

Side Seam Fastening

Side Seam Attachment

Side seam attachment is an integral part of developing the shear resistance and flexibility of a diaphragm system. The side seam attachment also creates a positive connection, limiting differential movement between the sheets of deck under out-of-plane loads. Limiting differential movement between the sheets helps to prevent damage to the roof system installed on the top side of the steel deck. The common side seam attachment systems are the button punch, top seam weld, and DeltaGrip® system for standing seam interlock side seams. Self-drilling screws are used for nestable side seams. The two common types of side seams are the standing seam interlock and the nestable side seam (see Figure 1.12.1).

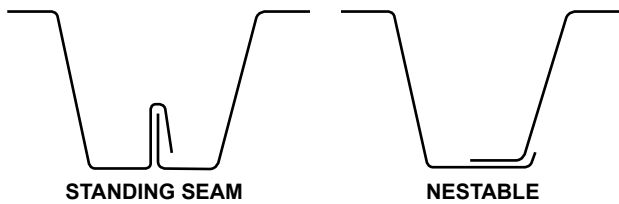


Figure 1.12.1: STANDING SEAM AND NESTABLE DIAGRAM

Button Punch

The button punch attachment is used to connect standing seam side seams. This low cost attachment uses a pneumatic or hand-operated button punch tool that clinches the seam together. The button punch option is used for low shear diaphragms that generally have high flexibilities. For architecturally exposed deck, the button punch system is a good option because no unsightly burn marks which are typically associated with welded connections. Although skilled labor is not required, the quality of the button punch that has been installed with a hand-operated tool is dependent on the operator. A “good” button punch should not become disengaged when a person jumps on the adjacent sheet of deck.



Figure 1.12.2: BUTTON PUNCH SIDE LAPS

Self-Drilling Screws

Self-drilling screws are used to attach nestable side lap steel decks. The screws have a mid range shear strength compared to button punches and top seam welds making them suitable for mid range diaphragm shears. The screws can be easily installed with low-skill labor using screw guns that are readily available. The screws do not leave burn marks associated with welding, but the screw points do protrude through the underside of the steel deck. As a result, screws may not be acceptable for some architecturally exposed steel decks.



Figure 1.12.3: SIDE SEAM SELF-DRILLING SCREW

Top Seam Weld

The top seam weld connects the standing seam deck side seams by welding the three layers of steel deck together. This is done after the hem is crimped using a hand or pneumatically operated crimping tool. Top seam welds can be used to produce high diaphragm shears and low flexibilities. Top seam welding is a slow process requiring skilled welders, leading to increased installation costs. The welding creates burn marks on the underside of the deck and occasional burn-through holes. Top seam welds are not recommended for architecturally exposed steel deck. Weld inspection, procedures and qualifications should be in accordance with AWS D1.3. Due to the high cost associated with installation and inspection, top seam weld connections have been largely replaced by the DeltaGrip side lap connection.



Figure 1.12.4: TOP SEAM WELD

Side Seam Fastening

DeltaGrip®

The DeltaGrip system was developed in 2003 to reduce the installed costs of high shear diaphragms by eliminating the costly top seam weld. This revolutionary clinching system punches three triangular tabs through the standing seam interlock side seam. This interlock creates the equivalent strength of a time consuming top seam weld with the rapid action of a pneumatically powered DeltaGrip tool. High-quality DeltaGrip connections can be installed with low-skill labor compared to the skilled welders required to make top seam welds.

