Title: TANK VALVE TESTING METHOD, VALVE AND KIT

Abstract: A rollover pressure/vacuum relief valve (10) is tested using a kit (150) and an actuation device (100). The valve comprises a valve body (18, 20) and a rollover gravity element (52), which actuates the valve when the orientation of the valve body changes with respect to gravity. The actuation device comprises a valve body engagement member (102) and a rollover gravity element engagement part (104). The device is used when testing the tank by connecting an adaptor (152) to an outlet (16) of the valve. A conduit (156) connects the adaptor to a test unit (160) which alternately pressurises the outlet to test the vacuum relief function (32), and evacuates the outlet to test the pressure relief valve function (22), and, subsequently, the efficacy of the rollover valve member (60, 62). The valve has a circumferential groove (29) to seat a spring clip (202) of a weather cap (200), which clip facilitates connection and removal of the cap from the valve.
Tank Valve Testing Method, Valve and Kit

This invention relates to volatile fuel storage tanks and pressure/vacuum relief valves therefor, and a method and kit for testing the valves thereof. In particular, although not exclusively, this invention relates to transportable tanks wherein said valve incorporates a rollover shut-off mechanism.

Pressure/vacuum relief valves are known that pop open when a given pressure difference on either side of the valve is exceeded. This can occur when temperatures rise or when the liquid, typically hydrocarbon fuel, is agitated - such as tends to occur during transport. Pressures can also rise during filling. On the other hand, during drainage of the liquid (or indeed, after cooling or settling of the liquid) a vacuum situation can pertain in the tank. Then ambient air should be permitted to enter the tank to relieve the vacuum.

It is also known to provide a rollover mechanism for such valves that automatically closes the valve in the event that the tank is toppled. This is necessary because the action of rolling over will always result in the pressure difference mentioned above being exceeded and the pressure relief valve opening. That can lead to loss of fuel.

Finally, a fire engulfment valve is disposed in the tank to open when the pressure difference across the valve exceeds a higher threshold pressure. Normally, this valve is not operated because the pressure/vacuum relief valve will operate first. However, in a rollover situation the pressure relief valve will be closed by the rollover mechanism. However, should a fire, for example,
outside the tank cause excessive heating of the liquid therein, this could result in catastrophic rupture of the tank. Thus a fire engulfment valve is arranged to open first. In this event there is a controlled escape of pressurised liquid/vapour which, although undesirable in itself, is clearly the lesser of two evils.

New British Standard BS EN 12972/2001 requires regular testing of tanks and the aforementioned valves, as well as of the integrity of the seals between such valves and the wall of the tanks.

Hitherto, it has not been feasible to test such valves in situ. Instead, they are removed for testing in a workshop/laboratory where they are fitted in the wall of a chamber that can be pressurised or evacuated to check actuation of the valve at the appropriate pressure differentials.

Our co-pending application number 0206683.5 discloses a device that enables a particular form of rollover valve to be tested in situ. That invention is predicated on the fact that, although such valves are almost invariably contained primarily within the confines of the tank, they are also usually located adjacent an access cover. Consequently, a device claimed in that application can be implemented to displace the rollover mechanism and simulate closure of the valve in a rollover situation. Thus the valve can be tested in situ by pressurising the tank.

However, that application also appreciates that, instead of pressurising and evacuating the tank to test the different functions of the valve, a connection may be made to the outlet of the valve on the outside of the
tank so that the high and low pressures can be applied on the outlet side of the valve, so avoiding the necessity to pressurise and evacuate the entire content of the tank.

Such a method cannot be employed, at least in respect of testing the rollover function, with valves that do not have the features of the rollover valve with which that application is primarily concerned. Those valves need to be tested in the traditional way.

It is an object of the present invention therefore to develop the method disclosed in the aforementioned application and provide a kit for testing valves more generally. The present invention is predicated on the fact that pressure/vacuum relief valves and rollover valves in tanks to which the present invention relates, are actuated at pressure differentials less than one bar. It is also predicated on the fact that such valves invariably have an outlet port for connection to a flanged aperture in the wall of the tank.

