

Combination Report

1. General

This combination report will technically explain the combination of Schroeder fire balloons envelopes with Balóny Kubiček bottom ends, respectively burners and envelopes. At first there is to be cleared that the combination of the bottom end is to be established as indicated in the flight manual of Balóny Kubiček. A corresponding table will be mentioned in this document. For future envelopes, burners and baskets, not mentioned in this report, the certificate holder's manuals must be followed as instructions for installation. In case of contradictory statements of the two manufacturers to a question concerning the combination, the safest combination is to be chosen.

The joining parts for envelope and bottom end are to be used from the Balóny Kubiček bottom end as described in their flight manual. The maximum take off mass is to be chosen as declared in the flight manual of the envelope manufacturer Schroeder fire balloons.

2. Available Equipment

This paragraph shows the available Equipment of both manufacturers that are subject to the combination issue explained in this document.

Schroeder fire balloons envelopes

- Fire balloons G envelopes with 24 gores
 - fire balloons G 22/24; size 2200m³
 - fire balloons G 26/24; size 2600m³
 - fire balloons G 30/24; size 3000m³
 - fire balloons G 34/24; size 3400m³
 - fire balloons G 36/24; size 3600m³
 - fire balloons G 40/24; size 4000m³
 - fire balloons G 42/24; size 4250m³
 - fire balloons G 45/24; size 4500m³
 - fire balloons G 50/24; size 5000m³
 - fire balloons G 60/24; size 6000m³
 - fire balloons G 70/24; size 7000m³
 - fire balloons G 85/24; size 8500m³
- Fire balloons G envelopes with 16 gores
 - fire balloons G 18/16; size 1800m³
 - fire balloons G 20/16; size 2000m³
 - fire balloons G 22/16; size 2200m³
 - fire balloons G 26/16; size 2600m³
 - fire balloons G 30/16; size 3000m³
 - fire balloons G 34/16; size 3400m³
 - fire balloons G 36/16; size 3600m³
- Fire balloons G/M envelopes with 24 gores
 - fire balloons G/M 18/24; size 1800m³
 - fire balloons G/M 20/24; size 2000m³
 - fire balloons G/M 22/24; size 2200m³

Balóny Kubiček load frames, baskets and burners

- Load frames
 - Basic- vario/fixed; 4 point attachment; attachment point dimensions 725 mm x 615 mm
 - K25P; 4 point attachment; attachment point dimensions 1225 mm x 808 mm
 - K32T; 4 point attachment; attachment point dimensions 1223 mm x 1331 mm
 - K32TT; 4 point attachment; attachment point dimensions 1374 mm x 1329 mm
 - K50TT; 4 point attachment; attachment point dimensions 1374 mm x 1329 mm
 - K50; 4 point attachment; attachment point dimensions 1674 mm x 1330 mm
 - K60; 8 point attachment; attachment point dimensions 1976 mm x 1332 mm
 - K60 strong; 8 point attachment; attachment point dimensions 850 mm x 1418 mm
- Burners
 - H3
 - H3-D
 - HB2
 - KOMET DUO
 - H4
 - KOMET TRIO
 - IGNIS

- Baskets
 - K7; size 85 cm x 85 cm
 - K10; size 86 cm x 116 cm
 - K11; size 98 cm x 116 cm
 - K12; size 116 cm x 116 cm
 - K12A; size 116 cm x 116 cm
 - K13; size 116 cm x 125 cm
 - K13S; size 100 cm x 120 cm
 - K15; size 116 cm x 135 cm
 - K16; size 116 cm x 145 cm
 - K17; size 116 cm x 145 cm
 - K18; size 116 cm x 155 cm
 - K22; size 125 cm x 180 cm
 - K25P; size 125 cm x 210 cm
 - K28; size 160 cm x 220 cm
 - K32T; size 160 cm x 240 cm
 - K32Y; size 160 cm x 240 cm
 - K32TT; size 160 cm x 250 cm
 - K40T; size 160 cm x 270 cm
 - K40Y; size 160 cm x 270 cm
 - K50; size 160 cm x 300 cm
 - K50TT; size 160 cm x 300 cm
 - K60; size 160 cm x 380 cm
 - K70; size 160 cm x 440 cm
 - K80; size 160 cm x 480 cm

Burner/envelope combination

The burners are only useable for certain maximum envelope sizes in order to ensure enough power for safe flight conditions at all times.

