

APPROVAL REPORT

Project No: 3049232
Supplements Project No.: N/A
Class: 4451
Product Name: Re-Examination of FM Approved Hilti Steel Deck Fasteners and Approval Examination of X-HSN 24, S-MD 12-24 x 1-5/8 M HWH5, and S-MD05Z 5,5X40 per FM Standard 4451
Name of Listing Company: Hilti Inc
Address of Listing Company: 5400 S 122nd E Ave
PO Box 21148
Tulsa OK 74146
United States
Customer ID: 1000004113
Customer website: www.us.hilti.com

Prepared by

Anthony Longabard

Anthony Longabard
Advanced Engineer

Reviewed by

L. D'Angelo

Leonard D'Angelo
Technical Team Manager

Cynthia E Frank

Cynthia Frank
Asst. Vice President - Group Manager
Materials

9/11/2013

Date of Approval

1 INTRODUCTION

1.1 Hilti Inc requested Approval examination of their X-HSN 24, S-MD 12-24 x 1-5/8 M HWH5, and S-MD05Z 5,5X40 steel deck fasteners to determine if they meet the Approval requirements of the Standard listed in Section 1.3. In addition, they requested re-examination of their X-ENP-19 L15, X-ENP-19 L15MX, X-ENP-19 L15MXR, X-EDN19 THQ12, X-EDN19 THQ12M, X-EDNK22 THQ12, and X-EDNK22 THQ12M steel deck structural attachment fasteners and 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, AND S-MD 10-16 x 7/8 HHWH Pilot Point side lap fasteners to determine if they meet the Approval requirements of the latest issue of the Standard listed in Section 1.3.

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

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

2.1 The X-HSN 24, S-MD 12-24 x 1-5/8 M HWH5, and S-MD05Z 5,5X40 steel deck structural attachment fasteners are described as follows:

2.1.1 The X-HSN 24 fastener is a powder-actuated steel deck structural attachment fastener used in securing 16, 18, 20, and 22 gauge (MSG) [0.0598, 0.0474, 0.0358, and 0.0295 in. (1.5, 1.2, 0.91, and 0.75 mm) thick] steel roof deck to supporting steel thicknesses of greater than or equal to 0.125 in. (3.2 mm), but less than or equal to 0.375 in. (9.5 mm). The fastener has a tapered and knurled shank.

2.1.2 The S-MD 12-24 x 1-5/8 M HWH5 and S-MD05Z 5,5X40 are self-drilling steel screws with a 5/16 in. (7.85 mm) hexagonal drive head and have a fluted shank to improve the thread cutting properties of the screw and are for use in securing 16, 18, 20, and 22 gauge (MSG) [0.0598, 0.0474, 0.0358, and 0.0295 in. (1.5, 1.2, 0.91, and 0.75 mm) thick] steel roof deck to the roof structural steel supporting members. The screws have a min 0.394 in. (10 mm) washer head. Both fasteners are 1.57 in. (40 mm) long and contain 24 threads per 1 in. (25 mm) length of threaded shaft. The threads have a minimum 0.209 in. (5.30 mm) major diameter, 0.160 in. (4.07 mm) minimum minor diameter and a minimum 0.19 in. (4.9 mm) point diameter. The fastener is designed for securing steel deck to steel supporting members having a thickness range of 0.0598 to 0.25 in. (1.5 to 6.4 mm).

2.2 All other products are as described in RoofNav.

3 EXAMINATIONS AND TESTS

3.1 All components, except those in Section 2.1.1 – 2.1.2, 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.

3.1.1 The re-examination portion of this project of previously Approved fasteners was performed according to revised Standard 4451, June 2012. Calculations were submitted for review in conjunction with data on file at FM Approvals under J.I. 2Y6A7.AM, 3011115, 3021719, 3029102, and 3036326 as the basis for Approval. All data is on file at FM Approvals under J.I. 2Y6A7.AM, 3011115, 3021719, 3029102, 3036326, and 3049232 along with other documents and correspondence applicable to this program

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

Table 1

FM Standard 4451 Performance Requirement	Original Project ID(s)
Allowable Live Load Deflection	Waived, not applicable
Combustibility From Below the Roof Deck	Waived, not applicable
Combination pull out / pull over resistance of fasteners (Testing)	Waived, see 3036326, 3021719, 3029102, and 2Y6A7.AM
	Testing included for fasteners listed in Section 2
Pull over resistance of fasteners (Calculation)	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)	Waived, not requested
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
	Testing included for fasteners listed in Section 2

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 location 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. A Form 797 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

Racing Point Industry Co., Ltd
1 Shengde Rd.
Kangshan
Kaoshiung Taiwan, 820
Taiwan, Republic Of China

Sheh Fung Screws Co., Ltd
No. 810 Fu Hsing West Road
Ding Yen Village-Chiao Tou
Kaoshiung Hsien
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 Form 797, Approved Product Revision Report. 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 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.

