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

OFFICE USE ONLY

APPLICATION #: OPM-0503

HCAI Preapproval of Manufacturer's Certification (OPM)

Type: ☐ New ☒ Renewal/Update

Manufacturer Information

Manufacturer: Legrand AV (Middle Atlantic)

Manufacturer's Technical Representative: Sudharsan Yogasuntharam

Mailing Address: 300 Fairefaild Road, Fairefield, NJ 07004

Telephone: (973) 839-1011 Email: sudharsan.yogasuntharam@legrand.com

Product Information

Product Name: AXS-IR Series

Product Type: Racks and Enclosures

Product Model Number: AXS-IR-1927-20, AXS-IR-1932-26, AXS-IR-1938-26, AXS-IR-2527-20, AXS-IR-2532-26, AXS-IR-2538-26, AXS-IR-3827-20, AXS-IR-3832-26, AXS-IR-3838-26, AXS-IR-4127-20, AXS-IR-4132-26, AXS-IR-4138-26, AXS-IR-4527-20, AXS-IR-4532-26, AXS-IR-4538-26

General Description: Gang-able Floor Standing Enclosures intended to enclose audio, video and IT equipment.

Applicant Information

Applicant Company Name: Legrand AV (Middle Atlantic)

Contact Person: Sudharsan Yogasuntharam

Mailing Address: 300 Fairefaild Road, Fairefield, NJ 07004

Telephone: (973) 839-1011 Email: sudharsan.yogasuntharam@legrand.com

Title: Compliance Engineer

Registered Design Professonal Preparing Engineering Recommendations

Company Name: SIMPSON GUMPERTZ & HEGER

Name: William Bruin California License Number: CE57867

Mailing Address: 500 12th Street, Suite 270, Oakland, CA 94607

Telephone: (510) 457-4456 Email: wmbruin@sgh.com

HCAI 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 HCAI prior to testing.

☒ Analysis

☐ Experience Data

☒ Combination of Testing, Analysis, and/or Experience Data (Please Specify): Tilt table testing in addition to FEM analysis

HCAI Approval

Date: 7/27/2022

Name: Mohammad Aliaari Title: Senior Structural Engineer

Condition of Approval (if applicable):

GENERAL

1. THIS HCAI PREAPPROVAL OF MANUFACTURE'S CERTIFICATION (OPM) IS BASED ON THE CBC2019. THE DEMAND (DESIGN FORCE) FOR USE WITH THIS OPM SHALL BE BASED ON THE CBC 2019

2. THE WORK SHOWN ON THESE DRAWINGS IS FOR THE SEISMIC SUPPORTS & ATTACHMENTS OF THE SUBJECT RACK ENCLOSURES. MAXIMUM PERMISSIBLE CONTENT CAPACITIES FOR VARIOUS HEIGHTS WITHIN THE BUILDING ARE PROVIDED IN TABLES 1 THRU 7.

3. SEISMIC SUPPORTS & ATTACHMENTS DESIGN HAS BEEN DONE IN ACCORDANCE WITH THE 2019 EDITION OF THE CALIFORNIA BUILDING CODE, PART 2, VOLUME 2 OF 2, AND ASCE 7-16, USING THE FOLLOWING PARAMETERS:

   I_P = 1.5 (CBC §1617.1.17)
   $S_{DS} \leq 2.04G$
   Ω_O = 2.0
   a_P= 2.5, R_P = 6
   Z, H= VARIES

   LATERAL FORCE, $F_{P,H} = [(0.4\ a_P S_{DS}\ I_P\ W_P) / R_P]*(1 + 2\ Z/H)$
   VERTICAL FORCE, $F_{P,V} = 0.2 S_{DS} W_P$

4. DESIGN LOADS SHOWN IN TABLE 1 ARE FACTORED LOADS THAT SHALL BE USED FOR STRENGTH DESIGN.

5. THIS PREAPPROVAL COVERS ONLY THE SUPPORTS & ATTACHMENTS OF THE EQUIPMENT TO THE STRUCTURE. IT DOES NOT COVER THE COMPONENT OR ITS CONTENTS. IF THE RACKS CONTAIN INTERNAL COMMUNICATION SERVERS & ROUTERS, SPECIAL SEISMIC CERTIFICATION IS REQUIRED.

6. MFR RESPONSIBLE FOR EQUIPMENT INCLUDING SEISMIC BRACKETS. CONTRACTOR RESPONSIBLE FOR ANCHOR HARDWARE & INSTALLATION.

INSTALLATION NOTES

1. RACK ENCLOSURES MAY BE ANCHORED TO EITHER A SAND LIGHT- OR NORMAL-WEIGHT, REINFORCED CONCRETE FLOOR OR SLAB (TABLES 2-4) OR SAND LIGHT- OR NORMAL-WEIGHT CONCRETE FILL OVER METAL DECK (TABLES 5-7). IN ALL CASES, THE MINIMUM CONCRETE COMPRESSIVE STRENGTH (F'C) SHALL BE 3,000 PSI.

2. REINFORCED CONCRETE FLOOR SLAB (OR CONCRETE FILL OVER METAL DECK) SHALL HAVE MINIMUM THICKNESS BASED ON THE ANCHOR TYPES AS NOTED IN TABLE 8 AND 9

3. INSTALLATION OF THE RACK ENCLOSURES IS LIMITED TO INTERIOR LOCATIONS ONLY, WHERE DESIGN IS CONTROLLED BY SEISMIC FORCES.

4. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS PRE-APPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.

5. SEOR MUST ENSURE THE ENCLOSURE RACK IS LOADED SO THAT THE CG IS NO HIGHER THAN THE CG SHOWN HEREIN. THE EQUIPENT MANUFACTURER HAS DESIGNED THE UNIT TO MAKE THE C.G. LESS THAN OR EQUAL TO THE HEIGHT DIMENSION SHOWN ON SHEET 6.

Anchor Type (Reference Table)	Demand Parameter	Maximum Shear (V_u) and Tension (T_u) Per Anchor (pounds) Elevation in Building (z/h) 0 (Ground)	1/3	2/3	≤ 1
Epoxy Anchor Solid Slab of NW Concrete (Table 2)	V_u	836	836	1060	1354
	T_u	2656	2656	2855	2795
Expansion Anchor Solid Slab of NW Concrete (Table 3)	V_u	818	818	1053	1080
	T_u	1880	1880	1895	1882
Expansion Anchor Solid Slab of Sand LW Concrete (Table 4)	V_u	753	753	743	757
	T_u	1295	1295	1299	1276
Expansion Anchor NW Concrete Fill over Deck (Table 5)	V_u	753	753	743	732
	T_u	1247	1247	1262	1245
Expansion Anchor Sand LW Concrete Fill over Deck (Table 6)	V_u	514	514	511	508
	T_u	824	824	838	842
Thru-Bolt Connection NW or Sand LW Concrete over Deck (Table 7)	V_u	1394	1394	1394	1394
	T_u	2185	2185	2185	2185

TABLE 1: MAXIMUM DEMAND LOADS FOR AXS-IR SERIES ENCLOSURES (SEE FOOTNOTES 1-3)

FOOTNOTES TABLE 1

1. INCLUDES ALL AXS-IR SERIES RACK ENCLOSURES UP TO A HEIGHT OF 45 SPACES.

2. DEMAND LOADS ARE MAXIMUM ULTIMATE LOADS PER ANCHOR, INCLUDING AN OVERSTRENGTH FACTOR (Ω_O = 2.0).

3. DEMAND LOADS ARE THE WORST CASE FOR A GIVEN ANCHOR AND ELEVATION COMBINATION, LOADED TO THE CONTENT CAPACITIES PROVIDED IN THE REFERNCED TABLES.

