APPLICATION FOR OSHPD PREAPPROVAL OF MANUFACTURER'S CERTIFICATION (OPM)

OFFICE USE ONLY

APPLICATION #: OPM-0255

OSHPD Preapproval of Manufacturer's Certification (OPM)

Type: [X] New [ ] Renewal/Update

Manufacturer Information

Manufacturer: APC by Schneider-Electric

Manufacturer's Technical Representative: Greg Ivey

Mailing Address: 801 Corporate Centre Drive, O'Fallon, MO 63368

Telephone: (636) 300-2300 Email: greg.ivey@se.com

Product Information

Product Name: NETSHELTER SX

Product Type: Network Equipment Cabinet

Product Model Number: Netshelter SX Cabinet Series (AR3abcXXXX & AR9abcXXXX)

General Description: Data center network equipment cabinet. See OPM drawing sheet SK1a for specific models included in the OPM.

Applicant Information

Applicant Company Name: APC by Schneider-Electric

Contact Person: Greg Ivey

Mailing Address: 801 Corporate Centre Drive, O'Fallon, MO 63368

Telephone: (636) 300-2300 Email: greg.ivey@se.com

Title: Engineering Manager – Rack Systems

Registered Design Professonal Preparing Engineering Recommendations

Company Name: RMJ STRUCTURAL ENGINEERS

Name: Jayson Haines California License Number: S4801

Mailing Address: 103 Linden Avenue, , South San Francisco, CA 94080

Telephone: (650) 871 -2282 Email: JHaines@rmjse.com

OSHPD Special Seismic Certification Preapproval (OSP)

☐ Special Seismic Certification is preapproved under OSP OSP Number:

Certification Method

Testing in accordance with: ☐ ICC-ES AC156 ☐ FM 1950-16

☐ Other(s) (Please Specify):

*Use of criteria other than those adopted by the California Building Standards Code, 2019 (CBSC 2019) for component supports and attachments are not permitted. For distribution system, interior partition wall, and suspended ceiling seismic bracings, test criteria other than those adopted in the CBSC 2019 may be used when approved by OSHPD prior to testing.

☒ Analysis

☐ Experience Data

☐ Combination of Testing, Analysis, and/or Experience Data (Please Specify):

OSHPD Approval

Date: 10/29/2021

Name: Jeffrey Kikumoto Title: Senior Structural Engineer

Condition of Approval (if applicable):

GENERAL NOTES

DESIGN

1. This OSHPD pre-approval of Manufacturer's Certification (OPM) based on the 2019 CBC. The demand (Design) forces for use with this OPM shall be based on the 2019 CBC.
1. This Document may only be used with the express written consent of the manufacturer listed below for the specific project site and installation location. This document is invalid without such consent.

Design Criteria:
Importance Factor 1.5
Maximum Value of S_{DS}=2.0, a_P=1.0, R_P=2.5, Ω_0=2.0 (As req'd for anchorage to concrete), z/h=0.0 (Concrete slab on grade), z/h<=0.5 for raised floor in lower half of building height.
Forces per ASCE 7-16 section 13.3.1, Equations 13.3-1, 13.3-2 & 13.3-3.
Note: For Site Specific S_{DS}, SEOR shall determine appropriate value to be utilized.

Dimensions: Refer to rough concrete surfaces, or top of slab,unless otherwise indicated.

Fasteners Expansion Anchors:

Anchor Diameter	Concrete Type	Min. f'c (psi)	Anchor Type	ICC Report No.	h_{ef} Min. Embed.	Min. Spacing	Min. Edge Dist.	Min. Conc. Thickness	Torque Test	Direct Tension
1/2"	Normal Weight	3,000	Hilti Kwik Bolt TZ-2 CS	ESR-4266	2"	6"	24"	4"	50 FT-LB	1902 lb

This pre-approval allows for up to a maximum of two adjacent concrete slab edges, 24" away minimum. See detail below for additional minimum allowable concrete edge distances. Testing of expansion anchors per 2019 CBC, 1705A.3: After a minimum of 24 hours have elapsed since installation, bolt testing shall be done in the presence of the special inspector and a report of the test results shall be submitted to SEOR and building code enforcement agency. Testing may be, direct pull tension test or torque test of at least 50% of the anchors.

Pre-Approval Conditions:
Drawing package is in accordance with the 2019 California Building Code.
The details are applicable to locations in California where S_{DS} <= 2.0 and z/h <= 0.5. For site specific S_{DS}, SEOR shall determine appropriate value to be utilized.

Anchorage forces shown on the drawings are factored loads that are associated with strength design.

This pre-approval only applies to the supports & attachments of the cabinet unit to the structure.

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JAYSON E. HAINES
No. 4801
Exp. 12/31/2021
STRUCTURAL
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SCHNEIDER ELECTRIC
NETSHELTER SX

OSHPD CABINET
SUPPORTS AND ATTACHMENTS

Signed by JEH Date 10/25/2021

Job No. 15262

Sheet No. SK1

RACK MATRIX (Netshelter SX Series)

