



User Instruction Manual Concrete Bolt Anchorage Connector

This manual is intended to meet the Manufacturer's Instructions as required by ANSI Z359.1 and ANSI A10.14, and should be used as part of an employee training program as required by OSHA.



WARNING: This product is part of a personal fall arrest, restraint, work positioning, personnel riding, or rescue system. The user must follow the manufacturer's instructions for each component of the system. These instructions must be provided to the user of this equipment. The user must read and understand these instructions before using this equipment. Manufacturer's instructions must be followed for proper use and maintenance of this equipment. Alterations or misuse of this equipment, or failure to follow these instructions, may result in serious injury or death.

IMPORTANT: If you have questions on the use, care, or suitability of this equipment for your application, contact DBI/SALA.

IMPORTANT: Record the product identification information from the ID label in the inspection and maintenance log in section 9.0 of this manual.

DESCRIPTION

2104560: Alloy steel anchor bolt, stainless steel D-ring bracket, forged steel D-ring. See Figure 1.

1.0 APPLICATIONS

1.1 PURPOSE: The Concrete Bolt Anchorage Connector is designed for use as an attachment of a personal fall arrest, restraint, work positioning, personnel riding, or rescue system to an anchorage. See Figure 2 for application illustrations.

A. PERSONAL FALL ARREST: The Concrete Bolt Anchorage Connector is used as a component of a personal fall arrest system to protect the user in the event of a fall. Personal fall arrest systems typically include a full body harness and a connecting subsystem (energy absorbing lanyard). Maximum permissible free fall is six feet.

B. RESTRAINT: The Concrete Bolt Anchorage Connector is used as a component of a restraint system to prevent the user from reaching a fall hazard. Restraint systems typically include a full body harness and a lanyard or restraint line. No vertical free fall is permitted.

C. WORK POSITIONING: The Concrete Bolt Anchorage Connector is used as a component of a work positioning system to support the user at a work position. Work positioning systems typically include a full body harness, positioning lanyard, and a back-up personal fall arrest system. Maximum permissible free fall is two feet.

D. PERSONNEL RIDING: The Concrete Bolt Anchorage Connector is used as a component of a personnel riding system to suspend or transport the user vertically. Personnel riding systems typically include a full body harness, boatswain's chair or seat board, and a back-up personal fall arrest system. No vertical free fall is permitted.

