

DATE: \_\_\_\_\_ PROJECT: \_\_\_\_\_

TO: \_\_\_\_\_ FROM: \_\_\_\_\_

SUBJECT: **HILTI X-HSN 24 POWDER-ACTUATED FASTENER SUBSTITUTION REQUEST**

SPECIFICATION TITLE: \_\_\_\_\_

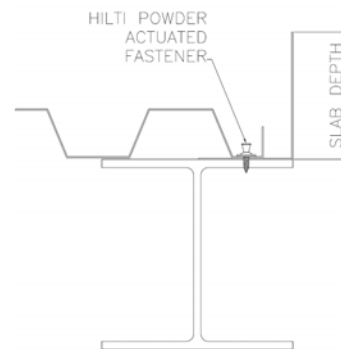
SECTION: \_\_\_\_\_ PAGE: \_\_\_\_\_ ARTICLE/PARAGRAPH: \_\_\_\_\_

DESCRIPTION: \_\_\_\_\_

DESIGN DETAIL NO.: \_\_\_\_\_

PROPOSED SUBSTITUTION: Use HILTI X-HSN 24 instead of fillet weld or arc spot puddle weld

**PRODUCT DESCRIPTION:** The Hilti X-HSN 24 Powder-Actuated Fasteners are designed as high performance solutions for attachment of cold-formed steel pourstops to structural steel supports as an alternative to welding. The Hilti powder-actuated fasteners come in a collated configurations to maximize productivity.



SUBMITTED BY: \_\_\_\_\_

**SUPPORTING DATA ATTACHED:**

- HILTI PRODUCT TECHNICAL GUIDE 2015
- ICC EVALUATION SERVICE REPORT PAGES
- FASTENER LOAD COMPARISON TABLES
- SAMPLES
- TEST REPORTS
- PRICING INFORMATION

**A/E REVIEW AND ACTION:**

- SUBSTITUTION APPROVED
- SUBSTITUTION APPROVED AS NOTED
- SUBSTITUTION REJECTED

COMMENTS: \_\_\_\_\_

SIGNED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

**Table 1 - Allowable Weld Design Values Pounds Per Inch of Fillet Weld or Per Hilti X-HSN 24 Powder-Actuated Fastener**

Pourstop Thickness (GA)	Pourstop Steel Fu (ksi)	Fillet Weld <sup>1</sup>	X-HSN 24	
		Tension or Shear	Pullover	Shear
20	45	689	560	600
18	45	919	725	785
16	45	1149	865	975
14	45	1438	865	975
12	45	2013	865	975
10	45	2587	-	-
20	65	996	560	600
18	65	1328	725	785
16	65	1660	865	975
14	65	2077	865	975
12	65	2906	865	975
10	65	3736	-	-

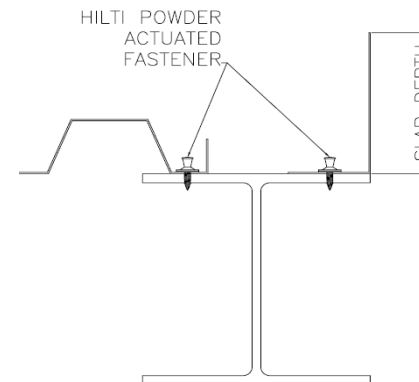
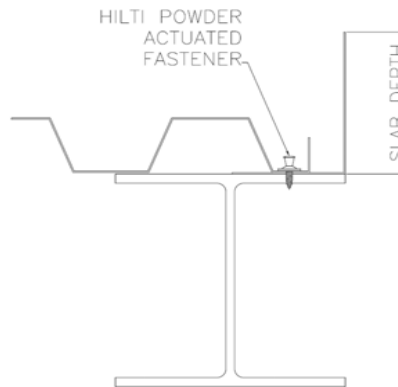
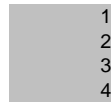
1.) Based upon AISI Manual for Cold-Formed Steel Design, 2008 Edition Table IV-1 assuming the transverse condition, which is the highest capacity.

