

Formation Fluid Shrinkage

Synonym: [Formation Volume Factor](#) = [Formation Fluid Shrinkage](#)

Ratio of fluid volume at [subsurface](#) conditions V_{sub} to fluid volume at reference conditions V_{ref} :

$$B = \frac{V_{\text{sub}}}{V_{\text{ref}}} = \frac{\rho_{\text{ref}}}{\rho_{\text{sub}}}$$

where ρ_{ref} is density at reference conditions and ρ_{sub} is density at [subsurface](#) conditions.

The reference conditions usually refer to [SPE Standard Conditions \(STP\)](#) but in some cases may refer to [separator conditions](#).

It can be calculated via [Z-factor](#) as:

(1)
$$B = \frac{Z}{Z_{\text{ref}}} \cdot \frac{p_{\text{ref}}}{p} \cdot \frac{T}{T_{\text{ref}}}$$

It is related to [fluid compressibility](#) c as:

(2)
$$c = -\frac{1}{B} \cdot \frac{dB}{dp}$$

For the [slightly compressible fluid](#) the [fluid compressibility](#) is not dependent on pressure $c(p) = c = \text{const}$ and [Formation Volume Factor](#) has a linear dependence on pressure p with usually a very small gradient $c \sim 0 \Leftrightarrow c \cdot (p - p_i) \ll 1$:

(3)
$$B(p) = B_i \cdot [1 - c \cdot (p - p_i)]$$

where

p_i	some pressure point around which the dynamic process is happening
B_i	Formation Volume Factor at this pressure point

The [FVF](#) values are usually used to recalculate the fluid volumes measured at surface to the fluid volumes which are produced from or injected to [subsurface](#) reservoir.

The most popular [FVF](#) are:

Oil formation volume factor (Bo)	Gas formation volume factor (Bg)	Water formation volume factor (Bw)
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See Also

[Petroleum Industry](#) / [Upstream](#) / [Subsurface E&P Disciplines](#) / [Fluid Analysis \(PVT\)](#) / [Dynamic fluid properties](#)

[[Oil formation volume factor \(Bo\)](#)] [[Gas formation volume factor \(Bg\)](#)] [[Water formation volume factor \(Bw\)](#)]

