

Report Number: 0188

Issued: 09/2010

Expires: 09/2012

Editorially Revised: 11/18/2011

DIVISION: 03 – CONCRETE
Section: 03210 – Reinforced Steel

REPORT HOLDER:

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EVALUATION SUBJECT:

LENTON[®] TERMINATOR MECHANICAL ANCHOR AND HEADED REINFORCING BAR SYSTEM IN CONCRETE

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- *2009 International Building Code[®] (IBC)*
- *2009 International Residential Code[®] (IRC)*
- *2006 International Building Code[®] (IBC)*
- *2006 International Residential Code[®] (IRC)*

1.2 Property Evaluated:

- Structural

1.3 Evaluated in accordance with:

- *IAPMO EC 006-2010*

2.0 USES

The LENTON TERMINATOR (D6, D16, & D14) is a mechanical device for use as mechanical

anchorage to develop steel reinforcing bars in tension in normal weight concrete as an alternative to standard hooks or to shorten development lengths of straight deformed reinforcing bars in reinforced concrete.

The LENTON TERMINATOR headed bar system complies with the requirements of ACI 318, 2009 & 2006 IBC, and 2009 & 2006 IRC and is suitable for use on grades, as listed in Table 1, of reinforcing bars complying with ASTM A615 and ASTM A706.

3.0 DESCRIPTION

3.1 General

The LENTON TERMINATOR is a headed steel reinforcing bar anchor used to mechanically anchor No. 4, 1/2-inch-diameter (12 mm) through No. 18, 2 1/4-inch-diameter (57 mm) reinforcing steel bars. The LENTON tapered threaded system utilizes a 6-degree tapered thread with a varying thread pitch of 1.25 mm, 2.0 mm, or 3.5 mm, depending on the reinforcement size. The product dimensions in Figure 1 are listed in Tables 2, 3, and 4 for the LENTON TERMINATOR D6, D16, and D14, respectively. The net bearing area of the anchor head exceeds four times the nominal cross-sectional area of the reinforcing bar. Dimensions and illustrations are provided at the end of this report.

3.2 Materials

3.2.1 Anchor Heads: The LENTON TERMINATOR anchor heads are manufactured from steels listed in Table 1.

3.2.2 Steel Reinforcing Bars: The reinforcing steel bars shall comply with the grades of ASTM A706 & ASTM A615 as listed in Table 1. Coatings complying with ASTM A775, ASTM A934, and ASTM A767 shall be applied prior to

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threading or in a manner as not to interfere with proper thread engagement.

4.0 DESIGN AND INSTALLATION

4.1 Design

4.1.1 Limitations On Obstructions:

Limitation on obstructions and interruptions in deformation patterns in front of the bearing surface of the head shall comply with Figure R3.5.9 as noted in ACI 318-08.

4.1.2 Development Length: When utilizing the equation in Section 12.6.2 of ACI 318-08 to calculate development length (see figure R12.6(a) of ACI 318-08), the licensed design professional shall verify that the proposed heads are listed in Table 1 as ASTM A970-06 compliant, the maximum compressive design strength of the concrete is 6,000 psi, and conditions a-f as stated in Section 12.6.1 of ACI 318-08 are met. When these design conditions have not been met, the anchorage shall be designed in accordance with ACI 318-05, Appendix D or designed otherwise to the satisfaction of the licensed design professional and approved by the Building Official.

Length of embedded reinforcement required to develop the design strength of reinforcement at a critical section, reference ACI 318-08 Section 9.3.3.

4.2 Installation

4.2.1 General Installation: The LENTON TERMINATOR mechanical anchorage system must be installed in accordance with ERICO Inc.'s manufactures installation instructions, applicable code sections of ACI 318, and this evaluation report.



The LENTON TERMINATOR heads are attached to the reinforcing bar utilizing internal taper threads within the head mating with taper threaded bar ends prepared by a fabricator approved by ERICO.

4.2.2 Termination of Headed Bars: When designed in accordance with Section 12.6.2 of ACI 318-08, longitudinal headed deformed bars extending from a beam or a slab terminating at a support member, such as a column should extend through the joint to the far face of the confined supporting member per figure R12.6(b) of ACI 318-08.

5.0 CONDITIONS OF USE

The LENTON TERMINATOR mechanical anchorage system described in this report complies with, or is a suitable alternative to what is stated 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 manufacture's installation instructions, and this report.

5.2 Anchorage system calculations and installation details must be submitted to the code official for approval and shall be prepared by a licensed design professional when required.

5.3 Special inspections may be required, refer to Section 1704.4 and 1704.13 of the IBC. The inspector's duties may include verifying grade and size of reinforcement bar, head

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identification, and installation of the headed bar system.

5.4 To satisfy minimum concrete cover requirements specified in Section 7.7 of ACI 318 the head is considered part of the bar.

