PETERSEN® 161-SERIES HIGH PRESSURE LIFTING AIR BAGS

OPERATING INSTRUCTIONS

WARNING!

Read and understand instructions before using Petersen® Plugs. Failure to comply may result in property damage, serious injury, or death!

- Never work under a load without safety supports.
- Never exceed the inflation pressure of 8 bars (118 psi).
- Never lift with more than two lifting air bags on each other.

Information

These instructions contain basic Lift Bag operating instructions and general technical information. The selection and application of a Lift Bag must be based on factors such as lifting requirements, load weight, lifting height, and the shape of the load. The manufacturer doesn't assume any responsibility for personal injuries or material damages arising from improper use or misuse of Lift Bags and their accessories. Actual conditions of lifting techniques and characteristics depend on each particular application and each situation has different requirements.

General guidelines for safe and efficient use of Lift Bags

Always wear protective clothing when using Lift Bags. Firemen and rescue-team members must be equipped completely in accordance with their safety requirements. Other users should wear safety helmet, safety glasses, and gloves or other safety equipment as required.

Lift Bags should always being carried with the inflation nozzle facing up and forward to be easily seen to avoid damage. Lift Bags of large sizes and weights should be moved by more than one person.

Lift Bags should be stored or transported in horizontal position. The lift bag should not come in contact with any surface over 55°C (131˚F).

It is simple to place and to inflate the Lift Bag but the operation can be very dangerous especially in the dark. The work place must be well illuminated with good visibility.

Inflation Controller Operation

Prior to connection of the Lift Bag to the Inflation Controller, turn the three way valve to the deflated position, (see flow arrows on top of valve handle), and set the pressure regulator to 0 psi.

Connect the Lift Bag to the distribution inflation hose and put it in the correct lifting position. (See instructions below for proper placement.) Connect the inflation hose to the Inflation Controller. Open the three-way filling valve to inflate the Lift Bag and then adjust the pressure regulator to the desired lifting pressure. Never inflate above 0.8 Mpa (8 bars, 118 psi). After the lifting operation is completed lower the pressure on the regulator and open the 3-way valve to deflate the Lift Bag. Disconnect the Lift Bags and remove them to a convenient location. Set a flat load on the Lift Bags to press out the remaining air and clean (instructions below) them for storage.

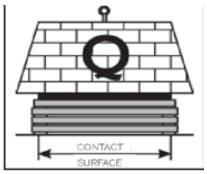
When using lifting bags never exceed the pressure ratings of the inflation Controller, inflation hose, lifting bag. Never connect the lifting bag directly to an air line without an Inflation Controller equipped with a regulator, valve and pressure gauges.

Use of compressed-air bottle, 200 or 300 bar

You may use a high pressure air or inert gas source for inflation only if it is equipped with a pressure reducing regulator that drops the pressure to under 150 psig. The Lift Bag Inflation Controller has a 150 psig maximum inlet pressure capacity.

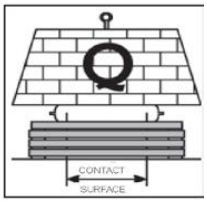
Positioning the Lift Bag under a load

Figure 1



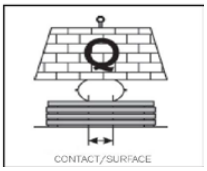
Position the Lift Bag on a level foundation (**Figure 1**). The fully deflated Lift Bag contains very little air.

Figure 2



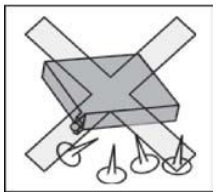
During the process of Lift Bag inflation, the air column and consequently the lifting height are increasing, while the contact surface between the bag and the object is decreasing, resulting in decreasing lifting capacity (**Figure 2**). Thus, maximal force can be attained only at the beginning of inflation, when the lifting height is minimal. During the inflation, the air bag is gradually getting a characteristic spherical form.

Figure 3



With the Lift Bag fully inflated, the contact surface and lifting capacity reach their minimum, and the lifting height its maximum (**Figure 3**). To be able to correctly operate the Lift Bag, a user must understand the data relating to the maximal lifting force, maximal lifting height, and maximal lifting capacity at maximal lifting height.