The following tables show the interchangeability of the equipment, regulated by Balóny Kubíček.

Balóny Kubíček Burner	fire balloons G and G/M envelope size range
H3	1800m ³ to 2200 m ³
H3-D	1800m ³ to 4250 m ³
HB2	1800m ³ to 5000 m ³
Komet Duo up to s/n 104	1800m ³ to 4250 m ³
Komet Duo from s/n 105	1800m ³ to 5000 m ³
H4	4000m ³ to 7000 m ³
Komet Trio	4000m ³ to 7000 m ³
Ignis double	1800m ³ to 6000 m ³
Ignis tiple	4000m ³ to 8500 m ³
Ignis quad	4500m ³ to 8500 m ³

Table 1: Burner/envelope combination

fire balloons G and G/M envelopesizes	Balóny Kubíček baskets
1800 m ³	K7, K10, K11, K12, K12A, K13, K13S
2000 m ³	K7, K10, K11, K12, K12A, K13, K13S, K15
2200 m ³	K7, K10, K11, K12, K12A, K13, K13S, K15
2600 m ³	K10, K11, K12, K12A, K13, K13S, K15, K16, K17, K18, K22
3000 m ³	K11, K12, K12A, K13, K13S, K15, K16, K17, K18, K22
3300 m ³	K13, K13S, K15, K16, K17, K18, K22
3400 m ³	K13, K13S, K15, K16, K17, K18, K22
3600 m ³	K13, K15, K16, K17, K18, K22 K25P, K28, K32T, K32Y
4000 m ³	K13, K15, K16, K17, K18, K22 K25P, K28, K32T, K32Y
4250 m ³	K16, K17, K18, K22 K25P, K28, K32T, K32Y
4500 m ³	K22 K25P, K28, K32T, K32Y, K32TT, K40T, K40Y, K50TT
5000 m ³	K25P, K28, K32T, K32Y, K32TT, K40T, K40Y, K50TT
6000 m ³	K25P, K28, K32T, K32Y, K32TT, K40T, K40Y, K50, K50TT
7000 m ³	K32T, K32Y, K32TT, K40T, K40Y, K50, K50TT, K60, K70, K80
8500 m ³	K40T, K40Y, K50, K50TT, K60, K70, K80

Table2: Envelope/basket combination

Balóny Kubíček	
Load frames	Applicable baskets
Basic; Vario or fixed	K10 to K22
K25P	K25P
K32T	K28, K32T; K32Y
K32TT	K32TT; K50TT
K50TT	K32TT; K50TT
K50	K40Y; K40T; K50;
K60	K50TT8; K60; K70; K80
K60 strong	K50TT8; K60 K70; K80

Table 3: Load frame/basket combination

There are some exemptions within the bottom ends which must strictly be adhered:

- K10 baskets of serial number 124 and higher must be combined with Ignis or Komet double burner;
- Basket sizes K25P and bigger must be combined with envelopes equipped with rotation vents;
- Baskets K40T, K40Y and K50 in combination with envelope size 8500 m³ can only be equipped with load frames including "s/n" before the serial number of the frame;
- The combination fire balloons G with 8500m³ and basket K50TT must only be used with load frame K50TT

3. Envelope load comparison

The envelope sizes of Balóny Kubíček and Schroeder fire balloons are comparable. Both manufacturers have almost the same envelope volumes steps. In the table below you can see the envelope volumes and the corresponding maximum take of masses of the envelopes as it is stated in the flight manuals

