

# Load case - surface protection (BOP)

Oliasoft

## Abstract

In this document we describe the load case *Surface protection (BOP)* available in the Oliasoft™ application.

## Introduction

Surface protection (BOP) is a burst load case, where the unknown is the internal pressure profile of the tubing<sup>1</sup>.

**Inputs** The following inputs define the surface protection (BOP) load case

- 1) The true vertical depth (TVD) along the wellbore as a function of measured depth. Alternatively, the wellbore described by a set of survey stations, with complete information about measured depth and inclination.
- 2) The true vertical depth/TVD of
  - a) The hanger of the tubing,  $TVD_{\text{hanger}}$ .
  - b) The shoe of the tubing,  $TVD_{\text{shoe}}$ .
- 3) The temperature profile of the wellbore,  $T$ .
- 4) Water density,  $\rho_w$ .
- 5) The fracture pressure at the shoe,  $P_{f@s}$ .
- 6) The gas gradient,  $\rho_g$ , or gas specific gravity,  $sg_{\text{gas}}$ .
- 7) The gravitation constant,  $g$ .

**Calculations** The hanger pressure is given by

$$P_{\text{hanger}} = P_{f@s} - g\rho_w (TVD_{\text{shoe}} - TVD_{\text{hanger}}). \quad (1)$$

The internal pressure of the tubing is given by the hydrostatic pressure from gas, from hanger to shoe. If gas specific gravity is entered,  $sg_{\text{gas}}$ , a gas gradient,  $\rho_g$ , is calculated using z-factor and Sutton correlations [1], using the temperature and hanger pressure as input. Precisely,

$$P_i = P_{\text{hanger}} + g\rho_g (TVD - TVD_{\text{hanger}}), \quad TVD \in [TVD_{\text{hanger}}, TVD_{\text{shoe}}]. \quad (2)$$

## References

- [1] Curtis H. Whitson and Michael R. Brulé. *Phase behavior*, volume 20 of *Henry L. Doherty series*. SPE Monograph series, 2000.

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<sup>1</sup>We denote any tubular by tubing. All calculations encompass both tubings and casings.