



Bar Joist - DX 860-HSN & DX 460-SM Deck Fastening Systems**DX 860-HSN Deck Fastening System**

- Powder-actuated tool with a high fastening rate—can help significantly reduce the time it takes to attach deck
- No touch-up work required—perfect for fastening painted or galvanized deck surfaces
- Magazine for 40 continuous fastenings—up to 1000 fastenings per hour
- Unique piston/brake system helps prevent the fastener from punching through the deck
- Fastenings can be made even on very thin supporting structures without the need for weld washers

DX 460-SM Fastening System

- Fully automated hand-held tool for miscellaneous fastenings on steel thicknesses of 3/16", such as profile metal sheets on bar joists. Available with yellow, red, or black cartridges and X-HSN 24 fasteners.

Structural Steel - DX 860-ENP-L & DX 76-MX Deck Fastening Systems**DX 860-ENP-L Deck Fastening System**

- Fully automatic tool provides up to 1000 fastenings per hour
- 40-cartridge and 40-fastener capacity minimizes loading time and increases productivity
- Built-in, adjustable power regulator for optimal control in achieving reliable fastenings
- Cartridge and fastener magazine can be loaded from the top without having to bend over
- Use-on-Demand program to meet your project needs

DX 76-MX Deck Fastening System

- Power regulator for optimal control to achieve reliable fastenings across a broad application range
- Magazined fasteners and boosters helps increase operating speed and reduce the number of wasted fasteners
- Redesigned grip for better balance and handling
- Fastener guide options allow for customizing the tool to the job

Deck Sidelaps - ST 1800(A) & SDT 5 Stand-Up System**Fast:**

- SDT 5 Magazine holds 50 collated sidelap connectors for deck sidelap applications where productivity is essential
- Two handle design and low vibration grip provide greater operator comfort and less fatigue
- A range of fasteners for sidelaps and for deck to thin bar joist

Reliable:

- Adjustable torque control for improved sidelap connector performance
- Depth set function helps provide consistent fastener depth
- Heavy duty design helps ensure longer tool life

Simple:

- Rotatable nosepiece of SDT 5 allows for easy access into most deck profiles from a variety of positions
- Electronically controlled, variable speed screwdriver with claw clutch for easier fastener starts
- Quick and easy jam release mechanism

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Decking System Overview

1.1 How To Use This Manual

The purpose of this manual is to serve as a “how to” guide for using Hilti deck fastening systems. It is intended primarily for steel deck installers, but may also serve as a reference guide for engineers, purchasing agents, general contractors, inspectors and owners.

The manual begins with an overview of decking applications, and then guides you through how to select and use the tools and fasteners typically appropriate for various applications. The guide then focuses on how to use and maintain these tools, how to make and inspect a proper fastening and concludes with a discussion of how to troubleshoot and make common field repairs.

After reading this manual, installers should have a solid understanding how to use Hilti deck fastening systems, and should be ready to take the Hilti deck fastening trainer or operator test.

Note: The deck fastening trainer and operator cards are only valid in conjunction with a DX Operator's License. For trainer or operator DX training/testing, contact your local Hilti representative.

This manual also serves as a reference guide and should be made available to those who are responsible for steel deck installation.

1.2 Mechanical Fastening Concepts

1.2.1 General Terminology

Direct fastening: A fastening method in which the fastenings are made without any preparation steps such as drilling a hole. Examples are powder-actuated fastening, self-drilling screws and welding.

Powder-actuated fastener: A nail-like fastener driven into steel, concrete or masonry with the use of a powder-actuated tool, suitable for holding down the fastened material.

Fastened material: The material which must be attached to the base material (e.g. steel deck).

Base material: The base into which the fastener is driven (e.g. structural steel or bar joist).

Fastening: The combination of fastener, fastened material and base material (after the fastener has been driven).

Powder-actuated tool: A tool that utilizes expanding gases from a powder load to drive a fastener.

Powder-actuated, indirect-acting tool: A powder-actuated tool in which the expanding gas of the powder load acts on a captive piston, which in turn drives the fastener. The average test velocity using the lightest fastener and strongest powder load must not exceed 100 m/s (328 fps), to meet the "low velocity" tool class per ANSI A10.3-2013. All Hilti powder-actuated tools used in the construction industry are classified as low velocity.

Powder load (Booster/Cartridge): A powder filled metal case used as the source of driving energy. The ANSI A10.3 terminology is a cased powder load.

Fastening system: The combination of fastener, fastening tool and power source.

Square of Deck: The area of roof or floor deck equal to 100 ft²

1.2.2 Steel Deck Fastener Design and Selection

DX 860-HSN

The DX 860-HSN is a fully automatic powder-actuated stand up decking tool designed for attaching steel deck to steel base materials. With a high fastening rate and 40-fastener magazine, the DX 860-HSN can significantly help reduce the time it takes to attach deck. Fastenings can be made on very thin support structures without the need for weld washers. Suitable for base steels with a thickness of 1/8" to 3/8". Fastens X-HSN 24 collated fasteners.



DX 860-ENP-L

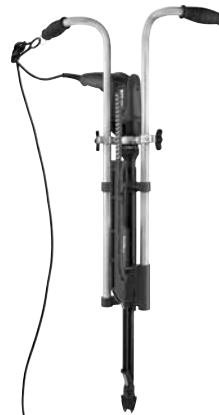
The DX 860-ENP-L is a fully automatic powder-actuated tool designed for attaching steel deck to structural steel beams. The tool has capacity of one strip of 40 cartridges and four flexible strips of 10 each X-ENP-19 L15 fasteners in an MXR collated configuration.



The DX 860-ENP-L is ergonomically designed to work in an upright position and can be loaded without the operator bending over. The system is suitable for deck with a flute width of 3/4" or greater and base steels with a thickness of 1/4" or greater.

SDT 5

The SDT 5 Stand Up Decking Tool is a steel deck sidelap and frame screw fastening tool. Combined with the DX 860-HSN or DX 860-ENP-L, these tools deliver a high speed, high productivity system for mechanically fastening metal deck. The SDT 5 can consistently drive up to 50 frame fastening screws or 50 sidelap screws in 16-26 gauge nestable decks before reloading. Its comfortable, durable design features adjustable torque clutch to provide consistent fastening quality. In a competitive market, the SDT 5 represents a major gain in productivity essential to staying on time and on budget.



DX 76-MX

The DX 76-MX is a magazine tool which holds 10 fasteners for reduced re-loads and improved productivity. This system is suitable for deck with a flute width of 3/4" or greater and a base steel thickness of 1/4" or thicker. Use with X-ENP-19 L15 fasteners in single or MX (collated) configuration.



DX 460-SM

The DX 460-SM is a medium duty powder-actuated decking tool with adjustable power regulation used for attaching steel deck to steel base materials. This system is best suited for deck with a flute width of 1/2" or greater and for base steels with a thickness of 3/16" to 3/8". Fastens X-HSN 24 collated fasteners.



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1.2.3 Anchoring Mechanisms

The following four anchoring mechanisms cause a DX-fastener to perform in steel base material.

- Clamping
- Keying
- Fusing (welding)
- Brazing or soldering

These mechanisms have been identified and studied by analyzing pullout test data and by microscopic examination of fastening cross-sections.

Clamping

As a fastener is driven, the base steel is displaced radially and towards both the entry and opposite surfaces. This results in residual pressure on the surface of the nail, which leads to friction or clamping. Clamping is the primary anchoring mechanism for through-penetrating fasteners.

Keying

The keying mechanism is possible when the fastener shank is knurled. A knurled fastener has grooves along the shank in which zinc and particles of base steel accumulate during the driving process. For fasteners that do not through-penetrate, keying is an especially important anchoring mechanism.

Fusion (welding)

Complete fusion of the fastener with the base steel is indicated by portions of base steel clinging to an extracted test fastener. Fusing or welding is observed mostly at the point of the fastener where the temperature during driving is the highest.

Brazing or Soldering

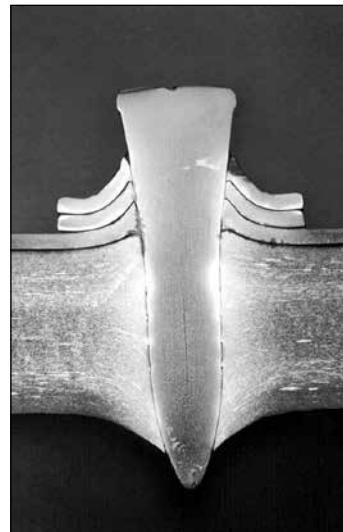
This refers to a zinc electro-plated layer on the fastener, which during fastening becomes brazed or soldered to the base steel.

Factors Influencing the Pull-out Resistance of Powder-Actuated Fasteners

Hilti powder-actuated fastening systems have been designed and produced to develop reliable performance. Factors that influence pullout strength have been identified through an understanding of the anchoring mechanisms, technical expertise and testing. Some of these factors are:

- Depth of penetration in the base steel
- Surface and material characteristics of the fastener
- Coating on the steel base material
- Driving velocity/energy
- Diameter and geometry of the fastener shank

Knowledge of the influencing factors is vital to the design of fastening systems and is useful for operators in understanding the various application limit guidelines for a fastening system.



1.3 Safety Characteristics of Hilti Powder-Actuated Tools

The safety of powder-actuated fastening systems can be looked at in terms of three general safety characteristics: Fastening safety, functional safety and operator safety.

Fastening safety is a measure of the adequacy of the in-place fastenings.

Functional safety refers to the operability of the tool, especially the Hilti powder-actuated tool safety devices under construction site conditions.

In the following section, we will focus on the five safety principles featured in Hilti powder-actuated tools.

Overview of DX safety principles

Five main design features in Hilti powder-actuated systems provide for additional operator safety – DX piston principle, drop firing safety, contact pressure safety, trigger safety and unintentional firing safety

1) DX piston principle: One of the frequent questions about the use of powder-actuated systems is what happens if the base material is missed during installation of the fastener. The piston principle means the energy from the powder load is transferred to a piston whose accelerated mass drives the fastener. Because the piston is captive in the tool, roughly 95% of the driving energy remains in the tool in the event the base material is missed. Thus the velocity of a fastener that has missed the base material is far lower than the velocities associated with fasteners from high velocity tools.

2) Drop firing safety: The drop firing safety prevents the tool from firing should it be dropped unintentionally. The drop firing safety is so designed that the tool will not fire when dropped onto a hard surface from heights up to ten feet.

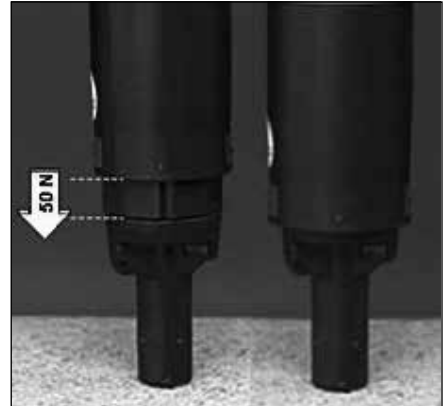
3) Contact pressure safety: This feature prevents the tool from firing unless it is firmly compressed against a surface.

4) Trigger safety: This mechanism ensures the trigger alone cannot cause ignition of the powder load. The trigger in a Hilti DX powder-actuated tool is uncoupled from the firing pin mechanism unless the tool is fully compressed.

5) Unintentional firing safety: Hilti DX tools cannot be fired by pulling the trigger and then compressing the tool against the work surface – also called bump firing. The tools can be fired only when they are first compressed, and then the trigger is pulled. This sequencing feature helps prevent the operator from accidentally firing the tool.



2) Drop firing safety



3) Contact pressure safety



4) Trigger safety



5) Unintentional firing safety

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1.4 Advantages of Mechanical Fastening of Roof/Floor Decks

Welding Problems

Cannot use in wet weather
 Relatively slow fastening rate
 (150 to 300 fastenings per hour)
 Health risks from zinc fumes
 Difficulty welding to epoxy coated or galvanized joists
 Overlaps very difficult to weld, often burn through the sheets
 Touch up painting required
 Cumbersome welding leads and masks
 Injury and fire hazard
 Weld washers often required when welding into thin material or for improved ductility in high seismic conditions

Benefits of Direct Fastening

Hilti tools perform well in inclement weather conditions
 Very fast; up to 700 - 1,100 fastenings/per hour/per tool
 No zinc fumes
 No problems with epoxy coated or galvanized joists
 No burn throughs
 No painting required
 Flexible self contained system
 Ergonomically designed system helps avoid chronic back pain
 No weld washers required

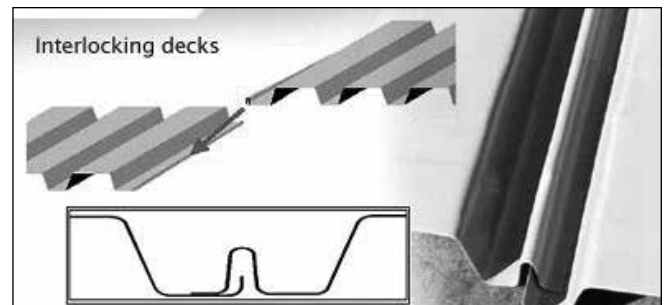
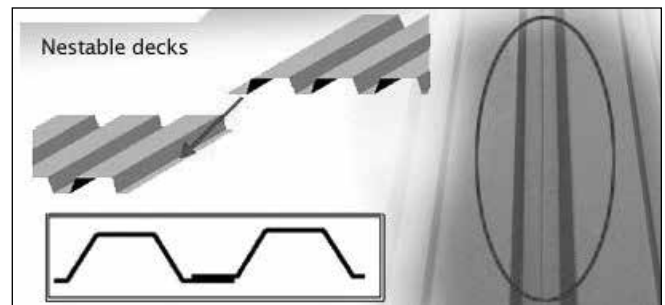
1.5 Types of Decks

Sheet metal deck is available in a wide variety of shapes, sizes and thicknesses and from a variety of different manufacturers.

Decking can be broken down into three major categories (1) Roof Decking (2) Composite Decking and (3) Form Decking.

Deck sheets are connected and fastened together by overlapping the edges or sides of the sheets. The design of the overlap is called the decking's side lap, and the most common designs use a nestable or interlocking shape. The differences are shown to the right. The sides of nestable decks simply overlap each other.

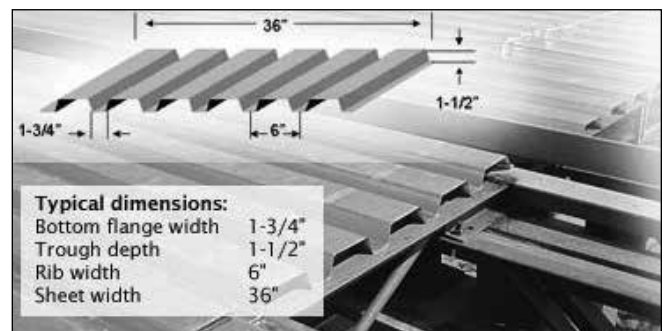
Interlocking decks use an overlap ending that hooks on top of an underlap ending. This shape is used primarily in Canada and on the West Coast of the United States. Note that in the U.S., this type of deck is identified with an "I" after the deck type nomenclature (e.g., BI, FI, NI).



1.5.1 Roof Decks

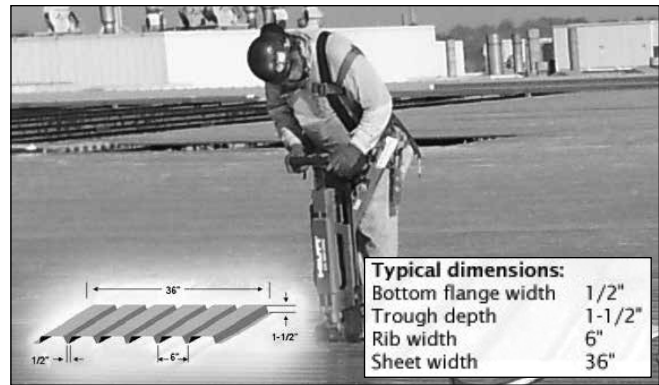
B-Deck 1-½ Wide Rib

B-deck is the most common deck type used in the United States and Canada varying from 16 to 24 gauge, with 18, 20 and 22 gauge being most common. B-deck sheets are typically 36" wide and 1.5" deep.



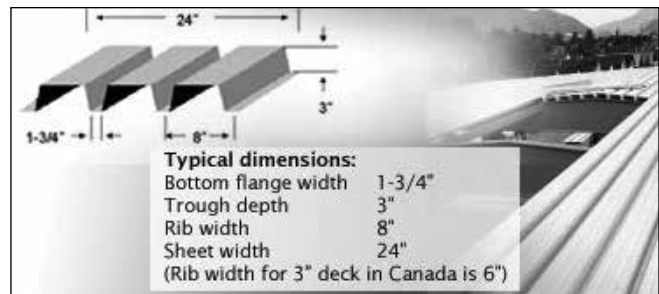
F-Deck

F-deck is similar to B-deck with the key difference being a bottom flange width of 1/2", where B-deck has a 1-3/4" bottom flange width.



N-Deck 3"

The N-deck is a deep rib deck, which provides greater strength and stiffness than most types of deck. It is mostly used on wider span structural steel buildings. However, N-deck is often used as an acoustical deck. Glass fiber sound absorbing batts are placed in the troughs to absorb up to 90% of the sound striking the deck. It is particularly suitable for structures such as auditoriums, schools and theaters.

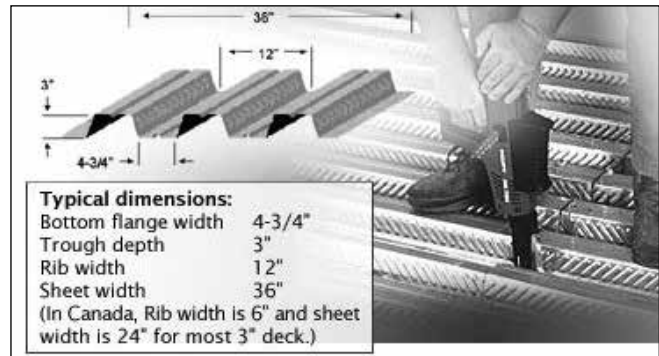


1.5.2 Composite Deck

Both steel composite deck and steel form deck are utilized with concrete to serve as floor systems.

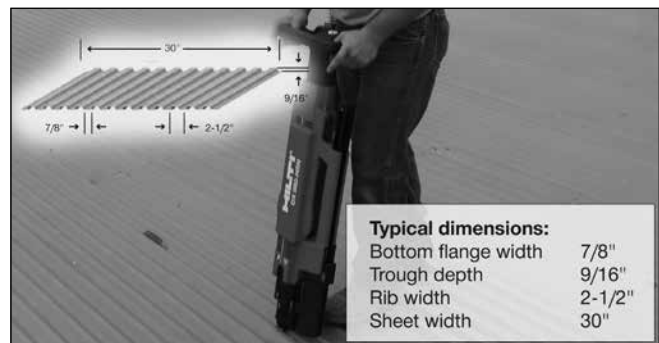
Composite decks are mainly used on structural steel. Concrete is poured over the deck to form the floor. Composite deck, in addition to serving as a form, is dimpled or embossed to provide a mechanical bonding (keying) to the concrete, which results in a composite slab.

