

GAS BALLOON MAINTENANCE MANUAL

MANUFACTURER:

CAMERON BALLOONS Limited
St. Johns Street, Bedminster, Bristol BS3 4NH
UNITED KINGDOM
Tel: +44(0)1179637216
email: technical@cameronballoons.co.uk website:www.cameronballoons.co.uk

STATEMENT OF INITIAL CERTIFICATION

This manual provides the maintenance instructions and inspection schedule for all types and variants detailed in EASA.BA.521 as required by EASA Certification Specification CS31GB.82. The technical content of this document is approved under the authority of DOA nr EASA.21J.140.

Signed..... Date.....03 August 2011.....

For and on behalf of Cameron Balloons Ltd.

Intentionally Blank Page

Record of Amendments

Amendment Number	Description	Pages Affected	Date	Approval
1	Record of Amendments updated, List of Effective Pages Updated. Maillon Rapide Links and Trail Rope added to Inspection Schedule criteria (Section 6).	i-iii, i-v, 6-3, 6-4, 6-6, 6-8	19/10/20	The technical content of this document is approved under the authority of EASA.21J.140 (C629)
2	Record of Amendments updated, List of Effective Pages Updated.. Inspection Schedule 100hr inspection requirement removed.	i-iii, i-v, 6-2	17/02/26	The technical content of this document is approved under the authority of DOA nr. UK.21J.0140 (C992)

NOTE: Any new or amended text in the revised page will be indicated by a black vertical line in the right hand margin, and the Amendment Number and the date will be shown at the bottom of the page.

Intentionally Blank Page

List of Effective Pages

Section	Page	Date of Issue	Section	Page	Date of Issue	Section	Page	Date of Issue
0	i-i	03 August 2011	5	5-1	03 August 2011	7	7-1	03 August 2011
		03 August 2011		5-2	03 August 2011		7-2	03 August 2011
	i-iii	17 February 2026						
	i-iv	03 August 2011	6	6-1	17 February 2026	8	8-1	03 August 2011
	i-v	17 February 2026		6-2	03 August 2011		8-2	03 August 2011
	i-vi	03 August 2011		6-3	19 October 2020			
	i-vii	03 August 2011		6-4	19 October 2020			
	i-viii	03 August 2011		6-5	03 August 2011			
				6-6	19 October 2020			
				6-7	03 August 2011			
				6-8	19 October 2020			
1	1-1	03 August 2011						
	1-2	03 August 2011						
2	2-1	03 August 2011						
	2-2	03 August 2011						
3	3-1	03 August 2011						
	3-2	03 August 2011						
4	4-1	03 August 2011						
	4-2	03 August 2011						

