



Certificate of Compliance

This certificate is issued for the following:

X-ENP-19 L15, X-ENP-19 L15MX, X-ENP-19 L15MXR
X-HSN 24, X-EDN19 THQ12, X-EDN19 THQ12M
X-EDNK22 THQ12, X-EDNK22 THQ12M
S-MD 12-24 x 1-5/8 M HWH5
S-SLC 01 HWH, S-SLC 01 M HWH
S-SLC 02 HWH, S-SLC 02 M HWH
S-MS 01 Z4,8 X 20M, S-MS 01 Z4,8 X 20
S-MD 12-14 X 1 HHWH Stitch
S-MD 10-16 x 7/8 HHWH Pilot Point

Prepared for:

Hilti Inc
7250 Dallas Parkway,
Suite 1000
Plano, TX 75024
United States

FM Approvals Class: 4451

Approval Identification: 3054498

Approval Granted: 11/3/2015

To verify the availability of the Approved product, please refer to www.roofnav.com

Said Approval is subject to satisfactory field performance, continuing Surveillance Audits, and strict conformity to the constructions as shown in RoofNav, an online resource of FM Approvals.

A handwritten signature in dark ink that reads 'Cynthia E. Frank'.

Cynthia Frank
AVP - Manager of Materials
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APPROVAL REPORT

Project No: 0003054498 – Reissue 1

Class: 4451/4470

Product Name: X-ENP-19 L15, X-ENP-19 L15MX, X-ENP-19 L15MXR
 X-HSN 24
 X-EDN19 THQ12, X-EDN19 THQ12M
 X-EDNK22 THQ12, X-EDNK22 THQ12M
 S-MD 12-24 x 1-5/8 M HWH5
 S-SLC 01 HWH, S-SLC 01 M HWH
 S-SLC 02 HWH, S-SLC 02 M HWH
 S-MS 01 Z4,8 X 20M, S-MS 01 Z4,8 X 20
 S-MD 12-14 X 1 HHWH Stitch
 S-MD 10-16 x 7/8 HHWH Pilot Point

Name of Listing Company: Hilti Inc

Address of Listing Company: 7250 Dallas Parkway, Suite 1000
 Plano, TX 75024
 United States

Customer ID: 1000004113-1

Customer website: www.us.hilti.com

Prepared by

John Cauley
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AVP, Principal Engineer, Materials

Cynthia E. Frank
AVP, Manager of Materials

11/3/15

Date of Approval

11/30/2015

Date of Reissue

1 INTRODUCTION

1.1 Hilti Inc requested Approval of their X-ENP-19 L15, X-ENP-19 L15MX, X-ENP-19 L15MXR, X-HSN 24, X-EDN19 THQ12, X-EDN19 THQ12M, X-EDNK22 THQ12, X-EDNK22 THQ12M and S-MD 12-24 x 1-5/8 M HWH5 fasteners to determine if they meet the Approval requirements of the standards listed in Section 1.3 with wind rating above Class 1-90.

1.2 This report may be freely reproduced only in its entirety and without modification.

1.3 Standards

| Title | Number | Issue Date |
|---|------------------------|------------|
| Approval Standard for Profiled Steel Panels for Use as Decking in Class 1 Insulated Roof Construction | 4451 | 6/2012 |
| Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction | 4470 | 6/2012 |
| American National Standard for Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures | ANSI/FM Approvals 4474 | 3/2004 |

1.4 Listing

The products and assemblies will be listed in RoofNav, an on-line resource of FM Approvals. Formulations, drawings and specifications are on file at FM Approvals.

2 DESCRIPTION

All products are as described in RoofNav. Formulations, drawings and specifications are on file at FM Approvals.

3 EXAMINATIONS AND TESTS

3.1 All components were produced under the FM Approvals Surveillance Audit program as indicated by FM Approvals labels. All samples were considered to be representative of standard production and were examined and tested as indicated below. Components incorporated into test samples were selected by FM Approvals personnel. Test samples were prepared by, or under the supervision of, FM Approvals personnel. All data is on file at FM Approvals along with other documents and correspondence applicable to this program.

3.2 Several performance requirements and tests required by the Standards have been waived due to previous successful testing. See Table 1 & 2 below for details.

