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RESEARCH REPORT: RR 26058  
(CSI# 03 15 19 and 03 16 00)

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REEVALUATION DUE  
DATE: September 1, 2019  
Issued Date: December 1, 2017  
Code: 2017 LABC

**GENERAL APPROVAL** – Renewal and Clerical Modification – HALFEN 50/30 M16 HSR Nibbed T-bolt

## DETAILS

The HALFEN HSR 50/30 M16 nibbed T-bolt is intended to be used with the HALFEN HTA 52/34 HDG Anchor Channel to resist tensile, transverse shear, bolt bending as well as longitudinal shear forces. The nibbed bolts can be used for the transfer of static, wind and seismic loads. The design strength of the nibbed T-bolt is based on the implementation of the specified torque (see Table 9.2). The design strengths of nibbed T-bolt is limited to fixture installation based on steel to steel contact per Figure 3. Fixture base may not be in contact with concrete surface.

The HALFEN HSR Nibbed T-bolt is classified as a hook – head locking channel bolt within ICC Acceptance Criteria 232 (here in referred to as AC232). Halfen HSR Nibbed T-bolts have a single nib located in the center of the head that creates a notch in the channel lips thus creating mechanical interlocking between the channel and nibbed bolt (see Figure 1). This is classified as a positive load transfer mechanism per AC232. This approval is for the HSR 50/30 M16 GV-S 8.8 T-bolt and HSR 50/30 M16 HDG 8.8 T-bolts only.

The HSR M16 50/30 M16 GV-s 8.8 T-bolt is comprised of carbon steel with a GV-S special coating corrosion finish. GVs is an electro galvanic plating method which is applied as a thicker layer ( $\geq 12\mu\text{m}$ ) than standard chromatisation ( $\geq 5\mu\text{m}$ ) performed in accordance with ISO 4042.

RR 26058  
Page 1 of 6

Halfen USA

RE: Halfen 50/30 M16 HSR Nibbed T-bolt

The HSR M16 50/30 M16 HDG 8.8 T-bolt is comprised of carbon steel with an HDG corrosion finish ( $\geq 5 \mu\text{m}$ ).

The properties, dimensions and characteristics of the HSR M16 50/30 GV-S 8.8 and HSR M16 50/30 HDG 8.8 T-bolts are provided in Table 1 and 2. Properties are provided for both HALFEN HSR and HS T-bolts to show that the dimensions and material properties are identical.

**Table 1 M16 HSR and HS Channel Bolt Properties**

T-Bolt	Finish	Diameter (mm [in])	B (mm [in])	K (mm [in])
HSR 50/30-M16-HDG 8.8	Hot Dip Galvanized (ASTM F2329M)	16 [.63]	41.5 [1.63]	11 [.43]
HSR 50/30-M16-GV-S 8.8	Zinc Electroplated (ASTM F1941M)	16 [.63]	41.5 [1.63]	11 [.43]
HS 50/30	Hot Dip Galvanized or Zinc Electroplated	16 [.63]	41.5 [1.63]	11 [.43]

**Table 2: M16 HSR & Channel Bolt Section Properties**

T-Bolt	Grade/ Material	$f_{utb}$ (Mpa [ksi])	$f_{yb}$ (Mpa [ksi])
HSR 50/30-M16-HDG 8.8	8.8 (ASTM F568)	800 [116]	640 [92.8]
HSR 50/30-M16-GV-s 8.8	8.8 (ASTM F568)	800 [116]	640 [92.8]
HS 50/30	8.8 (ASTM F568)	800 [116]	640 [92.8]

**The approval is subject to the following conditions:**

1. The 50/30 M16 HSR Nibbed T-bolts must be installed in accordance with this report and the manufacturer's installation instructions.
2. The HALFEN 50/30 M16 HSR Nibbed T-bolts are limited to installation with the HALFEN HTA 52/34 HDG Anchor Channel.
3. Calculations and details must be submitted to Structural Plan Check Division for approval. Calculations must be prepared, sealed and signed by a Civil or Structural Engineer registered in the State of California.