Figure 1 - Concrete Bolt Anchorage Connector

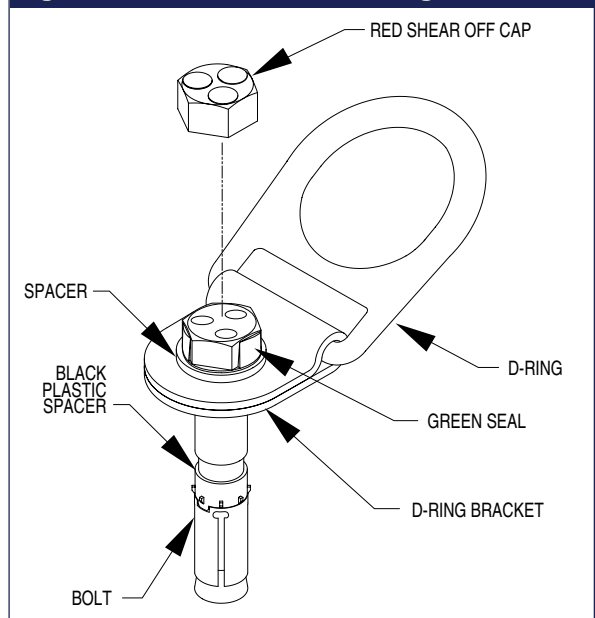
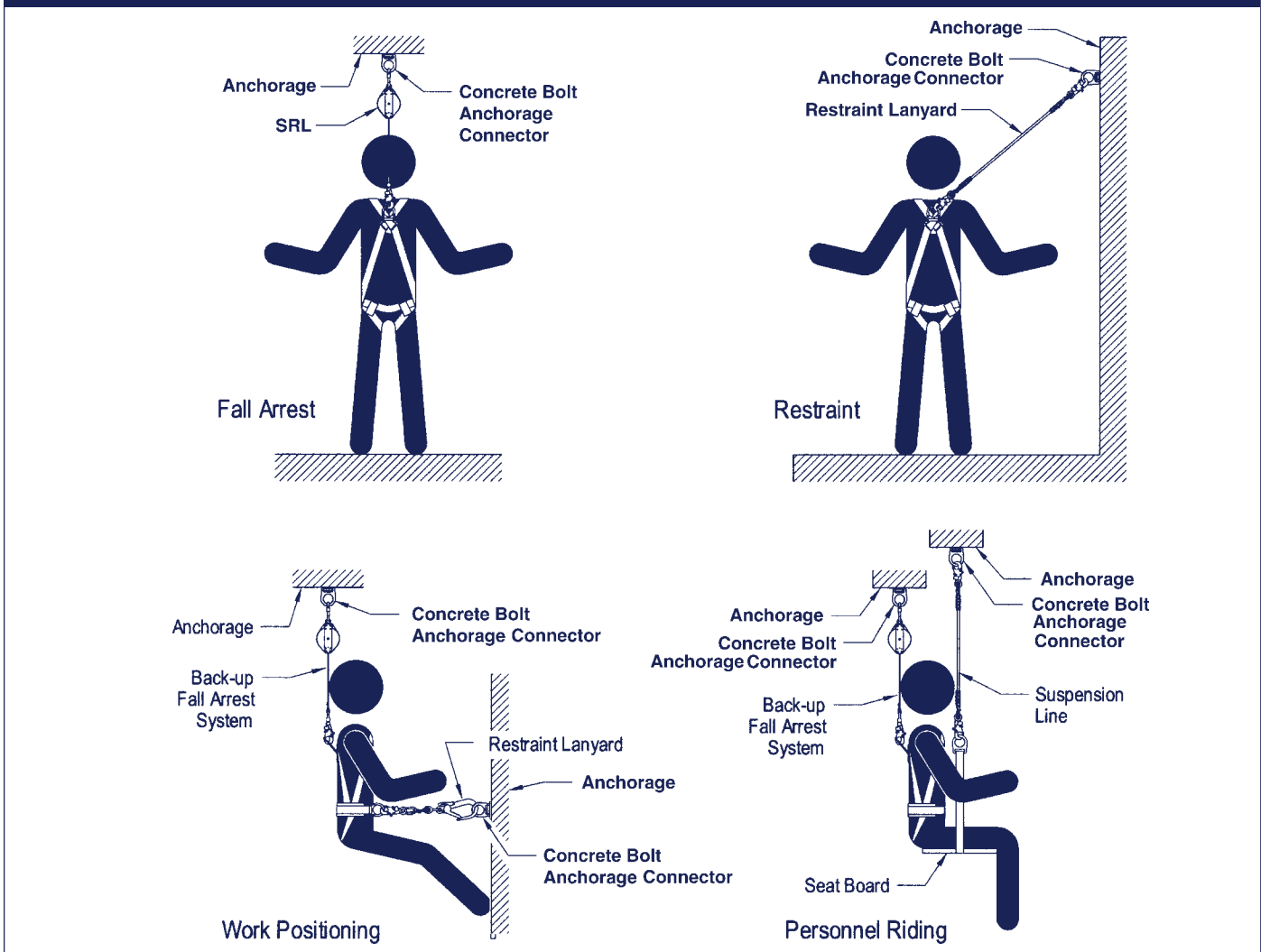


Figure 2 - Applications



E. RESCUE: The Concrete Bolt Anchorage Connector is used as a component of a rescue system. Rescue systems are configured depending on the type of rescue. No vertical free fall is permitted.

WARNING: Do not use the Concrete Bolt Anchorage Connector for applications not addressed in this manual.

1.2 LIMITATIONS: Consider the following application limitations before using this equipment:

- A. CAPACITY:** The Concrete Bolt Anchorage Connector is designed for use by persons with a combined weight (clothing, tools, etc.) of no more than 310 lbs. No more than one personal protective system may be connected at one time. **Note: For emergency rescues it may be acceptable to connect more than one system if the anchorage will support the anticipated loads.**
- B. FREE FALL:** Personal fall arrest systems used with this equipment must be rigged to limit the free fall to six feet (ANSI Z359.1) or five feet (ANSI A10.14). See the personal fall arrest system manufacturer's instructions for more information. Restraint systems must be rigged so that no vertical free fall is possible. Work positioning systems must be rigged so that free fall is limited to two feet or less. Personnel riding systems must be rigged so that no vertical free fall is possible. Rescue systems must be rigged so that no vertical free fall is possible.
- C. FALL CLEARANCE:** There must be sufficient clearance below the user to arrest a fall before the user strikes the ground or other obstruction. The clearance required is dependent on the following factors:
 - Deceleration distance
 - Free fall distance
 - Worker height
 - Movement of harness attachment element
 - Elevation of D-ring Anchorage Connector
 - Connecting subsystem length

See the personal fall arrest system manufacturer's instructions for more information.