					Anchor forces (lbs)			
					z/h=0.0		z/h<=0.5	
Model #	WidthXDepth	Height	U ref. per EIA–310	Weight	T_u	V_u	T_u	V_u
AR3abc AR9abc	600x1070	658	12	130	1220	440	625	660
		924	18	159	1220	440	625	660
		1198	24	196	1220	440	625	660
		1991	42	275	1220	440	625	660
		2124	45	300	1220	440	625	660
		2258	48	327	1220	440	625	660
		2347	50	196	1220	440	625	660
		2436	52	367	1220	440	625	660
		2525	54	389	1220	440	625	660
	600x1200	1198	24	212	1220	440	625	660
		1991	42	295	1220	440	625	660
		2124	45	322	1220	440	625	660
		2258	48	350	1220	440	625	660
		2347	50	372	1220	440	625	660
		2436	52	394	1220	440	625	660
		2525	54	417	1220	440	625	660
	750x1070	1198	24	235	1220	440	625	660
		1991	42	335	1220	440	625	660
		2124	45	365	1220	440	625	660
		2258	48	398	1220	440	625	660
		2347	50	422	1220	440	625	660
		2436	52	447	1220	440	625	660
		2525	54	474	1220	440	625	660
	750x1200	1198	24	251	1220	440	625	660
		1991	42	355	1220	440	625	660
		2124	45	387	1220	440	625	660
		2258	48	422	1220	440	625	660
		2347	50	447	1220	440	625	660
		2436	52	474	1220	440	625	660
		2525	54	502	1220	440	625	660
	800x1070	1198	24	249	1220	440	625	660
		1991	42	355	1220	440	625	660
		2124	45	387	1220	440	625	660
		2258	48	422	1220	440	625	660
		2347	50	447	1220	440	625	660
		2436	52	474	1220	440	625	660
		2525	54	502	1220	440	625	660
	800x1200	1198	24	265	1220	440	625	660
		1991	42	375	1220	440	625	660
		2124	45	409	1220	440	625	660
		2258	48	446	1220	440	625	660
		2347	50	472	1220	440	625	660
		2436	52	501	1220	440	625	660
		2525	54	531	1220	440	625	660
	600x900	658	12	119	1220	440	625	660
		924	18	148	1220	440	625	660
		1198	24	185	1220	440	625	660

Anchor forces (lbs) — Maximum anchor value for either a single unit or set of ganged units. 600 mm units must ganged at ground floor; Single 600mm units not allowed at ground floor.

AR3abc and AR9abc Series cabinets defined by:

a denotes depth:

0	35.4" (900 mm) deep
1 or 2	42.1" (1070 mm) deep
3	47.2" (1200 mm) deep

b denotes width:

0 or 1	23.6" (600mm) wide
4 or 5	29.5 (750 mm) wide
8	31.5" (800 mm) wide

c denotes height:

0, 1 or 2	78.4" (1991 mm) high for 42U
3	25.9" (658 mm) high for 12U
4	47.2" (1198 mm) high for 24U
5	83.6" (2124 mm) high for 45U
6	36.4" (924 mm) high for 18U
7	88.9" (2258 mm) high for 48U
8	95.9" (2436 mm) high for 52U
9	99.4" (2525 mm) high for 54U

Note: U designations are per EIA–310
EIA is Electronic Industries Association

SCHNEIDER ELECTRIC CERTIFIES THIS DOCUMENT AS AN OUTLINE DRAWING.
SIGNATURE:
PRINT NAME: GREG IVEY
TITLE: ME MANAGER, RACK SYSTEMS
DATE: 8/26/2019

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U reference is depth of cabinet per Electronic Industries Alliance.

FOR PLAN REFERENCE, SEE SHEET SK4

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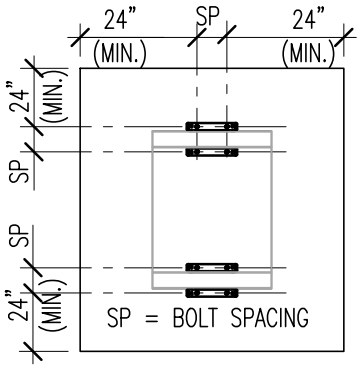
SCHNEIDER ELECTRIC NETSHELTER SX	Job No. 15262
OSHPD CABINET SUPPORTS AND ATTACHMENTS	Sheet No. SK1a
Signed by JEH Date 10/25/2021	

RESPONSIBILITY OF STRUCTURAL ENGINEER OF RECORD

1. Verify that the concrete meets the requirements of the applicable ICC ESR.
2. Verify that the anchors are at an adequate distance from any slab opening or edges.
3. Verify that all new or existing anchors are at an adequate distance from the anchors shown in this pre-approval. The SEOR shall verify that there is no adverse interaction where other anchors are within 18" or 6 h_{ef} from the unit's anchors.
4. Verify the adequacy of the structure to support the weight and forces shown in this pre-approval in addition to all other weights and forces that are imposed on it.
5. Provide any supplementary structure required for strength and stability.
6. Verify that the installation is in conformance with the 2019 CBC and with the notes and details shown in this pre-approval. Verify that the equipment's actual weight, center of gravity location, anchor locations, anchor details and the material and gage of the unit where attachments are made conform with the information shown in this pre-approval.
7. If content weight is less than 33 pcf, maximum live loads permitted shall be posted.



TYPICAL CONCRETE EDGE DETAIL

- Avoid damaging existing steel reinforcing in concrete slab when installing expansion anchors.
- Provide for full thread engagement of nut & washer.

Acceptance Criteria for Expansion Anchors:
Direction Tension Test:
Anchor shall maintain and hold test load of minimum (15) seconds & shall exhibit no discernable movement during the tension test, e.g., as evidenced by loosening of the washer under the nut.
Torque Test:
The applicable torque must be achieved within the following limits: wedge type: 1/2 turn of the nut.

Acceptance Criteria for Bolts thru Concrete on Metal Deck:
A. Bolts shall be torqued by $\frac{3}{4}$ turn of the nut, after snug tight condition is achieved. Snug tight condition is defined as the tightness required to bring the connected plies into firm contact.
B. Thru bolt holes size shall be 1/16" larger than bolt size for concrete.
C. Thru bolts in concrete shall receive Special Inspection and Testing (Through bolts with steel to steel connection in tension do not requrie tension testing) in accordance with requirements for post-installed concrete anchors.

