



Most Widely Accepted and Trusted

# ICC-ES Report

## ESR-3625

ICC-ES | (800) 423-6587 | (562) 699-0543 | www.icc-es.org

Issued 06/2016

This report is subject to renewal 06/2017.

**DIVISION: 03 00 00—CONCRETE**  
**SECTION: 03 15 00—CONCRETE ACCESSORIES**  
**SECTION: 03 21 00—REINFORCING STEEL**

**REPORT HOLDER:**

**CCL**

**8296 SHERWICK COURT  
JESSUP, MARYLAND 20794**

**EVALUATION SUBJECT:**

**CCL SHEARTRACK**



Look for the trusted marks of Conformity!

*“2014 Recipient of Prestigious Western States Seismic Policy Council (WSSPC) Award in Excellence”*



A Subsidiary of

*ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.*



# ICC-ES Evaluation Report

**ESR-3625**

Issued June 2016

This report is subject to renewal June 2017.

[www.icc-es.org](http://www.icc-es.org) | (800) 423-6587 | (562) 699-0543

A Subsidiary of the International Code Council®

**DIVISION: 03 00 00—CONCRETE**  
**Section: 03 15 00—Concrete Accessories**  
**Section: 03 21 00—Reinforcing Steel**

## REPORT HOLDER:

**CCL**  
**8296 SHERWICK COURT**  
**JESSUP, MARYLAND 20794**  
**(301) 490-8427**  
[www.cclint.com](http://www.cclint.com)

## EVALUATION SUBJECT:

### CCL SHEARTRACK

## 1.0 EVALUATION SCOPE

### Compliance with the following codes:

- 2015 *International Building Code*® (IBC)
- 2012, 2009 and 2006 *International Building Code*®\*

\*Codes indicated with an asterisk are addressed in Section 8.0.

### Property evaluated:

Structural

## 2.0 USES

The CCL Sheartrack are used as shear reinforcement in concrete slabs to replace stirrups, drop panels or column capitals to increase the punching shear resistance of the slabs.

## 3.0 DESCRIPTION

### 3.1 General:

The CCL Sheartrack are reinforcement assemblies that are formed by welding large-headed shear studs to steel base rails. The studs are provided in  $\frac{3}{8}$ -,  $\frac{1}{2}$ -,  $\frac{5}{8}$ - and  $\frac{3}{4}$ -inch (9.5, 12.7, 15.9, and 19.1 mm) diameters. The stud dimensions are given in Table 1 and base rail dimensions are given in Table 2. The assembly configuration is shown in Figure 1.

The CCL Sheartrack comply with the provisions of ASTM A1044.

### 3.2 Materials:

**3.2.1 Studs:** Studs are produced from ASTM A29 Grade 1010 through 1020 steel and conform to the following physical and mechanical requirements prescribed in Table 1 of ASTM A1044.

- Tensile strength, min, psi [MPa]: 65,000 [450]
- Yield strength, min, psi [MPa]: 51,000 [350]
- Elongation in 2 in. [50 mm], min, %: 20
- Reduction of area, min, %: 50

**3.2.2 Base Rails:** Base rails are produced from steel plates conforming to ASTM A36 and the following physical and mechanical requirements prescribed in Table 2 of ASTM A1044.

- Tensile strength, min, psi [MPa]: 65,000 [450]
- Yield strength, min, psi [MPa]: 44,000 [300]
- Elongation in 8 in. [200 mm], min, %: 20

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design:

**4.1.1 General:** Structural design and installation of CCL Sheartrack used as punching shear reinforcement in reinforced concrete slabs must comply with the applicable provisions of ACI 318-14 (2015 IBC). The specified yield strength of transverse reinforcement,  $f_{yt}$ , must not exceed the specified yield strength of the shear studs defined in Section 3.2.1.

**4.1.2 Design Considerations:** The structural design of CCL Sheartrack must determine and specify the following items, based on design requirements in this report:

- a. Number of studs per rail.
- b. Stud shank diameter.
- c. Base rail length.
- d. Shear rail assembly overall height (OH), which must comply with Section 8.7.7.1.1 of ACI 318-14.
- e. Stud spacing (s).
- f. Distance between column face and first peripheral line of studs ( $S_o$ ).
- g. Arrangement of headed shear stud reinforcement, which must comply with Section 8.7.7.1.2 of ACI 318-14.

