

## Health and Safety Executive Safety Alert

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### Failure of Residual Pressure Valves (RPV) manufactured by Ceodeux Indutec for Transportable Gas Cylinders

1 This alert provides information, which is relevant to fillers and testers. It is concerned with cylinders which are or have been used for mixed gases and fitted with Residual Pressure Valves (RPV) manufactured between 1997 and 2004 by Ceodeux Indutec (part of the Rotarex Group) **This alert does not cover valves manufactured since 2005.**

#### Background

2 Residual Pressure valves have become the standard for all mixed gas cylinders over the last few years due to problems in the beverage gas industry where liquids could be allowed back into the cylinder causing corrosion and occasionally premature failure. The Residual pressure valves were designed to overcome this problem by leaving pressure in the cylinder, which would prevent contamination. The Ceodeux valve has been widely used in the industry since 1997.

During 2002 a number of these valves manufactured from 60/40 brass failed during filling, with the residual pressure valve being ejected due to failure of the retaining plug. The failure mechanism has been identified as Stress Corrosion Cracking (SCC) however the root cause of the SCC has not been identified but filling with mixed gases appears to be a common factor. SCC is the conjoint action of stress and a corrosive environment which leads to the formation of a crack. Use of non-adequate filling adaptors contribute to exceed stress.

Since these first failures a number of valves, previously in welding gas use, have either failed on filling (with oxygen) or exhibited signs of SCC when removed from service and examined.

The design of the valves was changed slightly since 1997. The style and size of the plugs vary:

- Generation 1 valves until 2001 have a plug with a triangular slot or an hexagon 17 mm
- Generation 2 valves between 2000 and 2004 have a 14 mm hexagon plug
- Generation 3 valves since 2005 have a 14 mm hexagon plug

**This alert does not apply to 14mm hexagon plugs.** More details on types of valves are given in Annex 1.

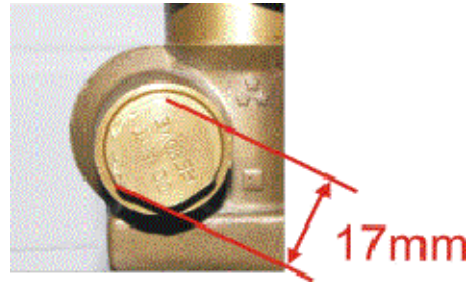
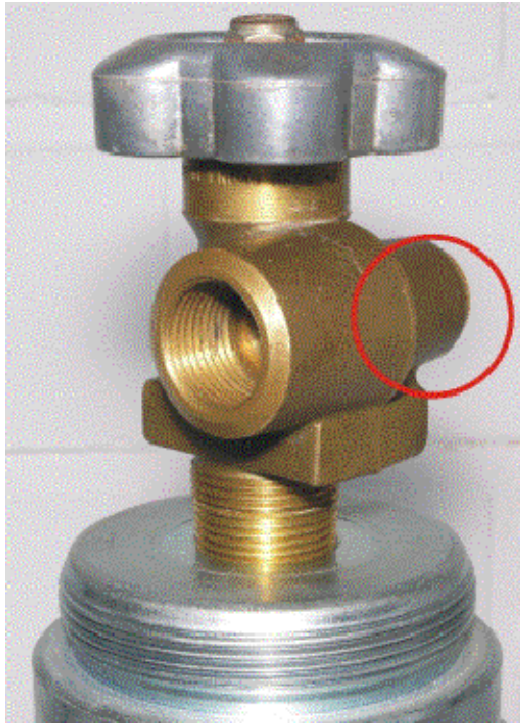
HSE is concerned that valves from generation 1 manufactured between 1997 and 2001 with the triangular or 17mm plug might fail during a **filling operation** and that this could result in a major injury or fatal accident. **Valves from generation 2 manufactured between 2000 and 2004 with the 14mm plug are currently undergoing further tests and information on the results of these tests will be issued to clarify if any further action is required.**

### **Action required**

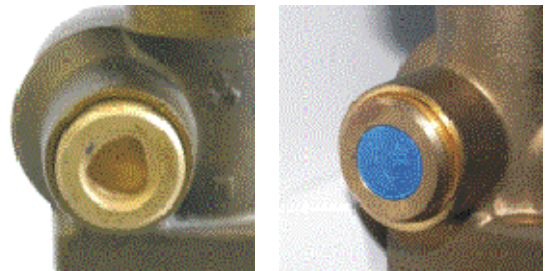
**3 All fillers and Testers** of Gas cylinders should take action to remove from service all cylinders fitted with valves with triangular or 17mm plugs manufactured, between 1997 and 2001, at the next fill. These cylinders can either have valves suitably modified or have the valves removed and replaced with new ones. Any modification must be tested and approved to the relevant standards to ensure the valves are safe for users and operators (e.g. self tapping steel protection cap approved by notified body and manufacturer). The duty holder should be drawn up a plan to ensure that all these valves are modified or replaced as soon as possible. This action applies to all gas cylinders not just beverage gas as often the use of cylinders is changed and there have been failures of valves that were not at the time of failure in mixed gas use. The list below gives an indication of the types of markings that can be found.

# Annex 1

## Identifying marks



17 MM Hex RPV plug



Triangular recess type plug (with and without plastic cap)



3 Stars and markings on valve with plug removed



Markings can be obscured by valve handle

## **The key marks are the series number 984502 and C510..... and RPV 212**

Examples of markings and type of plug used.

1999 – 984502 – BS341-3-BS341-25T RPV 212 Plug has triangular recess normally covered by blue plastic plug embossed with 3 Ceodeux stars

2000 - 984502 – BS341-3-BS341-25T RPV 212 Plug has triangular recess normally covered by blue plastic plug embossed with 3 Ceodeux stars

Up to 07/ 2001 - 984502 – BS341-3-BS341-25T RPV 212 Plug has triangular recess normally covered by blue plastic plug embossed with 3 Ceodeux stars

After 08/2001 - 984502 – BS341-3-BS341-25T RPV 212 Plug has **17mm** hexagonal brass head stamped **DO NOT REMOVE**

### **No action currently required on valves with the following markings:-**

12/2001, stamped C51000056-RPV212- **(Pi mark / CE29)** -BS341-3-BS341-25T EN849 25E. With a **14mm** brass hexagonal head stamped '**DO NOT REMOVE**'. Body embossed with the 3 Ceodeux stars.

2002 – C51000056 - BS341-3-BS341-25E- EN849 - RPV 212 – (Pi mark + 29) Plug has **14mm** hexagonal brass head stamped ,'**DO NOT REMOVE BP**'. Valve body now embossed with the 3 stars.

10 / 2002 – C51000056 - BS3-25E- EN849 - (Pi mark + 29) Plug has **14mm** hexagonal brass head stamped ,'**DO NOT REMOVE**'. The stamping is on a slightly raised circle on the head of the plug. Valve body embossed with the 3 stars.

2004 – C51000056 - BS3-25E- EN849 - (Pi mark + 29) Plug has 14mm hexagonal brass head stamped ,'**DO NOT REMOVE 03/04**'. The stamping is on a slightly raised circle on the head of the plug. Valve body embossed with the 3 stars.