Intentionally Blank Page

Contents

APPROVAL

RECORD OF AMENDMENTS

LIST OF SUPPLEMENTS

LIST OF EFFECTIVE PAGES

CONTENTS

SECTION 1: GENERAL

1.1 INTRODUCTION

1.2 PROHIBITED REPAIRS

1.3 REPAIR PARTS AND MATERIALS

1.4 APPLICABILITY

1.5 DESCRIPTION OF BALLOON, COMPONENTS, SYSTEMS AND INSTALLATIONS

SECTION 2: ENVELOPE REPAIRS

2.1 GENERAL

2.2 ENVELOPE REPAIRS

SECTION 3: BASKET REPAIRS

3.1 ROUTINE MAINTENANCE

3.2 WICKERWORK

3.3 LEATHER, SUEDE AND FABRIC TRIM

3.4 RAWHIDE

3.5 BASKET RUNNERS (WOVEN FLOOR BASKETS)

3.6 BASKET FLOORS AND RUNNERS (SOLID FLOOR BASKETS)

3.7 BASKET FRAMES

3.8 SUPPORT RODS

SECTION 4: RESERVED

SECTION 5: RESERVED

SECTION 6: INSPECTION SCHEDULE

6.1 GENERAL

6.1.1 Facility for Inspection

6.2 SCHEDULED INSPECTIONS

6.3 UNSCHEDULED INSPECTIONS

6.4 DOCUMENTATION

6.5 ENVELOPE

6.5.1 External

6.5.2 Internal

6.5.3 Resistivity Check

6.6 GAS VALVE

6.7 LOAD FRAME

6.8 BASKET

6.9 ANCILLARY EQUIPMENT (IF FITTED)

6.10 INSPECTION CRITERIA/TECHNIQUES

6.10.1 Documentation

6.10.2 Envelopes

6.10.3 Resistivity Test

6.10.4 Load Frame

6.10.5 Baskets

6.10.6 Ancillary Equipment (If fitted)

6.11 GRAB TEST

6.12 UNSCHEDULED INSPECTIONS

6.12.1 Pre-Flight Inspections

SECTION 7: SUPPLEMENTS

7.1 INTRODUCTION

7.2 LIST OF SUPPLEMENTS INSERTED

7.3 ADDITIONAL DATA

SECTION 8: REPAIR PARTS AND MATERIALS

8.1 GENERAL

8.2 ENVELOPE

8.3 LOAD RING

8.4 BASKET

1.1 INTRODUCTION

The maintenance of the GB1000 gas balloon is relatively simple compared to other types of aircraft, but the specialised equipment required for repairs to the envelope, and the training in its use, are not generally available at this time. The baskets differ little from those used with hot-air balloons and can be maintained by the same means.

1.2 PROHIBITED REPAIRS

Envelopes: All repairs to envelopes, rigging tapes, control lines and gas valves.

Baskets: Replacement of more than 20% of the total basket surface area.

Load bearing wires: The repair of swaged basket wires.

1.3 REPAIR PARTS AND MATERIALS

The balloon must be maintained using replacement parts and materials approved by Cameron Balloons Ltd. A list of repair parts and materials is contained in Section 8 of this manual.

1.4 APPLICABILITY

This manual contains maintenance and repair instructions for the GB1000 balloon only.

1.5 DESCRIPTION OF BALLOON, COMPONENTS, SYSTEMS AND INSTALLATIONS

A detailed description of the balloon and its components, systems and installations is included in Section 6 of the gas balloon flight manual.

Intentionally Blank Page

2.1 GENERAL

The general arrangement of balloon envelopes and systems are shown in the Cameron Balloons Flight Manual ISSUE 1, Section 6.

2.2 ENVELOPE REPAIRS

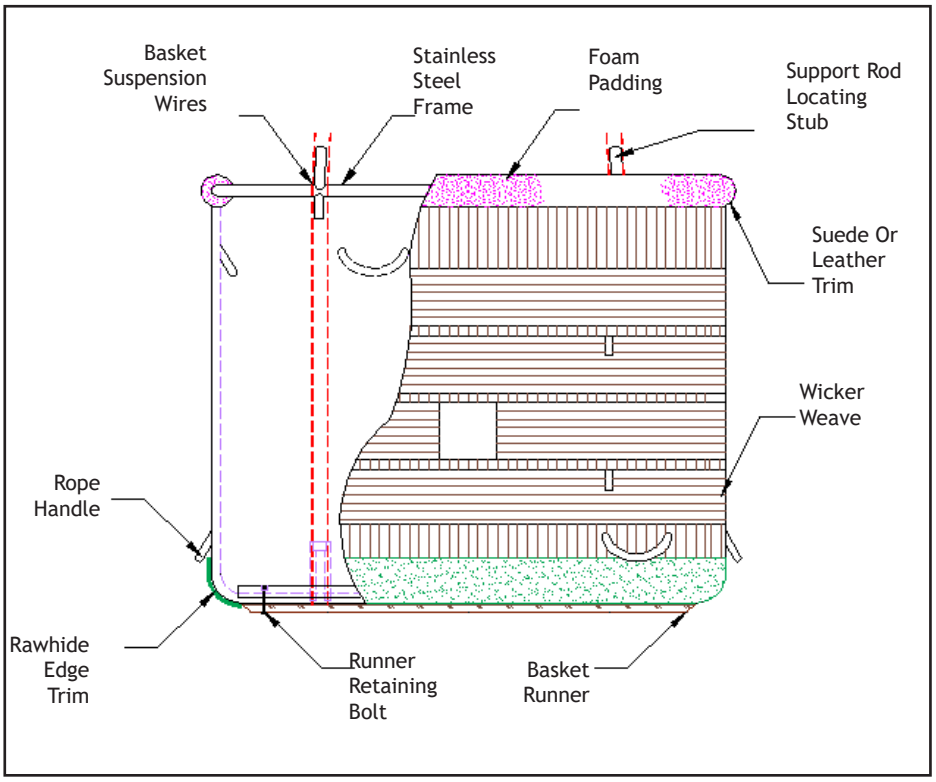
No envelope repairs are permitted except under the supervision of Cameron Balloons Limited at this time.

