

DIVISION: 03 00 00—CONCRETE
Section: 03 21 00—Reinforcing Steel

REPORT HOLDER:

DEXTRA MANUFACTURING CO., LTD.

EVALUATION SUBJECT:

ROLLTEC® MECHANICAL SPLICE SYSTEM FOR CONNECTING STEEL REINFORCING BARS IN CONCRETE

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012 and 2009 *International Building Code®* (IBC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)[†]

[†]The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Property evaluated:

Structural

2.0 USES

The Rolltec mechanical splice system is used as tension and compression mechanical splices of deformed steel reinforcing bars in reinforced concrete construction. The splice system complies with Section 25.5.7.1 of ACI 318-14 for the 2018 and 2015 IBC, and Section 12.14.3.2 of ACI 318 (-11 and -08) for the 2012 and 2009 IBC, as ACI 318 is referenced in IBC Section 1901.2. The mechanical splice system also complies with Type 1 and Type 2 mechanical splice requirements of Section 18.2.7.1 of ACI 318-14 for the 2018 and 2015 IBC, and Section 21.1.6.1 of ACI 318 (-11 and -08) for the 2012 and 2009 IBC, respectively, for use where Type 1 or Type 2 mechanical splices are specified by the IBC and ACI 318.

3.0 DESCRIPTION

3.1 General:

The Rolltec mechanical splice system consists of the Rolltec coupler or Rolltec Form Fixer coupler, and Rolltec reinforcing bars. The ends of the reinforcing bars are threaded with metric threads to mate with the internal threads of the coupler.

The Rolltec coupler is for use as either a standard splice or a position splice. The difference between the two splice systems is the manner of installation and the length of the threads on one of the two threaded steel reinforcing bar ends. The threaded length on one of the steel reinforcing bars in a position splice is longer than the length of the

threads on the second reinforcing bar. The Rolltec coupler is available for splicing Nos. 4, 5, 6, 7, 8, 9, 10, 11, 14 and 18 steel reinforcing bars, as well as No. 40 as per Annex A1 of ASTM A615. No 40. steel reinforcing bars are only in accordance with ACI 318-14 for use with the 2018 and 2015 IBC. See Figures 1, 2 and 3 and Table 1.

The Rolltec Form Fixer coupler consists of the Rolltec coupler with a steel flange factory-attached to one end of the coupler. The Rolltec Form Fixer couplers are available for splicing Nos. 4, 5, 6, 7, 8, 9, 10 and 11 steel reinforcing bars. See Table 1 and Figure 4.

The Rolltec Caging splice consists of the Rolltec coupler, a Rolltec Caging coupler which is a longer version of the Rolltec coupler, a threaded stud, a lock nut, and Rolltec reinforcing bars. The four components are delivered pre-assembled as a set. The coupler and the threaded stud are factory-attached together. The Rolltec Caging splice is available for splicing Nos. 6, 7, 8, 9, 10, 11, 14 and 18 steel reinforcing bars, as well as No. 40 as per Annex A1 of ASTM A615. No. 40 steel reinforcing bars are only in accordance with ACI 318-14 for use with the 2018 and 2015 IBC. See Figures 5 and 6 and Table 2.

3.2 Materials:

3.2.1 Couplers: The Rolltec couplers Caging couplers are manufactured from steel complying with GB/T699 or GB/T8162 grade 45, with minimum specified yield and tensile strengths of 45 and 85 ksi (315 and 590 MPa), respectively.

3.2.2 Threaded studs: The threaded studs are manufactured from steel complying with GB/T8077 grade 42CrMo, with minimum specified yield and tensile strengths of 101 and 116 ksi (700 and 800 MPa), respectively.

