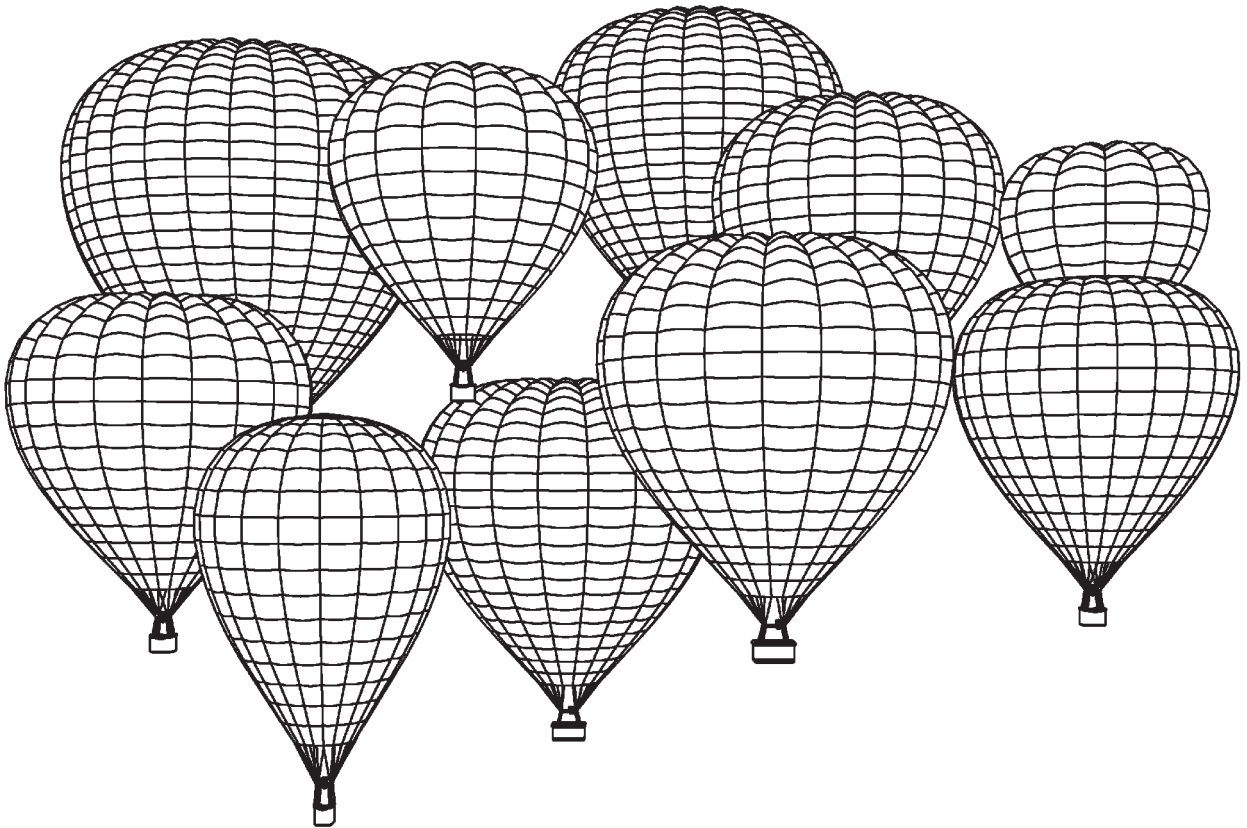

**KAVANAGH BALLOONS AUSTRALIA
PTY LIMITED**

**HOT AIR BALLOON
MAINTENANCE MANUAL**

ISSUE 4 - Revision 1




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Applicability of this manual is detailed on page 1-1



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2.6 VERTICAL LOAD TAPE REPAIRS

If damage occurs to a load tape, and it is apparent that more than 10% of the fibres are cut or burnt, the damaged section must be repaired before a further flight is attempted.

If pulleys or attachment points inside the balloon need to be removed during repairs, refer to section 2.8 for the approved method of re-attachment.

