



Vetter: Aircraft Recovery

LIFTING OUT OF LIMITS



Edition 01/2007

Vetter Aircraft Lifting Bags – Recovery sets for the A 380



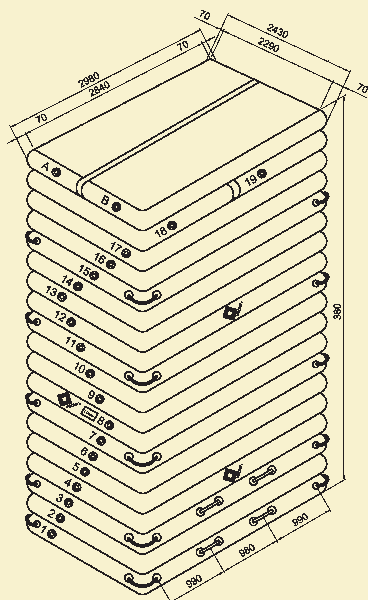
The two differing recovery systems for the Airbus A 380 are especially characterized by the following features:

- 1.0 bar (14.5 psi) technology
- this achieves increased stability
- a coupling system easy to use
- individual system for contour matching
- 2 new ALB (Type 30/380 and Type 60/400)

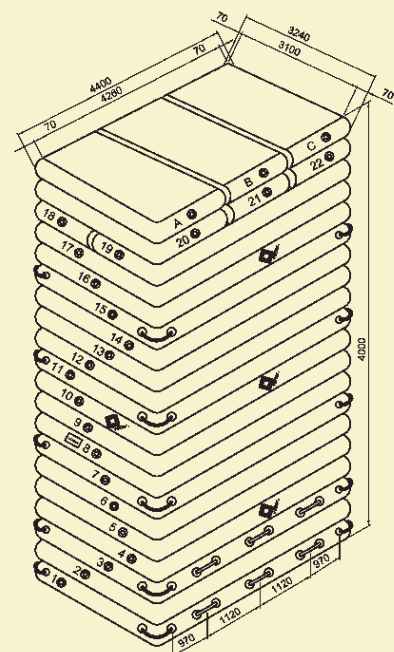
Alternatively, these two sets can be supplied in the field-proven design:

- with an operating pressure of 0.5 bar (7.25 psi)
- this makes it suitable as an upgrade for the existing systems
- equipped with stable claw couplings
- with corresponding contour matching system

ALB 30/380



ALB 60/400



Vetter Aircraft Lifting Bags 1.0 bar/14.5 psi



Aircraft Lifting Bags
1.0 bar/14.5 psi

Aircraft lifting bags are characterized by their sturdiness, strength, exceptional side stability and stability under load. In parallel to the existing series with an operating pressure of 0.5 bar/7.25 psi, the product program was extended to a second construction series (having an operating pressure of 1.0 bar/14.5 psi).

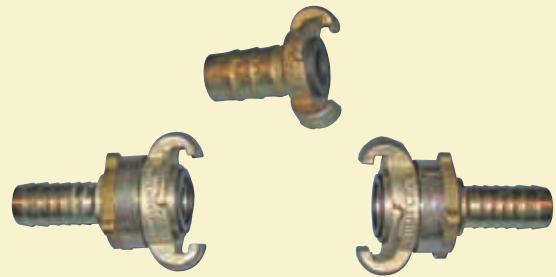
As opposed to the 0.5 bar/7.25 psi series, the side stability of the 1.0 bar/14.5 psi series is increased by 40%.

In addition to the operating pressure and the increased side stability, another essential distinctive feature is the coupling system.

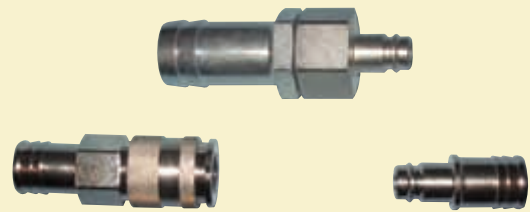
With the 1.0 bar/14.5 psi series, the ALB, hoses and controllers are fitted with rapid snap-in couplings, resp. nipples. This enables time-saving and easy inter-coupling of the individual elements.

