

Compressibility = β or c

@wikipedia

Disclaimer: Not to be confused with [Compressibility factor](#) Z .

A measure of relative change in [density](#) ρ or [molar volume](#) V_m under a unit [pressure](#) p variation:

$$(1) \quad \beta = \frac{1}{\rho} \left(\frac{\partial \rho}{\partial p} \right) = - \frac{1}{V_m} \left(\frac{\partial V_m}{\partial p} \right)$$

Symbol	Dimension	SI units	Oil metric units	Oil field units
β or c	$M^{-1} L^1 T^2$	Pa^{-1}	kPa^{-1}	psi^{-1}

[Compressibility](#) measures resistance of [Continuum body](#) to compression/decompression and is inverse to [Bulk modulus](#) K :

$$(2) \quad c = \frac{1}{K}$$

[Compressibility](#) depends on the thermodynamic conditions at which it is measured and as such is not a [material property](#).

The two major [medium](#) compression/decompression processes are [isothermal](#) and [isentropic](#) which result in different values of [compressibility](#):

Isothermal Compressibility	Isentropic Compressibility
$T = \text{const}$	$S = \text{const}$
(3) $\beta_T = \frac{1}{\rho} \left(\frac{\partial \rho}{\partial p} \right)_T$	(4) $\beta_S = \frac{1}{\rho} \left(\frac{\partial \rho}{\partial p} \right)_S$

Both β_T and β_S are not dependent on the [amount of chemical substance](#) and defined under specific conditions of [thermodynamic process](#) and as such are the [material properties](#) and properly tabulated for the vast majority of [materials](#).

In engineering practise, when the term [Compressibility](#) is used as [material property](#) it normally means [Isothermal Compressibility](#): $\beta = \beta_T$.

[Compressibility](#) is related to [Z-factor](#) Z and [Formation Volume Factor \(FVF\)](#) B as:

(5) $\beta(p) = \frac{1}{p} - \frac{1}{Z} \frac{dZ}{dp}$	(6) $\beta(p) = - \frac{1}{B} \frac{dB}{dp}$
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Disclaimer

In [Thermodynamics](#) the [compressibility](#) is denoted by β while [intensive heat capacities](#) are denoted by c with corresponding subscript.

On the other hand [Petroleum Industry](#) is traditionally using c symbol to denote [compressibility](#) which often lead to confusion with [heat capacity](#).

See also

[Physics](#) / [Mechanics](#) / [Continuum mechanics](#) / [Continuum body](#)

[[Isothermal Compressibility](#)] [[Isentropic Compressibility](#)]

[[Fluid compressibility](#)] [[Pore compressibility](#)] [[Total compressibility](#)]

[[Bulk modulus \(K or B\)](#)]