Note: *The lengths given in the tables and diagrams are the initial measurements. After sewing the joints there will be some shrinkage of the tape and an overall reduction in length of the joint.*

- i) Determine the type of load tape, thread and joint method required from the tables below. Due to changes in suppliers different materials are used depending on the serial number of the balloon. Diagrams of all joint methods are on page 5.

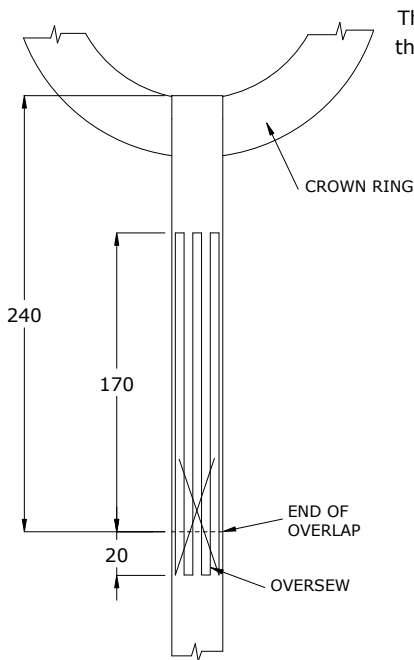
Model	Applicable Serial Numbers	Load Tape	Thread	Stitch length	Joints
EX-65, B-77	All	20mm KP2307	KP2606	5 per 25mm	A1, A2, A3
G-450	All	35mm KP2323	KP2608	5 per 25mm	B1, B2, B3
B-105 C-56, C-65, C-77 D-77, D-84, D-90, D-105 E-120, E-140	upto and including 305	25mm KP2308	KP2606	5 per 25mm	B1, B2, B3
B-105 C-56, C-65, C-77 D-77, D-84, D-90, D-105 E-120, E-140	greater than 305	25mm KP2321	KP2608	5 per 25mm	B1, B2, B3
B-105 C-56, C-65, C-77 D-77, D-84, D-90, D-105 E-120, E-140, BOX-90	greater than 380	25mm KP2329	KP2608	5 per 25mm	B1, B2, B3
E-160, E-180, E-210 E-240, E-260, E-300	upto and including 305	25mm KP2306	KP2606	5 per 25mm	B1, B2, B3
E-160, E-180, E-210 E-240, E-260, E-300	greater than 305	25mm KP2322	KP2608	5 per 25mm	B1, B2, B3
B-350, B-400	upto and including 344	35mm KP2314	KP2606	5 per 25mm	B1, B3, B4
B-350, B-400	greater than 344	35mm KP2323	KP2608	5 per 25mm	B1, B2, B3

- ii) Unpick the damaged section of load tape ensuring that the fabric is unpicked for 400mm each side of the damaged section.
- iii) Join in a new section of load tape as required making sure that the correct final length is obtained.

Where the suspension joint is damaged a new suspension joint can be made directly onto the existing flying wire (subject to successful inspection of the flying wire - refer to 1.1.14) and the new section joined to the existing load tape above the new suspension joint.

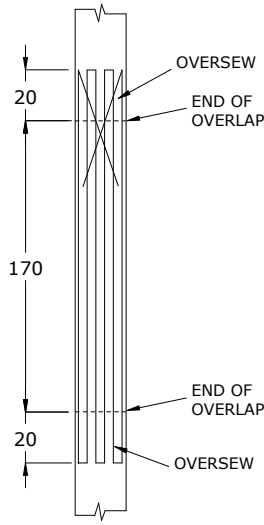
Similarly, a new crown ring joint can be added with the new section joined in below the crown ring.

- iv) When the load tape overlap joint is complete, the balloon fabric can be sewn back onto the load tape.

