

# ICC-ES Evaluation Report

## ESR-2166

Reissued October 2019

This report is subject to renewal October 2020.

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

### REPORT HOLDER:

DEXTRA MANUFACTURING CO., LTD.

### EVALUATION SUBJECT:

**BARTEC MECHANICAL ANCHORAGES FOR 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)<sup>†</sup>

<sup>†</sup>The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

For evaluation for compliance with codes adopted by Los Angeles Department of Building and Safety (LADBS), see [ESR-2166 LABC Supplement](#).

### Property evaluated:

Structural

## 2.0 USES

The Bartec mechanical anchorage system is a mechanical device complying with the requirements of Sections 25.4.4 and 25.4.5 of ACI 318-14 under the 2018 and 2015 IBC, and Section 12.6 of ACI 318-11 under the 2012 IBC (ACI 318-08 under the 2009 IBC), for use as mechanical anchorage to develop steel reinforcement bars in tension as an alternative to standard hooks or development lengths of straight deformed steel reinforcement bars in reinforced, normal-weight concrete. Related sections in the codes that permit or require mechanical anchorage of reinforcing bars are ACI 318-14 Sections 25.4.1.1, 25.4.1.2, 7.7.3.6, 7.7.3.8.3, 9.7.3.8.3, 9.7.3.6, 9.9.4.4, 9.9.4.5, 9.9.4.6, 13.2.8.4, 16.5.6.5, 18.3.2, 18.4.2.1, 18.8.5.2, and ACI 318 (-11 and -08) Sections 12.1.1, 12.10.6, 12.11.2, 12.11.3, 12.11.4, 12.12.1, as applicable.

## 3.0 DESCRIPTION

### 3.1 General:

The Bartec mechanical anchorage system consists of Bartec round end anchor plates and Bartec deformed steel reinforcing bars. The ends of the Bartec reinforcing bars are cold-formed and threaded with metric threads to mate with the internal threads of the round end anchors.

The Bartec mechanical anchorage system is available for Nos. 4, 5, 6, 7, 8, 9, 10 and 11 deformed steel reinforcing bars. See Figure 1 and Table 1 for additional details.

### 3.2 Materials:

**3.2.1 End Anchor Plates:** The end anchor plates are manufactured from steel complying with SAE J403-2001 grade 1045, with minimum specified yield and tensile strengths of 58 and 87 ksi (400 and 600 MPa), respectively.

**3.2.2 Steel Reinforcing Bars:** The deformed steel reinforcing bars (rebar) comply with ASTM A615, Grade 60, or ASTM A706, Grade 60. Galvanization and epoxy coatings, if applied to the reinforcing bars, comply with ASTM A767 or ASTM A775, respectively, and are applied prior to cold forming of the reinforcing bar ends. The forging and threading operations remove the zinc or epoxy coating.

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design:

The structural design and use of the Bartec mechanical anchorage system must comply with ACI 318, Sections 12.6.1 through 12.6.3.

### 4.2 Installation:

**4.2.1 General:** The Bartec mechanical anchorage system must be installed in accordance with Dextra Manufacturing's installation instructions, ACI 318-14 Sections 25.4.1.2, 25.4.4.1, 25.4.4.2 and 25.4.4.3 or ACI 318 (-11,-08) Sections 12.6.1 through 12.6.3, as applicable, and this evaluation report.

The end anchor plates are threaded onto the end of the Bartec steel reinforcing bars with the threads of the end anchor plates fully engaging the threads of the steel reinforcing bars. The end of the steel reinforcing bar must not be recessed in the end anchor plate.

**4.2.2 Minimum Anchorage Length:** The minimum anchorage length,  $l_{dt}$ , of headed bars must be determined as indicated in ACI 318-14 Section 25.4.4.2 or ACI 318 (-11,-08) Section 12.6.2, as applicable. Anchorage length is defined as the distance from the critical section to the concrete bearing face of the anchor plates. Critical section is defined as that location in the concrete member where the maximum steel bar stress is required.

**4.2.3 Termination of Headed Deformed Bars:** The headed deformed steel reinforcing bars extending from members, such as but not limited to beams, corbels or brackets, and terminating in an adjacent member, must be

extended to the far face of the confined region of the adjacent members.

