Health and Safety Executive

Failure of a road tanker pressure/vacuum relief valve

Health and Safety Executive - Safety alert

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Introduction

This safety alert is aimed at haulage contractors, users of tank containers and road tankers, companies servicing pressure/ vacuum relief valves and authorised inspection bodies contracted to verify the functioning of these valves.

Tank containers and road tankers used for flammable, corrosive and toxic liquids and gases will normally have a valve fitted to prevent damage to the tank from changes in the internal pressure. Haulage containers used for less hazardous liquids and gases may also have a valve.

Following a road incident in April 2020, investigations by Cleveland Police and HSE found evidence that a pressure/vacuum relief valve, originally manufactured by Fort Vale Engineering Ltd, had been modified by a third party. The valve cap had a nut welded to the top, most likely to allow it to be serviced without the use of a special tool to remove the valve cap. The unauthorised modification prevented the valve's safe operation.

Figure 1

Figure 2

Figure 1 A new 2.5-inch combined pressure/vacuum relief valve

Figure 2 The same type of valve with an unauthorised modification and the locking grub screw missing.

The welded nut prevented the free movement of the valve stem and resulted in the valve sticking in an open position. In this incident, the correct action by the vehicle driver minimised the release of hazardous vapour and prevented any harm to people or damage to property.

Background

In April 2020, the driver of an HGV hauling nitric acid noticed vapour coming from the tanker barrel in the area of the pressure/vacuum relief valve. He stopped at the roadside and rang the emergency services. Police closed the road and it remained closed until the tanker barrel had been fitted with a

replacement valve. The tanker continued the short distance to its intended destination where it was safely discharged. There were no injuries or property damage although the road closure will have affected people and businesses nearby.

During what should have been a momentary operation to vent the road tanker, the vacuum relief element of the valve became stuck in an open position allowing an uncontrolled escape of hazardous vapour. The relief valve fitted to the tanker barrel had been modified in a way that made it unsafe. The flanged bolt on the end of the valve stem had been removed and a nut had been welded to the valve cap. The end of the valve stem was able to catch on the thread inside the nut, preventing the vacuum relief element of the valve from closing.

It is likely that this modification was made when the valve was removed for routine servicing. The addition of the nut allows the valve cap to be unscrewed without using a special tool. Some valves fitted to other road tankers operated by the same haulage contractor were found to have the same potentially dangerous modification.

The HSE investigation also noted:

- The removal of the vacuum valve stem top bolt could allow the valve to open so far that the stem fouls on the valve cap itself, this will also prevent the valve from closing
- The locking screw in the side of the valve body had not been replaced after the valve was reassembled after servicing. This locking screw prevents the valve cap rotating, which will change the pressure retaining capability of the valve
- The valve was being serviced less frequently than suggested by the manufacturer
- The valves vacuum protection function was not being routinely tested before refitting

The valve shown above is manufactured by Fort Vale Engineering Ltd (who are not implicated in any way). Unsafe modifications may also be applied to similar devices by other manufacturers.

Action required

Users of tank containers (iso-tanks) and road tankers used for carriage of dangerous liquids and gases

Users should visually inspect the pressure/vacuum relief valves fitted to tank containers and road tankers. The inspection should establish if there have been any unauthorised modifications made to the valve, particularly items added to the valve to allow for easier dismantling.

- People doing the inspection should refer to the original manufacturers design information to confirm the valve layout
- It is normally not necessary to remove or dismantle the valve to carry out a visual external inspection
- Safe access for working at height may be required if not already fitted to the tanker

Authorised inspection bodies

Inspectors witnessing pressure testing of tanker relief valves may need further information and training so they can visually identify unsafe modifications made to valves.

Where valves have both a pressure and vacuum relief function, then both the over-pressure and under-pressure safety functions should be verified during the pressure test.

Companies servicing pressure safety valves

Anyone working on relief valves should be competent to do so. Valves should be serviced following the valve manufacturer’s guidance. Valves should not have temporary nor permanent modifications in order to by-pass the need for special tools to carry out the work. Where a modification is felt necessary, the valve manufacturer or similar competent person should be consulted.