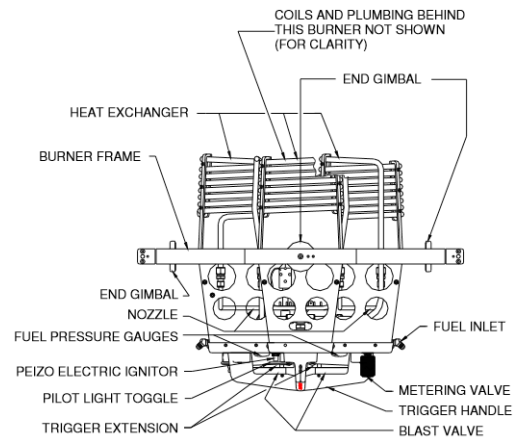
Applicable burners from this group are the double and triple burner assemblies. Each burner has Main Burner and it can also have the optional Whisper Burner (Glow burner).



#### HP III dual burner

**Source:** AEROSTAR CONTINUED AIRWORTHINESS INSTRUCTIONS FOR AEROSTAR (RAVEN) HOT AIR BALLOONS, ACAI PART I, Revision E, 2013, page 1-17

**Note:** optional glow valve not shown for clarity



#### HP III triple burner

**Source:** AEROSTAR CONTINUED AIRWORTHINESS INSTRUCTIONS FOR AEROSTAR (RAVEN) HOT AIR BALLOONS, ACAI PART I, Revision E, 2013, page 1-18

**Note:** optional glow valve not shown for clarity

## 6.7 Baskets

All Aerostar baskets have the same basic structure and features – upper and lower basket frames connector with woven wicker. The upper frame has also sockets for connecting of the burner superstructure (support burner frame and its support tubes), that can be made of aluminium or stainless-steel or its combinations. The basket's lower frame supports the floor, that can be either also woven from rattan wicker of made of solid plywood.

Models CW-AFX and RSW-AFX are fitted with flexible synthetic rods for burner frame support. The primary load is carried by suspension cables attached to the lower tubes and connected to the top frame with carabineers.

Partitioned baskets (RB5, RB6 RB8 and RB12) are fitted with a padded centre partitions.

### 6.7.1 Basket types

#### 6.7.1.1 Partitioned Baskets

The Aerostar partitioned baskets have classic construction with straight upper frame (flat top) and superstructure burner support system. They have internal partitions woven into the walls and fixed to the floor and upper frame of the basket. These partitions provide greater structural integrity to the basket and separation between groups of passengers. In these baskets the pilot and fuel tanks are contained in a separate compartment from the passengers.

#### 6.7.1.2 Open baskets

The Aerostar open baskets have classic construction with curved upper frame (swept top) and superstructure burner support system (except for CW-AFX and RSW-AFX baskets which have the synthetic rods support system).

## SECTION 7 - BALLOON HANDLING, CARE AND MAINTENANCE

### 7.3 Balloon Maintenance, Repairs and Alterations

All balloon maintenance and repairs must be carried out in accordance with the Kubicek Balloons Maintenance Manual Supplement (B.3205-MMS\_USBEA). If in doubt, contact KB (see the last page of this Balloon Flight Manual Supplement).

The Maintenance Manual (and all its supplements) is available for downloading on the Kubicek Balloons website: [www.kubicekballoons.eu](http://www.kubicekballoons.eu).

### 7.5 Cleaning and Care

#### 7.5.2 Basket

Refer to the Kubicek Balloons Maintenance Manual Supplement (B.3205-MMS\_USBEA).

#### 7.5.4 Burner

Refer to the Kubicek Balloons Maintenance Manual Supplement (B.3205-MMS\_USBEA).

## SECTION 8 - EQUIPMENT LIST

### Aerostar fuel tanks

Manufacturer	Material	Type	Empty Weight		Full Weight	
			[kg]	[lb]	[kg]	[lb]
Aerostar	Stainless steel	V-15 (vertical)	20	44	44	97
		V-18 (vertical)	22	49	51	112
		V-23 (vertical)	29	64	66	145

## SECTION 9 - APPENDICES

No change.

## SECTION 10 - SUPPLEMENTS

No change.

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**LET US HELP YOU!**

In case that you have any suggestion, difficulty, problem or comment, please contact our technical department at:

technical@kubicekballoons.cz  
+420 545 422 638

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