HYDRAULIC SHOCK ARRESTORS

TECHNICAL DESCRIPTION

incorporating

INSTALLATION and OPERATING/MAINTENANCE INSTRUCTIONS

dutramex pijpbevestigingstechniek

DUTRAMEX BV
P.O. Box 225
4140 AE Leerdam The Netherlands
Tel. +31 (0)345 614011
Fax +31 (0)345 619525
Email: info@dutramex.com

INSTALLATION AND IN-SERVICE INSPECTION PROCEDURE FOR HYDRAULIC SHOCK ARRESTORS

1. Scope

1.1 The following procedure shall be strictly adhered to for the installation of all HS shock arrestors supplied by Carpenter & Paterson.

2. Responsibility

2.1.1 It is the responsibility of Carpenter & Paterson to ensure that each shock arrestor is adequately packed to preclude damage during shipment.

2.1.2 It is the responsibility of installation engineers to perform a pre-installation check as described in Section 3 of this procedure.

2.1.3 Installation engineers shall inform Carpenter & Paterson in writing immediately a defect is identified during a pre-installation check.

2.1.4 Any suspect units shall be quarantined on site until a final disposition has been agreed between customer and Carpenter & Paterson engineering personnel.

2.1.5 Since the correct functioning of hydraulic shock arrestors depends on precision valving and exacting tolerances, care shall be exercised by all personnel to ensure that each unit is protected from damage during transit and also during storage and installation.

3. Pre-Installation Check

3.1.1 Visual examination of each shock arrestor shall be carried out to identify any leakage of oil that might have occurred during transit.

3.1.2 Observe that fluid level indicator plunger is between the minimum and maximum position indicated on indicator plunger (Fig 1).

If the plunger is below the level indicated as minimum on the plunger the unit shall be topped up as per Section 6 of this procedure.

3.1.3 Check the unique mark number stamped on the end block of each unit against all relevant contract documentation.

3.1.4 The mark number described in Section 3.1.3 is also marked on all materials used with the unit concerned and is either hard stamped on each piece or wire tagged.

3.1.5 Each shock arrestor shall be identified against either a detailed drawing of the completed assembly showing the location, identification and pin to pin dimension or the relevant section of a Carpenter & Paterson catalogue.

3.1.6 Piston rod setting shall also be checked as detailed in Section 4 of this procedure.

4. **Design**

4.1.1 The unit comprises an internally ported hydraulic cylinder fitted with a flow control valve and fluid reservoir. During operation the piston is free to move unrestricted in either direction for piston velocities of 5mm/sec or less. For velocities greater than 5mm/sec the piston will lock and the unit will act as a rigid strut. This velocity is greater than any operational/thermal growth and less than the velocity of any normally anticipated disturbing force.

4.1.2 During the pre-installation check (Section 3) or when adjustment of piston stroke is required, care shall be taken to avoid applying a sudden force, otherwise the unit will lock. To prevent locking of units during these conditions only gradual forces shall be applied. The locking of units will occur in both compression or tension if a sudden force is applied. If the locking occurs a reversal of the force applied gradually will unlock the unit.

4.2.1 A spring loaded fluid reservoir ensures safe installation of the unit at any angle or position.

4.2.2 Fluid level is indicated by a round plunger extending out of the rear of the reservoir (Fig 1).

4.3.1 Units are shipped from Carpenter & Paterson complete, tested, inspected and the reservoirs filled to the level required.

4.3.2 Carpenter & Paterson shock arrestors have been efficiently designed to minimise field adjustment, therefore when units are required for use in a specific (Mark No.) installation the piston rod is pre-set and clamped at the correct cold installed stroke position. Unless otherwise specified the installed stroke position of the piston will be so calculated to ensure that the thermal movement will straddle the mid-stroke position of the unit, thus giving equal reserve at each end of the stroke.

4.3.3 It is the company's recommendation that the stroke reserve distance be a minimum of 25 mm.

4.4. If the unit does not have a pre-set clamp the piston rod should be set in accordance with the dimension specified on detail drawing sheet.