8 DOCUMENTATION

The following document describes the fasteners referenced in this report and is on file at FM Approvals.

Document Title	Issue Date
Surveillance Audit Manual	August 2013

9 CONCLUSIONS

- 9.1 Evaluation from the re-exam and previous FM Approvals programs indicate that Hilti Inc. X-ENP-19 L15, X-ENP-19 L15MX, X-ENP-19 L15MXR, X-EDN19 THQ12, X-EDN19 THQ12M, X-EDNK22 THQ12, and X-EDNK22 THQ12M steel deck structural attachment fasteners continue to meet the Approval requirements of FM Approvals for use as a component in Class 1-60, Class 1-75, and Class 1-90 wind uplift rated insulated steel deck roof constructions when installed as described in RoofNav, an on-line resource of FM Approvals.
- 9.1.1 X-ENP-19 L15, X-ENP-19 L15MX, and X-ENP-19 L15MXR are Approved for use in securing FM Approved steel deck at the maximum spans shown in the table below to structural steel supporting members in the thickness range of greater than or equal to 0.25 in.

	Fastener O.C. Spacing	Rating	MAX SPAN [INCHES]					
			22 ga		20 ga		18 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
X-ENP-19 L15, X-ENP-19 L15MX, X-ENP-19 L15MXR	6	60	227	413	279	510	381	804
		75	181	331	223	408	304	643
		90	151	275	186	340	254	536
	8	60	170	310	209	382	285	603
		75	136	248	167	306	228	482
		90	113	206	139	255	190	402
	12	60	113	206	139	255	190	402
		75	90	165	111	204	152	321
		90	75	137	93	170	127	268

9.1.2 X-EDN19 THQ12 and X-EDN19 THQ12M are Approved for use in securing FM Approved steel deck at the maximum spans shown in the table below to structural steel supporting members in the thickness range of greater than or equal to 0.1875 in. but less than 0.25 in.

	Fastener O.C. Spacing	Rating	MAX SPAN [INCHES]					
			22 ga		20 ga		18 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
X-EDN19 THQ12, X-EDN19 THQ12M	6	60	262	515	322	515	515	515
		75	209	412	258	412	412	412
		90	174	343	215	343	343	343
	8	60	196	386	241	386	386	386
		75	157	309	193	309	309	309
		90	131	257	161	257	257	257
	12	60	131	257	161	257	257	257
		75	104	206	129	206	206	206
		90	87	171	107	171	171	171

9.1.3 X-EDN19 THQ12 and X-EDN19 THQ12M are Approved for use in securing FM Approved steel deck at the maximum spans shown in the table below to structural steel supporting members of thickness equal to 0.25 in.

	Fastener O.C. Spacing	Rating	MAX SPAN [INCHES]					
			22 ga		20 ga		18 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
X-EDN19 THQ12, X-EDN19 THQ12M	6	60	262	477	322	587	437	907
		75	209	382	258	470	349	726
		90	174	318	215	391	291	605
	8	60	196	358	241	440	328	680
		75	157	286	193	352	262	544
		90	131	238	161	293	218	453
	12	60	131	238	161	293	218	453
		75	104	191	129	235	174	363
		90	87	159	107	195	145	302

9.1.4 X-EDN19 THQ12 and X-EDN19 THQ12M are Approved for use in securing FM Approved steel deck at the maximum spans shown in the table below to structural steel supporting members in the thickness range of greater than 0.25 in. but less than or equal to 0.375 in.

	Fastener O.C. Spacing	Rating	MAX SPAN [INCHES]					
			22 ga		20 ga		18 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
X-EDN19 THQ12, X-EDN19 THQ12M	6	60	262	477	322	820	437	820
		75	209	382	258	656	349	656
		90	174	318	215	546	291	546
	8	60	196	358	241	615	328	615
		75	157	286	193	492	262	492
		90	131	238	161	410	218	410
	12	60	131	238	161	410	218	410
		75	104	191	129	328	174	328
		90	87	159	107	273	145	273

9.1.5 X-EDNK22 THQ12 and X-EDNK22 THQ12M are Approved for use in securing FM Approved steel deck at the maximum spans shown in the table on the following page to structural steel supporting members in the thickness range of greater than or equal to 0.125 in. but less than 0.25 in.