#### 4.3 Special Inspection:

Special inspection is required in accordance with 2018, 2015 and 2012 IBC Section 1705 and 2009 IBC Section 1704, as applicable. In addition to verifying placement of the mechanical anchorage system as required by this evaluation report, duties of the special inspector include inspection of field preparation of components, assembly of the anchor plates on the steel bars, and labeling of the products as noted in this evaluation report.

#### 5.0 CONDITIONS OF USE

The Bartec mechanical anchorage system described in this report complies with, or is a suitable alternative to what is specified in, the code indicated in Section 1.0 of this report, subject to the following conditions:

- 5.1 The system must be installed in accordance with the IBC, 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 Anchorage system calculations and installation details for each project must be submitted to the code official for approval, and must be prepared by a registered design professional when required by the statutes of the jurisdiction where the system is installed.
- 5.3 Under the 2018 and 2015 IBC: For structures regulated by Chapter 18 of ACI 318-14, with the Bartec mechanical anchorage system used as reinforcement resisting earthquake-induced moment, axial force, or both, in special moment frames, special structural walls, and all components of special structural walls including coupling beams and wall piers, mill certificates of the deformed bars of the mechanical anchorage systems 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, with the Bartec mechanical anchorage system used as reinforcement 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, mill certificates of the deformed bars of the mechanical anchorage systems 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, with the Bartec mechanical anchorage system used as reinforcement resisting earthquake-induced flexural and axial forces in frame members, special structural walls and coupling beams, mill certificates of the deformed bars of the mechanical anchorage systems 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 4.3 of this report.

5.7 Minimum concrete cover must be in accordance with Section 20.6.1.3.1 of ACI 318-14 or Section 7.7 of ACI 318 (-11 and -08), as applicable, and must be measured to the outer surface of the anchor plate of the anchorage system and steel reinforcement bar.

5.8 The use of headed deformed bars as an alternative to tension lap splices under the 2018, 2015, 2012 and 2009 IBC is outside the scope of this report.

#### 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Headed Deformed Bars (AC308), dated January 2013 (editorially revised September 2018).

#### 7.0 IDENTIFICATION

7.1 Each Bartec end anchor plate is stamped with the model designation of "BEASC", the letters DM (i.e., Dextra Manufacturing) and a work order number, a letter "T" indicating conformance to ASTM A970-06 and a letter "H" indicating conformance to ASTM A970-09 for Class HA headed bars. The packaging of the end anchor plates has a label bearing the company name and address of Dextra Manufacturing, the model designation and the evaluation report number (ESR-2166). Bundles of the Bartec steel reinforcing bars are labeled with a tag bearing the Dextra Manufacturing company name, the product designation (Bartec), the rebar size, and the evaluation report number (ESR-2166).

7.2 The report holder's contact information is the following:

**DEXTRA MANUFACTURING CO., LTD.**  
**5<sup>th</sup> FLOOR LUMPINI II BUILDING**  
**247 SARASIN ROAD**  
**LUMPINI, PHATHUMWAN, BANGKOK 10330**  
**THAILAND**  
[www.dextragroup.com](http://www.dextragroup.com)  
[jjbraun@dextragroup.com](mailto:jjbraun@dextragroup.com)

TABLE 1—BARTEC MECHANICAL ANCHORAGE SYSTEM

ANCHOR PLATE MODEL DESIGNATION	REINFORCING STEEL		ANCHOR PLATE		THREAD DIMENSIONS <sup>1</sup>
	Nominal Size	Nominal Cross-Sectional Area, $A_b$ (inches <sup>2</sup> )	Nominal Outside Diameter (inches)	Net Bearing Area, $A_{brg}$ (inches <sup>2</sup> )	
BEASC #4	4	0.20	1 <sup>7</sup> / <sub>32</sub>	0.86	M16 × 2.0
BEASC #5	5	0.31	1 <sup>1</sup> / <sub>2</sub>	1.27	M20 × 2.5
BEASC #6	6	0.44	1 <sup>3</sup> / <sub>4</sub>	1.76	M24 × 3.0
BEASC #7	7	0.60	2 <sup>1</sup> / <sub>16</sub>	2.40	M27 × 3.0
BEASC #8	8	0.79	2 <sup>3</sup> / <sub>8</sub>	3.29	M30 × 3.5
BEASC #9	9	1.00	2 <sup>3</sup> / <sub>4</sub>	4.64	M33 × 3.5
BEASC #10	10	1.27	2 <sup>15</sup> / <sub>16</sub>	5.27	M36 × 3.0
BEASC #11	11	1.56	3 <sup>3</sup> / <sub>8</sub>	6.94	M39 × 4.0

For SI: 1 inch = 25.4 mm, 1 inch<sup>2</sup> = 645.16 mm<sup>2</sup>.