X-HVB shear connectors or Nelson Studs may also be used to transfer shear loading between the concrete slab and the steel beam. X-HVBs are powder-actuated fastened and Nelson Studs are welded through the decking to the steel structure and also act as a fastener for the deck. Hilti X-HVB shear connectors may be fastened using the Hilti DX 76, with an X-HVB fastener guide, an X-HVB piston, and Hilti X-ENP-21 HVB fasteners (see the Hilti Direct Fastening Product Technical Guide for additional information).



1.5.3 Form Deck

Form decks are mainly used on bar joists. Concrete is poured over the deck to form the floor. It is available from 20 to 28 gauge but 24, 26 and 28 gauge are most commonly used. When welding, thin form deck (thinner than 24 gauge) usually has to be completed using weld washers. The placing of the washer takes extra time and increases the in-place fastening costs. Mechanical fasteners have no special requirements for thin deck.



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1.6 Types of Base Material

Steel Types

Steel types for the purpose of decking can be broken down into:

- Open web steel joists, commonly called bar joists
- Structural steel sections

Bar Joist

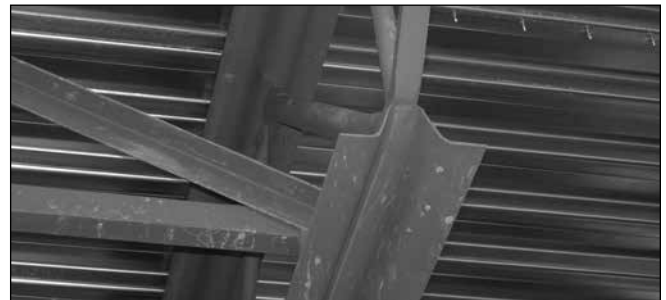
Bar joists have angled bars connecting to the top and bottom steel flanges. The flanges are also known as chords. Bar joists support loads more efficiently than do wide-flange beams, and they are typically more affordable. As a rule, the flange thickness of bar joists ranges from 1/8" to 1/4". However, occasionally, 7/64" and 3/8" thick bar joists may be used.

Bar joists are widely used for roof and floor decks in light commercial construction. Most shopping centers, warehouses, and industrial buildings in the U.S. and Canada use bar joist construction.



Omega Joists

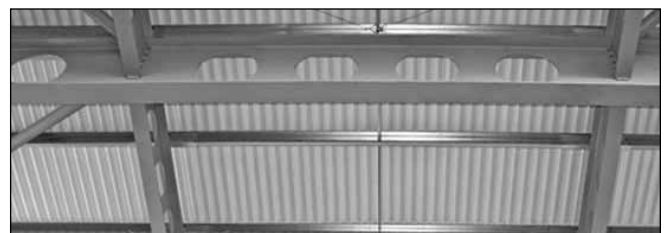
Omega Joist is a proprietary joist type commonly seen in western Canada and parts of the US. It can also be used in conjunction with Hilti's mechanical deck attachment system (see image to the right).



Gauge Purlins / Tubular Steel Joists

Gauge purlins or tubular steel joists come in various profiles from C channels to Z purlins. These structural members are typically 18 ga to 12 ga making them lighter weight than typical structural steel or bar joist profiles. The light gauge pose issues with attachment of metal deck due to the thin top chords. Self-drilling screws are the most common fastener used for this deck attachment.

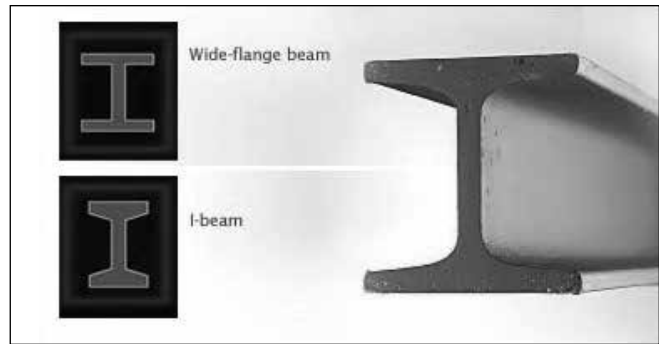
These structures are common in commercial strip centers, grocery stores, restaurants, or other smaller structures. Hilti Racing Tip 5 screws are a perfect solution for tdeck attachment to these lighter gauge profiles.



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Structural Steel Sections

The most widely used steel shapes for buildings that use structural steel sections include wide-flange beams and I-beams.



Structural Steel with Purlins

Structural steel with purlins is often used in a building's frame design. The purlins help to handle the additional weight requirements of multi-story buildings and buildings that support heavy industry, which need to operate hoists or other equipment attached to the roof. Structural steel purlins typically have a flange thickness of 1/4" or more.



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1.6.1 Bar Joist Applications

Roof Decking to Steel Bar Joist

Roof deck can typically be fastened with the X-HSN 24 fastener.

Floor decking to Steel Bar Joist

Floor deck can typically be fastened with the X-HSN 24 fastener.

1.6.2 Structural Steel Applications

Roof Decking to Steel Beams

Roof deck is fastened directly to steel beams of thickness greater than or equal to ¼" using an X-ENP 19 fastener. This type of construction can be found mostly in auditoriums, schools, hospitals and theatres.

Floor Decking to Steel Girders

Floor deck is fastened directly to steel beams with of thicknesses greater than or equal to ¼" using ENP fasteners. Composite beam floor decks are normally fastened using Nelson studs or X-HVB as shear connectors.

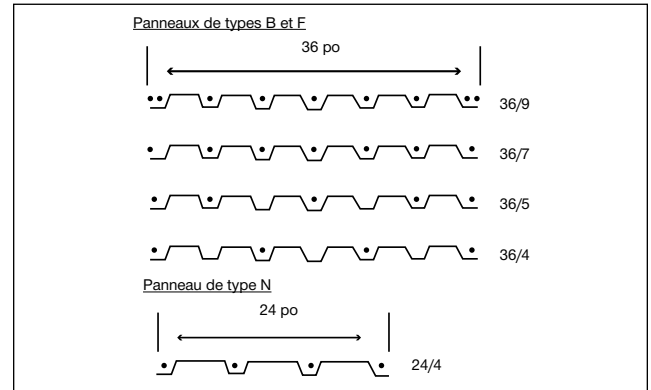
1.6.3 Sidelap Application

In this application, screws are used to attach overlapping metal sheets of nestable or screwable interlocking deck. Sidelaps are the primary screw fastening application for decking.

Sidelap fastening is the same regardless of the base steel. The fastener used is determined by the metal deck being used in the application.

1.7 Fastening Patterns

The fastening pattern determines the number and spacing (positioning) of the fasteners when attaching a decking panel to a steel member. Design load calculations dictate the fastening pattern based on the type of deck and fastening method specified for the particular project. The specified pattern is identified first by the sheet width and then by the number of fasteners required for each steel member span that crosses the decking panel. The image below identifies typical fastener patterns for the common roof decks. It is important to understand this nomenclature.



When using interlocking decking panels, the sheet typically is fastened to the steel member on both sides of the connecting side lap. With nestable decking panels, only one fastening is normally required at the side lap. This means interlocking decking panels can require up to 15% more fastenings.

Wind tacking

Wind tacking is the process of fastening metal decking panels at their edges before they are permanently attached. This keep the sheets in their proper positions and helps prevent them from being pulled away by wind uplift during the construction process.

2. Gearing Up for the Job

The following overview introduces Hilti direct fastening tools used to fasten metal deck to structural steel and bar joist. You will learn how to select the correct Hilti tool(s) and fastener(s) for your application.

2.1 Hilti Tool Solutions for Structural Steel

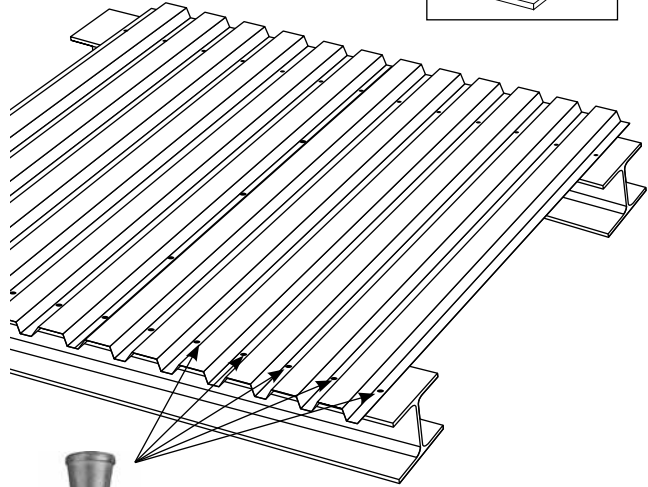
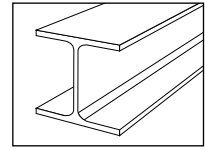
The DX 860-ENP-L is a semi-automatic, powder-actuated tool designed specifically for attaching metal deck to structural steel beams. These tools represent the next generation of Hilti direct fastening stand-up tools. The DX 860-ENP-L features an extended baseplate assembly and piston that facilitates the fastening of 3" deep N type deck.

The DX 860-ENP-L has the capacity to house one strip of 40 collated cartridges and 40 fasteners (4 strips of 10 collated X-ENP-19). This tool is ergonomically designed to work in an upright position, allowing the operator to remain in a standing position even while reloading fasteners and cartridges.

This stand-up system is generally suitable for deck with flute widths of 3/4" or greater and base steels with a thickness of 1/4" or greater.

The DX 76-MX is a heavy duty system consisting of a low velocity powder-actuated decking tool and fasteners for attaching metal deck to steel base materials. Special features include cartridge power regulation for optimal control to achieve reliable fastenings across a broad application range. The DX 76-MX should be used with X-ENP-19 L15 fasteners in MX collated configuration. The DX 76-MX tool is available with a variety of single shot fastener guides, and allows for fastening non collated fasteners for applications such as shear connector attachment and grating fastener attachment. This system is generally suitable for deck with a flute width of 3/4" or greater and base steels with a thickness of 1/4" or greater.

It is extremely important to not mix DX 76 and DX 76-MX parts. The tool will not function properly and may lead to a variety of issues as a result.



X-ENP-19 L15



DX 76-MX



DX 860-ENP

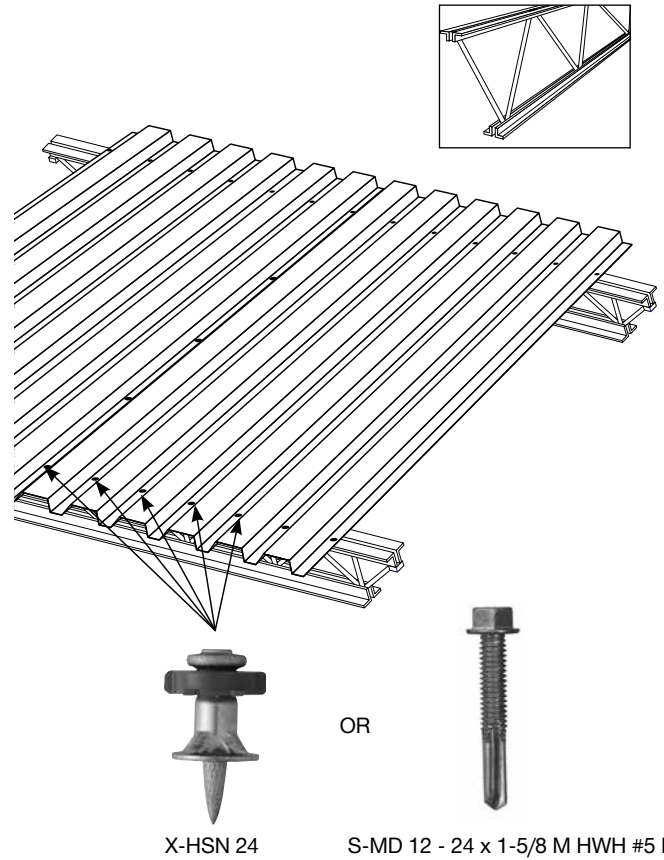
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2.2 Hilti Tool Solutions for Bar Joist

The **DX 860-HSN** is a semi-automatic powder-actuated stand up decking tool designed for attaching metal deck to steel base materials. With a high fastening rate and 40-nail magazine, the DX 860-HSN can significantly help reduce the time it takes to attach deck. Fastenings can be made on very thin support structures without the need for weld washers. The X-HSN 24 fasteners are generally suitable for base steels with a thickness from 1/8" to 3/8" with a flute width of 1/2" or greater.

The **DX 460-SM** is a medium duty powder-actuated decking tool with adjustable power regulation used for attaching metal deck to steel base materials. This system is best suited for deck with a flute width of 1/2" or greater and for base steels with a thickness of 3/16" to 3/8". Fastens X-HSN 24 fasteners.

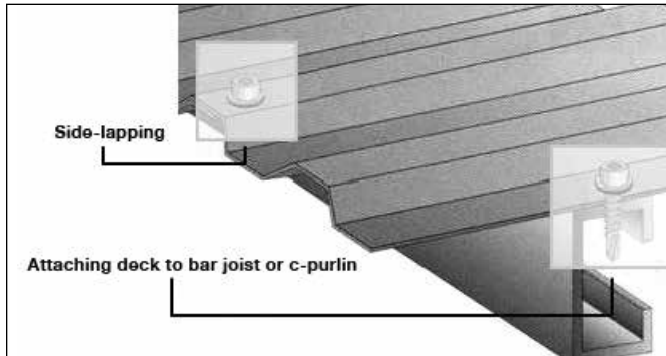
Collated Screws: The most productive screw-fastening method for fastening deck to bar joists up to 1/8" thick is the Hilti SDT 5. As joists become heavier than 1/8", the installer could utilize the SDT 5 or for more productivity, switch to DX 860 tools. The Racing Tip screws for deck frame attachment will drill up to 1/2" of total material.



X-HSN 24

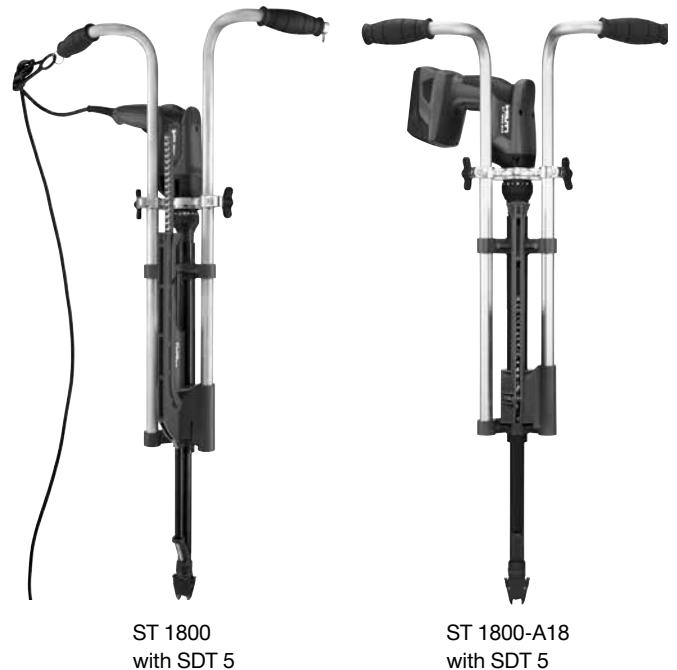
OR

S-MD 12 - 24 x 1-5/8 M HWH #5 RT



DX 460-SM

DX 860-HSN



ST 1800 with SDT 5

ST 1800-A18 with SDT 5

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2.3 Hilti Tool Solutions for Side Lap Fastening

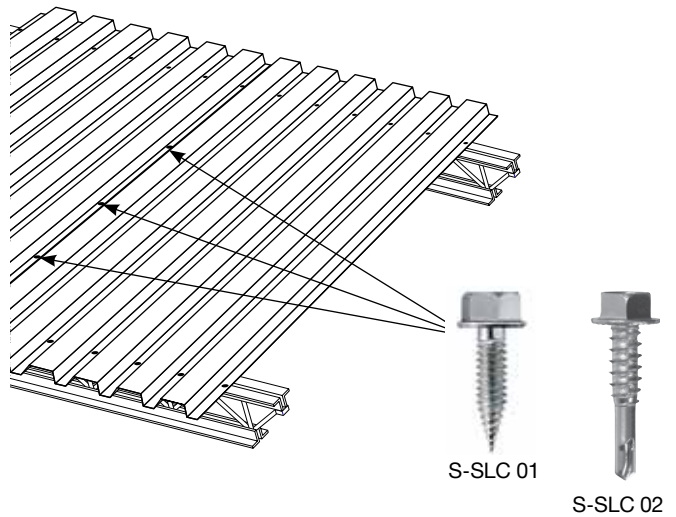
Screws are sometimes used to attach decking panels to bar joists as well as to fasten the sidelaps of nestable or screwable interlocking deck. However, they are seldom utilized for attaching deck to structural steel.

Collated Sidelap Connectors (SLC): The most productive screw-fastening method for fastening sidelaps is the Hilti SDT 5 Stand-Up Tool. It utilizes the ST 1800 or ST 1800-A18 Adjustable Torque Screwdrivers in the SDT 5 Stand-Up Tool with strips of collated sidelap connectors (SLC). The system utilizes strips of 50 collated sidelap connectors to create an ergonomic stand-up system for repeat fastenings of sidelaps. Because the installer remains in an upright working position, they can typically work faster and more comfortably.

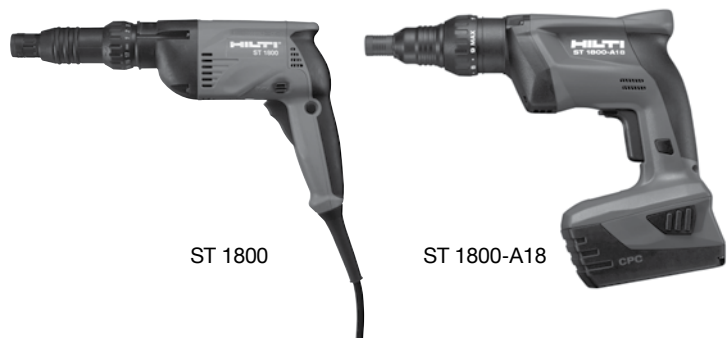
In a highly competitive market, the speed of the Hilti SDT 5 and ST 1800 or ST 1800-A18 system, combined with the DX 860-HSN or DX 860-ENP-L tools, represents major potential gains in productivity essential to staying on time and on budget.

Single Screws/Sidelap Connectors:

Hilti also offers a complete line of fasteners for making sidelap connections, such as Hilti self-drilling or sharp point sidelap connectors.



