

Compound Pump vacuum pump in the craneway

Manufacturer: Pannkoke Flachglastechnik GmbH
Type: 7002-COMP

equipped with:
Number of the vacuum circuits: 1

Safety requirements for vacuum lifting devices taken from the European Standard EN 13155:2003

This draft for safety requirements of non-fixed load lifting attachments makes some essential requirements on a vacuum lifting device, which have to be fulfilled by each load suspension device and some only by vacuum lifting devices. Also, safety requirements for grabs and tongs are defined in this draft.

The title of this standard is:
Krane — Lose Lastaufnahmemittel

This standard is valid in all the EU countries. All new load lifting attachments brought into circulation must conform to this standard, this, at least, is our understanding.

The forward to this standard contains the following:

This document (EN 13155:2003) has been prepared by Technical Committee CEN/TC 147 "Cranes - Safety", the secretariat of which is held by BSI.

This European standard must receive the status of a national standard, either through the publication of an identical text or through recognition by January 2004. Any opposing national standards must be withdrawn by January 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

To determine the relationship to the EC Directive, see the information in Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Section 5 lists safety requirements and or measures. Particular requirements relating to vacuum lifting devices are given under point 5.2.2 of the standard.

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	Requirements	Solution found
5.2.2.1	<p>Vacuum lifting beams shall be dimensioned to hold at least a load corresponding to two times the working load limit at the end of the working range and the beginning of the danger range respectively at all intended angles of tilt. The maximum angles of tilt shall be increased in accordance with 5.1.1.2.</p> <p>NOTE: The pressure range within which it is possible to work is termed the working range. The danger range adjoins the working range. In some vacuum lifting systems, in particular self-priming vacuum lifting beams, the resultant pressure decrease depends upon the weight of the load.</p>	<p>The compound pump is only designed for generating a vacuum for the suspension gear with suction cups, and that suspension gear must be designed accordingly.</p> <p>Generally speaking, the vacuum connection is produced using a hose reel.</p>
5.2.2.2	Non-self-priming vacuum lifting beams shall be equipped with a pressure measuring device clearly showing the working range and the danger range of the vacuum.	Our control vacuum meter has already been in use since the seventies and each of our vacuum lifting devices has such a control vacuum meter. The working range is marked green, the danger area red.
5.2.2.3	...	
5.2.2.4	The measuring device or the indicator respectively shall be fully visible for the slinger or, if there is no slinger, for the driver of the crane when in his normal working position.	<p>The additional measuring equipment required should be attached to the crane line and would be invisible and inaudible to the operator.</p> <p>Or the suspension gear should be equipped with a corresponding measuring fixture, meaning that electrical power needs to be supplied to the suspension gear.</p>
5.2.2.5	Means shall be provided to prevent the risks due to vacuum losses. This shall be:	
	a) in the case of vacuum lifting beams with a vacuum pump: a vacuum reservoir with a non-return valve between the vacuum reservoir and the pump, located as close as possible to the vacuum reservoir	The compound pump does have a large vacuum reservoir but this is connected to the suspension gear by the hose reel. An observation of this product showed that the hose reel is very prone to leaks in the system as a whole, and that it therefore constitutes a danger area. This is one of the reasons why we are withdrawing from this tried and tested system, and we have stopped all further development work on it.
	b) ...	
	c) ...	
	d) ...	

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	Requirements	Solution found
5.2.2.6	<p>There shall be a device to warn automatically when the danger range is reached, if vacuum losses can not be compensated. The display must be visual or acoustic, depending on the operating conditions of the vacuum lifting beam and in compliance with EN 981, EN 842 and EN 457. The warning system must also function when there is a power failure on the vacuum lifting beam.</p> <p>NOTE: The warning device is not the pressure measuring device of 5.2.2.2 or the indicator of 5.2.2.3.</p>	<p>The previous system only has a warning lamp on the crane operating switch when correctly installed. If the compound pump were to be equipped correctly with a warning signal backed up by a rechargeable battery, it would then need to have a commensurate size of power storage device capable of supplying power to a flashing light and/or an appropriate volume of warning signal whenever there is a power failure.</p>
5.2.2.7	<p>In case of power failure, the vacuum lifting beam shall be able to hold the load for 5 minutes. This is not necessary in no-go areas and this is not necessary for turbine vacuum lifting beams if all the following conditions are met:</p> <ul style="list-style-type: none"> • • the operator maintains control of the load through steering handles which ensures that the operator is outside the danger zone in case of the load falling; • • in addition to clause 5.2.2.6 a warning device shall be activated as soon as the power fails; • • the manufacturer shall prohibit lifting of the geometric centre of the suction pads above 1.8 m by marking and instructions for use. 	<p>Great safety risk posed by the long (defect-prone) hose line. Otherwise, the large vacuum reservoir provides a certain margin of safety.</p> <p>The tightness of the system is tested before delivery. Only devices which lose less than 5 % vacuum within 15 minutes will be delivered.</p>
5.2.3.8	<p>For vacuum lifting beams intended to be used in a building area a secondary positive holding device is required or there shall be two vacuum reserves each fitted with non-return valves. Each vacuum reserve shall be connected to a separate set of suction pads. Each set of suction pads shall fulfil the requirement of the clause 5.2.2.1.</p>	<p>The compound pump is not intended for this kind of application.</p>
5.2.2.9	<p>The releasing of the load shall be actuated by a two action control. This is not necessary if the release of the load is not possible until the load has been put down or in no-go areas.</p>	<p>This concept cannot be implemented with the previous solution.</p>
5.2.2.10	...	
5.2.2.11	...	

From our product observation exercise, we have learned that the hose reel often caused leakage problems, sometimes only affected partial areas. This leakage causes loss of vacuum and therefore also a loss of retaining force.

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The second weak spot is the required warning system beside the control vacuum meter. This also has to function safely when there is a power failure. With a building height of 8 metres and more, and a very low noise level in the glass store or production area this must be very loud, and the light source must be very intense and penetrating. Warning equipment of this kind then requires a lot of power, which needs to be laid on.

Crane manufacturers are constantly calling for new and different concepts for operating with remote wireless control. At the same time, over the last few years, the quantities of compound pumps sold have declined sharply because an increasing number of combined devices is being used. This is why we have ceased production of these compound pumps. In particular because we are unable in a reliable manner to implement the rising safety requirements associated with this device combination.

Bernd Pannkoke
managing director