Figure 4

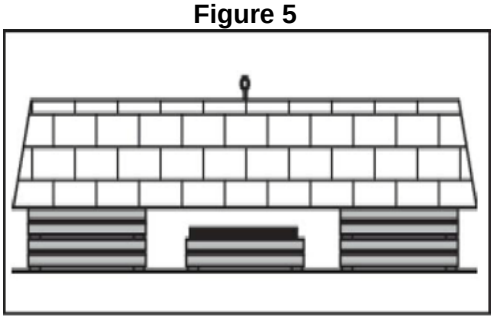


or

Position the Lift Bag on a flat surface cleared of any glass fragments or other foreign particles that might damage it. Use sand or another granulated material to cover any slippery surface such as oily spots or ice - to reduce the risk of slipping. When the Lift Bag area is soft, unstable not level, build a solid support (**Figure 4**).

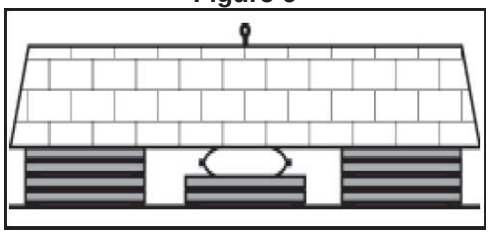
Position the Lift Bag against the center of the load with the inflation nozzle pointed right or left. The load surface must be as large as the Lift Bag contact area to help prevent the load from sliding. When there is more than 70

Figure 5



mm (2.76”) space between the ground and the object to be lifted, build a firm foundation leaving just enough space to insert a non inflated bag onto the foundation and under the load. The foundation must be undivided without any gap under the Lift Bag (**Figure 5**). Add safety supports to each side of the Lift Bag/s as the load is lifted (**Figure 5**) to support it in the event the Lift Bag or inflation system fails.

Figure 6



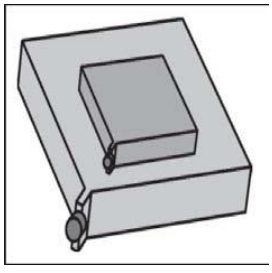
After each time the load is lifted, slowly empty the Lift Bag lowering the load onto the safety supports.

Add additional foundation height for the Lift Bag as needed and repeat the Lift Bag inflation until the required height is achieved. Each time the load is lifted add safety supports as high as possible (**Figure 6**).

WARNING! *WITH ANY LIFTING OPERATION, THE SAFETY SUPPORTS ARE OF ESSENTIAL IMPORTANCE. ANY WORK UNDER A LOAD SUPPORTED ONLY BY AN INFLATED AIR BAG IS STRONGLY FORBIDDEN.*

Lifting height and weight with multiple Lift Bags

Figure 7



In order to increase lifting height it is also possible to use two air bags. Place the smaller one in the middle and on top of the larger one, with the inflation nozzles pointed away from the load (**Figure 7**). Never stack more than two air bags under a load.

First inflate the lower, larger Lift Bag until the smaller one touches the load. Then inflate the upper Lift Bag and if necessary the lower one again, until the required lifting height is achieved. Position safety supports under the load with care, then slowly empty the air bags until the load is supported by the safety supports.

The lifting capacity cannot be increased by placing air bags one upon another. Stacking two Lift Bags will only increase the lifting height. The total lifting capacity does not exceed the lifting capacity of the small Lift Bag (Figure 10). The lifting capacity depends on the size of the air bag surface in contact with the lower surface of the load.

Lifting capacity (kg) = bag internal pressure (bar) x active contact surface (cm^2)

Due to the increasing lift bag convexity during the lifting procedure the contact surface between the bag and the load grows smaller. Thus the lifting capacity decreases in proportion to the increase of lifting height. Use the below graph to choose the proper size of Lifting Bag.

If the lifting height cannot be defined, select the largest air bag available and suitable to be placed under the load.

Thus, lifting capacity can only be increased by placing one Lift Bag beside another, provided that both are being inflated simultaneously.

Figure 8

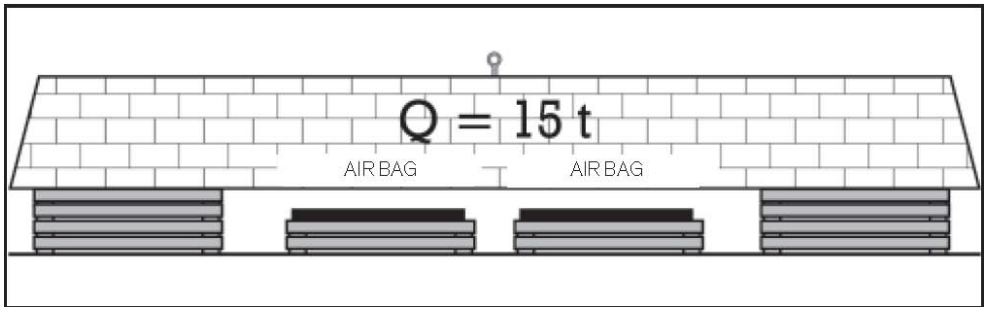


Figure 8 shows two Lift Bags, placed next each other under a 15 ton foundations. The first Lift Bag can lift 8 tons, the second 12 tons. Neither of the bags can lift the load of 15 tons alone, however, together they are able to lift up to 20 tons.