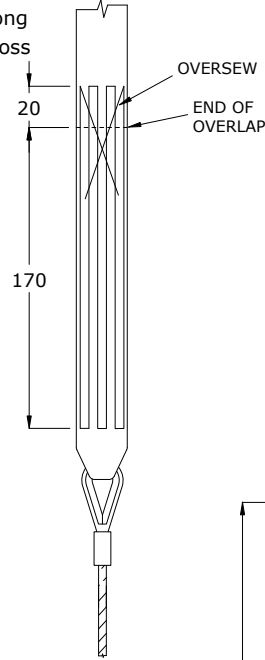


Joint A1
Crown ring

The stitch pattern is six parallel rows along the length of the join with one stitch across the tape to the next row.

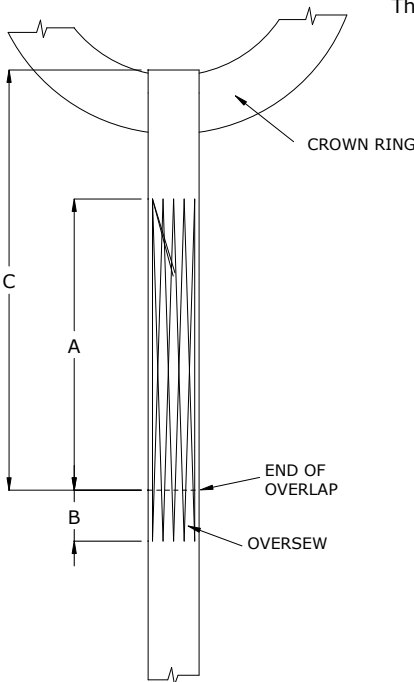


Joint A2
Overlap



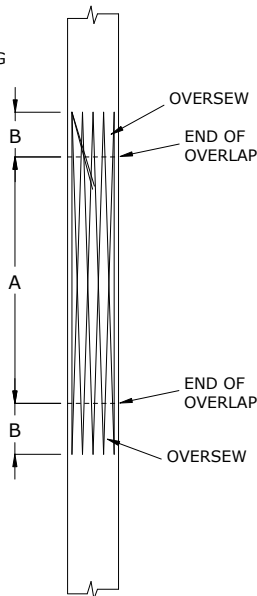
Joint A3
Suspension

Note:
All Dimensions in mm

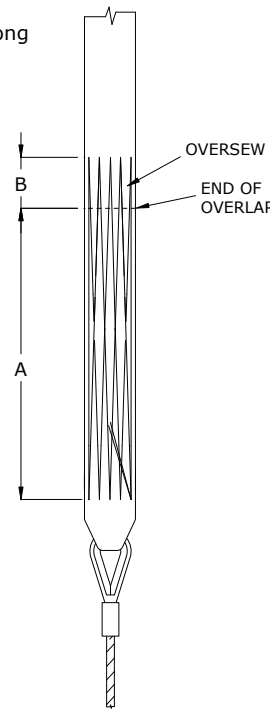


Joint B1
Crown ring

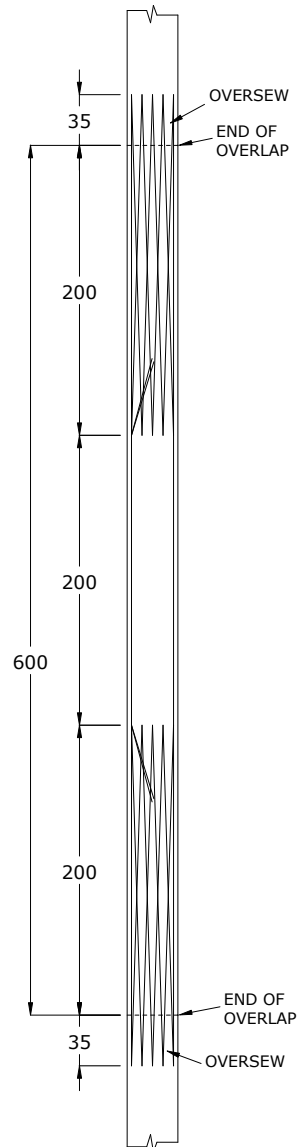
The stitch pattern is ten rows along the length of the join in reverse "w" pattern



Joint B2
Overlap



Joint B3
Suspension



Joint B4
Overlap

Model - these dimensions apply to Joints B1, B2, B3	Dim A	DIM B	Dim C
B-105, C-56, C-65, C-77, D-77, D-84, D-90, D-105, E-120, E-140, E-160, E-180, E-210, E-240, E-260, E-300	170	25	240
B-350, B-400, G-450	200	35	290

- iv) Tie the end to the becket of the upper pulley with an overhand knot.
- v) A test inflation and functional check must be carried out before returning the balloon to service.

