

## Floor Live Load Deflection Limits for Room-In-Attic Trusses

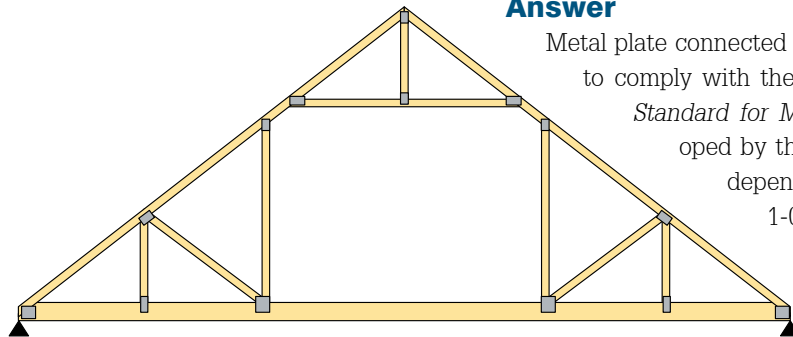
by Ryan J. Dexter, P.E. & Larry Wainright

Live load deflection limits in trusses with habitable spaces.

**Question**  
What is the standard deflection design limit for truss bottom chords supporting a ceiling? I am an architect and my particular residential project uses a "Room-In-Attic" truss. I believe that a live load deflection limit of  $L/360$  is needed to prevent cracking of the drywall. Will this be standard construction or will it require special details?

**Answer**

Metal plate connected wood trusses (MPCWT) are designed and manufactured to comply with the code-referenced standard ANSI/TPI 1 *National Design Standard for Metal Plate Connected Wood Truss Construction* developed by the Truss Plate Institute (TPI). The deflection limits differ depending upon which building code is being referenced. TPI 1-07 is the MPCWT design standard referenced by the 2009 IRC. Table 7.6-1 specifically requires "habitable spaces in Trusses" to be designed for a live load deflection limit of  $L/360$ .



**Table 7.6-1 Deflection Limits for Non-Cantilevered Portions of Trusses.<sup>4</sup>**

Values given in the table are divisors that are applied to the clear span length,  $L_c$ , to establish a deflection limit (limit =  $L_c /$  specified value).

Member	Deflection due to LL only	Deflection due to Total Load (LL + DL)
Roof Truss supporting plaster <sup>1</sup>	360	240
Roof Truss supporting drywall <sup>1</sup>	240	180
Roof Truss not supporting ceilings <sup>1</sup>	180	120
Floor Trusses <sup>2,4</sup> (see footnotes for Trusses supporting ceramic tile)	360 or 480 <sup>3</sup>	240
Top Chord panel <sup>5</sup>	180	120 (600 <sup>6</sup> )
Habitable spaces in Trusses <sup>7</sup>	360	

<sup>1</sup> Roofs not having sufficient slope or camber to assure adequate drainage shall be investigated for ponding.  
<sup>2</sup> Certain floor coverings require more restrictive deflection criteria. For ceramic tile, Truss spacing and appropriate dead load for the installation method, and other aspects of design per ANSI A108/A118/A136 shall be such that the system passes the requirements of the Building Designer per Chapter 2 of this Standard.  
<sup>3</sup> Floor Trusses with ceilings attached that meet L/480 criteria shall not require strongbacks to meet deflection criteria.  
<sup>4</sup> Cantilevered and overhang portions of Trusses are subject to deflection limits using the values shown above applied to twice the length of the cantilever,  $L_c$ .  
<sup>5</sup> Span length for Top Chord panel limits shall be the panel length.  
<sup>6</sup> Where required by ACI 308/ASCE 5/TMS-402 for Trusses used as a beam or lintel providing support of vertical masonry veneer.  
<sup>7</sup> Limit is for panel deflection of the loaded panel when loaded with 30 psf (14.4 KPa) or greater of live load.

ANSI/TPI 1-2007 Table 7.6-1 (Courtesy of TPI)

Per the TPI 1-2007 Commentary, the term "Habitable spaces in Trusses" was used because the deflection limits should cover more than just attic "trusses" since other truss types may have spaces in them that are habitable as defined by the governing building code. Notice that total load deflection is not listed for members with habitable spaces as it is not a requirement in IRC 2009 Table R301.7.

While the provision for habitable spaces is given in TPI 1-2007, the previous version, TPI 1-2002 (referenced by the 2006 IRC), did not contain this provision. You'll see habitable spaces are not listed in Table 7.5-1 on facing page.

**Table 7.5-1 Deflection limits for non-cantilevered portions of trusses.<sup>5</sup>**

Values given in the table are divisors that are applied to the clear span length,  $L_c$ , to establish a deflection limit (limit =  $L_c /$  specified value).

MEMBER	Deflection due to LL only	Deflection due to total load (LL+DL)
Roof truss supporting plaster <sup>1</sup>	360	240
Roof truss supporting drywall <sup>1</sup>	240	180
Roof truss not supporting ceilings <sup>1</sup>	180	120
Floor trusses <sup>2</sup>	360 or 480 <sup>3</sup>	
Floor trusses supporting ceramic tile <sup>4</sup>		360
Top chord panel <sup>6</sup>	180	120

<sup>1</sup> Roofs not having sufficient slope or camber to assure adequate drainage shall be investigated for ponding.  
<sup>2</sup> Certain floor coverings require more restrictive deflection criteria.  
<sup>3</sup> Floor trusses with ceilings attached that meet L/480 criteria shall not require strongbacks.  
<sup>4</sup> Maximum truss spacing shall be 16" o.c. per ANSI A108/ANSI A118/136. Perpendicular blocking installed at 16" o.c. maximum shall be permitted in lieu of the 16" o.c. truss spacing.  
<sup>5</sup> Cantilevered portions of trusses are subject to deflection limits using 1/2 the values shown above applied to the length of the cantilever,  $L_c$ .  
<sup>6</sup> Span length for top chord panel limits shall be the panel length.

ANSI/TPI 1-2002 Table 7.5-1 (Courtesy of TPI)

While not required to do so, many manufacturers still provide the increased deflection limit as a matter of serviceability. Depending on the version of the code you are referencing, you may want to specify a  $L/360$  or  $L/480$  deflection limit for the habitable room to minimize the potential for callbacks. **SBC**

Do you have questions pertaining to building codes? Contact Larry Wainright at [lwainright@qultim.com](mailto:lwainright@qultim.com).

**at a glance**

- ❑ Deflection limits for trusses with habitable spaces differ depending upon the building code.
- ❑ The 2009 IRC references TPI 1-2007; it defines a live load deflection limit of  $L/360$  for these trusses.
- ❑ TPI 1-2002, which the 2006 IRC references, does not contain a live load deflection limit.

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