In accordance with a first aspect of the present invention, there is provided a method of testing a pressure/vacuum relief valve in a transportable tank, which method comprises the steps of:

a) connecting an adaptor to the outlet port of the valve;
b) providing a source of fluid pressure and vacuum to the adaptor, together with a pressure device to measure the pressure in the adaptor; and
c) noting the pressures at which the vacuum relief and pressure relief functions of the valve operate.
Preferably, the valve is also a rollover valve and said method further comprises the steps of:

d) disconnecting and removing the valve from the tank;

e) tilting the valve to actuate its rollover mechanism; and

f) detecting any leak when vacuum is applied to said adaptor.

Step d) above may be performed prior to step a).

In accordance with a second aspect of the present invention, there is also provided a kit to carry out said method, the kit comprising:

a) an adaptor for connection to a pressure/vacuum relief valve;

b) a source of fluid pressure and vacuum to the adaptor; and

c) a pressure device to measure the pressure in the adaptor.

Said adaptor may be integral with said source. Preferably, however, it is a separate component, a plurality of different ones thereof being provided, each adapted for connection to the outlet of a different form of pressure/vacuum relief valves.

A flexible conduit preferably connects said source and measurement device to said adaptor, whereby relatively remote testing of the valve is feasible. In this event, said measurement device includes a detection mechanism to detect changes in pressure in the adaptor caused by actuation of the pressure/vacuum relief functions of the valve and/or to detect flow of fluid through the valve caused by leakage through the valve.
Such a detection mechanism may be provided in any event.

In a third aspect, the present invention provides a method of testing a transportable volatile fuel tank comprising:

a) a tank defined by a wall thereof;
b) an inspection aperture;
c) a closure for said aperture; and
d) a rollover pressure/vacuum relief valve having a valve body and a gravity element adapted to close the valve in the event of displacement of the tank from a normal operational position, the valve body including a valve outlet projecting through the wall; and said method comprising the steps of:

i) connecting an adaptor to the valve outlet;
ii) providing a source of fluid pressure and vacuum to the adaptor, together with a pressure device to measure the pressure in the adaptor;

iii) opening said inspection aperture;
iv) manually activating said gravity element to close said relief valve; and

v) evacuating said adaptor to detect any leakage through said relief valve.

Preferably, before step iii) above, the method also comprises the steps of:

vi) evacuating said adaptor to detect the pressure differential across the valve at which said pressure relief valve operates; and/or

vii) pressurising said adaptor to detect the pressure differential across the valve at which said vacuum relief valve operates.

When said tank further comprises
e) a fire engulfment valve,
said method further comprises the steps of:
viii) closing said inspection aperture; and
ix) pressurising said tank to detect any leakage through said relief valve and fire engulfment valve, and any other part of the tank, and to detect the pressure at which said engulfment valve actuates.

This method avoids the need to pressurise the entire tank twice because the functionality of the rollover and pressure/vacuum relief functions of that valve are tested externally of the tank.

Preferably, said manual activation of said gravity element is effected by use of a rollover pressure/relief valve actuation device comprising a valve body engagement member, a rollover gravity element engagement part, mounted on said member, bias on the device to urge the rollover gravity element of a rollover pressure/vacuum relief valve into an actuated position thereof when said element part and body member are engaged with said gravity element and valve body respectively and said valve body is in a normal operational position in which said gravity element would not otherwise actuate the valve, and a catch to retain the device in position on the valve.

Preferably, said actuation device is inserted through said aperture prior to engagement with said relief valve.

Another predication on which a different aspect of the present invention is based is the fact that the valves being tested are in region of the tank that is
accessible to the outside, so that the adaptor can be connected to the valve. Being accessible implies that the valve will be open to the environment, and will therefore be provided with a weather cap to prevent rain and snow from entering the mouth of the valve and being drawn into the tank to contaminate its contents. Since the weather cap needs to be removed, it is a further object of the present invention to provide a valve with a quick release weather cap.

In accordance with this fourth aspect of the present invention, there is provided a pressure/vacuum relief valve comprising a body having a neck for reception in a wall of a tank for volatile liquid, and a weather cap releasably connected to said neck to prevent, in use, ingress of rain or snow into an opening of the valve in said neck, wherein said neck has a circumferential groove and said weather cap is provided with a spring clip to seat in said groove, said clip being actutable from outside the valve and the weather cap to disengage the clip from said groove and permit removal of the weather cap from the neck.

Such an arrangement provides a simple and quick access to the valve so that time is not wasted dismantling the weather cap from the valve.

