Operating Instructions for Elevator Buffers type LP

1 Scope of application

The Elevator Buffer type LP is an energy dissipation type buffer according to EN 81-1/2, EN 81-20, EN 81-50 5.5 and therefore can be universally used for all applications in the construction of elevators. The EC type examination permits the use in passenger and freight elevators both under the elevator car and under the counter weight.

2 Functional description

Fig. 1a: Buffer with Protection Tube

Fig. 1b: Buffer with Linear Slide
In the case of a buffer stroke the piston rod 2 is forced into the cylinder tube 1 and the hydraulic fluid 3 in the tube is displaced and forced to the outside through small throttling ports 4 in the tube wall. The fluid accumulates within the jacket tube 5. At the same time the gas volume 6 above the hydraulic medium is further compressed. The sealing system 7 maintains a reliable seal between the hard chromium-plated piston rod and the atmosphere.

After the buffer stroke and return to hydraulic balance the compressed gas volume forces the displaced fluid back into the cylinder and extends the piston rod.

The level of the hydraulic fluid at the gas interface can be read at any time through the sight glass 9 without opening the unit.

3 General Instructions

If people are working in the elevator shaft a suitable refuge must be ensured.

Warning!

Buffers are safety devices. Mounting, inspection and maintenance work may only be carried out by expert personnel! Observe the applicable safety instructions!

4 Preparations

4.1 Design Data

Among the data on the buffer type plate there is included:

- Piston diameter and stroke
- Minimum impact mass,
- Maximum impact mass and
- Rated speed

4.2 Ambient Temperature Limit

The ambient temperature should be between -10 °C and 50 °C.

The buffer can be supplied in a special design filled with a special hydraulic oil for low ambient temperatures. This buffer can be used between -20 °C and +40 °C and is labelled with a special designation for this temperature range. An enhanced EC type examination is also provided.
4.3 Place of Installation

The place of installation should be in a clean and dry condition.

Verify the place of installation of the buffer and the bearing capacity of the mounting surface.

Verify the size of the remaining lower refuge. For an entirely pressed-in elevator car buffer a sufficiently dimensioned refuge must be provided below the elevator car in compliance with the respective code.

5 Mounting

Safety Instruction:

Prior to all mounting and maintenance work, an appropriate measure to prevent automatic switching on or automatic start-up of the drive must be in place!

1. The buffer is supplied ready for installation complete with oil filling.

2. If the buffer is supplied with pressed-in piston rod, the securing devices should be removed. Cut the securing straps at the side when the buffer is standing upright.

Warning! The extending piston rod can cause injury!

3. Fastening material should be ordered separately. Suitable means are heavy-duty dowels or rag bolts M 16x160 DIN 529 with nuts and washers 18 DIN 126.

4. Fastening should be made in the upright condition directly on the ground or on a suitable console. The buffer piston rod should be accurately mounted in the vertical position. Therefore, mounting must be made on a horizontal surface or suitable shims should be used.

5. The buffer should be fixed exactly under the centre of gravity of the elevator car or counterweight respectively. If several buffers are used, these must be distributed symmetrically to the centre. Check the alignment of the buffer e.g. using a water level. The piston rod has to point vertical up.

6. Press-in the piston rod several times by hand. This permits transport-caused air bubbles to escape from the hydraulic fluid. Subsequently, the piston rod must be completely extended and the oil level correct.

If buffers may be displaced for service work at the elevator e.g. by

- swinging to a service position or
- removing

please note:

1. The elevator may only be set into operation again if the buffer is replaced to its working position and fastened correctly. We recommend installing a suitable electrical controlling device.

2. Then press-in the piston rod of the buffer at least two times. This allows air bubbles escaping from the hydraulic cylinder.

3. Finally check, that the piston rod is fully extended and the oil level is correct.

4. Fix suitable instructions for acting near the point of installation.
5.1 Electric Connection

**Dangerous Voltage!**
During connection work the installation must be de-energised!

Carry out the electric connection to the limit switch 13 (Figures 1a or 1b). During wiring the working range of the linear slide 17 and the protection tube 10 during buffer stroke must be observed.

6 Commissioning

**Safety Instruction:**
During buffer testing no persons are allowed to stay in the elevator shaft!

1. Verify the extended position of the piston rod and the oil level.
2. Carry out a first buffer test with reduced speed and without additional load.
4. Wait for approx. 1 - 2 minutes and then relieve the buffer.
5. Verify the extended position of the piston rod and the oil level. Check the buffer and the impact point for possible damage and oil leaks.
6. If no defects are found, carry out a second buffer test. This test should be carried out, if possible, with rated speed and maximum load.
7. Repeat points 4. and 5.

