MAINTENANCE MANUAL

for

ULTRAMAGIC HOT AIR BALLOONS

H 31 42 56 65 77
V 25 56 65 77 90 105
S 50 70 90 105 130 160
T 150 180 210
F Special Shapes

M 42 56 56C 65 65C 77 77C 90 105 120 130 145 160
N 180 210 250 300 355 425 500
Z 90

Serial number	_____
Approval	**Rev. 17**
Date	_____

ULTRAMAGIC,S.A.
Aerodrom Igualada-Odena s/n
08700 IGUALADA (SPAIN)
tel +34 93 8042202
fax +34 93 8035604
e-mail admin@ultramagic.com
web www.ultramagic.com

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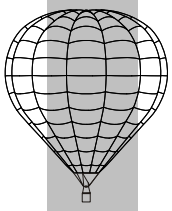
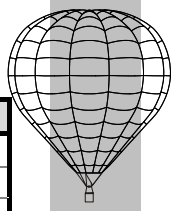


LIST OF APPROVED REVISIONS

See list of effective pages.
Note- From revision 7 any new or amended text in the revised page will be indicated by a black vertical line in the left margin, and the revision number will be shown at the top of the page.

Revision Nº	Modifications (Brief description)	Date
1	Supplements 1, 2 and 3	24-Sep-03
2	Supplement 4	19-Apr-04
3	Supplement 5	01-Sep-04
4	Supplement 6	15-Dec-05
5	Supplement 7 Changes on Inspections and renumbering	26-May-06
6	Supplements 8 and 9	15-Nov-06
7	FAA of USA requirements Section 7 Airworthiness Limitations Supplement 10	17-Apr-07
8	Supplement 4 revision Supplement 11 BMK-008 Single Burner Supplement 12 BMK-008 Double Burner Supplement 13 BMK-050 Burner	01-May-07
9	Supplement 14 MK21 Vapour Pilot Light Supplement 15 MK21 Improved Filtering	15-Feb-08
10	Supplement 13 BMK-050 Burner revision FAA requirements introduced	20-Jun-08
11	Corrections to section 2 and 6 Correction to Appendix 2 Supplement 5 Disabled Pax Basket revision	17-Dec-08
12	Amendment to sections 0, 2, 4, 6, A2 Supplement 17 'Tekno' Envelopes (added) Supplement 18 'Tekno' Baskets (added) Supplement 19 'FuelTek' System (added)	24-Mar-10
13	Amendment to sections 0, 1, 2, 4, 6, A2 Supplement 18 'Tekno' Baskets (revised)	10-Sep-10
14	SUPERSEDED	N/A
15	Supplement 21 "F-35 R4TS" Amendment to sections 0, 1, 2, 3, 4, 6	10-Dec-12
16	Section 7 (EASA Approval 10041973)	10-Dec-12
17	Amendment to sections 2, 7 Supplements 17 and 18 revision	13-Nov-13



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4.9	15	10-Dec-12	6.14	12	24-Mar-10			
4.10	15	10-Dec-12	6.15	12	24-Mar-10			
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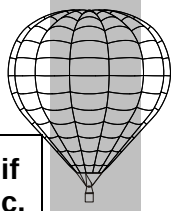
4.12	15	10-Dec-12	6.17	15	10-Dec-12			



LIST OF APPROVED SUPPLEMENTS

Supplement No.	Description	Issue		Tick if Applic.
		Number	Date	
1	Mk 21 Double burner electric blast valve	2	Sept-03	
2	Mk 10 Burner maintenance, double, triple and quad.	2	Sept-03	
3	Use of “Quick Links” for flying wire replacement.	2	Sept-03	
4	Solo & Duo Maintenance	3	Apr-04	
5	Disabled Passengers Basket	3	Dec-08	
6	Cruise Control	2	Dec-05	
7	Butane Burner	2	May-06	
8	Centre Gimbal Assembly	2	Nov-06	
9	Fastflat Quick Release Coupling	2	Nov-06	
10	U.S. units conversion table to I.S. units	2	Apr-07	
11	BMK-008 Single Burner	2	May-07	
12	BMK-008 Double Burner	2	May-07	
13	BMK-050 Double, Triple & Quad Burner Rev. 10	2	May-08	
14	MK21 Vapour Pilot Light	2	Feb-08	
15	MK21 Improved Filtering	2	Feb-08	
17	‘Tekno’ Envelopes	2	Nov-13	
18	‘Tekno’ Baskets	3	Nov-13	
19	‘FuelTek’ Fuel Control System	1	Mar-10	
21	Special shape F-35 “R4TS”	1	Nov-12	