Preferably, said neck is threaded and a nut is screwed thereon to captivate the lip of an aperture in the wall of the tank between the nut and a shoulder at the base of said neck, said circumferential groove being formed in said nut.

Preferably, said nut is castellated and said weather cap is seated on peaks of said castellations, the
castellations providing for ingress and egress of vapour through the valve.

Preferably, said spring clip comprises a spring wire fixed at a first end thereof to the weather cap and defining a polygon centrally around an axis of the cap, the other end crossing the first end and between them forming grip elements that can be squeezed together to expand said polygon, which polygon, in an unstressed position, has sides in which a circle slightly smaller than the base of said circumferential groove fits, and in a squeezed-together position has sides through which said nut can pass. The polygon may be a square.

The invention is further described hereinafter, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a section through a rollover pressure/vacuum relief valve, held in an actuation position by an actuation device, and having connected to it a kit in accordance with the present invention;

Figure 2 is a similar view to Figure 1 but with a different embodiment of kit and with the valve demounted from a vehicle tank;

Figures 3a, b and c are different views of a weather cap and castellated nut; and

Figure 4 is a side section through a weather cap and castellated nut forming part of a valve in accordance with the third aspect of the present invention.

With reference to Figure 1, a rollover pressure/vacuum relief valve 10 is shown. This has a shoulder 12, an O-ring seal 14, and a threaded outlet 16. The outlet 16 is inserted through a hole in a top wall 17 of a tank and is secured therein by a threaded and
castellated nut 19. In normal use, a weather cap (not shown) is screwed into the threaded bore 21 of the nut to prevent rain entering the outlet. The castellations 23 of the nut permit the valve to breathe. Alternatively the weather cap can be connectable to the nut 19 by any convenient and releasable means. One preferred mechanism is described further below with reference to Figures 3 and 4.

The bulk of the valve 10 is within the confines of the tank.

The valve 10 comprises a hollow valve body 18 terminating in a skirt 20. A plunger 22 performs both vacuum and pressure relief functions of the valve 10 in a manner known in the art and not explained further herein. Should the pressure in the valve body exceed a low threshold limit (about 100 mBar) then the plunger 22 pops up, permitting venting of the tank around the plunger 22.

In the event of a vacuum developing in the tank, a vacuum seal element 32 is provided in the plunger 22. This relieves the vacuum by action of atmospheric pressure opening the element 32 against the pressure of a return spring (not shown).

A rollover mechanism 50 comprises a pendulum 52 pivotally mounted in a plate couplet 54. When gravity deflects the pendulum 52, it pivots in the couplet 54 and presses a seal element 60 against a seat 62 in the valve body 18.

Thus, when a tank incorporating the pressure/vacuum relief valve 10 in a horizontal top wall is tilted from its normal operational position, the seal member 60 is
pressed against seat 62 closing the valve 10.

Also shown in Figure 1 is a valve actuation device 100. The actuation device 100 comprises a body member 102 and a gravity element 104. The gravity element 104 is mounted through studs 106 and dowels 108 and urged apart by springs 110.

The body member 102 is provided with a fork 112 adapted to engage anywhere around the periphery of skirt 20 of the valve 10. Before the fork 112 can be engaged with the skirt 20, the pendulum 52 must be displaced slightly in order to permit access of the fork to the inside of skirt 20. During insertion, the gravity element 104 is pressed against the body member 102, compressing the springs 110. When the fork 112 is fully inserted around skirt 20, catch 70 on gravity element 104 engages the pendulum 52. When gravity element 104 is released, springs 110 push it leftwardly in the drawing and displace the pendulum 52 sufficiently far to engage seal member 60 with its seat 62.

In the position shown in Figure 1, the actuation device 100 is retained in engagement with the valve 10 by the catch 70. It can only be released therefrom by compressing the gravity element against the body member so that catch 70 can escape from pendulum 52 and the fork 112 be withdrawn from engagement with the skirt 20.

To test the valve 10, a test kit 150 is applied to the valve 10. Firstly the weather cap (not shown) is removed from its connection to nut 19. Then an adaptor 152 is screwed into the nut 19. An O-ring seal 154 is disposed between the adaptor and top edge 154 of the outlet 16. A seal between the adaptor 152 and outlet 16
is thereby effected.

A flexible conduit 156 connects the adaptor 152 with a test unit 160, which comprises a compressor (not shown), a direction switch 162 and a pressure gauge 164. The pressure measures the pressure in the conduit 156, which is in fluid connection with the outlet 16.