**Table 2 - Allowable Load Capacities for Hilti Powder-Actuated Fasteners from ICC-ES ESR-3592 (lb)<sup>1</sup>**

Fastener Designation	Base Steel Thickness											
	1/8"		3/16"		1/4"		3/8"		1/2"		3/4"	
	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear	Tension	Shear
X-HSN 24	435	975	635	975	750	975	750	975	-	-	-	-

1.) Reference Tables 2 and 3 of ESR-3592 for complete details regarding the load values provided in this table.

Weld Length #1  
Weld Length #2  
Weld Length #3  
Weld Length #4



**Table 3 - Hilti X-HSN 24 vs. Fillet Weld (Tension)<sup>1,2,3,4,5,6</sup>**

Pourstop Gauge (Fu)	Inch of Fillet Weld			
	1	2	3	4
<b># of X-HSN 24 fasteners in 1/8" thick base steel (Fy = 50 ksi)</b>				
20 GA (45 ksi)	1.58	3.17	4.75	6.34
18 GA (45 ksi)	2.11	4.23	6.34	8.45
16 GA (45 ksi)	2.64	5.28	7.92	10.57
14 GA (45 ksi)	3.31	6.61	9.92	13.22
12 GA (45 ksi)	4.63	9.26	13.88	18.51
10 GA (45 ksi)	5.95	11.89	17.84	23.79
20 GA (65 ksi)	2.29	4.58	6.87	9.16
18 GA (65 ksi)	3.05	6.11	9.16	12.21
16 GA (65 ksi)	3.82	7.63	11.45	15.26
14 GA (65 ksi)	4.77	9.55	14.32	19.10
12 GA (65 ksi)	6.68	13.36	20.04	26.72
10 GA (65 ksi)	-	-	-	-
<b># of X-HSN 24 fasteners in 3/16" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	1.15	2.30	3.45	4.59
18 GA (45 ksi)	1.45	2.89	4.34	5.79
16 GA (45 ksi)	1.81	3.62	5.43	7.24
14 GA (45 ksi)	2.26	4.53	6.79	9.06
12 GA (45 ksi)	3.17	6.34	9.51	12.68
10 GA (45 ksi)	4.07	8.15	12.22	16.30
20 GA (65 ksi)	1.66	3.32	4.98	6.64
18 GA (65 ksi)	2.09	4.18	6.27	8.37
16 GA (65 ksi)	2.61	5.23	7.84	10.46
14 GA (65 ksi)	3.27	6.54	9.81	13.08
12 GA (65 ksi)	4.58	9.15	13.73	18.31
10 GA (65 ksi)	-	-	-	-
<b># of X-HSN 24 fasteners in 1/4" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	1.15	2.30	3.45	4.59
18 GA (45 ksi)	1.23	2.45	3.68	4.90
16 GA (45 ksi)	1.53	3.06	4.60	6.13
14 GA (45 ksi)	1.92	3.83	5.75	7.67
12 GA (45 ksi)	2.68	5.37	8.05	10.74
10 GA (45 ksi)	3.45	6.90	10.35	13.80
20 GA (65 ksi)	1.66	3.32	4.98	6.64
18 GA (65 ksi)	1.77	3.54	5.31	7.08
16 GA (65 ksi)	2.21	4.43	6.64	8.85
14 GA (65 ksi)	2.77	5.54	8.31	11.08
12 GA (65 ksi)	3.87	7.75	11.62	15.50
10 GA (65 ksi)	-	-	-	-