NOTE: *If the extra rope is not already installed on the balloon, contact Kavanagh Balloons technical staff for replacement rope length and details on changing/installing the necessary pulleys for a 3:1.*

2.12 VELCRO

Two piece velcro style touch tape closure is used on all vent systems for securing the vent panel during inflation or in the case of a circular rip panel deflation system, during flight.

2.12.1 VELCRO CLEANING

The performance of the velcro seal is improved by regular cleaning. Carefully remove all materials and debris (e.g. grass, thread etc.) trapped in either side of the velcro.

Balloons with velcro circular rip panels are best packed away with the velcro closed as the hook side is abrasive and may damage adjacent stitching.

2.12.2 VELCRO REPLACEMENT ON CIRCULAR RIP PANELS

WARNING: *Kavanagh Balloons use two different specifications of velcro depending on the application. The two types are not interchangeable or able to be mixed and matched.*

When replacing velcro on rip panels, use only KP2039 Loop and KP2040 Hook sewn on with metric 30, KP2601 polyester thread.

- i) Carefully unpick the old velcro from the backing tape and remove excess threads.
- ii) Re-sew the new velcro, copying the original method.

Note: *Both the hook and the loop velcro must be replaced at the same time.*

2.12.3 VELCRO REPLACEMENT ON ALL OTHER DEFLATION SYSTEMS

Velcro replacement on Parachute Vent, Smart Vent and Lite Vent may be carried out by sewing a matching piece of KP2312 loop or KP2315 hook over the top of the existing piece of velcro provided there is no more than two layers on any particular velcro tab. Copy the original sewing method using KP2601 polyester thread.

2.13 ENVELOPE FLYING WIRES

Damage to envelope flying wires must not exceed 6 broken strands. Where flying wires are swaged as pairs, damage to one leg of the wire will require replacement of the pair. Excessive heat damage to flying wires is also cause for rejection.

Heat damage can be identified by a change in colour to a dull blue or brown instead of the normal polished metal finish. "Bluing" of the wire rope indicates that the wire has been heated enough to cause annealing and a significant reduction in strength.

If damage exceeds these limits then the relevant cable or cables must be replaced.

If minor damage occurs, resulting in frayed ends protruding, care should be taken to ensure these are bound or glued in place in such a way as to allow for ease of future inspection.



2.13.1 REPLACEMENT OF ENVELOPE FLYING WIRES

Replacement flying wires must be supplied by Kavanagh Balloons and will be of a reduced length to allow fitting with a KP2001 quick link to the existing load tape turn back.

The specification for the flying wires vary from model to model. Refer to the following table for the correct specification wire rope.

Model	Wire Rope	Description	Swage	Thimble
EX-65, B-77, B-105, BOX-90	KP2702	3.2mm (1/8") 7x19 304 Stainless Steel	KP2009	KP2003
All other models	KP2701	4mm (5/32") 7x19 304 Stainless Steel	KP2004	KP2003

- i) Unpick the rigging cover.
- ii) Cut the damaged wire away at the load tape suspension joint with wire cutters. Take care not to damage the load tape suspension joint.
- iii) Inspect the load tape joint and loop for damage or wear. If the load tape wear exceeds the limits in Section 2.6 then the load tape must be repaired before the flying wire is replaced.
- iv) Attach the new flying wire with the supplied quick link and tighten.
- v) Sew the new rigging cover in place.