*If any anchor fails testing, all anchors of the same type shall be tested, which are install by the same trade, not previously tested until twenty (20) consecutive anchors pass, then resume initial test frequency.

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SCHNEIDER ELECTRIC NETSHELTER SX	Job No. 15262
OSHPD CABINET SUPPORTS AND ATTACHMENTS	Sheet No. SK2
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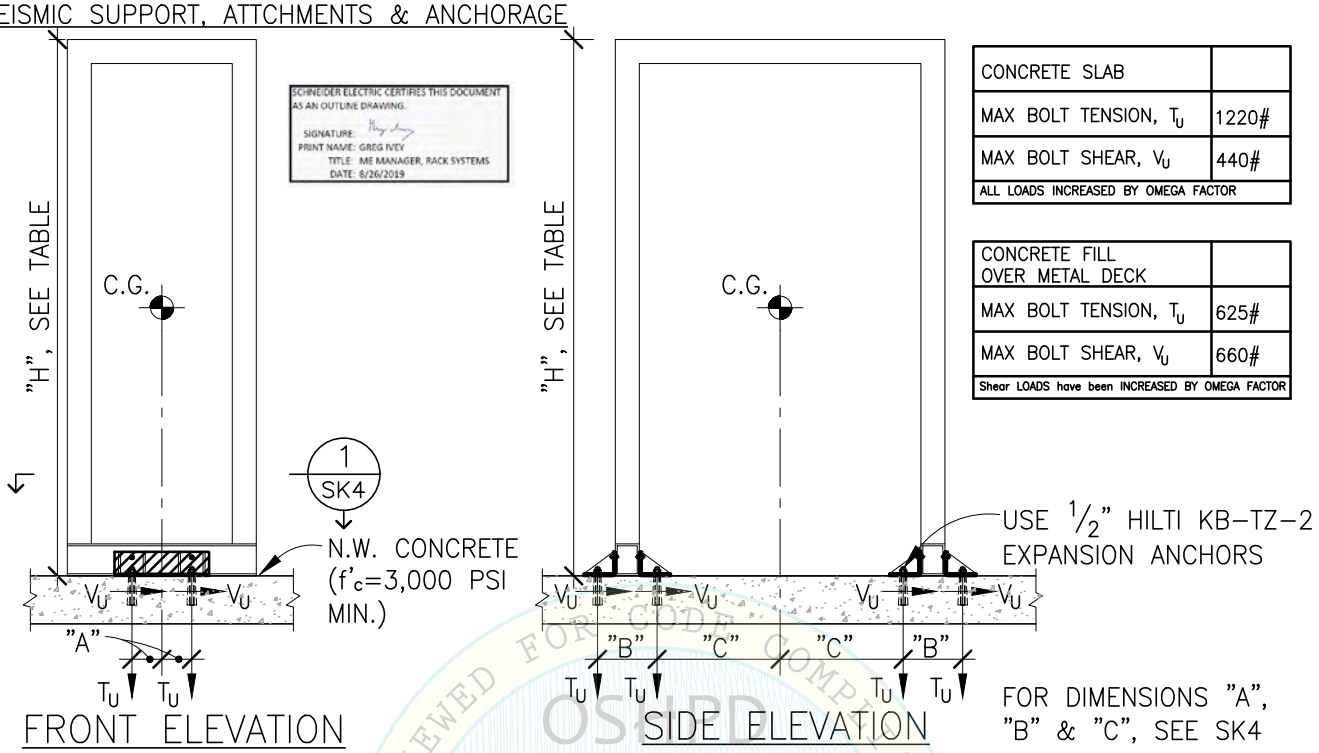
SEISMIC SUPPORT, ATTCHMENTS & ANCHORAGE



CONCRETE SLAB	
MAX BOLT TENSION, T_U	1220#
MAX BOLT SHEAR, V_U	440#
ALL LOADS INCREASED BY OMEGA FACTOR	

CONCRETE FILL OVER METAL DECK	
MAX BOLT TENSION, T_U	625#
MAX BOLT SHEAR, V_U	660#
Shear LOADS have been INCREASED BY OMEGA FACTOR	

NOTES:

1. DESIGN CENTER OF GRAVITY AT 1/2 THE HEIGHT OF THE UNIT. (NOTE: LOAD CABINET FROM BOTTOM FIRST)
2. FORCES ARE DETERMINED PER 2019 CBC AND ITS REFERENCED STANDARDS AND ASCE 7-16 STRENGTH DESIGN. (S_{DS}<=2.0(HIGH SEISMIC) 1.0(LOW SEISMIC), a_p=1.0, I_p=1.5, R_p=2.5, Ω_0=2.0, z/h=0(GROUND LEVEL) & z/h<=.5(50% OF BLDG. HT.)).
3. SEE GENERAL NOTES FOR ALL OTHER CONDITIONS AND LIMITATIONS.
4. NETSHELTER SX EXTERIOR CABINET UNIT COVER COMPOSED OF 14 ga COLD ROLLED STEEL 29.4 ksi.
5. SIGN MUST BE POSTED INDICATING CABINET TOTAL WT. LIMITS LISTED IN THE TABLE 1.
6. WEIGHTS LISTED IN "TABLE 1" APPLY TO ALL UNITS IRRESPECTIVE OF SIZE.
7. ARCHITECT OR ENGINEER OF RECORD TO VERIFY THE SPECIFIC CONFIGURATION OF THE COMPONENTS WITHIN THE CABINET COMPLIES WITH C.G. PARAMETERS INDICATED BY NOTE #1.

