

PUMP BASICS: AFFINITY LAWS

1

Speed is directly proportional to Flow.

2

Head is proportional to Flow squared.

3

Input power is proportional to Flow cubed.

LAW 1

Law 1 means that as RPM is reduced, flow (GPM) is reduced in a linear relationship. For example, if RPM drops to 70% of the original, GPM drops to 70% of the original.



LAW 2

Law 2 means that as RPM is reduced, pressure (feet of head) is reduced by the square. For example, if RPM drops to 70% of the original, feet of head would drop by $(70\% \times 70\%) = 0.72 = 0.49$ or 49% of the original.



LAW 3

Law 3 means that as RPM is reduced, power consumption (brake horsepower) is reduced by the cube. In the same example, the power would drop to $(0.7 \times 0.7 \times 0.7) = (0.7)^3 = 0.343$ or 34.3% of the original.



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Source: Grundfos, Peerless Pumps

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