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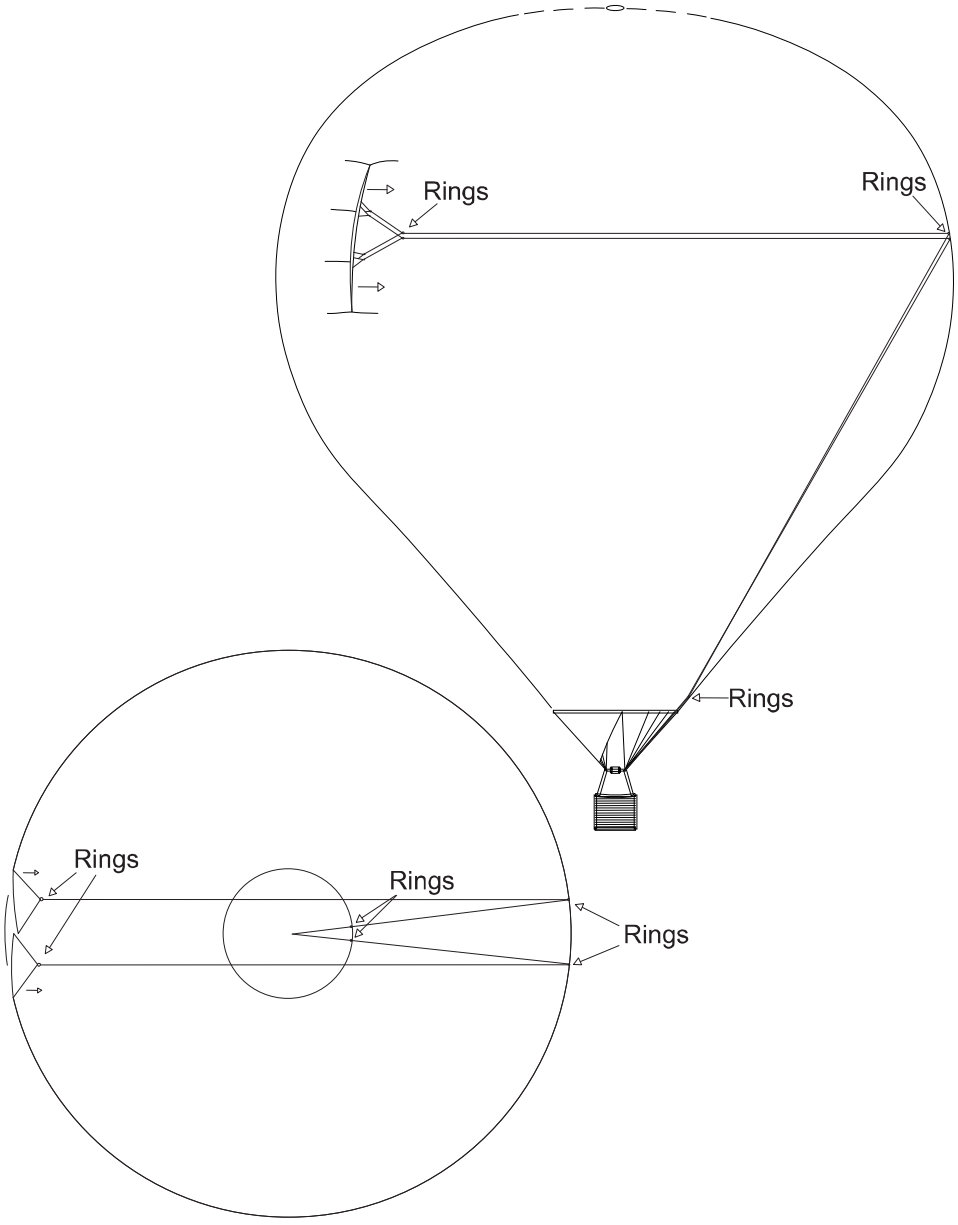