D. SWING FALLS: Swing falls occur when the anchorage point is not directly above the point where a fall occurs. See Figure 3. The force of striking an object in a swing fall may cause serious injury or death. Minimize swing falls by working as close to the anchorage point as possible. Do not permit a swing fall if injury could occur. Swing falls will significantly increase the clearance required when a self retracting lifeline or other variable length connecting subsystem is used.

E. ENVIRONMENTAL HAZARDS: Use of this equipment in areas with environmental hazards may require additional precautions to prevent injury to the user or damage to the equipment. Hazards may include, but are not limited to: heat, chemicals, corrosive environments, high voltage power lines, gases, moving machinery, and sharp edges. Contact DBI/SALA if you have questions about using this equipment where environmental hazards exist.

F. TRAINING: This equipment must be installed and used by persons trained in its correct application and use. See section 4.0.

1.3 APPLICABLE STANDARDS: Refer to national standards, including ANSI Z359.1 and ANSI A10.14; and local, state, and federal requirements for more information on personal fall arrest systems and associated components.

2.0 SYSTEM REQUIREMENTS

2.1 COMPATIBILITY OF COMPONENTS: DBI/SALA equipment is designed for use with DBI/SALA approved components and subsystems only. Substitutions or replacements made with non-approved components or subsystems may jeopardize compatibility of equipment and may effect the safety and reliability of the complete system.

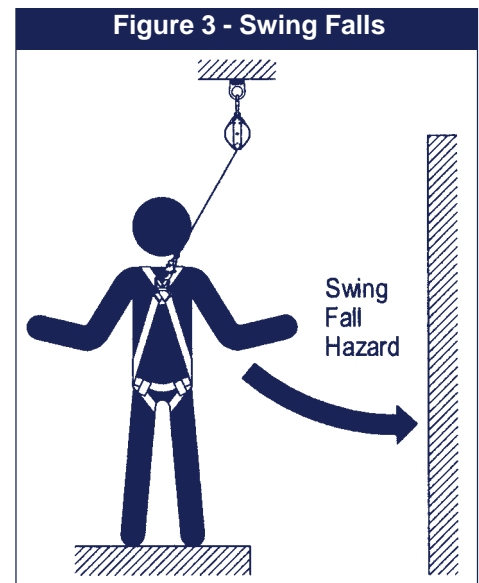
2.2 COMPATIBILITY OF CONNECTORS: Connectors are considered to be compatible with connecting elements when they have been designed to work together in such a way that their sizes and shapes do not cause their gate mechanisms to inadvertently open regardless of how they become oriented. Contact DBI/SALA if you have any questions about compatibility.

Connectors (hooks, carabiners, and D-rings) must be capable of supporting at least 5,000 lbs. (22.2 kN). Connectors must be compatible with the anchorage or other system components. Do not use equipment that is not compatible. Non-compatible connectors may unintentionally disengage. See Figure 4. Connectors must be compatible in size, shape, and strength. Self-locking snap hooks and carabiners are required by ANSI Z359.1 and OSHA.

2.3 MAKING CONNECTIONS: Only use self-locking snap hooks and carabiners with this equipment. Only use connectors that are suitable to each application. Ensure all connections are compatible in size, shape and strength. Do not use equipment that is not compatible. Ensure all connectors are fully closed and locked.

DBI/SALA connectors (snap hooks and carabiners) are designed to be used only as specified in each product's user's instructions. See Figure 5 for inappropriate connections. DBI/SALA snap hooks and carabiners should not be connected:

