

The 'Gulper' – a latrine/drain pit emptying pump

Description – The Gulper is a manually operated pump for emptying the contents from wet pit latrines and drain interceptor tanks. The Gulper is constructed from stainless steel: for the puller rod and the valves, and standard PVC pipes and fittings for the main body. The overall dimensions of the Gulper are around 2m long and 90mm diameter riser pipe.

Basic operation: The device is based on a simple direct action type handpump – a butterfly type valve is fitted on the bottom of the puller rod and another is fitted in the bottom of the riser pipe as a 'check-valve'. The pump is operated by either one or two pit emptying operators. The handle is raised and lowered which lifts the contents of the pit up through the riser pipe. This is then discharged through the angle 'T' outlet pipe at the top of the Gulper. This is directed into a container positioned directly below the outlet of the pump (see Figure 1)



Figure 1 - The Gulper – a handpump for emptying latrine pits



Figure 2- Inner valve on the bottom of the puller rod



Figure 3 - Strainer and valve at the bottom of the riser pipe

Why introduce the Gulper in Cambodia?

There is increasing effort and focus on reaching Cambodia's Sanitation targets for the MDG's in Cambodia. The focus and demand is very much on providing latrines (predominantly pour-flush). However there is limited attention on the issue of emptying the pits when they become full and this should be considered in advance. There is good coverage by vacuum tanker service available in the urban areas but this doesn't extend to the provincial villages. Also this service is around \$30/pit emptied which is a considerable sum for low income families. IaW were recently introduced to the Gulper by Stephen Sugden who initially designed the first prototype in Dar Es Salaam, Tanzania. The Gulper was considered as a simple design requiring standard parts available as well as using production processes that could be replicated here in Cambodia. It could also form part of an improved pit emptying service for existing informal pit emptying operators. This method is considered to offer better protection to the operators as it

reduces the operators contact with the pit contents. This should reduce the risk of infection and ultimately from operators being ill and off work as a result.

Flow rates from initial trials

IaW has produced one Gulper so far based on the designs from Tanzania. Initial trials in the workshop have shown that the flow rate of the Gulper is around 3ltr/stroke depending on the stroke length used. If a pit is around 1m diameter and 1.5m deep (sludge) it is anticipated that this could be emptied in approximately 10minutes. Additional time will be required when changing full containers for empty ones.

Cost of the Gulper.

The cost of the first Gulper made was around \$75 this includes material costs, labour, workshop overheads and a small profit. This does cost does not cover any development costs or the production of technical drawings.

Survey and evaluation opportunities:

It is our intention to evaluate the Gulper through existing pit emptying service operators. This way they can provide comparative feedback based on their own experience of emptying pits. Also as there is very little information relating to pit emptying service within Cambodia. This will be an opportunity to question the pit emptying operators about the service they provide in order to better understand what the situation is in Cambodia. Questions will relate to typical pit sizes, time required to empty pits, cost of equipment and the service they provide, the area covered as well as health issues. It is understood that it is common within poorer communities for pits to be emptied by hand (rope and bucket method). This exposes the operators to health risks as the pits are almost always single pits they will contain fresh faeces.

First Gulper trials: Our first trial with the Gulper was carried out in early October 2007 with a father and son who ran an informal service emptying urban drain interceptor pits. They reported that it normally takes around 2-3 hours to empty a full drain pit and this can contain between 2-3m³ of sludge. The sludge is normally removed from the pits by the operators placing themselves in the pit which is often neck deep. Buckets are used to scoop out the septic black sludge from the pit and this is then poured into empty cement bags. These are tied off and left for the municipal waste collection trucks to remove. It is believed these are taken to the municipal landfill sites for disposal. A typical cost for removing sludge from a drain pits is between \$15 and \$20.

The father and son tested the Gulper on a small drain interceptor pit in Toul Kork area of Phnom Penh next to their house. One operator lowered the Gulper to the bottom of the pit and positioned the foot rests on top of the pit in one corner. A cement bag was wrapped around and held on the outlet pipe while the pump was operated, see Figure 4. The volume of sludge lifted per stroke allowed the cement bags to be filled with only a few strokes of the pump. The pit was not fully emptied as this was only a limited trial and accurate flow rates were not obtained for this test. After filling several cement bags the operators reported that in their opinion this method provided at least three distinct advantages over their normal method. Firstly they said that



Figure 4 - First trials of the Gulper on a small drain interceptor pit in Phnom Penh by a father and son team

they did not have to get down into the pit themselves and this kept them and their clothes cleaner. Secondly, they felt that by not climbing into the pit this would further protect them from the risk of disease. Thirdly, that the rate of removing sludge was much faster than their usual bucket method and this would make the time spent at the site less than before. Just from this short trial they considered the Gulper to be very useful and expressed interest in purchasing one unit.

The operators also provided very useful feedback on the unit and how it could be improved. Firstly from their experience the depths of pits they have worked on vary and that a fixed length Gulper would not be practical. They suggested that the design could be improved if short sections (around 0.5m) could be added/removed to suit the varying depths of pits. They also suggested that the clamp/foot rests were strengthened and made longer as these were too thin and short.

Health issues: Both the father and son said that they had not suffered from any illness which they could connect to their work. They remarked that over the last seven years neither of them had suffered from any illness over the last seven years. It was also interesting to hear that it is usual for people who empty pits to apply paraffin over their bodies prior to entering the pit. This is believed to provide protection against infection or disease. This had been recommended to the father and son by someone else who also provided the same type of service.

Further work: the changes recommended in the first trial will be made and additional trials will be carried out over a longer period. Other operators will also be sought and asked to assist with the evaluation of the Gulper and to see if interest is sufficient to start production of more Gulpers and to promote these through the water and sanitation sector/NGO's engaged in this type of work

Funding opportunities?

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