If no defects are found, the buffer is ready for operation.

7 Regular inspections

During regular inspections of the elevator installation or for trouble shooting the following inspections are possible for which all the a/m safety instructions must be observed:

7.1 Inspection of the extended piston rod

Buffer with protection tube to Fig. 1a:
- The sight glass 9 is not masked by the protection tube 10.
- The limit switch 13 is not actuated.

Buffer with linear slide to Fig. 1b:
- The limit switch 13 is not actuated.
- The visible part of the piston rod is as long as the respective stroke (see indication on the type plate).
7.2 Oil level check

The elevator buffers series LP are equipped with a sight glass as an oil indicator. Therefore, the buffer does not need to be opened for the oil level check! This inspection should only be carried out with fully extended piston rod (see a/m point 7.1).

a) Buffer with one sight glass
   The oil level should be visible in the sight glass 9, see Fig. 2a

b) Buffer with two sight glasses
   - minimum: the oil level is visible in the lower sight glass
   - maximum: the oil level is below the top edge of the upper sight glass
   see Fig. 2b

Factory oil filling for buffers with one sight glass is up to the centre of the sight glass (at ambient temperatures of 16 °C to 22 °C). Factory oil filling for buffers with two sight glasses is below the top edge of the upper sight glass.

The oil level is depending on temperature. At ambient temperatures around freezing point, the oil level can drop near the minimum. High ambient temperatures let the oil level rise.

If during the oil level check the oil level is found to be too high, air bubbles might be in the oil. In this case first press the piston rod of the (upright standing) buffer several times as far as possible. If the oil level is not falling although the piston rod is fully extended, oil must be removed.

If the oil level is too low, oil must be added (see point 8.3 "Correction of the oil level"). In this case check the buffer for leakage.

7.3 Gas pressure check

For resetting the piston rod after a buffer stroke the buffer is filled with nitrogen. The gas pressure at extended piston rod is 5 bar.

The gas pressure may be checked without using a measuring instrument. For this purpose press the piston rod by hand for some centimetres.

If the piston rod then returns automatically to its initial position, the gas pressure is sufficient. Otherwise proceed as described under point 8.4 "Gas refilling".

7.4 General visual inspection

Pay attention to oil spots on the floor or on the buffer. An oil film on the piston rod 2 is normal. Check the piston rod surface for damage and tightly adherent contaminations.

Check the state and function of the limit switch 13.

If leaks or damage is found, the buffer must be exchanged or repaired.
7.5 Check the piston rod for icing

If the buffer is operated at ambient temperatures below the freezing point, the piston rod must be protected from the accumulation of frost, snow or ice. It is necessary to check whether the measures taken to prevent icing are functioning properly.

8 Maintenance

Under normal operating conditions the elevator buffer LP does not require maintenance. However, if during the a/m checks defects are detected, these can be removed as described in the following.

Every time, safety measures must be taken against unintentional setting in motion of the elevator!

8.1 Removing the protection tube

For buffers with a protection tube (Fig. 1a) this should be removed for maintenance work. For this purpose remove the three hexagonal screws 12. Push the protection tube 10 downward into the service position "X". The oil filling screw 14 and the gas filling valve 15 are now accessible. At the same time the limit switch 13 is actuated. After termination of the maintenance work the protection tube is mounted in reverse order.

Warning!
The buffer is pressurised. Prior to opening the buffer and for oil refilling the pressure must be released!

8.2 Relieving gas pressure

Remove the valve cap from the gas filling valve 15 in order to uncover the valve opening.

Press in the valve cone with a suitable pointed object and let the gas escape.

Place a tire filling device on the filling valve and let the gas escape. As an alternative you can
8.3 Correction of the oil level

- Remove the oil filling screw 14 after having relieved the gas pressure.
- For refilling use the following oil types only:
  a) buffer standard model (-10 °C up to +50 °C): Hydraulic oil DIN 51524-2 HLP respectively ISO 6743/4 HM viscosity ISO VG 46
  b) buffer with low temperature design (-20 °C up to +40 °C, see label): Hydraulic oil DIN 51524-3 HVLP respectively ISO 6743/4 HV viscosity ISO VG 22
- Refill the hydraulic oil:
  - buffers with one sight glass: until the oil level is in the centre of the sight glass
  - buffers with two sight glasses: until the oil level is below the top edge of the upper sight glass
- If the oil level is too high (see 7.2), oil must be removed.
- The limit values of the oil levels (see Fig. 2a/2b) should absolutely be observed. The correct oil level is only indicated if the piston rod is fully extended. In the case of too high an oil level there is a danger that the buffer becomes overloaded during buffer stroke. If the oil level is too low, the damping effect of the buffer may be reduced.
- Then replace the oil filling screw 14.
- Make sure a new copper sealing ring A 14x18 DIN 7603 is used.
- Subsequently refill gas.