Intentionally Blank Page

3.1 ROUTINE MAINTENANCE

Clean the basket regularly. The basket should be washed with plain water (no detergent), and must not be stored wet.

The basket may be re-varnished with any good quality varnish. Varnish only the outside of the basket to allow the wicker to 'breathe'. Alternatively, the basket may be sprayed or painted on both sides of the wickerwork with Danish Oil. If a basket has previously been treated with Danish Oil, varnish should not be used.



Typical Basket Construction

The leather or suede trim may be cleaned with any leather or suede care product, while leather straps should occasionally be treated with Nikwax, Dubbin or a similar leather treatment product to maintain their suppleness.

3.2 WICKERWORK

Damage to the wickerwork that will allow an object 50mm (2in) diameter to pass through should be repaired by local re-weaving. Ensure no sharp ends are left inside the basket.

Local re-weaving must be limited to a total of 20% of the total basket surface area, and 25% of the surface area of any basket side. Repairs must not affect the structural integrity of the basket.

Distorted wickerwork should be straightened by soaking in water. The wickerwork should be allowed to dry while being held in the correct position.

3.3 LEATHER, SUEDE AND FABRIC TRIM

If the leather or suede trim is damaged, the damaged area should be covered in a 'saddle' of the same material. The 'saddle' should be cut to wrap over the padded edge and be laced under the padding in the same manner as the original trim. The edges of the 'saddle' should be hemmed before fitting.

3.4 RAWHIDE

The rawhide must be kept in good condition as it protects bottom of the basket from abrasion during landings, and contributes significantly to basket strength.

Damaged Sections should be removed and replaced. The rawhide should be cut to shape and holes drilled or punched in it to accept the lacing cord. The rawhide should be soaked in water for at least 12 hours for it to become soft. The rawhide should be laced in position using either rawhide thong or polyester cord.

3.5 BASKET RUNNERS (WOVEN FLOOR BASKETS)

Basket runners that are cracked or badly worn must be replaced. The replacement runners must be made from kiln dried ash or beech. If the runners are loose, the nuts should be tightened.

The retaining bolts should be cut off level with the top of the inner batten. The protruding threaded shaft of the bolt should be peened over the nut to prevent the nut from loosening.

3.6 BASKET FLOORS AND RUNNERS (SOLID FLOOR BASKETS)

Splits in solid basket floors that are visible on both sides of the wood, and are between 75mm (3in) and 450mm (18in) in length should be repaired by fitting a marine plywood patch to the inside of the basket floor. The patch must be of at least the same thickness as the floor, and must be screwed and bonded in place. If the split is of greater length, the basket floor must be replaced. Split or damaged basket runners must be replaced with runners made from kiln dried ash or beech, bonded and bolted into place.

If the anti-slip strips are worn out or damaged, they should be replaced.

The damaged strip should be removed with a paint stripping tool or similar blunt instrument. Ensure that all the old adhesive is removed from the basket floor.

NOTE: The strip can be softened with a heat gun to aid removal.

Cut the new strip to the correct shape. Peel the backing tape from the strip and bond it to the basket floor.

3.7 BASKET FRAMES

Cameron Balloons Ltd. should be contacted for advice if basket frames are cracked or the tubing is distorted.

3.8 SUPPORT RODS

Support Rods must be replaced if cracked or broken.

Intentionally Blank Page

Intentionally Blank Page

Intentionally Blank Page

Intentionally Blank Page

6.1 GENERAL

This is the manufacturer's recommended inspection schedule for the Cameron GB1000 Gas Balloon.