**4.1.3 Earthquake Loads:** The CCL Sheartrack may be used at slab-to-column connections of structures where the flat slab is used together with the primary seismic force-resisting systems in structures assigned to Seismic Design Categories C, D, E and F, such as concrete shear walls, under the following conditions:

**4.1.3.1 General:** Lateral force-resisting elements of the structure are designed using IBC.

**4.1.3.2 Shear Strength:** The nominal shear strength provided by the concrete in the presence of the headed shear stud reinforcement, referenced in Section 22.6.6.1 of ACI 318-14, must be revised as follows:

$$V_c = 1.5\lambda\sqrt{f'_c}b_o d$$

This revision requires revisions to the nominal shear strength,  $V_n$ , and the maximum shear stress,  $v_n$ .

Two-way slabs without beams designated as part of the seismic-force-resisting system, must comply with the provisions in Section 18.4.5.8 of ACI 318-14, except that  $V_c$  must be limited as set forth in this section.

Two-way slabs without beams, which are not designated as part of the seismic-force-resisting system, must comply with the provisions in Section 18.14.5.1 of ACI 318-14, except that  $V_c$  must be limited as set forth in this section and the design story drift ratio specified in Section 18.14.5.1 of ACI 318-14 must not exceed the drift ratio referenced in Table 12.12-1 of ASCE/SEI 7.

#### 4.2 Installation:

Installation of the CCL Sheartrack must comply with the applicable code and the approved engineering plans. The CCL Sheartrack assemblies must be positioned correctly around columns and set in accordance with the IBC and the approved construction documents. Concrete cover must comply with Section 20.6.1.3.5 of ACI 318-14. See Figure 1 for typical installation details.

#### 4.3 Special Inspection:

Special inspection of CCL Sheartrack reinforcement and its installation at the jobsite is required in accordance with IBC Section 1705.3. The special inspector is responsible for verifying identification of the CCL Sheartrack per Section 7.0 of this report, verifying the condition of the CCL Sheartrack assembly, and verifying that the location, positioning, clearances, and concrete cover for the CCL Sheartrack assemblies comply with the approved engineering drawings and the applicable code.

### 5.0 CONDITIONS OF USE

The CCL Sheartrack 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 CCL Sheartrack must be designed, manufactured, and installed in accordance with this report and the approved plans. In the event of a conflict between this report and the approved plans, this report governs.
- 5.2 Design details and drawings must be in compliance with the design requirements of Section 4.1 of this report and must be approved by the code official. The calculations and drawings must be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is to be built.
- 5.3 Special inspections must be provided in accordance with Section 4.3 of this report.
- 5.4 The CCL Sheartrack are manufactured at the CCL USA Inc. facility in Jessup, Maryland, under a quality-control program with inspections by ICC-ES.

### 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Headed Shear Stud Reinforcement Assemblies for Concrete Slabs or Footings (AC395), dated October, 2008 (editorially revised February 2016).

### 7.0 IDENTIFICATION

The CCL Sheartrack are identified by a label which includes the part designation, manufacturer's logo (CCL) and address, and the evaluation report number (ESR-3625).

### 8.0 OTHER CODES

#### 8.1 Scope:

In addition to the 2015 IBC, the products described in this report were evaluated for compliance with the requirements of the following codes:

- 2012, 2009 and 2006 *International Building Code*<sup>®</sup> (IBC)

#### 8.2 Uses:

See Section 2.0.

#### 8.3 Description:

See Section 3.0.

#### 8.4 Design and Installation:

##### 8.4.1 Design:

**8.4.1.1 General:** Structural design and installation of CCL Sheartrack used as punching shear reinforcement in reinforced concrete slabs must comply with the applicable provisions of ACI 318-11 for the 2012 IBC or AC318-08 for the 2009 IBC, as applicable. Under the 2006 IBC, compliance must be with ACI 318-05 and Sections 3.5.5, 7.7.5 and 11.11.5 of ACI 318-08. The specified yield strength of transverse reinforcement,  $f_{yt}$ , must not exceed the specified yield strength of the shear studs defined in Section 3.2.1.

