

Pore Compressibility = c

@wikipedia

Synonym: [Pore Compressibility](#) = CPHI

A measure of [formation porosity](#) ϕ change due to [reservoir pressure](#) p variation:

$$(1) \quad c_{\phi} = \frac{1}{\phi} \frac{\partial \phi}{\partial p}$$

There is a statistical correlation between [initial formation compressibility](#) $c_{\phi}(\phi)$ and [formation porosity](#) which can be picked by various [compressibility-porosity models](#).

[Pore compressibility](#) stays constant for small [pressure](#) variations but in a wide range of [pressure](#) variations the dependence on ambient [pressure](#) $c_{\phi}(p)$ can not be neglected and should be tabulated from laboratory core tests or estimated from [compressibility-pressure correlations](#).

The typical values are:

$$c = 0.5 \div 1.5 \text{ GPa}^{-1}$$

but may go higher for poorly consolidated rocks.

In many practical cases the [pore compressibility](#) can be considered as poorly dependent on [reservoir pressure](#) variation: $c_{\phi}(p) = c_{\phi} = \text{const.}$

In this case [porosity](#) dependence on [reservoir pressure](#) can be simulated as:

$$(2) \quad \phi(p) = \phi_i \cdot \left[1 + c_{\phi} (p - p_i) + 0.5 c_{\phi}^2 (p - p_i)^2 \right]$$

But in case the [reservoir pressure](#) is changing substantially one may need to account for the effect it takes on [pore compressibility](#) (see [Pore compressibility @model](#)) and then [reservoir pressure](#) - [porosity](#) model is going to take the following form:

$$(3) \quad \phi(p) = \phi_i \cdot \exp \left[\int_{p_i}^p c_{\phi} dp \right]$$

See Also

[Petroleum Industry](#) / [Upstream](#) / [Subsurface E&P Disciplines](#) / [Petrophysics](#) / [Geomechanical Rock Modelling](#)

[[Compressibility](#)][[initial pore compressibility](#)]

[[Compressibility \(rock\)](#)]

[[Pore compressibility @model](#)]