The following pages can be copied and used as a check list for performing inspections. The inspector should fill in the boxes at the bottom of each page as a record of the inspection. Insert the registration and serial number of the balloon at the bottom of each page.

There are no components that require mandatory replacement.

6.1.1 Facility for Inspection

The inspection should be carried out in a hangar, sports hall or similar building where there is sufficient space to partially inflate the balloon with air. The floor must be clean, or perhaps covered with plastic sheet, and the whole surroundings must be free of any sharp objects which could damage the envelope. A suitable fan should be available to partially inflate the balloon with air.

6.2 SCHEDULED INSPECTIONS

At intervals of one calendar year make the inspections prescribed in Sections 6.4 to 6.9 using the inspection criteria in Sections 6.10.

6.3 UNSCHEDULED INSPECTIONS

Unscheduled inspections are those inspections, other then the Scheduled Inspections prescribed in Section 6.2, which must be performed as conditions dictate. They are:

1. Pre-flight Inspections (Section 6.12.1)

6.4 DOCUMENTATION

1.	The Aircraft Logbook (logbook), Certificate of Airworthiness (C of A) and Flight Manual must be present at the time of inspection.	
2.	Check that the correct component serial numbers are entered in the logbook (e.g. basket).	
3.	Check the applicability of the Flight Manual to all the major components.	
4.	Where components are made by another manufacturer, check for the available supplementary operational and maintenance instructions	
5.	Check the applicability of service bulletins, AD's and other mandatory continued airworthiness requirements	

6.5 ENVELOPE

6.5.1 External

1.	Check the condition of the crown ring and crown line.	
2.	Check the joints of the vertical load tapes with the crown ring.	
3.	Check condition of load tapes following each from the lower rigging point to its junction with the crown ring.	
4.	Check condition of the fabric panels (gore-by-gore) for damage.	
5.	Check the condition of the skirt where the load tapes enter the balloon for peel damage.	
6.	Check condition of the valve and tricing lines (external sections)	
7.	Inspect the rip line and its tie point attachments on the vertical load tape	
8.	Inspect the deflation chimney, collar and cover	
9.	If the envelope has flown more than 250 hours, perform a grab test.	

Remove shoes and any hard or sharp personal objects and enter the balloon through the deflation chimney.

CN	Inspection Date	Inspectors Signature

6.5.2 Internal

1.	Inspect the envelope for pin holes (revealed by light spots)	
2.	Check condition of the internal section of the valve and tricing lines, especially at their points of attachment to the lower part of the envelope and the tricing-line pulley.	

6.5.3 Resistivity Check

1.	Check envelope Resistivity <100kΩ	

6.6 GAS VALVE

1.	Check condition of valve (plates, sealing surfaces, springs)	
2.	Check fasteners for condition and completeness	
3.	Check function (by hand)	

6.7 LOAD FRAME

1.	Check condition of load frame	
2.	Check karabiners or Maillon Rapide Links for condition and completeness	

CN	Inspection Date	Inspectors Signature

6.8 BASKET

1.	Check the condition of the nylon support rods (if fitted).	
2.	Check the condition of the basket wires.	
3.	Check the condition of the basket frames.	
4.	Check the condition of the basket weave.	
5.	Check the condition of the protective rawhide on the lower edge of the basket.	
6.	Check the condition of the rope handles	
7.	Check that the fire extinguisher maintained according to manufacturers instructions (if fitted)	
8.	Check the condition of the pilot restraint harness anchor (if fitted).	
9.	Check the condition of the basket floor.	

6.9 ANCILLARY EQUIPMENT (IF FITTED)

1.	**Sand Bags:** Check condition	
2.	**Launch restraint:** Check function and condition of latch. Check bridle and ropes for wear, fading or damage. Check karabiners for damage and correct operation.	
3.	**Pilot restraint harness:** Check function of buckle. Check webbing for wear or fading or damage.	
4.	**Instruments:** Verify that instruments are operational (if applicable).	
5.	**Trail Rope:** Check condition of rope and container. Ensure rope is packed dry.	

