

INSTALLATION INSTRUCTIONS FOR No. 4 THROUGH 11 ZAP SCREWLOK STRUCTURAL CONNECTORS ON GRADE 60 REBAR [U.S. METRIC GRADE 420]

Place the **No. 4 through 11 ZAP SCREWLOK STRUCTURAL CONNECTOR** against the structural steel member making sure it is flat against the surface. Before welding, ensure the surface of the structural member is clean and free from any coatings or debris in the entire area that will be covered by the weld. Using an appropriate electrode for low carbon steel, grades 1018 or 1026 (**E7018**, **E7026** or equivalent), fillet weld the entire circumference of the connector using weld bevel size "W" per Chart 1 on page 2. If desired, the connector may be tack welded in place before completing the entire weld. (Welding to conform to AWS D1.1, Structural Welding Code, full penetration, bevel groove)

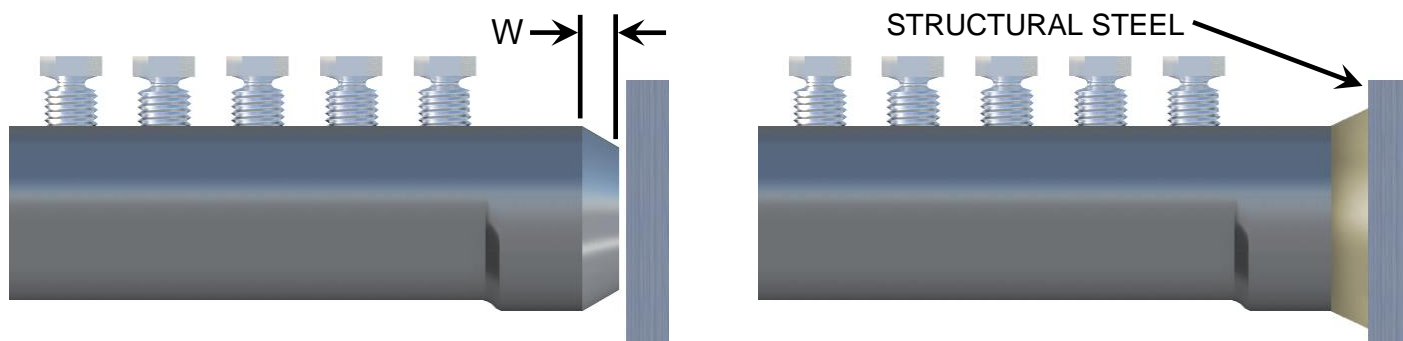


FIGURE 1: Structural Connector, Before and After Weld

Slide the rebar into the connector at least the **Minimum Insertion Length "I"** per Figure 2 and Chart 1. Alternatively, the bar can be inserted until it contacts the structural steel member. Do not under-insert, as shown in Figure 3. If desired, measure and mark the rebar before inserting it into the connector per Figure 2.

