The Virial Equation of State

The second virial coeffi cient, B, results from all the "two-body" interactions in the system, that is, all the interactions between two molecules; the third virial coeffi cient, C, results from all the "three-body" interactions in the system; and so on.

From this point of view, can you see why you need to include more and more terms as the pressure increases?

$$z \equiv \frac{Pv}{RT} \equiv 1 + \frac{B}{v} + \frac{C}{v^2} + \frac{D}{v^3} + \cdots$$

Additionally, if the pressure is so low that not even two-body interactions affect the system properties, we have an ideal gas.