MAXIMUM CABINET TOTAL WEIGHT (TABLE 1)

MODEL NUMBER	MAX TOTAL WEIGHT, GROUND FLOOR, SINGLE UNIT*	MAX WEIGHT, GROUND FLOOR, GANGED UNIT* (WEIGHT PER UNIT)**	MAX TOTAL WEIGHT, UPPER FLOOR, SINGLE UNIT	MAX WEIGHT, UPPER FLOOR, GANGED UNIT* (WEIGHT PER UNIT)**
DIRECT ON FLOOR	800 LBS.	1200 LBS.	N/A	1100 LBS.

*MAX WEIGHT IS CABINET AND CONTENTS

**THIS WEIGHT IS PER CABINET IN GANGED CONFIGURATION; NO MAXIMUM ON # OF GANGED UNITS

MAXIMUM CABINET WEIGHTS	
600 mm WIDTH	417#
750 mm WIDTH	502#
800 mm WIDTH	531#

TABLE APPLIES TO 1070 mm AND 1200 mm CABINETS

ALLOWABLE CONTNET WEIGHT IS DIFFERENCE BETWEEN CABINET WEIGHT AND MAX WEIGHT NOTED IN TABLE

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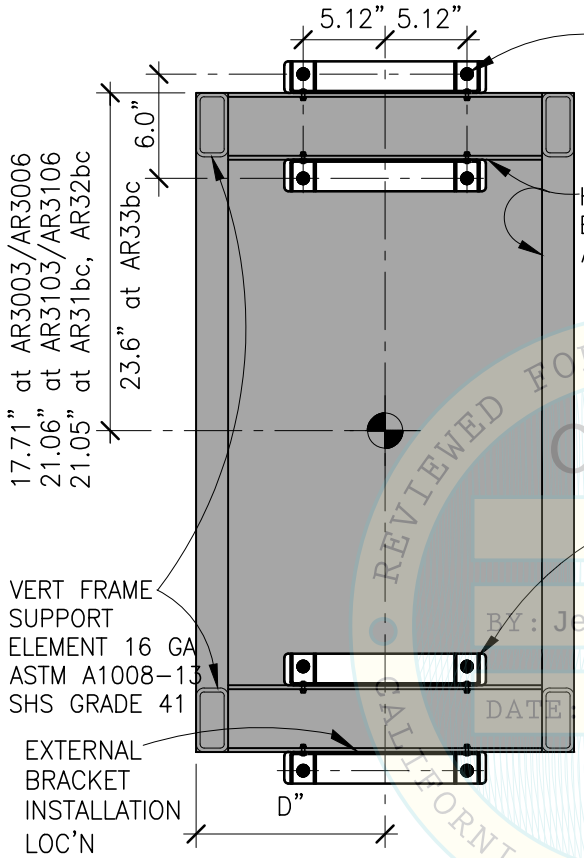
SCHNEIDER ELECTRIC NETSHELTER SX	Job No. 15262
OSHPD CABINET SUPPORTS AND ATTACHMENTS	Sheet No. SK3
Signed by JEH Date 10/25/2021	

NOTES:
*SEE Rack Matrix on sheet SK1a for all possible dimensions. Design based on AR3 & AR9 series rack.
*INTERNAL and EXTERNAL BRACKETS SHALL BE INSTALLED FOR OSHPD PROJECTS.

CONDITION SCHEDULE

CONDITION	SEE
CONCRETE SLAB	SK6



AR3abc & AR9abc SERIES BOTTOM PLAN VIEW

PLAN 1 / SK4
N.T.S.

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TITLE: ME MANAGER, RACK SYSTEMS
DATE: 8/26/2019

BOLT REQUIREMENTS
1. USE 8 EXPANSION BOLTS PER CABINET, WITH 4 EACH SIDE, THRU BRACKET

BRACKET MATERIAL (0.1181" THK, ASTM A1008-13 SHS GRADE 41) w/ M8 (ISO 898-1 CLASS 10.9) BOLTS PROVIDED BY NETSHELTER.

AR3abc and AR9abc- as follows
a denotes depth:
0 35.4" (900 mm) deep
1 or 2 42.1" (1070 mm) deep
3 47.2" (1200 mm) deep
b denotes width:
0 or 1 23.6" (600 mm) wide
4 or 5 29.5" (750 mm) wide
8 31.5" (800 mm) wide
c denotes height: (U designations per EIA-310)
(EIA is Electronic Industries Association)
0, 1 or 2 78.4" (1991 mm) high for 42U rack
4 47.2" (1198 mm) high for 24U rack
5 83.6" (2124 mm) high for 45U rack
6 92.4" (2347 mm) high for 50U rack
7 88.9" (2258 mm) high for 48U rack
8 95.9" (2436 mm) high for 52U rack
9 99.4" (2525 mm) high for 54U rack

MAX/MIN DIMENSIONS: (TABLE 2) THESE ARE JUST THE MAX/MIN TABULATED VALUES FROM TABLE ON SHT SK1a".

MODEL	"H" MAX (in.)	"D" MIN (in.)	MAX CABINET FRAME WEIGHT
AR3abc	99.4"	11.8"	531#
AR9abc	99.4"	11.8"	531#

BASED ON ARa0c and AR3a1c SERIES or AR9a1c SERIES

BASED ON AR3ab9 SERIES or AR9ab9 SERIES

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SCHNEIDER ELECTRIC NETSHELTER SX

OSHPD CABINET SUPPORTS AND ATTACHMENTS

Signed by JEH Date 10/25/2021

Job No. 15262

Sheet No. SK4

NOTES:
*SEE Rack Matrix on sheet SK1a for all possible dimensions. Design based on AR3 & AR9 series rack.
*INTERNAL and EXTERNAL BRACKETS SHALL BE INSTALLED FOR OSHPD PROJECTS.