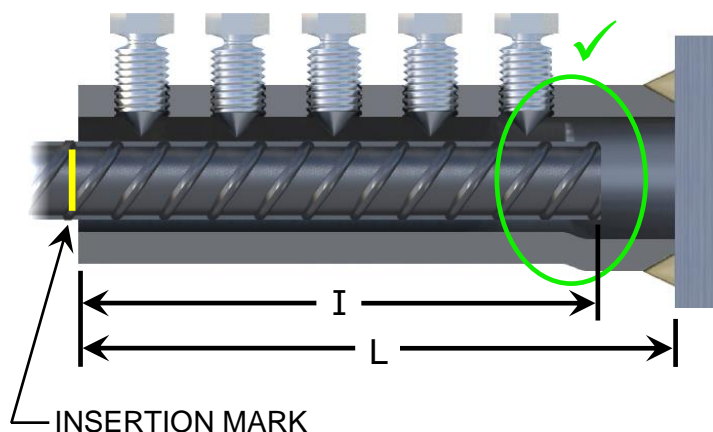


FIGURE 2: **Correct** Rebar Insertion Depth

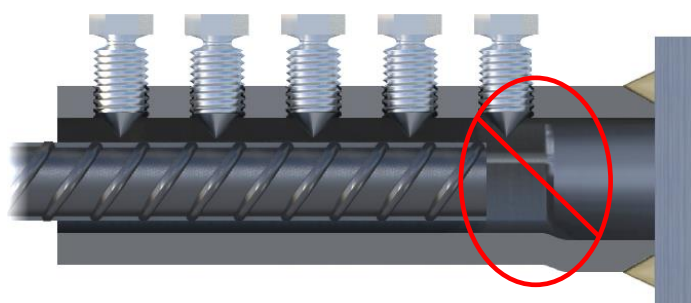


FIGURE 3: **Incorrect** Rebar Insertion Depth

Using an **impact wrench** and a **socket "S"**, per Chart 1 on page 2, tighten the twist-off screws starting **at the end** of the connector furthest away from the weld working your way **toward the weld** at the structural steel. Tighten each screw until the head of the screw **twists off**. (See Chart 1 for approximate twist-off torque)

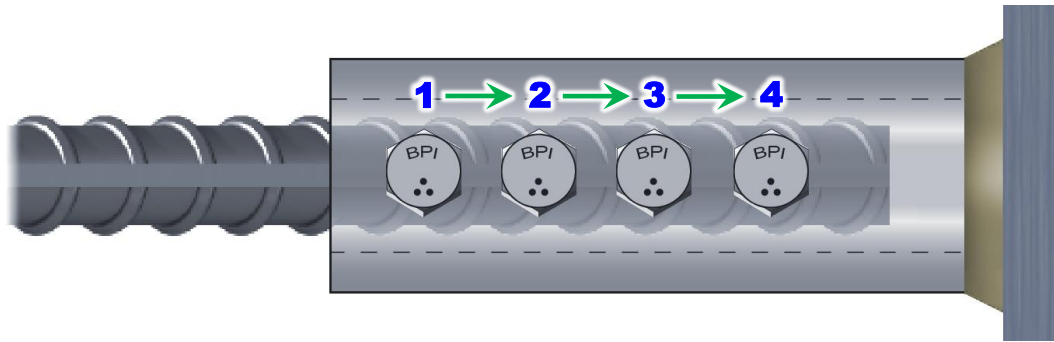


FIGURE 3: **Correct** Tightening Order (#7 shown, other sizes similar)

DO NOT USE THESE STRUCTURAL CONNECTORS IN CONJUNCTION WITH REBAR WHICH IS LARGER OR SMALLER THAN THE INTENDED BAR SIZE. **KEEP STRUCTURAL CONNECTORS CLEAN AND KEEP THREADS RUST FREE, PER FIGURE 5. STORE CONNECTORS IN A CLEAN, DRY PLACE UNTIL READY TO INSTALL. RUST IN THE THREADS PRIOR TO ASSEMBLY, PER FIGURE 6, IS UNACCEPTABLE BECAUSE IT COULD RESULT IN LOWER PERFORMANCE OF THE ASSEMBLED CONNECTOR.**