SDT 5

ST 1800-A18
with SDT 5

ST 1800

ST 1800-A18

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2.4 Order Information

Description	Package Contents	Item No.
DX 860-HSN-PTR Powder-Actuated Tool	Includes tool, cleaning accessories, spray lubricant and operating instructions in an impact-resistant plastic tool box	00282482
DX 860-HSN-PTR Use-on-Demand (Daily Rate)	Use-on-Demand provides for use of a DX 860-HSN tool for a daily rate. All general maintenance plus shipping is covered by Hilti. Replacement pistons and brakes must be purchased by customer.	03445872
DX 460-SM Powder-Actuated Tool	Includes tool, cleaning set, spare buffer, ear protectors and Hilti lubricant spray in an impact-resistant plastic tool box	00371685

For complete information on operation, maintenance and cleaning of the tools, visit www.us.hilti.com/decking or www.hilti.ca

Decking Fasteners — .27 Caliber Cartridge Short

Description	DX 460-SM Combos (Includes equal quantities of fasteners and Clean Tec cartridges)			DX 860-HSN Combos (Includes equal quantities of fasteners and red Clean Tec cartridges)					
	Base Steel Thickness	Qty	Red Item No.	Qty	Item No.	Qty	Item No.	Qty	Item No.
X-HSN 24	1/8" to 3/8"	1000	03511817	2000	03509037	16,000	03509038	32,000	03509039



Note - Proper performance requires selection of the correct cartridge power level for the specific application. Contact Hilti for assistance.

Accessories

Description		DX 460-SM	DX 860-HSN	Item No.
X-SH 460 Stand Up Handle For using the DX 460-SM as an upright decking system		■		00370831
X-SM Magazine		■		00370827
X-460-PSM Piston		■		00373303
X-460-B Buffer		■		00373330
DX 860-HSN-PTR Piston and Brake			■	00284990

Order Information

Description	Package Contents	Item No.
DX 76-MX Powder-Actuated Tool	Includes tool with magazine, magazine ramrod, cleaning brushes, cleaning cloth, Hilti spray lubricant and operating instructions in an impact-resistant plastic tool box	00285794
DX 860-ENP-L Powder-Actuated Tool	Includes tool, cleaning kit, Hilti spray lubricant and operating instructions in an impact-resistant plastic tool box	00386793
DX 860-ENP-L Use-on-Demand (Daily Rate)	Use-on-Demand provides for use of a DX 860 ENP-L for a daily fee. All general maintenance plus shipping is covered by Hilti. Replacement pistons and stop rings must be purchased by customer. ENP-L model permits fastening into 3" deep N type deck	03445954

For complete information on operation, maintenance and cleaning of the tools, visit www.us.hilti.com/decking or www.hilti.ca



Decking Fastener Kits

Description	Base Steel Thickness	DX 76 and DX 76-MX Kits* with M10 long cartridges		DX 860-ENP-L Kits with M40 long cartridges				
		Qty - 1000 .27 cal. C-T Blue (M-Heavy)	Qty - 1000 .27 cal. C-T Red (Heavy)	Qty - 2000 .27 cal. C-T Blue (M-Heavy)	Qty - 2000 .27 cal. C-T Red (Heavy)	Qty - 2000 .27 cal. Black (X-Heavy)	Qty -32,000 .27 cal. C-T Blue (M-Heavy)	Qty - 32,000 .27 cal. C-T Red (Heavy)
X-ENP-19 L15 MX-R (collated-flexible)	1/4" - unlimited	35010001	3510002	3510003	3510004	03497919	3510005	3510006

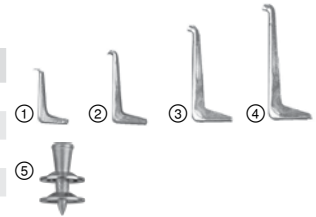
Note - Proper performance requires selection of the correct cartridge power level for the specific application. Contact Hilti for assistance.

* Kits include equal quantities of fasteners and cartridges

HVB Shear Connectors and X-ENP Fasteners

Use with the DX 76 tool, HVB fastener guide (00285486) and HVB piston (00285493)

Description	Connector Height	Qty	Item No.
Shear Connector X-HVB 95	① 3-3/4"	200	00348179
Shear Connector X-HVB 110	② 4-5/16"	200	00348180
Shear Connector X-HVB 125	③ 4-15/16"	125	00348181
Shear Connector X-HVB 140	④ 5-1/2"	120	00348321
Shear Connector Fastener X-ENP-21 HVB	⑤	100	00283512



Use with HVB connectors

Accessories

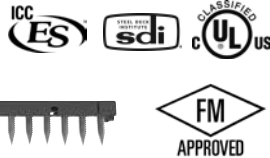
Description	DX 76-MX	DX 76-FN15	DX 76-HVB	DX 860-ENP-L	Item No.
Nail Magazine MX 76 Magazine for use with the DX 76	■				00285521
Fastener Guide X-76-F-N15 Single 15mm fastener guide for use with the DX 76		■			00285484
Fastener Guide X-76-F-HVB HVB Shear Connector Fastener Guide for use with the DX 76			■		00285486
Piston X-76-P-ENP Replacement piston and stop ring for the DX 76	■	■			00285488
Piston X-76-P-HVB HVB replacement piston for the DX 76			■		00285493
Stop Ring X-76-PS Replacement stop ring for the DX 76	■	■	■		00285494
Piston and Stop Ring Set X-860-P-ENP Replacement piston and stop ring for the DX 860				■	00384948

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Order Information

Description	Package Contents	Item No.
ST 1800 Metal Construction Screwdriver	Includes tool with depth gauge, 13 ft supply cord and operating instructions in a cardboard box	00378546
ST 1800-A18 Adjustable Torque Screwdriver	Includes tool, (2) B 18 Li-Ion 3.3-Ah CPC batteries, (1) C 4/36-ACS LI TPS charger and operating instructions in a Hilti soft tool bag	03482102
SDT 5 Stand Up Decking Tool	Includes stand up tool, 2 grips, magazine, 3/16", supply cord strain relief clasp and operating instructions	00387785

Sidelap Connectors (SLC)



Description	Application	Package Qty	Item No.
S-SLC 01 M MWH Sidelap Connector	For 18, 20, 22, 24, 26 gauge deck	250	00385453
S-SLC 02 M MWH Sidelap Connector	For 16, 18, 20, 22 gauge deck	250	00378973
10-16 x 3/4" M HWH3 Self-Drilling Collated Screw	For 18, 20, 22, 24, 26 gauge deck to bar joist or frame up to 1/8"	250	00378976
12-24 x 7/8" M HWH4 Self-Drilling Collated Screw	For 16, 18, 20, 22 gauge deck to bar joist or frame up to 3/16"	250	00378977

Racing Tip Frame Fasteners

For attachment of metal deck to bar joist



Description	Max. Drill Capacity	Max. Fastening Thickness	Package Qty	Item No.
S-MD 12-24 x 1 5/8" M HWH5 RT	0.500"	0.700"	250	02058922

Accessories

Description	Item No.
SDT 5 Magazine For use with the SDT 5 stand-up decking tool	00387598
SDT Integrated Driver and Setter –5/16" For use with the SDT 5 stand-up decking tool	00423706

2.4.1 Fastener Selection and Steel Deck Layout

Selection of the proper Hilti deck fastener depends on the supporting base steel thickness. The Hilti Deck Fastener Selection Gauge shown in Figure 1 should be used by the decking installer to confirm fastener selection. The cut-out slot on the gauge is fit against the bar joist top chord or steel beam flange. As the internal card slides in the gauge, the typical Hilti deck fastener is highlighted with a green box. A red box indicates that the corresponding Hilti deck fastener is outside the base material application limits and should not be used for steel deck fastening to the base material being gauged. Note that because of wide variations in base material hardness, on-site test installation is always recommended. If any difficulty is encountered, contact your Hilti representative.

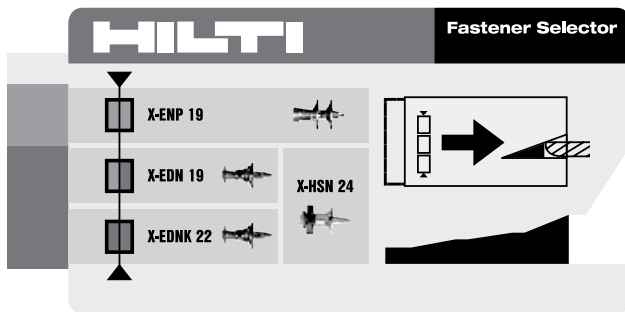


Figure 1 – Hilti Deck Fastener Selection Gauge

Steel deck installers must lay out deck properly and mark frame fastening lines in order to ensure that steel deck panels are connected to the supporting steel frame. Marking frame fastening lines is essential when attaching steel deck to thin base steels ($t_{fl} < 1/4"$), including open web steel joists. For all applications, the fasteners should be installed at least $3/8"$ (10 mm) from the edge or toe of the joist top chord or steel beam flange. Additionally, when installing into a bar joist top chord (angle), the fasteners need to be installed at a distance from the angle, $b_x \leq 8 \times t_{fl}$ and not into the vertical portion of the angle. Reference Figure 2 for edge distance and b_x dimensions.

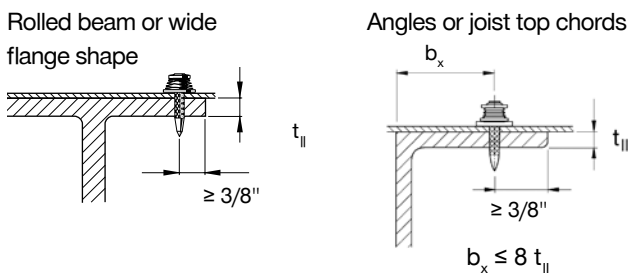


Figure 2 – Edge Distance Recommendations

Extra care must be taken at the endlap and corner lap conditions where multiple layers of steel deck nest or interlock on adjacent panels. It is particularly important that endlap and corner lap conditions of two and four deck layers be snug and tight against one another and the supporting steel frame, prior to installation of the fastener, in order for the fastening to be made as shown in Figure 3. Tight endlap and corner lap requirements are independent of the fastening type and contribute directly to the performance of arc spot welds, screws, powder-actuated fasteners, punches and crimps/clinches. If the steel deck endlaps and corner laps aren't tight, a proper fastening can't be made.

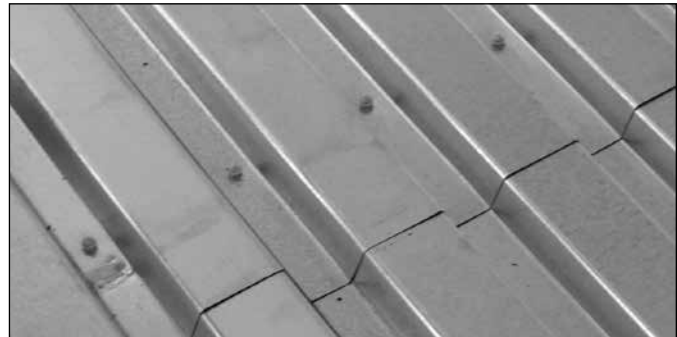


Figure 3 – Tight Nesting of Steel Deck Sheets



For projects where the base steel is predominantly bar joists, the X-HSN 24 is the fastener typically chosen.

If hot-rolled beams are predominant, then the X-ENP-19 L15 should typically be chosen.

For projects with varying base steel thickness it may be necessary to use more than one frame fastener type.

The following chart is a convenient tool for assisting in the selection of the proper fastener.

Fastener Selection Guide

Base Material Thickness	Fastener Type*	Installation Tools	Application
Bar Joist from 1/8" to 3/8" (3-9 mm)	X-HSN 24 	DX 860-HSN DX 460-SM**	Roof and Floor Deck
Structural Steel Structural steel, hardened structural steel and heavy steel ≥1/4" (6 mm)	X-ENP-19 L15 	DX 860-ENP-L DX 76 MX	Roof and Floor Deck

*Typical

**The DX 460-SM should not used with base steel thicknesses of less than 3/16".

2.4.2 Choosing the Right Cartridge Color and Power Regulation

When installing powder-actuated deck fasteners it is important for the deck to be clamped tightly to the base material, and the installed fasteners to have a nailhead stand-off, h_{NVS} , within the specified range. The Hilti Power Adjustment Guide, shown in Figure 1, is a valuable aid to the decking foreman. It is primarily intended for power adjustment of the powder-actuated tool. This is done by installing test fastenings into representative deck/base steel and then checking the nailhead stand-off, h_{NVS} , at the beginning of the work to achieve the optimal cartridge and tool power level. This is a critical step in the work because of variations in the structural steel strengths (F_y , F_u) and member thicknesses. By investing this time up front and properly correlating the fastening system to actual site materials, most fastening issues can be avoided. During installation, it is also advisable to check the work periodically to spot deficiencies before large portions of the deck might be fastened incorrectly, especially if there is variability in base material strength. Failure to properly set the tool, fastener and cartridge prior to starting work can decrease fastening quality consistency.

Prior to starting work, a test fastening should be installed and the h_{NVS} checked, using the Hilti Power Adjustment Guide. If necessary, the installer must adjust the power or force of the powder-actuated system. There are two ways to accomplish this power adjustment. One is by use of different cartridge colors and the other is by adjusting the power regulator on the tool itself.

Cartridge colors available for Hilti Decking Tools are (in order of increasing power): yellow, blue, red and black. All Hilti decking tools come equipped with power adjustment capability. The settings on the power regulation dials range from "1" being the lowest power setting and "4" being the highest.

Figure 2 provides the installer with general guidelines to cartridge colors for Hilti bar joist and structural steel deck fasteners. These charts are guidelines that the installer can use to start the process of test fastenings discussed above. Note that a higher or lower power level may be required, depending on the properties of the specific base metal.

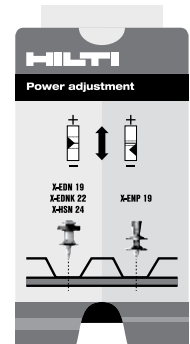
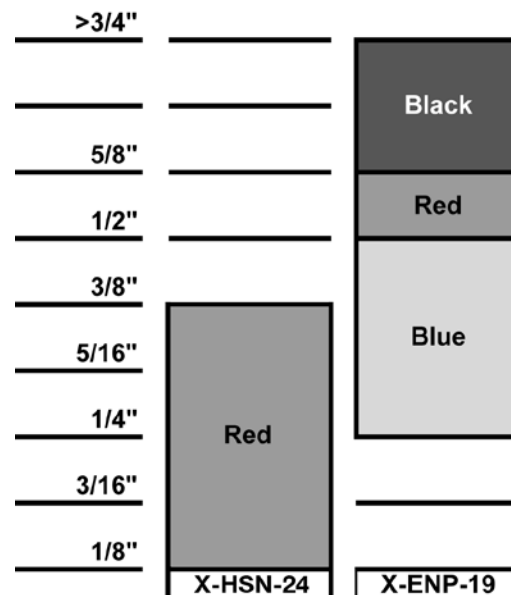


Figure 1 – Hilti Power Adjustment Guide

Base Material Thickness



1 Cartridge guidelines for the X-ENP-19 fastener are acceptable for all current Hilti Decking Tools for attachment to structural steel. Cartridge guidelines for the X-HSN-24 fasteners are for the DX 860-HSN. Cartridge guidelines for the DX 460-SM can be found in the tool operator manual. Recommendations are guidelines only and require verification on each site.

2.4.3 Estimating the Number of Frame Fasteners^{1, 2}

Fastener Pattern	Fastener Spacing	Frame Fasteners per Square of Roof Deck							
		4.0	4.5	5.0	5.5	6.0	6.5	7.0	8.0
Support Spacing (ft)									
36/11	6"	78	69	63	59	53	50	46	40
36/9	6"	61	56	50	45	43	39	36	33
36/7	6"	53	48	43	39	37	34	32	28
36/5	6-12-12-6	37	33	30	28	26	24	23	20
36/4	12"	29	26	22	22	21	19	18	16
36/3	18"	21	19	17	16	15	14	13	12
30/6	6"	53	48	43	39	37	34	32	28
30/4	6-18-6	34	30	28	26	24	22	21	19
30/3	12-18	24	22	20	19	17	16	15	14
24/5	6"	53	48	43	39	37	34	32	28
24/3	6"	29	26	22	22	21	19	18	16
24/4	8"	41	37	34	31	29	27	25	22

¹ Estimated quantities are for one square of decking. A square of roof decking is an area of 100 ft². No provision is made for waste.

Perimeter fastening spacing is based on 12 in. on-center assumption.

² For standing seam sidelaps (interlocking deck), add 15% to quantities in table.

Equation:

$$\# \text{ FASTENERS NEEDED} = \left(\frac{\text{TOTAL DECK AREA IN SQUARE FEET}}{100} \right) \times (\# \text{ from table above})$$

Example:

Total area of roof deck: 50,000 square feet
 Joist spacing (support spacing) 6 ft
 Fastener pattern: 36/7

Number of fasteners needed = 50,000 / 100 x 37 = 18,500 fasteners

For interlocking sidelaps as opposed to nestable sidelaps add an additional 15%. Finally as a general rule add another 5-10% extra as an allowance for waste.

Note: Rule of thumb is one DX 860 tool per 50,000 ft² plus a backup tool. For example, on a 100,000 ft² project, the suggested number of tools is three.



X-ENP-19 L15



X-HSN 24



S-MD 12 - 24 x 1-5/8 M HWH #5 RT

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2.4.4 Estimating the Number of Sidelap Connectors

Side lap conditions

Sheet-to-sheet connections may be required at the side laps of deck. These are referred to as stitch connections. The usual stitch connections are Hilti sidelap connectors, standard self-drilling screws, welds or button punches. Manual button punching of sidelaps requires a special crimping tool. The quality of the button punch attachment depends on the strength and care of the tool operator. It is therefore important that a consistent method is developed.

To achieve good sidelap welds, good metal-to-metal contact is needed; otherwise burn holes are the rule rather than the exception. On occasion, sidelap welds will be specified for decks that have button punchable sidelaps, (interlocking deck). Typically, the best, easiest and fastest method is to use Hilti sidelap connectors.

In order to calculate the number of screws required, the following information is required:

INFORMATION REQUIRED	SOURCE
Total deck area in square feet	Available from structural drawing or main contractor.
Number of side lap fasteners between joists	Available from structural drawing or specification.
Sheet width (in feet)	Available from structural drawings. Standard B-Deck is 36" - 3 ft wide. Standard N-Deck is 24" - 2 ft wide. Composite floor is 24" - or 36" wide. Form Deck is 30" wide.
Joist spacing (in feet)	Available from structural drawings.

Equation:

$$\# \text{ SCREWS NEEDED} = \left(\frac{\text{TOTAL DECK AREA IN SQUARE FEET}}{\text{SHEET WIDTH IN FEET} \times \text{JOIST SPACING IN FEET}} \right) \times \left(\# \text{ OF SIDELAP FASTENERS BETWEEN JOIST} \times 1.05 \right)$$

Example

Total area 50,000 square feet
 Sheet width: 36" = 3ft
 Joist spacing: 5ft
 Number of side lap fasteners per sheet: 5

No. of screws needed = (50,000 sq ft divided by (3 ft x 5 ft)) x 5 x 1.05* = 17,500 screws

*Typical value to accommodate for waste .