To test the operation of the vacuum seal 32, the rollover mechanism 150 is placed in its normal working position (not shown) in which the pendulum hangs vertically and the seal member 60 is open. An access port, shown schematically at 166 in the wall 17 of the tank, is opened. In this position, the space under the vacuum seal 32 is at the same, atmospheric pressure as at a vent E of the unit 160. The pressure gauge 164 is then calibrated to a zero position, meaning zero pressure differential across the vacuum seal 32.

Switch 162 on the test unit 160 is then turned to position H in which, when the compressor is operated by pressing button 168, draws air through vent E and controllably and selectively pressurises conduit 156 and the space above plunger 22. The button 168 is held open until the pressure differential across seal element 32 approaches the design actuation pressure of that element. The button is then released and any subsequent drop in pressure is detected on the gauge 164 (and possibly by a separate flow detector indicated by signal element 170) to identify a leak past either the vacuum seal 32 or, indeed, the pressure seal 22. In either event, the valve 10 is then removed for service and/or replacement with an operational valve.

If no leak is detected, the button is again pressed
increasing further the pressure in the conduit 156. Eventually, the vacuum seal 32 is opened and the pressure rises no further. The pressure at which this occurs (typically about 20 mbar pressure differential) is noted and if it differs from the appropriate design pressure, the valve is removed and serviced and/or replaced. Switch 162 is then turned to its central position at which conduit 156 is connected to atmosphere E.

To test the pressure relief valve 22, the above procedure is repeated except that switch 162 is turned to position L. Here, when button 168 is pressed, the compressor draws air from conduit 156 and expels it to atmosphere E. The gauge 164 then measures a negative pressure differential across the valve 10. Button 168 is released just below the pressure at which the plunger 22 is designed to operate and, again, any leak, past either the vacuum seal 32 or plunger seal 22 is detected. If found, the valve is removed, as before. Subsequently the pressure differential is further reduced until the plunger 22 is pushed from its seat by the atmospheric pressure below and any marked difference from the design pressure (typically 100 mbar) at which this occurs is noted, and, if detected, the valve is removed.

Finally, to test the rollover mechanism, actuation device 100 is applied through the aperture 166 and engaged with the pendulum 52 to move it to the position shown in Figure 1. Access aperture 166 remains open. Assuming switch 162 has been returned to its central position and the pressures on either side of the valve 10 equalised, and gauge 164 zeroed, switch 162 is again turned to position L. Greater vacuum is then applied up to about 200 mbar differential, and again, any leak is noted and, if detected, the valve is removed and serviced.
or replaced.

Finally, to test the fire engulfment valve (not shown) and the general fluid tightness of the tank, the aperture 166 is closed (leaving the actuation device 100 in place), and the tank pressurised using an external source. Any leaks are detected (by means not shown), and the pressure at which the engulfment vale opens is noted.

Turning to Figure 2, a rollover pressure/vacuum relief valve 10' is shown removed from a vehicle tank. Although shown as having the same design as the valve 10 of Figure 1, it could have any design as presently commercially available. All known valves have a threaded outlet 16' of one description or another, and the present invention contemplates removing such valves from the tank and testing them either in the workshop/laboratory or, preferably, in the field.

For this purpose there is required a number of different adaptors 152' having connection features appropriate for the different kinds of valve 10' that are available. Each adaptor is provided with a port 180 to releasably receive a coupling 182 on the end of conduit 156. The coupling 182 and port 180 can be of any convenient design provided it is releasable and forms a fluid tight connection between the adaptor and conduit. Indeed, the adaptor may be fixed in the conduit 156, and it is between the conduit and the test unit 160 that a releasable connection is provided. However, this duplicates the conduit as many times as there are different adaptors. In fact, the conduit should be reasonably long, so that, when the valve can be tested in situ, probably on the top of a fuel tanker, the test unit can remain at ground level, possibly in a van in which it
is transported. In this event, there would be little sense in duplicating the conduit.

However, it may not always be possible to test the valve in situ. For example, its outlet may not be accessible to the adaptor while the valve is connected to the tank. Also, if internal access to it cannot be gained from the outside of the tank, or if its rollover mechanism cannot be artificially actuated, as described above with reference to Figure 1, then testing in situ will not be possible. In this case it is necessary to remove the valve from the tank. However, with the appropriate adaptor 152', the test method described above can be employed. The only difference is that the rollover mechanism is tested simply by tilting the valve 10' so that it is gravity that actuates the rollover mechanism.

