

Feeling Pressured Getting into air pressure

The effects of atmospheric pressure can be felt by stepping into an extra large trash bag. Once in the bag, the air pressure is slightly reduced with a vacuum cleaner. The bag will squeeze the occupant due to the differences of external and internal pressure.

SAFETY FIRST:

- This activity should be done with at least three people
- One person must be in control of the vacuum cleaner on/off switch at all times. One person to enter the plastic bag
- And one person to help the person in the bag
- The person stepping into the bag must never place his or her head into the bag.
- The person entering the plastic bag should be at least 100 lbs. (45 kg)

Materials:

- Extra large, heavy duty garbage bag (55 gallon size)
- Industrial strength vacuum cleaner (10 to 12 amp) with hose

Assembly:

1. Place the trash bag on a soft surface like a carpet. Have someone remove their shoes and step into the bag (This will be the "bag-person"). Be careful not to puncture the bag.
2. The bag-person should sit in the bag with legs crossed.
3. Insert the vacuum hose into the bag. The bag-person should hold the end of the hose in their lap with at least one hand cupped around the nozzle (without blocking the opening). This will help prevent the plastic bag from being sucked into the vacuum hose.
4. The hose should run along side the bag-person's neck. Seal the bag around the neck (the plastic should be in contact with as much skin around the neck as possible) and the hose.
5. Some one should help the person in the bag maintain the seal around his/her neck.

To do and notice:

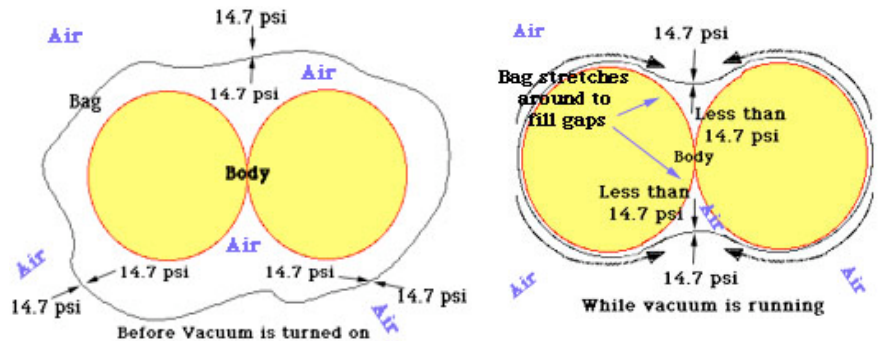
A third person should turn on the vacuum cleaner (This person must shut off the vacuum if any problems arise.) Watch what happens and continually ask what sensations the person in the bag is feeling.

What's going on:

As the vacuum cleaner decreases the pressure inside the bag, the bag-person should feel a definite tightening or squeezing sensation on their body. Observers will notice that the bag conforms to the bag-person's body.

This squeezing sensation can be quite substantial. The "squeeze" is due to the stretching of the plastic bag caused by the difference in internal and external air pressure.

When the person first gets inside bag, the pressure inside and outside the bag are the same [14.7 pounds per square inch (psi) at sea level or 1013.5 kilopascals]. When the vacuum is turned on, the pressure inside the bag is reduced [At the Exploratorium we averaged approximately a 10% or a 1 psi (or 6.894 kilopascals) reduction in air pressure in the bag with a 12-amp vacuum cleaner. The higher external air pressure pushes on all of the bag's outside surface towards the lower air pressure regions inside the bag. Any location where the bag doesn't press directly against something, like an arm, leg or hose is forced to stretch. It is this stretching that causes the "tighten" sensation around the participant's body.



References: A version of this activity was first seen at NSTA International Convention -Jamaica 1995.