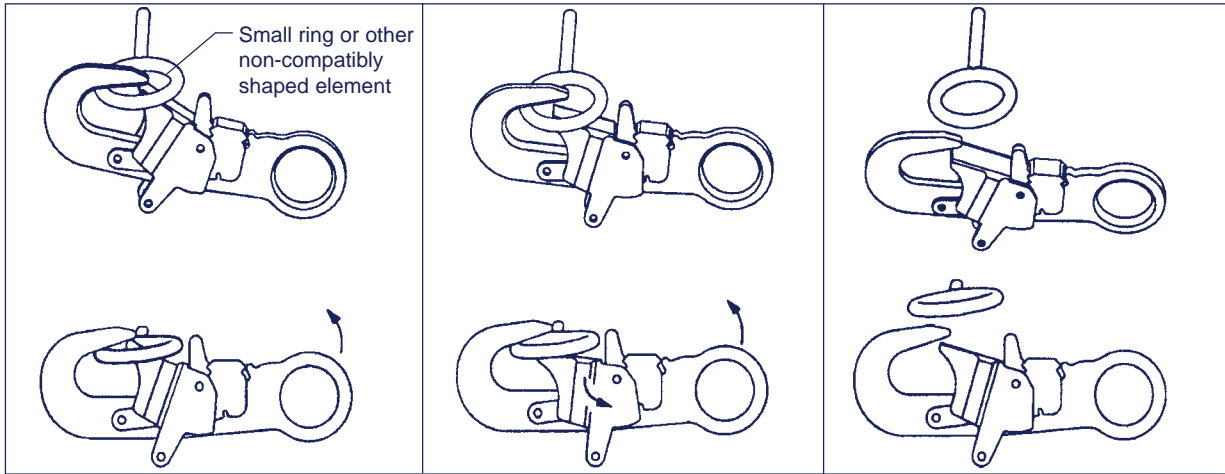
- A. To a D-ring to which another connector is attached.
- B. In a manner that would result in a load on the gate.



NOTE: Large throat opening snap hooks should not be connected to standard size D-rings or similar objects which will result in a load on the gate if the hook or D-ring twists or rotates. Large throat snap hooks are designed for use on fixed structural elements such as rebar or cross members that are not shaped in a way that can capture the gate of the hook.

Figure 4 - Unintentional Disengagement (Roll-out)

If the connecting element that a snap hook (shown) or carabiner attaches to is undersized or irregular in shape, a situation could occur where the connecting element applies a force to the gate of the snap hook or carabiner. This force may cause the gate (of either a self-locking or a non-locking snap hook) to open, allowing the snap hook or carabiner to disengage from the connecting point.



1. Force is applied to the snap hook.

2. The gate presses against the connecting ring.

3. The gate opens allowing the snap hook to slip off.

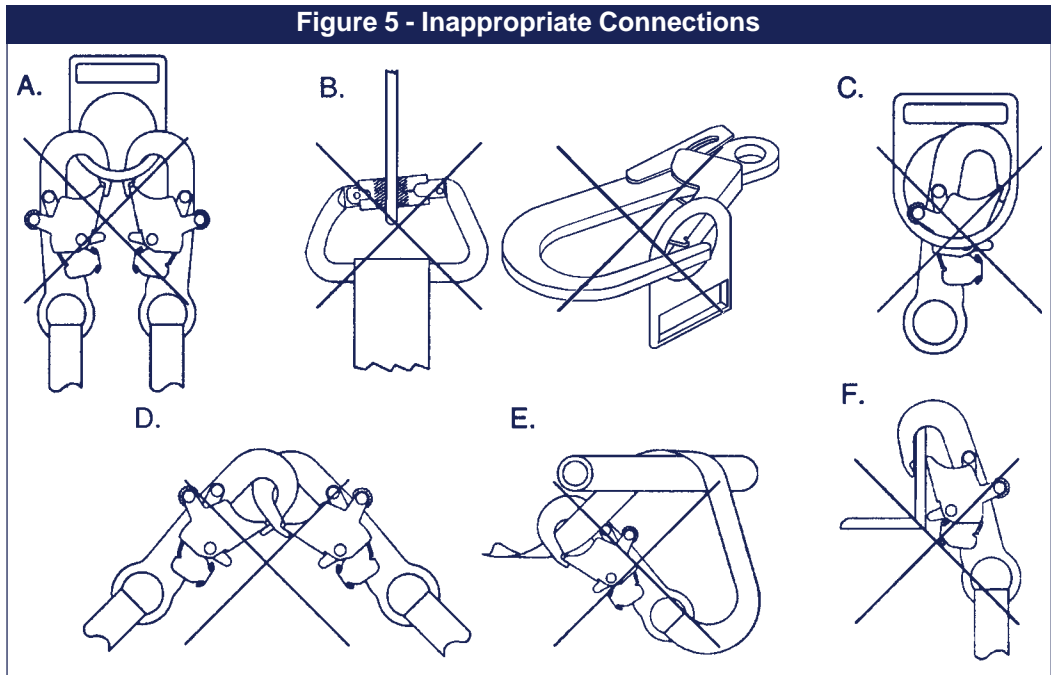
C. In a false engagement, where features that protrude from the snap hook or carabiner catch on the anchor and without visual confirmation seems to be fully engaged to the anchor point.

