

# Hall Plot

**Synonym:** Cumulative Productivity Plot = Hall Plot

One of the Productivity Diagnostics methods based on correlation between cumulative pressure drawdown:

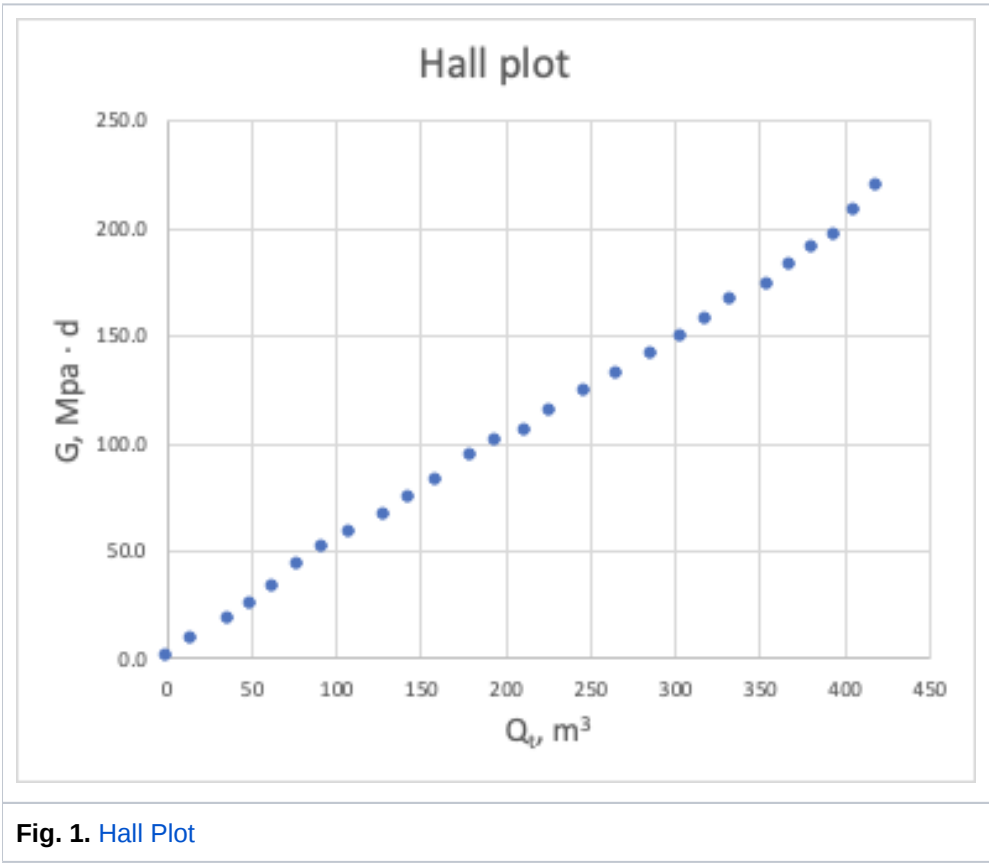
(1) 
$$G(t) = \int_0^t (p_{wf}(\tau) - p_e(\tau)) d\tau$$

and total sandface cumulative offtake/intake:

(2) 
$$Q_t(t) = \int_0^t q_t(\tau) d\tau$$

where

|          |                                                          |
|----------|----------------------------------------------------------|
| $\tau$   | production/injection time                                |
| $q_t$    | total sandface flowrate as function of time $\tau$       |
| $p_e$    | drain-area formation pressure as function of time $\tau$ |
| $p_{wf}$ | bottomhole pressure as function of time $\tau$           |



It shows unit slope on log-log plot for stabilized reservoir flow:

(3) 
$$G(t) = J^{-1} Q_t(t)$$

where

|     |                             |
|-----|-----------------------------|
| $J$ | constant productivity index |
|-----|-----------------------------|

Due to integration procedure the [Hall Plot](#) has a better tolerance to uncertainties in [formation pressure](#) and [bottomhole pressure](#) comparing to [Unweighted J-plot](#) and usually results in more accurate estimation of [productivity index](#).

It is highly recommended to plot [sandface flowrates](#) rather than [surface flowrates](#) to achieve better linearity in correlation for [stabilized reservoir flow](#).

Although it is equally applicable to [producers](#) and [injectors](#), due to lack of [BHP](#) and [formation pressure](#) data availability for [producers](#) in most practical cases in the past the [Hall plot](#) analysis was mostly applied for [water injectors](#).

The [pressure drawdown](#) integral  $G(t)$  is usually calculated over interpolated values of [formation pressure](#) and [bottomhole pressure](#) :

$$G(t) = \int_0^t (p_{wf}(\tau) - p_e(\tau)) d\tau = \sum_k (p_{wf}(\tau_k) - p_e(\tau_k)) \delta\tau_k$$

## See Also

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[Petroleum Industry](#) / [Upstream](#) / [Production](#) / [Subsurface Production](#) / [Field Study & Modelling](#) / [Production Analysis](#) / [Productivity Diagnostics](#)