Table 1

| FM Standard 4451 Performance Requirement | Original Project ID's |
|--|--|
| Allowable Live Load Deflection | Waived, see 3049232 |
| Combustibility From Below the Roof Deck | Waived ¹ |
| Combination pull out / pull over resistance of fasteners (Testing) | Waived, see 3036326, 3021719, 3029102, and 2Y6A7.AM, 3049232 |

| | |
|---|---|
| Pull over resistance of fasteners (Calculation) | Included |
| Combination pull off / pull over resistance of arc spot welds | Waived, not applicable |
| Side lap fastener and side lap crimping and interlocking resistance | Waived, see 3036326, 3021902, and 3011115 |
| Fastener pull out resistance for above deck components | Waived, not applicable |
| Steel Deck Bending Stresses Under Service Wind Loads | Waived, not applicable |
| Wind Uplift Ratings Greater Than Class 1-90 and all assemblies that utilize steel deck with a design thickness less than 0.0295 in. (0.75 mm) | Included |
| Foot Traffic Resistance of Insulation | Waived, not applicable |
| Bearing Capacity of Insulation | Waived, not applicable |
| Corrosion Resistance Test (Optional Test) | Waived, not requested |
| Drivability Evaluation of Fasteners | Waived, see 3036326, 3049232, 3049232 |

Table 2

| FM Standard 4470 Performance Requirement | Original Project ID(s) |
|--|------------------------|
| Combustibility From Above the Roof Deck | Waived ¹ |
| Combustibility From Below the Roof Deck | Waived ¹ |
| Hail Damage Resistance Test | Waived ¹ |
| Water Leakage Resistance Test | Waived ¹ |
| Foot Traffic Resistance Test | Waived ¹ |
| Susceptibility to Heat Damage Test | Waived ¹ |
| Corrosion Resistance Test | Waived ² |
| Wind Uplift Resistance | Included |

¹ All roof covers and insulations are Approved for the OEM, no new insulations included.

² All fasteners are Approved for the OEM, no new fasteners included.

3.3 FM Approvals 12x24 ft (3.7x7.3 m) Simulated Wind Uplift Pressure Test - One 12 x 24 ft wind uplift test was completed with the sample construction and results noted below.

| | |
|------------------------|---|
| Cap Ply: | DuraFlex 190 SBS, adhered with hot asphalt applied at 25 lb/sq |
| Base Ply: | DuraFlex 190S SBS, adhered with hot asphalt applied at 25 lb/sq |
| Base Sheet: | DuraFlex SBS PolyBase, adhered with hot asphalt applied at 25 lb/sq |
| Base Sheet Securement: | Trufast 3" Metal Insulation Plates and Trufast #15 EHD fasteners spaced 6 in. on center through the 4 in. wide base sheet laps and in two rows evenly spaced between the laps. |
| Cover Board: | 0.625 in. thick Securock Gypsum-Fiber Roof Board, loose laid |
| Insulation: | 1.5 in. thick H-Shield, loose laid |
| Steel Deck: | 22 ga. [0.0295 in. (0.75 mm) thick], Grade 80, Type B, wide rib deck secured to 0.25 in. (6.4 mm) thick structural supports spaced 60 in. (1524 mm) o.c. with X-ENP-19 L15 MXR fasteners spaced 6 in. (150 mm) o.c. along each support. Deck side laps were fastened with Hilti S-MD 10-16 x 7/8 HHWH Pilot Point fasteners spaced 12 in. (305 mm) o.c. |
| Result: | The test sample met the 330 psf (15.8 kPa) minimum test requirement for Class 1-330 windstorm classification. The sample failed after maintaining a pressure of 345 psf (16.5 kPa) for 53 seconds due to base ply delamination from the base sheet. |

4 MARKING

- 4.1 The manufacturer shall mark each product and/or packaging with the manufacturer's name and product trade name. In addition, product and/or packaging must be marked with the Approval Mark of FM Approvals.
- 4.2 Markings denoting Approval by FM Approvals shall be applied by the manufacturer only within and on the premises of manufacturing locations that are under the FM Approvals Surveillance Audit program.
- 4.3 The manufacturer agrees that use of the FM Approvals name or Approval Mark is subject to the conditions and limitations of the Approval by FM Approvals. Such conditions and limitations must be included in all references to Approval by FM Approvals.

5 REMARKS

- 5.1 The securement of the roof system must be enhanced at the building corners and perimeter as outlined in FM Global Property Loss Prevention Data Sheet 1-29.
- 5.2 The roof cover must be installed using a roof perimeter flashing system Approved by FM Approvals. See RoofNav.

6 SURVEILLANCE AUDIT

The manufacturing facilities at the following locations shall be visited on a routine basis. The facility processes and quality control procedures in place have been determined to be satisfactory to manufacture products identical to that tested and Approved. An FM Approved Products/Specification-Tested Revision Request Form shall be submitted to FM Approvals for requesting to manufacture products at any additional or alternate manufacturing facilities which are not listed below.