D. To each other.

E. Directly to webbing or rope lanyard or tie-back (unless the manufacturer's instructions for both the lanyard and connector specifically allows such a connection).

F. To any object which is shaped or dimensioned such that the snap hook or carabiner will not close and lock, or that roll-out could occur.

Figure 5 - Inappropriate Connections



2.4 PERSONAL FALL ARREST SYSTEM: Personal fall arrest systems used with this equipment must meet applicable state, federal, OSHA, and ANSI requirements. A full body harness must be worn when this equipment is used as a component of a personal fall arrest system. As required by OSHA, the personal fall arrest system must be capable of arresting the user's fall with a maximum arresting force of 1,800 lbs., and limit the free fall to six feet or less. If the maximum free fall distance must be exceeded, the employer must document, based on test data, that the maximum arresting force will not be exceeded, and the personal fall arrest system will function properly.

When a free fall greater than six feet, and up to a maximum of twelve feet is possible, DBI/SALA recommends using a personal fall arrest system incorporating a DBI/SALA Force2 Energy Absorbing Lanyard. DBI/SALA has

performed testing using the Force2 Energy Absorbing Lanyard in free falls up to twelve feet to ensure the maximum arresting force does not exceed 1,800 lbs., and the system functions properly. The results of these tests are listed in the user instruction manual provided with Force2 Energy Absorbing Lanyards.

2.5 RESTRAINT SYSTEM: Restraint systems used with this equipment must meet state, federal, OSHA, and ANSI requirements. See ANSI A10.14 for more information on restraint systems.

2.6 ANCHORAGE STRENGTH: The anchorage strength required is dependent on the application. Following are anchorage strength requirements for specific applications:

- A. FALL ARREST:** The structure to which the Concrete Bolt Anchorage Connector (CBAC) is attached must sustain static loads applied in the directions permitted by the fall arrest system of at least: 3,600 lbs. with certification of a qualified person, or 5,000 lbs. without certification. See ANSI Z359.1 for certification definition. When more than one personal fall arrest system is attached to an anchorage, the strengths stated above must be multiplied by the number of personal fall arrest systems attached to the anchorage. From OSHA 1926.500 and 1910.66: Anchorages used for attachment of a personal fall arrest system shall be independent of any anchorage being used to support or suspend platforms, and must support at least 5,000 lbs. per user attached; or be designed, installed, and used as part of a complete personal fall arrest system which maintains a safety factor of at least two, and is supervised by a qualified person.
- B. RESTRAINT:** The structure to which the CBAC is attached must sustain static loads applied in the directions permitted by the restraint system of at least 3,000 lbs. When more than one restraint system is attached to an anchorage, the strengths stated above must be multiplied by the number of restraint systems attached to the anchorage.
- C. WORK POSITIONING:** The structure to which the CBAC is attached must sustain static loads applied in the directions permitted by the work positioning system of at least 3,000 lbs., or twice the potential impact load, whichever is greater. When more than one work positioning system is attached to an anchorage, the strengths stated above must be multiplied by the number of work positioning systems attached to the anchorage.
- D. PERSONNEL RIDING:** The structure to which the CBAC is attached must sustain static loads applied in the directions permitted by the personnel riding system of at least 2,500 lbs. When more than one personnel riding system is attached to an anchorage, the strengths stated above must be multiplied by the number of personnel riding systems attached to the anchorage.
- E. RESCUE:** The structure to which the CBAC is attached must sustain static loads applied in the directions permitted by the rescue system of at least 2,500 lbs. When more than one rescue system is attached to an anchorage, the strengths stated above must be multiplied by the number of rescue systems attached to the anchorage.

WARNING: Mark or label the Concrete Bolt Anchorage Connector with the intended application. Use of this equipment for an application that does not meet the anchorage strength requirements stated above may result in serious injury or death.

3.0 INSTALLATION AND USE

WARNING: Do not alter or intentionally misuse this equipment. Consult DBI/SALA when using this equipment in combination with components or subsystems other than those described in this manual. Some subsystem and component combinations may interfere with the operation of this equipment. Use caution when using this equipment around moving machinery, electrical and chemical hazards, and sharp edges.

WARNING: Consult with your doctor if there is reason to doubt your fitness to safely absorb the shock from a fall arrest. Age and fitness seriously affect a worker's ability to withstand falls. Pregnant women or minors must not use the DBI/SALA Concrete Bolt Anchorage Connector.