**8.4.1.2 Design Considerations:** The structural design of CCL Sheartrack must determine and specify the following items, based on design requirements in this report:

- a. Number of studs per rail.
- b. Stud shank diameter.
- c. Base rail length.
- d. Shear rail assembly overall height (OH), which must comply with Section 11.11.5 of ACI 318-11 (2012 IBC) or -08 (2009 IBC).
- e. Stud spacing (s).
- f. Distance between column face and first peripheral line of studs ( $S_o$ ).
- g. Arrangement of headed shear stud reinforcement, which must comply with Sections 11.11.5.2 and 11.11.5.3 of ACI 318-11 (2012 IBC) or -08 (2009 IBC).

**8.4.1.3 Earthquake Loads:** See Section 4.1.3.

**8.4.1.3.1 General:** See Section 4.1.3.1.

**8.4.1.3.2 Shear Strength:** The nominal shear strength provided by the concrete in the presence of the headed shear stud reinforcement, referenced in Section 11.11.5.1 of ACI 318-11 or -08, must be revised as shown in Section 4.1.3.2.

This revision requires revisions to the nominal shear strength,  $V_n$ , and the maximum shear stress,  $v_n$ .

Two-way slabs without beams designated as part of the seismic-force-resisting system, must comply with the provisions in Section 21.3.6.8 of ACI 318-11 or -08 for 2012 and 2009 IBC, respectively, except that  $V_c$  must be limited as set forth in Section 4.1.3.2.

Two-way slabs without beams, which are not designated as part of the seismic force-resisting system, must comply

with the provisions in Section 21.13.6 of ACI 318-11 or -08 for the 2012 and 2009 IBC, respectively, or Section 21.11.5 of ACI 318-05 for the 2006 IBC, as applicable, except that  $V_c$  must be limited as set forth in Section 4.1.3.2 and the design story drift ratio specified in Section 21.13.6 ACI 318-11 or -08 or Section 21.11.5 of ACI 318-05, as applicable, must not exceed the drift ratio referenced in Table 12.12-1 of ASCE/SEI 7.

**8.4.2 Installation:** Installation of the CCL Sheartrack must comply with the applicable code and the approved engineering plans. The CCL Sheartrack assemblies must be positioned correctly around columns and set in accordance with the IBC and the approved construction documents. Concrete cover must comply with Section 7.7.5 of ACI 318-11 or -08. See Figure 1 for typical installation details.

**8.4.3 Special Inspection:** See Section 4.3, except for Section 1705.3 of the 2012 IBC and IBC Section 1704.4 for the 2009 and 2006 IBC.

**8.5 Conditions of Use:**

See Section 5.0.

**8.6 Evidence Submitted:**

See Section 6.0.

**8.7 Identification:**

See Section 7.0

TABLE 1—CCL SHEARTRACK STUD DIMENSIONS

SHANK DIAMETER, D [in. (mm)]	HEAD DIAMETER, H [in. (mm)]	H/D RATIO	SHANK AREA, S <sub>A</sub> [in. <sup>2</sup> (mm <sup>2</sup> )]	HEAD AREA, H <sub>A</sub> [in. <sup>2</sup> (mm <sup>2</sup> )]	H <sub>A</sub> /S <sub>A</sub> RATIO	HEAD THICKNESS, T [in. (mm)]
<sup>3</sup> / <sub>8</sub> (9.5)	1.19 (30.1)	3.17	0.110 (71)	1.112 (712)	10.1	0.24 (6.1)
<sup>1</sup> / <sub>2</sub> (12.7)	1.58 (40.2)	3.16	0.196 (127)	1.961 (1,269)	10.0	0.33 (8.4)
<sup>5</sup> / <sub>8</sub> (15.9)	1.98 (50.2)	3.17	0.307 (199)	3.079 (1,979)	10.0	0.40 (10.2)
<sup>3</sup> / <sub>4</sub> (19.1)	2.37 (60.2)	3.16	0.442 (287)	4.412 (2,846)	10.0	0.47 (12.0)

TABLE 2—BASE RAIL DIMENSIONS

STUD SHANK DIAMETER, D [in. (mm)]	PLATE WIDTH, W [in. (mm)]	PLATE THICKNESS, TH [in. (mm)]	PLATE LENGTH
<sup>3</sup> / <sub>8</sub> (9.5)	1.25 (31.8)	0.25 (6.4)	Determined by the registered design professional
<sup>1</sup> / <sub>2</sub> (12.7)	1.25 (31.8)	0.25 (6.4)	
<sup>5</sup> / <sub>8</sub> (15.9)	1.75 (44.5)	0.375 (9.5)	
<sup>3</sup> / <sub>4</sub> (19.1)	2.00 (50.8)	0.375 (9.5)	

