# Hyperbaric chamber to test robustness of electric cables and junctions

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## *ABSTRACT*

*The testing of connecting accessories used for underground electric cables under EN 33-226 annex 7, requires the use of a hyperbaric chamber adapted to run those particular tests.*

*A stainless steel chamber associated with an environment control system (temperature cycles, pressure) is presented that can meet all users requirements.*

*A comprehensive control panel can accommodate heating and cooling systems, automat controlling cycles and measuring devices for the experiments.*

*Flexibility of the system may is intended to test from 1 large cable up to 12 small lines.*

## *KEYWORDS*

Hyperbaric chamber, Cables robustness testing, Underwater electric cables, Cables accessories, Transition joints for cables.

## INTRODUCTION

The testing of connecting accessories used for underground electric cables under EN 33-226 annex 7, requires the use of a hyperbaric chamber adapted to run those particular tests. This equipment takes little space in the laboratory and is also suited for deep sub sea cables

The environmental parameters to which the tested cables should be exposed to are basically: pressure, temperature cycles, power supplies changes and specific fluids.

The described system (Figure 4) includes 5 mains subassemblies:

- A hyperbaric chamber designed for the testing pressure,
- An environmental control unit,
- A main control panel with the automat,
- A panel for the clients' measurements and recording systems (example : partial discharge monitoring)
- An electric power supply panel devoted to the cables. .

Each of these subassemblies can be designed to meet specific needs as required by the client.

## TYPE OF TESTS SUPPORTED

The tests to be carried pout within this equipment are defined in the standard:
*"Robustness test for medium voltage joints and transitions joints"* [1].
However for immersion testing, instead of using a water bath restricted to about 1 m depth of water, the hyperbaric device presented here will support tests at almost any simulated depth or pressure. The present preliminary study is for a pressure vessel that can withstand 2 bars which is equivalent to an actual depth of 20 meters. It can be extended even to greater depth, only the pressure vessel will have to be constructed and certified accordingly.

## EQUIPMENT DESCRIPTION

### Hyperbaric chamber

The chamber is a stainless steel tube diameter 800mm, length from 1500mm up to 3000mm according to the type and length of the cables to be tested. Since the test temperature is part of the program, the chamber is thermally protected.
The pressure rating of the chamber is presently 2 bars; it can be calculated for any higher level of testing pressure.
A certification body will stamp the rating of the pressure vessel.
Both ends of the tube are doors fitted with O'rings and closed with a clamping device. The doors assembly can carry various types of interchangeable flanges which can be fitted with a selected number of holes to receive pass through for 1 up to 12 cables in accordance with the diameters of the cables and tests to be carried out.
The chamber and the doors are installed on trolleys, to make it easy to install the cables and adjust the doors when the cables are already passed trough the doors, before securing the pressure seals around the cables.
The chamber is fitted with a pressure release safety valve, a drain, and air inlet, several through hull passages for fluid circulation and electric connections of sensors. (Figure 1).
The chamber is connected to the control stand via an umbilical gathering the necessary hoses and electric connections for the sensors.