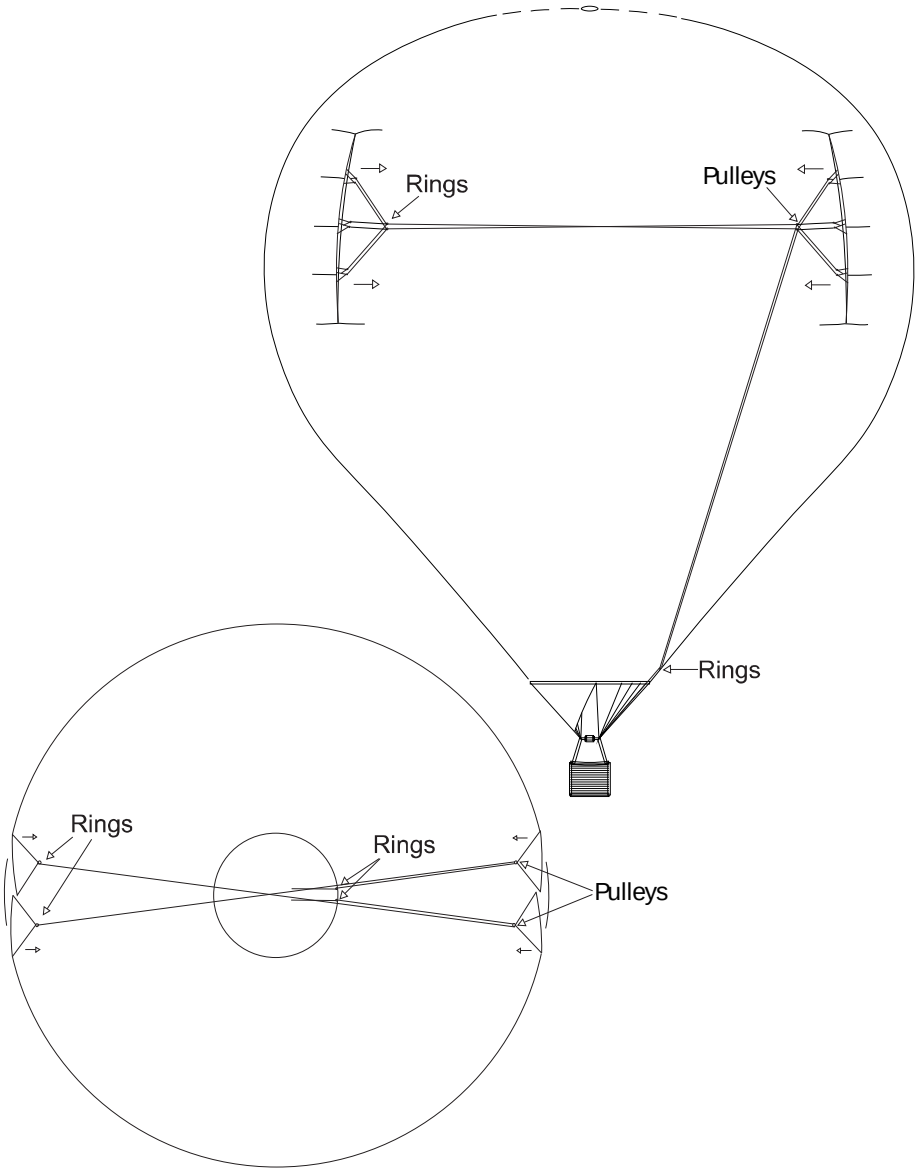
2.10.6 Turning Vent Control Lines

