

Tube lifters:

Kranbranchens medlemmer har haft udfordringer med at redegøre for "Tube lifters" funktion og sikkerhedssystem, bl.a. har Arbejdstilsynet spurgt efter vakuumreservoir ved tilsynsbesøg.

Kranbranchen har kontaktet en fabrikant af "Tube lifters" og bedt om hjælp med at beskrive funktionen/risikovurderingen bag deres produkter.

Kranbranchen kontaktede Schmalz fra Tyskland, som producerer Schmalz Vacuum Tube Lifter Jumbo. Grundlæggende er opbygningen ens uanset fabrikat.

Først - princip bag Tube lifters:

Function of Vacuum Handling Systems

Vacuum Tube Lifter Jumbo

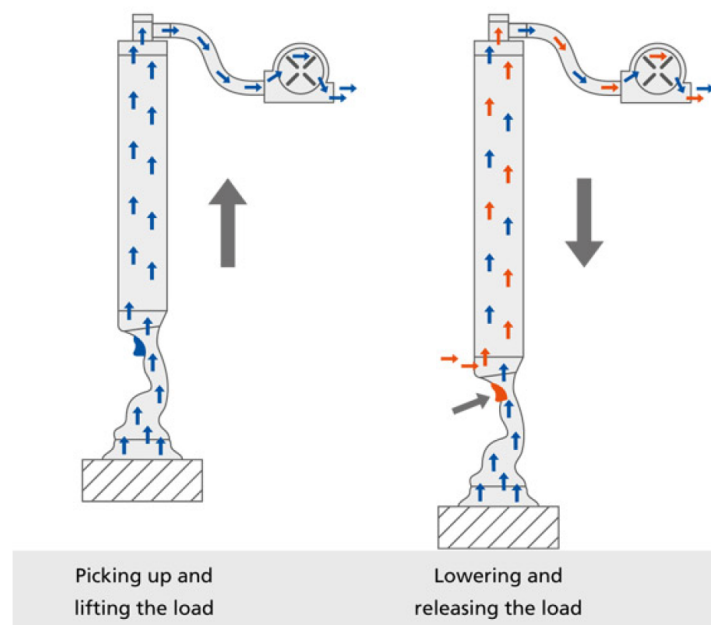
The vacuum [tube lifter](#) Jumbo consists of a vacuum generator, a lifting unit, an operating unit and vacuum gripper. The Jumbo only uses vacuum to raise and lower loads.

Picking up and Lifting the Load

- The vacuum generator (pump, blower or ejector) generates a vacuum in the system by continually evacuating air.
- The difference between the negative pressure and the ambient pressure draws the workpiece to the vacuum gripper. This is generally called "picking up" the workpiece.
- Once the workpiece has been picked up, the flow rate causes the lift tube to contract. The workpiece is then lifted.

Lowering and Releasing the Load

- Operating the control element feeds atmospheric air into the system ("venting"). The vacuum is reduced.
- This causes the lift tube to expand and the load is lowered. The lifting height can be precisely controlled by controlling the amount of atmospheric air that is fed into the system. To release the load, the vacuum is completely eliminated through maximum venting via the operator handle (pressing the control button down fully).



Kilde: <https://www.schmalz.com/en/vacuum-knowledge/vacuum-lifter-function-and-selection/design-and-function/>

Herefter - svar fra Schmalz:

You are coming back with an issue which is joining us our entire career with vacuum handling systems, especially with tube lifters. So often the local authorities refer to the Machine Directive as the valid and only standard for tube lifters as well.

Of course tube lifter manufacturers have to follow some paragraphs of this directive however the leading standard/norm is the EN 14238:2004+A1:2009 Cranes – Manually controlled load manipulating devices.

Here the most important § is under 5.4.2 as mentioend below:

5.4.2.1 Holding force

Vacuum load holding devices shall provide a holding force of at least 2 times the force necessary to lift the WLL in all load holding configurations and foreseeable accelerations.

The manufacturer shall state the required minimum friction factor in the instructions for use, if handling with the suction pad(s) in inclined or vertical position is foreseen.

Vacuum load holding devices shall be such that the lifting operation can only start when the necessary vacuum is established and maintained.

5.4.2.2 Pressure failure

In order to prevent risks due to the case of vacuum drop to the danger range during operation, the manipulator shall be in accordance with 5.2.2.5 of EN 13155:2003.

The manipulator shall be capable of automatically put down the load safely or shall be fitted with a pressure measuring device clearly showing the working range and the danger range to the operator in his normal operating position

When vacuum losses cannot be compensated, there shall be an automatic device to warn that the danger range has been reached. The warning signal shall be optical or acoustic, depending upon the circumstances of use for the vacuum holding device.

5.4.2.3 Power failure

Vacuum load holding devices shall be equipped with devices to warn the operator in the case of power failure.

In case of power failure, the manipulator shall be capable of retaining the load for a duration of at least 2 minutes or shall be capable of being lowered safely before it is released.

When the warning device indicates power failure or that the danger range is reached safe operation to put down the load shall be possible.

Internal comment:

Jumbo is a special situation, since the stroke movement is also performed via the vacuum.

Check valves are installed on all Jumbos on top of the lift tube so in case of power failure the lift tube itself is a vacuum reservoir.

No pressure measuring device indicating the operating and danger area. However, the load will be automatically and safely lowered via the given and required 2:1 area ratio of the gripper against the lifting hose.

Since this set-down functions works automatically and safely, the warning device is not required. If the vacuum is too low, the workpiece can no longer be lifted by the lifting tube.

Hope this helps to solve this concern.

Hvis der opstår problemer ved tilsynsbesøg så er I velkomne til at kontakte sekretariatet.

Juli 2022
Kranbranchens sekretariat