Halfen USA

RE: Halfen 50/30 M16 HSR Nibbed T-bolt

4. Halfen anchor channels are permitted for use with fire-resistance rated construction provided that at least one of the following conditions is fulfilled:
  - a. Anchor channels are used to resist wind or seismic forces only.
  - b. Anchor channels that support a fire-resistance rated envelope or a fire resistance rated membrane are protected by approved fire-resistance rated materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards.
  - c. Anchor channels are used to support nonstructural elements.
5. The use of anchor channels to resist fatigue or shock loads is beyond the scope of this approval.
6. Use of hot-dipped galvanized carbon steel anchor channels is permitted for exterior exposure or damp environments. In case channels are cut after applying the zinc-coating, only use in dry internal conditions is permitted.
7. Steel anchoring materials in contact with preservative-treated and fire-retardant-treated wood shall be of zinc-coated carbon steel. The minimum coating weights for zinc-coated steel shall comply with ASTM A153.
8. Period Special Inspection during installation shall be performed in accordance with Section 1705.1.1 of the 2017 Los Angeles Building Code, with continuous or periodic special inspections as defined in Section 1702.1 of the 2017 LABC. Under the LABC, additional requirements in Sections 1705, 1706, 1707, and 1709 shall be observed, as applicable.
  - a. The special inspector shall be present intermittently during anchor channel placement in the formwork to verify anchor channel type, type of steel, length of channel, and number and diameter of anchors as well as anchor channel placement and edge distance in accordance with the approved plans and proper fastening of the anchor channels to the formwork in accordance with the MPII.
  - b. Following placement of concrete and form removal, the special inspector shall verify that the concrete around the anchor channel is without significant visual defects and the anchor channel is flush with the concrete surface, and that the channel interior is free of concrete, laitance, or other obstructions. Following the installation of attachments to the anchor channel, the special inspector shall verify that the correct system hardware, such as threaded bolts and saddle washers, has been used, positioned correctly, and torqued, all in accordance with the MPII.
  - c. The special inspector shall be present for the initial installations of attachments to each type and size of anchor channel. For ongoing installations over an extended period, the special inspector shall perform regular inspections to confirm correct handling and installation.
  - d. Where they exceed the requirements stated here, the special inspector shall adhere to the special inspection requirements provided in the statement of special inspections as prepared by the registered design professional in responsible charge and approved by LADBS.

Halfen USA

RE: Halfen 50/30 M16 HSR Nibbed T-bolt

9. On-site proof loading to verify the installed anchor channels' capacity is required for all installations designated by the registered design professional or Building Inspector. The proof loading program shall be established by the registered design professional and approved by the LADBS. As a minimum, the following requirements shall be addressed:
  - a. Frequency and location of proof loading based on channel size and length
  - b. Proof loads specified by channel size
  - c. Acceptable displacements at proof load
  - d. Remedial action in the event of failure to achieve proof load or excessive displacement.
10. HALFEN 50/30 M16 HSR Nibbed T-bolts are produced by a Los Angeles City approved fabricator.
11. The HALFEN 50/30 M16 HSR Nibbed T-bolts are identified by packaging labeled with the manufacturer's name, bolt type, bolt diameter and length, bolt grade, corrosion protection type and Los Angeles Research Report Number (LARR 26058).

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RE: Halfen 50/30 M16 HSR Nibbed T-bolt

## **DISCUSSION**

The clerical modification is to update the report to the 2017 City of Los Angeles Building Code.

This report is in compliance with the 2017 City of Los Angeles Building Code.

The approval is based on tests and analysis in accordance with ICC-ES Acceptance Criteria for Anchor Channels in Concrete Elements (AC 232), dated February 2016.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this Approval have been met in the project in which it is to be used.

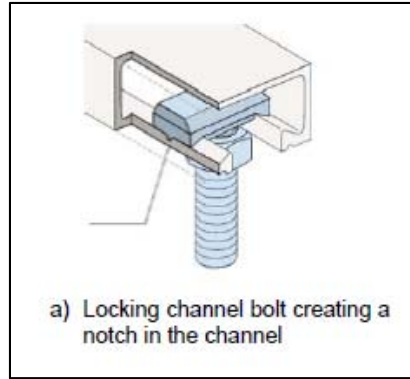
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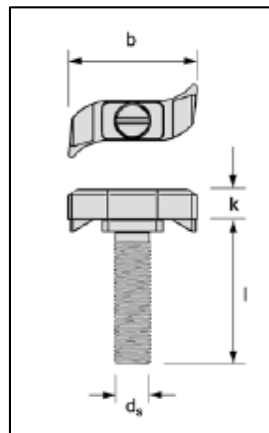
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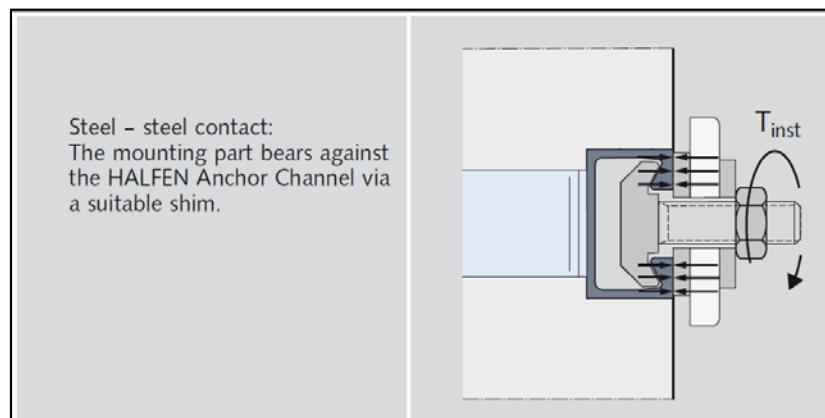
- Table 9.2.1 and Table 9.2.2 – Test Program for Evaluating Anchor Channels for Use in Cracked and Uncracked Concrete (2 Pages)
- Halfen Anchor Channel Design Conditions (31 Pages)



**Figure 1: Anchor Channel with Mechanical Interlock**



**Figure 2 HSR (Hook-head) Channel Bolt Dimensions**



**Figure 3: Steel -to - Steel contact**