CN	Inspection Date	Inspectors Signature

6.10 INSPECTION CRITERIA/TECHNIQUES

6.10.1 Documentation

Check the serial numbers of all the equipment listed in the logbook (basket, envelope etc.) against those to be inspected.

If any equipment is missing or additional to the original list, then note the addition or deletion of equipment in the logbook.

Check the logbook for the balloon's age and hours flown. This will provide a general idea of the condition to be expected and will indicate whether a grab test of the envelope fabric is necessary.

Examine the logbook with particular attention to maintenance, repairs, modifications and flights/hours since the previous inspection. Parts of the balloon that have been repaired or serviced should have extra attention paid to them during the inspection. During the inspection be particularly vigilant for non-approved modifications and non-approved repairs.

A list of outstanding Service Bulletins which may apply to a balloon is on the Cameron Balloons website.

If there is no mention in the logbook of the Service Bulletin having been completed, either refer to the Cameron Balloons website or contact Cameron Balloons, for details of the relevant Service Bulletin.

6.10.2 Envelopes

Envelope fabric: All fabric repairs must be within the specified limitations and have been performed using approved methods. Indications for a grab test 'at inspectors discretion' include colour fading, fungal attack or a suspicion that the logbook does not accurately reflect the hours flown.

Envelope seams: No damage to the seam stitching is permitted.

Load tapes: The most common damage to load tapes is wearing in the loop of the top or bottom turnback. Ensure that the stitching of turnbacks is secure and that the stitching has not been abraded. Inspect each load tape over its full length.

Crown ring: The crown ring should be free of damage or corrosion. Light surface corrosion or minor surface damage that could abrade the load tapes may be removed or smoothed over with a Scotchbrite pad. Note the size of damage / corrosion and the face of the ring on which it occurs in the log book. Excessive damage or corrosion will require replacement of the crown ring. If the ring shows any indications of expansion (change in section) it should be rejected as this is a sign of internal corrosion. Check compatibility with the gas valve.

Control line pulley: Pulleys should be in good condition, free to rotate and be securely attached to the envelope. Check the pulley for axle wear by attempting to move the pulley sheave within the body of the pulley. Excessive movement indicates a worn axle.

6.10.3 Resistivity Test

This test can be done as a field test using a multimeter with blunt probes. Ensure that there is no visible moisture on the areas of fabric to be tested. If the balloon is visibly wet then it must be dried before the fabric resistance is measured.

Access the inner surface of the balloon via the rip panel or valve orifice. Place the multimeter probes on the inner (black) surface of the balloon, 150mm ± 10mm apart and note the resistance of the fabric between the probes. Repeat this measurement five times, each time on a different panel. Repeat the test a further five times, but each time with a different vertical seam running between the probes. Calculate the average of the each of the two sets of readings.

If the average resistance calculated across the fabric panels and across the seams is

<100kΩ the envelope has passed the fabric resistance test. If the resistance is greater contact Cameron Balloons Limited for information.

Record the average resistance across the fabric panels and the average resistance across seams in the balloon logbook.

6.10.4 Load Frame

Karabiners: These must be Stubai 2.5 tonne, 3 tonne (steel and marked ‘Stubai 2500’ or ‘Stubai 3000’) or 4 tonne. There must be no damage, distortion or significant corrosion. Check the hinges for free movement and lubrication. Check the screwgates are working correctly.

Maillon Rapide Links: These may be used where weight is critical. They are steel comparents fitted with screw gates. These must be of the 2.25 Tonne or 3.25 Tonne break load capacity. The 2.25 Tonne is marked with WLL 450kg N5 while the 3.25 Tonne is marked WLL 650kg N6. There must be no damage, distortion or corrosion.

Load frame: Inspect the frame carefully, paying particular attention to the condition of the welds. Check for any indications of fracture or unauthorised repairs, particularly if the frame shows signs of distortion.

Corner buffers: (flexible corner frames) Damaged worn or missing corner buffers are not a C of A failure, but replacement is recommended as missing buffers will increase wear and the risk of damage to other parts of the flexible corner system.