3.2.3 Steel Reinforcing Bars: The deformed steel reinforcing bars comply with ASTM A615 grade 60 and 80 or ASTM A706 grade 60 and 80 for Nos. 4, 5, 6, 7, 8, 10 and 40, and with ASTM A615 grade 60 or ASTM A706 grade 60 for Nos. 9, 11, 14, and 18.. Galvanization and epoxy coatings, if applied to the reinforcing bars, must comply with ASTM A767 or ASTM A775, respectively, and be applied prior to threading of the reinforcing bar ends. The threading operation removes the zinc or epoxy coating near the bar ends.

4.0 INSTALLATION

4.1 General:

4.1.1 Standard Splice: The coupler must be threaded onto the end of one reinforcing bar, without tools, to an approximate depth equal to half the coupler length. The depth of thread engagement is limited by the threads on the reinforcing bar and is one-half the coupler length. The second reinforcing bar must be threaded into the opposite

end of the coupler and the splice tightened with a wrench applied to the second reinforcing bar. The final installation of the coupler shall have not more than three bar end threads emerging from each end of the coupler.

4.1.2 Position Splice (type B): The coupler is fully threaded onto the reinforcing bar having the end with the longer length of thread. The end of the second reinforcing bar is butted to the end of the first bar, and the coupler is then reverse-threaded onto the second bar. The splice must be tightened with a wrench applied to the bar. The final installation of the coupler shall have not more than three full bar end threads emerging from the ends of the coupler (a full thread is a thread that is continuous around the circumference of the bar).

4.1.3 Position Splice (type C): This splice consists in adding a lock nut to a type B Position splice described in section 4.1.2. The thread on the second reinforcing bar is made longer in order to accommodate the lock nut. The final installation is identical to that of the type B splice, with the added step of tightening the lock nut.

4.1.4 Form Fixer Couplers: The coupler must be threaded onto one reinforcing bar as described for a Rolltec coupler in a standard splice in Section 4.1.1. The flange of the coupler can be nailed to the wooden formwork for the concrete. The second reinforcing bar is threaded into the opposite end of the coupler as described in Section 4.1.1, after removal of the formwork.

4.1.5 Caging Splice: The coupler must be threaded onto the end of one reinforcing bar, without tools, until it butts against the threaded stud. The end of the second reinforcing bar is brought as close as possible to the end of the threaded stud, but doesn't need to butt it. The Caging coupler is then reverse-threaded onto the second bar, followed by the lock nut. After full assembly, no thread shall appear between the lock nut and the groove of the threaded stud. The splice must be tightened with a wrench applied to both couplers. The final installation of the coupler shall have not more than three full bar end threads emerging from the ends of both couplers.

4.2 Special Inspection:

Special inspection is required in accordance with Section 1705 of the 2012 IBC (Section 1704 of the 2009 IBC). In addition to verifying placement of reinforcing bar splices in accordance with this report, the special inspector must verify reinforcing bar embedment; coupler and rebar identification; field preparation of components, including field preparation of reinforcing bar ends; and assembly of the components resulting in spliced reinforcing bars.

5.0 CONDITIONS OF USE

The Rolltec mechanical splice system described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The splice system must be installed in accordance with the applicable code, the manufacturer's instructions and this report. In the case of conflict between the manufacturer's published instructions and this report, this report governs.
- 5.2 Splice locations must comply with applicable code requirements and be noted on plans approved by the code official.
- 5.3 Under the 2018 and IBC, as applicable, for structures regulated by Chapter 21 of ACI 318-11 (as required by 2018 and 2015 IBC Section 1905.1), to splice deformed longitudinal reinforcing bars resisting

earthquake-induced flexure, axial force, or both, in special moment frames, special structural walls, and all components of special structural walls including coupling beams and wall piers, with the Rolltec mechanical splice system, mill certificates of reinforcing bars must be submitted to the code official as evidence that the steel reinforcing bars comply with ACI 318-14 Section 20.2.2.5.