NOTE: *The load tape suspension joint should never be unpicked to install a replacement flying wire.*

NOTE: *In situations where the load tape turn back is also damaged, full length flying wires attached to a pre-sewn turn back and length of load tape can be supplied so the new section of load tape can then be joined in as per section 2.6*

6.2 INSPECTION CRITERIA

6.2.1 LOGBOOK

Check the log book is present and that all maintenance and flight entries have been recorded and are up to date.

Note the number of hours flown since the last inspection and check that the balloon complies with all current Airworthiness Directives as applicable in the country where the balloon is flown.

When the inspection is complete, an entry must be made in the log book to identify the details of the inspection, any work carried out and the person and authority under which the inspection and work was carried out.

6.2.2 COMPONENT INSPECTION LIST

For ease of record keeping section 6.1 can be printed out and used as a check sheet. The table in 6.1.2 can be used to record the details of the components inspected.

6.2.3 ENVELOPE FABRIC AND LOAD TAPES

The general envelope inspection is best carried out during a hot inflation test as it allows easy viewing for damage and operation of all control lines. With the exception of special shape envelopes, when an inflation is not possible, a careful, panel by panel inspection may be carried out. Although recommended, a functional check of the deflation system is at the inspectors discretion and must be carried out if there is reason to suspect excessive opening force for the deflation system may be required.

NOTE: Special shape envelopes require a hot inflation for inspection

If excessive opening force for the deflation system is found, a line load test must be carried out as per Section 6.3.4.

Check the heat link for security and the temperature tell tale for indication of overheating. The heat link is located near the top of the balloon on gore 1 and should be a red flagged, 120°C heat link.

The temperature tell tale must be inspected for indication of overheating. If the most recent temperature tell tale label indicates heating to above 120°C, even if the heat link is still present, an envelope overheat inspection as per 6.3.3 is required. Tell tale labels must not be removed from the balloon.

If the tell tale is water damaged or illegible, a new tell tale should be installed as per 6.3.3 and the log book entry should record the reason for installing the new tell tale.

Check the balloon log book for the total hours logged. If the envelope has logged more than 300 hours or is suspected of having been overheated perform the grab test as described in Section 6.3.1. The grab test may be performed at the inspector's discretion if the condition of the fabric is in question.

Check the envelope for holes, tears and abrasions. Small holes or low quality fabric repairs in the lowest six metres of the envelope are acceptable, but all other damage must have been repaired using approved methods.

Check the envelope for fabric porosity by sucking or blowing air (by mouth) through the fabric. If substantial porosity is suspected, perform a flight test as described in section 6.3.2 to establish if controllability is in question.

Check all vertical and horizontal tapes for security of stitching. In particular, inspect the stitching of the crown ring and the joints between overlying tapes and the top rim tape as well as the security of the of the load tape to rigging wire joints at the bottom of the balloon. Load tape that has more than 10% of its fibres worn, melted or broken or has broken stitching on any joint, is cause for rejection.



6.2.4 SMART VENT

Check all pulleys for wear or seizure. Pulleys with excessive play or pulleys showing signs of seizure or wear are cause for rejection.

Any damage to cords or ropes which make up part of the deflation system rigging or controls must not exceed 10% of the cross sectional area. Even if there is less damage than the specified limit, the part must be replaced if it is possible that the damage could cause entanglement or failure which may prevent the smooth operation of the deflation system.

Inspect the fabric and load tapes in the vent panel and lip seal for signs of wear, broken stitching or over heating. Check and clean velcro tabs if required.

Check the security of all attachment points for the centre pull deflation line. Check the top centralising lines and guide rings on the under side of the crown ring for wear and abrasion.

If operation of the Smart Vent rip line (centre pull) is difficult - refer to Section 6.3.4 to carry out a line load test.

6.2.5 LITE VENT

Check all pulleys for wear and seizure. Pulleys with excessive play or pulleys showing signs of seizure or wear are cause for rejection.

Any damage to cords or ropes which make up part of the deflation system rigging or controls must not exceed 10% of the cross sectional area. Even if there is less damage than the specified limit, the part must be replaced if it is possible that the damage could cause entanglement or failure which may prevent the smooth operation of the deflation system.