4.5.1 A change in piston rod setting is obtained by gently pushing or pulling on the rod, whichever is required. As specified in Section 4.1.2 the force must only be applied slowly in order to prevent the poppet valve from closing and thus causing the unit to lock.

4.5.2 It is recommended that application of force can be attained by using a lever arrangement to offer suitable velocity control.

4.5.3 The lever arrangement described above shall be made from wood or other similar material to prevent any damage to the rod ends.

4.5.4 Care shall be taken not to damage or score the polished surface of the piston rod.

4.5.5 Flat surfaces have been machined near the threaded sections of the rods to facilitate the use of either open or box wrenches when required.

4.6.1 In an installation where calculation thermal movement is small compared to the total stroke it is permissible, at the discretion of the Project Engineer to use part of the reserve stroke to provide for a small amount of installation adjustment.

4.6.2 Installation engineers shall receive guidance from the Project Engineer on a case by case basis, should field adjustment be required.

4.6.3 It is recommended that the stroke reserve be not less than 25 mm, as per Section 4.3.3.

5. **Fluid Topping-up Operation**

5.1.1 The method used for topping up hydraulic shock arrestors (where fluid level indicated is between minimum and maximum level) is by means of a hand compressor with a flexible nipple attachment. Normal addition of fluid does not require an air bleeding operation (See Section 6 for fluid types).

5.1.2 Attach hand compressor to filler nipple. Loosen filler nipple sufficiently to allow fluid to pass check valve. Pump compressor until the fluid level indicator (Fig 1) is in its fully extended position. Finally, tighten filler nipple and remove compressor.

6. **Type of Fluids Used in Shock Arrestors**

6.1.1 The fluid used in shock arrestors containing polyurethane seals is type Dow Corning 200/350.

6.1.2 The fluid used in shock arrestors containing ethylene propylene seals (generally for Nuclear Installation) is type GE.SF.1154 and is supplied direct from America with Certificate of Conformance.

6.1.3 Note: Due to changes in fluid type, confirmation of actual fluid used can be obtained by reference to the snubber nameplate attached to the unit.

7. Installation

7.1 Hydraulic units are supplied from the factory complete as shown in the Carpenter & Paterson catalogue i.e. complete with a spherical bearing at each end (Fig 2).

7.2 Establish points on both pipework and structural attachment.

7.3 Bring hydraulic unit into position and check for required overall pin to pin dimension which may differ from that shown on the installation drawing because of erection tolerances.

7.4 Any differences should be accommodated by adjusting the structural steelwork attachments and not by compressing or extending the snubber length or by unscrewing the spherical bearing housings.

7.5 Any required relocation of strut attachment to clear an interference should be brought to the attention of the Project Engineer. It is common practice to establish project guidelines on the amount of relocation that will be tolerated providing loading conditions on piping and structure remain similar. Any deviation will be established by the Project Engineer.

7.6 Orientate each attachment as required to ensure that any possible transverse movement of piping at point of strut attachment will be provided for by available angularity displacement of spherical weld or bolt in place as required.

7.7 CAUTION: Care should be exercised during installation to prevent damage to piston and reservoir indicator housing.

8. Welding Requirement

8.1 Welding requirements will conform to approved welding procedures.

9. Post Installation Inspection Procedure

9.1 For units that have been installed in accordance with Sections 1-8, follow steps as outlined in this section.

9.2 Prior to inspection of installed units, ensure that detail drawings are available for all locations having hydraulic snubbers.

9.3.1 Using the appropriate detail drawings and information as described in Section 3.1.4 and 3.1.5, check for the following:-

9.3.2 General orientation of unit for inspection purposes.

9.3.3 Check pin to pin dimension.

9.3.4 Ensure piston rod and threaded adaptor are completely engaged within their rod ends.

9.3.5 Ensure welds are in accordance with Section 8.

9.3.6 Remove shipping clamp from piston rod.

9.4.1 If, upon checking, unit pin to pin dimension is not in accordance with detail drawing or other discrepancies are note, it should be brought to the attention of the Project Engineer.