3.1 BEFORE EACH USE of this equipment inspect it according to section 5.0 of this manual.

3.2 PLAN your system before installation. Consider all factors that will affect your safety during use of this equipment. The following list gives important points to consider when planning your system:

- A. ANCHORAGE:** Select a rigid anchorage capable of supporting the loads specified in section 2.6.

- B. SHARP EDGES:** Avoid working where system components may be in contact with, or abrade against, unprotected sharp edges.
- C. AFTER A FALL:** Components which have been subjected to the forces of arresting a fall must be removed from service and destroyed.
- D. RESCUE:** The employer must have a rescue plan when using this equipment. The employer must have the ability to perform a rescue quickly and safely.

3.3 INSTALLATION REQUIREMENTS:

A. CONCRETE BOLT ANCHORAGE CONNECTOR (CBAC)

LOCATION: Select a location on a suitable strength anchorage that will provide overall safety and proper loading as shown in Figure 6. The concrete must have a minimum compressive strength of 3000 psi. The CBAC is not intended for use in lightweight concrete, hollow block, brick, grout, or stone. The concrete base material must be at least 6 1/4-inches thick.

The mounting hole for the CBAC must be located at least 15 inches from any free edge and far enough away from any obstruction or feature that will keep the D-ring from rotating freely when a personal fall arrest system is attached to it. When mounting more than one CBAC is mounted on an anchorage, they must be separated by at least 10 inches. Drill bits used to create the mounting holes must conform to ANSI B212.15. See Figure 7.

B. INSTALLATION:

- Step 1.** Use a rotary hammer and 11/16-in., 3/4-in., or 18-mm bit to drill a hole to a depth of 4 1/8 in.
- Step 2.** Clean the hole using a blow-out bulb or compressed air. The hole must be free of debris for the CBAC to develop full strength.
- Step 3.** Use a hammer to drive the CBAC into the hole. The CBAC must be seated firmly against the D-ring flange. Do not expand the anchor bolt by hand before installation.
- Step 4.** Tighten the bolt using a 15/16-in. wrench. The red cap will shear off at the appropriate torque and the green seal on the bolt head indicates that the anchor has tightened properly. A torque wrench is not required for installation. When the red cap has sheared off the anchor, no further adjustment is necessary.

- C. REMOVAL:** The CBAC can be removed by loosening the bolt with a 3/4-in. wrench. Parts of the CBAC bolt will remain in the hole permanently. After removal, the hole should be filled with grout or sealant to prevent reuse of the hole. The D-ring bracket and flanged spacer (see Figure 1) may be reused if they have not been subjected to a fall force and the meet the inspection criteria in Section 5.2. The bolt cannot be reused and must be destroyed after removal.

- D. REUSE:** The flanged spacer and D-ring components may be reused if they have not been subjected to a fall force. Refer to the previous section for removal instructions. Assemble the CBAC using DBI/SALA supplied parts as shown in Figure 8. The components should be assembled on the bolt in the following order: flat washer, D-ring bracket, flanged spacer, black plastic spacer, expansion sleeve, cone nut. The D-ring bracket must fit over the flanged spacer and rotate freely. Two tabs on the plastic spacer must engage the matching slots on the expansion sleeve. Do not expand the anchor bolt by hand prior to installation.

Figure 6 - Loading the Anchorage Connector

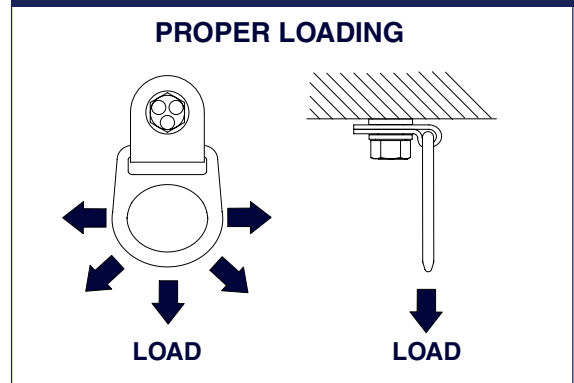
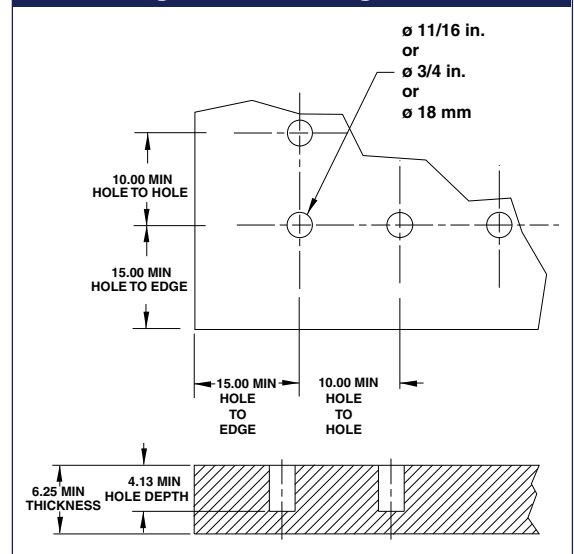