Schroeder fire balloons		Balóny Kubíček		load difference
fire balloons G envelope volume	MTOM	BB-Type envelope volumes	MTOM	
1700 m ³ -1900 m ³	535 kg	BB17GP	495 kg	40 kg
2000 m ³	630 kg	BB20; BB20E	630 kg	0 kg
2100 m ³	630 kg	BB20GP; BB20XR	730 kg	-100 kg
2200 m ³	690 kg	BB22E	680 kg	10 kg
		BB22; BB22N; BB22Z	730 kg	-40 kg
2600 m ³	820 kg	BB26E	730 kg	90 kg
		BB26; BB26N; BB26Z	840 kg	-20 kg
3000 m ³	910 kg	BB30N; BB30Z	945 kg	-35 kg
3400 m ³	1040 kg	BB34Z	1040 kg	0
3600 m ³	1040 kg	BB37N; BB37Z	1150 kg	(-110 kg)
4000 m ³	1260 kg	BB40Z	1310 kg	-50 kg
4250 m ³	1340 kg	BB42Z	1410 kg	-70 kg
4500 m ³	1410 kg	BB45N; BB45Z	1520 kg	-110 kg
5000 m ³	1575 kg	BB51Z	1690 kg	-115 kg
6000 m ³	1890 kg	BB60N; BB60Z	1940 kg	-50 kg
7000 m ³	2205 kg	BB70Z	2300 kg	-95 kg
8500 m ³	2205 kg	BB85Z	2820 kg	-615 kg

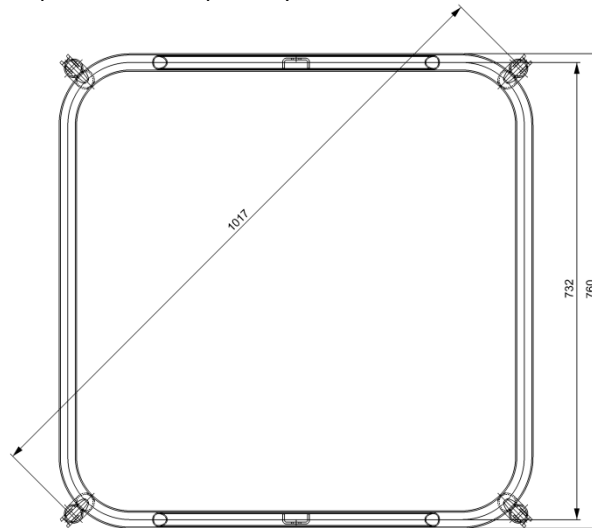
Table 4: Maximum load comparison

Table 4 shows the MTOM comparison of Schroeder fire balloons- and Balóny Kubíček envelopes. The load difference between the manufacturer's envelopes is shown on the right side. In the right column the MTOM of Balóny Kubíček is subtracted from the MTOM of Schroeder fire balloons. There are differences within the load capacities of the envelopes even though they have comparable volumes. The envelopes must not be overloaded, that's why the maximum take off mass of the combination fire balloons envelopes with Balóny Kubíček bottom ends must be ruled by the Schroeder fire balloons flight manual. The Kubicek bottom ends, combined as described

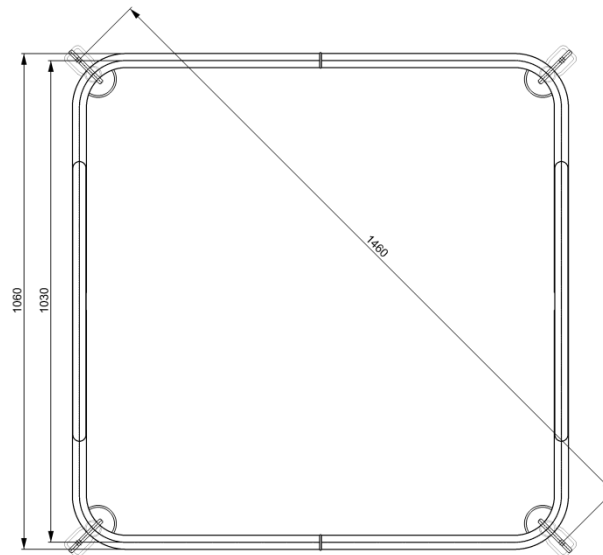
in Table2 cannot be overloaded in combination with the corresponding Schroeder envelope, if all regulations stated in this document are respected.

4. Loadframe sizes

Schroeder fire balloons has only got a few applicable load frame sizes. A small load frame (drawing No. 201.6 and 201.7) with either a mechanical or hydraulic height adjustment but the same junction point distances and a large load frame (drawing No. 201.5) with mechanical height adjustment. These frames are shown in pictures 1 and 2. The other two frames mentioned in the TCDS are firstly an individual piece (Drawing No. 201.1), built only once, and secondly an out of production frame (drawing No.201.2). Nevertheless the out of production load frame (drawing No. 201.2) is compatible with all applicable envelopes of the small load frames (drawing No. 201.6 and 201.7) and doesn't need to be explained here separately.