Pourstop Gauge (Fu)	Inch of Fillet Weld			
	1	2	3	4
<b># of X-HSN 24 fasteners in 3/8" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	1.23	2.46	3.69	4.92
18 GA (45 ksi)	1.27	2.54	3.80	5.07
16 GA (45 ksi)	1.53	3.06	4.60	6.13
14 GA (45 ksi)	1.92	3.83	5.75	7.67
12 GA (45 ksi)	2.68	5.37	8.05	10.74
10 GA (45 ksi)	3.45	6.90	10.35	13.80
20 GA (65 ksi)	1.78	3.56	5.34	7.11
18 GA (65 ksi)	1.83	3.66	5.50	7.33
16 GA (65 ksi)	2.21	4.43	6.64	8.85
14 GA (65 ksi)	2.77	5.54	8.31	11.08
12 GA (65 ksi)	3.87	7.75	11.62	15.50
10 GA (65 ksi)	-	-	-	-
<b># of X-HSN 24 fasteners in 1/2" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	-	-	-	-
18 GA (45 ksi)	-	-	-	-
16 GA (45 ksi)	-	-	-	-
14 GA (45 ksi)	-	-	-	-
12 GA (45 ksi)	-	-	-	-
10 GA (45 ksi)	-	-	-	-
20 GA (65 ksi)	-	-	-	-
18 GA (65 ksi)	-	-	-	-
16 GA (65 ksi)	-	-	-	-
14 GA (65 ksi)	-	-	-	-
12 GA (65 ksi)	-	-	-	-
10 GA (65 ksi)	-	-	-	-
<b># of X-HSN 24 fasteners in ≥ 3/4" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	-	-	-	-
18 GA (45 ksi)	-	-	-	-
16 GA (45 ksi)	-	-	-	-
14 GA (45 ksi)	-	-	-	-
12 GA (45 ksi)	-	-	-	-
10 GA (45 ksi)	-	-	-	-
20 GA (65 ksi)	-	-	-	-
18 GA (65 ksi)	-	-	-	-
16 GA (65 ksi)	-	-	-	-
14 GA (65 ksi)	-	-	-	-
12 GA (65 ksi)	-	-	-	-
10 GA (65 ksi)	-	-	-	-

- 1.) Based upon powder-actuated fastener point through point penetration.
- 2.) Comparisons between weld and powder-actuated fasteners are based upon the fasteners only and do not consider other failure modes (e.g. sheet steel failure)
- 3.) Loads are assumed to act about the centroid of the fastener group or weld length and do not consider prying forces.
- 4.) Fastener totals do not take into account the capacities of the pourstop itself and or the capability of the pourstop to have the number of fasteners provided installed through it. Minimum fastener spacing and edge distance without reduction in powder-actuated fastener performance is 1" and 1/2", respectively.
- 5.) Trial installations are recommended.

**Table 4 - Hilti X-HSN 24 vs. Fillet Weld (Shear)<sup>1,2,3,4,5,6</sup>**

Pourstop Gauge (Fu)	Inch of Fillet Weld			
	1	2	3	4
<b># of X-HSN 24 fasteners in 1/8" thick base steel (Fy = 50 ksi)</b>				
20 GA (45 ksi)	1.15	2.30	3.45	4.59
18 GA (45 ksi)	1.17	2.34	3.51	4.68
16 GA (45 ksi)	1.18	2.36	3.54	4.71
14 GA (45 ksi)	1.47	2.95	4.42	5.90
12 GA (45 ksi)	2.06	4.13	6.19	8.26
10 GA (45 ksi)	2.65	5.31	7.96	10.61
20 GA (65 ksi)	1.66	3.32	4.98	6.64
18 GA (65 ksi)	1.69	3.38	5.08	6.77
16 GA (65 ksi)	1.70	3.41	5.11	6.81
14 GA (65 ksi)	2.13	4.26	6.39	8.52
12 GA (65 ksi)	2.98	5.96	8.94	11.92
10 GA (65 ksi)	-	-	-	-
<b># of X-HSN 24 fasteners in 3/16" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	1.15	2.30	3.45	4.59
18 GA (45 ksi)	1.17	2.34	3.51	4.68
16 GA (45 ksi)	1.18	2.36	3.54	4.71
14 GA (45 ksi)	1.47	2.95	4.42	5.90
12 GA (45 ksi)	2.06	4.13	6.19	8.26
10 GA (45 ksi)	2.65	5.31	7.96	10.61
20 GA (65 ksi)	1.66	3.32	4.98	6.64
18 GA (65 ksi)	1.69	3.38	5.08	6.77
16 GA (65 ksi)	1.70	3.41	5.11	6.81
14 GA (65 ksi)	2.13	4.26	6.39	8.52
12 GA (65 ksi)	2.98	5.96	8.94	11.92
10 GA (65 ksi)	-	-	-	-
<b># of X-HSN 24 fasteners in 1/4" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	1.15	2.30	3.45	4.59
18 GA (45 ksi)	1.17	2.34	3.51	4.68
16 GA (45 ksi)	1.18	2.36	3.54	4.71
14 GA (45 ksi)	1.47	2.95	4.42	5.90
12 GA (45 ksi)	2.06	4.13	6.19	8.26
10 GA (45 ksi)	2.65	5.31	7.96	10.61
20 GA (65 ksi)	1.66	3.32	4.98	6.64
18 GA (65 ksi)	1.69	3.38	5.08	6.77
16 GA (65 ksi)	1.70	3.41	5.11	6.81
14 GA (65 ksi)	2.13	4.26	6.39	8.52
12 GA (65 ksi)	2.98	5.96	8.94	11.92
10 GA (65 ksi)	-	-	-	-