S-SLC 01



S-SLC 02

3.1 Fastening Basics

3.1.1 Loading/Unloading the DX 860-HSN and ENP-L Tools

The following section shows how to properly load and unload the DX 860 tools. As the processes of loading and unloading the DX 860-HSN and ENP-L tools are nearly identical, we will discuss them simultaneously. Before using any tool, always read and comply with the tool instruction manual, and obtain operator training on the specific tool being used, as required by OSHA regulations.

Fasteners for the DX 860 decking tools are loaded into the magazine of the tool as shown below. The HSN tool takes up to 60 fasteners, or six strips of 10 collated HSN fasteners. It is important that the tool be fully loaded with 60 fasteners when the cartridges are loaded. Although the cartridge strips contain only 40 cartridges, it is important to load all 60 fasteners into the magazine, as the tool is gravity fed, and this will allow the fasteners to properly feed into the magazine.

The DX 860-ENP-L tool, however, is primarily mechanically fed. As such, the tool holds the same quantity of fasteners and long cartridges (40 each). It is important to use only the flexible MXR collated strips of ENP fasteners and the collated strips of 40 long Hilti cartridges. Once the fasteners are in place, the cartridges are loaded by inserting collated strips of 40 long cartridges into the cartridge magazine. It is important to fully insert the strips until they are flush with the top of the cartridge magazine.



DX 860



ENP fasteners



HSN fasteners



DX 860-HSN short cartridges



1 Insert fasteners into magazine



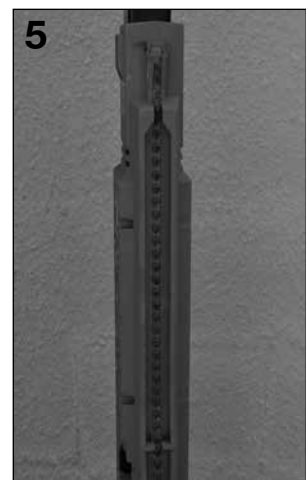
2 Insert cartridges



3 Ensure top of strip is flush



4 Fasteners fully loaded



5 Cartridges fully loaded

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In order to remove the cartridges from any of the DX 860 tools, simply push down on the cartridge strip as shown below. This will force the cartridges through the chamber and out the other side of the tool. They may then be pulled out completely.

Warning: Always remove the cartridges prior to working on tools. Remove cartridges and fasteners during work breaks and before storing or shipping the tool.

It is important to remove cartridge strips whenever storing or shipping any powder-actuated tool.

When unloading fasteners from the DX 860, one can remove all but one of the fastener strips by turning the tool upside down and letting them slide out of the magazine column.

One strip will be locked in place inside the baseplate. It is important not to attempt to remove the ENP fastener strip which is in the baseplate assembly by prying it back up through the magazine, as this may damage the tool.

The fasteners in the baseplate assembly may be removed if necessary by pulling them out of the magazine at the point where the empty fastener strips are expelled. This is accomplished by pulling down the discharge lever and simultaneously pulling out the fasteners.



6 Push down on cartridges to remove strip



7 Pull cartridges out the opposite side of the tool



8 Unloading fasteners from magazine



9 One strip remains in the baseplate assembly



10 Push the lever to unload fasteners



11 Keep lever pushed, pull out strip

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3.1.2 Loading the DX 460-SM

The DX 460-SM tool is loaded by inserting a strip of 10 cartridges through the bottom of the handle portion of the tool. Only strips of 10 collated Hilti 0.27 caliber short cartridges may be used. The fasteners are loaded into the bottom of

the magazine of the tool and are held in place by rotating the magazine lever parallel to the magazine (turning the lever perpendicular will allow fasteners to come out).



DX 460-SM



DX 460 cartridges



X-HSN 24 fasteners



1 Loading fasteners



2 Loading cartridges



3 Lever must be parallel to hold in fasteners

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3.1.3 Loading the DX 76-MX

The DX 76-MX tool is loaded by inserting a .27 caliber long cartridge strip into the cartridge magazine on the side of the tool. The ENP MX fastener is loaded by inserting either end of the MX strip of 10 fasteners into the top of the magazine with the pointed ends of the fasteners directed out, away from the body of the tool. As the magazine is spring loaded, the operator must take care not to let go of the fasteners until they are fully inserted into the magazine or they may eject out of the

magazine and strike the operator or a bystander. The single fastener configuration of the DX 76-MX is loaded by inserting single non-collated ENP fasteners into the fastener guide with the fastening point directed out toward the front of the tool.

When unloading fastener strips, always remember the strips are housed in a spring-loaded magazine. Press down on the fastener strip (as shown), and press the release lever, while carefully controlling the fastener strip in order to prevent the strip from ejecting.



DX 76-MX



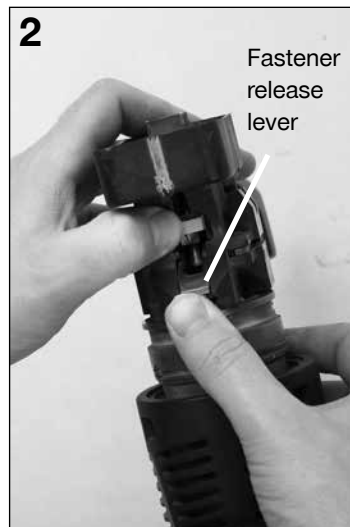
DX 76-MX cartridges



DX 76-MX fasteners



1 To load - Push collated strip until top of strip is below fastener release lever



2 To unload - Firmly hold collated strip, press fastener release lever, and allow strip to slowly eject out of the magazine

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3.1.4 Marking the Deck

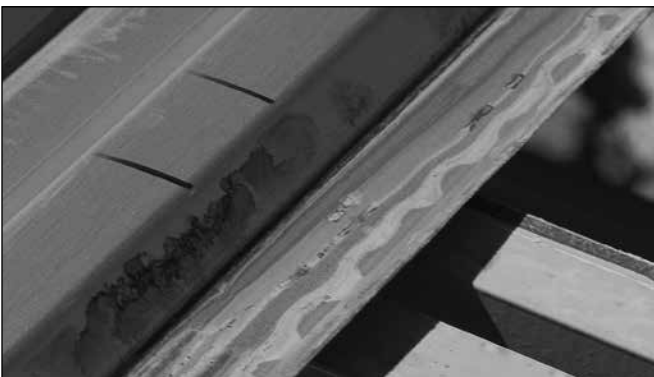
Once the deck panels are set in place, it becomes difficult to identify the location of the beam or joist. If not aligned, the beam or joist can be missed and the tool piston may drive the fastener through the deck panel.

It is important to align each decking sheet as it is placed across the frame and mark the location of the beams or joists with a bold, permanent marker or by snapping a chalk line. This allows fastening to be accomplished much more quickly and with fewer beam/joist misses. The DX 860-HSN tool features a piston brake, which in most cases prevents the piston from punching through the deck. The DX 860-ENP-L, DX 460-SM and the DX 76-MX do not feature this technology, and may punch through the deck if the beam is missed.

Missing the joist or beam causes premature breakage of pistons, brakes and stop rings. It is estimated that the stop ring of the DX 76 will break after an average of 30 to 40 misses, while the conical brake on the DX 860-HSN will typically last for up to several hundred misses. It is possible, however, that missing the joist or beam may cause the piston and stop brake of the DX 860-HSN to jam. For jamming solutions, please refer to the troubleshooting portion of the guide. The buffer on the DX 460-SM may require changing after 5 to 10 misses.



Mark the top of the metal deck to indicate the location of the base steel



Bold, clear marks on the top of the deck aid as a guide for fastener placement

3.1.5 Making a Fastening

Making a fastening with Hilti decking tools is simple. After loading fasteners and cartridges into the tool, fully depress the baseplate of the tool against the deck, holding the tool perpendicular to the work surface and pull the trigger. Fastening with the tools at an angle can result in improper fastenings with reduced capacity and could cause the fastener to free flight. Prior to making a fastening, the operator must ensure that the deck is pressed firmly against the base material to eliminate any open space between the two. Special care must be used when fastening multiple layers of deck to ensure proper fastening, as open spaces between deck layers will decrease the quality of the fastening. The operator must be aware of the gauge of the deck and the thickness of the base material to ensure that the fasteners are within the proper parameters of use.



Fastening with the DX 860-ENP-L



Fastening with the DX 76-MX

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3.2 Inspecting Fastenings to Ensure Quality

Steel deck construction projects may present a challenge with respect to the quality control of connections between sheet steel and the supporting steel structure. Quality control measures for welding typically consists of visual checks and dimensional or size verifications, which may or may not confirm a proper fastening. Field verification of the adequacy of powder-actuated mechanical steel deck fasteners can be conducted as described in this section.

The use of mechanical fasteners does not imply a need to inspect every fastening point unless specified by the structural engineer. No guideline standards are published by SDI, AWS, AISC or OSHA for percentages of steel deck connections that must be checked or that can be unsatisfactory. This determination must be made by the structural engineer and the Authority Having Jurisdiction.

Hilti has multiple systems in place that help ensure steel deck fastenings are done right the first time. Together with a commitment to field quality control by the steel deck installer, these systems may alleviate the need for post-fastener installation inspection. Hilti North America has over 1,000 account managers and field engineers available for training steel deck installers. This hands-on training includes the use of Hilti powder-actuated tools in accordance with ANSI A10.3 safety requirements, use of the Deck Fastener Selector Gauge, proper steel deck layout and end/corner lap nesting. Proper fastener, tool and cartridge selection as well as the use of the Hilti Power Adjustment Guide, (shown in Figure 1 and discussed in section 2.4.2 and 3.2.1) are also key elements of the installer training. Furthermore, the Hilti DX 860-HSN tools come equipped with piston brakes, which virtually eliminate the possibility of overdriving fasteners.

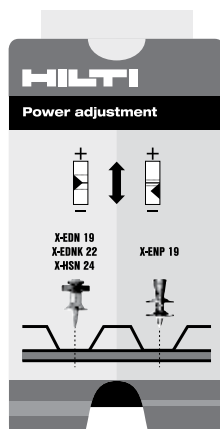


Figure 1 –
Hilti Power
Adjustment Guide

There are three main characteristics of proper fastenings that must be considered:

1. Fasteners installed in proper locations.

Fasteners must be installed in the proper steel deck valleys or flutes in accordance with the structural roof deck plans and design and in the proper location in the base steel. This is particularly important on thin base steel, which can become deformed if the fastener is placed too close to the edge. The fastener point must penetrate into, but not necessarily through, the supporting steel (top chord or flange), depending on the fastener/deck/base steel configuration.

2. Clamping of fastened part to base material.

Fasteners must clamp the steel deck down to the base steel (top chord or flange). There should not be any visible gaps between the steel deck and the base steel or between the steel deck laps.

3. Washer placement and condition.

In general, the fastener washer edges must clamp the steel deck sheet to the base steel. The washers should not curl upwards away from the deck surface and must not dig or cut into the steel deck surface. For the X-HSN 24 fastener, the top hat washer must be compressed. For the X-ENP-19 fastener, the piston mark (indentation) should be clearly visible on the fastener washer as shown in Figure 2.

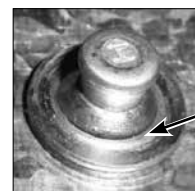


Figure 2 – X-ENP-19 L15
Piston Mark (indentation)

When the inspector is unclear about the compression of the top hat washer or the piston mark, the Hilti Power Adjustment Guide may be used to measure for optimal powder-actuate fastener nailhead stand-off, $_{NVS}$. Note that measuring nail head stand-off does not verify proper fastener embedment unless the steel deck and base material are tightly clamped, with the base steel not deformed or bent. Conversely, measuring nail head stand-off does not confirm an improper fastening. If slightly outside the range, further investigation into the three characteristics of proper fastenings given above should be completed.

The following Figures 3 and 4 provide visual examples of proper and improper steel deck fastenings for Hilti bar joist (X-HSN 24) and structural steel (X-ENP-19 L15) fasteners, respectively.

Inspection of the installed steel deck and installation of roof coverings, insulation and membrane should be done soon after steel deck installation to assist in alleviating corrosion or other issues that could arise due to long-term exposure. Fasteners must be completely protected from the weather within 180 days after installation.

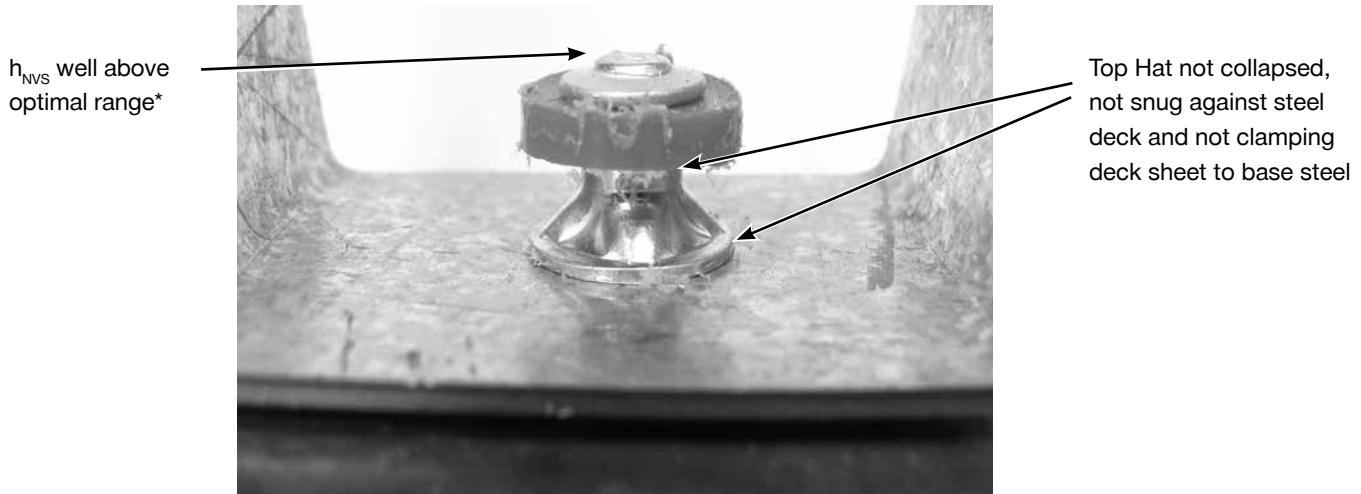


Figure 11a: Under Driven X-HSN 24 Fastener with Single Sheet to Base Steel

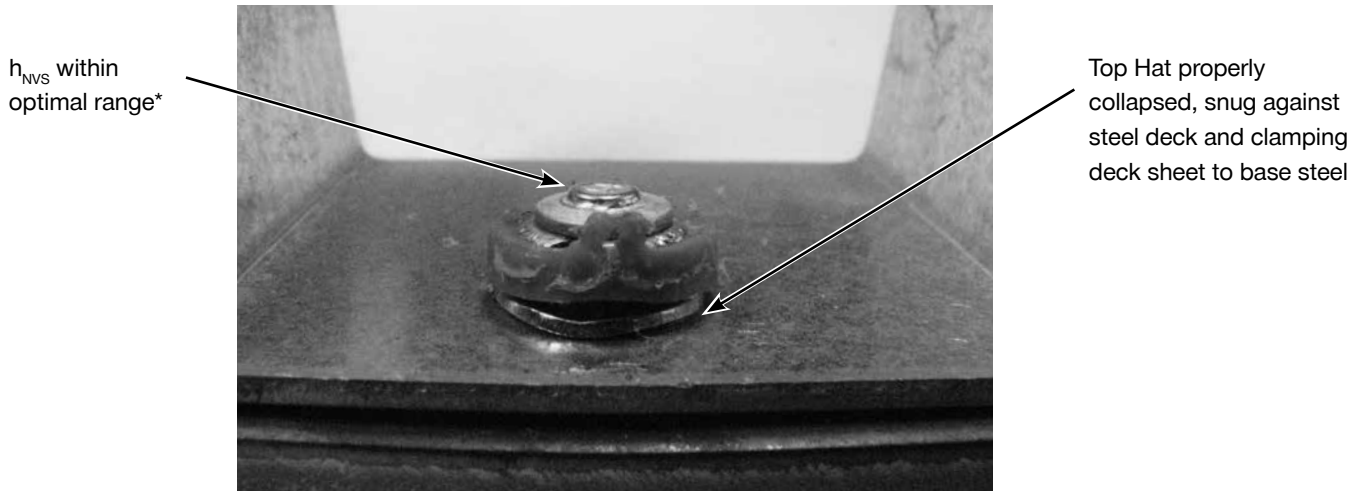


Figure 11b: Properly Driven X-HSN 24 Fastener with Single Sheet to Base Steel

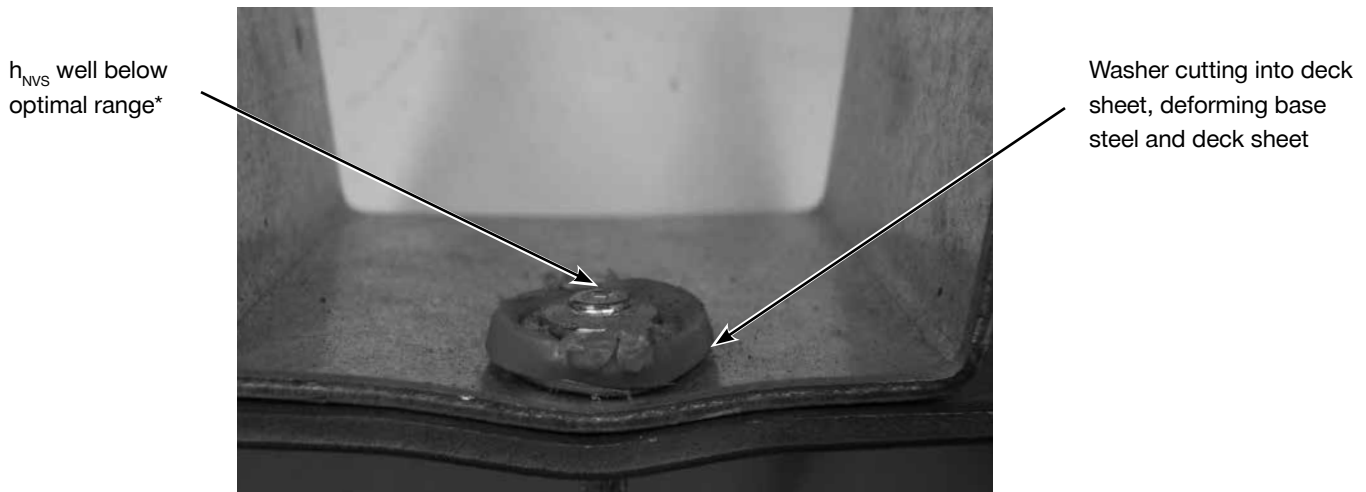
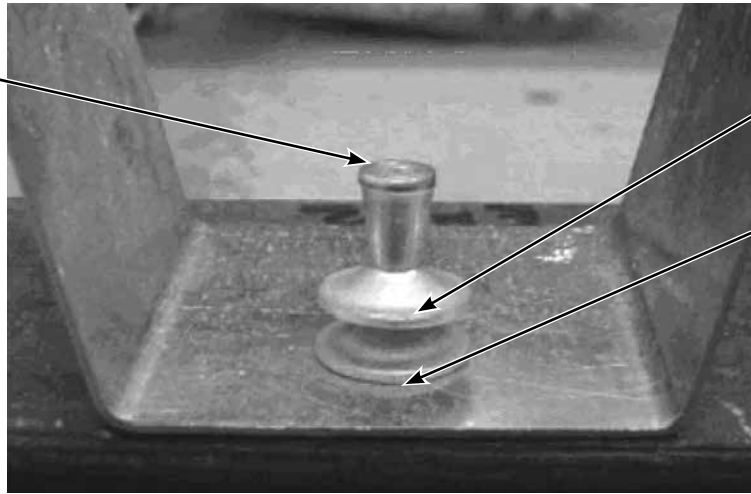


Figure 11c: Over Driven X-HSN 24 Fastener with Single Sheet to Base Steel

* Optimal stand-off (h_{NVS}) range for the X-HSN 24 fastener is $5 \text{ mm} \leq h_{NVS} \leq 9 \text{ mm}$.