If a turning vent line is damaged or burned near one end, it is permitted to install a new section up to a maximum of 2.5 metres. Damage in excess of this requires that the complete line is replaced to one that is identical to the one installed in the balloon envelope. Installation is similar to that of the parachute line and extreme care should be taken to ensure that the lines are not crossed or twisted.



Turning vent line rigging (single)

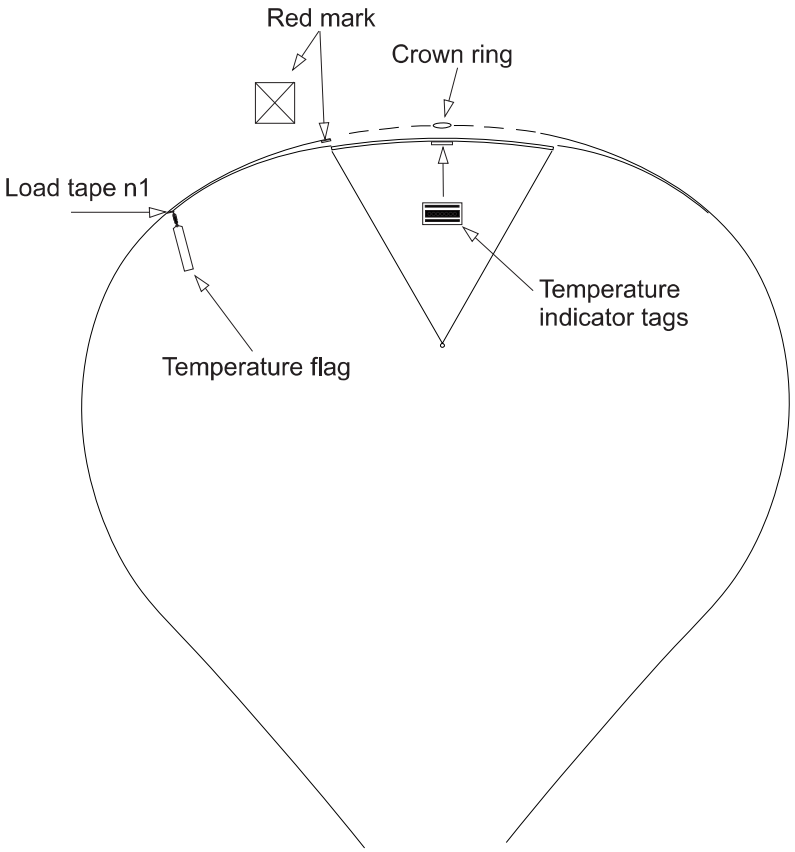
Note that turning vent control cords are routed in a different manner depending whether if the balloon has one set of rotation vents or two. In the first case, blue and black cords are always routed parallel, whilst double sets of rotation vents require the cords to be crossed at the centre axis of the balloon. Note also on the figures the alternative use of rings or pulleys on both arrangements.



Turning vent line rigging (double)

2.11 Temperature Indicators

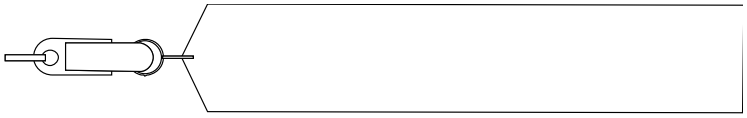
These consist of the 1. Temperature Flag and 2. Temperature Tags
They are installed in the envelope at the positions shown in the diagram below.



Temperature indicator positions 16

2.11.1 Temperature Flag

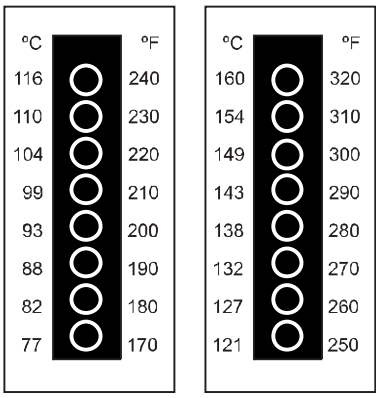
This consists of a flag of balloon fabric attached to the inside if the balloon by means of a specially designed fitment. When the inside of the envelope reaches a temperature beyond the maximum approved then the fitment releases the flag. When the fitment returns to a lower temperature it adjusts to its original position. It is therefore possible to refit the flag by pushing it back into its fitting. Therefore this part should only need replacing if it becomes lost or damaged. A release of the flag indicates that the envelope fabric may have been overheated. This can be confirmed by reading the temperature tags once the envelope has been deflated.



Temperature Flag 17

2.11.2 Temperature Tags

These are indicators which change colour to black once a certain temperature is reached. If they show a temperature above the maximum authorised then a fabric test should be carried out as the fabric may be permanently damaged. Note of this should always be made in the balloon logbook. As long as the fabric is still within test requirements then a new tag may be fitted so that indication of further overheating can be maintained. This is stuck and then sewn in place as the original as shown in the above diagram.



Temperature Tags

2.12 Envelope Materials

2.12.1 Sewing Thread

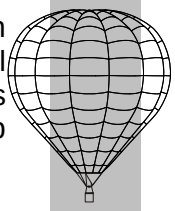
Ultramagic use polyester, metric 40 size, 3-strand continuous filament thread in envelope manufacture. The same specification nylon thread is an acceptable alternative. No other type of thread may be used.

Nomex thread is used where sewing nomex accessories. This thread however must never be used on balloon seams or load tapes.

2.12.2 Fabrics

The following fabrics are used in the manufacture of Ultramagic envelopes. (See also Ultramagic Balloon Fabric Specification sheet Appendix 1.)