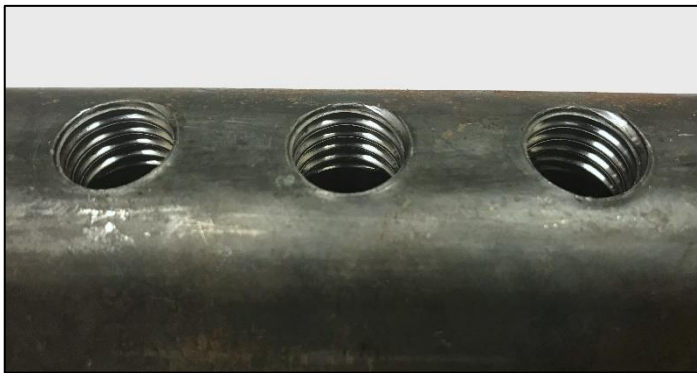


FIGURE 5: Clean **Acceptable** Connector

FIGURE 6: **Unacceptable** Rust in Connector Threads

CHART 1

REBAR SIZE US [metric/CAN]	APPROXIMATE STRUCTURAL CONNECTOR LENGTH "L" (in.)	WELD BEVEL SIZE "W" (in.)	MINIMUM REBAR INSERTION LENGTH "I" (in.)	NUMBER OF SCREWS PER STR. CONNECTOR	IMPACT SOCKET SIZE "S"	AVERAGE SCREW TWIST-OFF TORQUE "T" (ft-lb)	MINIMUM IMPACT WRENCH WORKING TORQUE (ft-lb)
#4 [12/10M]	3 1/8	3/16	2 1/2	2	1/2	60	250
#5 [16/15M]	4 1/8	1/4	3 1/2	3	1/2	60	250
#6 [20/20M]	5 3/8	1/4	4 1/2	4	1/2	60	250
#7 [22]	6 3/8	5/16	5 3/8	4	5/8	105	500
#8 [25/25M]	7 7/8	3/8	6 1/2	5	5/8	105	500
#9 [28/30M]	8	7/16	6 7/8	4	3/4	215	750
#10 [32]	9 1/2	1/2	8 1/4	5	3/4	215	750
#11 [36]	11 1/8	9/16	9 1/2	6	3/4	215	750

▼ Example of suitable pneumatic impact wrench is Ingersoll Rand, IR 261

Please direct all assembly questions to BarSplice Products, Inc.

CAUTIONS AND SUGGESTIONS

1. In all cases, consider your own **personal safety**. Before beginning, make sure the equipment is functioning and in good working order. Ensure that you are securely positioned and that you will not slip or fall during installation.
2. Weld quality, integrity and inspection are the responsibility of others. Use only qualified welders and weld procedures in accordance with AWS D1.1. (electrode E7018, E7026 or equivalent for low carbon steel, grades 1018 or 1026)
3. Follow the torque order described. Do not use any other torquing order.
4. For **best performance** and **ease of installation**, use a high quality $\frac{3}{4}$ inch drive **pneumatic impact wrench** (▼such as Ingersoll Rand IR 261) and suitable impact socket. Make sure the impact wrench is rated to achieve at least the minimum impact wrench working torque specified in **CHART 1** to avoid stalling. The **air supply** hose and fittings should have a minimum inside diameter of $\frac{1}{2}$ **inch**. The towable air compressor should be large enough to provide **100 psi** (7 bar) gauge pressure & deliver a minimum air flow at load of **45 cfm**.
5. It is **NOT** recommended to use a battery powered or electric impact wrench of any size, make or model.
6. Each screw should normally take **4 – 8 seconds** for the head to twist-off. If each screw takes more than 10 seconds to twist-off, then there is either a restriction preventing enough air flow to reach the impact wrench, or the impact wrench is worn out/undersized and needs to be serviced/replaced. Examples of restrictions are the air line is too small, underrated air compressor, gauge pressure at air compressor set too low, hose fittings too small, underrated impact wrench, outside temperature too low for air compressor or impact wrench to function properly.
7. **DO NOT** use an open-ended wrench or an adjustable wrench because of the risk of rounding-out the hexagon head prior to reaching the torque needed to twist off the head.
8. Prior to assembly, straighten excessively bent rebar ends so that proper wedge contact is made between rebar and coupler. BAR ENDS should be straight to within $\frac{1}{8}$ inch in 18 inches. For curved rebar with a diameter that exceeds 54 feet, a bar end straightness check is not necessary. If needed, grind-off large shear lips that prevent proper insertion of rebar into structural connector.
9. Replace missing screws immediately with BPI special screws only. **DO NOT ALLOW THREADED HOLES TO RUST.**
10. If bars are corroded, removal of rust/corrosion on the bar ends must be performed to the same degree as that required to bond with concrete prior to installing the Zap coupler. Testing of old or severely corroded bars is recommended to ensure the integrity of the adjoining bars and compliance to design requirements. Performance statements of Zap Screwlok Structural Connectors are based upon the use of ASTM **A615 or A706** Grade 60 rebar.
11. **DO NOT ATTEMPT TO EPOXY COAT OR HOT-DIP GALVANIZE AN UNCOATED ZAP PRODUCT IN ANY WAY. DO NOT ALLOW ABRASIVE BLAST MATERIAL TO COME INTO CONTACT WITH UNASSEMBLED THREADS.**

