‘Screw-Lid’ Vault

SA Patent 2005/06650 (Vault)
& SA Patent application 2015/07179 (Lock & key assembly)

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Following repeated hits by vandals in 2009 on two remote boreholes in Limpopo, WSM Leshika Consulting (Pty) Ltd specified the ‘Screw-lid’ Vault, and subsequent attempts to breach these installations have not succeeded. They are increasingly being specified to protect remote boreholes. The vault is described below:

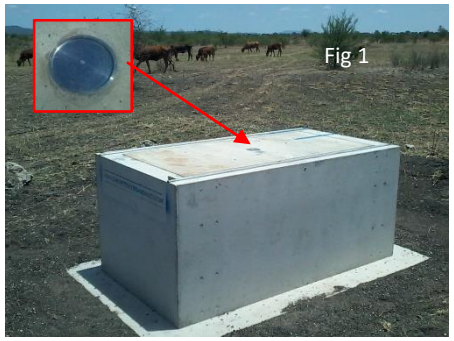
Fig 1


Fig 2


Fig 3


Fig 4


Fig 5

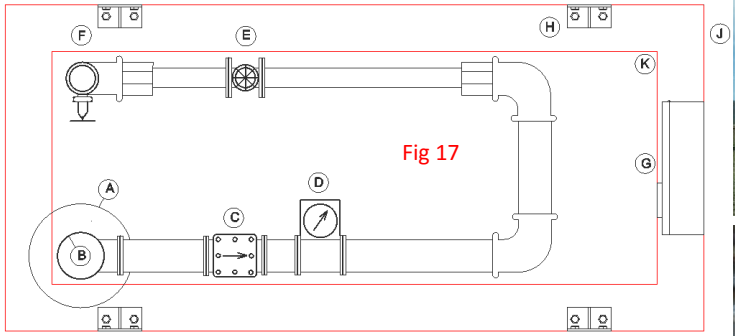

Fig 17

Fig 1 shows a Screw-lid vault installed in a remote rural setting. Essentially it is an elongated box on a base, and closed on top with a liftable lid. The walls are recessed at the top (see fig 6) to receive and support the lid. In the centre of the lid is a hollow tube (see fig 4), the ‘access tube’, which is the way into the vault. This tube is closed off by a central plug (see inset in fig1). The inset in Fig 2 shows the ‘key assembly’ approaching the plug. (It has a retractable key and a magnetic base to facilitate attachment to the plug). With the plug removed (see RHS of fig 2) the ‘lock’ comes into view. Next the key assembly is used to remove the lock (fig 3) and now the access tube is open (fig 4). Now an ‘opening tool’ is inserted into the access tube (see fig 5). This tool consists of a handle connected to a hollow bar that has an external thread. It is lowered into the access tube until it reaches a large brass nut that is housed in the lower section of the access tube (see fig 4). Now the tool’s handle is turned clockwise and in this way it threads its way through the nut until is reaches a ‘female conical bush’ housed centrally in a ‘beam’ (fig 6) (where the lid has been removed to show the beam, which transfers the weight of the lid to the walls via bolted connections). The bottom of the opening tool is also conical (fig 11), the male counterpart of the female conical bush, and with ongoing turning the opening tool seats into the female conical bush. Then with further turning the lid begins to come up out of the walls (see fig 7). (Note there is a thrust bearing arrangement above the tool’s cone to facilitate easy turning). Once the lid is high enough to clear the walls, it is rotated (see fig 8) until it has swung through 90 degrees, whereupon wheels fastened to the underside of the lid (fig 9) will line up with the rails on top of the walls. The lid is now lowered by rotating the tool anti-clockwise, until the wheels come to rest on the rails (fig 10). With continued turning the opening tool exists the female conical bush (fig 11), and now it is possible to push the lid to either end of the vault (fig 12), allowing maintenance to be done (see fig 13) on the pump/valves/pipes/electrical controls, or a meter reading taken. Note that in fig 13 the beam has been unbolted and removed to give more working space in the vault. The vault may be closed by reversing the steps described above.

The lock, key assembly, and the thread of the opening tool are customisable in numerous combinations, allowing each end user to have their own unique locking system. These items are exceptionally robust and are maintenance free. The vaults are factory made (fig 14) from 60MPa concrete, and the reinforcing in the walls and lid consists of multiple layers of Y 12 rebar that are too closely spaced (see fig 15) for a chisel to pass. Installation is by means of a crane truck on levelled and compacted ground fig 16).

It may be seen from item H in fig 17 that the base is connected to the walls by means of four internal brackets - see also fig 6. The walls can thus only be removed from the base if the lid has been opened. Fig 6 also shows that the base has a relatively large central opening, allowing the upstand pipe to be positioned in different positions. By having the upstand pipe in one of the corners, as indicated in fig 17 and fig 6, it is possible to extend the length of the internal piping to accommodate more valves. For example in fig 17 a non-return valve (C), flow meter (D), gate valve (E) and air valve (F) have been fitted. The control panel (G) for the pump should ideally also be housed inside the vault as indicated, and the electrical cables going into the control panel should be harnessed into a loop to allow the panel to be lifted out to do maintenance (see fig 13). Fig 17 (B) is the upstand pipe, covered by the baseplate (A), while (K) is the perimeter of the opening in the base, and (J) is the inside perimeter of the walls.

For other anti-theft products in our range which variously protect valve chambers, pump houses, transformer rooms, sub stations, stand alone control panels, etc, please see www.concretedoorsandvaults.com. All products have robust locking mechanisms, are made from high strength concrete, and are heavily reinforced.


Fig 6


Fig 7


Fig 8


Fig 9


Fig 10


Fig 11


Fig 12


Fig 13


Fig 14


Fig 15


Fig 16