If an inspection book is kept for the elevator buffer, the oil level corrections should be recorded here.

8.4 Gas refilling

- Remove the cap from the gas filling valve 15.
- Place a tire filling device on the filling valve. All commercially available filling systems can be used for car tire valves VG8.
- Fill the buffer with nitrogen gas, filling pressure 5 bar. The filling pressure must not be exceeded.
- The piston rod should now be fully extended.
- The use of pressurized air instead of nitrogen is allowed. Never fill with oxygen or other inflammable gases such as propane and acetylene!
- Finally check the gas filling valve 15 and the oil filling screw 14 with a leak-detecting spray or soap water for gas tightness.
- Replace the valve cap.
9 Measures during operation

9.1 What is to be done after a buffer stroke?

During normal elevator operation the buffers do not come into operation. Therefore, a buffer stroke is regularly the result of an operation failure. After release of the buffer and the signalling of the piston rod reset (limit switch 13), as a rule, the elevator is again ready for operation. Nevertheless, we recommend a full visual inspection of the buffer and the elevator.

9.2 What is to be done if oil leakage is detected?

Search for the location of oil leak. If leaking oil is visible and the leak cannot be stopped, the buffer should be changed immediately. In the case of any doubt regarding the state of the buffer, it should be changed. For this purpose Henning offers a repair/exchange service for buffers. Leaked oil should be absorbed using oil binder or cleaning rags.

9.3 What is to be done in the case of too low an oil level?

Check the buffer for leakages. If no leaks are found, oil should be refilled (see chapter 8). If oil is leaking, proceed as described in chapter 9.2.

9.4 What is to be done in the case of too high an oil level?

Too high an oil level can only occur if too large a quantity of oil has been refilled. Follow the instructions under point 7.2 "Oil level check". Make sure that the piston rod is entirely extended. If oil must be removed, follow chapter 8.

9.5 What to do if the piston rod will no longer fully extend?

Refill nitrogen as described under point 8.4. Check the entire buffer with leak detecting spray or soap water for possible gas leakage. If the problem still exists, the buffer should be exchanged or repaired by skilled personnel.

9.6 What is to be done if the piston rod is damaged?

Damaged or bent piston rods impair the functional safety of the buffer. Such buffers should be exchanged or repaired by skilled personnel.
10 Service

For ordering replacement parts, please, contact our Service Department. The following buffer-specific data is always required:

- Buffer type
- Serial number
- Maximum and minimum impact mass
- Rated travel speed

Henning GmbH & Co KG offers elevator buffers as repair/exchange. These buffers can be supplied in a short time, have been overhauled in our works and are supplied with full manufacturer's guaranty.

11 Recycling

At the end of its working life, the buffer can be recycled as follows:

- Relieve the gas pressure as described in 8.2
- Fully remove the hydraulic oil and supply it to company for used oil recycling
- Dispose of the buffer as iron scrap
### Appendix

#### Technical Data:

<table>
<thead>
<tr>
<th>Size x Stroke</th>
<th>Rated speed max. v [m/s]</th>
<th>Impact mass min. - max. m [kg]</th>
<th>Impact energy max. E [kNm]</th>
<th>Buffer force max. F [kN]</th>
<th>Weight with oil filling G [kg]</th>
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#### Dimensions Type LP 40 with protection tube:

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<th>B</th>
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All dimensions in mm.

All data subject to modifications!
Dimensions Type LP 40 / 50 with linear slide:

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</table>

All dimensions in mm.

All data subject to modifications!

Hydraulic oils and allowed ambient temperatures during elevator operation:

a) buffer standard model:

Hydraulic oil DIN 51524-2 HLP respective ISO 6743/4 HM viscosity ISO VG 46 for ambient temperatures from -10 °C up to +50 °C

b) buffer with low temperature design (upon request):

Hydraulic oil DIN 51524-3 HVLP respective ISO 6743/4 HV viscosity ISO VG 22 for ambient temperatures from -20 °C up to +40 °C

c) Special designs with biodegradable or flame-retardant hydraulic fluids (on request):

Various special fluids are tested for the hydraulic buffer LP and released for use. Please note the special marking of the buffer and the additional inserts for order documentation in the individual case!