	Fastener O.C. Spacing	Rating	MAX SPAN [INCHES]					
			22 ga		20 ga		18 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
X-EDNK22 THQ12, X-EDNK22 THQ12M	6	60	262	551	322	551	551	551
		75	209	440	258	440	440	440
		90	174	367	215	367	367	367
	8	60	196	413	241	413	413	413
		75	157	330	193	330	330	330
		90	131	275	161	275	275	275
	12	60	131	275	161	275	275	275
		75	104	220	129	220	220	220
		90	87	183	107	183	183	183

9.1.6 X-EDNK22 THQ12 and X-EDNK22 THQ12M are Approved for use in securing FM Approved steel deck at the maximum spans shown in the table below to structural steel supporting members of thickness equal to 0.25 in.

	Fastener O.C. Spacing	Rating	MAX SPAN [INCHES]					
			22 ga		20 ga		18 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
X-EDNK22 THQ12, X-EDNK22 THQ12M	6	60	262	477	322	587	437	797
		75	209	382	258	470	349	637
		90	174	318	215	391	291	531
	8	60	196	358	241	440	328	597
		75	157	286	193	352	262	478
		90	131	238	161	293	218	398
	12	60	131	238	161	293	218	398
		75	104	191	129	235	174	318
		90	87	159	107	195	145	265

9.2 The currently Approved Hilti Inc. steel deck side lap fasteners, S-SLC 01 HWH, S-SLC 01 M HWH, S-MS 01 Z4,8 X 20 M, S-MS 01 Z4,8 X 20, S-SLC 02 HWH, S-SLC 02 M HWH, S-MD 10-16 x 7/8 HHWH Pilot Point, and S-MD 12-14 X 1 HHWH Stitch, continue to meet the Approval requirements of FM Approvals for use as a component in Class 1-60, Class 1-75, and Class 1-90 wind uplift rated insulated steel deck roof constructions when installed as described in RoofNav, an on-line resource of FM Approvals.

Fastener	Deck Type ¹	Deck Gauge	Maximum Fastener Spacing ²
S-SLC 01 HWH S-SLC 01 M HWH S-MS 01 Z4,8 X 20 M S-MS 01 Z4,8 X 20	FM Approved nominal 1-1/2 in. (38 mm) deep steel deck (B-Type)	20 and 22	36 in. (0.9 m)
S-SLC 02 M HWH S-SLC 02 HWH S-MD 10-16 x 7/8 HHWH Pilot Point S-MD 12-14 X 1 HHWH Stitch		18, 20, and 22	
S-SLC 01 HWH S-SLC 01 M HWH S-MS 01 Z4,8 X 20 M S-MS 01 Z4,8 X 20	FM Approved nominal 3 in. (76 mm) deep steel deck (N-Type)	20 and 22	
S-SLC 02 M HWH S-SLC 02 HWH S-MD 10-16 x 7/8 HHWH Pilot Point S-MD 12-14 X 1 HHWH Stitch		18, 20, and 22	

¹ Hilti fasteners may be used with additional FM Approved steel deck types, see RoofNav for details.

² Intermediate fastener spacings may be utilized.

- 9.3 Test results from this program indicate that the X-HSN 24, S-MD 12-24 x 1-5/8 M HWH5, and S-MD05Z 5,5X40 steel deck structural attachment fasteners meet the requirements of the FM Approvals Standard listed in section 1.3 when used to secure steel deck to a building structure as follows.
- 9.4 X-HSN 24 is Approved for securing 18, 20, and 22 ga. [0.0474, 0.0358 and 0.0295 in. (1.2, 0.91, and 0.75 mm) thick], generic FM Approved steel roof deck with Class 1-90 wind ratings when the fasteners are spaced maximum 12 in. (305 mm) o.c. at the supports.
- 9.5 S-MD 12-24 x 1-5/8 M HWH5 and S-MD05Z 5,5X40 are Approved for securing 20 and 22 ga. [0.0358 and 0.0295 in. (0.91 and 0.75 mm) thick], generic FM Approved steel roof deck with Class 1-75 wind ratings when the fasteners are spaced maximum 12 in. (305 mm) o.c. or Class 1-90 wind ratings when the fasteners are spaced maximum 8 in. (203 mm) o.c. at the structural supports of thicknesses less than 0.125 in (3.2 mm) or greater than or equal to 16 ga. [0.0598 in. (1.5 mm)].
- 9.6 S-MD 12-24 x 1-5/8 M HWH5 and S-MD05Z 5,5X40 are Approved for securing 18 ga. [0.0474 in. (1.2 mm) thick], generic FM Approved steel roof deck with Class 1-60 wind ratings when the fasteners are spaced maximum 12 in. (305 mm) o.c. or Class 1-90 wind ratings when the fasteners are spaced maximum 8 in. (203 mm) o.c. at the structural supports of thicknesses less than 0.125 in (3.2 mm) or greater than or equal to 16 ga. [0.0598 in. (1.5 mm)].
- 9.7 S-MD 12-24 x 1-5/8 M HWH5 and S-MD05Z 5,5X40 are Approved for securing 18, 20, and 22 ga. [0.0474, 0.0358 and 0.0295 in. (1.2, 0.91, and 0.75 mm) thick], generic FM Approved steel roof deck with Class 1-90 wind ratings when the fasteners are spaced maximum 12 in. (305 mm) o.c. at the structural supports of greater than or equal to 0.125 in (3.2 mm) or less than or equal to 0.25 in (6.4 mm).
- 9.7.1 X-HSN 24 is Approved for use in securing FM Approved steel deck at the maximum spans shown in the table below to structural steel supporting members in the thickness range of greater than or equal to 0.125 in. but less than 0.375 in.

