

Numerical and experimental investigations on the behaviour of leachate collection pipes in waste disposal engineering

H.-G. Kempfert, Y. Hu & E. Ott

Institute of Geotechnique, University of Kassel, Germany

ABSTRACT: The paper presents the essential results obtained from the numerical and experimental investigations on the mechanical behaviour of leachate collection pipes which are applied in waste disposal engineering. First, several short-term model tests on PEHD pipes were done under different conditions. With the help of the measured displacements from the model tests the numerical model using FEM was calibrated. Based on these results, numerical parameter study was carried out to research the behaviour of PEHD drainage pipes under practical working conditions. Many varying factors, such as short- and long-term stiffness, different base sealing materials, geometrical profiles of pipes etc were included in the study.

1 INTRODUCTION

PEHD drainage pipes have been widely used to build leachate collection systems in waste disposal engineering. As illustrated in Figure 1, normally these drainage pipes have circle cross section (250 to 300 mm diameter) and are embedded in coarse drainage gravel. With the help of this system the leachate of the waste disposal should be collected, and if needed let into cleaning plants.

Waste cover has normally a height of up to 60 m. The resulting heavy loads in pipe zones must be

partly carried by the pipes. The part of loads carried by the embedded pipes depend upon many factors, above all the stiffness of pipe material.

It is well known that PEHD material is more flexible than other materials such as stoneware. Under the loading of the waste cover, PEHD pipe may deform considerably (see figure 2). This problem is especially critical, if the long-term state is considered. In this situation, the stiffness of PEHD pipes may decrease considerably, especially at high

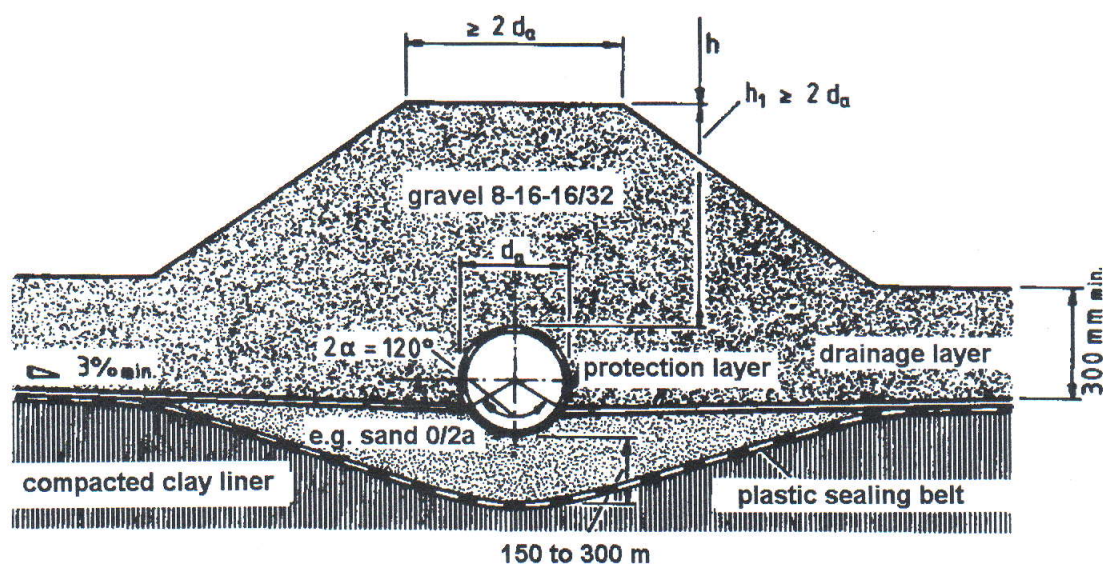


Figure 1. Cross section of construction, leachate collection pipe zone, according to DIN 19 667.