6.10.5 Baskets

Load Frame support rods: The support rods must not be cracked or broken. The support rods should be checked for length relative to basket wires. Rig the load frame to the basket, and check that the basket wires do not allow the load frame to lift more than 50mm (2in) on the support rods. Check the condition of the support rod sockets.

Basket wires: Check for broken strands and condition of thimbles and ferrules. Inspect particularly at the top of the basket and the swaged end joint. Be especially vigilant if performing a power line contact inspection (6.22.3), as it is possible for the wires to be annealed or eroded near both the entry and exit points of the spark. Damage must not exceed 5% of the wire cross section (6 strands). The hide wire protection on the underside of solid floor baskets must have no damage that exposes the wire.

Basket frames: Inspect for cracking and distortion. Particular attention should be given to areas adjacent to support rod sockets (upper frames) and tee-junctions adjacent to the pilot compartment (lower frames, T and TT baskets). Where frame tubes are bent, trim and padding should be removed to check for further damage.

Basket weave: There should be no damage to the wickerwork that will allow an object 50 mm (2in) diameter to pass through. There must be no sharp protrusions inside the basket that might cause injury. The weave should be free of rot, fungal attack (especially in the base of woven floor baskets) or infestation (e.g. woodworm) and not so dry as to make the cane brittle.

Trapped mud and debris should be removed from underneath the skids and hidden areas as this will cause the basket to rot.

Basket wall weave: In the basket wall no more than 2 adjacent upright stakes may be broken, provided that the next three uprights on either side of the damaged area are intact. There should be no large areas in which the weave is worn below half of its original thickness.

Woven basket floors: In the floor weave no major longitudinal stakes should be broken. No more than two adjacent longitudinal canes may be broken or worn below $^{2}/_{3}$ of their original thickness. There must be a minimum of three undamaged longitudinal canes on either side of any two broken canes. Basket runners should be unbroken and free of major cracks. An acceptable crack will not cross more than 10mm of runner width, and will not extend more than 150mm along the runner. Check that the basket runners are secure, tighten and trim the runner bolts if necessary (refer to Section 3.4)

Solid basket floors: Check the integrity of the wooden floor and runners. Runner damage should be assessed as for a woven floor basket. Solid basket floors may not have any split which exceeds 75mm (3 in) in length, and is visible on both sides of the floor. Check the condition of the weave where it joins to the basket floor. If longitudinal strips are fitted to protect the basket wires during side-loading for transportation, check the retaining bolts for tightness and the strips for wear or damage.

Basket rawhide: The lacing must be intact and secure. Minor abrasion is acceptable. Any defects in the rawhide which allow the ingress of foreign matter must be repaired (Section 3.4).

Pilot restraint harness anchor: Check load tape anchors for wear or damage. Check the basket stakes that the anchor is attached to for security and freedom from fracture. For U-bolt anchors, check the U-bolt for deformation check the condition and security of the nuts and the condition of the floor around the fitting. On under batten anchors check the condition of the batten and the D-ring.

6.10.6 Ancillary Equipment (If fitted)

Sand Bags: Check condition of rope. Check condition of bag and stitching. Check for leakage.

Launch restraint: Check the physical condition of the latch mechanism. Inspect for signs of distortion or wear. Check the operation of the latch. Inspect the webbing strap (if fitted) for signs of wear, cuts, heat damage and UV degradation (UV degradation usually manifests itself as fading of the webbing). If the webbing has any defects it should be replaced. Check the condition of the restraint rope for wear or damage.

Pilot restraint harness and strap: Check the condition and function of buckles and fittings. Check the condition of the webbing as for a launch restraint.

Instruments: Check altimeter against reference altitude (e.g. site elevation). Check Variometer for initial needle deflection when switched on/off.

Trail Rope: Ensure assembly is complete and free from rot. Minor rope damage is acceptable. Ensure rope is packed dry.

