

Floor system performance

It is always a good idea to consider the performance (i.e., vibration, bounce etc.) of any floor system. Currently, there are no true industry standard guidelines to use for I-Joists but there are several practical aids that have shown to be useful. Some are design aids, some are installation aids, and some are retrofit aids. They are offered as tools to help you minimise floor performance complaints but cannot be guaranteed to eliminate all floor performance problems.

Begin by using the concepts of fundamental natural frequency and damping when designing floor systems. The Fundamental Natural Frequency (FNF) is a measure of how the floor vibrates when you walk on it and is measured in cycles per second (called a Hertz or Hz).

Damping is a measure of how quickly a floor stops vibrating and is expressed as a percent between 1% and 100% (most residential floors have a damping range between 5%-25% damping).

Our bodies are extremely sensitive to vibrations below 9 Hz so the ideal floor would have a high FNF with high damping. Most problem floors have a combination of a low FNF (below 9 Hz) and a low damping (around 5%). The following list will help you determine the effect of different parameters on floor performance.

It is the combination and interaction of these parameters that determines how the floor ‘feels’.

DESIGN PARAMETERS	EFFECT ON FNF	EFFECT ON DAMPING
<ul style="list-style-type: none"> • Longer Spans • Higher ‘L over’ deflection limit (L/480 vs. L/360) • Using an absolute upper limit on live load deflection (Usually between 8mm to 12mm max) • Using deeper I-Joists • Reduced Joist on-center (o.c) spacing • Adding perpendicular load bearing partition walls • Increasing overall weight of floor 	<p>Significantly lowers Significantly increases Significantly increases</p> <p>Increases Increases Little or no effect Significantly lowers</p>	<p>Little or no effect Little or no effect Little or no effect</p> <p>Little or no effect Little or no effect Significantly increases Significantly increases</p>
INSTALLATION PARAMETERS		
<ul style="list-style-type: none"> • Unlevel bearings (walls, beams & hangers) • Direct applied Gyprock ceiling • Thicker flooring material • Screw & glued flooring material • Tongue & groove (T&G) flooring material 	<p>Significantly lowers Significantly increases Increases Increases Increases</p>	<p>Significantly lowers Significantly increases Increases Increases Increases</p>
RETROFIT PARAMETERS		
<ul style="list-style-type: none"> • Dindas I-Joist mid span blocking (one row) • 90x45 flat on I-Joist bottom (perpendicular) • 90x45 strong back on I-Joist bottom (perpendicular) (vertical 90x45 nailed to side of flat 90x45) 	<p>Little or no effect Little or no effect Increases</p>	<p>Increases Increases Significantly increases</p>