It is envisaged that the source of compressed air and vacuum discussed above may comprise the normal workshop supply of compressed air, typically at 6 bar, and a venturi arrangement to create vacuum. That, and a regulator to control the pressure, and valves having the requisite degree of sensitivity and selectivity, can all be disposed in a brief-case sized compartment. The compartment on the end of a compressed air hose, can be taken by a user onto tankers for testing valves in situ and this will generally require only one visit to the top of the tanker.

Referring to Figures 3 and 4, the castellated nut 19 is shown in more detail. It is cylindrical and internally threaded at 21 to fit on the neck 16 of the valve 10. Notches 25 are formed from the base of the castellation slots 23, and these enable a C-spanner to be
employed to tighten and loosen the nut 19 on the neck 16. Peaks 27 of the castellations 23 normally support a weather shield 200. The weather shield 200 is a domed cap that prevents rain and snow and other contaminants from entering the threaded bore 21 of the castellated nut 19 and fouling the operation of the plunger arrangement 22.

To retain the cap 200 in place, a spring clip 202 is provided comprising a bent spring wire formed into a polygon shape, shown as a square in Figure 3c. One end 205 of the wire clip 202 is fixed to the centre of the weather cap by a nut and bolt 204. The wire bends around the dome of the weather shield 200 forming, at the edge thereof, a first grip element 206. The wire then is formed into a square 208 underneath the cap 200. The square 208 is centred on the axis of the shield 200, where the nut 204 is located. The wire 202 crosses itself at the fourth corner of the square 208 and forms a second gripping element at its end 210.

The nut 19 is provided with a circumferential groove 29 and the square section 208 of the spring clip 202 has sides slightly less than the diameter of the base of the circumferential groove 29. However, when the grip elements 206, 210 are squeezed together by a user, the square section 208 is distorted so that the distances between its sides are greater than the diameter of the nut 19. Moreover, the depth of the square section 208 with respect to the end 205 of the spring clip 202 under the bolt 204, is such that, as shown in Figure 4, the shield 200 is seated on the castellation peaks 27 when the spring clip 202 is engaged with the circumferential groove 29. Indeed, the separation is slightly less than the height of the castellation peaks 27 above the groove
29, so that the shield 200 is pressed slightly against the castellations 27 to prevent rattle when in position. A rubber pad may be disposed between them to further reduce any tendency to rattle, if desired.

The use of a polygonal shape of the spring 208 is advantageous so that the clip grips the base of the groove 29 at three or more places, again having the effect of reducing any tendency to rattle.

Although shown attached to the outer side of the shield 200, the end 205 could equally be attached on the underside of the shield 200, and extend through one of the castellations 23 when in position. However, this would make the grip elements 206,210 slightly less conveniently visible and less easily grasped by a user.

The great advantage of the present arrangement is that removal and replacement of the weather shield is extremely straightforward, so that a minimum of effort is required to get the testing procedure described above under way.
CLAIMS

1. A method of testing a pressure/vacuum relief valve in transportable tanks, which method comprises the steps of:
   a) connecting an adaptor to the outlet port of the valve;
   b) providing a source of fluid pressure and vacuum to the adaptor, together with a pressure device to measure the pressure in the adaptor; and
   c) noting the pressures at which the vacuum relief and pressure relief functions of the valve operate.

2. A method as claimed in claim 1, in which the valve is also a rollover valve and said method further comprises the steps of:
   d) disconnecting and removing the valve from the tank;
   e) tilting the valve to actuate its rollover mechanism; and
   f) detecting any leak when vacuum is applied to said adaptor.

3. A method as claimed in claim 2, in which step d) is performed prior to step a).

4. A kit to carry out a method as claimed in claim 1, 2 or 3, the kit comprising:
   a) an adaptor for connection to a pressure/vacuum relief valve;
   b) a source of fluid pressure and vacuum to the adaptor; and
   c) a pressure device to measure the pressure in the adaptor.
5. A kit as claimed in claim 4, in which said adaptor is integral with said source.

6. A kit as claimed in claim 4, in which said adaptor is a separate component to said source, a plurality of different ones thereof being provided, each adapted for connection to the outlet of a different form of pressure/vacuum relief valves.