Sizes and lifting heights are identical for both series, however the nominal lifting power for the 1.0 bar/14.5 psi series is double that of the other series.

This series also enables the divided top chambers to match to the aircraft contours.



Coupling system 0.5 bar / 7.25 psi



Coupling system 1.0 bar / 14.5 psi

Advantages

- 40% higher stability against transverse forces
- easy and quickly useable coupling system
- optimum matching to the aircraft contours using divided contact chambers
- supplied as a fixed complete bag or as individual chamber
- space weave fabric avoids bulging of the top and bottom plates
- can be repaired
- long life duration of approximately 15 - 20 years

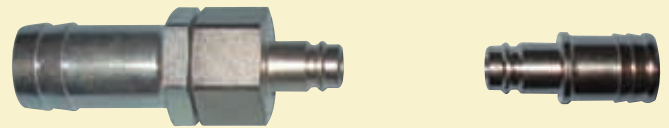
Safety

- each ALB chamber has an integrated safety valve
- 2.5 times the bursting pressure to the operating pressure
- protection bushes on all connection nipples
- test pressure of 1.5 bar (21.75 psi)
- highly tear-proof polyamide fabric
- resistive against oil and ozone

Vetter Aircraft Lifting Bags 5/120 NG 0.5 bar/7.25 psi

This compact set enables material protective recovery of aircraft when normal recovery equipment cannot be used. Their prime purpose is to produce free space underneath the aircraft so that suitable devices can be used for recovery operations.

Due to its lifting power of 5.6 t and a lifting height of 120 cm (47.2 inch), this set is suitable for use on light aircraft as well as on business aircraft and Lear jets. The number of lifting bag sets and the type of equipment is mainly dependent on the type of aircraft to be recovered and its position.



Hose coupling/nipple

In the transport and storage box there is an integrated 6-section controller with dead man switching as well as the corresponding inflation hoses and an air supply hose in addition to the ALB.

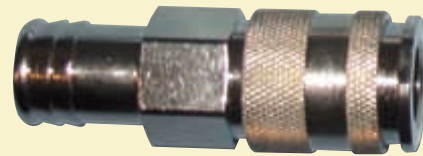
An essential advantage of the compact set is the ingeniously easy-to-use coupling system.

Advantages

- ready-to-use unit in the transport and storage box
- each chamber can be individually controlled and checked
- ingeniously easy-to-use coupling system
- space weave of the fabric avoids bulging of top and bottom plates
- can be repaired
- life duration approximately 15 - 20 years

Safety

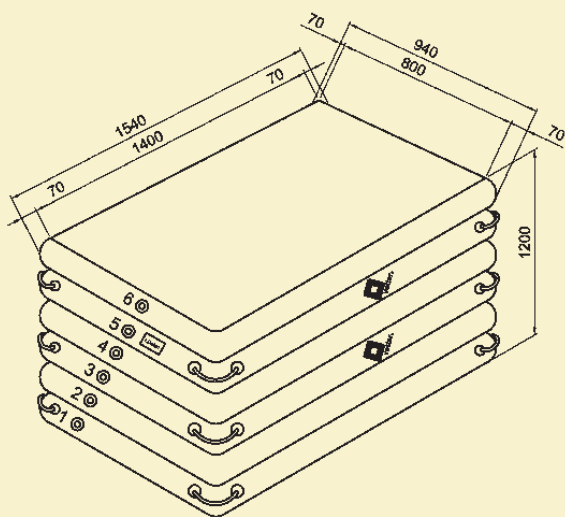
- controller with dead man switching
- 4 times the bursting pressure to the operating pressure
- protection bushes on all connection nipples
- 1.3 times the test pressure to the operating pressure
- exceptionally sturdy and abrasion-proof fabric coating
- resistive against oil and ozone