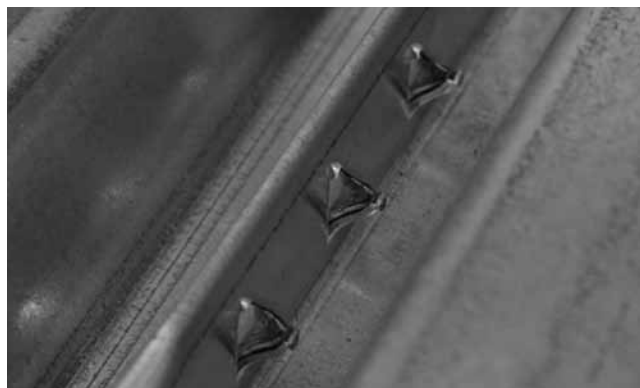


Figure 1.12.5: DELTAGRIP PUNCH

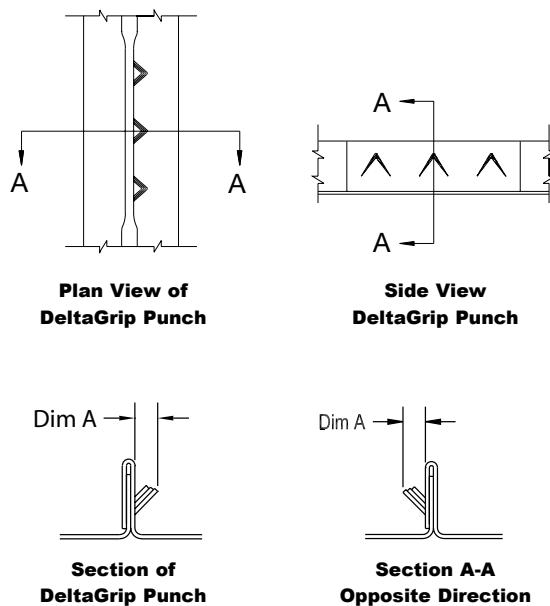


Figure 1.12.7: DELTAGRIP PUNCH VIEWS

DeltaGrip Inspection

The DeltaGrip system can be visually inspected from the top side of the steel deck by observing that all three layers of the side lap are engaged and that the punch-out distance meets the minimum offset required (see Figure 1.10.6). To assist with this task, ASC Steel Deck has developed a Go/No-Go gage to provide a rapid jobsite check of the punch-out distances (see Figure 1.12.8).

Schedule Minimum Offset	
Gage	Dim A (in)
22	0.19
21	0.19
20	0.19
19	0.16
18	0.16
16	0.16
For SI 1 inch = 25.4mm	



Figure 1.12.6: DELTAGRIP PUNCH OUT DISTANCES

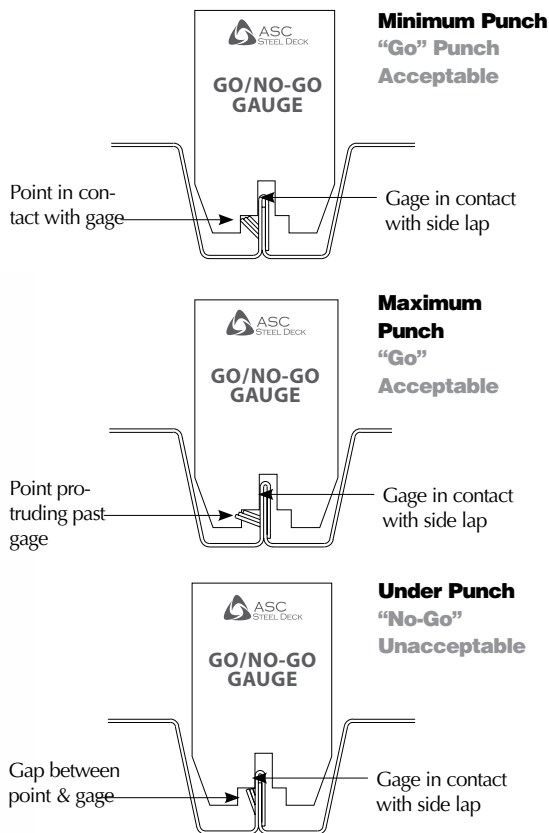


Figure 1.12.8: DELTAGRIP GO/NO-GO GAUGE