Wear Mechanisms of Piston Seals for reciprocating handpumps for rural water supply,

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Abstract

In Uganda 63% of the rural population depend on improved water sources for drinking water; 36% depend on unimproved water sources. The hand pump is a robust technology that can provide safe water from groundwater resources. However, the large number of non-functioning hand pumps indicates that a holistic approach may be necessary to tackle this problem and ensure functional sustainability of rural water supply. Most hand pump technical failures are due to wearing of piston seals, which results in low delivery rates of pumped water and more pumping effort indicating low pump efficiency. With regard to reciprocating hand pumps for rural water supply, little evidence of tribological analysis of wear behaviour of piston seals has been found in the literature. This paper is aimed at demonstrating wear behaviour of piston seals in reciprocating hand pumps. The purpose is to provide a basis for predicting piston seal lifetime. Practical surveys and analysis are based on hand pumps installed in Makondo parish, Masaka District. This paper therefore determines and identifies the wear mechanisms and modes that piston seals for reciprocating hand pumps undergo. First level surface analysis is used for this determination. Comparative analyses of abrasive wear models for nitrile rubber is discussed when surface roughness and loading are varied.

Keywords: *First level surface analysis; Piston seals; Reciprocating handpump; Rural drinking water supply; Wear mechanisms*