Pourstop Gauge (Fu)	Inch of Fillet Weld			
	1	2	3	4
<b># of X-HSN 24 fasteners in 3/8" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	1.15	2.30	3.45	4.59
18 GA (45 ksi)	1.17	2.34	3.51	4.68
16 GA (45 ksi)	1.18	2.36	3.54	4.71
14 GA (45 ksi)	1.47	2.95	4.42	5.90
12 GA (45 ksi)	2.06	4.13	6.19	8.26
10 GA (45 ksi)	2.65	5.31	7.96	10.61
20 GA (65 ksi)	1.66	3.32	4.98	6.64
18 GA (65 ksi)	1.69	3.38	5.08	6.77
16 GA (65 ksi)	1.70	3.41	5.11	6.81
14 GA (65 ksi)	2.13	4.26	6.39	8.52
12 GA (65 ksi)	2.98	5.96	8.94	11.92
10 GA (65 ksi)	-	-	-	-
<b># of X-HSN 24 fasteners in 1/2" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	-	-	-	-
18 GA (45 ksi)	-	-	-	-
16 GA (45 ksi)	-	-	-	-
14 GA (45 ksi)	-	-	-	-
12 GA (45 ksi)	-	-	-	-
10 GA (45 ksi)	-	-	-	-
20 GA (65 ksi)	-	-	-	-
18 GA (65 ksi)	-	-	-	-
16 GA (65 ksi)	-	-	-	-
14 GA (65 ksi)	-	-	-	-
12 GA (65 ksi)	-	-	-	-
10 GA (65 ksi)	-	-	-	-
<b># of X-HSN 24 fasteners in ≥ 3/4" thick base steel (Fy = 36 ksi)</b>				
20 GA (45 ksi)	-	-	-	-
18 GA (45 ksi)	-	-	-	-
16 GA (45 ksi)	-	-	-	-
14 GA (45 ksi)	-	-	-	-
12 GA (45 ksi)	-	-	-	-
10 GA (45 ksi)	-	-	-	-
20 GA (65 ksi)	-	-	-	-
18 GA (65 ksi)	-	-	-	-
16 GA (65 ksi)	-	-	-	-
14 GA (65 ksi)	-	-	-	-
12 GA (65 ksi)	-	-	-	-
10 GA (65 ksi)	-	-	-	-

- 1.) Based upon powder-actuated fastener point through point penetration.
- 2.) Comparisons between weld and powder-actuated fasteners are based upon the fasteners only and do not consider other failure modes (e.g. sheet steel failure)
- 3.) Loads are assumed to act about the centroid of the fastener group or weld length and do not consider prying forces.
- 4.) Fastener totals do not take into account the capacities of the pourstop itself and or the capability of the pourstop to have the number of fasteners provided installed through it. Minimum fastener spacing and edge distance without reduction in powder-actuated fastener performance is 1" and 1/2", respectively.
- 5.) Trial installations are recommended.