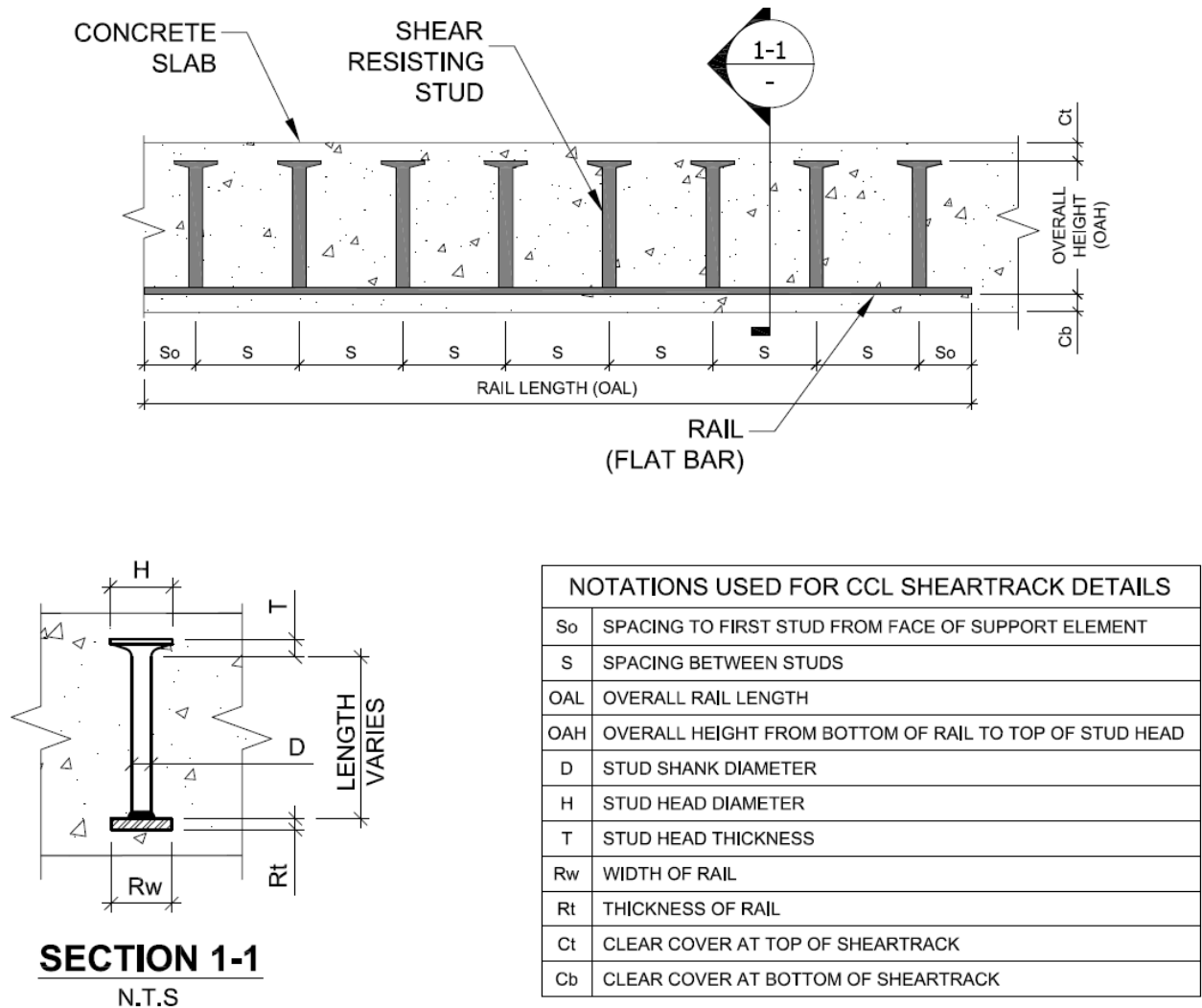


FIGURE 1—CCL SHEARTRACK DIAGRAM AND INSTALLATION