High tenacity nylon fabric with polyurethane coating - This has a rip-stop construction. The coating has various additives to reduce the effects of Ultraviolet rays and to prevent fungal growth. This fabric is used generally throughout the envelope with the exception of the parachute and top panel and the mouth panel. This fabric should not be used as a substitute for the following silicon coated fabric.



High strength nylon fabric with a silicon base coating - This is of a plain weave and can also be identified by its slippery finish. This fabric is used in the parachute and top panel as standard but also may be used in other areas of the envelope. Where this fabric is used in the envelope it must be repaired or replaced with the same fabric. The rip-stop polyurethane fabric must not be used.

The mouth or throat panel and scoop/skirt of the balloon are made from fire resistant fabric (Nomex – weight 160 grm/m2 minimum). This is much thicker than the nylon materials and is porous. This area should normally be repaired with the same material.

The fabrics described and specified may be substituted with an equal or higher specification. (See Ultramagic Balloon Fabric Specification sheet Appendix 1)

2.12.3 Load Tapes

Ultramagic load tapes are made from polyester. Similar tapes may be used for repairs providing the strengths quoted on the Load tape Specification table below are exceeded.

Series	Volume	Vertical Load tape size MM.	Load tape strength Kg.
H	31 42	18	1300
	56 65 77	25	1800
S	90 105 130 160	25	1800
T	150 180 210	25	1800
V	56 65 77 90 105	18	1300
M	42 56 56c 65 65c 77 77c 90 105 120 130	*14 18	*900 1300
	145 160	18	1300
N	180 210	18	1300
	250 300 355 425 500	25	1800
Z	90	25	1800

* Where ULTRAMAGIC major modification nr.16 applies
- Horizontal: Flat 17 mm (Strength 650 kg)

2.12.4 Flying Wires

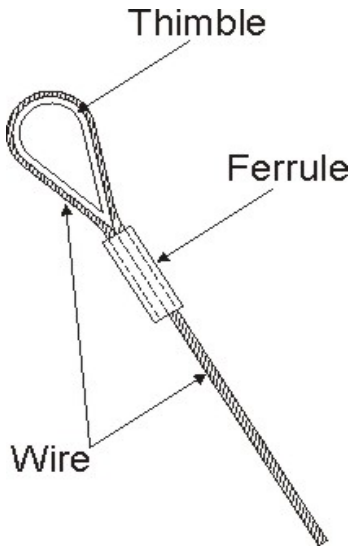
These wires must be made from stainless steel wire.

Type 3mm diameter 7 x 19 construction AISI316 stainless steel to BS MA29
Type 4mm diameter 7 x 19 construction AIS1316 stainless steel to BS MA29

Series	Volume	Wire Diameter MM.	Minimum Wire strength Kg.
H	31 42	3	500
	56 65 77	4	900
S	90 105 130 160	4	900
T	150 180 210	4	900
V	56 65 77 90 105	3	500

M	42 56 56c 65 65c 77 77c 90 105 120 130	*3 4	*500 900
	145 160	4	900
N	180 210	3	500
	250 300 355 425 500	4	900
Z	90	4	900

* Where ULTRAMAGIC major modification nr.16 applies

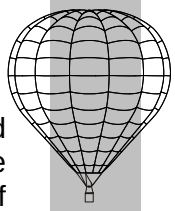


The wire ends are produced by the fitment of a thimble and then by a swaging of a copper ferrule. This is a special process, which requires special tooling controlled to exacting standards. Therefore wires may only be used that are produced and supplied by Ultramagic S.A. Any variation to this rule is only allowed by written authority by Ultramagic S.A.

2.12.5 Ropes and Chords

The ropes and chords used in Ultramagic balloons have been selected and tested to meet their various requirements and are made of synthetic material. The following specifications must be adhered to.

1. Parachute retaining lines are 3mm. diameter Kevlar when a standard parachute is fitted. When a FDS rapid deflation system is installed in the balloon then the Parachute retaining/release lines are Kevlar core with a polyester outside and are 2.5mm diameter.
2. Parachute release lines on a parachute only system are 3mm diameter Kevlar.
3. Parachute control line is Kevlar core with polyester outside and is 8 to 10mm diameter. When a parachute only is installed then this line is red. When a FDS rapid deflation system is fitted to the envelope then the parachute line is white.
4. FDS control line is Kevlar core with polyester on the outside. This line is always red and is 8 to 10mm in diameter.
5. Rotation Vent lines are Kevlar core with polyester on the outside and are of 5mm diameter, or alternatively 4mm for envelopes not above size 210. The right is blue and the left is black
6. Crown Line is 8 to 10 mm polyester in white with a red stripe.