Figure 9

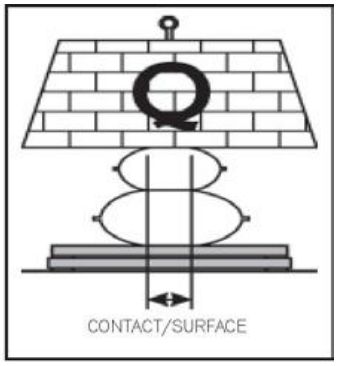


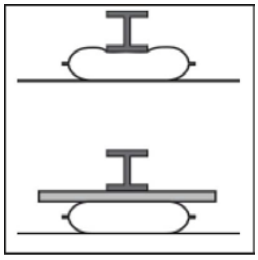
Figure 10

The lifting height can be increased by stacking Lift Bags (**Figure 9**). If the lifting height of one Lift Bag is 18 cm max and of the other 22 cm, both together and fully inflated can achieve the lifting height of 40 cm.

WARNING! *NEVER LIFT WITH MORE THAN TWO AIR BAGS STACKED ON EACH OTHER. USE SAFETY SUPPORTS AND LIFT BAG FOUNDATIONS TO ACHIEVE MOST LIFTING HEIGHTS.*

Lifting the objects of unusual forms

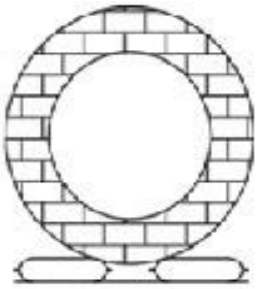
Figure 10



The Lift Bag steel or Kevlar cord can be damaged by twisting if the load does not contact the entire surface of the Lift Bag. A support must be inserted between the Lift Bag and the load to permit the lifting force to be equally distributed over the entire lifting surface (**Figure 10**).

Lifting a cylindrical object

Figure 11



Cylindrical objects of great size such as tanks don't admit lifting by a single Lift Bag. If the object is not firmly fastened it will roll away when the Lift Bag begins inflating to its typical spherical form. Cylindrical objects must be lifted using two Lift Bags, one at each side of the object. The inflation must be controlled to permit equal coordinated lifting (**Figure 11**).

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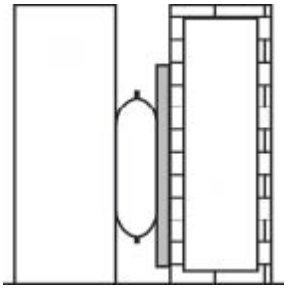
Separating and pushing, using air bags

Figure 12

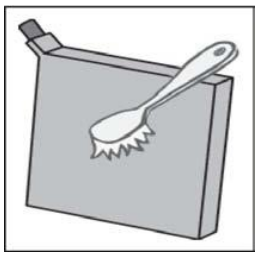


Lift Bags also be used to separate or move objects. To prevent damage care must be taken if an object has thin walls which could be bent or broken by the pressure. The Lift Bag should be positioned against a rib, a pillar, or another strong and rigid section. Otherwise insert a fiberboard between the Lift Bag and the object to increase the surface area (**Figure 12**).

Cleaning after use

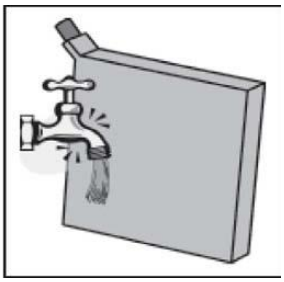
After each use Lift Bags must be cleaned of oil or grease spots that can cause air bags to slide and dirt that might disable inflation nozzle. In the upright position with the nozzle at the top, knock the Lift Bag against the floor to shake off the dirt. Clean any dirt out of the inflation nozzle with a vacuum, thin piece of wire, and/or brush. Be carful to pull the dirt out; do not let it drop into the Lift Bag.