- 5.4 Under the 2012 IBC, for structures regulated by Chapter 21 of ACI 318-11 (as required by 2012 IBC Section 1905.1), to splice deformed reinforcing bars resisting earthquake-induced flexure, axial force, or both, in special moment frames, special structural walls, and all components of special structural walls including coupling beams and wall piers, with the Rolltec mechanical splice system, mill certificates of reinforcing bars must be submitted to the code official as evidence that the steel reinforcing bars comply with ACI 318-11 Section 21.1.5.2.
- 5.5 Under the 2009 IBC, for structures regulated by Chapter 21 of ACI 318-08 (as required by 2009 IBC Section 1908.1), to splice deformed reinforcing bars resisting earthquake-induced flexure and axial forces in frame members, structural walls and coupling beams, with the Rolltec mechanical splice system, mill certificates of reinforcing bars must be submitted to the code official as evidence that the steel reinforcing bars comply with ACI 318-08 Section 21.1.5.2.
- 5.6 Special inspection must be provided in accordance with Section 4.2 of this report.
- 5.7 Minimum concrete cover must be in accordance with the IBC and must be measured to the outer surface of the coupler.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Mechanical Connector Systems for Steel Reinforcing Bars (AC133), dated October 2015 (editorially revised May 2018).

7.0 IDENTIFICATION

- 7.1 Each coupler is stamped with the letter "R" that designates the Rolltec product name, the letter "S" or "C" that designates the standard coupler or Caging coupler respectively, the required rebar size, the letter "D" that identifies Dextra, a traceability code, and "T2" to designate the use of the coupler in a Type 2 splice. The packaging for the couplers has a label bearing the company name and address of Dextra Manufacturing Co., Ltd., the coupler model number, and the evaluation report number (ESR-4091). Bundles of threaded steel reinforcing bars, both with and without couplers temporarily threaded onto their ends, are labeled with a tag bearing the product designation (Rolltec), the Type 2 splice designation, the rebar size and the evaluation report number (ESR-4091).
- 7.2 The report holder's contact information is the following:

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THAILAND
www.dextragroup.com

TABLE 1—ROLLTEC COUPLER (STANDARD, POSITION AND FORM FIXER)¹

REBAR NOMINAL SIZE		D	L	T	A
US	Imperial	in	in	in	in
#4	13	3/4	1 1/2	3/8	2 3/8
#5	16	1	1 7/8	3/8	2 3/8
#6	19	1 1/4	2 3/8	3/8	2 3/8
#7	22	1 3/8	2 1/2	3/8	2 3/8
#8	25	1 5/8	2 3/4	1/2	2 3/8
#9	29	1 3/4	2 3/4	1/2	3
#10	32	2	3 1/2	1/2	3
#11	36	2 1/4	3 3/8	5/8	3
40mm	40 ³	2 1/2	4 1/8	5/8	NA ²
#14	43	2 3/4	5	7/8	NA ²
#18	57	3 3/4	5 1/2	7/8	NA ²

For SI: 1 inch = 25.4 mm.

¹Coupler dimensions in this table and shown in Figures 1, 2, 3 and 4 are nominal dimensions for detailing.

²NA signifies that the Form Fixer couplers are not available in the noted size.

³40mm metric size reinforcing steel bar No. 40 steel reinforcing bars are only in compliant accordance with ACI 318-14 for use with the 2018 and 2015 IBC.

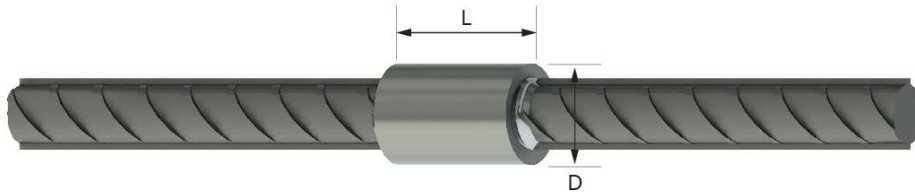


FIGURE 1—INSTALLED ROLLTEC COUPLER (STANDARD SPLICE)