Connection nipple for ALB

ALB 5/120 NG
0.5 bar/7.25 psi

ALB 5/120 NG



Technical data for ALB 5/120 NG

	Unit	ALB 5/120 NG
Art.-No.		3500004901
Lift power	t lbs	5.6 6.2
Max. lifting height	cm inch	120 47
Lifting bag chambers		6
Support area (LxW)	cm inch	140 x 80 55 x 32
Total area (LxW)	cm inch	154 x 94 61 x 37
Insertion height (deflated bag)	cm inch	8 3
Operating pressure	bar psi	0.5 7.25
Test pressure	bar psi	0.65 9.40
Nominal capacity	i cu.ft.	1,698 60
Air requirement	l cu.ft.	2,550 90
Packing dimensions of the box (LxWxH)	cm inch	115 x 123 x 61 45 x 48 x 24
Dimensions of the packing bag (LxWxH)	cm inch	110 x 40 x 40 43 x 16 x 16
Approximate weight	kg lbs	29 64
Approximate weight of set	kg lbs	195 430

Set table for ALB 5/120 NG

Art.-No.	Description	Art.-No. 3500005201 Set ALB 5/ 120 NG
3500004901	ALB 5/120 NG 0.5 bar/7.25 psi	1
0350025400	6-section ALB controller, 0.5 bar/7.25 psi, dead man, aluminium	1
0350007401	ALB compressed air hose, 0.5 bar, 10 m (7.25 psi/32 ft.), yellow	6
0350007801	ALB air supply hose, 10 m (32 ft.), red	1
0350024300	Padded plate, 10 mm/0.4 inch	1
0050016700	Set of repair material	1
0350024900	Packing bag ALB 5/120	1
0350025000	Transport and storage box 115x123x61 cm/45x48x24 inch	1

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Vetter Aircraft Lifting Bags 0.5 bar/7.25 psi



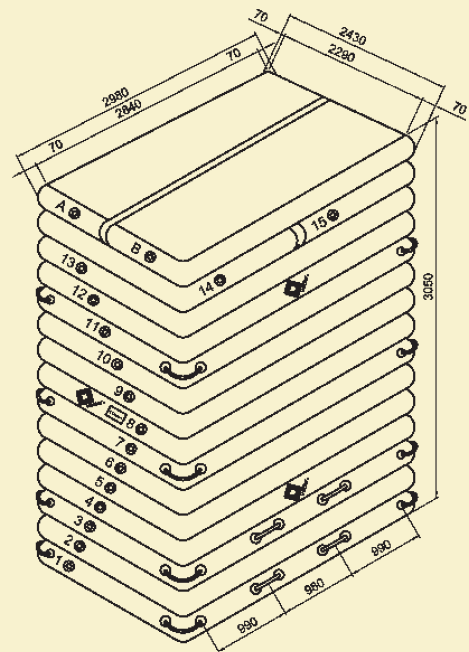
The pneumatic aircraft lifting bags are designed so that their surfaces softly position to the contours of the aircraft and the pressure is optimally distributed over it. With a maximum insertion height of 25 cm (10 inch) and a bag area of up to 14 m² the ALB are ideally suited to lift aircraft evenly up to 4 m/13 ft. (without any support from underneath).

The strong lifting power of up to 60 tons per bag and the enormous side stability, due to the space weave fabric having thousands of individual threads per square metre, ensure safe recovery.

Some of the essential characteristics of the modified ALB are a size matching related to the positioning area as well as the addition of 3 new sizes (refer to Technical Data).

The ALB are manufactured in 8 standard sizes.