Audit Locations

| | | |
|--|---|---|
| Hilti, Plant 1 Feldkircherstrasse 100 P. O. BOX 333 FL-9494 Schaan Principality of Liechtenstein | Sheh Fung Screws Co., Ltd No. 810 Fu Hsing West Road Ding Yen Village-Chiao Tou Kaoshiung Hsien Taiwan, Republic Of China | Racing Point Industry Co., Ltd 1 Shengde Rd. Kangshan Kaoshiung Taiwan, 820 Taiwan, Republic Of China |
|--|---|---|

7 MANUFACTURER’S RESPONSIBILITIES

- 7.1 The manufacturer shall notify FM Approvals of any planned change in the Approved products, prior to general sale or distribution, using the FM Approved Products/Specification-Tested Revision Request Form. No changes of any nature shall be made unless notice of the proposed change has been given and written authorization obtained from FM Approvals.
- 7.2 To ensure compliance with his procedures in the field, the manufacturer shall supply to the installer such necessary instruction or assistance required to produce the desired performance achieved in the tests.

7.3 In accordance with the Master Agreement, the manufacturer shall make full and immediate disclosure to FM Approvals of all information concerning any defect in, or potential hazard of, the product or service manufactured or provided by the Customer which is Approved by, or being examined by, FM Approvals. The manufacturer shall make all necessary arrangements for the investigation of complaints / anomalies applicable to this approval and shall keep records of all complaints / anomalies including actions taken.

8 DOCUMENTATION

No new documents have been created as all products are currently Approved.

9 CONCLUSIONS

9.1 Testing and evaluation from this and previous FM Approvals programs indicate that Hilti Inc. X-ENP-19 L15, X-ENP-19 L15MX, X-ENP-19 L15MXR, X-HSN 24, X-EDN19 THQ12, X-EDN19 THQ12M, X-EDNK22 THQ12, X-EDNK22 THQ12M and S-MD 12-24 x 1-5/8 M HWH5 steel deck structural attachment fasteners meet the requirements of FM Approvals for use as a component in above Class 1-90 wind uplift rated insulated steel deck roof constructions when installed as described in RoofNav, an on-line resource of FM Approvals. The fasteners are spaced 6 in. (151 mm) on center along the structural support. Steel deck side laps are secured using S-SLC 01 HWH, S-SLC 01 M HWH, S-SLC 02 HWH, S-SLC 02 M HWH, S-MS 01 Z4,8 X 20M, S-MS 01 Z4,8 X 20, S-MD 12-14 X 1 HHWH Stitch or S-MD 10-16 x 7/8 HHWH Pilot Point fasteners. Wind rating per securement of the deck and securement of the above deck components.

- **X-ENP-19 L15, X-ENP-19 L15MX, X-ENP-19 L15MXR** fasteners are for structural support of greater than or equal to 0.25 in. (6.4 mm) thickness
- **X-HSN 24** fastener is for structural supports of greater than or equal to 0.125 in. (3.2 mm) but less than or equal to 0.375 in. (9.5 mm) thickness
- **X-EDN19 THQ12, X-EDN19 THQ12M** fasteners are for structural supports of greater than or equal to 0.25 in. (6.4 mm) but less than or equal to 0.375 in. (9.5 mm) thickness
- **X-EDNK22 THQ12, X-EDNK22 THQ12M** fasteners are for structural supports of equal to 0.25 in. (6.4 mm) thickness
- **S-MD 12-24 x 1-5/8 M HWH5** fastener is for structural supports of greater than 0.125 in. (3.2 mm) but less than or equal to 0.25 in. (6.4 mm) thickness

9.1.1 The X-ENP-19 L15, X-ENP-19 L15MX, X-ENP-19 L15MXR, X-HSN 24, X-EDN19 THQ12, X-EDN19 THQ12M, X-EDNK22 THQ12, X-EDNK22 THQ12M and S-MD 12-24 x 1-5/8 M HWH5 fasteners shown above are for use with current FM Approved mechanically attached roof coverings when the in-row fastener spacing is greater than one-half of the deck span, per proprietary listings. Wind rating per securement of the deck and securement of the above deck components.