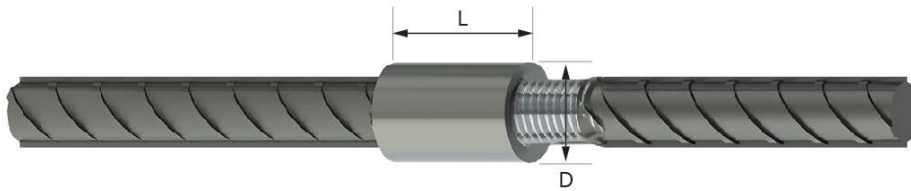


FIGURE 2—INSTALLED ROLLTEC COUPLER (POSITION SPLICE TYPE B)

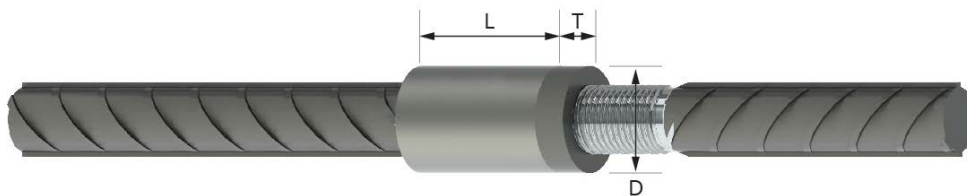


FIGURE 3—INSTALLED ROLLTEC COUPLER (POSITION SPLICE TYPE C)



FIGURE 4—INSTALLED FORM FIXER COUPLER

TABLE 2—ROLLTEC CAGING COUPLER¹

REBAR NOMINAL SIZE		D	L _{Max}
US	Imperial	in	in
#6	19	1 ¹ / ₄	8
#7	22	1 ³ / ₈	8 ⁵ / ₈
#8	25	1 ⁵ / ₈	9 ³ / ₈
#9	29	1 ³ / ₄	9 ³ / ₄
#10	32	2	12 ¹ / ₈
#11	36	2 ¹ / ₄	12 ³ / ₈
40mm	40	2 ¹ / ₂	14 ³ / ₈
#14	43	2 ³ / ₄	17 ¹ / ₈
#18	57	3 ³ / ₄	19 ⁵ / ₈

For SI: 1 inch = 25.4 mm.

¹Coupler dimensions in this table and shown in Figures 5 and 6 are nominal dimensions for detailing. 40mm metric size reinforcing steel bar No. 40 steel reinforcing bars are only in compliant accordance with ACI 318-14 for use with the 2018 and 2015 IBC only applicable to the 2018 IBC.

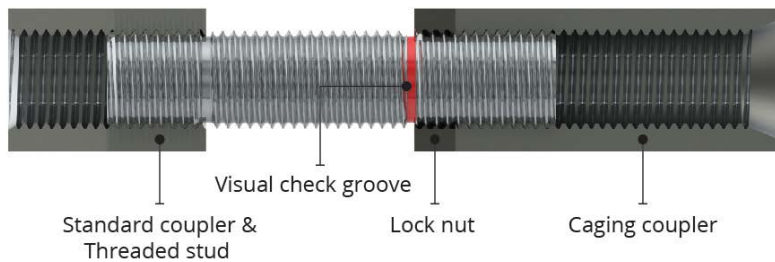


FIGURE 5—ROLLTEC CAGING SET

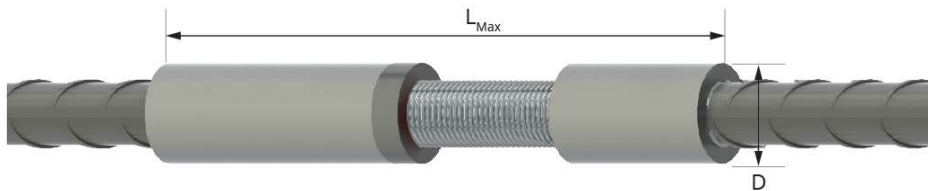


FIGURE 6—ROLLTEC CAGING SPLICE