Inspect the fabric and load tapes in the vent panel for signs of wear, broken stitching or over heating. Check and clean velcro tabs if required.

Check the security of all attachment points for the centre pull deflation line. Check all extension ropes for wear and condition. Check the top centralising lines for wear and abrasion.

Check the condition of the reset weight and pulley. Worn or damaged (leaking or depleted) reset weights must be replaced.

If operation of the Lite Vent rip line (centre pull) is difficult - refer to Section 6.3.4 to carry out a line load test.

6.2.6 PARACHUTE VENT

Check all attachment points, centralising lines and shroud lines for wear.

Any damage to cords or ropes which make up part of the deflation system rigging or controls must not exceed 10% of the cross sectional area. Even if there is less damage than the specified limit, the part must be replaced if it is possible that the damage could cause entanglement or failure which may prevent the smooth operation of the deflation system.

Inspect the fabric and load tapes in the vent panel for signs of wear, broken stitching or over heating. Check and clean velcro tabs if required.

6.2.7 CIRCULAR RIP PANEL

Inspect the velcro for general condition and operation. Velcro contaminated with grass or other matter which is reducing the performance of the velcro seal should be cleaned as per 2.12.1

Broken hooks and frayed loops on the velcro are indicators that the performance of the seal should be checked. If there is any indication of the seal releasing during use, both sides of the velcro should be replaced.

SECTION 7 - LIST OF PARTS AND MATERIALS

7.1 ENVELOPE PARTS

KA2001	120 DEGREE HEAT LINK
KA2006	LITE VENT RESET WEIGHT- 5KG
KA2007	LITE VENT RESET WEIGHT- 6KG
KP1001	12MM OVAL STEEL KARABINER
KP1038	2MM PLAITED POLYESTER CORD
KP1314	NO. 20 KEVLAR THREAD
KP1316	HTN90 CLOTH - 90 GSM HIGH TENACITY NYLON
KP1317	LUCKENHAUS CLOTH - 60 GSM RIPSTOP NYLON
KP1318	DURALIFE CLOTH - 68GSM RIPSTOP NYLON
KP1319	NOMEX CLOTH - SCOOP AND BASE PANELS
KP1320	K27 CLOTH - 80 GSM HIGH TENACITY NYLON
KP2001	6MM QUICK LINK
KP2002	VENT PULLEY (LARGE)
KP2003	4MM SS THIMBLE
KP2004	COPPER SWAGE FOR 5/32" WIRE ROPE
KP2005	SMALL PULLEY FOR ROTATION/SMART/LITE VENT
KP2006	VENT PULLEY (LARGE WITH BECKET)
KP2007	4MM SS DEE SHACKLE FOR SCOOP ATTACHMENT
KP2008	12.7MM ACETAL BALL STOP FOR SMART VENT AND LITE VENT RIGGING
KP2024	TEMPERATURE TELL-TALE
KP2038	1/2" X 2.5MM WELDED RING FOR SCOOP
KP2039	50MM KLEGGTOSTAR VELCRO LOOP - CIRCULAR RIP PANELS ONLY
KP2040	50MM KLEGGTOSTAR VELCRO HOOK - CIRCULAR RIP PANELS ONLY
KP2301	16MM HORIZONTAL LOAD TAPE.
KP2303	48MM LOAD TAPE.
KP2304	80MM LOAD TAPE FOR VELCRO TAB BACKING.
KP2306	25MM VERTICAL LOAD TAPE E-160 TO E-300
KP2307	20MM VERTICAL LOAD TAPE EX-65 & B-77
KP2308	25MM VERTICAL LOAD TAPE C-56 TO E-140
KP2309	25MM BLACK WEBBING FOR LEFT ROTATION VENT LOWER END.
KP2312	VELCRO 50MM VELCRO (LOOP) - SEE KP2039 FOR CIRCULAR RIP PANELS
KP2314	35MM POLYESTER LOAD TAPE FOR VERTICAL LOAD TAPES, B-350 & B-400.
KP2315	VELCRO 50MM VELCRO (HOOK) - SEE KP2040 FOR CIRCULAR RIP PANELS
KP2320	25MM GREEN WEBBING FOR RIGHT ROTATION VENT LOWER END.
KP2321	25MM VERTICAL LOAD TAPE C-56 TO E-140
KP2322	25MM VERTICAL LOAD TAPE E-160-E-300
KP2323	35MM VERTICAL LOAD TAPE, B-350, B-400, G-450
KP2325	80MM RIP PANEL BACKING
KP2327	35MM VERTICAL LOAD TAPE, B-350, B-400, G-450
KP2328	25MM VERTICAL LOAD TAPE E-160 TO E-300
KP2329	25MM VERTICAL LOAD TAPE C-56 TO E-140 & BOX-90
KP2601	SEWING THREAD - POLYESTER METRIC 30 FOR NORMAL SEAMS.
KP2602	SEWING THREAD - KEVLAR METRIC 35
KP2606	SEWING THREAD - BONDED NYLON NO. 13 FOR VERTICAL LOAD TAPE JOINS. SEE SECTION 1.1.9
KP2607	SEWING THREAD - POLYESTER METRIC 20 ATTACHING PULLEYS, VELCRO, ETC.
KP2608	SEWING THREAD - POLYESTER 277 FOR VERTICAL LOAD TAPE JOINS & TURNBACKS