ALB 30/305



Advantages

- each chamber can be individually controlled and checked
- extensive range of accessories
- divided top chambers enable matching to the contours of the aircraft
- supplied as a fixed connected complete bag or as individual chamber
- space weave of the fabric avoids bulging of top and bottom plates
- can be repaired
- life duration approximately 15 - 20 years

Safety

- automatic pressure monitoring of the contour chambers
- all controllers are fitted with safety valves and manometers
- 4 times the bursting pressure to the operating pressure
- protection bushes on all connection couplings
- 1.3 times the test pressure to the operating pressure
- exceptionally sturdy and abrasion-proof fabric coating
- resistive against oil and ozone

DESIGN AND DELIVERY PACKAGE

The ALB are basically designed for both series, 0.5 bar/7.25 psi and 1.0 bar/14.5 psi, as follows:
The individual chambers are arranged numerically exactly the same as the related controllers, this ensures that there is clear allocation between controller and ALB chamber.

The divided top chambers, which are in direct contact with the aircraft contour, are marked alphabetically. The corresponding manometer and lever on the controller responsible for the control of these chambers are also marked alphabetically.

The delivery package of one set of ALB contains:

- 1 Aircraft Lifting Bag
- 1 Padded plate, 10 mm / 0.4 inch
- 1 Packing bag
- 1 Set of repair material
- 1 Transport and storage box

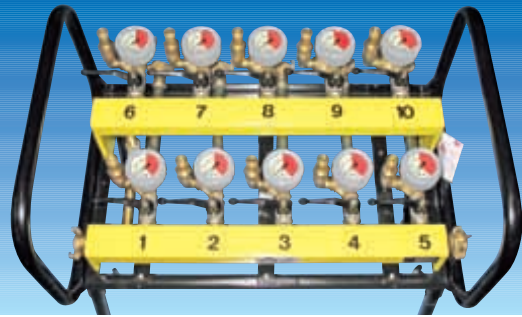
The only exception is the set ALB 5/120. This is supplied as a compact package and includes controller, inflation hoses and air supply hose.

CONTROLLERS

With controllers one basically differentiates between a fitting design and a dead man switching design. The standard controllers are supplied as 5 section, 10 section or 17 section devices. There are two types of 10 section and 17 section controllers: the controller with contour chamber regulation and those without this facility. The controllers with contour chamber regulation have an adjustable pressure regulator integrated for 0.1 to 0.5 bar (1.45 to 7.25 psi) enabling constant pressure in the divided contact chambers. There are either 2 or 3 contact chambers depending on the size of the bag. In order to inflate the larger bags two controllers are connected together via a connection hose to form one unit owing to the number of chambers involved. For this, there is a controller without contour chamber regulation for the lower chambers and a controller with regulation for the upper chambers.



Fitting controller without contour chamber control



Dead man controller with contour chamber control



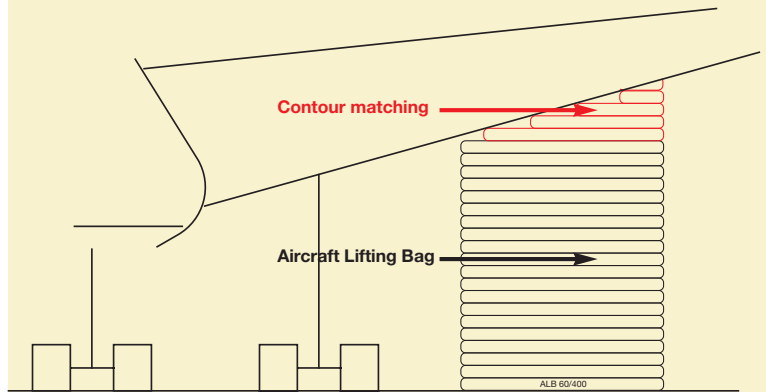
Fitting controller

- supplied with 5 sections, 10 sections or 17 sections
- 10 section controller and 17 section controller with or without contour chamber control
- low in weight
- sturdy and little maintenance needed
- other sizes on request
- short inflation times

Dead man controller

- available as 10 section controller and 17 section controller
- can be supplied with or without contour chamber control
- high quality glass-fibre reinforced housing
- dead man operation (automatic zero adjustment)
- various colours for the control levers thus achieving better distinction between contact chamber control (red) and control of the other chambers (black)
- low in weight

Vetter Contour matching



Contour matching can be carried out using two different methods:

- contour matching using contact chambers of the aircraft lifting bag
- contour matching using vacuum chambers

CONTOUR MATCHING USING THE CONTACT CHAMBERS

The transverse and longitudinally arranged bag chambers enable optimum matching to the positioning surfaces, especially if the aircraft is positioned at an angle.