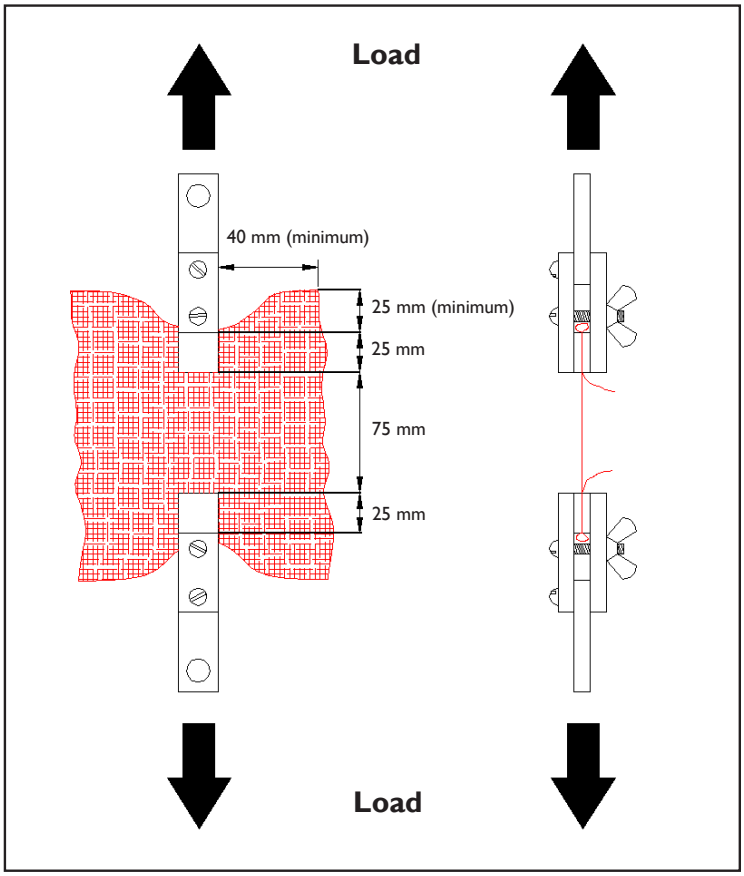
6.11 GRAB TEST

The grab test should be performed on each colour of fabric near the top of the envelope.

The fabric must be gripped with the jaw edges carefully aligned so that the same fibres are being pulled from each end.

The clamp edges must be parallel so that the fibres are loaded evenly. The clamp should be tightened so that the fabric does not move in the jaws.

If the fabric withstands a 30lb (13.6kg) pull it is fully airworthy



Grab Test Procedure

6.12 UNSCHEDULED INSPECTIONS

6.12.1 Pre-Flight Inspections

Pre-flight inspections are covered in the Cameron Balloons Gas Balloon Flight Manual Iss. 1, Section 4 or later EASA approved revision.

7.1 INTRODUCTION

This Section 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 the main manual.

The balloon shall be operated in accordance with the applicable supplement and/or additional approved data when appropriate, but the content of the base 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 Manual, the information given in a supplement takes precedence.

A complete list of Supplements is available on the Cameron Balloons Limited website.

NOTE: Supplements are updated independently of the base flight manual. It is not necessary to update supplements issued with a specific balloon unless notified by Service Bulletin.

7.2 LIST OF SUPPLEMENTS INSERTED

Date of Insertion	Doc. Ref	Description

Signed _____ Name _____ Date _____

Authority _____

7.3 ADDITIONAL DATA

When the envelope detailed in the approval section is being used in conjuction with

.....
(insert details of basket/burner)

the following approved data must be used.

.....
(insert document title, section and paragraph reference)

Signed _____ Name _____ Date _____

Authority _____

8.1 GENERAL

This Section provides a list of design definitions of the replacement parts and materials used in the maintenance of the balloon and its ancillary equipment.

All parts and materials are available from Cameron Balloons Ltd. or approved suppliers.

8.2 ENVELOPE

Consumable items: CB1653-0001, Break-thread

8.3 LOAD RING

The load ring has no spare parts. Where standard hot air balloon baskets are used, refer to Cameron Hot Air Balloon Flight Manual, Issue 10 or later EASA approved revision.

8.4 BASKET

Contact Cameron Ballons Limited. Where standard hot air balloon baskets are used, refer to Cameron Hot Air Balloon Flight Manual, Issue 10 or later EASA approved revision.

Intentionally Blank Page