4. THESE LOADS ARE PROVIDED FOR THE END USER TO CHECK THE SLAB AND BUILDING STRUCTURE.

5. THE MAXIMUM TENSION AND SHEAR SHOWN ARE INDEPENDENT MAXIMUMS. THEY DO NOT OCCUR SIMULTANEOUSLYFOR THE SAME UNIT OR INSTALLATION SCENARIO. THUS THEY MAY BE CONSERVATIVE FOR SOME INSTALLATIONS.

6. ANCHORAGE CAPACITIES WERE VALIDATED WITHIN THIS OPM APPLICATION USING CONCURRENT LOADS FOR SPECIFIC INSTALLATION SCENARIOS.

Date Signed: 1/7/2022

USED ON: - -	APPROVALS	DATE
	MODELED	
	DRAWN	
NEXT ASSY: - -	CIRCLED DIMENSIONS ARE CRITICAL INSPECTION DIMENSIONS	
MATERIAL: SEE COMPONENTS	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES TOLERANCES ARE: DECIMAL: 2 PLC ±.03 3 PLC ±.010 FRACTIONS: ±1/32 ANGLES: ±°	Middle Atlantic Products, Inc
FINISH - - - -	SCALE = 1/8	TITLE: AXS-IR-SERIES HCAI
		PART NO. / PART REV
		SIZE B / DXF NO. NONE
		DWG NO. / DWG REV

RACK ENCLOSURE CAPACITY TABLES

TABLE 2: AXS-IR SERIES ENCLOSURES & MAXIMUM HCAI SEISMIC CONTENT CAPACITY (LBS) WITH APPROVED EPOXY ANCHORING SYSTEM IN SOLID SLAB NORMAL WEIGHT CONCRETE (SEE FOOTNOTES 1-4)

RACK ENCLOSURE	ELEVATION IN BUILDING (Z/H) GROUND	1/3	2/3	≤1.0
AXS-IR-1927-20	1200	1200	1200	1200
AXS-IR-1932-26	1200	1200	1200	1200
AXS-IR-1938-26	1200	1200	1200	1200
AXS-IR-2527-20	1200	1200	1200	1150
AXS-IR-2532-26	1200	1200	1200	1150
AXS-IR-2538-26	1200	1200	1200	1150
AXS-IR-3827-20	1200	1200	1100	825
AXS-IR-3832-26	1200	1200	1100	825
AXS-IR-3838-26	1200	1200	1100	825
AXS-IR-4127-20	1200	1200	1025	750
AXS-IR-4132-26	1200	1200	1025	750
AXS-IR-4138-26	1200	1200	1025	750
AXS-IR-4527-20	1200	1200	950	675
AXS-IR-4532-26	1200	1200	950	675
AXS-IR-4538-26	1200	1200	950	675

FOOTNOTES TABLE 2

1. INCLUDES ALL AXS-IR SERIES RACK ENCLOSURES UP TO A HEIGHT OF 45 SPACES
2. RACK ENCLOSURES SHALL BE INSTALLED WITH MIDDLE ATLANTIC AXS-IR-Z4K SEISMIC KIT PER MANUFACTURER INSTRUCTIONS, WITH THE ADDITION OF A 5/8" WELD WASHER AT EACH ANCHOR LOCATION
3. THE SUPPORTED RACK ENCLOSURE CONTENTS SHALL BE DISTRIBUTED WITHIN THE ENCLOSURE SUCH THAT 50% OF THE TOTAL WEIGHT IS LOCATED WITHIN THE BOTTOM THIRD OF THE RACK ENCLOSURE HEIGHT, 25% IN THE MIDDLE THIRD, AND 25% IN THE TOP THIRD. CONTENTS ARE IN ADDITION TO UNIT SELF-WEIGHT
4. ANCHORAGE WITH HILTI HIT-RE 500 V3 (ICC-ES ESR 3184) OR SIMPSON STRONG-TIE SET-XP (ICC-ES ESR 2508). REFER TO TABLE 8.
5. RATED RACK CAPACITY = 1200 LBS

TABLE 3: AXS-IR SERIES ENCLOSURES & MAXIMUM HCAI SEISMIC CONTENT CAPACITY (LBS) WITH APPROVED EXPANSION ANCHORS IN SOLID SLAB NORMALWEIGHT CONCRETE (SEE FOOTNOTES 1-4)

RACK ENCLOSURE	ELEVATION IN BUILDING (Z/H) GROUND	1/3	2/3	≤1
AXS-IR-1927-20	1200	1200	1200	925
AXS-IR-1932-26	1200	1200	1200	925
AXS-IR-1938-26	1200	1200	1200	925
AXS-IR-2527-20	1200	1200	1000	750
AXS-IR-2532-26	1200	1200	1000	750
AXS-IR-2538-26	1200	1200	1000	750
AXS-IR-3827-20	950	950	700	500
AXS-IR-3832-26	950	950	700	500
AXS-IR-3838-26	950	950	700	500
AXS-IR-4127-20	900	900	625	450
AXS-IR-4132-26	900	900	625	450
AXS-IR-4138-26	900	900	625	450
AXS-IR-4527-20	800	800	575	400
AXS-IR-4532-26	800	800	575	400
AXS-IR-4538-26	800	800	575	400

FOOTNOTES TABLE 3

1. INCLUDES ALL AXS-IR SERIES RACK ENCLOSURES UP TO A HEIGHT OF 45 SPACES
2. RACK ENCLOSURES SHALL BE INSTALLED WITH MIDDLE ATLANTIC AXS-IR-Z4K SEISMIC KIT PER MANUFACTURER INSTRUCTIONS, WITH THE ADDITION OF A 5/8" WELD WASHER AT EACH ANCHOR LOCATION
3. THE SUPPORTED RACK ENCLOSURE CONTENTS SHALL BE DISTRIBUTED WITHIN THE ENCLOSURE SUCH THAT 50% OF THE TOTAL WEIGHT IS LOCATED WITHIN THE BOTTOM THIRD OF THE RACK ENCLOSURE HEIGHT, 25% IN THE MIDDLE THIRD, AND 25% IN THE TOP THIRD. CONTENTS ARE IN ADDITION TO UNIT SELF-WEIGHT
4. ANCHORAGE WITH HILTI KWIK-BOLT TZ2 OR SIMPSON STRONG-TIE STRONG BOLT 2. REFER TO TABLE 8.
5. RATED RACK CAPACITY = 1200 LBS

TABLE 4: AXS-IR SERIES ENCLOSURES & MAXIMUM HCAI SEISMIC CONTENT CAPACITY (LBS) WITH APPROVED EXPANSION ANCHORS IN SOLID SLAB SAND-LIGHTWEIGHT CONCRETE (SEE FOOTNOTES 1-4)