9.1.2 The maximum support spacing and wind uplift ratings are per the following tables for use with FM Approved fully or partially adhered roof coverings or with mechanically attached roof coverings when the in-row fastener spacing is less than or equal to one-half of the deck span, per proprietary listings. Wind rating per securement of the deck and securement of the above deck components.

| Wind Rating | 22 ga (0.0295 [0.75]) | | | | 20 ga (0.0358 [0.91]) | | | | 18 ga (0.0474 [1.20]) | | | |
|-------------|-----------------------|------|--------|------|-----------------------|------|--------|------|-----------------------|------|--------|------|
| | 33 ksi | | 80 ksi | | 33 ksi | | 80 ksi | | 33 ksi | | 80 ksi | |
| | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm |
| 1-105 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-120 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-135 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-150 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-165 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-180 | 68 | 1727 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-195 | 63 | 1600 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-210 | 59 | 1498 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-225 | 55 | 1397 | 72 | 1828 | 67 | 1701 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-240 | 51 | 1295 | 72 | 1828 | 63 | 1600 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-255 | 48 | 1219 | 72 | 1828 | 59 | 1498 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-270 | 45 | 1143 | 72 | 1828 | 56 | 1422 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-285 | 43 | 1092 | 72 | 1828 | 53 | 1346 | 72 | 1828 | 72 | 1828 | 72 | 1828 |
| 1-300 | 41 | 1041 | 72 | 1828 | 50 | 1270 | 72 | 1828 | 69 | 1752 | 72 | 1828 |
| 1-315 | 39 | 990 | 71 | 1803 | 48 | 1219 | 72 | 1828 | 65 | 1651 | 72 | 1828 |
| 1-330 | 37 | 939 | 68 | 1727 | 46 | 1168 | 72 | 1828 | 62 | 1574 | 72 | 1828 |

9.1.3 The maximum support spacing and wind uplift ratings are per the following tables for use with Carlisle Syntec Inc., United States Gypsum Company or US Ply, Inc. FM Approved fully or partially adhered roof coverings or with mechanically attached roof coverings when the in-row fastener spacing is less than or equal to one-half of the deck span, per proprietary listings. Wind rating per securement of the deck and securement of the above deck components.

| Wind Rating | 22 ga (0.0295 [0.75]) | | | | 20 ga (0.0358 [0.91]) | | | | 18 ga (0.0474 [1.20]) | | | |
|-------------|-----------------------|-----|--------|------|-----------------------|------|--------|------|-----------------------|------|--------|------|
| | 33 ksi | | 80 ksi | | 33 ksi | | 80 ksi | | 33 ksi | | 80 ksi | |
| | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm | in. | mm |
| 1-345 | 35 | 889 | 65 | 1651 | 44 | 1117 | 72 | 1828 | 60 | 1524 | 71 | 1803 |
| 1-360 | 34 | 863 | 62 | 1574 | 42 | 1066 | 72 | 1828 | 57 | 1447 | 68 | 1727 |
| 1-375 | 33 | 838 | 60 | 1524 | 40 | 1016 | 72 | 1828 | 55 | 1397 | 65 | 1651 |
| 1-390 | 31 | 787 | 57 | 1447 | 39 | 990 | 71 | 1803 | 53 | 1346 | 62 | 1574 |
| 1-405 | 30 | 762 | 55 | 1397 | 37 | 939 | 68 | 1727 | 51 | 1295 | 60 | 1524 |
| 1-420 | 29 | 736 | 53 | 1346 | 36 | 914 | 66 | 1676 | 49 | 1244 | 58 | 1473 |
| 1-435 | 28 | 711 | 51 | 1295 | 35 | 889 | 63 | 1600 | 47 | 1193 | 56 | 1422 |
| 1-450 | 27 | 685 | 50 | 1270 | 33 | 838 | 61 | 1549 | 46 | 1168 | 54 | 1371 |
| 1-465 | 26 | 660 | 48 | 1219 | 32 | 812 | 59 | 1498 | 44 | 1117 | 52 | 1320 |

9.2 Tests show that the tested roof constructions in and of themselves would not create a need for automatic sprinklers.

9.3 Since a duly signed Master Agreement is on file for this customer, Approval is effective as of the date of this report.

9.4 Continued Approval will depend upon satisfactory field experience and periodic Facilities and Procedures Audits.

PROJECT DATA RECORD: 0003054498

ATTACHMENTS: None

ORIGINAL TEST DATA See PDRs for projects in Tables 1 & 2

| Rev | Change Description | Date | Originator | Approver |
|-----|---|----------|------------|----------|
| 1 | Page 1 - Changed address from Plano, OK 75024 to Plano, TX 75024 Page 6, Section 9.1.3, removed word "Meets" | 11/24/15 | Cauley | Smith |