CONDITION SCHEDULE

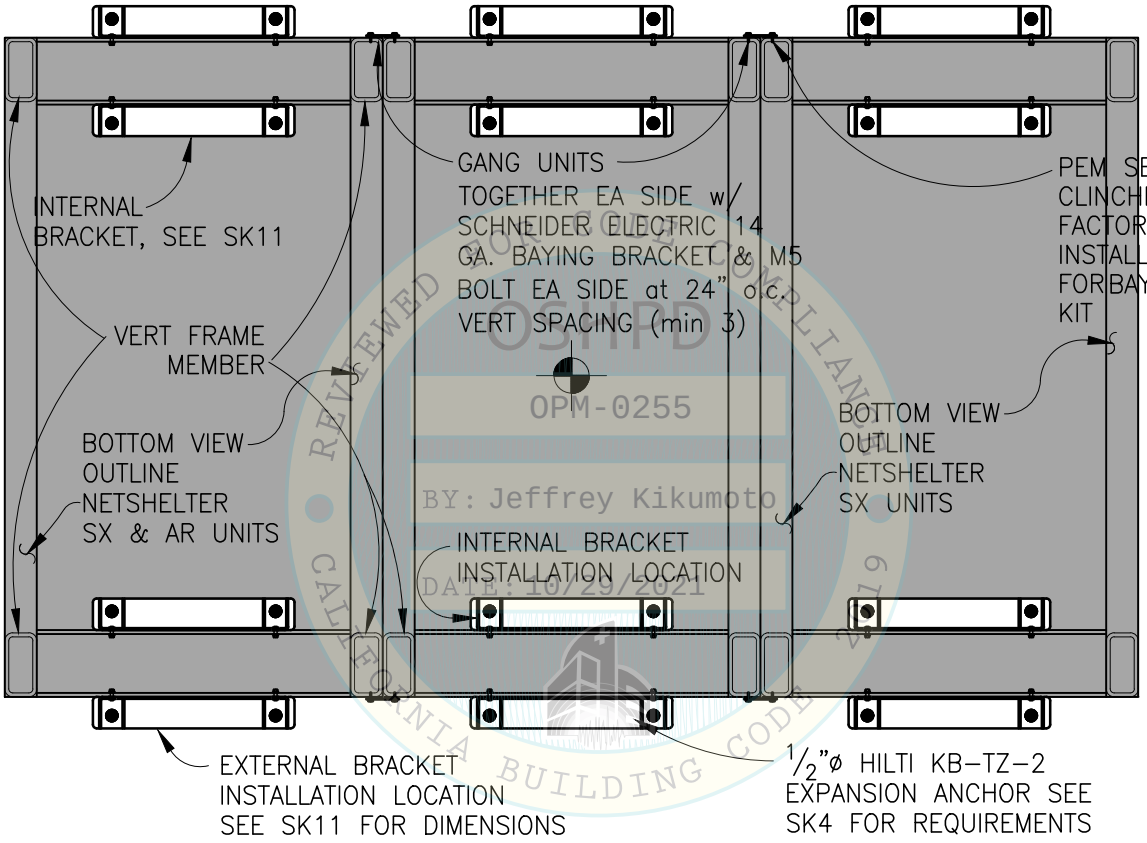
CONDITION	SEE
CONCRETE SLAB	SK6
CONCRETE FILL OVER METAL DECK	SK7

CONCRETE SLAB	
MAX BOLT TENSION, T_U	1220#
MAX BOLT SHEAR, V_U	440#
ALL LOADS have been INCREASED BY OMEGA FACTOR	

CONCRETE FILL OVER METAL DECK	
MAX BOLT TENSION, T_U	625#
MAX BOLT SHEAR, V_U	660#
Shear LOADS have been INCREASED BY OMEGA FACTOR	

INSTALLATION FOR THE FOLLOWING CONDITIONS:

1. SEE BOLT REQUIREMENTS ON SK4 FOR ANCHORAGE REQUIREMENTS.



GANG UNIT BOTTOM PLAN VIEW (3 UNITS OR MORE GANGED TOGETHER)
NO MAXIMUM # OF UNITS

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PLAN 1 / SK5
N.T.S.

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SCHNEIDER ELECTRIC NETSHELTER SX
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Job No. 15262
Sheet No. SK5