RACK ENCLOSURE	ELEVATION IN BUILDING (Z/H) GROUND	1/3	2/3	≤1
AXS-IR-1927-20	1100	1100	800	600
AXS-IR-1932-26	1100	1100	800	600
AXS-IR-1938-26	1100	1100	800	600
AXS-IR-2527-20	900	900	650	450
AXS-IR-2532-26	900	900	650	450
AXS-IR-2538-26	900	900	650	450
AXS-IR-3827-20	600	600	425	275
AXS-IR-3832-26	600	600	425	275
AXS-IR-3838-26	600	600	425	275
AXS-IR-4127-20	550	550	375	250
AXS-IR-4132-26	550	550	375	250
AXS-IR-4138-26	550	550	375	250
AXS-IR-4527-20	500	500	340	210
AXS-IR-4532-26	500	500	340	210
AXS-IR-4538-26	500	500	340	210

FOOTNOTES TABLE 4

1. INCLUDES ALL AXS-IR SERIES RACK ENCLOSURES UP TO A HEIGHT OF 45 SPACES
2. RACK ENCLOSURES SHALL BE INSTALLED WITH MIDDLE ATLANTIC AXS-IR-Z4K SEISMIC KIT PER MANUFACTURER INSTRUCTIONS, WITH THE ADDITION OF A 5/8" WELD WASHER AT EACH ANCHOR LOCATION
3. THE SUPPORTED RACK ENCLOSURE CONTENTS SHALL BE DISTRIBUTED WITHIN THE ENCLOSURE SUCH THAT 50% OF THE TOTAL WEIGHT IS LOCATED WITHIN THE BOTTOM THIRD OF THE RACK ENCLOSURE HEIGHT, 25% IN THE MIDDLE THIRD, AND 25% IN THE TOP THIRD. CONTENTS ARE IN ADDITION TO UNIT SELF-WEIGHT
4. ANCHORAGE WITH HILTI KWIK-BOLT TZ2 OR SIMPSON STRONG-TIE STRONG BOLT 2. REFER TO TABLE 8.
5. RATED RACK CAPACITY = 1200 LBS

SGH

REGISTERED PROFESSIONAL ENGINEER WILLIAM M. BRUIN No. C 57867 CIVIL STATE OF CALIFORNIA

Date Signed: 1/7/2022

USED ON: - -	APPROVALS	DATE	Middle Atlantic Products, Inc
NEXT ASSY: - -	MODELED		TITLE: AXS-IR-SERIES HCAI
MATERIAL: SEE COMPONENTS	DRAWN		PART NO. / PART REV
FINISH: - -	CIRCLED DIMENSIONS ARE CRITICAL INSPECTION DIMENSIONS		SIZE B / DXF NO. NONE
	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES TOLERANCES ARE: DECIMAL: 2 PLC ±.03, 3 PLC ±.010 FRACTIONS: ±1/32 ANGLES: ±1°		DWG NO. / DWG REV
	SCALE = 1/16		

TABLE 5: AXS-IR SERIES ENCLOSURES & MAXIMUM HCAI SEISMIC CONTENT CAPACITY (LBS) WITH APPROVED EXPANSION ANCHORS IN NORMAL WEIGHT CONCRETE FILL OVER METAL DECK (SEE FOOTNOTES 1-4)

RACK ENCLOSURE	ELEVATION IN BUILDING (Z/H) GROUND	1/3	2/3	≤1
AXS-IR-1927-20	1100	1100	800	575
AXS-IR-1932-26	1100	1100	800	575
AXS-IR-1938-26	1100	1100	800	575
AXS-IR-2527-20	875	875	625	450
AXS-IR-2532-26	875	875	625	450
AXS-IR-2538-26	875	875	625	450
AXS-IR-3827-20	575	575	400	275
AXS-IR-3832-26	575	575	400	275
AXS-IR-3838-26	575	575	400	275
AXS-IR-4127-20	525	525	350	225
AXS-IR-4132-26	525	525	350	225
AXS-IR-4138-26	525	525	350	225
AXS-IR-4527-20	475	475	325	200
AXS-IR-4532-26	475	475	325	200
AXS-IR-4538-26	475	475	325	200

FOOTNOTES TABLE 5

1. INCLUDES ALL AXS-IR SERIES RACK ENCLOSURES UP TO A HEIGHT OF 45 SPACES
2. RACK ENCLOSURES SHALL BE INSTALLED WITH MIDDLE ATLANTIC AXS-IR-Z4K SEISMIC KIT PER MANUFACTURER INSTRUCTIONS, WITH THE ADDITION OF A 5/8" WELD WASHER AT EACH ANCHOR LOCATION.
3. THE SUPPORTED RACK ENCLOSURE CONTENTS SHALL BE DISTRIBUTED WITHIN THE ENCLOSURE SUCH THAT 50% OF THE TOTAL WEIGHT IS LOCATED WITHIN THE BOTTOM THIRD OF THE RACK ENCLOSURE HEIGHT, 25% IN THE MIDDLE THIRD, AND 25% IN THE TOP THIRD. CONTENTS ARE IN ADDITION TO UNIT SELF-WEIGHT
4. ANCHORAGE WITH HILTI KWIK-BOLT TZ2 OR SIMPSON STRONG-TIE STRONG BOLT 2. REFER TO TABLE 9.
5. RATED RACK CAPACITY = 1200 LBS

TABLE 6: AXS-IR SERIES ENCLOSURES & MAXIMUM HCAI SEISMIC CONTENT CAPACITY (LBS) WITH APPROVED EXPANSION ANCHORS IN SAND-LIGHTWEIGHT CONCRETE FILL OVER METAL DECK (SEE FOOTNOTES 1-4)

RACK ENCLOSURE	ELEVATION IN BUILDING (Z/H) GROUND	1/3	2/3	≤1
AXS-IR-1927-20	700	700	500	350
AXS-IR-1932-26	700	700	500	350
AXS-IR-1938-26	700	700	500	350
AXS-IR-2527-20	550	550	375	250
AXS-IR-2532-26	550	550	375	250
AXS-IR-2538-26	550	550	375	250
AXS-IR-3827-20	350	350	225	125
AXS-IR-3832-26	350	350	225	125
AXS-IR-3838-26	350	350	225	125
AXS-IR-4127-20	300	300	175	90
AXS-IR-4132-26	300	300	175	90
AXS-IR-4138-26	300	300	175	90
AXS-IR-4527-20	250	250	150	70
AXS-IR-4532-26	250	250	150	70
AXS-IR-4538-26	250	250	150	70

