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SLEEVE-LOCK® GROUT SLEEVE MECHANICAL SPLICE SYSTEM FOR STEEL REINFORCING BARS IN CONCRETE

CSI Section: 03 21 00 Reinforcing Steel

1.0 RECOGNITION

The Dayton Superior D410 Sleeve-Lock® Grout Sleeve Mechanical Splice Systems recognized in this report have been evaluated for use to mechanically splice deformed steel reinforcing bars in concrete structural members. The structural properties of the Mechanical Splice Systems were evaluated for compliance with the following specifications:

- AASHTO LRFD Bridge Design Specifications, 8th Edition, September 2017
- AASHTO LRFD Bridge Construction Specifications, 3rd Edition, 2010

2.0 LIMITATIONS

Use of the Dayton Superior Sleeve-Lock® Grout Sleeve Mechanical Splice Systems recognized in this report is subject to the following limitations:

2.1 The D410 Sleeve-Lock® Grout Sleeve splices shall be installed in accordance with the applicable specifications, the manufacturer's instructions, and this report. In the event of a conflict, the more restrictive governs.

2.2 Splice locations and reinforcing bar placement shall comply with applicable specification requirements and be noted on plans approved by the owner (agency having jurisdiction).

2.3 The D410 Sleeve-Lock® Grout Sleeve splices shall be assembled with deformed steel reinforcing bars having a diagonal deformation pattern. Other reinforcing bar deformation patterns were not evaluated and are beyond the scope of this report.

2.4 Minimum concrete cover shall be in accordance with AASHTO LRFD Bridge Design Specifications Section 5.10.1. Concrete cover shall be measured from the outer surface of the splice system.

2.5 If bending of the reinforcing bar shall be necessary prior to being attached to the splice system, the bar shall be cold bent as set forth in Section 9.4.1 of AASHTO LRFD Bridge Construction Specifications.

2.6 Dayton Superior Mechanical Splice Systems recognized in this report consist of the Sleeve Lock (D410), which is produced in Easton, PA, and the grout (D490 or HP-12), which is produced in Kansas City, KS.

3.0 PRODUCT USE

3.1 General: The D410 Sleeve-Lock® Grout Sleeve is used to mechanically splice deformed steel reinforcing bars installed in concrete structural members.

The splices conform to AASHTO LRFD Bridge Design Specifications Section 5.5.3.4 for mechanical connections subject to repetitive loads with a constant-amplitude threshold greater than 1,000,000 cycles, and Section 5.10.8.4, full-mechanical connections providing not less than 125 percent of the specified yield strength of the reinforcing bar in tension and compression and slip less than 0.01 inch when tested in accordance with AASHTO LRFD Bridge Design Specifications Section 5.10.8.4.2b.

3.2 Design: The locations of splices shall be detailed on the plans and approved by the building official. Concrete cover and spacing shall be as required in AASHTO LRFD Bridge Design Specifications Section 5.10.1 and shall be measured from the outside of the splice system.

3.3 Installation: The D410 Splice Systems shall be installed in accordance with the AASHTO LRFD Bridge Design Specifications, this listing report, and the manufacturer's installation instructions. Where conflicts occur, the more restrictive shall govern. The manufacturer's installation instructions for the splicing systems are in the D410 Sleeve-Lock® Application Guide (07/13), which is available through the following link: ds_sleeve-lock_ag.pdf (daytonsuperior.com).

The reinforcing bars and grout sleeves shall be clean and free from rust, oils, dust, and other foreign material. In addition, all foreign material and water shall be removed from the sleeve. The steel reinforcing bars are inserted halfway into the sleeve, one from each end. The sleeve is then filled with the D490 or HP-12 Grout, which is allowed to cure, completing the connection. The sleeve may be cast into concrete elements and filled with grout at a later time through the grout ports on the sleeve. Each 50 lb (22.7 kg) grout bag requires a minimum of six pints (2.8 L) of water for plastic consistency and a maximum of up to seven pints (3.3 L) for flowable consistency. The D490 or HP-12 Grout has to be cured so that a minimum compressive strength of 12,000 psi (83 MPa) is achieved. Compressive strength tests have to be conducted to assure the grout compressive strength of 12,000 psi

(83 Mpa). Full reinforcement bar engagement shall be ensured. The reinforcement bar ends shall be placed up against the reinforcing bar stop of the sleeve.

3.3.1 Grout Testing: Grout strength shall be determined by testing 2-inch (50 mm) cube specimens in accordance with ASTM C109. The grout cubes shall be kept under job site conditions until the compressive strength testing.