## X-HSN 24 for Fastening Deck to Bar Joist 3.5.2

### 3.5.2.1 Product Description

The Hilti bar joist deck fastening system consists of powder-actuated tools that are primarily used with the X-HSN 24 fasteners, which are available in a collated version.

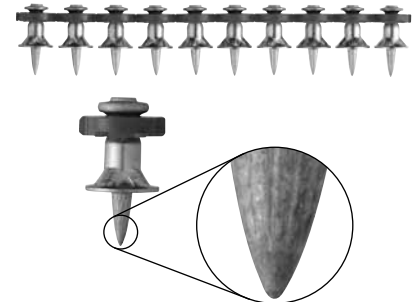
For many bar joist decking projects, the tool of choice is the DX 860-HSN tool. This self-contained stand up decking tool is powered by 0.27 caliber short cartridges, which are loaded into the tool in strips of 40. The cartridges drive the X-HSN 24 fasteners into almost any type of steel deck profile and base steel thicknesses of 1/8" to 3/8". These fasteners are available in collated strips of 10. Four of these strips are loaded

into the DX 860-HSN tool, along with the cartridge strip, and enable the operator to fasten at a rate of up to 1,000 quality fastenings per hour. Additionally, this tool offers punch through resistance in cases where the base material is inadvertently missed.

Other tools include the hand held DX 460-SM, a semi-automatic magazine tool for use on smaller jobs or in tandem with the DX 860-HSN.

Hilti X-HSN 24 steel deck fasteners comply with ANSI/SDI RD1.0, C1.0 and NC1.0 standards.

- 3.5.2.1 Product Description
- 3.5.2.2 Material Specifications
- 3.5.2.3 Technical Data
- 3.5.2.4 Ordering Information



X-HSN 24

### 3.5.2.2 Material Specifications

Fastener designation	Fastener material	Fastener plating	Nominal fastener hardness
X-HSN 24	Carbon Steel	5 µm Zinc <sup>1</sup>	55.5 HRC

1 ASTM B633, SC 1, Type III. Reference Section 2.3.3.1 for more information.

### 3.5.2.3 Technical Data

Allowable pullout loads for attachments to steel base material lb (kN)<sup>1, 2, 3</sup>

Fastener	Base material thickness (in.)			
	1/8	3/16	1/4	3/8
X-HSN 24	435 (1.95)	635 (2.82)	750 (3.34)	750 (3.34)

- 1 These values represent testing performed in ASTM A36 plate steel.
- 2 The values must be compared with allowable tensile pullover values.
- 3 Allowable values based on safety factor of 5.0.

Allowable pullover and shear bearing loads for attaching steel deck<sup>1,2,3</sup>

Fastener	Steel deck gauge (in.)											
	16 (0.0598)		18 (0.0474)		20 (0.0358)		22 (0.0295)		24 (0.0239)		26 (0.0179)	
	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)	Tension lb (kN)	Shear lb (kN)
X-HSN 24 <sup>1</sup>	865 (3.85)	975 (4.29)	725 (3.22)	785 (3.45)	560 (2.49)	600 (2.64)	500 (2.22)	500 (2.20)	450 (2.00)	410 (1.80)	415 (1.85)	310 (1.36)

- 1 For base steel thickness 1/8" (3 mm) to 3/8" (10 mm).
- 2 Allowable values are based on a safety factor of 3.0.
- 3 Loads based on ASTM A1008, or minimum ASTM A653 SQ33 steel deck.

### Approvals/Listings

**ICC-ES (International Code Council)**  
 ESR-3592, ESR-2776, ESR-2197, ESR-1116, ESR-1735P, ESR-1414, ESR-2408

**COLA (City of Los Angeles)**  
 RR 25974, RR 25877, RR 25296

**FM (Factory Mutual)**  
 For attaching Class 1 Steel Roof Decks with 1-60 and 1-90 wind uplift ratings.

Refer to FM RoofNav for specific assembly listings.

**UL (Underwriters Laboratories)**  
 Fasteners for attaching steel roof deck (uplift and fire classification)