7. A kit as claimed in claim 4, 5 or 6, in which a flexible conduit connects said source and measurement device to said adaptor, whereby the valve can be tested relatively remotely from the source.

8. A kit as claimed in any of claims 4 to 7, in which said measurement device includes a detection mechanism to detect changes in pressure in the adaptor caused by actuation of the pressure/vacuum relief functions of the valve and/or to detect flow of fluid through the valve caused by leakage through the valve.

9. A method of testing a transportable volatile liquid tank comprising:
   a) a tank defined by a wall thereof;
   b) an inspection aperture;
   c) a closure for said aperture; and
   d) a rollover pressure/vacuum relief valve having a valve body and a gravity element adapted to close the valve in the event of displacement of the tank from a normal operational position, the valve body including a valve outlet projecting through the wall; and
said method comprising the steps of:

i) connecting an adaptor to the valve outlet;

ii) providing a source of fluid pressure and vacuum to the adaptor, together with a pressure device to measure the pressure in the adaptor;

iii) opening said inspection aperture;

iv) manually activating said gravity element to close said relief valve; and

v) evacuating said adaptor to detect any leakage through said relief valve.

10. A method as claimed in claim 9, in which, before step iii) above, the method also comprises the steps of:

vi) evacuating said adaptor to detect the pressure differential across the valve at which said pressure relief valve operates; and/or

vii) pressurising said adaptor to detect the pressure differential across the valve at which said vacuum relief valve operates.

11. A method as claimed in claim 10, in which, when said tank further comprises

e) a fire engulfment valve,

said method further comprises the steps of:

viii) closing said inspection aperture; and

ix) pressurising said tank to detect any leakage through said relief valve and fire engulfment valve, and any other part of the tank, and to detect the pressure at which said engulfment valve actuates.

12. A method as claimed in claim 9 or 10, in which said
manual activation of said gravity element is 
effected by use of a rollover pressure/relief valve 
actuation device comprising a valve body engagement 
member, a rollover gravity element engagement part, 
mounted on said member, bias on the device to urge 
the rollover gravity element of a rollover 
pressure/vacuum relief valve into an actuated 
position thereof when said element part and body 
member are engaged with said gravity element and 
valve body respectively and said valve body is in a 
normal operational position in which said gravity 
element would not otherwise actuate the valve, and a 
catch to retain the device in position on the valve.

13. A method as claimed in claim 12, in which said 
actuation device is inserted through said aperture 
prior to engagement with said relief valve.

14. A pressure/vacuum relief valve comprising a body 
having a neck for reception in a wall of a tank for 
volatile liquid, and a weather cap releasably 
connected to said neck to prevent, in use, ingress 
of rain or snow into an opening of the valve in said 
neck, wherein said neck has a circumferential groove 
and said weather cap is provided with a spring clip 
to seat in said groove, said clip being actutable 
from outside the valve and the weather cap to 
disengage the clip from said groove and permit 
removal of the weather cap from the neck.

15. A valve as claimed in claim 14, in which said neck 
is threaded and a nut is screwed thereon to 
captivate the lip of an aperture in the wall of the 
tank between the nut and a shoulder at the base of 
said neck, said circumferential groove being formed
in said nut.

16. A valve as claimed in claim 14 or 15, in which said nut is castellated and said weather cap is seated on peaks of said castellations, the castellations providing for ingress and egress of vapour through the valve.

17. A valve as claimed in claim 14, 15 or 16, in which said spring clip comprises a spring wire fixed at a first end thereof to the weather cap and defining a polygon centrally around an axis of the cap, the other end crossing the first end and between them forming grip elements that can be squeezed together to expand said polygon, which polygon, in an unstressed position, has sides in which a circle slightly smaller than the base of said circumferential groove fits, and in a squeezed-together position has sides through which said nut can pass.

18. A valve as claimed in claim 17, in which said polygon is a square.

19. A pressure/vacuum relief valve of a transportable tank for a volatile liquid, substantially as hereinbefore described with reference to the drawings.

20. A method of testing a pressure/vacuum relief valve of a transportable tank for a volatile liquid, substantially as hereinbefore described with reference to the drawings.

21. A test kit to test a pressure/vacuum relief valve of
a transportable tank for a volatile liquid, or to test such a tank, substantially as hereinbefore described with reference to the drawings.
Fig. 1