

Summary of Testing of MCL Hangers for Open-Web Steel Joists

The MCL hanger is a newly developed system for transferring the gravity load of a horizontal pipe or other item (e.g., a duct) to a steel joist at its centerline. This system of hangers consists of 12 variations, all of which use a T-shaped piece (tee) that bears on the top of both angles in either the upper or lower chord. All tees have either a clear or threaded hole. The M1 series has a shallow stem (shank) for top or bottom chords with a 1" nominal gap between angles. The M2 series has a deeper and slightly wider stem for use at chords with a 1-1/8" gap, which includes top chords made with cold-formed angles. All four of the M3 series have a side leg with a set screw, for use at a bottom chord with either size gap.

The tee is made of sintered powdered-metal (iron plus copper; FC-0208-50) with a minimum yield of 50 ksi. In addition to the tee, either a threaded rod (with top heavy-hex nut) or bolt is used together with a bottom heavy-hex nut (with integral washer) and a large washer. These are used at the chord's bottom to secure the hanger assembly to the chord. The rod or bolt projects below the bottom nut to enable attachment of hardware associated with pipe saddles or other brackets.

At a top chord, the tee with rod is inserted between the chord angles from the bottom until the tee's stem clears the top of the angles. The tee is then rotated 90° and moved down so its head bears on the angles. This is followed by installation of the large washer and nut.

For all variations of the hanger system, the tee's head bears on both chord angles. The contact bearing applies a force near or through the shear center of each angle. This minimizes local torsion effects on each of the angles and globally on the overall joist.

Loads due to steel pipes are based on Schedule 40, water filled and 15' maximum between hangers. Small and medium vertical loads (up to 250 lbs allowable; 4" NPS pipe) are supported by a 3/8" threaded rod or bolt. Larger vertical loads (760 lbs maximum allowable; 8" NPS pipe) are carried by a 1/2" rod or bolt.

Hanger specimens were tested in 2020 at Underwriters Laboratories to requirements of UL 203 *Standard for Pipe Hanger Equipment for Fire Protection Service* (section 11). Refer also to NFPA 13 *Standard for the Installation of Sprinkler Systems* (9.1.1.2 and related sections). Small lengths of joist chords, made with the thinnest angles normally available, were used as test fixtures for mounting the hangers. The UL test load was 250 lbs plus five times the rated (allowable) load. The two rated loads of 250 lbs (3/8" rod or bolt) and 760 lbs (1/2" rod or bolt) correspond to test loads of 1,500 lbs and 4,050 lbs, respectively. Three specimens of each of the 12 variations were successfully tested (no failures) for strength.

The UL testing also included vibration tests (UL 203, section 13) to evaluate resistance to loosening. Three hanger specimens with 3/8" inch rods were successfully tested. Testing used a frequency of 35 Hertz, a peak-to-peak vertical amplitude of 0.065", a duration of 100 hours per specimen and a supported load of 130 lbs.

Limitations

The Engineer of Record for an individual project is responsible for evaluating the structural design adequacy of the joists to which the hangers will transfer load.

SB Engineering, LLC

James C. LaBelle, P.E., Doc.E.



Managing Member

4-17-20

Engineering Guidelines

The hangers can be used for **rated (allowable)** vertical loads of **250 lbs** or **760 lbs** per hanger, depending on the diameter (3/8" or 1/2", respectively) of the threaded rod or bolt. The loads are based on the weight of horizontal steel pipe (Schedule 40; filled with water) with up to 15' between hangers. The smaller load corresponds to 4" NPS maximum pipe and the larger load to 8" NPS maximum pipe.

Each of the rated loads corresponds to a *test* load equal to 250 lbs plus five times the rated load. Thus, specimens were *tested* to 1,500 and 4,050 lbs, for 4" and 8" pipe, respectively. In addition, hanger specimens have been successfully tested for resistance to loosening due to vibration.

Hangers, which are T-shaped, are attached to either the top or bottom top chord of an open web steel joist. In the installed position, a hanger is nominally centered on the chord's width, with each side of the tee's head bearing on a chord angle. Thus, each angle supports nominally half of the total load. The load is applied at or near the shear center of each angle, which minimizes torsion effects.

Each of the three hanger series has four types: two with threaded holes for rods (3/8" or 1/2") and two with clear holes for bolts and threaded rods (3/8" or 1/2"). For top chords consisting of hot-rolled angles with a 1" nominal gap, the M1 series hangers (shallow stems) are applicable. For top chords with cold-formed angles and a 1-1/8" gap, utilize the M2 series, which have deeper and slightly wider stems (shanks).

For bottom chords with a 1" nominal gap between angles, use the M1 series hangers. For bottom chords with a nominal 1-1/8" gap, utilize the M2 series. Alternatively, the M3 series hangers, which include a side leg with a set screw, may be used for either size gap.

Limitations

The Engineer of Record for an individual project is responsible for evaluating the structural design adequacy of the joists to which the hangers will transfer load.

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CERTIFICATE OF COMPLIANCE

Certificate Number EX28231
Report Reference EX28231-20200331
Issue Date 2020-MARCH-31

Issued to: Morgan CL Hangers LLC
374 County Rd 244
Cullman AL 35057

**This certificate confirms that
representative samples of**

HANGERS, PIPE
M138T, M138, M238T, M238, M338T, M338,
M150T, M150, M250, M250T, M350, M350T.

Have been investigated by UL in accordance with the
Standard(s) indicated on this Certificate.

Standard(s) for Safety: UL 203 and ULC/ORD C203 - Pipe Hanger Equipment for
Fire Protection Service.

Additional Information: See the UL Online Certifications Directory at
<https://iq.ulprospector.com> for additional information.

This *Certificate of Compliance* does not provide authorization to apply the UL Mark. Only the UL Follow-Up
Services Procedure provides authorization to apply the UL Mark.

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Follow-Up Services.

Look for the UL Certification Mark on the product.



Bruce Mahrenholz, Director North American Certification Program
UL LLC

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