

## Armstrong Seismic Technical Paper T-BAR LED Smartlight

In typical T-bar ceiling systems, cross runners are interconnected with opposing cross runners through a main runner or cross tee route hole opening. Light fixtures are mounted to sit on the flange of the T-bar and are supported by the suspension system. Light fixtures are hardwired to the electrical supply lines and to prevent falling must be attached to the suspension system and must have slack wires on opposing corners of the fixture.

T-BAR LED Smartlights are low voltage LED lights that become an integral part of the suspension system through the XL tee-to-tee locking clip technology. By becoming part of the suspension system, there are no large electrified light fixtures that could fall. The T-BAR LED Smartlight technology eliminates the need for slack wires and provides positive attachment through the tee-to-tee locking connection.

This connection system has been independently tested and found to yield meets the code requirement of 180 pounds in tension and compression.

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Full scale seismic testing was performed September 19, 2013 utilizing the University at Buffalo Earthquake Simulator (shake table) apparatus. The full-scale dynamic testing was performed according to a modified ICC Acceptance Criteria for Seismic Qualification Testing of Nonstructural Components, AC 156. This criterion was modified to make it specific for the testing of grid system types. The complete test protocol and test program is contained in Report No. UBCSEE/SEESL-2013-12, dated December 17, 2013.

Armstrong conducted tests on the T-BAR LED Smartlight. The seismic simulation for this design was based on the mapped spectra accelerations at short periods of  $S_5$  up to 2.25 g (from the International Building Code, 2009). Spectra were generated for horizontal and vertical earthquake shaking.

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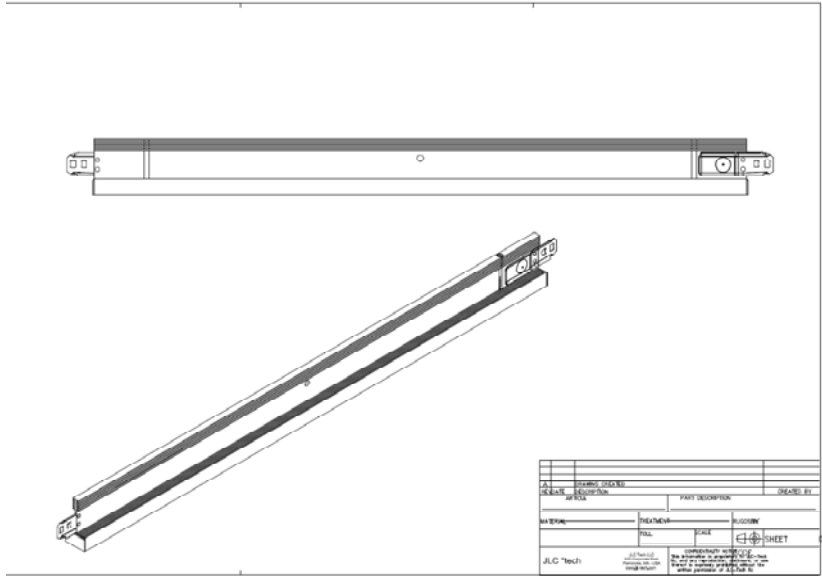
The system consisted of main runners running in the east west direction which were 4 ft on center starting 2 ft from the north wall. The west and the north walls were fixed by a 1/8" aluminum pop rivet into the wall molding. On the south and the east walls the grid was cut 1/2 to 3/4" short and had BERC2 clips snapped over the wall molding. There was 7800 wall molding on all walls.

The main runners were spanned with special 4' T-BAR LED Smartlight tees which were then bridged with 2' T-BAR LED Smartlight tees. T-BAR LED Smartlight Cross tees are extruded aluminum shaped to house a LED lighting system.

Suspension wires of soft annealed galvanized no. 12 gage steel were spaced at 48" on center. All vertical wires were attached to the ceiling suspension member and to the support frame with a minimum of 3 turns within 3 inches of the connection.

One strut was fastened to the main runner and extended to the structural frame. This strut was placed 74 inches from the south wall and 74 inches from the west wall. Horizontal restraints were installed using four no.12 gage wires secured to the main runner within 2 inches of the cross runner and were splayed 90° from each other at an angle not more than 45° from the plane of the ceiling.

Panels were Ultima Tegular (1.05 #/ft<sup>2</sup>) that was back loaded with a layer of ½" drywall (2.0 #/ft<sup>2</sup>). The weight of the grid was 0.35 #/ft<sup>2</sup> for a total ceiling weight of 3.40 #/ft<sup>2</sup>.



### Seismic Conclusion

For this system, two performance limit states were defined as no damage to the suspension system and no loss of any ceiling panel. Qualification levels were determined as one level of shaking below the level at which the limit state was not reached.

For these evaluation tests, the T-BAR LED Smartlight was loaded to 3.40 pounds/ft<sup>2</sup> was tested to a maximum shaking intensity of 2.25g.

Ceiling System ID	System Description	Qualification Level	
		Limit state 1 <sup>1</sup>	Limit state 2 <sup>2</sup>
11	T-BAR LED Smartlight was loaded to 3.40 pounds/ft <sup>2</sup>	2.00	1.75

1. Limit state 1 is the loss of one or more panels.

2. Limit state 2 is the substantial failure of the suspension system requiring replacement of the system.

If you have any questions on the seismic performance of this product, please contact TechLine.