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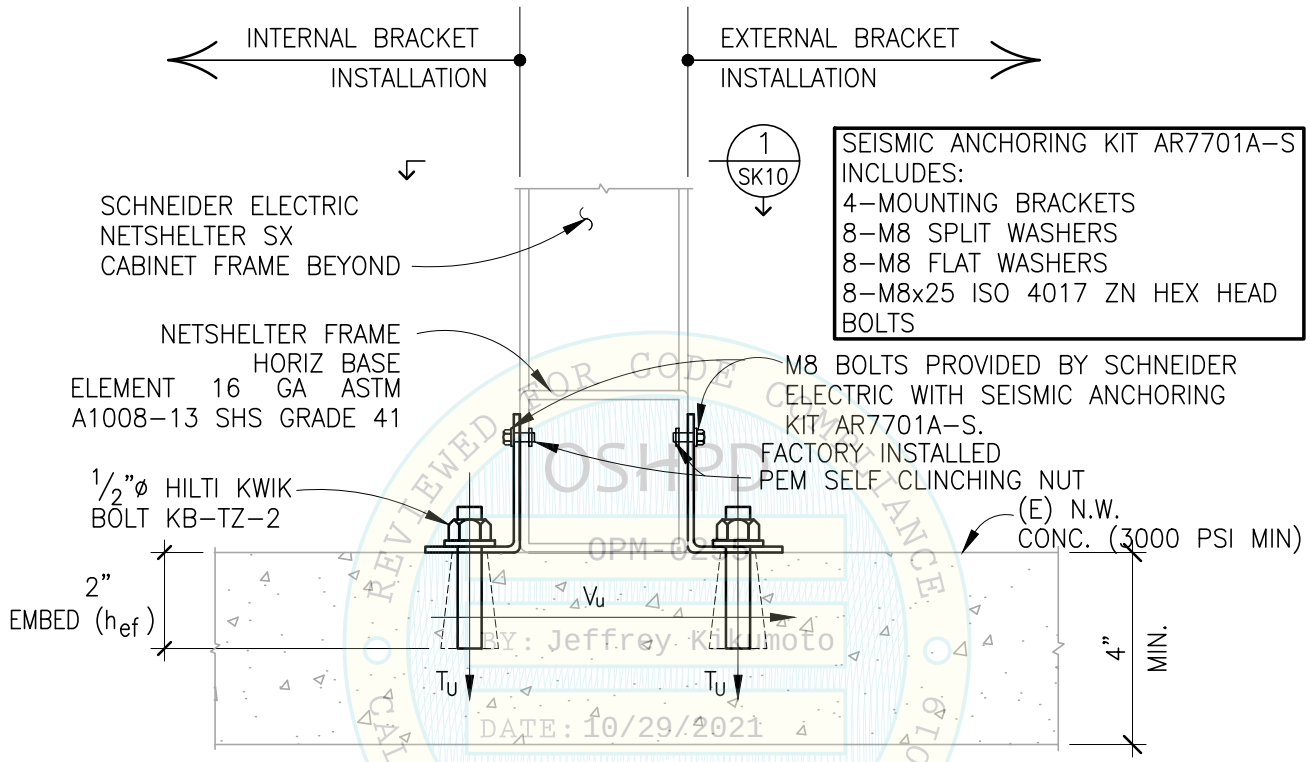

CONCRETE SLAB INSTALLATION DETAIL 1/SK6

3"=1'-0"

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SCHNEIDER NETSHELTER SX UNIT CABINET NOTES:

1. CABINET COVER GAGE THICKNESS SHALL NOT BE LESS THAN 16 ga.
2. BASE MATERIAL SHALL BE COLD ROLLED STEEL 29.4 ksi.
3. THE STRUT(S) AND ITS ATTACHMENTS ARE DESIGNED TO RESIST A LOAD NOT LESS THAN $V_{U\ STRUT}$ IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT, WHERE $V_{U\ STRUT}=0.7V_U$ x (NO. OF ANCHORS ENGAGED BY STRUT), MIN.

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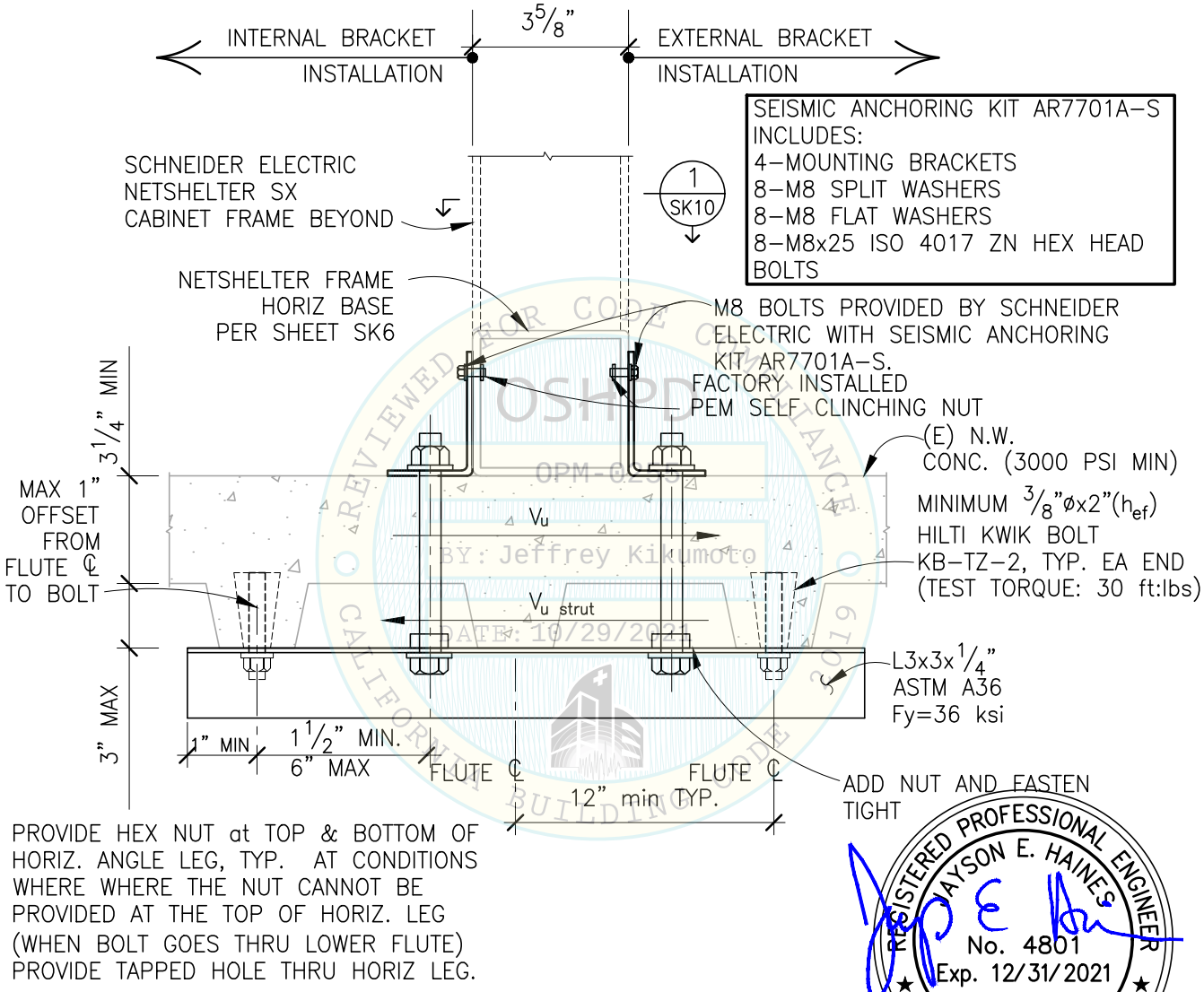