FOOTNOTES TABLE 6

1. INCLUDES ALL AXS-IR SERIES RACK ENCLOSURES UP TO A HEIGHT OF 45 SPACES
2. RACK ENCLOSURES SHALL BE INSTALLED WITH MIDDLE ATLANTIC AXS-IR-Z4K SEISMIC KIT PER MANUFACTURER INSTRUCTIONS, WITH THE ADDITION OF A 5/8" WELD WASHER AT EACH ANCHOR LOCATION.
3. THE SUPPORTED RACK ENCLOSURE CONTENTS SHALL BE DISTRIBUTED WITHIN THE ENCLOSURE SUCH THAT 50% OF THE TOTAL WEIGHT IS LOCATED WITHIN THE BOTTOM THIRD OF THE RACK ENCLOSURE HEIGHT, 25% IN THE MIDDLE THIRD, AND 25% IN THE TOP THIRD. CONTENTS ARE IN ADDITION TO UNIT SELF-WEIGHT
4. ANCHORAGE WITH HILTI KWIK-BOLT TZ2 OR SIMPSON STRONG-TIE STRONG BOLT 2. REFER TO TABLE 9.
5. RATED RACK CAPACITY = 1200 LBS

TABLE 7: AXS-IR SERIES ENCLOSURES & MAXIMUM HCAI SEISMIC CONTENT CAPACITY (LBS) WITH ½" THRU-BOLTS IN NORMALWEIGHT OR SAND-LIGHTWEIGHT CONCRETE FILL OVER METAL DECK. (SEE FOOTNOTES 1-4)

RACK ENCLOSURE	ELEVATION IN BUILDING (Z/H) GROUND	1/3	2/3	≤1
AXS-IR-1927-20	1200	1200	1200	1200
AXS-IR-1932-26	1200	1200	1200	1200
AXS-IR-1938-26	1200	1200	1200	1200
AXS-IR-2527-20	1200	1200	1200	1200
AXS-IR-2532-26	1200	1200	1200	1200
AXS-IR-2538-26	1200	1200	1200	1200
AXS-IR-3827-20	1200	1200	1200	1200
AXS-IR-3832-26	1200	1200	1200	1200
AXS-IR-3838-26	1200	1200	1200	1200
AXS-IR-4127-20	1200	1200	1200	1200
AXS-IR-4132-26	1200	1200	1200	1200
AXS-IR-4138-26	1200	1200	1200	1200
AXS-IR-4527-20	1200	1200	1200	1200
AXS-IR-4532-26	1200	1200	1200	1200
AXS-IR-4538-26	1200	1200	1200	1200

FOOTNOTES TABLE 7

1. INCLUDES ALL AXS-IR SERIES RACK ENCLOSURES UP TO A HEIGHT OF 45 SPACES
2. RACK ENCLOSURES SHALL BE INSTALLED WITH MIDDLE ATLANTIC AXS-IR-Z4K SEISMIC KIT PER MANUFACTURER INSTRUCTIONS, WITH THE ADDITION OF A 5/8" WELD WASHER AT EACH ANCHOR LOCATION.
3. THE SUPPORTED RACK ENCLOSURE CONTENTS SHALL BE DISTRIBUTED WITHIN THE ENCLOSURE SUCH THAT 50% OF THE TOTAL WEIGHT IS LOCATED WITHIN THE BOTTOM THIRD OF THE RACK ENCLOSURE HEIGHT, 25% IN THE MIDDLE THIRD, AND 25% IN THE TOP THIRD. CONTENTS ARE IN ADDITION TO UNIT SELF-WEIGHT
4. ANCHORAGE WITH ½" DIAMETER THRU-BOLTS OF ASTM F1554 GRADE 36 OR 105, WITH CONNECTION TO THE DECK SOFFIT AS DETAILED ON THE DRAWINGS. REFER TO TABLE 9.
5. RATED RACK CAPACITY = 1200 LBS

Date Signed: 1/7/2022

USED ON	APPROVALS	DATE
NEXT ASSY	MODELED	
MATERIAL: SEE COMPONENTS	DRAWN	
FINISH	CIRCLED DIMENSIONS ARE CRITICAL INSPECTION DIMENSIONS	
	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES TOLERANCES ARE: DECIMAL: 2 PLC ±.03, 3 PLC ±.010 FRACTIONS: ±1/32 ANGLES: ±1°	
	SCALE = 1/16	

Middle Atlantic Products, Inc

TITLE: AXS-IR-SERIES HCAI

PART NO. | PART REV

SIZE B | DXF NO. NONE

DWG NO. | DWG REV

CONCRETE ANCHOR NOTES

1. CONCRETE ANCHORS FOR THE SUBJECT RACK ENCLOSURES INSTALLED IN SOLID REINFORCED CONCRETE SHALL BE ONE OF THE TYPES LISTED IN TABLE 8, WITH THE DIAMETER, EMBEDMENT, AND EDGE DISTANCES SPECIFIED. ANCHORS SHALL BE OF CARBON STEEL AND FOLLOW ALL INSTALLATION REQUIREMENTS SPECIFIED IN THE CORRESPONDING ESR REPORTS.

2. CONCRETE ANCHORS FOR THE SUBJECT RACK ENCLOSURES INSTALLED IN TOP SIDE OF CONCRETE FILL OVER METAL DECK SHALL BE ONE OF THE TYPES LISTED IN TABLE 9, WITH THE DIAMETER, EMBEDMENT, AND EDGE DISTANCES SPECIFIED. ANCHORS SHALL BE OF CARBON STEEL AND FOLLOW ALL INSTALLATION REQUIREMENTS SPECIFIED IN THE CORRESPONDING ESR REPORTS

3. ALTERNATIVELY, SUBJECT RACK ENCLOSURES MAY BE INSTALLED IN TOP SIDE OF CONCRETE FILL OVER METAL DECK USING THE THRU-BOLT CONNECTION AS LISTED IN TABLE 9 AND SHOWN ON THE DRAWINGS.

4. LOCATE ALL EXISTING REINFORCING BARS WITHIN 12 INCHES OF PROPOSED ANCHOR LOCATIONS PRIOR TO DRILLING FOR CONCRETE ANCHORS. DO NOT CUT, CORE, OR DRILL THROUGH EXISTING REINFORCING BARS.

5. ALL CONCRETE ANCHORS SHALL BE INSTALLED WITH PROPER TOOLS AND PROCEDURES IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND ICC EVALUATION SERVICE REPORTS REFERENCED ABOVE.

6. CONCRETE ANCHORS REQUIRE SPECIAL INSPECTION FOR INSTALLATION IN ACCORDANCE WITH CBC TABLE 1705A.3.

7. CONCRETE ANCHORS SHALL BE TESTED A MINIMUM OF 24 HOURS AFTER INSTALLATION TO VERIFY PROPER INSTALLATION IN ACCORDANCE WITH CBC SECTION 1910A.5

8. A MINIMUM OF TWO ANCHORS (50%) PER ENCLOSURE MUST BE TESTED (CBC 1910A.5.3).

9. TESTING OF THE POST INSTALLED ANCHORS SHALL BE DONE IN THE PRESENCE OF THE SPECIAL INSPECTOR & A REPORT OF THE TEST RESULTS SHALL BE SUBMITTED TO THE ENFORCEMENT AGENCY (CBC 1910A.5.3)

10. ANCHORS SHALL BE TESTED TO LOADS SHOWN BELOW (CBC 1910A.5.4):

    A) EPOXY ANCHORS IN NORMAL WEIGHT CONCRETE – 3904 LB

    B) ½" DIA EXPANSION ANCHORS IN NORMAL OR SAND-LIGHT WEIGHT CONCRETE: 50 FT-LB FOR KWIK-BOLT TZ2 OR 60 FT-LB FOR STRONG BOLT 2

    C) 3/8" DIA EXPANSION ANCHORS FOR UNDERSIDE OF METAL DECK (SEE SHEET 7): 30 FT-LB FOR STRONG BOLT 2

11. TEST ACCEPTANCE CRITERIA (CBC 1910A.5.5):

    A) HYDRAULIC RAM METHOD (EPOXY ANCHORS): ANCHOR SHALL MAINTAIN TEST LOAD FOR A MINIMUM OF 15 SECONDS AND SHALL EXHIBIT NO DISCERNIBLE MOVEMENT (AS EVIDENCED BY THE LOOSENING OF THE WASHER UNDER THE NUT)

    B) TORQUE WRENCH METHOD (EXPANSION ANCHORS): ANCHOR SHALL ATTAIN THE SPECIFIED TORQUE WITHIN ½ TURN OF THE NUT.