Figure 13



Clean the Lift Bag surface with a brush with hard bristles moving the brush in all directions. Never use a sharp brush that might damage the Lift Bag. After brushing off the dirt, use a brush to wash off any remaining oil or dirt with a light solution of warm water and a dish washing detergent using the brush (**Figure 13**).

Figure 14



Rinse the surface with cold, fresh water (**Figure 14**) or with a water jet to remove all remaining dirt and detergent. With the air bag in the upright position, wipe the nozzle with clean dry cloth. Let the air bag dry in an open dry atmosphere. Don't speed up drying with heat.

Preventive maintenance

After every use carefully inflate the air bag. Start with the pressure of 0.5 bar (7.25 psi) and check for damages. If there are no damages visible such as holes or cuts, increase the pressure to 4 bar (58 psi) maximum and repeat the visual check-up. If there are holes or cuts visible the air bags should be taken out of operation. Repairs may be performed only by a manufacturer's representative or its authorized service technician.

Lift Bags in storage also require periodic inspection for damage. Check the cleaned Lift Bag for air blisters, notches or worn sections. Mark any damage or defect and consult the manufacturer or an authorized service provider. Check the nozzle for any damage which could disable the connection. Replace the nozzle, if necessary.

Nozzle repair

Damaged nozzles may be replaced by unscrewing the nozzle and replacing with a new one. Be careful not to dislodge the threaded part molded into the Lift Bag. Frozen nozzles may be defrosted with quick defrosting spray or manually warming the nozzle. Wear protective gloves. Remove foreign bodies from the nozzle with a vacuum and/or wire. Contact the manufacturer or the authorized service provider to repair any damage to the Lift Bag.

Storage

Store the Lift Bags in the vertical or horizontal position with the nozzles facing the user, not pushed against a wall, to protect them when stored and when moved. Periodically clean and check the Lift Bags, air supply hoses, couplings, controllers, valves, and pressure gauges. Mark any damage and consult the manufacturer or the nearest authorized service provider.

Service life Lift Bags are made from rubber and therefore subject to aging and have a maximum useful life of 15 years after which they should be taken out of service.

PERIODICAL INSPECTIONS

Periodical check-ups of lifting bags are required for safety. Every lifting bag ships with a test sheet and instructions for performing periodical evaluations. Periodical check-ups may be carried out by a representative of the manufacturer, or any other person authorized by the manufacturer.

LEAK TEST: Inflate the Lift Bag with water to 8 bar (116 psi) and let it set under pressure for at least ten (10) minutes. If the Lift Bag will not maintain pressure it must be taken out of service.

VISUAL INSPECTION: Verify that steel or Kevlar reinforcement cords are not exposed on the surface of the Lift Bag. Smaller foreign bodies may only be removed from the surface if they do not damage the surface if not imbedded into the surface. Inspect for boils or blisters that may damage the integrity of the air bag. Soft porous boils, bulges suggest there is a defect. Boils, bulges, or blisters with the below characteristics generally do not affect the product.

a. firm, with a dia. of less than .25" or 6.35 mm
b. firm, 1" or 25.40 mm long and 1/8 inch or 3.175 mm or less long
c. firm, protruding from the surface less than 1/16 inch or 1.587 mm.

If there are visible ply separations or air or water remains captured the Lift Bag should be taken out of service.

A fold on part of the edge of the Lift Bag is acceptable if its depth does not exceed 3/8 inch or 9.525 mm. width.

Inspect the brass nipple for damage including cuts or damaged threads. If the nipple damaged, the Lift Bag should be taken out of service.