	Fastener O.C. Spacing	Rating	MAX SPANS [INCHES]							
			22 ga		20 ga		18 ga		16 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
X-HSN 24	6	60	262	478	322	800	437	800	800	800
		75	209	382	258	640	350	640	640	640
		90	174	318	215	533	291	533	533	533
	8	60	196	358	241	600	328	600	600	600
		75	157	286	193	480	262	480	480	480
		90	131	239	161	400	218	400	400	400
	12	60	131	239	161	400	218	400	400	400
		75	104	191	129	320	175	320	320	320
		90	87	159	107	266	145	266	266	266

- 9.7.2 X-HSN 24 is Approved for use in securing FM Approved steel deck at the maximum spans shown in the table on the following page to structural steel supporting members of thicknesses greater than or equal to 0.375 in.

X-HSN 24	Fastener O.C. Spacing	Rating	MAX SPAN [INCHES]							
			22 ga		20 ga		18 ga		16 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
6	60	262	478	322	721	437	721	721	721	
	75	209	382	258	577	350	577	577	577	
	90	174	318	215	481	291	481	481	481	
8	60	196	358	241	541	328	541	541	541	
	75	157	286	193	432	262	432	432	432	
	90	131	239	161	360	218	360	360	360	
12	60	131	239	161	360	218	360	360	360	
	75	104	191	129	288	175	288	288	288	
	90	87	159	107	240	145	240	240	240	

9.7.3 S-MD 12-24 x 1-5/8 M HWH5 and S-MD05Z 5,5X40 are Approved for use in securing FM Approved steel deck at the maximum spans shown in the table below to structural steel supporting members of thicknesses in the thickness range of greater than or equal to 0.0598 in. but less than 0.125 in.

S-MD 12-24 X 1-5/8 M HWH5, S-MD05Z 5,5X40	Fastener O.C. Spacing	Rating	MAX SPAN [INCHES]							
			22 ga		20 ga		18 ga		16 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
6	60	200	200	200	200	200	200	200	200	
	75	160	160	160	160	160	160	160	160	
	90	133	133	133	133	133	133	133	133	
8	60	150	150	150	150	150	150	150	150	
	75	120	120	120	120	120	120	120	120	
	90	100	100	100	100	100	100	100	100	
12	60	100	100	100	100	100	100	100	100	
	75	80	80	80	80	80	80	80	80	
	90	66	66	66	66	66	66	66	66	

9.7.4 S-MD 12-24 x 1-5/8 M HWH5 and S-MD05Z 5,5X40 are Approved for use in securing FM Approved steel deck at the maximum spans shown in the table below to structural steel supporting members of thicknesses in the thickness range of greater than or equal to 0.125 in. but less than or equal to 0.25 in.

S-MD 12-24 X 1-5/8 M HWH5, S-MD05Z 5,5X40	Fastener O.C. Spacing	Rating	MAX SPAN [INCHES]							
			22 ga		20 ga		18 ga		16 ga	
			33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi	33 ksi	80 ksi
6	60	231	449	280	449	449	449	449	449	
	75	185	359	224	359	359	359	359	359	
	90	154	299	187	299	299	299	299	299	
8	60	173	336	210	336	336	336	336	336	
	75	138	269	168	269	269	269	269	269	
	90	115	224	140	224	224	224	224	224	
12	60	115	224	140	224	224	224	224	224	
	75	92	179	112	179	179	179	179	179	
	90	77	149	93	149	149	149	149	149	

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

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

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

PROJECT DATA RECORD: 3049232

ATTACHMENTS: N/A
ORIGINAL TEST DATA See PDRs for projects in Table 1