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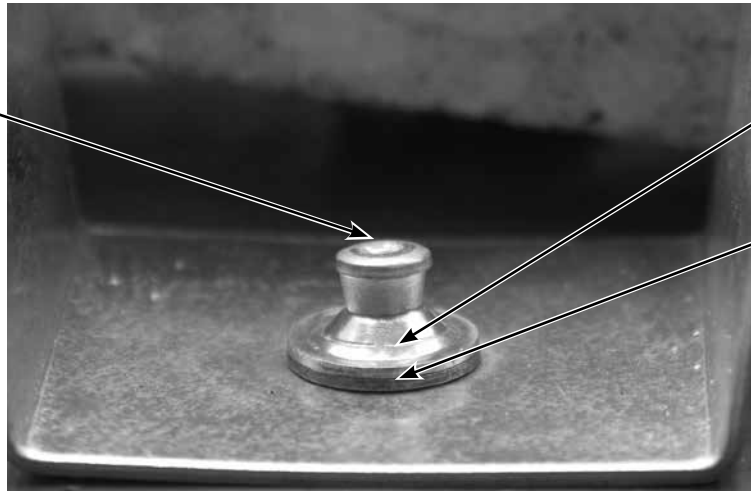
h_{NVS} well above optimal range*



Piston mark (indentation) not visible on fastener
Gap visible between washers
Washers not clamping deck sheet to base steel

Figure 12a: Under Driven X-ENP-19 Fastener with Single Sheet to Base Steel.

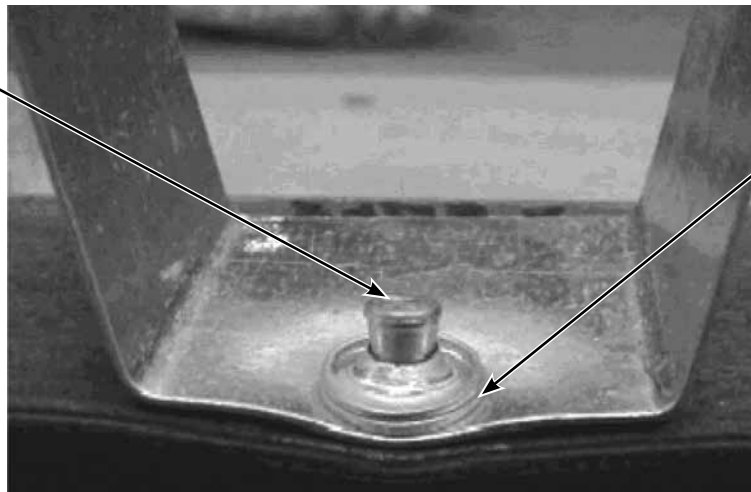
h_{NVS} within optimal range*



Piston mark (indentation) clearly visible on fastener
Washers snug against one another and clamping deck sheet to base steel

Figure 12b: Properly Driven X-ENP-19 Fastener with Single Sheet to Base Steel

h_{NVS} well below optimal range*



Washers cutting into deck sheet, deforming base steel and deck sheet

Figure 12c: Over Driven X-ENP-19 Fastener with Single Sheet to Base Steel

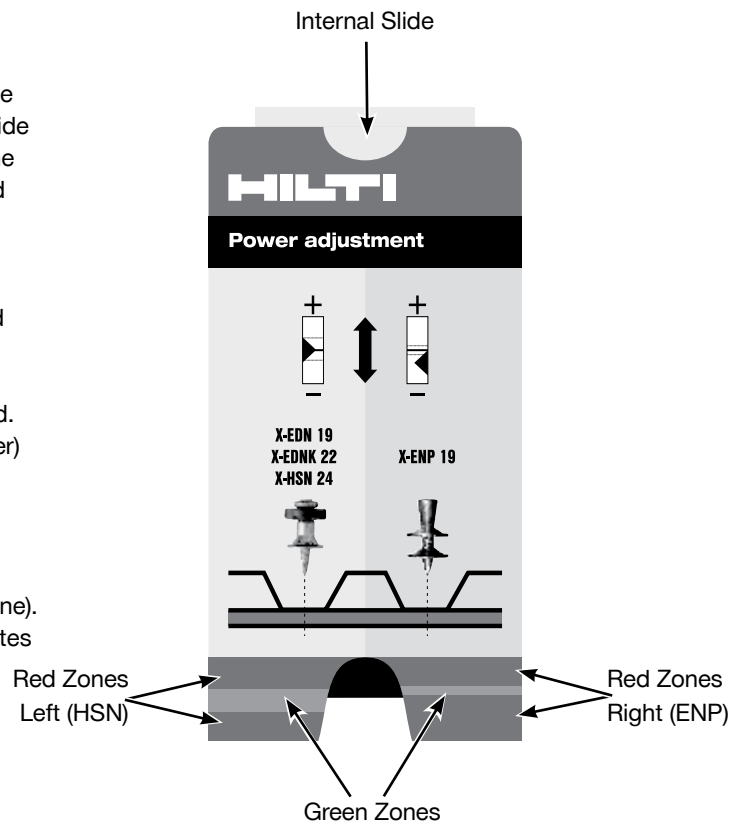
* Optimal stand-off (h_{NVS}) range for the X-ENP-19 fastener is $8.2 \text{ mm} \leq h_{NVS} \leq 9.8 \text{ mm}$.

3.2.1 Power Adjustment Guide

The Power Adjustment Guide depicted is used by holding the guide by the sides and placing it over the fastener. The left side of the guide (viewed as shown) is referenced when setting the X-HSN 24 fasteners. The right side of the guide is referenced when setting the X-ENP-19 fasteners.

Example:

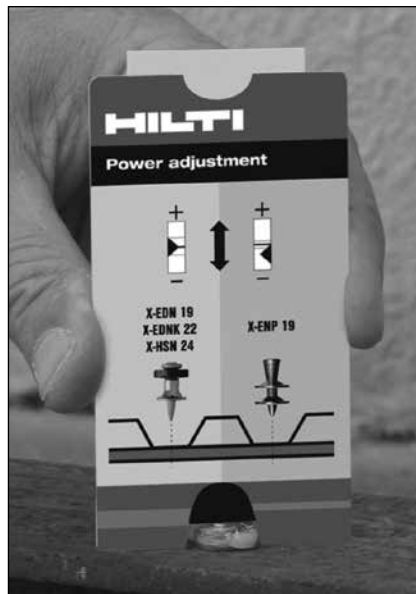
- To start, the internal slider is aligned even with the top and bottom of the guide.
- The card is then held by the sides, perpendicular to the work surface above the top of the fastener to be evaluated.
- The card is lowered so the bottom center of the card (slider) touches the top of the fastener and then continues to be lowered until the bottom edge of the card meets the work surface.
- The internal slide indicates whether the power level is too high or too low (red zones) or at an optimum level (green zone).
- The bottom of the slide falling within the green zone indicates that the power level is set correctly.
- If the bottom of the slide falls within a red zone, the power level will need to be adjusted. Power levels can be increased or decreased by adjusting the tool's internal power regulator or by using a different strength cartridge.



Power Adjustment Guide Examples



Under-driven X-ENP-19
(Guide stops in red zone - power adjustment necessary)



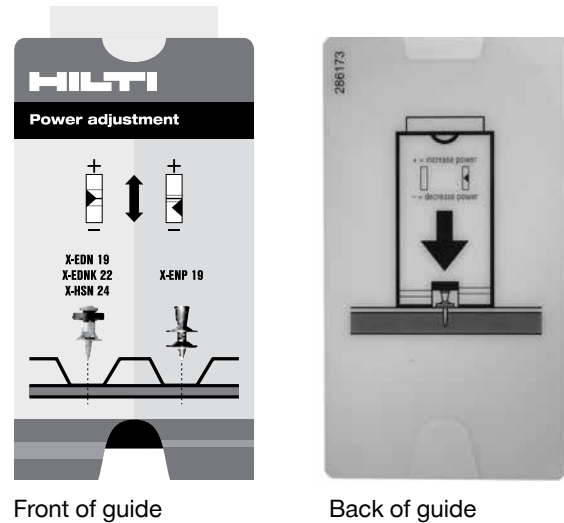
Properly driven X-HSN 24
(Guide stops in green zone - no power adjustment necessary)

To determine the optimum power level, follow these steps:

- 1: Make five to eight fastenings on single layer metal sheets
- 2: Push the Power Adjustment Guide against the head of the set nail as depicted on the backside of the guide.
- 3: Check the guide to see which zone that fastener falls within.

Red: Outside optimal range
 Green: Within optimal range

- 4: If the nail stand-off is not within the allowable range, adjust the power settings on the tool as indicated by the pointers in the center of the guide. If the pointer falls within the "+" zone, increase power. If the pointer falls within the "-" zone, decrease power.



Front of guide

Back of guide

Location of power regulation dials on decking tools



Power regulator on DX 860



Power regulator on DX 76



Power regulator on DX 460-SM

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4. Maintenance and Troubleshooting Guide

Decking tools are used hundreds of thousands of times in the most demanding application in the world of direct fastening: fastening steel to steel with steel.

As such, it is hardly surprising that maintenance takes on increased importance in this application. Regularly cleaning and maintaining decking tools is vital to performance. All tools should be cleaned and lubricated daily. The user must understand how to disassemble and clean (brush) the tools, where to lubricate, and how to reassemble.

The following section details some of the basics of cleaning and maintaining the various decking tools. Complete details are provided during the Hilti DX certification training.

Always remove the cartridges and fasteners from the tool prior to performing any maintenance, cleaning or troubleshooting.

4.1 Cleaning and Maintaining DX 860 Tools

4.1 Cleaning and Maintaining DX 860 Tools



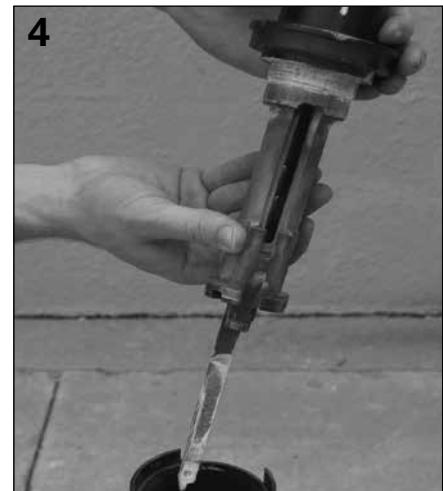
Remove baseplate from tool by holding tool body firmly and turning baseplate counter clockwise



Remove brake (ENP stop ring)

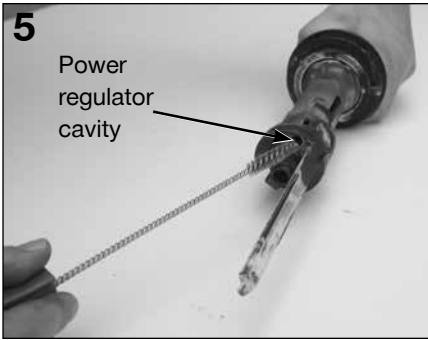


Remove piston by releasing pawl lever

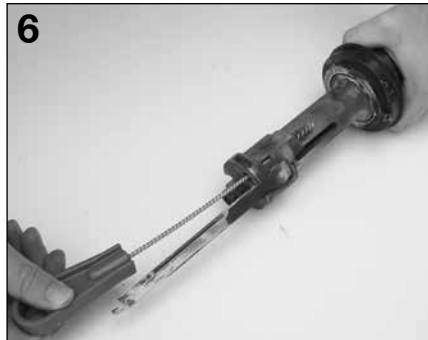


Remove piston sleeve from tool also by releasing the pawl lever

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5
Power regulator cavity



6



7

Brush out piston sleeve interior, focus on power regulator cavity, combustion chamber



8

Brush exterior of piston sleeve



9

Brush interior of tool



10

Shake out carbon build-up

17



Re-insert piston sleeve

18



Replace piston

19



Replace stop brake*

20



Re-insert, twist on baseplate assembly

21



Slide magazine into basket

* Stop brakes should be checked daily to ensure they are in good working condition. Using worn stop brakes and/or mixing tool parts could cause damage to the tools and may require them to be sent to a Hilti Repair Center.

4.2 DX 860-HSN Field Repairs and Troubleshooting

The DX 860-HSN is the optimal tool for serial applications on bar joist or thin steel (application limit 3/8" thick joist or beam). Due to the extremely high volume of fasteners driven in a typical application, the wear parts of the tool will need to be exchanged on a regular basis. The typical wear parts include the following:

- DX 860-HSN Piston/Brake Set (Item # **284990**)
- HSN Piston Retaining Clip Set (Item # **380625**)
- HSN Pressure Pin and Spring (Item # **380624**)
- HSN Bearing Sleeve Collar and Screw (Item # **380612**)

4.2.1 Replacing Pistons and Brakes

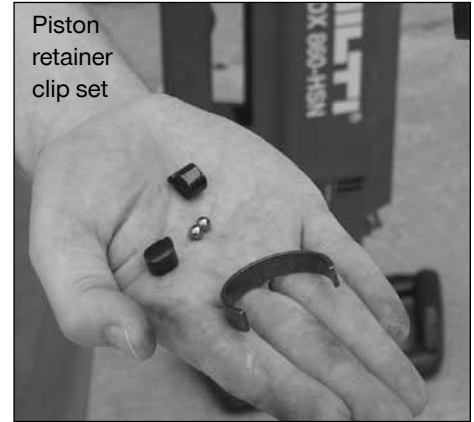
The pistons and brakes come in a set, and will typically need to be replaced every 6,000 to 10,000 fastenings. This will vary depending on the type of application, fastener, cartridge, as well as the frequency of cleaning/lubrication. The piston and brake set (spares set) is easily replaced by removing the old piston from the fastener guide, pulling the brake off of

the fastener guide and inserting the new components. This process is depicted in detail under section 4.1.

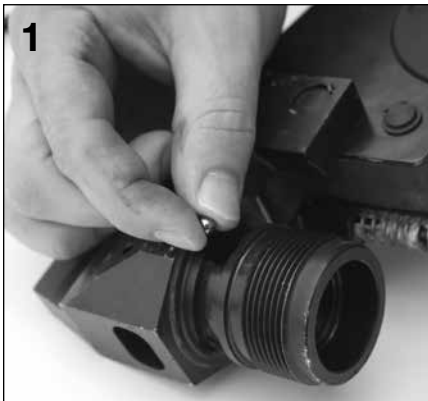
4.2.2 Replacing Piston Retainers

As the name suggests, the piston retainer set keeps the piston in the proper position as it drives the fastener. The piston retaining clip set may last an average 20,000 fastenings depending on the variables listed above. Normally when this set of components fails, the clip will crack and fall off the fastener guide, allowing the bearings to also fall out of position.

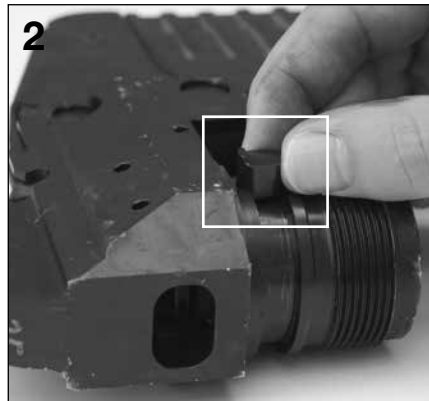
These components are easily replaced by doing the following:



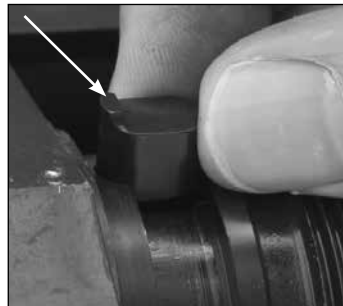
DX 860-HSN Field Repairs



1 Replace the bearings (one goes on each side of the threaded portion of the fastener guide).



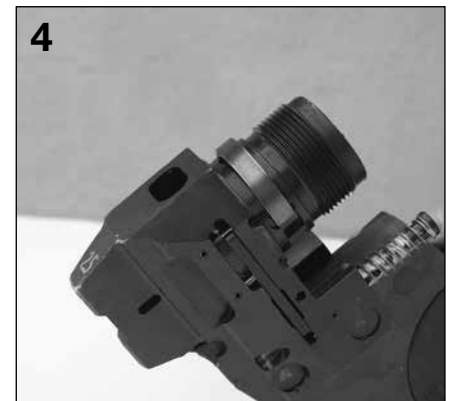
2 Place the bearing covers over the bearings (again, one on each side) and oriented away from the threaded portion of the fastener guide



Extended portion facing upward and away from threaded portion



3 Place the retainer clip over the assembly

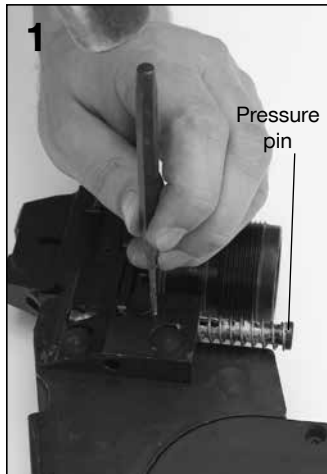


4 Push into place with thumbs

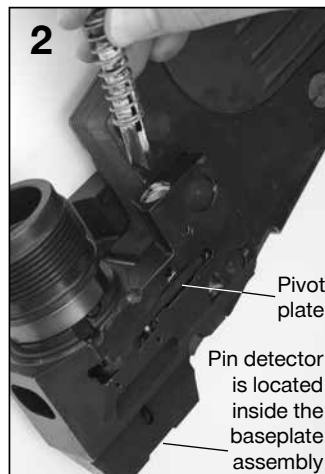
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4.2.3 Replacing the Pressure Pin

The pressure pin actuates the pivot plate which in turn actuates the pin detector (see pictures below) which prevents the tool from actuating if no fasteners are loaded. The pressure pin may last an average 20,000 fastenings before it needs to be replaced. This is an easy fix which may be accomplished by doing the following:



1 Drive out the old holding pin using a 3/32" punch.



2 Remove the pressure pin (unless it is broken and has already fallen out of place).



3 Position the new pressure pin with the tapered side toward the pivot plate (the spring fits on the pressure pin).



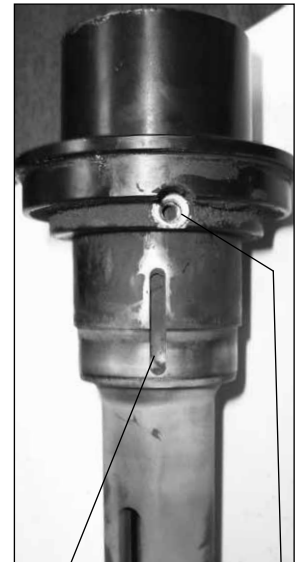
4 Drive in the new holding pin with the punch.