INSTALLATION INSTRUCTIONS FOR No. 14 & 18 ZAP SCREWLOK STRUCTURAL CONNECTORS ON GRADE 60 REBAR [U.S. METRIC GRADE 420]

Place the **No. 14 or 18 ZAP SCREWLOK STRUCTURAL CONNECTOR** against the structural steel member making sure it is flat against the surface. Before welding, ensure the surface of the structural member is clean and free from any coatings or debris in the entire area that will be covered by the weld. Using an appropriate electrode for low carbon steel, grades 1018 or 1026 (**E7018**, **E7026** or equivalent), fillet weld the entire circumference of the connector using weld bevel size "W" per Chart 1 on page 2. If desired, the connector may be tack welded in place before completing the entire weld. (Welding to conform to AWS D1.1, Structural Welding Code, full penetration, bevel groove)

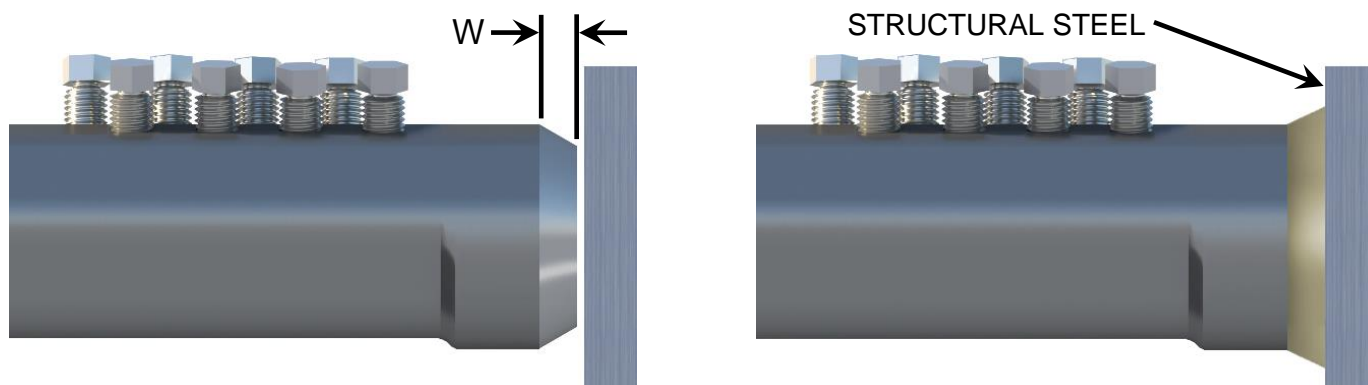


FIGURE 1: Structural Connector, Before and After Weld

Slide the rebar into the connector at least the **Minimum Insertion Length "I"** per Figure 2 and Chart 1. Alternatively, the bar can be inserted until it contacts the structural steel member. Do not under-insert, as shown in Figure 3. If desired, measure and mark the rebar before inserting it into the connector per Figure 2.