PROVIDE HEX NUT at TOP & BOTTOM OF HORIZ. ANGLE LEG, TYP. AT CONDITIONS WHERE WHERE THE NUT CANNOT BE PROVIDED AT THE TOP OF HORIZ. LEG (WHEN BOLT GOES THRU LOWER FLUTE) PROVIDE TAPPED HOLE THRU HORIZ LEG.

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CONCRETE FILL OVER METAL DECK INSTALLATION

DETAIL 1/SK7

3"=1'-0"

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SCHNEIDER ELECTRIC NETSHELTER SX	Job No. 15262
OSHPD CABINET SUPPORTS AND ATTACHMENTS	Sheet No. SK7
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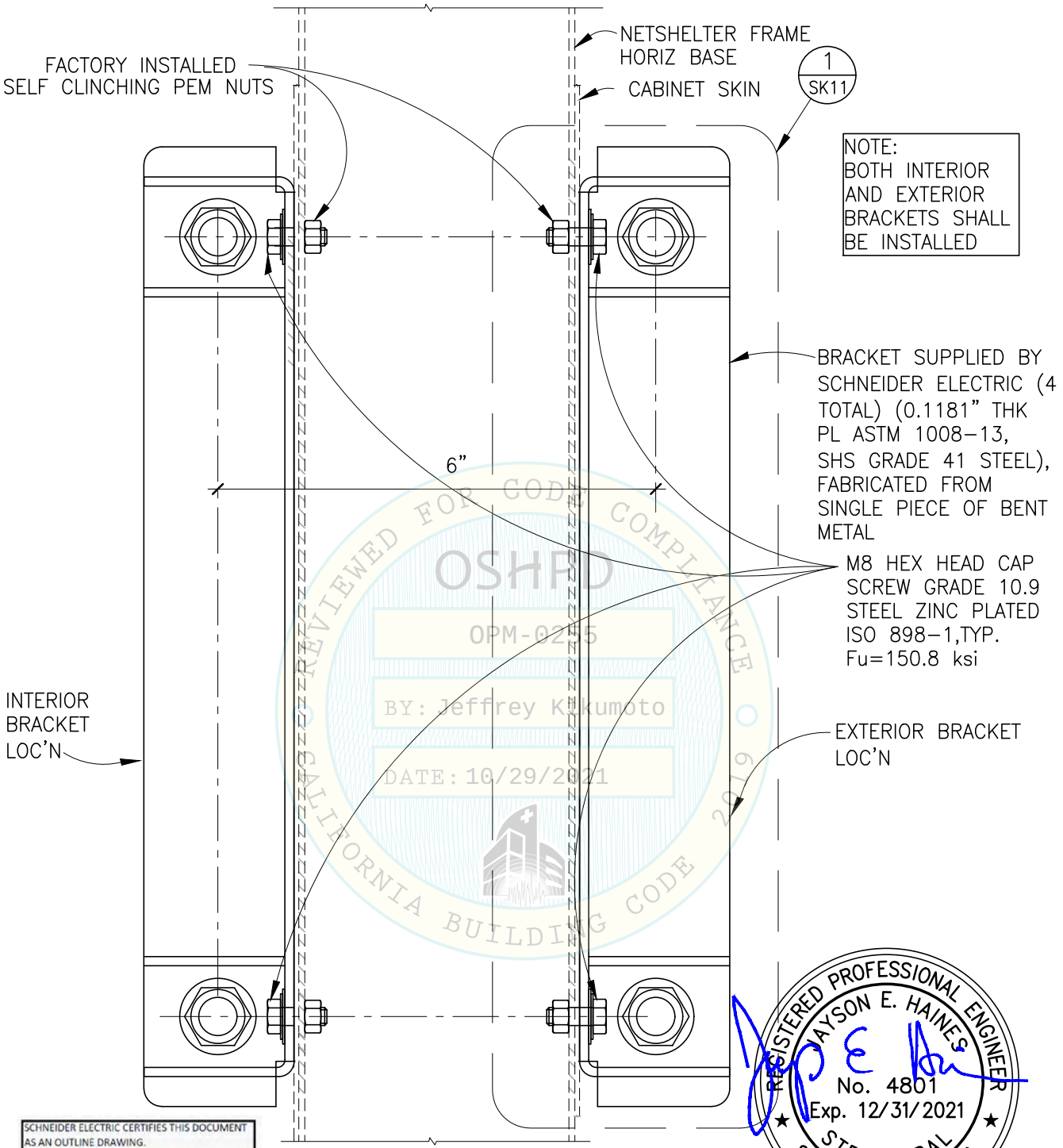

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DETAIL 1
N.T.S. SK10

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SCHNEIDER ELECTRIC
NETSHELTER SX