<sup>1</sup>In the thread dimensions, the value of M is the nominal diameter in millimeters and the other value is the thread spacing in millimeters.

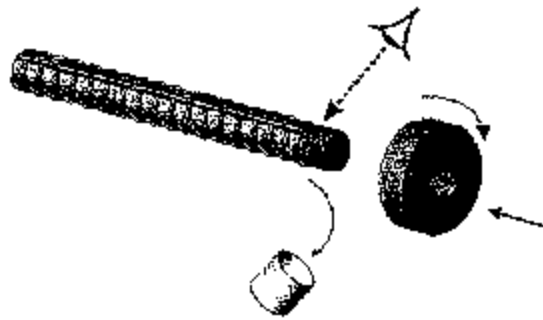


FIGURE 1—BARTEC END ANCHORAGES

# ICC-ES Evaluation Report

# ESR-2166 LABC Supplement

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**REPORT HOLDER:**

**DEXTRA MANUFACTURING CO., LTD.**

**EVALUATION SUBJECT:**

**BARTEC MECHANICAL ANCHORAGES FOR STEEL REINFORCING BARS IN CONCRETE**

## 1.0 REPORT PURPOSE AND SCOPE

**Purpose:**

The purpose of this evaluation report supplement is to indicate that Bartec Mechanical Anchorages for Steel Reinforcing Bars in Concrete, described in ICC-ES master evaluation report [ESR-2166](#), have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

**Applicable code editions:**

- 2017 *City of Los Angeles Building Code* (LABC)

## 2.0 CONCLUSIONS

The Bartec Mechanical Anchorages for Steel Reinforcing Bars in Concrete, described in Sections 2.0 through 7.0 of the master evaluation report [ESR-2166](#), comply with the LABC Chapter 19, and are subjected to the conditions of use described in this supplement.

## 3.0 CONDITIONS OF USE

The Bartec Mechanical Anchorages for Steel Reinforcing Bars in Concrete described in this evaluation report must comply with all of the following conditions:

- All applicable sections in the master evaluation report [ESR-2166](#).
- The design, installation, conditions of use and identification of the Bartec Mechanical Anchorages for Steel Reinforcing Bars in Concrete are in accordance with the 2015 *International Building Code*® (2015 IBC) provisions noted in the master evaluation report [ESR-2166](#).
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- Continuous special inspection by Deputy Inspector shall be provided during installation of mechanical anchorages.

This supplement expires concurrently with the evaluation report, reissued October 2019.

# ICC-ES Evaluation Report

# ESR-2166 CBC Supplement

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## EVALUATION SUBJECT:

**BARTEC MECHANICAL ANCHORAGES FOR STEEL REINFORCING BARS IN CONCRETE**

## 1.0 REPORT PURPOSE AND SCOPE

### Purpose:

The purpose of this evaluation report supplement is to indicate that Bartec mechanical anchorage system, recognized in ICC-ES master evaluation report ESR-2166, has also been evaluated for compliance with the codes noted below.

### Applicable code edition(s):

- 2019 and 2016 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) and Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

## 2.0 CONCLUSIONS

### 2.1 CBC:

The Bartec mechanical anchorage system, described in Sections 2.0 through 7.0 of the master evaluation report ESR-2166, complies with CBC Chapter 19, provided the design and installation are in accordance with the 2018 and 2015 *International Building Code*® provisions respectively, noted in the master report and the additional requirements of CBC Chapters 16, 17 and 19, as applicable.

The products have not been evaluated under Chapter 7A for use in the exterior design and construction of new buildings located in a Fire Hazard Severity Zone within State Responsibility Areas or any Wildland–Urban Interface Fire Area.

#### 2.1.1 OSHPD:

The applicable OSHPD Sections of the CBC are beyond the scope of this supplement.

#### 2.1.2 DSA:

The applicable DSA Sections of the CBC are beyond the scope of this supplement.

This supplement expires concurrently with the evaluation report, reissued October 2019.