6.0 EVIDENCE SUBMITTED

Data in accordance with IAPMO-ES Evaluation Criteria for Headed and Mechanically Anchored Deformed Reinforcement Bars in Tension (EC 006-2010).

7.0 IDENTIFICATION

All LENTON TERMINATOR heads are permanently identified with the manufactures mark or logo, the unique heat code identification, and the letter "T" indicating that the heads have been produced to an ASTM A970 specification.

The packaging labels for the heads shall include the manufacture or registered trademark, model or name of the product, size, and evaluation report number (ER- 0188).

A handwritten signature in black ink, appearing to read "Amir" followed by a flourish.

Director of Evaluation Services

EVALUATION REPORT



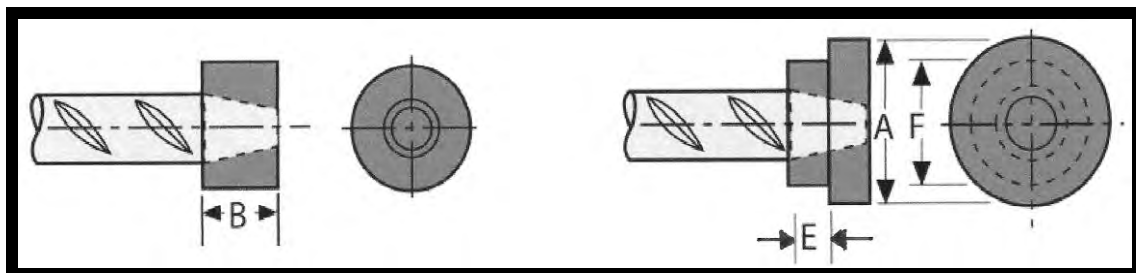
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TABLE 1: LENTON TERMINATOR D6, D16, & D14 SPECIFICATIONS

Series and Part Number Suffix	Anchor Head Material	ASTM A970 Compliant	Rebar Material	Rebar Sizes
LENTON TERMINATOR D6	AISI 1141 (or equivalent)	ASTM A970-07 ¹	ASTM A706 Gr. 60	#4 to #18 ³
			ASTM A615 Gr. 60	#5 to # 18 ³
			ASTM A615 Gr. 75 ²	#5 to # 18 ³
LENTON TERMINATOR D16	AISI 1141 (or equivalent)	ASTM A970-07 ¹	ASTM A706 Gr. 60	#4 to #18 ³
			ASTM A615 Gr. 60	#5 to # 18 ³
			ASTM A615 Gr. 75 ²	#5 to # 18 ³
		ASTM A970-06	ASTM A706 Gr. 60	#5 to #14 ³
			ASTM A615 Gr. 60	#5 to #8 & #10 to #14 ³
ASTM A615 Gr. 75 ²	#5 & #10			
LENTON TERMINATOR D14	AISI 1141 (or equivalent)	ASTM A970-07 ¹	ASTM A706 Gr. 60	#4 to #18 ³
			ASTM A615 Gr. 60	#5 to # 18 ³
			ASTM A615 Gr. 75 ²	#5 to # 18 ³
		ASTM A970-06	ASTM A706 Gr. 60	#5 to #14 ³
			ASTM A615 Gr. 60	#5 to #8 & #10 to #14 ³
ASTM A615 Gr. 75 ²	#5 & #10			

Note: Anchorage shall be designed in accordance with ACI 318-05 Appendix D or designed otherwise to the satisfaction of the licensed design professional and approved by the Building Official for heads compliant with ASTM A970-07¹, Grade 75² reinforcement, or for reinforcement sizes that exceed No. 11³.

Figure 1: LENTON TERMINATOR – D6/D16/D14 Series



- A = Large Diameter**
- B = Length of LENTON TERMINATOR Head & Bar Engagement**
- E = Length of Small Step (when applicable)**
- F = Small Diameter (when applicable)**

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Table 2: LENTON TERMINATOR – D6 Series

Reinforcement Bar Designation				Part Number	"A"		"B"		"E"		"F"	
In/lb	Metric (mm)	Canadian	Soft Metric		in	mm	in	mm	in	mm	in	mm
4	12	10M	13	EL12D6	1-3/8	35	9/16	14	–	–	–	–
5	16	15M	16	EL16D6	1-1/2	38	7/8	22	–	–	–	–
6	20	20M	19	EL20D6	1-7/8	48	1-1/8	29	–	–	–	–
7	22	–	22	EL22D6	2	51	1-1/4	32	–	–	–	–
8	25	25M	25	EL25D6	2-1/4	57	1-3/8	35	–	–	–	–
9	28	30M	29	EL28D6	2-3/4	70	1-1/2	38	–	–	–	–
10	32	–	32	EL32D6	3	76	1-9/16	40	–	–	–	–
11	36	35M	36	EL36D6	3-1/4	83	1-11/16	43	–	–	–	–
–	40	–	–	EL40D6	3-3/4	95	2-1/2	64	1	25	3	76
14	43	45M	43	EL43TD6	4	102	2-1/8	54	1	25	3	76
–	50	–	–	EL50TD6	4-1/2	114	2-9/16	65	1	25	3	76
18	57	55M	57	EL57TD6	5-1/8	130	2-3/4	70	1	25	3	76

NOTE 1: Thread does not need to be flush with end of LENTON TERMINATOR. Thread may be +/- 2 threads from the backside of head.

