16D 3rd Edition BOP Accumulator Sizing and Performance Tool

The 16D 3rd Ed. BOP Accumulator Sizing and Performance Tool (16D Tool, for short) is a Windows application designed to accompany API Specification 16D 3rd Edition, Nov 2018, and make it easier to handle the accumulator sizing calculations as described in the specification.

16D presents a set of circumstances and outlines the calculations that must be done to size an accumulator. The 16D Tool allows you to make those calculations to size a new accumulator bank, or to test the capacity of an existing accumulator bank. It is also structured to be a robust general purpose accumulator design tool. The 16D Tool has the following features:

Analyze Well Control, Std 53 drawdown, and EDS sequences all at the same time. The three sequences do not have to operate the same stack functions, but they do use the same accumulator bank and the same precharge.

Output is computed with stack functions operated in sequence, showing the accumulator state (pressures, volumes, etc) at the end of each step in the sequences.

Output includes all pressures, temperatures, densities, gas and fluid volumes, entropies, etc. needed to judge suitability, cross check calculations by hand, and compare with other calculations.

Calculate a Precharge table for the calculated target precharge pressure over any temperature range with any desired temperature increment. Example: calculate precharge pressure every 2 degrees F from 70°F to 105°F.

Adiabatic Well Control and EDS sequences are done using API 16D Method C.

For the isothermal sequence, choose a simple Std 53 drawdown, Method B drawdown, or Method B sequence for acoustic and pilot bottles. Volume factors are adjustable for non-API purposes.

Readily insure compliance with API 16D 3rd Edition, Nov 2018; API Standard 53, 5th Ed, December 2018; or API RP 16ST.

Built-in gas law code gives results identical to that used in the National Institute of Standards and Technology (NIST) Refprop program. These are the most accurate models of nitrogen and helium available and computations are good to over 100,000 psia.

Build robust sizings by including and accounting for environmental temperature ranges and precharge tolerances and unavoidable precharge uncertainties.

Handle standard bladder and piston accumulators as well as depth compensated bottles.

Analyze any mix of surface and subsea conventional bottles and/or depth compensated bottles subsea. Example: you may have surface bottles with subsea bottles, or subsea piston accumulator bottles mixed with depth compensated bottles, or all three.

Have the computer choose number of bottles and/or precharge, or set the values yourself. Example: you may start by letting the computer find a precharge, and then switch to entering the precharge yourself to see the effect. Or you may set the number of subsea bottles you have, and then let the computer find the number of surface bottles you need.

Calculate volume of control fluid required to charge the bank and estimate minimum pump horsepower.

Included with the 16D Tool are project files for all 16D 3rd Ed Example problems, accompanied by a manual discussing each example, any errors in 16D, comments on deficiencies, and suggestions for improvements, where appropriate.

Includes project files for all 16D 2nd Ed Example problems, accompanied by a manual discussing how to import and update old 2nd Ed project files you may have, any errors in the 2nd Ed examples, comments on deficiencies, and suggestions for improvements, where appropriate.

The manuals accompanying the examples bring up a number of issues in dealing with 16D and sizing in general that make the manuals into mini-textbooks on sizing accumulators.

Build a list of equipment including a description, type of equipment, open and close volumes, closing ratios, and operating pressure. Store that information in the project or in an independent library you can call on later.

Allow data entry and display in any desired mix of English and metric units of measure. Each data entry field has its own, independent unit of measure. Each field can also be set with its own, individual data format.

Each numeric data entry field is provided with a calculator function for evaluating simple algebraic functions. Ex: suppose surface accumulator is composed of 6 ea 15 gal bottles, and 3 ea 20 gal bottles. You can type in “(6*15)+(3*20) gal” and the field will become “150 gal”.

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