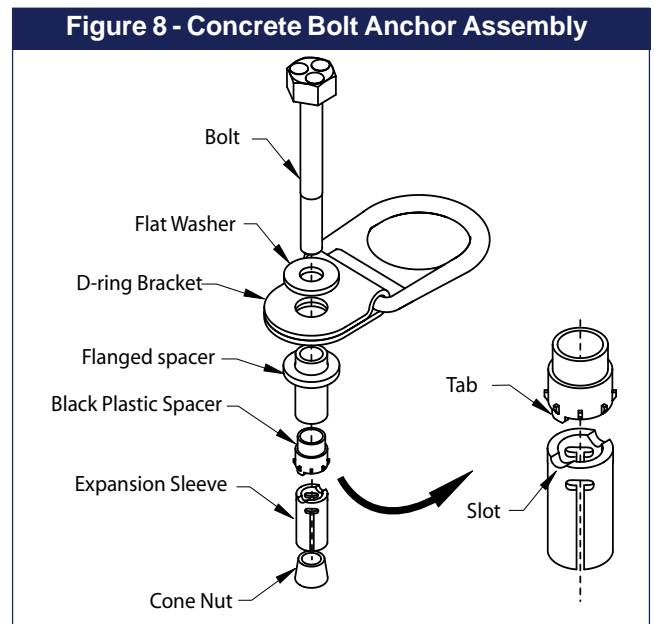
Figure 7 - Mounting Holes



3.4 MAKING CONNECTIONS: When using a hook to connect to the Concrete Bolt Anchorage Connector (CBAC), ensure roll-out cannot occur. Roll-out occurs when interference between the hook and mating connector causes the hook gate to unintentionally open and release. Self locking snap hooks and carabiners should be used to reduce the possibility of roll-out. Do not use hooks or connectors that will not completely close over the attachment object. See subsystem manufacturer's instructions for information on connecting to the CBAC.

4.0 TRAINING

4.1 It is the responsibility of the user and the purchaser of this equipment to assure that they are familiar with these instructions, trained in the correct care and use of, and are aware of the operating characteristics, application limits, and the consequences of improper use of this equipment.



IMPORTANT: Training must be conducted without exposing the user to a fall hazard. Training should be repeated on a periodic basis.

5.0 INSPECTION

5.1 FREQUENCY:

- **Before Each Use** inspect the Concrete Bolt Anchorage Connector (CBAC) according to sections 5.2 and 5.3.
- **Formal Inspection:** A formal inspection of the CBAC and its connection to the structure must be performed at least annually by a competent person other than the user. The frequency of formal inspections should be based on conditions of use or exposure. See sections 5.2 and 5.3. Record the inspection results in the inspection and maintenance log in section 9.0.

5.2 INSPECTION STEPS:

- Step 1.** Inspect the torque seal. If the green seal on the bolt head is damaged or missing, the Concrete Bolt Anchorage Connector (CBAC) may not be properly installed or may have been tampered with. Any CBAC that shows signs of tampering must be removed from service. It may not be used for fall arrest, fall restraint, work positioning or rescue applications.
- Step 2.** Inspect the anchor for proper embedment. The D-ring flange must be seated firmly against the concrete.
- Step 3.** Inspect the D-ring for damage or corrosion. Inspect the D-ring for cracks or wear that may affect strength and operation.
- Step 4.** Inspect the D-ring bracket for damage or deformation. The bracket should swivel freely on the bolt. Inspect the bracket for cracks or wear that may affect strength and operation.
- Step 5.** Inspect the system components according to the manufacturer's instructions.
- Step 6.** Record the inspection results in the inspection log in section 9.0.

5.3 If inspection reveals an unsafe or defective condition, remove the Concrete Bolt Anchorage Connector from service and destroy it.

6.0 MAINTENANCE

- 6.1 Clean the Concrete Bolt Anchorage Connector with a mild soap solution. Excessive build-up of dirt may prevent the D-ring from swivelling.