4.2.4 Replacing the Bearing Sleeve Collar and Screw

The bearing sleeve collar and screw will typically fail when the screw gets loose or strips threads in the collar. This is a simple fix that can be accomplished in the following manner:

- 1: Remove the baseplate assembly and piston.
- 2: Remove the piston sleeve by releasing pawl lever.
- 3: Remove the screw (assuming it is still in place).
- 4: Pull the collar off of the tool.
- 5: Position the new collar on the tool.
- 6: Fasten the screw.
- 7: Spray blue lock tight on the inside of the screw.
- 8: Put the baseplate back onto the tool.

NOTE: The collar must be able to slide in the track. If it does not slide, this indicates that the area is blocked. In order to prevent this, keep this area clear of debris.



This area must be kept free of debris, or tool may bind.
Screw is inserted here.

By mastering those basic repairs, the operator will be able to solve the majority of the most common maintenance issues associated with the DX 860-HSN.

4.2.5 DX 860-HSN Troubleshooting

In addition to these maintenance issues, the tool may occasionally cease to function due to a number of other wear related causes. The following section details the most common problems and illustrates recommended solutions.

1: The tool will not completely depress.

This indicates that the pin detector has not detected a fastener in the baseplate assembly. Ensure that the tool is completely loaded with fasteners. At times, foreign objects may block the pin detector. Ensure that the baseplate is clean, well lubricated and free of foreign objects. Also ensure that the collated fastener strips in use are not broken. When this occurs, jamming may occur which may lead to the tool not being properly fed.

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4.2.5 DX 860-HSN Troubleshooting (cont.)

2: The tool will fully depress, but will not actuate.

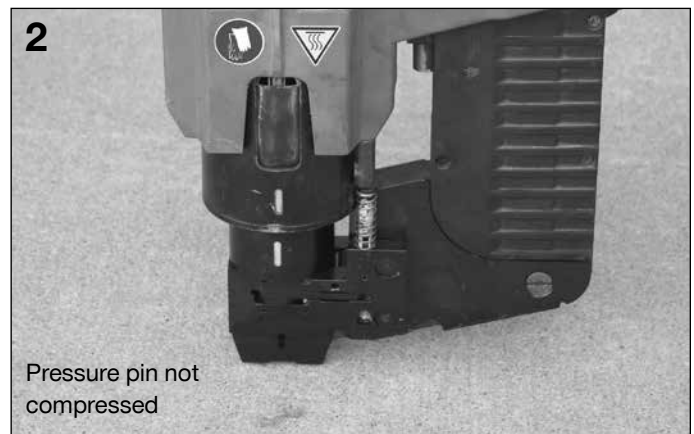
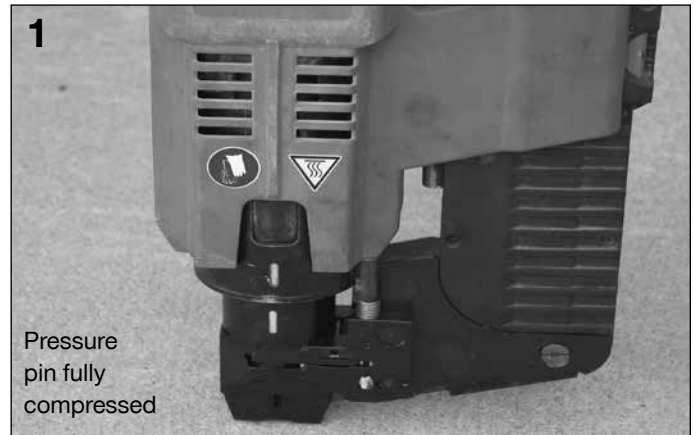
First, ensure that the cartridges are loaded and aligned properly. Often, forwarding the cartridges by slightly manually advancing the cartridge strip (push the cartridge strips down slightly until you feel the cartridge strip click into the detector) will fix the issue.

This could also be caused by not having enough fasteners in the fastener magazine. The DX 860-HSN is a gravity fed tool. Fill fastener magazine with fasteners and attempt another fastening. If this does not work, make sure the "window" on the front of the tool is closed. If it is open, close the window and attempt another fastening.

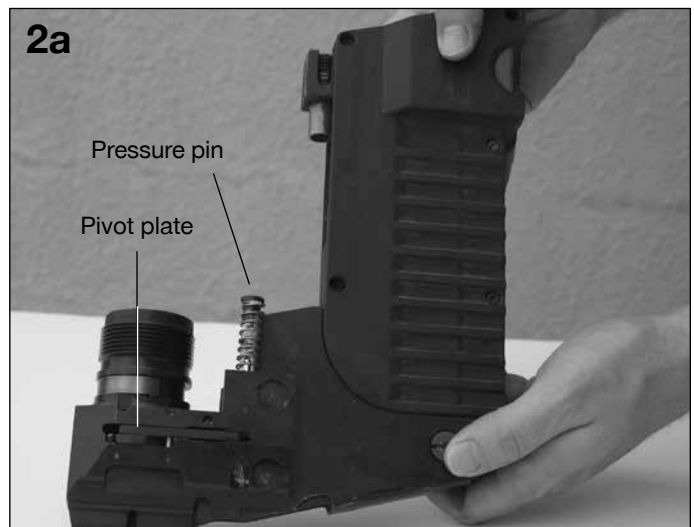
This may also be due to a jammed fastener. Ensure that the nose of the baseplate assembly is free of jammed fasteners. Fasteners tend to jam the tool most often when the operator misses the base material and continues to attempt to fire the tool. In this case, as the fastener does not attach to the base material, it may remain lodged in the baseplate. Repeated misses will exacerbate this problem. If fasteners do become lodged in the nose of the baseplate, unload the tool, remove the baseplate, actuate the pivot plate so as to clear the pin detector out of the way, and force the jammed fasteners out of the baseplate with the piston of the tool.

2a: Problems in the pivot plate may also cause the tool to not fire. Ensure that the pressure pin is properly actuating the pivot plate, and that the pivot plate is actuating the pin detector. If the pin detector or pivot plate is suspected of causing a failure to fire, cleaning and lubricating these components will often fix this problem. If the pivot plate is broken, the tool will have to be shipped to Hilti tool repair for maintenance.

Further causes of failure to fire include broken wear components. Check to ensure that all wear components are in good condition, and replace them as needed.



The tool will fully depress, but will not fire.



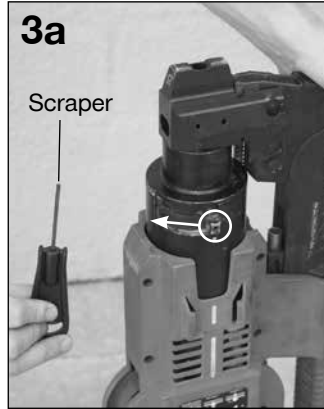
Insert the scraper or a pen into this area to actuate the pin detector in the barrel of the tool and clear the debris.

3: The tool becomes stuck when compressed.

This is probably due to the piston becoming stuck in the brake of the tool. To correct this, release the piston by rotating the lever opposite of the pawl of the tool, and in so doing release the piston from the grip of the pawl (see pictures below). Then remove the baseplate, and carefully (the tool may be very hot) remove the piston and brake and replace.



Tool is stuck in compressed position



Rotate lever to release pawl



Pawl lever

Pawl is now released, and baseplate can be removed

This problem may also occur if the stop brake is absent when the tool is fired. This will result in the piston protruding through the baseplate assembly, which may cause extensive damage to the baseplate. If this should occur, unload the tool, and carefully attempt to dislodge the piston by tapping the tool against a steel beam, or using a hammer to tap the piston back into the baseplate. After this is accomplished, remove the baseplate, reinsert a new piston and brake, and check the baseplate for further damage.

4.3 DX 860-ENP-L Field Repairs and Troubleshooting

The only repair components which should be replaced at the field level for the DX 860-ENP-L are the piston and stop ring. These should last on average about 5,000 to 7,000 shots depending on the application variables discussed earlier. The item number for the stop ring and piston is **#384948**.

DX 860-ENP-L piston/stop ring set (item number **#384948**)

It is very important to use only the above mentioned piston and stop ring set. Using any other pistons and stop rings such as the X-76-P-ENP or the X-76 PTR piston and brake spares set could cause extensive damage to the tool.

The DX 860-ENP-L may suffer a field failure due to various reasons; the following list will address the more common causes and fixes.

1: The tool will not advance cartridges.

Ensure that the cartridges are properly aligned; try advancing the cartridge strip manually by pressing the cartridges down into the tool until you feel "a click" as the cartridge fits into the detector. If this does not solve the problem, attempt to remove the cartridge strip from the tool and clean the tool. If the cartridge strip will not move, contact your Hilti account

manager for assistance. If the problem persists the tool must be sent in for Hilti tool maintenance.

2: The tool will not advance fasteners.

If fastening very closely to a wall/perimeter, the wall may block the expelled fastener collation from advancing out of the tool.

Occasionally, the fasteners may jam inside the baseplate assembly. In this case, remove the baseplate assembly and clear out the jam. Clean the baseplate assembly, reassemble tool and proceed with fastening.

4.4 Cleaning and Maintaining the DX 460-SM

4.4 Cleaning and Maintaining the DX 460-SM

To clean the DX 460-SM, follow the instructions illustrated below:



1 Press down the release lever and unscrew the fastener guide



2 Remove the fastener guide



3 Remove the piston



4 Remove the buffer*



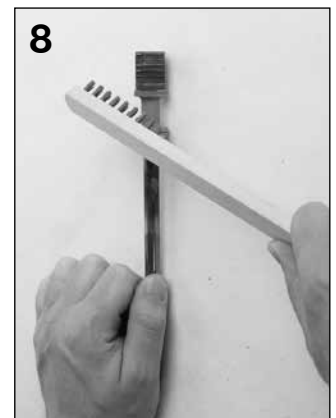
5 Brush out the interior of the piston sleeve



6 Remove the piston sleeve from the gas return unit by pressing down the button lock on the front of the handle



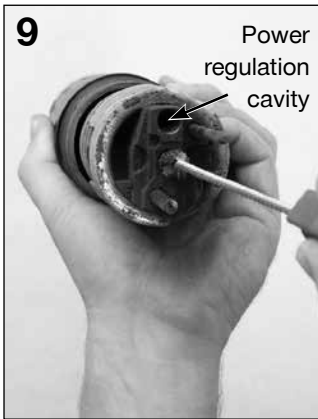
7 Unscrew the piston sleeve for the gas return unit



8 Brush piston

* Buffers should be checked daily to ensure they are in good working condition. Using worn buffers and/or mixing tool parts could cause damage to the tools and may require them to be sent to a Hilti Repair Center.

DX 460-SM Maintenance (cont.)



Brush out combustion chamber and power regulation cavity



Brush out the cartridge track

4.5 DX 76-MX Maintenance and Field Repairs

4.5.1 DX 76-MX Cleaning and Maintenance

To clean the DX 76-MX, follow the instructions as illustrated below.



Unscrew the magazine



Remove the magazine



Remove the piston



Remove the stop ring



Slide the lever out



Remove the piston sleeve



Brush outside of piston sleeve



Brush interior of piston sleeve

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DX 76-MX Cleaning and Maintenance cont.



Brush combustion chamber



Brush power regulation cavity



Brush piston



Brush out interior of fastener guide



Ensure fastener guide is completely clean

* Stop rings should be checked daily to ensure they are in good working condition. Using worn stop rings and/or mixing tool parts could cause damage to the tools and may require them to be sent to a Hilti Repair Center.

Reassembly:

Ensure that cocking handle is completely forward, fit the piston guide sleeve into the tool (slider should face upward as shown below), compressing it down into the tool, and moving the lever by the trigger back into place.



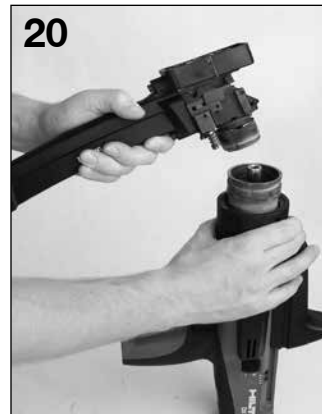
Insert piston sleeve into tool



Insert piston into tool



Reinsert stop ring into magazine



Reassemble magazine (fastener guide) by twisting it on in a clockwise direction until it locks.

It is important to use only Hilti spray lube, as it has been formulated for use in Hilti powder-actuated tools. Stop rings/brakes and pistons represent the primary wear components, and should be changed about every 5,000 to 10,000 fastenings with DX 860-HSN tool, and 5,000 to 7,000 fastenings with the ENP tools. Pistons for DX 460-SM tools are available separate from the stop rings, and should be replaced every 5,000 to 10,000 fastenings. Buffers for the DX 460-SM tool should be replaced much more frequently, whenever deformation occurs.

Buffers should be checked daily to ensure they are in good working condition. Using worn buffers and/or mixing tool parts may create a safety issue, could cause damage to the tools and may require them to be sent to a Hilti Repair Center.

4.5.2 DX 76-MX Field Repairs and Troubleshooting

Care must be taken in ensuring that the appropriate pistons are chosen, due to the fact that the standard DX 76 and the DX 76-MX require different pistons. These pistons must not be confused with the very similar DX 860-ENP-L pistons. See the Hilti product catalog for ordering information.

As with the DX 860-ENP-L, these components typically last approximately 5,000 to 7,000 fastenings.

4.6 When a Field Repair is Not Possible

When a tool goes down, Hilti understands the importance of getting it back on the job quickly. If a failure should occur, that can not be resolved at the job site, there are a number of options depending on which tool is being used, and whether the tool(s) in question were rented, purchased, or acquired through the Fleet Management program.

Hilti Repair Procedure*

If the tool was acquired through the Use on Demand service UoD, a replacement tool may be acquired by calling Hilti Customer Service, and requesting a replacement tool. A replacement tool will be shipped to the user at no charge overnight (where available) unless otherwise specified. It is always a good idea to call your local Hilti representative as he or she may be able to assist in either fixing the tool or getting a replacement. It generally takes about one to two business days to replace a tool acquired through the UoD program. After requesting a replacement tool, it is important to send the broken tool in, using shipping labels provided by a Hilti Customer Service representative.

If the tool(s) was acquired through Hilti Fleet Management or purchased outright, follow these steps:

- 1. Call** Hilti Customer Service (U.S. 1-800-879-8000, Canada 1-800-363-4458).
- 2. Answer** a few simple questions and a pre-paid shipping label will be faxed or emailed to you within minutes.
- 3. Package your tool** for shipping, place the pre-paid shipping label on the box and give the packaged tool to your delivery person or drop it off at the nearest shipping location. (U.S. - shipping via UPS; Canada - shipping methods vary depending upon region).

Hilti strives to repair and return your tool within 5 working days.

* These processes/services are current as of 12/2013, and may change without notice. Contact Hilti to obtain current program details.

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4.7 Operation Guide to the SDT 5 Stand-Up Deck Fastening Tool

4.7.1 How to Assemble the SDT 5/ST 1800 Stand-Up Deck Fastening System

Shown with the ST 1800 for clarity. Similar procedure with the ST 1800-A18. The components of the SDT 5/ST 1800 system are:

- SDT Frame
- Handles
- Magazine
- Drive shaft and Setter
- ST 1800 Adjustable Torque Screwdriver
- Collated Fasteners

Step 1 – Install the handles. Loosen the outer butterfly clamps. Slide the handles into the frame. If the tool is new, this may require some wiggling of the handles.

Step 2 - Adjust the height of the handles. The handles can be raised or lowered according to the height of the operator. It is recommended that operators set the height of the handles so the operator's arms meet the handles at almost full extension. This allows the operator to use their body weight to help drive fasteners. This method helps reduce arm fatigue and increase productivity.

Step 3 – Attach the magazine. Simply press it to the frame. It clamps above and below the feed area as show in the picture.

Note the magazine is reversible. The magazine faces inside if set up like in the picture. Simply switch the handles if you want the magazine to face outside.

- Some operators prefer the magazine on the inside because they find it easier to reload and to see how many screws remain.
- Some operators prefer the magazine on the outside because it cannot be knocked off accidentally by their knees.

Step 4 – Attach the drive shaft /setter to the ST 1800 Adjustable Torque Screwdriver. Pull back on holder release as shown and insert the drive shaft.

Note that this picture shows the ST 1800 without the dust cap. It is not necessary to remove the dust cap. The dust cap covers the silver metal part visible in Image 4 to the right. In the bottom picture, it is covered by the dust cap.

It is only necessary to remove the dust cap if the operator is going to use the tool for handheld operation with a depth gauge.



Install the handles



Adjust handle height to fit the operator



Attach the magazine



Insert drive shaft/setter into the ST 1800



ST 1800 with dust cap in place

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Step 5 – Install the ST 1800 in the SDT 5. Loosen the middle butterfly clamp until the frame can open. With the drive shaft / setter already in the ST 1800, slide the tool into the frame.

Step 6 – Close the frame clamp and secure it with the butterfly clamp. Note that it is highly recommended that the ST 1800 face as shown in picture 6. This gives the operator access to the Forward / Reverse switch and the trigger lock.

If the F / R switch is pressed in, as shown in the picture, the operator knows that the tool is in Forward.

Step 7 – Secure the tool cord through the cord keeper. Make a small loop, push the loop through the bottom, oval section and slide loop over the retainer.

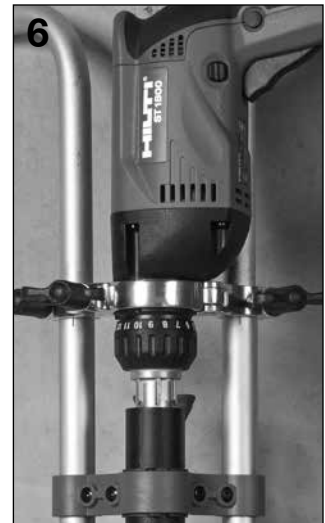
Step 8 – To prepare your collated fasteners for easy access, separate the box at the perforation line. This allows the operator to place the box in a pouch on their tool belt.

Step 9 – Load the magazine with fasteners. Take a strip of collated fasteners and insert either end into the magazine (the screws' drill tips face away from the tool). Make sure the strip is completely inserted. You may need to lightly shake the magazine for all the screws to drop in. Remove the plastic strip once all screws are loaded. Place a second strip into the magazine. This strip remains in the magazine. Up to 50 screws can be loaded into the magazine at one time. When the screws in the magazine are spent, remove any empty plastic strips and reload.

Note that there is not a front or back to the strips — either end can be inserted into the magazine.