KP2701	ENVELOPE SUSPENSION CABLES 4MM (5/32") 7/19 SS
KP2702	ENVELOPE SUSPENSION CABLES 3.2MM (1/8") 7/19 SS
KP2706	8MM ROPE KEVLAR CORE - RED (SMART VENT)
KP2707	8MM ROPE KEVLAR CORE - WHITE (SMART/LITE VENT)
KP2708	8MM KEVLAR CORE - RED & WHITE (LITE VENT, SMART VENT & PARACHUTE VENT)
KP2709	2.8MM VECTRAN SHROUD LINE CORD
KP2711	4MM POLYESTER ROTATION VENT CORD
KP2712	6MM POLYESTER ROPE FOR ENVELOPE BAG
KP2713	12MM POLYESTER CROWN ROPE
KP2714	14MM POLYESTER CROWN ROPE
KP2715	10MM 16 PLAIT POLYESTER CROWN ROPE
KP2719	6MM SHOCK CORD FOR ROTATION VENTS AND SCOOPS
KP4006	80MM SS SNAP HOOK FOR SCOOP

7.2 BURNER PARTS

KA4008	VAPOUR HOSE ASSEMBLY 2.4 METRE
KA4014	5/16" SS PIVOT BOLTS FOR BURNER FRAME
KP4001	MAIN LIQUID HOSE END COUPLING 1 1/4" ACME
KP4016	PILOT BURNER MINI BALL VALVE
KP4067	PILOT BURNER JET
KP4071	PILOT BURNER ELECTRODE
KP4005	LIQUID FIRE BALL VALVE
KP4010	PEIZO IGNITER
KP4013	BALL VALVE CENTRE 1/2" COMPLETE
KP4501	BALL VALVE 1/2" SS STEM ONLY
KP4502	BALL VALVE 1/2" SEAL KIT
KP4503	PRESSURE GAUGE 0-1600 KPA
KP4513	SOCKET CAP SCREW FOR VALVE BLOCKS (1/4" X 3 1/2")
KP4602	MAIN LIQUID HOSE (2200MM)
KP4605	MAIN LIQUID HOSE (2400MM)
KP4608	MAIN LIQUID HOSE (3000MM)
KP4609	MAIN LIQUID HOSE (3200MM)
KP4611	MAIN LIQUID HOSE (2800MM)
KP4612	MAIN LIQUID HOSE (3500MM)