7.0 SPECIFICATIONS

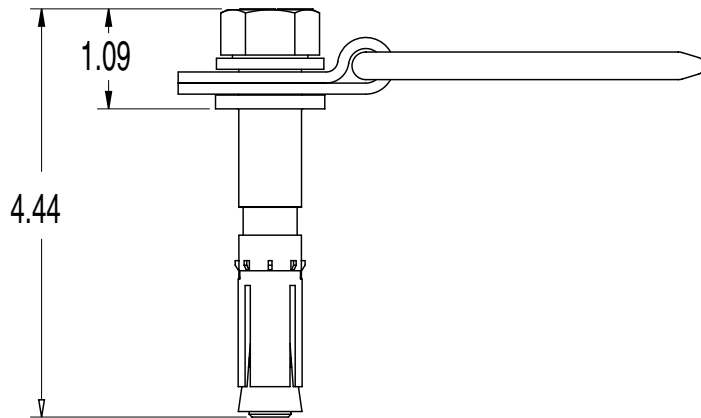
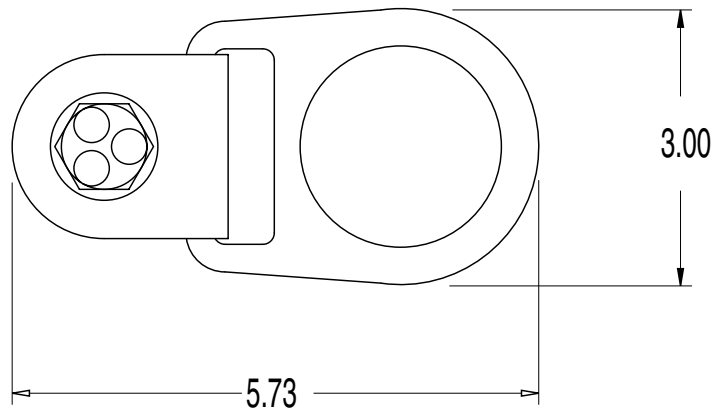
7.1 Materials:

D-ring Bracket Material: Stainless Steel

D-ring Material: Forged Alloy Steel

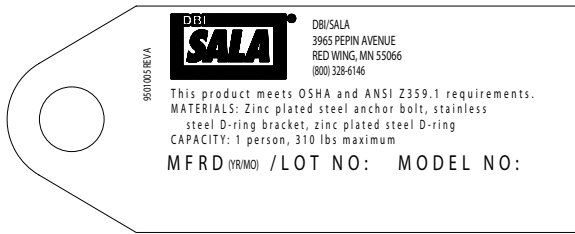
Anchor Bolt Material: Alloy Steel

7.2 Dimensions:

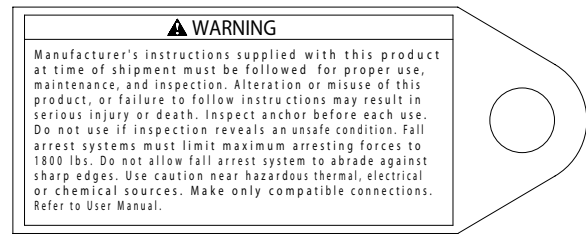


8.0 LABELING

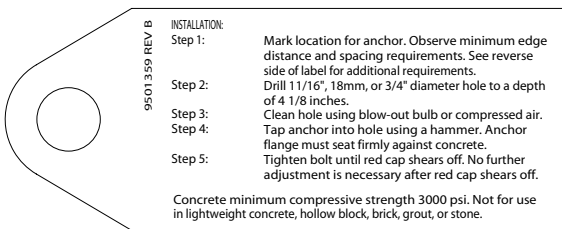
8.1 The following labels must be present and fully legible:



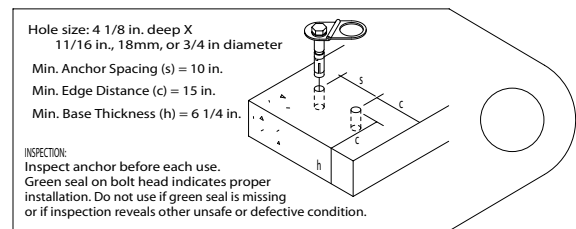
FRONT



BACK



FRONT



BACK

9.0 INSPECTION AND MAINTENANCE LOG

DATE OF MANUFACTURE: _____

MODEL NUMBER: _____

DATE PURCHASED: _____

INSPECTION DATE	INSPECTION ITEMS NOTED	CORRECTIVE ACTION	MAINTENANCE PERFORMED
Approved By: _____			
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