

Tempe Fire Department Policies and Procedures
Air Bags
405.12
Rev 10-1-10

PURPOSE

The Paratech MAXIFORCE air bags carried on our Ladder and Squad companies use pneumatic force to lift and move large, heavy objects.

PROCEDURE

The components of the air bag system are:

- Pressure regulator that attaches to the SCBA bottle.
- Control valve with 2 outlets
- Multiple colored airlines
- Various sizes and capacity MAXIFORCE bags
- Inline relief valve
- Y splitter

Setting up the system:

Estimate the weight to be lifted and the distance to be moved.

Weight per cubic foot:

Steel – 490 lbs

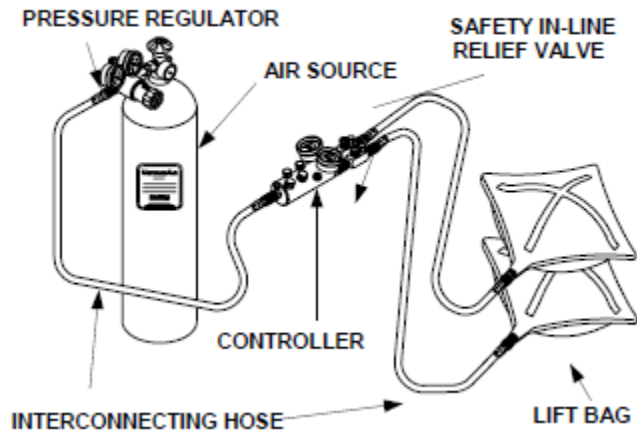
Concrete – 150 lbs

Wood – 35 lbs

Lay out the appropriate air bags. Each bag is marked with the lifting height and capacity.

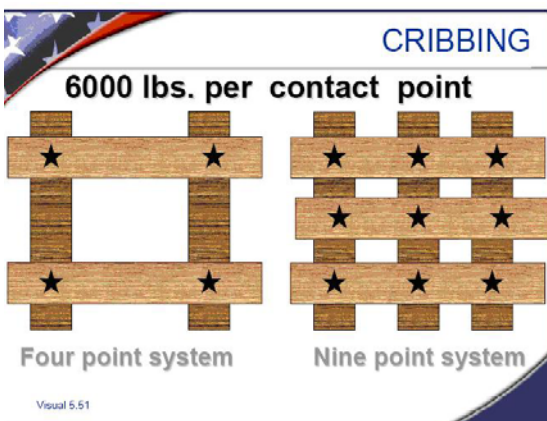
Connect the regulator to a SCBA bottle. Connect the control valve to the regulator via air line. If the airline is needed for extension, the control valve can be connected directly to the regulator. Each connection has a safety locking ring at the coupling which is tightened to prevent accidental disconnection.

Connect an air line from the control valve to the air bag. You may connect an inline relief valve between the air line and air bag. This will allow you to disconnect the air line if needed while keeping air pressure in the air bag.



Cribbing

No personnel can be under an object without cribbing in place to prevent being crushed. Cribbing should be put in place while lifting is in progress. If the object is too high to reach and lift with two air bags use cribbing under the air bags to take up the void space and bring the air bags closer to the object being lifted. Cribbing is usually made up of 4" x 4" lumber, varying in length. Cribbing shall be stacked in a 2 by 2 or a 3 by 3 stack (see picture below). Each contact point will give you 6,000 lbs. A 2 by 2 crib tower will hold 24,000 lbs and a 3 by 3 tower will hold 54,000 lbs. Limit your height to triple the width of the crib tower. Overlap the corners by 4 inches. The bottom layer should be solid. If you are at the desired height and a row of cribbing won't fit, use wedges to take up the void space. Try and make sure the wedges are inline vertically with the contact points so the weight is distributed correctly. The top row can be a solid row of cribbing so there is less deformity to the bottom of the air bags. At no time should **ANY** body parts pass underneath the load to position or reposition any cribbing. Use tools or other cribbing material when placing cribbing placed under the load.

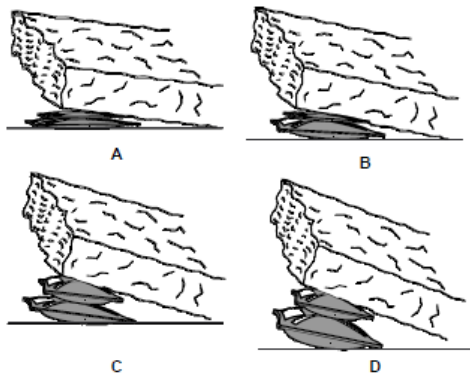


Lifting

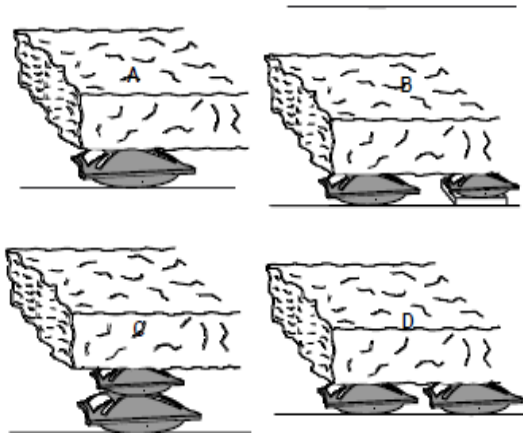
Place the bags under the lifting point with the larger bag on the bottom. The "X" on the bag marks the center of the lifting force. You should use the two biggest bags possible so you don't underestimate the lifting height and weight. Center bag(s) directly under the lifting point. If there are any sharp edges, place cribbing or an outrigger plate between the bag and lifting point to prevent puncture or deformity. Cribbing or an outrigger plate should also be used to distribute the weight at the lifting point if collapse or deformity is possible due to structural weakness.

One crew member will work the control valve while another (typically the Captain) will direct the lift. Make sure the SCBA bottle is turned on and the pressure regulator is set at 118 psi. Commands should be given according to the color of the hose connected to the bag. (Example: raise on red, lower on yellow.) This way there is no confusion about which bag, top or bottom, to inflate or deflate. Capacity is reached at 118 psi. If attempts are made to surpass this pressure, the safety pop off valves will release excess pressure at the control valve. The gauges at the control valve are marked from green to red at 118 psi.

If the height requirement demands the use of two stacked lift bags, the smaller lift bag shall be on the top (A) and the bottom lift bag inflated first until the top lift bag contacts the load (B). The top lift bag is then inflated to achieve the desired lift (C). If additional lift is required at full inflation of the top lift bag, the bottom lift bag is further inflated (D).



Lift capacity does not increase by stacking two lift bags one on top of the other, only lifting height increases. Lifting capacity is controlled by the smaller bag capacity. Use lift bags, side-by-side, to additively increase capacity by inflating the lift bags simultaneously.



When lifting large cylindrical objects, use a lift bag on both sides of the cylinder, and wedge to provide an even lift.



Deflating

Deflating or lowering is still a two person operation. One to direct, and one to work the control valve. If you have had to rest the load on cribbing so you could raise the height of the air bags to lift, you will have to reverse the process to lower. Lower the airbags in the reverse order that they were raised. Once the process is started you may deflate both bags at the same time. Always make sure the pressure is relieved at the gages before any part of the system is disconnected.

Relieve the pressure at the regulator, after turning the SCBA off, with the small valve on the regulator.

The pressure in the line connecting the regulator and the control valve may be relieved by pressing the inflate and deflate buttons.