7.3 FUEL TANKS

KA3004	REGO DUST CAP WITH LANYARD
KA3601	PADDED TANK COVER - WORTHINGTON
KA3602	PADDED TANK COVER - KAVANAGH 55
KA3603	PADDED TANK COVER - KAVANAGH 76
KA3604	PADDED TANK COVER - KAVANAGH 82
KA3605	LIQUID TANK VALVE - QSOV ASSEMBLY
KA4003	COMET VAPOUR PRESSURE REGULATOR ASSEMBLY
KA5007	MALE LIQUID CONNECTOR 1 1/4" ACME FOR QSOV
KA5009	TOP BLOCK FOR QSOV
KP1701	LIQUID VALVE SPANNER - SHERWOOD AND QSO VALVES

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Section 7 - Parts List



KP1702	VAPOUR VALVE SPANNER - VAPOUR VALVE WITH PRV
KP1703	AFL SPANNER - AUTOMATIC FILL LIMITERS
KP3605	55L AUTOMATIC FILL LIMITER
KP3606	82L AUTOMATIC FILL LIMITER
KP3607	VAPOUR OUTLET VALVE (POL) WITH INTEGRAL PRESSURE RELIEVE VALVE
KP3607	VAPOUR TANK VALVE WITH PRESSURE RELIEF VALVE
KP3608	POL VAPOUR VALVE PLUG
KP3610	MALE LIQUID CONNECTOR 1 1/4" ACME
KP3613	VAPOUR PILOT LIGHT HOSE CONNECTOR (FEMALE)
KP3613	QUICK RELEASE REGULATOR COUPLING FOR PILOT HOSE
KP3614	LIQUID OUTLET ELBOW M/F 3/8" NPT
KP3615	LIQUID OUTLET VALVE - SHERWOOD
KP3615	LIQUID WITHDRAWAL TANK VALVE - SHERWOOD HANDWHEEL
KP3616	76L AUTOMATIC FILL LIMITER
KP3643	O RING - MALE LIQUID CONNECTOR 1 1/4" ACME
KP3644	BONNET & STEM ASSY FOR SHERWOOD LIQUID VALVE (KP3615)
KP3646	GASKET, AUTOMATIC FILL LIMITER 1 3/4" ACME
KP3657	VAPOUR REGULATOR - BULLFINCH TINYREG
KP3660	GASKET - MALE LIQUID CONNECTOR 1 1/4" ACME
KP3678	CONTENTS GAUGE GASKET (ALL MODELS)
KP3692	AUTOMATIC FILL LIMITER CAP
KP3703	BONNET & STEM ASSY FOR SHERWOOD VAPOUR VALVE WITH PRV (KP3607)
KP4064	CONTENTS GAUGE SCREWS (ALL MODELS)

7.4 BASKET PARTS

KA3001	50M HANDLING LINE, ROLLED IN BAG
KA3003	TANK STRAP
KA3005	BRACKET FOR FIRE EXTINGUISHER
KA3023	PILOT RESTRAINT HARNESS
KP1001	3000KG STEEL KARABINER
KP2001	QUICK LINK FOR CROSS BRACING
KP2314	WEBBING FOR CROSS BRACING
KP2323	WEBBING FOR CROSS BRACING
KP3001	BASKET SUSPENSION CABLES 1/4" 7/19 SS
KP3002	6MM SS THIMBLE
KP3006	NYLON BURNER POLES (BLACK) LENGTH AS REQUIRED.
KP3009	COPPER SWAGE FOR 1/4" WIRE ROPE
KP3010	70MM SS SNAP SHACKLE FOR HANDLING LINE
KP3027	FIRE EXTINGUISHER 1KG DRY POWDER B(E)
KP3037	TURNBUCKLE FOR CROSS BRACING
KP3050	10MM EYE BOLT FOR CROSS BRACING
KP3403	90X45 KERUIING F22 RUNNERS FOR LARGE PARTITIONED BASKETS
KP3404	75X45 KERUIING F22 RUNNERS FOR SMALL TO MEDIUM PARTITIONED BASKETS
KP3406	75X38 KERUIING F22 RUNNERS FOR SMALL BASKETS
KP3805	14MM 16 PLAIT POLYESTER ROPE BASKET HANDLES
KP3806	24MM NYLON ROPE OUTER BASKET HANDLES



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