LIFT BAG TECHNICAL DATA

*Maximum Lift Height		Deflated Size				Maximum Pressure	Test Pressure	Burst Pressure	Maximum Load US	Thickness		Volume	Shpg Wt	Item
in	mm	in	mm	in	mm	PSI	PSI	PSI	Tons*	in	mm	Cu/Ft	lbs	Number
2.7	68	**6**	152	**6**	152	116	174	464	1.1	1.1	27	0.18	2	**161-0606**
5.1	129	**9**	228	**9**	228	116	174	464	3.1	1.1	27	0.53	3	**161-0909**
5.9	149	**12**	304	**12**	304	116	174	464	6.4	1.1	27	1.48	6	**161-1212**
7	177	**15**	381	**15**	381	116	174	464	10.8	1.1	27	3.04	9	**161-1515**
8.6	218	**18**	457	**18**	457	116	174	464	14.2	1.1	27	5.37	12	**161-1818**
10.6	269	**22**	558	**22**	558	116	174	464	22.7	1.1	27	10.45	18	**161-2222**
11.8	299	**24**	609	**24**	609	116	174	464	27.7	1.2	30	14.7	25	**161-2424**
14.1	358	**27**	685	**27**	685	116	174	464	35.3	1.2	30	21.9	30	**161-2727**
16.5	419	**31**	787	**31**	787	116	174	464	46.4	1.2	30	32.5	41	**161-3131**
17.7	431	**35**	889	**35**	889	116	174	464	58.8	1.2	30	46.8	50	**161-3535**
20	508	**36**	914	**36**	914	116	174	464	74.1	1.2	30	53.1	56	**161-3636**

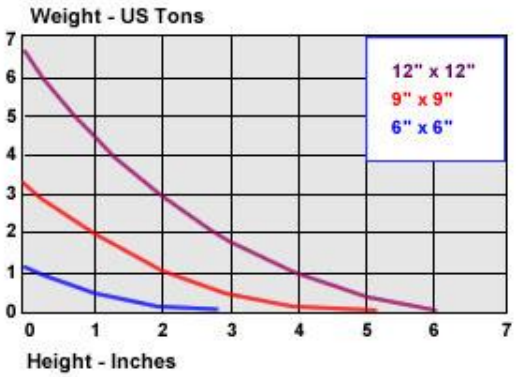
*Maximum Lift Height		Deflated Size				Maximum Pressure	Test Pressure	Burst Pressure	Maximum Load US	Thickness		Volume	Shpg Wt	Item
in	mm	in	mm	in	mm	PSI	PSI	PSI	Tons*	in	mm	Cu/Ft	lbs	Number
7.9	200	**13**	330	**41**	1041	116	174	464	24.2	1.1	27	8	19	**161-1341**
7	177	**12**	304	**18**	457	116	174	464	10.5	1.1	27	3.4	7.7	**161-1218**
9	228	**15**	381	**20**	508	116	174	464	15	1.1	27	6	10.8	**161-1520**
9	228	**15**	381	**30**	762	116	174	464	22.8	1.1	27	9.5	16.3	**161-1530**

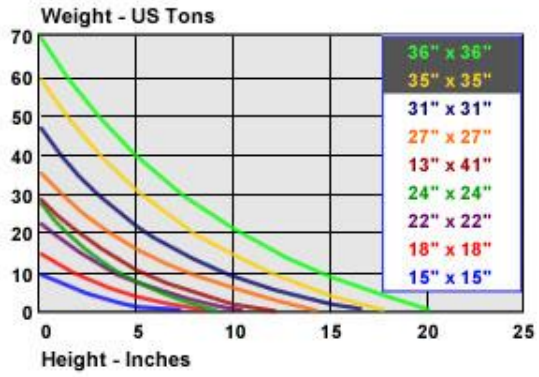
Lifting capacity at lifting height

*Note: Selection of the proper air bag depends on the ratio of height vs. weight.

For instance, you wouldn't use a 30 ton air bag to lift 30 tons.

Max. lift height decreases as the weight increases. Use the graph (RIGHT) to determine the max. height any particular bag will lift a certain weight.





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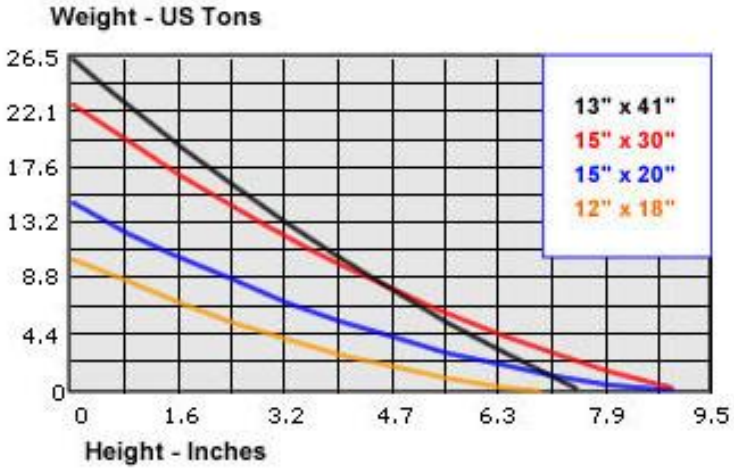

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