BOLTS THROUGH CONCRETE ON METAL DECK

A. BOLTS SHALL BE TORQUED by ¾ TURN OF THE NUTS AFTER THE SNUG TIGHT (THE SNUG-TIGHT CONDITION IS DEFINED AS THE TIGHTNESS REQUIRED TO BRING THE CONNECTED PLIES INTO FIRM CONTACT) CONDITION IS ACHIEVED, UNLESS OTHERWISE NOTED.

B. THROUGH BOLT HOLES SHALL BE 1/16' LARGER THAN BOLT SIZE (HOLE SIZE = BOLT SIZE + 1/16) FOR CONCRETE

C. THROUGH-BOLTS IN CONCRETE SHALL RECEIVE SPECIAL INSPECTION AND TESTING (THROUGH-BOLTS WITH STEEL TO STEEL CONNECTION IN TENSION DO NOT REQUIRE TENSION TESTING) IN ACCORDANCE WITH REQUIREMENTS FOR POST-INSTALLED ANCHORS.

TABLE 8: ACCEPTABLE FASTENERS FOR ANCHORING OF THE AXS-IR SERIES OF RACK ENCLOSURES TO SOLID REINFORCED CONCRETE (SEE NOTE 1)

Anchor Type	ICC ESR	Anchor Diameter (inches)	MIN Embedment (inches) (hef)	MIN Slab Thickness (inches)	MIN Edge Distance (Inches)	MIN Spacing (inches) (Note 5)
HILTI HIT RE 500V3 Threaded Rod Epoxy (Notes 2,4)	3814	0.5	6	8.5	6	18
Simpson Strong-Tie Set-XP Threaded Rod Epoxy Anchors (Notes 2,4)	2508	0.5	6	8.5	6	18
HILTI KWIK Bolt TZ2 Expansion Anchors (Note 3)	4266	0.5	3.25	6	6	18
Simpson Strong-Tie Strong-Bolt 2 Expansion Anchors (Note 3)	3037	0.5	3.375	6	6	18

NOTES TABLE 8

1. FOR NORMALWEIGHT OR SAND-LIGHTWEIGHT CONCRETE WITH A MINIMUM FC = 3000 PSI. EPOXY ANCHORS MAY ONLY BE USED IN NORMAL WEIGHT CONCRETE.

2. APPLIES TO THE AXS-IR SERIES ENCLOSURES LISTED IN TABLES 1-4

3. APPLIES TO THE AXS-IR SERIES ENCLOSURES LISTED IN TABLES 5-7 ALSO, PROVIDE FOR FULL THREAD ENGAGEMENT OF NUT & WASHER.

4. STANDARD THREADED ROD SHALL BE ASTM F1554 GRADE 36, OR 105.

5. MIMIMUM SPACING APPLIES TO MULTIPLE UNITS INSTALLED ADJACENT TO ONE ANOTHER, AND IS TAKEN AS THE DISTANCE FROM CENTERLINE TO CENTERLINE OF ANCHORS.

Date Signed: 1/7/2022

USED ON: - -	APPROVALS	DATE
NEXT ASSY: - -	MODELED	
MATERIAL: SEE COMPONENTS	DRAWN	
FINISH - -	CIRCLED DIMENSIONS ARE CRITICAL INSPECTION DIMENSIONS	
- -	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES TOLERANCES ARE: DECIMAL: 2 PLC ±.03, 3 PLC ±.010 FRACTIONS: ±1/32 ANGLES: ±1° SCALE = 1/6	

Middle Atlantic Products, Inc

TITLE: AXS-IR-SERIES HCAI

PART NO. | PART REV

SIZE: B | DXF NO. NONE

DWG NO. | DWG REV

TABLE 9: ACCEPTABLE FASTENERS FOR ANCHORING OF THE AXS-IR SERIES OF RACK ENCLOSURES TO TOPSIDE OF CONCRETE FILL OVER METAL DECK (NOTES 1,2)

Anchor Type	ICC ESR	Outside Diameter (inches)	Effective Embedment (inches) (hef)	MIN Thick Above/Within Flute (inches)	MIN Edge Distance (Inches)	MIN Spacing (inches)
HILTI KWIK Bolt TZ2 Expansion Anchors	4266	0.5	2	3.25/1.5	7.5	9
Simpson Strong-Tie Strong-Bolt 2 Expansion Anchors	3037	0.5	2.25	3.25/1.5	6	8
ASTM F1554 Thru-Bolt (Note 3)	NA	0.5	NA	3.25/1.5	6	NA

NOTES TABLE 9

1. FOR NORMALWEIGHT OR SAND-LIGHTWEIGHT CONCRETE WITH A MINIMUM FC = 3000 PSI
2. APPLIES TO THE AXS-IR SERIES ENCLOSURES LISTED IN TABLES 4-6
3. ASTM F1554 GRADE 36 OR 105 THRU-BOLTS WITH CONNECTION TO THE DECK SOFFIT AS DETAILED ON THE DRAWINGS.