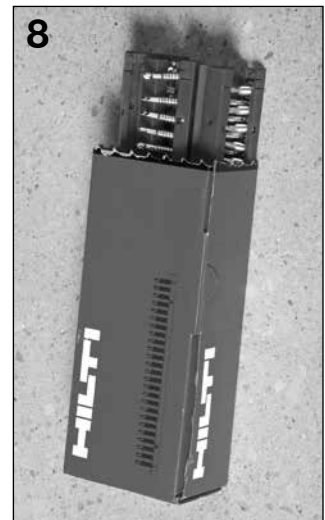
Slide drive shaft/setter into sleeve and set ST 1800 into frame



Close collar and secure tool by tightening butterfly clamp frame



Secure cord through cord keeper



Remove perforated end of fastener box for easy access



Load magazine with up to 50 fasteners



Second strip remains in magazine

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4.7.2 Fastening with the SDT 5/ST 1800 Deck Fastening System

Shown with the ST 1800 for clarity. Slightly different set-up with the ST 1800-A18. Please see owners manual or product catalog for specifics. The picture below shows the recommended stance for operating the SDT 5. This gives the operator the best balance.

To start driving screws: Check the ST 1800 Screwdriver to ensure that it is in the forward position (the F/R switch is pushed in toward the right side of the tool).

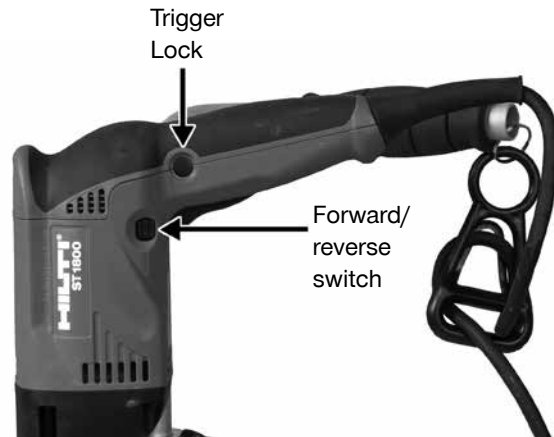
If there is no screw visible in the nose of the SDT 5, compress the tool one time to advance a screw from the magazine into the driving chamber. Once a screw is in place, you are ready to begin fastening sidelaps. (Any time a screw or SLC does not fasten completely or slips out, you will need to reload. Compress the tool lightly once to reload and then resume fastening.)

To start the ST 1800, pull the trigger and press the trigger lock button in for continuous "power on".

Place hands comfortably on the grips of the SDT 5. It is recommended that you use the ridges of the metal deck as a backstop. This minimizes risk of slipping, especially on wet deck. Now you are ready to fasten.



Recommended stance: Arms extended with slight bend at elbow, hands comfortably on grips, feet are shoulder width apart and one foot slightly forward



Forward/reverse and trigger lock switches are easily accessible



SDT 5 nose prior to first compression shows no screw loaded into the driving chamber



SDT 5 nose after first compression shows that tool is fully loaded and ready to begin fastening sidelaps



Note that the nose can be rotated 90 degrees. Simply hold it firmly between your boots and rotate the SDT 5 90 degrees to the left or the right.

Use ridge of deck as backstop to minimize slipping

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The SDT 5 has a different rhythm than the DX 860 tools. Use smooth, even compression. Let your body weight do the work. Develop a steady rhythm so the tool can feed and fasten properly. The picture to the right shows several fastenings. The spacing between fasteners will depend on the specification of your project.

4.7.3 Finding the Correct Torque Clutch Setting

The ST 1800 has an 18 position adjustable torque clutch. It is essential for proper fastening that the torque clutch be adjusted correctly. Failure to do so can result in overdriving. This can strip out the fastener and dramatically reduce load values.

There is a small black tab on the top of the ST 1800 that indicates the torque clutch setting.

As a general rule of thumb: #10 fasteners use a setting between 11 and 13; #12 fasteners use a setting between 13 and 15. The exact number will depend on the application.

Fastener	Torque Setting ¹
SLC1 (Sidelap Connector 1)	8 - 10
SLC2 (Sidelap Connector 2)	12 - 14
#10 x 3/4" HWH3 Sidelap Screw	10 - 12
#12 x 7/8" HWH4 Collated Screw	11 - 13 ²

¹ Usual torque setting range

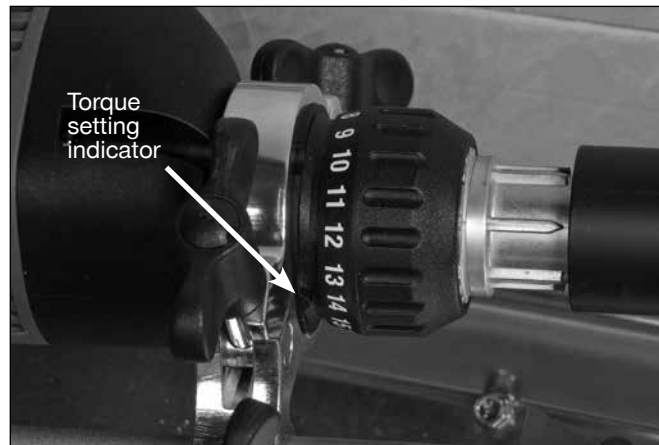
² Usual torque setting range for fastening sidelaps. When fastening bar joist, torque setting may be higher and will vary depending on the thickness of the joist.

It is recommended that you start low and increase the torque one setting at a time as needed. Insufficient torque will cause fastener stand-off. If you experience stand-off, increase the torque setting by one and drive another fastener. Repeat this cycle until the fastener drives completely down and the torque clutch disengages. You will hear a grinding sound at the end of each fastening that indicates the torque clutch has disengaged.

If the fastener is driven completely but you do not hear the torque clutch disengage, the torque is too high. This indicates the fastener is over driven and it is possible the threads have stripped and the fastening is not reliable. If this occurs, reduce the torque setting by one and drive another fastener. Repeat this cycle until you hear the torque clutch disengage after each fastening. The correct torque setting is achieved when the screw is driven completely and the clutch is heard to disengage.



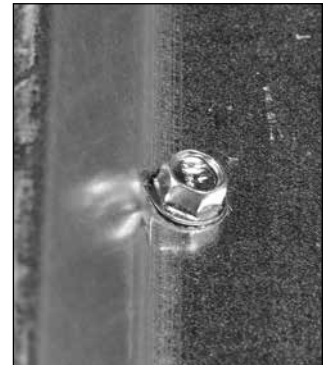
Spacing between fastenings will vary depending on project specifications



Torque setting indicator is a black tab located on the top of the tool



Fastener stand-off -
Torque setting is too low.
Increase setting by one and
drive another fastener



Fastener properly driven -
Torque setting is correct
when fastener head is fully
seated and torque clutch
disengages

4.7.4 Clearing a Jam

Jams can arise in the normal operation of the SDT 5. They are often the result of trying to drive the tool too fast. Working too quickly can result in unintentional cycling of the feeding mechanism which can cause multiple fasteners to be placed in the driving chamber.

Remember to use a smooth, even motion for best operation.

If a jam occurs, unplug the tool's power cord, remove the magazine and inspect the feed area.

Clear screws by working to move them up and out. You may need to open the teeth in the feed area. This is easily done by manually pushing them towards the outer edges of the chamber.

Take your time when clearing a jam. Do not use tools such as screwdrivers to pry out fasteners. This can permanently damage the feeding mechanism.

4.7.5 Unloading the Fasteners

When you are finished working, you may wish to unload the fasteners from your tool. To clear the drive chamber, simply squeeze both sides of the nose to open the metal jaws. The loaded fastener should freely fall from the chamber.

If there are other fasteners in the magazine that you would like to remove, simply detach the magazine from the tool frame. Fully insert an empty plastic strip into the end of the magazine and turn the magazine upside down. You may have to shake the magazine slightly to slide the fasteners into the plastic strip. Once all fasteners are in the plastic strip, remove strip from magazine.

If you have questions, please contact Hilti at 1-800-879-8000 in the United States or 1-800-363-4458 in Canada.



Jammed driving chamber



Opening the "teeth" in the feed area to release the jammed fasteners



To clear nose, squeeze both sides of the nose piece



To remove fasteners, insert plastic strip and tilt magazine downward

3.5.1 Steel Deck Fastener Selection and Design

3.5.1.4 Submittal Information for Roof Deck

Hilti Account Manager: _____ Date: _____

Phone: _____ DDAATT: _____

Decking Installer: _____ Hilti Regional Field Engineer: _____

Contact Name (Last, First): _____ Phone: _____

Installer Trained by Hilti: Yes No, please schedule training Fax/e-mail: _____

Engineer of Record: _____ Contact Name (Last, First): _____

Phone: _____ Fax/e-mail: _____

Project Name: _____ Project Zip Code: _____

Total Area: _____ Deck Manufacturer: _____

Building Code: 2012 IBC 2009 IBC 2006 IBC Other Design Reference: SDI ICC-ES CSSBI Other

Submittal Recipient: Decking Installer Account Manager Other: _____

Zone _____	Support Span (ft) _____	Support Steel <input type="checkbox"/>	<input type="checkbox"/>	Design Diaphragm Shear Capacity (plf) _____		
Subst. Frame: <input type="checkbox"/> X-ENP-19 <input type="checkbox"/> X-EDN19/X-EDNK22		Subst. Sidelap: <input type="checkbox"/> Hilti SLC <input type="checkbox"/> # 10 Screw <input type="checkbox"/> # 12 Screw <input type="checkbox"/> Button Punch <input type="checkbox"/> Proprietary Punch System		<input type="checkbox"/> Exposed to Weather		
Deck Type	Deck Gauge	Frame Type	Frame Pattern	Sidelap Type	Sidelap Pattern	Base Thickness
<input type="checkbox"/> B (1.5")	<input type="checkbox"/> 24	<input type="checkbox"/> 1/2" PW	<input type="checkbox"/> 36 / <input type="checkbox"/> 9	<input type="checkbox"/> #10 Screw	<input type="checkbox"/> _____ # Per Span	<input type="checkbox"/> < 3/16"
<input type="checkbox"/> BI (1.5")	<input type="checkbox"/> 22	<input type="checkbox"/> 5/8" PW	<input type="checkbox"/> 30 / <input type="checkbox"/> 7	<input type="checkbox"/> #12 Screw	<input type="checkbox"/> _____ (in.) On Center	<input type="checkbox"/> 3/16"
<input type="checkbox"/> N (3")	<input type="checkbox"/> 20	<input type="checkbox"/> 3/4" PW	<input type="checkbox"/> 24 / <input type="checkbox"/> 5	<input type="checkbox"/> Button Punch	<input type="checkbox"/> _____ (in.) Top Seam Weld Length	<input type="checkbox"/> 1/4"
<input type="checkbox"/> Other	<input type="checkbox"/> 18 <input type="checkbox"/> 16	<input type="checkbox"/> #12 or #14 Screw <input type="checkbox"/> Other	<input type="checkbox"/> __ / <input type="checkbox"/> 4 <input type="checkbox"/> 3 <input type="checkbox"/> __	<input type="checkbox"/> _____ (in.) Top Seam Weld Length <input type="checkbox"/> Proprietary Punch System <input type="checkbox"/> Other	<input type="checkbox"/> 5/16" <input type="checkbox"/> 3/8" <input type="checkbox"/> > 3/8"	

Zone _____	Support Span (ft) _____	Support Steel <input type="checkbox"/>	<input type="checkbox"/>	Design Diaphragm Shear Capacity (plf) _____		
Subst. Frame: <input type="checkbox"/> X-ENP-19 <input type="checkbox"/> X-EDN19/X-EDNK22		Subst. Sidelap: <input type="checkbox"/> Hilti SLC <input type="checkbox"/> # 10 Screw <input type="checkbox"/> # 12 Screw <input type="checkbox"/> Button Punch <input type="checkbox"/> Proprietary Punch System		<input type="checkbox"/> Exposed to Weather		
Deck Type	Deck Gauge	Frame Type	Frame Pattern	Sidelap Type	Sidelap Pattern	Base Thickness
<input type="checkbox"/> B (1.5")	<input type="checkbox"/> 24	<input type="checkbox"/> 1/2" PW	<input type="checkbox"/> 36 / <input type="checkbox"/> 9	<input type="checkbox"/> #10 Screw	<input type="checkbox"/> _____ # Per Span	<input type="checkbox"/> < 3/16"
<input type="checkbox"/> BI (1.5")	<input type="checkbox"/> 22	<input type="checkbox"/> 5/8" PW	<input type="checkbox"/> 30 / <input type="checkbox"/> 7	<input type="checkbox"/> #12 Screw	<input type="checkbox"/> _____ (in.) On Center	<input type="checkbox"/> 3/16"
<input type="checkbox"/> N (3")	<input type="checkbox"/> 20	<input type="checkbox"/> 3/4" PW	<input type="checkbox"/> 24 / <input type="checkbox"/> 5	<input type="checkbox"/> Button Punch	<input type="checkbox"/> _____ (in.) Top Seam Weld Length	<input type="checkbox"/> 1/4"
<input type="checkbox"/> Other	<input type="checkbox"/> 18 <input type="checkbox"/> 16	<input type="checkbox"/> #12 or #14 Screw <input type="checkbox"/> Other	<input type="checkbox"/> __ / <input type="checkbox"/> 4 <input type="checkbox"/> 3 <input type="checkbox"/> __	<input type="checkbox"/> _____ (in.) Top Seam Weld Length <input type="checkbox"/> Proprietary Punch System <input type="checkbox"/> Other	<input type="checkbox"/> 5/16" <input type="checkbox"/> 3/8" <input type="checkbox"/> > 3/8"	

Zone _____	Support Span (ft) _____	Support Steel <input type="checkbox"/>	<input type="checkbox"/>	Design Diaphragm Shear Capacity (plf) _____		
Subst. Frame: <input type="checkbox"/> X-ENP-19 <input type="checkbox"/> X-EDN19/X-EDNK22		Subst. Sidelap: <input type="checkbox"/> Hilti SLC <input type="checkbox"/> # 10 Screw <input type="checkbox"/> # 12 Screw <input type="checkbox"/> Button Punch <input type="checkbox"/> Proprietary Punch System		<input type="checkbox"/> Exposed to Weather		
Deck Type	Deck Gauge	Frame Type	Frame Pattern	Sidelap Type	Sidelap Pattern	Base Thickness
<input type="checkbox"/> B (1.5")	<input type="checkbox"/> 24	<input type="checkbox"/> 1/2" PW	<input type="checkbox"/> 36 / <input type="checkbox"/> 9	<input type="checkbox"/> #10 Screw	<input type="checkbox"/> _____ # Per Span	<input type="checkbox"/> < 3/16"
<input type="checkbox"/> BI (1.5")	<input type="checkbox"/> 22	<input type="checkbox"/> 5/8" PW	<input type="checkbox"/> 30 / <input type="checkbox"/> 7	<input type="checkbox"/> #12 Screw	<input type="checkbox"/> _____ (in.) On Center	<input type="checkbox"/> 3/16"
<input type="checkbox"/> N (3")	<input type="checkbox"/> 20	<input type="checkbox"/> 3/4" PW	<input type="checkbox"/> 24 / <input type="checkbox"/> 5	<input type="checkbox"/> Button Punch	<input type="checkbox"/> _____ (in.) Top Seam Weld Length	<input type="checkbox"/> 1/4"
<input type="checkbox"/> Other	<input type="checkbox"/> 18 <input type="checkbox"/> 16	<input type="checkbox"/> #12 or #14 Screw <input type="checkbox"/> Other	<input type="checkbox"/> __ / <input type="checkbox"/> 4 <input type="checkbox"/> 3 <input type="checkbox"/> __	<input type="checkbox"/> _____ (in.) Top Seam Weld Length <input type="checkbox"/> Proprietary Punch System <input type="checkbox"/> Other	<input type="checkbox"/> 5/16" <input type="checkbox"/> 3/8" <input type="checkbox"/> > 3/8"	

Notes

Fax or email completed forms to Hilti Technical Support at (918) 459-3004 or deck@hilti.com.

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Steel Deck Fastener Selection and Design 3.5.1

3.5.1.5 Submittal Information for Floor Deck

Hilti Account Manager:	Date:
Phone:	DDAATT:
Decking Installer:	Hilti Regional Field Engineer:
Contact Name (Last, First):	Phone:
Installer Trained by Hilti: <input type="checkbox"/> Yes <input type="checkbox"/> No, please schedule training	Fax/e-mail:
Engineer of Record:	Contact Name (Last, First):
Phone:	Fax/e-mail:
Project Name:	Project Zip Code:
Total Area:	Deck Manufacturer:
Building Code: <input type="checkbox"/> 2012 IBC <input type="checkbox"/> 2009 IBC <input type="checkbox"/> 2006 IBC <input type="checkbox"/> Other	Design Reference: <input type="checkbox"/> SDI <input type="checkbox"/> ICC-ES <input type="checkbox"/> CSSBI <input type="checkbox"/> Other
Submittal Recipient: <input type="checkbox"/> Decking Installer	<input type="checkbox"/> Account Manager <input type="checkbox"/> Other: _____

Zone _____	Support Span (ft) _____	Support Steel <input type="checkbox"/> <input type="checkbox"/>	Bar Joist <input type="checkbox"/>	Str. Steel <input type="checkbox"/>	Design Diaphragm Shear Capacity (plf) _____	
Subst. Frame: <input type="checkbox"/> X-ENP-19 <input type="checkbox"/> X-EDN19/X-EDNK22		Subst. Sidelap: <input type="checkbox"/> Hilti SLC <input type="checkbox"/> # 10 Screw <input type="checkbox"/> # 12 Screw <input type="checkbox"/> Button Punch <input type="checkbox"/> Proprietary Punch System				
Deck Type	Deck Gauge	Frame Type	Frame Pattern	Sidelap Type	Sidelap Pattern	Base Thickness
<input type="checkbox"/> B (1.5")	<input type="checkbox"/> 28	<input type="checkbox"/> 1/2" PW	<input type="checkbox"/> 36 / <input type="checkbox"/> 9	<input type="checkbox"/> #10 Screw	<input type="checkbox"/> _____ # Per Span	<input type="checkbox"/> < 3/16"
<input type="checkbox"/> BI (1.5")	<input type="checkbox"/> 26	<input type="checkbox"/> 5/8" PW	<input type="checkbox"/> 30 / <input type="checkbox"/> 7	<input type="checkbox"/> #12 Screw	<input type="checkbox"/> _____ (in.) on Center	<input type="checkbox"/> 3/16"
<input type="checkbox"/> N (3")	<input type="checkbox"/> 24	<input type="checkbox"/> 3/4" PW	<input type="checkbox"/> 24 / <input type="checkbox"/> 5	<input type="checkbox"/> Button Punch		<input type="checkbox"/> 1/4"
<input type="checkbox"/> 2" x 12"	<input type="checkbox"/> 22	<input type="checkbox"/> #12 or #14 Screw	<input type="checkbox"/> __ / <input type="checkbox"/> 4	<input type="checkbox"/> _____ (in.) Top Seam Weld Length		<input type="checkbox"/> 5/16"
<input type="checkbox"/> 3" x 12"	<input type="checkbox"/> 20	<input type="checkbox"/> Other	<input type="checkbox"/> 3	<input type="checkbox"/> Other		<input type="checkbox"/> 3/8"
<input type="checkbox"/> 9/16"	<input type="checkbox"/> 18		<input type="checkbox"/> _			<input type="checkbox"/> > 3/8"
<input type="checkbox"/> Other	<input type="checkbox"/> 16					
<input type="checkbox"/> Normal Weight Concrete . . . <input type="checkbox"/> 3000 psi		_____ (Inches) Concrete Depth Above Top of Flute				
<input type="checkbox"/> Lightweight Concrete <input type="checkbox"/> 3500 psi						
		<input type="checkbox"/> 4000 psi				
<input type="checkbox"/> Insulating Concrete <input type="checkbox"/> 130 psi						
<input type="checkbox"/> Perform Calculations based on Shear Studs Present in Design Deck fastened at a 36/4 pattern with standing seam sidelaps fastened by button punches @ 36" O.C. maximum. Refer to ICC-ES ESR-2197, Tables 16-20, for more details.						
Minimum Concrete Shear Reinforcement		<input type="checkbox"/> .00075 b _w s ² <input type="checkbox"/> .00025 b _w s ²				
Minimum Average Spacing of Shear Studs		<input type="checkbox"/> 12" <input type="checkbox"/> 18" <input type="checkbox"/> 24" <input type="checkbox"/> 30" <input type="checkbox"/> 36"				
Minimum Welded Wire Fabric for Tabulated Shear Values		<input type="checkbox"/> 6 x 6 - W 1.4 x W 1.4 <input type="checkbox"/> 6 x 6 - W 2.0 x W 2.0 <input type="checkbox"/> 6 x 6 - W 2.9 x W 2.9 <input type="checkbox"/> 6 x 6 - W 4.0 x W 4.0 <input type="checkbox"/> 4 x 4 - W 4.0 x W 4.0 <input type="checkbox"/> 6 x 6 - W 7.5 x W 7.5 <input type="checkbox"/> 6 x 6 - W 8.3 x W 8.3				

Notes

Fax or email completed forms to Hilti Technical Support at (918) 459-3004 or deck@hilti.com.