The foam rubber padded plate (10 mm/0.4 inch) is used as a protection against sharp-edged parts. A padded plate (30 mm/1.2 inch) can be additionally ordered.



CONTOUR MATCHING USING VACUUM CHAMBERS

The increasing number of new aircraft fuselage and wing shapes make contour matching imperative in the field of aircraft recovery using pneumatic lifting bags. It was for this reason that Vetter GmbH further developed a field-proven recovery system in cooperation with the authorities at Frankfurt Airport which offers the following advantages:

- low pressure point loading on sensitive aircraft parts
- meets the specifications of the aircraft manufacturers
- high degree of stability
- high safety standard
- individual contour matching





Stabilization is made in a number of steps:

Step 1

In the first step, a pneumatic aircraft lifting bag is positioned under the wings of the aircraft to be recovered.

Step 2

In the second step, vacuum bags are positioned on the lifting bag facing the fuselage.

These vacuum bags are similar to vacuum mattresses used by rescue services and exactly match to the contours.

When a vacuum is then produced in the bags they will shape themselves to the contours and stabilize the aircraft.



Vacuum bags before contour matching



Vacuum bags after contour matching



Step 3

In the third step large intermediate spaces are filled out with individual chamber bags, with dimensions of 50 x 230 cm (20 x 91 inch) and 100 x 230 cm (40 x 91 inch), which are blown up to the full operating pressure.

Step 4

In the fourth and last step before the lifting procedure starts, the smaller intermediate spaces can be filled with filling sacks having dimensions of 40 x 60 cm (16 x 24 inch).

These sacks let the air through enabling contour matching and supporting of antennas, spindle drives and other protruding parts.



In order to meet the requirements of modern aircraft recovery, an existing ALB system can be extended for contour matching with the following accessories. The required quantities depend on the existing system.

Set table for contour matching

Art.-No.	Description	Art.-No. 3500005000 Set 30 to	Art.-No. 3500005100 Set 40 to	Art.-No. 3500007200 Set 60 to
350006400	ALB Chamber 500 x 2300 mm 0.5 bar (20 x 91 inch 7.25 psi)	6	9	12
350006300	ALB Chamber 1000 x 2300 mm 0.5 bar (40 x 91 inch 7.25 psi)	6	9	12
350004800	ALB Chamber 2270 x 1540 mm 0.5 bar (89 x 61 inch 7.25 psi)	3	6	9
350006100	ALB Chamber 1000 x 2300 mm (40 x 91 inch) VACUUM	7	10	13
0350007301	ALB compressed air hose 10 m (32 ft.), yellow, with screw coupling	20	30	40
0350007401	ALB compressed air hose 10 m (32 ft.), yellow, with snap-in coupling	10	15	20
0350022500	Base plate 2440 x 1250 mm (96 x 49 inch), 10 mm (0.4 inch) thick	3	4	6
0350003800	10 section ALB controller, 0.5 bar/7.25 psi, dead man	2	3	4
0350019800	8 section ALB controller VACUUM, dead man	1	2	2
0350022600	Filling sack 400 x 600 mm (16 x 24 inch), filled with Styropore	60	60	60
0350022700	Label set, numbering 1 - 25	2	2	2
0350022800	Label set, numbering 26 - 50	2	2	2
0350022900	Fold-up ladder, 12 steps	1	1	1
0350023000	Covering, 1.46 m (57 inch) folded out	1	1	1
0350005100	Compressed air distributor, 1 input, 6 blockable outputs	1	1	1