OSHPD CABINET
SUPPORTS AND ATTACHMENTS

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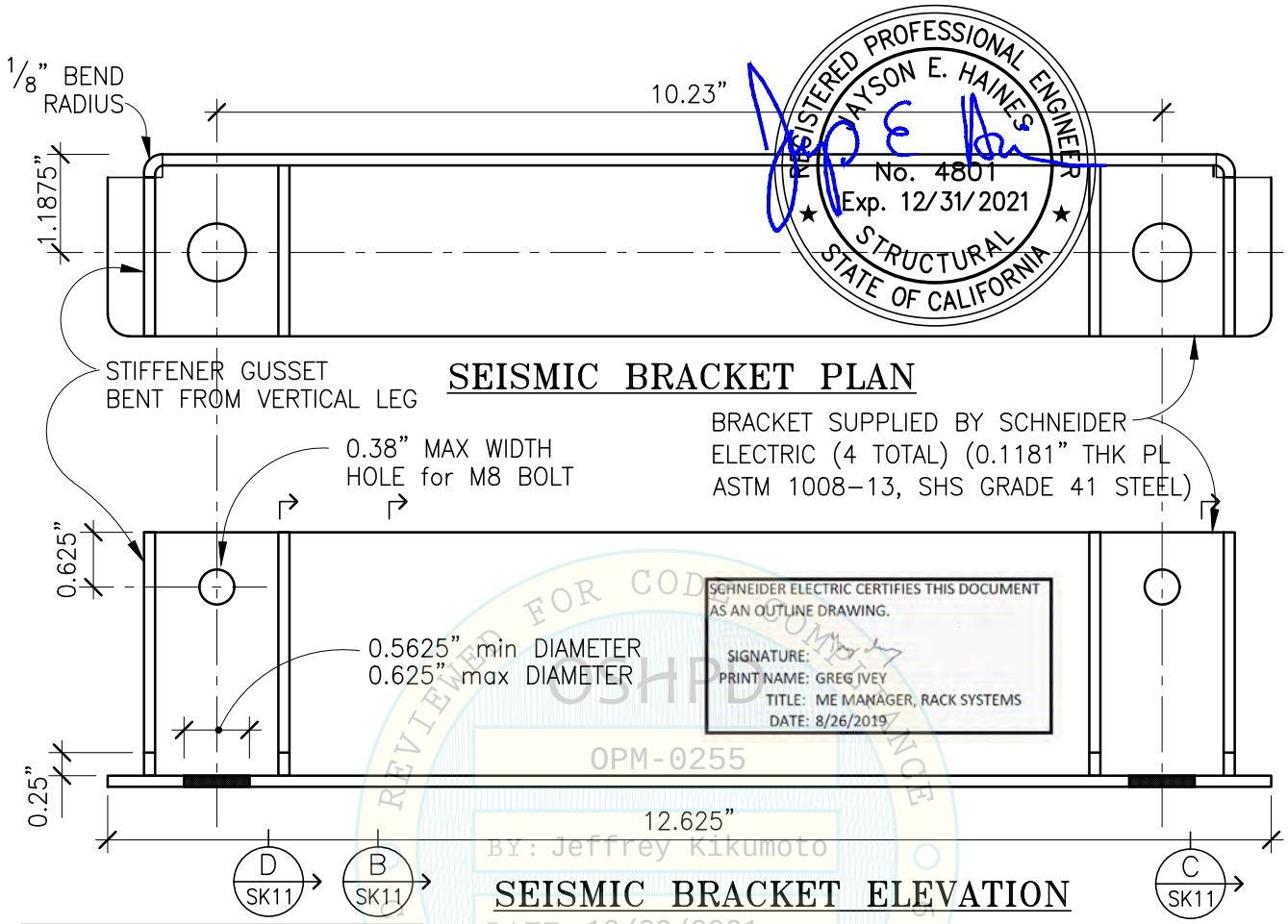
Job No. 15262

Sheet No. SK10

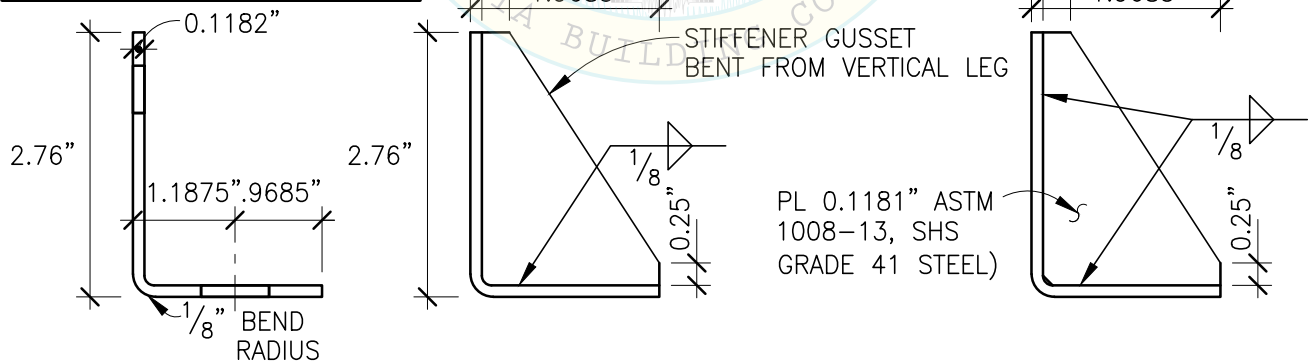


SEISMIC BRACKET PLAN

SEISMIC BRACKET ELEVATION

NOTE:
BRACKET SHALL BE FABRICATED BY SCHEINDER ELECTRIC WITH METRIC DIMENSIONS, PER SCHNEIDER STANDARDS

DETAIL 1 / SK11
N.T.S.



SEC. B / SK11
N.T.S.

SEC. C / SK11
N.T.S.

SEC. D / SK11
N.T.S.

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SCHNEIDER ELECTRIC NETSHELTER SX

OSHPD CABINET SUPPORTS AND ATTACHMENTS

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Sheet No. SK11