Picture 1: relevant measures of load frame drawing No. 201.6

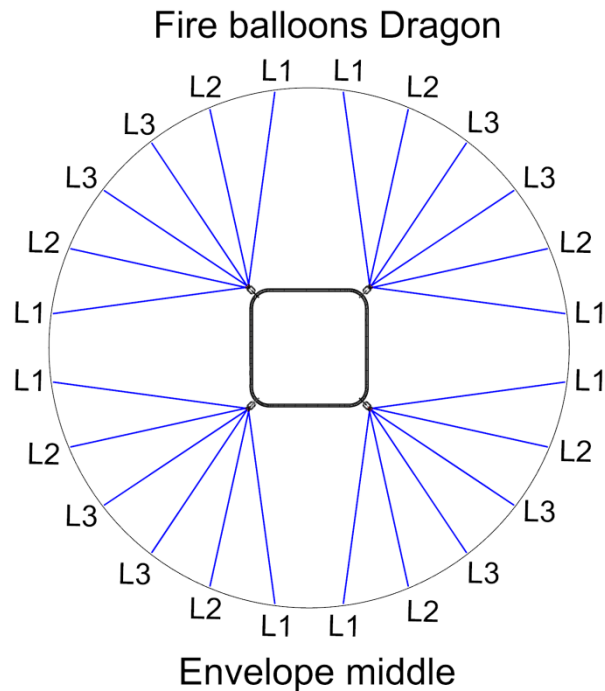


Picture 2: relevant measures of load frame drawing No. 201.5

All Load frames produced by Schroeder fire balloons are square shaped. The flying wires as you can see in picture 3 are divided in four packs of 6 wires each, connected to the attachment points on the corners of the frame. The packs of the 24 gore envelopes consist of 3 wires. Every end of a wire is connected via a steel triangle to a load tape. That makes 6 load tapes per pack. The packs of the 16 gore envelopes consist of 2 wires with two load tapes each. Two adjoining load tape are connected to the two ends of one wire.

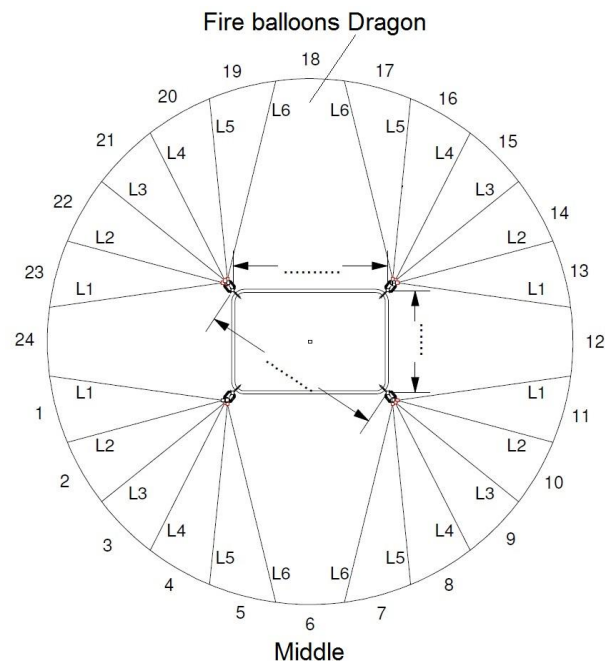
The square load frame with four attachment points is combined with a round opening of the balloon. That means that there are 3 different lengths within one flying wire pack of the 24 gore envelope and two different lengths within one flying wire pack of the 16 gore envelope pack. (see picture 3). The lengths of the wires are specially

designed and fitted to the envelope in order to gain a round and plane fire opening of the envelope and avoid unnecessary stress to the load tapes and fabric caused by an uneven shape of the fire opening.