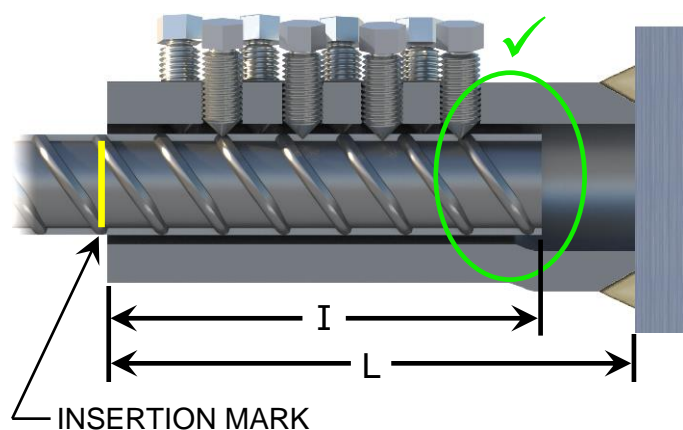


FIGURE 2: **Correct** Rebar Insertion Depth

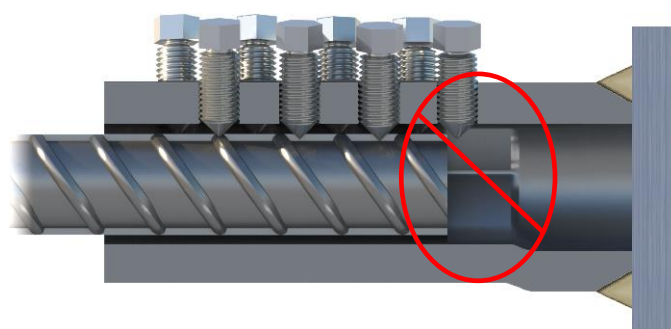


FIGURE 3: **Incorrect** Rebar Insertion Depth

Using an **impact wrench** and a **socket "S"**, per Chart 1 on page 2, tighten the twist-off screws starting **at the end** of the connector furthest away from the weld working your way **down one row toward the weld** at the structural steel. Tighten each screw until the head of the screw **twists off**. (See Chart 1 for approximate twist-off torque) After all the heads have been twisted off on the first row, repeat the procedure down the second row, starting at the end and working your way toward the weld at the structural steel.

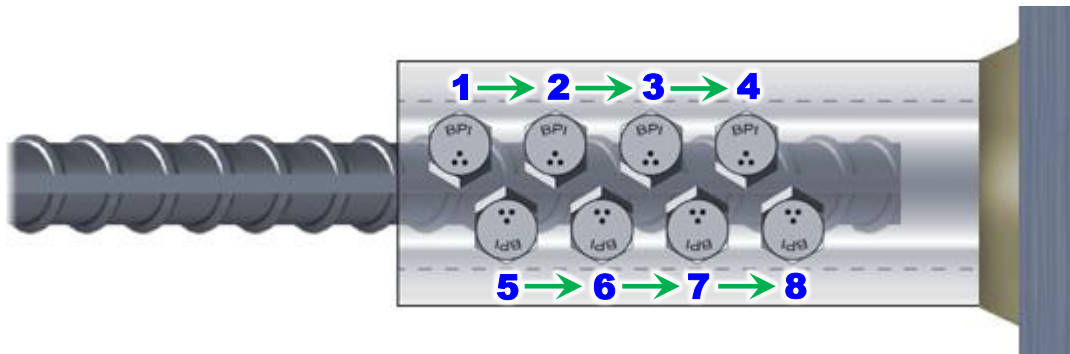


FIGURE 3: **Correct** Tightening Order (#14 shown, #18 similar)

DO NOT USE THESE STRUCTURAL CONNECTORS IN CONJUNCTION WITH REBAR WHICH IS LARGER OR SMALLER THAN THE INTENDED BAR SIZE. **KEEP STRUCTURAL CONNECTORS CLEAN AND KEEP THREADS RUST FREE, PER FIGURE 5. STORE CONNECTORS IN A CLEAN, DRY PLACE UNTIL READY TO INSTALL. RUST IN THE THREADS PRIOR TO ASSEMBLY, PER FIGURE 6, IS UNACCEPTABLE BECAUSE IT COULD RESULT IN LOWER PERFORMANCE OF THE ASSEMBLED CONNECTOR.**



FIGURE 5: Clean **Acceptable** Connector

FIGURE 6: **Unacceptable** Rust in Connector Threads

CHART 1

REBAR SIZE US [metric]	APPROXIMATE STRUCTURAL CONNECTOR LENGTH "L" (in.)	WELD BEVEL SIZE "W" (in.)	MINIMUM REBAR INSERTION LENGTH "I" (in.)	NUMBER OF SCREWS PER STR. CONNECTOR	IMPACT SOCKET SIZE "S"	AVERAGE SCREW TWIST-OFF TORQUE "T" (ft-lb)	MINIMUM IMPACT WRENCH WORKING TORQUE (ft-lb)
#14 [43]	9 3/4	11/16	7 1/2	8	3/4	350	1000
#18 [57]	15 3/8	7/8	12	16	3/4	350	1000