RESPONSIBILITIES OF THE SEOR

1. THE STRUCTURAL ENGINEER-OF-RECORD (SEOR) SHALL VERIFY THAT THE WEIGHT OF RACK ENCLOSURE CONTENTS DOES NOT EXCEED THE APPROVED CAPACITY FOR THE LOCATION OF INSTALLATION.
2. THE SEOR SHALL VERIFY THAT PROJECT SPECIFIC SEISMIC PARAMETERS (S_{DS} & z/h) DO NOT EXCEED THE DESIGN VALUES STATED ON THESE DRAWINGS
3. THE SEOR SHALL VERIFY THAT THE EXISTING STRUCTURE IS ADEQUATE TO SUPPORT THE LOADS AND REACTIONS IMPOSED BY THE ANCHORED RACK ENCLOSURE IN ADDITION TO ALL OTHER LOADS AND FORCES. MAXIMUM ANCHORAGE DEMAND LOADS ARE LISTED IN TABLE 1.
4. SEOR SHALL VERIFY THAT A PLACARD IS PLACED ON THE RACK STATING THE FOLLOWING:
   - A. UNIT MODEL NUMBER.
   - B. NAME OF THE BUILDING IN WHICH IT WILL BE INSTALLED.
   - C. HIGHEST FLOOR WHERE IT CAN BE USED.
   - D. MAXIMUM TOTAL WEIGHT OF THE CONTENTS THAT CAN BE STORED ON THE RACK.
   - E. MAXIMUM WEIGHT THAT CAN BE STORED ON EACH SHELF BASED ON THE WEIGHT DISTRIBUTION SPECIFIED IN THIS OPM.
   - F. MAXIMUM S_{DS} VALUE AS LISTED IN THIS OPM.
5. SEOR SHALL VERIFY THAT THE CONCRETE FLOOR MEETS THE REQUIREMENTS OF THIS PRE-APPROVAL.
6. VERIFY THAT THE CONCRETE SLAB TO WHICH THE EQUIPMENT IS ANCHORED MEETS ALL REQUIREMENTS OF THE APPLICABLE ICC ESR.
7. VERIFY THAT THE ANCHORS ARE AN ADEQUATE DISTANCE FROM ANY SLAB EDGES OR OPENINGS.
8. VERIFY THAT ALL NEW OR EXISTING ANCHORS ARE AN ADEQUATE DISTANCE FROM THE ANCHORS SHOWN IN THIS PRE-APPROVAL. VERIFY THAT THERE IS NO ADVERSE INTERACTION WHERE OTHER ANCHORS ARE WITHIN 18" OR 6 hef FROM THIS UNIT'S ANCHORS.
9. VERIFY THAT THE INSTALLATION IS IN CONFORMANCE WITH THE 2016 CBC AND THE DETAILS SHOWN IN THIS PRE-APPROVAL.

SGH

REGISTERED PROFESSIONAL ENGINEER
WILLIAM M. BRUIN
No. C 57867
CIVIL
STATE OF CALIFORNIA

Date Signed: 1/7/2022

USED ON	APPROVALS	DATE
- -	MODELED	
NEXT ASSY:	DRAWN	
- -	CIRCLED DIMENSIONS ARE CRITICAL INSPECTION DIMENSIONS	
MATERIAL: SEE COMPONENTS	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES TOLERANCES ARE: DECIMAL: 2 PLC ±.03, 3 PLC ±.010 FRACTIONS: ±1/32 ANGLES: ±1°	
FINISH - -	SCALE = 1/16	

Middle Atlantic Products, Inc

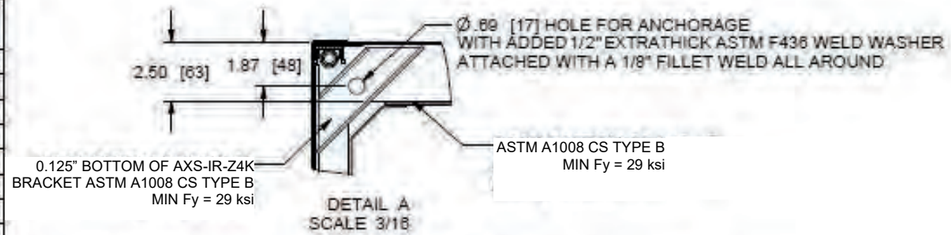
TITLE: AXS-IR-SERIES HCAI

PART NO. | PART REV

SIZE B | DXF NO. NONE

DWG NO. | DWG REV

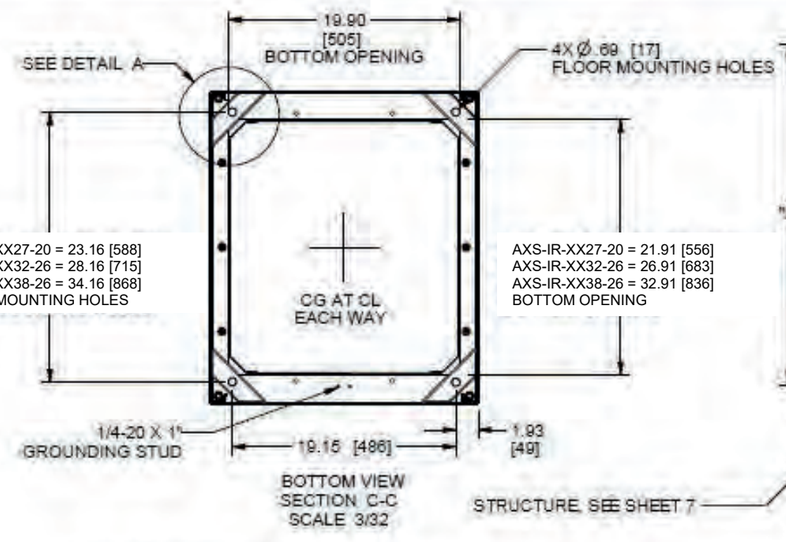
MODEL # *	USEABLE RACKING HEIGHT	HOST CABINET OVERALL HEIGHT "A"	HOST CABINET OVERALL DEPTH "B"	FRAME DEPTH "C"	FRAME HEIGHT "D"	FRAME ROLL OUT "F"	RACK WEIGHT [LBS] (EMPTY)
AXS-IR-1927-20	16	37.45 [951]	27 [686]	20 [508]	32.5 [826]	47.5 [1207] TO 48.5 [1232]	130
AXS-IR-2527-20	22	47.95 [1218]	27 [686]	20 [508]	43.0 [1092]	47.5 [1207] TO 48.5 [1232]	139
AXS-IR-3827-20	35	70.70 [1796]	27 [686]	20 [508]	65.0 [1651]	47.5 [1207] TO 48.5 [1232]	151
AXS-IR-4127-20	38	75.95 [1929]	27 [686]	20 [508]	70.3 [1786]	47.5 [1207] TO 48.5 [1232]	163
AXS-IR-4527-20	42	82.95 [2107]	27 [686]	20 [508]	77.3 [1963]	47.5 [1207] TO 48.5 [1232]	167
AXS-IR-1932-26	16	37.45 [951]	32 [813]	26 [660]	32.5 [826]	47.5 [1207] TO 48.5 [1232]	147
AXS-IR-2532-26	22	47.95 [1218]	32 [813]	26 [660]	43.0 [1092]	47.5 [1207] TO 48.5 [1232]	156
AXS-IR-3832-26	35	70.70 [1796]	32 [813]	26 [660]	65.0 [1651]	47.5 [1207] TO 48.5 [1232]	170
AXS-IR-4132-26	38	75.95 [1929]	32 [813]	26 [660]	70.3 [1786]	47.5 [1207] TO 48.5 [1232]	184
AXS-IR-4532-26	42	82.95 [2107]	32 [813]	26 [660]	77.3 [1963]	47.5 [1207] TO 48.5 [1232]	188
AXS-IR-1938-26	16	37.45 [951]	38 [965]	26 [660]	32.5 [826]	47.5 [1207] TO 48.5 [1232]	161
AXS-IR-2538-26	22	47.95 [1218]	38 [965]	26 [660]	43.0 [1092]	47.5 [1207] TO 48.5 [1232]	170
AXS-IR-3838-26	35	70.70 [1796]	38 [965]	26 [660]	65.0 [1651]	47.5 [1207] TO 48.5 [1232]	184
AXS-IR-4138-26	38	75.95 [1929]	38 [965]	26 [660]	70.3 [1786]	47.5 [1207] TO 48.5 [1232]	196
AXS-IR-4538-26	42	82.95 [2107]	38 [965]	26 [660]	77.3 [1963]	47.5 [1207] TO 48.5 [1232]	202