2.12.6 Pulleys

Parachute pulleys are generally made from “Tufnol” which is a fibre reinforced resin. Two types are used, the Becket and non-Becket. When replacing pulleys one should always use an identical type. The Becket type is normally used where a rope has to be tied back to the pulley. In all other cases a non-becket type is used. Alternative supply of pulleys must not be used in lieu of Ultramagic pulleys.

2.12.7 Guide Rings

These are made from 5mm diameter stainless steel wire. The internal diameter is 25mm These are welded and polished. Alternative supply of rings must not be used in lieu of Ultramagic rings.

2.12.8 Karabiners

The only permitted type is Stubai rated to 3000 Kg. For N-500 envelope or C-14 basket it will be used the Stubai 4000 Kg karabiner.

2.12.9 Control Line Hooks

These are vital parts that are required to maintain control of the balloon. No substitution for genuine Ultramagic parts is allowed.

2.12.10 Scoop Fixings

Whilst not vital to safety it is still important to use similar sized items to the factory fitted ones. However material and finish should also be similar.

2.12.11 Quick Links

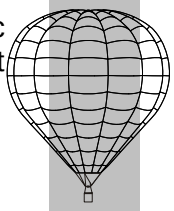
These are used in the parachute release line attachment to the pulley and are vital parts to maintain control of the balloon. Only Ultramagic supplied parts are allowed.

2.13 Envelope Cleaning

2.13.1 Envelope fabric and load tapes.

Cleaning of the envelope should only be undertaken when it is likely that it will be able to dry out.

Only use warm water washing by hand with a gentle soap solution. Do not use any strong or biological detergent or agents, which have a bleach content as this can damage the protective coatings of the fabric. Do not rub the fabric too hard and avoid the use of abrasive materials. Always rinse off the soap with plenty of clean water.



The envelope must not be stored wet or damp as the moisture can cause fabric deteriation caused by mould or mildew. Should the envelope have to be packed wet because of weather conditions then the following must be carried out within a few days.

1. Spread the envelope out in a clean dry area.

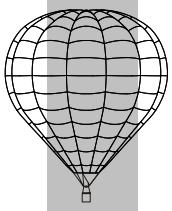
2. Cold inflate the envelope with an inflation fan and turn the envelope over until completely dry.

3. Ensure that the storage bag is dry before packing the envelope.

CAUTION: Hot inflating a very wet envelope may cause damage to the fabric.

2.13.2 Velcro

It is very easy for Velcro to have waste material, grass etc. trapped on it because of the nature of the material. This can affect the efficiency of the Velcro. It is therefore recommended that both parts of the velcro are regularly cleaned by carefully removing any trapped material. Do not use water as this can affect the efficiency of the Velcro joint



Section 7 – Airworthiness Limitations

7.1 Approval Statement

The Airworthiness Limitations section is FAA approved and specifies maintenance required under Secs. 43.16 and 91.403 of the Federal Aviation Regulations.

7.2 Mandatory Replacement Time

There is only one component of any Ultramagic Balloon that has to be replaced in a specified length of time. This is as follows.

Fuel cylinder Safety valve or pressure relief valve (PRV) - At intervals not to exceed 120 calendar months from date of manufacture a new pressure relief valve must be installed. - ref. MM page 6.13

7.3 Structural Inspection Interval

Validity of the C of A is subject to the log book containing an inspection certificate / certificate of release to service valid according to the following inspection schedule:

- **Envelopes, Baskets, Burners**: Every 100 flight hours or after one year since the date of last inspection, whichever occurs sooner.
- **Fuel Cylinders**: After one year since the date of last inspection.

Periods between inspections may be extended out of the limits above only where the following conditions are met:

- The extension is not greater than 30 days and 100 flight hours are not exceeded since the last inspection.
- The provision is not adopted as a regular basis.
- The extension is recorded and signed in the aircraft logbook.
- The extension is justified and approved by the person or organization responsible for the continued airworthiness management of the Balloon, prior to its execution.
- The extension does not concern Components subject to Service life limitations and/or Airworthiness Directives.
- No instructions against the use of the extension have been set beforehand on previous inspections.

For U.S. registered balloons, the tolerance extension listed in this section is not permitted.

7.4 Structural Inspection Procedure

Inspection Procedure is detailed in Section 6 of this manual and with a checklist included in Appendix 2