



# RE-EVALUATION OF 150 KV CABLE CAPACITY

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## ABSTRACT

In asset management an update of asset data is necessary as circumstances change. In 2004 ENECO-Netbeheer and Prysmian cables and Systems BV re-evaluated the status and transport capacity of old 150 kV cables. This paper describes the results.

The status of the cables was acceptable.

As ground parameters change over time, these were determined along the cables again. Also a current profile and sheath temperature were measured during a month. A new calculation of the transport capacity using IEC60287 and IEC60853-2 resulted in a cyclic rating with a peak load of 56-109 % of the old rating.

## KEYWORDS

150 kV cables, Condition assessment, Current rating, Transport capacity, Cyclic rating

## INTRODUCTION

ENECO has used 150 kV cables for a long time, since 1961. The cables have aged and the surroundings have changed. To determine the right asset data for future grid development, a survey was started to find out the condition of cables and their surroundings, and to evaluate their present transport capacity.

## HISTORY

In 1959 GEB-Rotterdam (now a part of ENECO) ordered its first 150 kV cable at NKF (now Prysmian). This cable is in operation since 1961 as part of a 150 kV circuit to supply energy to substation Botlek.

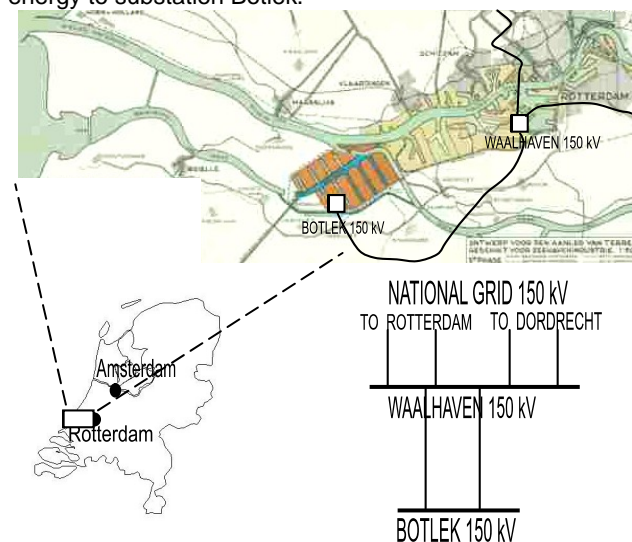


Figure 1: Planning map and grid structure 1961

During the sixties and seventies the Rotterdam harbour was growing rapidly. This resulted in a major extension of the grid. In this period more 150 kV cables and overhead lines were installed to supply electricity to the new harbour areas. The substations Europoort, Theemsweg, Oudeland and Maasvlakte were erected. Finally, around 1980 a 380 kV overhead line was completed between the national 380 kV grid and the Maasvlakte-area.

In the last two decades most of the growing energy need has been supplied by decentralized production in the area. Major expansions of the grid stopped, but several stations were built to connect the new power plants.

Also, the extension of roads and other infrastructures, led to reconstruction of existing cables and overhead lines.

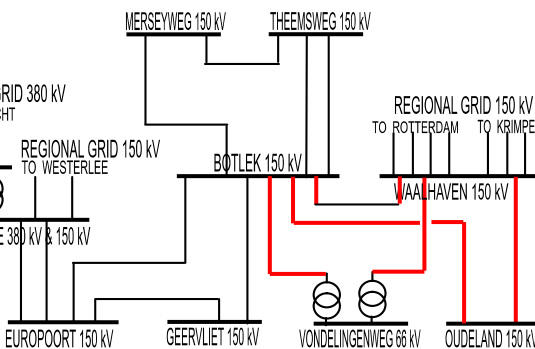
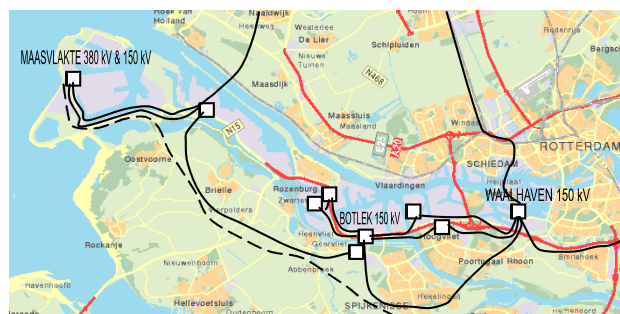


Figure 2: Map and grid structure 2000

As a result, the old cables are still functioning, but in a drastically altered surrounding.

## OVERVIEW OF CIRCUITS

This paper deals with four 150 kV cable circuits, built from 1959 to 1969, that are still in use today. These are:

- o Waalhaven-Oudeland
- o Waalhaven-Botlek
- o Waalhaven-Vondelingenweg
- o Botlek-Oudeland

The 1994 Botlek-Vondelingenweg cable is included in the capacity calculations, it runs parallel to Botlek-Oudeland .

In figure 2 the five circuits are indicated in bold red lines.