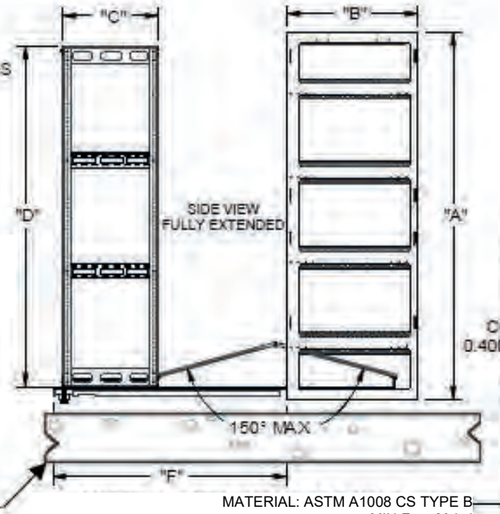
DETAIL A
SCALE 3/16

* FOR SEISMIC APLICATION USE P/N AXS-IR-Z4K
** BSPN-xx-xx ADDS 0.656 [17] PER SIDE TO WIDTH (REMOVABLE SIDE PANELS)
*** MINIMUM RAIL SETBACK SHOWN. MAXIMUM RAIL SET BACK IS 2.5 [64]
**** REQUIRES TRACKS (TRACK50) AND STANDS(TRACKL) FOR SERVICING

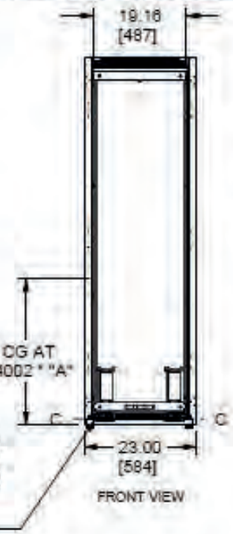
NOTE(S):
1. ALL DIMENSIONS IN FORMAT: INCHES [MILLIMETERS]
2. THE SEISMIC CONTENT CAPACITIES OF THIS OPM ARE APPLICABLE WHEN THE AXS-IR IS IN THE CLOSED AND LOCKED POSITION

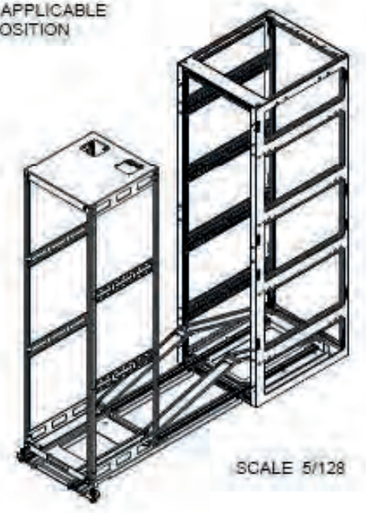


BOTTOM VIEW
SECTION C-C
SCALE 3/32



STRUCTURE, SEE SHEET 7





SCALE 5/128

MATERIAL: ASTM A1008 CS TYPE B
MIN Fy = 29 ksi

SUPPORTS & ATTACHMENTS MATERIAL THICKNESS = .060 [1.5] BASE + .125 [3.2] BRACKET

FIRST RACK SPACE IS 4 INCHES FROM BASE, ALL OTHER RACK SPACES ARE 1.755 INCHES IN HEIGHT
MAS CONTECT CAPACITY FOR EACH UNIT CAN BE FOUND ON TABLE 2 THRU 7 BASED ON CAPACITY OF SUPPORTS & ATTACHMENTS

(4 ANCHORS TO BE USED)
ANCHORED USING AXS-IR-Z4K BRACKET WITH ½" WELD WASHER AT EACH ANCHOR LOCATION. INSTALL ON SITE PER KIT DIRECTIONS.
REFER TO DETAILS ON SHEET 7

Middle Atlantic Products
certifies this document as an outline drawing.

Signature: Y. Sudharsan

Print Name: Sudharsan Yogasuntharam

Title: Compliance & Regulatory Engineer

Date: 12/29/2021

REGISTERED PROFESSIONAL ENGINEER
WILLIAM M. BRUN
No. C 57867
CIVIL
STATE OF CALIFORNIA

Date Signed: 1/7/2022

USED ON	APPROVALS	DATE
- -	MODELED	
	DRAWN	
NEXT ASSY	CIRCLED DIMENSIONS ARE CRITICAL INSPECTION DIMENSIONS	
- -	UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES TOLERANCES ARE: DECIMAL: 2 PLC ±.03, 3 PLC ±.010 FRACTIONS: ±1/32 ANGLES: ±1°	
MATERIAL: SEE COMPONENTS	SCALE = 1/16	
FINISH - -		

