UNITED KINGDOM
CIVIL AVIATION AUTHORITY

BALLOON NOTICE

(for Balloon AOC Holders)

Flight Operations Inspectorate (General Aviation), Aviation House, Gatwick Airport South, West Sussex, RH6 0YR

1/2007

This notice contains information and advice on the operation of balloons for public transport. It must be retained with your copy of CAP 611.

Passenger Landing Position Guidance to Operators

The guidance provided by hot-air balloon operators on the passenger landing position varies, and none of the advice has been subjected to scientific scrutiny. The Safety Regulation Group of the UK Civil Aviation Authority has therefore undertaken an independent scientific study to provide the best advice for the protection of passengers during balloon landings. Physical tests were carried out using a balloon basket together with highly detailed computer simulations. Representatives of the UK balloon manufacturing and operating industry participated in the research.

The information below is an extract from the research. The full report, CAA Paper 2006/06, will be made available at:

http://www.caa.co.uk/Paper200606

The objectives of the research were to evaluate the current advice given to balloon passengers on the position to adopt during landing and to ascertain whether any protective measures should be introduced to further reduce the risk of injury during landing.

The best advice on the position of passengers may however not be practicable in all cases e.g. the size of the passenger compartments in T-partition baskets and the number of passengers and positioning of fuel tanks in open baskets may force a compromise in passenger positions.

The term “vulnerable passenger" refers to those who are physically small, children, the elderly and the infirm.

Passengers should be briefed on the position to adopt during landing at the pre-flight briefing and be reminded of it just prior to landing. It is recommended that, prior to hot inflation, all passengers should board the basket and simultaneously practise the body position they should adopt on landing.

Three landing scenarios were used in the research, a heavy landing, a tip-over of the basket and a basket contacting a fence or hedge during a drag landing. These three scenarios were judged the most likely to cause injury.

Passenger Landing Position Guidance is therefore recommended for the following basket types:

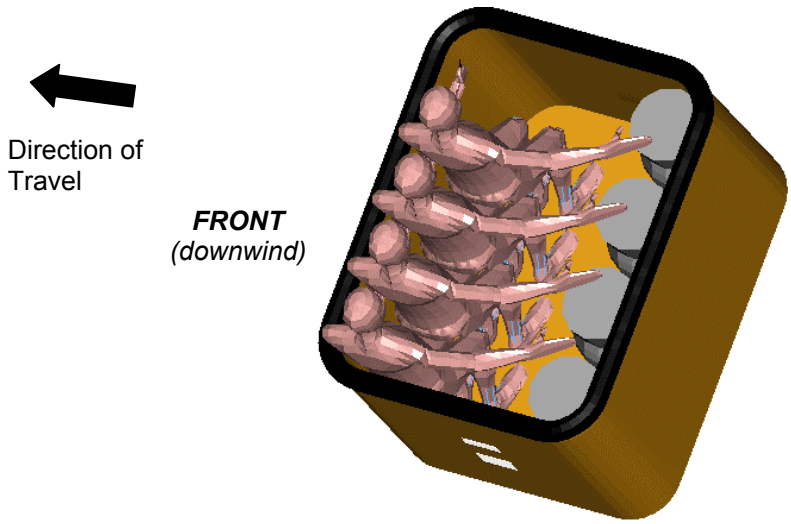
Open Basket

In an open basket, with the fuel cylinders installed at the back of the basket, it is recommended that passengers adopt a sideways position at the front side of the basket as shown in Figure 1.

In the sideways position, it is recommended that the most vulnerable passengers be placed at the front of the row of passengers and the strongest at the back of the row.

Passengers should be advised to grasp the basket rope handles where possible.

Figure 1. Sideways landing position in an open basket.



These positions may not always be practicable depending on the number of passengers and fuel tanks being carried.