9.4.2 Upon determination of the amount of deviation from the detailed drawing, if adjustment is required, adjustment should be made in accordance with section 7.4.

9.4.3 NOTE: Field adjustment should be made in accordance with Section 4.6.1 "Installing personnel will receive guidance from the Project Engineer on a case by case basis should field adjustment be required".

9.4.4 It is recommended that the stroke reserve should not be less than 25mm.

10. **In-Service Inspection Programme**

10.1.1 It is recommended that all hydraulic shock arrestors in-service shall be subject to a full visual inspection programme and physical check once per year.

10.1.2 Shock arrestors for nuclear containment areas shall also be subjected to a full visual and physical inspection programme once per year as a minimum requirement.

10.1.3 Additional inspection shall also take place on any units which may have participated in any unusual shock occurrence involving known damage to piping or equipment of any units that are subjected to suspect environmental conditions.

10.1.4 Each inspection programme shall be fully documented and include as a minimum requirement the following points:

10.2.1 Each shock arrestor shall have its oil level indicator tube visually checked to determine oil level.

10.2.2 It should be noted that some oil will be used during the normal functioning of the unit and may need replacing during the annual inspection (see section 5).

10.2.3 If the oil level indicator shows excessive loss of oil the visual inspection shall continue until the point of leakage has been determined.

10.2.4 Leakage point, if any, shall be recorded and the necessary action taken.

10.3 All units that have been topped up with fluid shall be quarantined for 24 hours prior to re-inspection for oil leaks.

10.4 Each unit shall be visually inspected for external damage and/or corrosion.

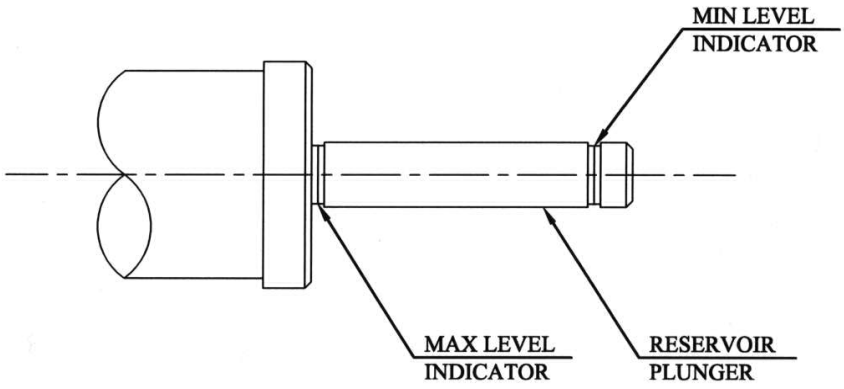
MIN LEVEL
INDICATOR
MAX LEVEL
INDICATOR
RESERVOIR
PLUNGER

FIG. 1

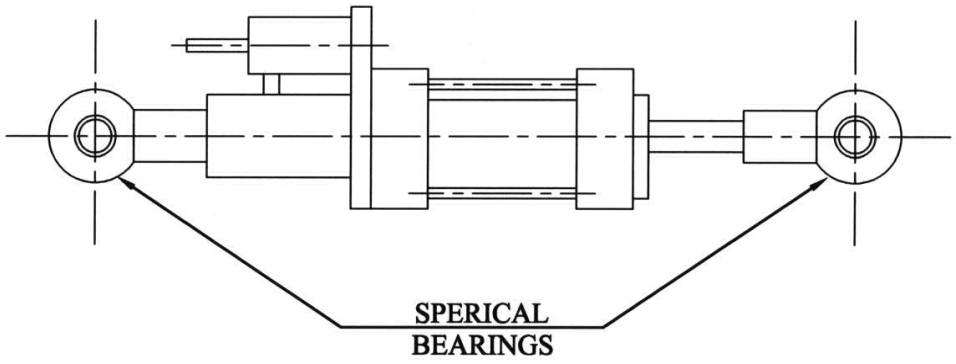
SPERICAL
BEARINGS

FIG. 2