NOTE 2: Net bearing area (A_{brg}) exceeds 4 times the area of the bar (A_{br})

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Table 3: LENTON TERMINATOR – D16 Series

Reinforcement Bar Designation				Part Number	"A"		"B"		"E"		"F"	
In/lb	Metric (mm)	Canadian	Soft Metric		in	mm	in	mm	in	mm	in	mm
4	12	10M	13	EL12D16	1-3/8	35	3/4	19	–	–	–	–
5	16	15M	16	EL16D16	1-1/2	38	15/16	24	–	–	–	–
6	20	20M	19	EL20D16	1-7/8	48	1-3/8	35	–	–	–	–
7	22	–	22	EL22D16	2	51	1-7/16	38	–	–	–	–
8	25	25M	25	EL25D16	2-1/4	57	1-9/16	40	–	–	–	–
9	28	30M	29	EL28D16	2-3/4	70	1-5/8	42	–	–	–	–
10	32	–	32	EL32D16	3	76	1-3/4	46	–	–	–	–
11	36	35M	36	EL36D16	3-1/4	83	2-1/16	52	–	–	–	–
–	40	–	–	EL40D16	3-3/4	95	2-1/4	58	–	–	–	–
14	43	45M	43	EL43TD16	4	102	2-1/2	67	1	25	3	76
–	50	–	–	EL50TD16	4-1/2	114	2-11/16	71	1	25	3	76
18	57	55M	57	EL57TD16	5-1/8	130	2-3/16	84	1	25	3	76

NOTE 1: Thread does not need to be flush with end of LENTON TERMINATOR. Thread may be +/- 2 threads from the backside of head.

NOTE 2: Net bearing area (A_{brg}) exceeds 4 times the area of the bar (A_{br})

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Table 4: LENTON TERMINATOR – D14 Series

Reinforcement Bar Designation				Part Number	"A"		"B"		"E"		"F"	
In/lb	Metric (mm)	Canadian	Soft Metric		in	mm	in	mm	in	mm	in	mm
4	12	10M	13	EL12D14	1-3/4	45	11/16	18	-	-	-	-
-	14	-	-	EL14D14	1-3/4	45	13/16	21	-	-	-	-
5	16	15M	16	EL16D14	2	55	15/16	24	-	-	-	-
-	18	-	-	EL18D14	2-1/2	60	1-1/8	29	-	-	-	-
6	20	20M	19	EL20D16	2-1/2	65	1-3/8	35	-	-	-	-
7	22	-	22	EL22D14	2-3/4	70	1-7/16	38	-	-	-	-
8	25	25M	25	EL25D14	3-1/4	80	1-9/16	40	-	-	-	-
9	28	30M	29	EL28D14	3-3/4	95	1-5/8	42	1	25	3-1/8	80
-	30	-	-	EL30D14	3-3/4	95	2-1/16	52	1	25	3-1/8	80
10	32	-	32	EL32D14	4	105	1-3/4	46	1	25	3-1/8	80
-	34	-	-	EL34D14	4-3/8	110	2-3/16	55	1	25	3-1/8	80
11	36	35M	36	EL36D14	4-1/2	115	2-1/16	52	1	25	3-1/8	80
-	38	-	-	EL38D14	4-3/4	120	2-1/8	53	1	25	3-1/8	80
-	40	-	-	EL40D14	5	130	2-1/4	58	1	25	2-3/8	58
14	43	45M	43	EL43TD14	5-1/2	150	2-5/8	67	1-15/16	34	2-1/2	61
-	50	-	-	EL50TD14	6-1/2	160	2-13/16	71	1-15/16	33	3-1/8	77
18	57	55M	57	EL57TD14	7-1/2	190	3-5/16	84	1-5/8	41	3-1/8	80

NOTE 1: Thread does not need to be flush with end of LENTON TERMINATOR. Thread may be +/- 2 threads from the backside of head.

NOTE 2: Net bearing area (A_{brg}) exceeds 4 times the area of the bar (A_{br})



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SUPPLEMENT

CODE SUPPLEMENT to ER-0188

DIVISION: 03-CONCRETE
Section: 03210 – Reinforced Steel

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EVALUATION SUBJECT:

LENTON® TERMINATOR D6/D14/D16
MECHANICAL ANCHOR AND HEADED
REINFORCING BAR SYSTEM IN
CONCRETE

1.1 Compliance with the following codes:

- *2008 American Concrete Institute® 318 (ACI 318-08)*
- *2005 American Concrete Institute 318 (ACI 318-05)*