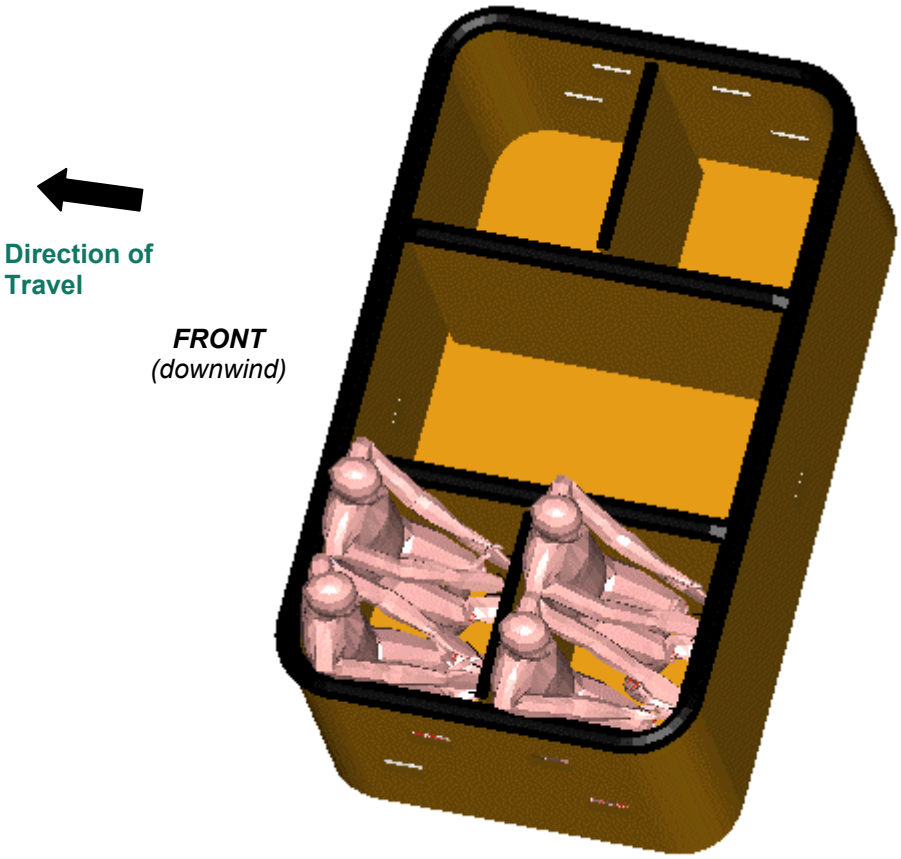
For larger open baskets, where there is sufficient space, the preferable position may be as described below for T-partitioned baskets.

T-Partitioned Basket

In a single or double T-partitioned basket, passengers should adopt a backwards-landing position as is shown in Figure 2.

It is recommended that the most vulnerable passengers be positioned in the downwind (front) compartments of the basket and the strongest passengers in the upwind (rear) compartments.

Figure 2. Backwards landing position in a T-basket.



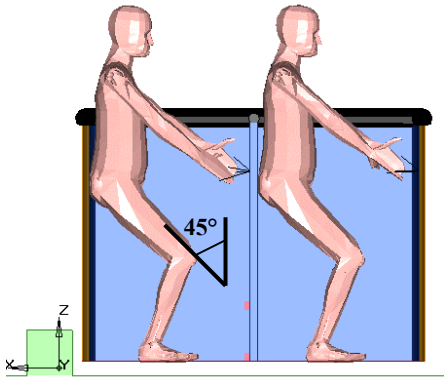
Some T-partitioned baskets may be of a physical size that precludes the use of the recommended passenger positions.

All Baskets

It is recommended for both the sideways landing position in the open basket, and the backwards-landing position in the T-partitioned basket, that the passengers bend their knees to an angle of less than 90 degrees, see Figure 3.

It is highly recommended that foam padding be added to the basket floor, inner sides and rim. Very firm, high-density foam padding should be used on the floor such that passengers are stable whilst standing on it. Soft, less-dense foams may give rise to an increase in twisted ankles when and if passengers lose their balance.

Figure 3. Knees bent at an angle of less than 90 degrees.



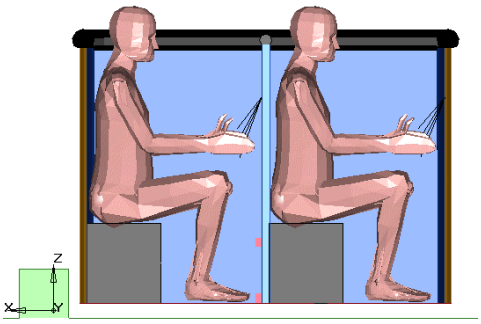
Foam Seating Blocks

Dense foam seating blocks can offer benefits especially if used in conjunction with additional padding to reduce the effect of head impact with the basket structure. Their use is recommended where practicable as shown in Figure 4. As these foam blocks are a minor modification only those approved by the balloon manufacturer may be used.

When a backward position seated on foam blocks, as is shown in Figure 4, is adopted, extra foam protection should be added to the basket side/rim basket to reduce the impact loading to the head from contact with the side or rim.

The physical size of the compartments in some T-partitioned baskets may preclude the use of these foam seating blocks.

Figure 4. Dense foam block seating.



CONCLUSIONS

The above advice is the result of a thorough scientific investigation and, although the recommendations are advisory in nature, operators should be aware that failure to adopt the advice might increase their business-risk exposure if a passenger suffers an injury during landing.