‘Screw-Lid’ Vault

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

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Fig 1


Fig 2


Fig 3

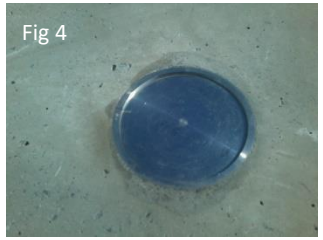
Fig 4


Fig 5


Fig 6


Fig 17

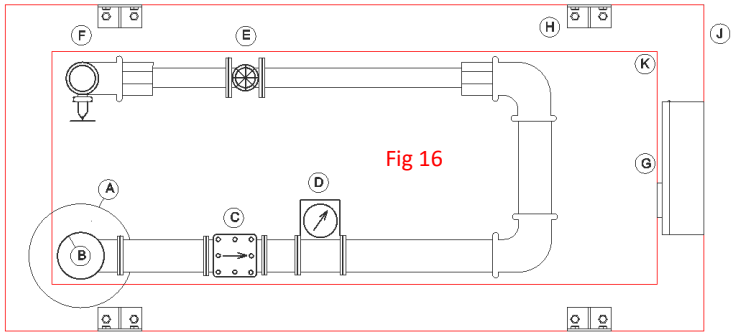

Fig 16

Following repeated hits by vandals in 2009 on two remote boreholes in Limpopo, LSM Leshika Consulting Engineers specified the ‘Screw-lid’ Vault. Subsequent attempts to breach these installations have not succeeded. The vaults come in different sizes and are made from 60MPa concrete. They are increasingly being specified to protect remote boreholes. The vault is described in figures 1 through 17:

Fig 1 shows a Screw-lid vault installed in a remote rural setting, while in fig 2 the vault installed in a village. 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 9) to receive and support the lid. The reinforcing in the walls and lid consists of multiple layers of Y 12 rebar that are too closely spaced (see fig 3) for a chisel to pass.


Fig 15

In the centre of the lid is a hollow tube, the ‘access tube’, which is the way into the vault. This tube is closed off by a plug (fig 4). When the plug is removed (fig 5) my means of the magnetic base of the ‘key assembly’ (RHS of fig 7), a ‘lock’ comes into view further down the access tube (fig 5). Next the key of the key assembly is inserted into the lock, the lock is removed (fig 6) and now the access tube is open. Next an ‘opening tool’ is inserted into the access tube (see fig 8). 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 6). 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 9, 11). The beam is bolted at either end to the walls of the vault (see fig 9 where the lid has been removed to show the beam). The bottom of the opening tool is also conical (fig 8), the male counterpart of the female conical bush in the beam, 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 10). (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 easily rotated (see fig 11) until it has swung through 90 degrees (see fig 12,13), whereupon small wheels fastened to the underside of the lid (see fig 12) will line up with the rails on top of the walls. The lid is now lowered by rotating the tool anti-clockwise this time, until the wheels come to rest on the rails (fig 13). With continued turning the opening tool exists the female conical bush, and now it is possible to push the lid to either end of the vault (see fig 14), allowing maintenance to be done (see fig 17), or a meter reading taken. Note that the beam (fig 9, 13,14) may also be unbolted and removed similar to fig 17 if more working space is required for a major maintenance operation. The vault may be closed by reversing the steps described above.


Fig 14


Fig 13

It may be seen from fig 9,15,16 that the base is connected to the walls by means of four internal brackets. The walls can thus only be removed from the base if the lid has been opened. Figure 9 &15 also show that the base has a relatively large central opening, allowing the upstand pipe to be positioned in numerous different positions. By having the upstand pipe in one of the corners, as indicated in fig 15 and 16, it is possible to extend the length of the internal piping to accommodate more valves. For example in fig 16 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 17). Fig 16 (B) is the upstand pipe, covered by the baseplate (A), while (H) is one of four brackets that connect the base to the walls. (K) is the perimeter of the opening in the base, and (J) is the inside perimeter of the walls.

Note that 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 robust and maintenance free.

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


Fig 7


Fig 8


Fig 9


Fig 10


Fig 11


Fig 12