Picture 3: Wire plan for square load frames

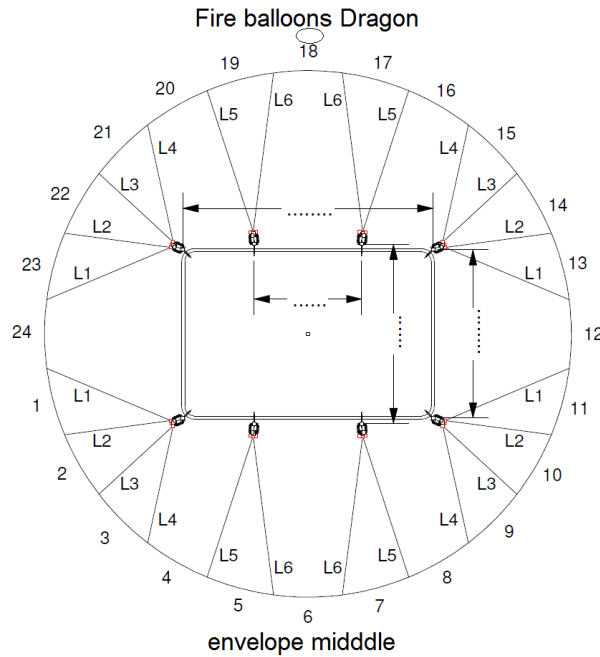
In contrast to that, all Balóny Kubíček load frames are rectangle formed (see table 5). That means that all wires of one pack have different lengths in order to shape a round and plane fire opening of the envelope (see picture 4).



Picture 4: Wire plan for rectangle load frames

If the combination of a Schroeder fire balloons envelope with Balóny Kubíček bottom ends is to be registered, the flying wires must be adjusted to the deployed load frame at Schroeder fire balloons factory. The flying wire lengths are not mentioned in this document, they will be fitted individually.

If there is a load frame with 8 attachment points, the four flying wires packs need to be split up into smaller packs of one and two wires as you can see in picture 5.



Picture 5: load frame with 8 attachment points

applicable burner frames	burner frame dimensions [mm]	attachment points	attachment point distances [mm]
Schroeder fire balloons			
small	760 x 760	4	730 x 730
large	1060 x 1060	4	1030 x 1030
Balóny Kubíček			
Basic / Vario	700 x 680	4	725 x 615
K25P	1244 x 830	4	1225 x 808
K32T	1244 x 1350	4	1223 x 1331
K32TT, K50TT	1400 x 1350	4	1374 x 1329
K50	1700 x 1350	4	1674 x 1330
K60	2000 x 1350	8	1976 x 1332 (850 x 1418)
K60 Strong	2000 x 1350	8	1976 x 1332 (850 x 1418)

Table 5: load frame dimensions

In table 5 all relevant load frame dimensions and attachment point displacements of both manufacturers are displayed for comparison. As can be seen, Balóny Kubíček has no load frame attachment point measures comparable to the standard frames of Schroeder fire balloons.

5. Calculations

There is only one part of the envelope that needs to be checked by calculations for the combination of Schroeder fire balloons envelopes and Balóny Kubíček bottom ends. None of the relevant parameters like MTOM, max. Temperature etc of the envelope changes but the angle of the flying wires needed to connect the load frame to the envelope. This change of angle does only affect the base tape of the envelope opening in the bottom. If the attachment points distance enlarges, the load to the tape increases if the distance between envelope and load frame remains constant. Accordingly to that relation the distance between the load frame and the envelope, as only variable, has to be adjusted in order to fulfil the safety conditions. At first the wire with the worst load, or the wire with the worst angle is located. After the location of that specific wire the angle is adjusted in regard of the



Theo Schroeder
fire balloons GmbH
Am Bahnhof 12,
54338 Schweich, Germany

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standard angle of the corresponding Schroeder fire balloons combination and a distance between the load frame and the envelope of 1,8 m to 2 m.

The calculations of each combination is added to the file of this issue.

6. Conclusion

The combination of Schroeder fire balloons envelopes and Balóny Kubíček bottom ends is possible if some things are respected.

- The standard flying wires need to be replaced by individually calculated wires.
- The Maximum Take Off Mass mentioned in the Schroeder fire balloons Flight Manual must be adhered to.
- The scoop needs to be also individually changed in order to remain undamaged.
- If the envelope is equipped with the Paraquick system, the fast deflation locking mechanism must be attached to the bottom end (bracket welded to the load frame, attached with Velcro to burner rod, etc.)