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6.1 Trainer Test - Hilti Deck Fastening Systems

1. **What type of fastener are typically used to fasten 20 gauge B deck to 1/4" thick bar joist?**
 - a. S-MD 12-24x1-5/8 M HWH5 RT
 - b. X-HSN 24
 - c. X-ENP-19 L15
 - d. All of the above
2. **What type of fastener are typically used to fasten 18 gauge B deck to 1/2" thick structural steel beams?**
 - a. S-MD 12-24x1-5/8 M HWH5 RT
 - b. X-HSN 24
 - c. X-ENP-19 L15
 - d. All of the above
3. **What type of fastener are typically used to fasten 26 gauge 9/16" form deck onto 1/8" joist?**
 - a. X-HSN 24
 - b. S-MD 12-24x1-5/8 M HWH5 RT
 - c. X-ENP-19 L15
 - d. All of the above
4. **What types of fasteners are typically used to make attachments of the X-HVB Shear Connector?**
 - a. X-ENP-21 HVB Fasteners
 - b. S-MD 12-24x1-5/8 M HWH5 RT
 - c. X-HSN 24
 - d. X-ENP-19 L15
5. **Which tool(s) can be used to fasten 20 gauge BI deck to 3/16" bar joist?**
 - a. DX 860-HSN
 - b. DX 76-MX
 - c. DX 860-ENP-L
 - d. B or C
6. **Which tool(s) can be used to fasten 18 gauge N deck to structural steel 1/2" and thicker?**
 - a. DX 860-HSN
 - b. DX 76-MX
 - c. DX 860-ENP-L
 - d. B or C
7. **Which cartridge(s) are most commonly used to fasten 20 gauge deck into structural steel ranging in thickness from 1/4" to 3/8" with the DX 860-ENP-L Tool?**
 - a. Yellow
 - b. Red
 - c. Black
 - d. Blue
8. **Which cartridge is most commonly used to fasten 18 gauge deck into bar joist less than or equal to 3/16" thick with the DX 860 HSN Tool?**
 - a. Red
 - b. Black
 - c. Blue
 - d. Yellow
9. **Which parts can be repaired at the field level for the DX 860-HSN tool?**
 - a. Pistons/stop and rings/breaks
 - b. Piston retainer clip sets and bearing sleeve collar/screws
 - c. Pressure pin and springs
 - d. All of the above
10. **True or False: DX 860-HSN and DX 460-SM pistons/brakes can be used interchangeably.**
 - a. True
 - b. False
11. **True or False: DX 860-ENP-L and DX 76-MX pistons/brakes can be used interchangeably.**
 - a. True
 - b. False
12. **What will happen if the joist is missed while fastening metal deck into bar joist with a DX 860-HSN tool?**
 - a. The fastener will punch through the deck with high velocity
 - b. The fastener will likely be stopped from punching through the deck
 - c. The fastener will punch through the deck and free flight at a low velocity
 - d. None of the above
13. **What type(s) of lubricant can be used with the Hilti powder-actuated tools?**
 - a. WD 40
 - b. Industrial grade grease
 - c. Hilti lubrication spray
 - d. All of the above
14. **True or false: All Hilti decking tools are low velocity.**
 - a. True
 - b. False
15. **The suggested Hilti power driven fastener inspection technique is:**
 - a. Best performed with a hammer
 - b. Best described as a visual inspection
 - c. Performed by destructive testing
 - d. Impossible to perform in the field

16. How many DX 860 tools should I use on a 100,000 sq. ft. job assuming a 36/7 fastening pattern?

- 1
- 2
- 3
- None of the above

17. How often should the Hilti powder-actuated tools be cleaned on the jobsite?

- At least once per day
- When the tool begins to jam repeatedly
- Once per week
- Never, Hilti is responsible for all tool cleaning

18. What should be done in the event that a tool does not operate correctly and the operator is unable to repair it using the information contained in Hilti Decking Manual?

- Call a Hilti Account Manager
- Do nothing
- Call Hilti Customer Service
- A or C

19. The SDT 5 can use which one of the following fasteners:

- Hilti collated decking screws and Sidelap Connectors
- The loose screws which came bundled with the metal deck
- The loose screws which came bundled with the metal deck and we loaded into the empty red Hilti strips

20. The SDT 5 can use which one of the following metal screwdrivers:

- Hilti ST 1800 adjustable torque screwdriver
- Hilti ST 2500 screwdriver
- Hilti ST 1800-A18 adjustable torque screwdriver
- A and C

21. How do I know if the adjustable torque clutch on the ST 1800 is set correctly? Match each number with the letter which explains what is happening:

- Adjustable torque clutch is set too low
 - Adjustable torque clutch is set too high
 - Adjustable torque clutch is set just right
- The tool makes a 'grinding' sound at the end of every fastening, and the screw is fully seated against the deck
 - The tool makes a 'grinding' sound and the fasteners are standing off
 - The tool sometimes doesn't make a 'grinding' sound but the fasteners are driven all the way

22. The SDT 5 can be used for which one of the following applications?

- Fastening Nestable sidelaps of roof deck, floor deck or form deck
- Fastening Interlocking sidelaps of roof deck, floor deck or form deck
- Fastening Interlocking sidelaps of roof deck, floor deck or form deck that are designated as "screwable sidelap" by the deck manufacturer
- A and C

23. What is the secret to minimizing jams when operating the SDT 5?

- Set the handles high and use only your arms to make the fastening
- Use the tool as fast and as hard as possible.
- Develop a smooth, consistent rhythm using your body weight.

To receive trainer card/certification, trainer must successfully complete the Operator's and Trainer's test.

Answer key on page 59.

6.2 Operator Test - Hilti Deck Fastening Systems

1. **What tools and fasteners are typically used to fasten down metal deck to bar joist between 3/16" and 3/8"?**
 - a. DX 860-HSN and X-HSN 24
 - b. DX 76-MX and X-ENP-19 L15
 - c. SDT5 and S-MD 12-24x1-5/8 M HWH5 RT
 - d. All of the Above
2. **What tools may be used to fasten down metal deck to structural steel 1/4" and thicker?**
 - a. DX 860-HSN
 - b. DX 76-MX
 - c. DX 460-SM
 - d. DX 860-ENP
 - e. All of the above
 - f. B and D
3. **What is the most common cartridge used for bar joist with the DX 860-HSN when the base material is 1/4" and less?**
 - a. Green
 - b. Yellow
 - c. Red
 - d. Black
4. **What will happen if a DX 860-HSN tool is fired without the piston brake being installed?**
 - a. The tool will function as usual
 - b. The tool will jam and may be damaged
 - c. The tool will not fire
 - d. The tool will fire properly once and jam on the second attempt
5. **What Hilti products might be used in place of Nelson Stud?**
 - a. X-ENP-19
 - b. X-HVB shear connectors with X-ENP-21 HVB fasteners
 - c. X-HVB shear connectors with X-HSN 24 fasteners
 - d. All of the above
6. **How often must Hilti decking tools be cleaned and lubricated?**
 - a. At least once a day
 - b. At least once a week
 - c. Never, Hilti repair services is responsible for cleaning tools
7. **What type(s) of lubricant can be used with the Hilti powder-actuated tools?**
 - a. WD 40
 - b. Industrial grade grease
 - c. Hilti lubrication spray
 - d. All of the above
8. **What will happen if the joist is missed while fastening metal deck into bar joist with a DX 860-HSN tool?**
 - a. The fastener will punch through the deck with high velocity
 - b. The fastener will likely be stopped from punching through the deck
 - c. The fastener will punch through the deck and free flight at a low velocity
 - d. None of the above
9. **The suggested Hilti power driven fastener inspection technique is:**
 - a. Best performed with a hammer
 - b. Best described as a visual inspection
 - c. Performed by destructive testing
 - d. Impossible to perform in the field
10. **If you discover that the fasteners are being overdriven while using the Hilti PAT deck system, what steps may be taken to correct this?**
 - a. Decrease the power setting on the tool
 - b. Use a lighter cartridge
 - c. Use a different fastener
 - d. A and/or B
11. **What should be done in the event that a tool does not operate correctly and the operator is unable to repair it using the information contained in Hilti Decking Manual?**
 - a. Call a Hilti Account Manager
 - b. Do nothing
 - c. Call Hilti Customer Service
 - d. A or C
12. **How many fastenings per hour can you make before exceeding the recommended fastening rate when using the DX 860-ENP?**
 - a. 400 fastenings per hour
 - b. 1,000 fastenings per hour
 - c. 1,500 fastenings per hour
 - d. None of the above
13. **What should you do if the piston gets jammed in the baseplate assembly (barrel of the tool)?**
 - a. Unload the tool, remove the baseplate, remove the piston and brake and install a new spars set
 - b. Attempt to pound the piston back into place with a hammer
 - c. Spray Hilti Spray Lubricant into the barrel until the piston loosens
 - d. None of the above

14. What will happen if you do not regularly clean your Hilti decking tools?

- Nothing, Hilti tools feature permanent lubrication and do not require additional lubrication
- The tools will experience excessive wear, increasing the possibility of the tool becoming inoperable and/or inconsistent fastening quality
- The tool will immediately become inoperable
- None of the above

15. How many fasteners (at a minimum) should the DX 860-HSN have in it at any given time while fastening metal deck?

- 10
- 20
- 30
- None of the above

16. Name three Hilti DX 860-HSN parts which may be repaired at the field level.

- Spares pack, piston retaining clip set, pressure pin and spring
- Spares pack, magazine, baseplate
- Baseplate, pawl lever, spares pack
- All of the above

17. Check all items below that apply to the safety features of the Hilti DX tools.

- DX captive piston principle
- Drop fire safety
- Contact pressure safety
- Trigger safety
- Unintentional fire safety

18. The SDT 5 can use which one of the following fasteners:

- Hilti collated decking screws and Sidelap Connectors
- The loose screws which came bundled with the metal deck
- The loose screws which came bundled with the metal deck and we loaded into the empty red Hilti strips

19. The SDT 5 can use which one of the following metal screwdrivers:

- Hilti ST 1800 adjustable torque screwdriver
- Hilti ST 2500 screwdriver
- Hilti ST 1800-A18 adjustable torque screwdriver
- A and C

20. How do I know if the adjustable torque clutch on the ST 1800 is set correctly? Match each number with the letter which explains what is happening:

- Adjustable torque clutch is set too low
 - Adjustable torque clutch is set too high
 - Adjustable torque clutch is set just right
- The tool makes a 'grinding' sound at the end of every fastening
 - The tool doesn't make a 'grinding' sound and the fasteners are standing off
 - The tool doesn't make a 'grinding' sound but the fasteners are driven all the way

21. What is the secret to minimizing jams when operating the SDT 5?

- Set the handles high and use only your arms to make the fastening
- Use the tool as fast and as hard as possible.
- Develop a smooth, consistent rhythm using your body weight.

Answer key on page 59.



**Hilti.
Outperform.
Outlast.**

Trained Instructor - Hilti Deck Fastening System

Date Issued: _____

This certifies that

_____ has received the recommended training in the operation and maintenance of the Hilti Deck Fastening System and has received the information required to operate and to train operators in the use of the Hilti Deck Fastening System.



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HILTI **Hilti. Outperform. Outlast.**

Trainer: _____

I have received instruction in the training of operators of the Hilti Deck Fastening System and agree to conform to the rules and regulations governing the instruction of tool operators.

Signature: _____
Valid for 3 years after date issued

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Terms and Conditions of Sale (U.S.)

Payment Terms:	Net 30 days from date of invoice. Customer agrees to pay all costs incurred by Hilti in collecting any delinquent amounts, including attorney's fees.
Freight:	All sales are F.O.B. Destination with transportation allowed via Hilti designated mode. Delivery dates are estimates only and Customer accepts all risks associated with any delay, even if Hilti is advised that time is of the essence. Additional charges for expedited shipments, special handling requirements, and orders below certain dollar amounts shall be the responsibility of Customer. Fuel surcharges may apply depending on market conditions.
Credit:	All orders sold on credit are subject to Credit Department approval.
Return Policy:	Products must be in saleable condition to qualify for return. Saleable condition is defined as unused items in original undamaged packaging and unbroken quantities and in as-new condition. All returns are subject to Hilti inspection and acceptance, and a \$125 restocking charge if returned more than 90 days after invoice date. Proof of purchase is required for all returned materials.
Ineligible Return:	Special order products and discontinued items are not eligible for return or credit. Dated materials are only returnable in case quantity and within 14 days after invoice date. In no event shall any product be returnable or qualify for credit after 1 year from invoice date.
Warranty:	Hilti warrants that for a period of 12 months from the date it first supplies a product it will, at its sole option and discretion, refund the purchase price of, repair, or provide a replacement for, such product which contains a defect in material or workmanship. Hilti warrants that for a period of 12 months from the date it first supplies a service, it will, at its sole option and discretion, refund the purchase price of, or reperform, such portion of the service that does not conform to the contract requirements. Absence of Hilti's receipt of notification of any such defect or nonconformance within this 12-month period shall constitute a waiver of all claims with regard to such product and service. THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Hilti shall in no event be liable for, and Customer hereby agrees to indemnify Hilti against, all claims related to special, direct, indirect, incidental, consequential, and any other damages arising out of or related to the sale, use, or inability to use the product, including costs and attorney's fees, even if caused in whole or in part by the negligence of Hilti.
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Domestic Origin:	Origin information may be obtained by written request to Hilti, Inc., Contract Compliance, P. O. Box 21148, Tulsa, Oklahoma 74121. Hilti's Quality Department personnel are the only individuals authorized to warrant the country of origin of Hilti products.
Business Size:	Hilti is a large business.
Prices:	Prices are those stated on the order, and unless otherwise noted are based on purchasing all items on the order — pricing for individual products may vary for purchases of different quantities or item combinations. Hilti does not maintain most favored customer records, makes no representation with respect to same, and rejects any price warranty terms proposed by Customer. Hilti's published net price list is subject to change without notice.
Consent to Jurisdiction:	All transactions shall be deemed to have been made and entered into in Tulsa, Oklahoma. Any and all disputes arising directly or indirectly from such transactions shall be resolved in the courts of the County of Tulsa, State of Oklahoma, to the exclusion of any other court, and any resulting judgment may be enforced by any court having jurisdiction of such an action. All transactions shall be governed by and construed in accordance with the laws of the State of Oklahoma.
Indemnification:	Customer hereby agrees to indemnify Hilti for any costs, including attorney's fees, incurred by Hilti as a result, in whole or in part, of any violation by Customer of any Federal, State or Local statute or regulation, or of any nationally accepted standard. It shall be Customer's sole responsibility to comply with all applicable laws, regulations, and codes regarding the handling, use, transportation, or disposal of products upon taking possession of same.
Insurance:	Hilti's insurance is reflected on the Certificate of Insurance available at www.us.hilti.com , which contains what is current at that particular time. In no event shall Hilti be obligated to continue to provide the same insurance or any other insurance, including coverage, limits, or deductibles.
Convert Check to Eft:	When Customer provides a check as payment, it authorizes Hilti to use information from the check to make a one time electronic funds transfer from Customer's checking account or to process the payment as a check transaction. When Hilti uses information from Customer's check to make an electronic funds transfer, funds may be withdrawn from the account as soon as the same day the check is received, and Customer will not receive its check back from the financial institution.
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Ineligible Return:	Special order products and discontinued items are not eligible for return or credit. Dated materials are only returnable in case quantity and within 14 days after invoice date. In no event shall any product be returnable or qualify for credit after 1 year from invoice date.
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Indemnification:	Customer hereby agrees to indemnify Hilti for any costs, including attorney's fees, incurred by Hilti as a result, in whole or in part, of any violation by Customer of any Federal, State or Local statute or regulation, or of any nationally accepted standard. It shall be Customer's sole responsibility to comply with all applicable laws, regulations, and codes regarding the handling, use, transportation, or disposal of products upon taking possession of same.
Insurance:	Hilti's insurance is reflected on the Certificate of Insurance available at www.us.hilti.com , which contains what is current at that particular time. In no event shall Hilti be obligated to continue to provide the same insurance or any other insurance, including coverage, limits, or deductibles.
Convert Check to Eft:	When Customer provides a check as payment, it authorizes Hilti to use information from the check to make a one time electronic funds transfer from Customer's checking account or to process the payment as a check transaction. When Hilti uses information from Customer's check to make an electronic funds transfer, funds may be withdrawn from the account as soon as the same day the check is received, and Customer will not receive its check back from the financial institution.
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Trainer Test - Answer Key

1: d 2: c 3: a 4: a 5: a 6: d 7: b 8: a 9: d 10: b 11: b 12: b 13: c 14: a 15: b 16: c 17: a 18: d 19: a 20: d 21: c, a, b 22: d 23: c

Operator Test - Answer Key

1: a 2: f 3: c 4: b 5: b 6: a 7: c 8: b 9: b 10: d 11: d 12: b 13: a 14: b 15: b 16: a 17: a, b, c, d, e 18: a 19: d 20: c, a, b 21: c

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