3.4 Inspection: Inspection of the mechanical splices shall be provided in accordance with the requirements of the owner (agency having jurisdiction), as applicable. Where no inspection requirements are specified, inspections shall be in accordance with the AASHTO LRFD Bridge Construction Specifications. In addition to verifying the installation of steel reinforcing bar splices in accordance with this report, the grade and size of reinforcing bars, splice identification, reinforcing bar embedment length to splices, the position of splices, placement of reinforcing bar splices, as well as installation of the splices to the reinforcing bars, shall be verified.

4.0 PRODUCT DESCRIPTION

4.1 General: The Sleeve-Lock® system consists of the D410 Sleeve-Lock® Grout Sleeve and the D490 or HP-12 Grout.

4.2 D410 Sleeve-Lock® Grout Sleeve: The D410 Sleeve-Lock® Grout Sleeve is a ductile iron cast sleeve that accommodates steel reinforcing bars, sized No. 4 through No. 11 and No. 14, in order to form a mechanical connection. Sizes, dimensions, and configurations are provided in Table 1 and Figure 1 of this report. Section 3.3 of this report provides installation, testing, and inspection requirements.

The sleeves may be coated with epoxy or zinc (hot-dip galvanized). Epoxy coatings shall comply with and be applied in accordance with Section 9.2.2 of the AASHTO LRFD Bridge Construction Specifications and zinc hot-dip galvanized coating shall comply with ASTM A767. The zinc hot-dip galvanized coating has a matte gray finish. Coatings such as zinc electroplating conforming to the requirements of ASTM B633 have a bright silver or silver-gold finish and may be applied to sleeves. Coatings not complying with Section 2.5.2 of AASHTO LRFD Bridge Design Specifications are allowed but are not considered corrosion-resistant.

4.3 Grout: The D490 or HP-12 Grout shall be used with D410 Sleeve-Lock® Grout Sleeves. The grout shall comply with ASTM C1107 and shall be proportioned to achieve a minimum compressive strength of 12,000 psi (83 MPa) when tested in accordance with ASTM C109. Packaged in 50 pound (22.7 kg) bags, the grout has a shelf life of 12 months when stored unopened cool, dry area free of direct sunlight. Storage, preparation, placement, and information shall comply with the D410 Sleeve-Lock® Application Guide (07/13).

4.4 Steel Reinforcing Bars: Deformed steel reinforcing bars shall comply with ASTM A615 Grades 60 or ASTM A706 Grades 60 specifications. The reinforcing bars may be epoxy-coated in accordance with ASTM A934. The reinforcing bars shall have diagonal deformation patterns.

4.5 Concrete: The concrete materials, proportioning, placement, exposure, finishing, and curing shall comply with the contract documents, Section 5 of AASHTO LRFD Bridge Design Specifications, and Section 8 of the AASHTO LRFD Bridge Construction Specifications.

5.0 IDENTIFICATION

D410 Sleeve-Lock® Grout Sleeves are packaged with a label bearing the manufacturer's name (Dayton Superior Corporation), address, model (D410), size, product name, and listing report number (UEL-5017). D490 or HP-12 Grout is packaged with a label bearing the manufacturer's name (Dayton Superior Corporation), address, model (D490 or HP-12), product name, and listing report number (UEL-5017). The following IAPMO UES Mark of Conformity may also be used as shown below.

IAPMO UES UEL- 5017

6.0 SUBSTANTIATING DATA

6.1 Testing and analytical data in accordance with AASHTO LRFD Bridge Design Specifications.

6.2 Test reports are from laboratories in compliance with ISO/IEC 17025.

7.0 STATEMENT OF RECOGNITION

This listing report describes the results of research completed by IAPMO Uniform Evaluation Service on Dayton Superior Corporation D410 Sleeve-Lock® Grout Sleeve Mechanical Splice Systems for Reinforcing Bars to assess conformance to the specifications shown in Section 1.0 of this report, and serves as documentation of the product certification. Products are manufactured at locations noted in Section 2.6 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this listing report please visit www.uniform-es.org or email us at info@uniform-es.org

TABLE 1 – Dimensions of D410 Sleeve-Lock® Grout Sleeve and Grout Information

Bar Size	Sleeves per Bag of Grout[1]	Sleeve Dimensions (inches)				
		A	B	C	D	E
No. 4	46	9.5	1.26	0.87	2.14	4.63
No. 5	50					
No. 6	20	13.0	1.73	1.14	2.61	6.38
No. 7	21					
No. 8	12	16.5	2.01	1.42	2.89	8.07
No. 9	12					
No. 10	14	18.0	2.16	1.57	3.04	8.75
No. 11	12	19.5	2.32	1.73	3.32	9.52
No. 14	6	24.5	2.60	2.01	3.73	12.0

For SI: 1 inch = 25.4 mm

[1] The amounts are approximate and only include the grout within the sleeves.

FIGURE 1 – D410 Sleeve-Lock® Grout Sleeve Dimensions