Middle Atlantic Products, Inc

TITLE: AXS-IR-SERIES HCAI

PART NO. | PART REV

SIZE B | DXF NO. NONE

DWG NO. | DWG REV

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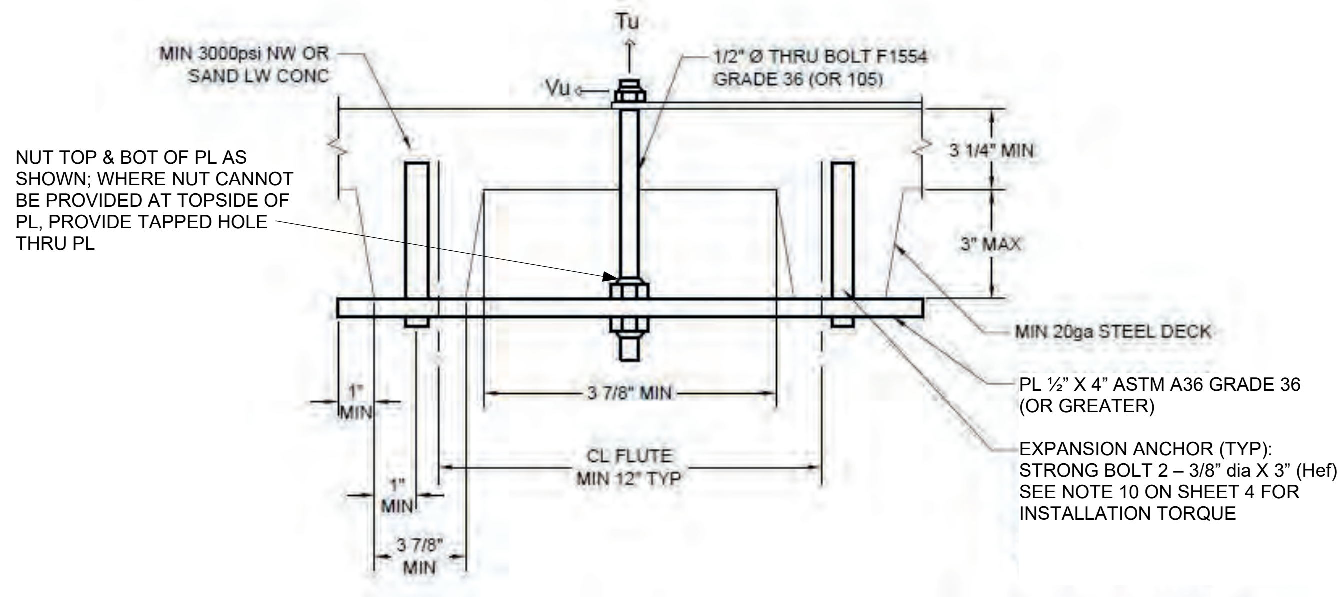
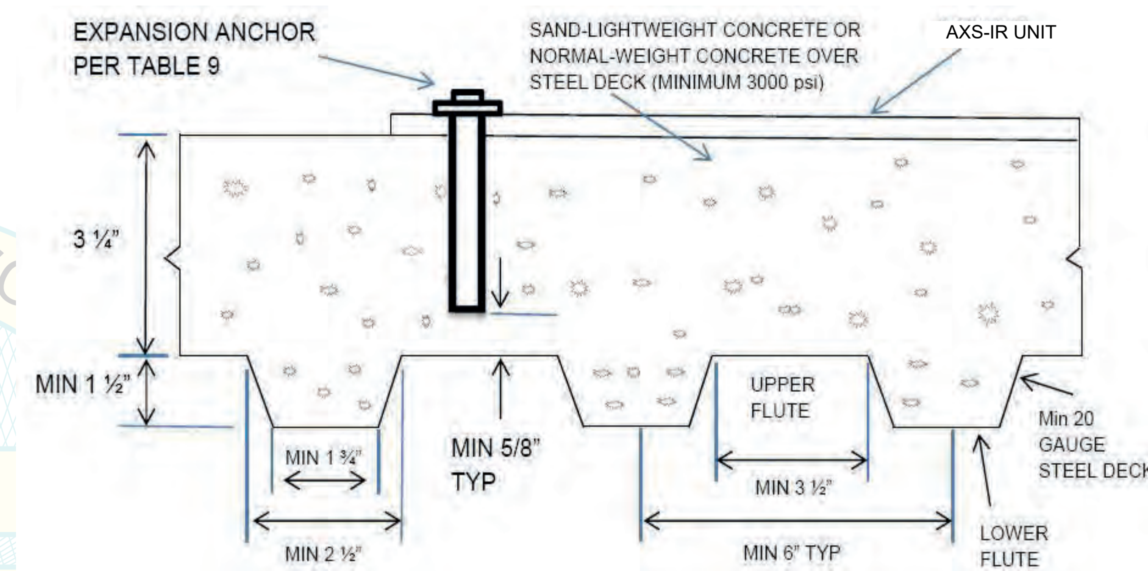
		EFFECTIVE DATE:	TBD
	AXS-IR-SERIES HCAI	PAGE:	7 of 7

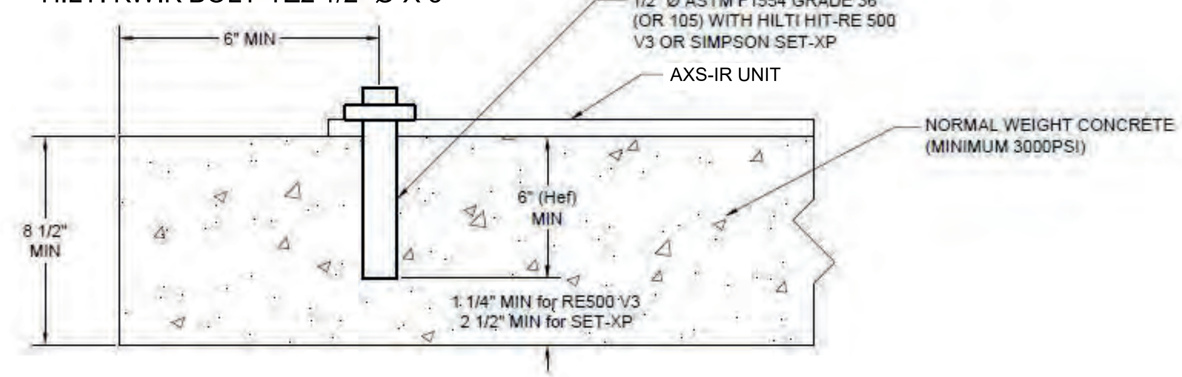


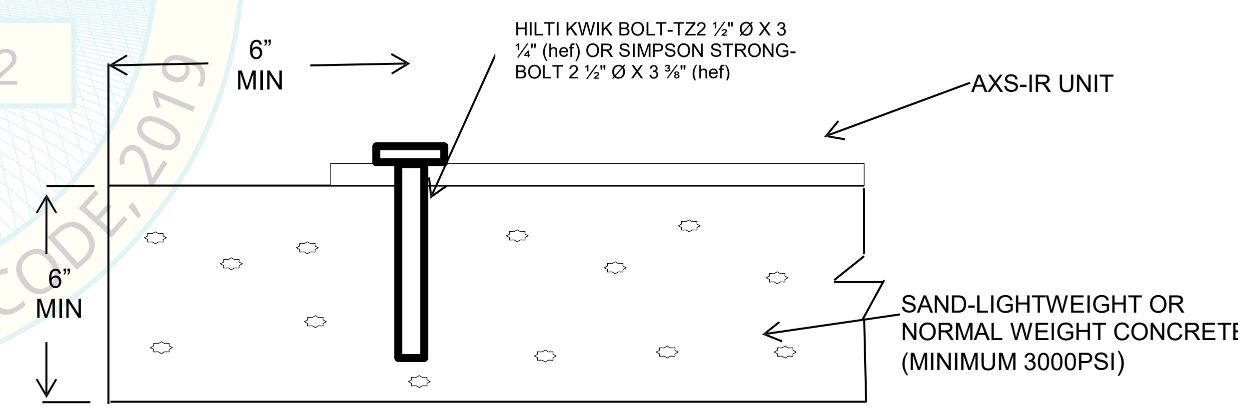
THRU-BOLT CONNECTION DETAIL



EXPANSION ANCHOR IN DECK CONNECTION DETAIL

HILTI KWIK BOLT-TZ2 1/2 "Ø X 3





EXPANSION ANCHOR CONNECTION DETAIL

SGH

REGISTERED PROFESSIONAL ENGINEER WILLIAM M. BRUIN No. C 57867 CIVIL STATE OF CALIFORNIA

Date Signed: 1/7/2022

USED ON: - -	APPROVALS	DATE	Middle Atlantic Products, Inc
NEXT ASSY: - -	MODELED		TITLE AXS-IR-SERIES HCAI
MATERIAL: SEE COMPONENTS	DRAWN		PART NO. / PART REV
FINISH: - -	CIRCLED DIMENSIONS ARE CRITICAL INSPECTION DIMENSIONS. UNLESS OTHERWISE SPECIFIED, ALL DIMENSIONS ARE IN INCHES. TOLERANCES ARE: DECIMAL: 2 PLC ±.03, 3 PLC ±.010; FRACTIONS: ±1/32; ANGLES: ±1°		SIZE B / DXF NO. NONE
	SCALE = 1/8		DWG NO. / DWG REV