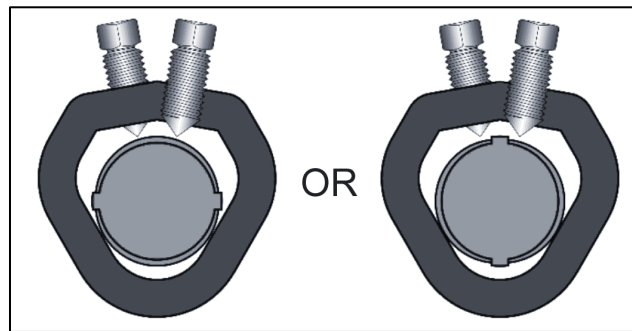
▼ Example of suitable pneumatic impact wrench is Ingersoll Rand, IR 290

Please direct all assembly questions to BarSplice Products, Inc.

CAUTIONS AND SUGGESTIONS

1. In all cases, consider your own **personal safety**. Before beginning, make sure the equipment is functioning and in good working order. Ensure that you are securely positioned and that you will not slip or fall during installation.
2. Weld quality, integrity and inspection are the responsibility of others. Use only qualified welders and weld procedures in accordance with AWS D1.1. (electrode E7018, E7026 or equivalent for low carbon steel, grades 1018 or 1026)
3. For best installation and performance, try to adjust the orientation of the structural connector or rebar so that the rebar deformations are in full bearing contact with the wedge shape of the connector body, opposite of the screws.

PREFERRED REBAR ORIENTATION



4. Follow the torque order described. Do not use any other torquing order.
5. For **best performance** and **ease of installation**, use a high quality 1-inch drive **pneumatic impact wrench** (▼ such as Ingersoll Rand IR 290) and suitable impact socket. Make sure the impact wrench is rated to achieve at least the minimum impact wrench working torque specified in **CHART 1** to avoid stalling. The **air supply** hose and fittings should have an inside diameter of **¾ inch or 1 inch**. The towable air compressor should be large enough to provide **100 psi (7 bar)** gauge pressure & deliver a minimum air flow at load of **60 cfm**.
6. It is **NOT** recommended to use a battery powered or electric impact wrench of any size, make or model.
7. Each screw should normally take **4 – 8 seconds** for the head to twist-off. If each screw takes more than 10 seconds to twist-off, then there is either a restriction preventing enough air flow to reach the impact wrench, or the impact wrench is worn out/undersized and needs to be serviced/replaced. Examples of restrictions are the air line is too small, underrated air compressor, gauge pressure at air compressor set too low, hose fittings too small, underrated impact wrench, outside temperature too low for air compressor or impact wrench to function properly.
8. **DO NOT** use an open-ended wrench or an adjustable wrench because of the risk of rounding-out the hexagon head prior to reaching the torque needed to twist off the head.
9. Prior to assembly, straighten excessively bent rebar ends so that proper wedge contact is made between rebar and coupler. BAR ENDS should be straight to within ¼ inch in 18 inches. For curved rebar with a diameter that exceeds 54 feet, a bar end straightness check is not necessary. If needed, grind-off large shear lips that prevent proper insertion of rebar into structural connector.
10. Replace missing screws immediately with BPI special screws only. **DO NOT ALLOW THREADED HOLES TO RUST.**
11. If bars are corroded, removal of rust/corrosion on the bar ends must be performed to the same degree as that required to bond with concrete prior to installing the Zap coupler. Testing of old or severely corroded bars is recommended to ensure the integrity of the adjoining bars and compliance to design requirements. Performance statements of Zap Screwlok Structural Connectors are based upon the use of ASTM **A615 or A706** Grade 60 rebar.
12. **DO NOT ATTEMPT TO EPOXY COAT OR HOT-DIP GALVANIZE AN UNCOATED ZAP PRODUCT IN ANY WAY. DO NOT ALLOW ABRASIVE BLAST MATERIAL TO COME INTO CONTACT WITH UNASSEMBLED THREADS.**

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