APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0115

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)

Manufacturer's Technical Representative: Oscar Saenz

Mailing Address: 500 W. Highway 94, Jefferson City, MO 65101

Telephone: (573) 659-6325 Email: oscar.a.saenz@hitachienergy.com

Product Information

Product Name: Transformer Product Family

Product Model Number(s): Varies (see attachment)

Product Category: Transformers

Product Sub-Category: Transformers – Liquid Filled

General Description: One and three phase, liquid filled distribution transformers including padmount, horizontal, and unit substation product families.

Mounting Description: Base Mounted Rigid -

Tested Seismic Enhancements: None

Applicant Information

Applicant Company Name: TRU Compliance, by Structural Integrity Associates

Contact Person: Daniel Zentner

Mailing Address: 233 SW Wilson Ave, Suite 101, Bend, OR 97702

Telephone: (541) 292-5839 Email: dzentner@structint.com

Title: Program Manager

California Licensed Structural Engineer Responsible for the Engineering and Test Report(s)

Company Name: STRUCTURAL INTEGRITY ASSOCIATES, INC.

Name: LACHEZAR HANDZHIYSKI California License Number: S6515

Mailing Address: 5215 Hellyer Avenue, Suite 210, San Jose, CA 95138

Telephone: (669) 437-0200 Email: Lhandzhiyski@StructInt.com

Certification Method

☐ GR-63-Core ☒ ICC-ES AC156 ☐ IEEE 344 ☐ IEEE 693 ☐ NEBS 3

☐ Other (Please Specify):

Testing Laboratory

Company Name: U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER, CONSTRUCTION ENGINEERING RESEARCH LABORATORY (CERL)

Contact Person: James Wilcoski

Mailing Address: 2902 Newmark Dr., Champaign IL 61822-1076

Telephone: (217) 373-1026 Email: ERDCinfo@usace.army.mil

Company Name: CLARK TESTING LABORATORY, INC.

Contact Person: Devon Lohr

Mailing Address: 1801 Route 51, Jefferson Hills PA 15025

Telephone: (412) 387-1001 Email: smazon@clarktesting.com

Company Name: ENVIRONMENTAL TESTING LABORATORIES, INC. (ETL)

Contact Person: Jeremy Lange

Mailing Address: 11034 Indian Trail, Dallas TX 75229-3513

Telephone: (972) 247-9657 Email: info@etldallas.com

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 1.01

S_{DS} (Design spectral response acceleration at short period, g) = 2.25

a_p (Amplification factor) = 1.0

R_p (Response modification factor) = 2.5

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 0

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

HCAI Approval (For Office Use Only) - Approval Expires on 02/19/2031

Date: 2/19/2025

Name: Mohammad Karim Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: S_{DS} (g) = 2.25 z/h = 0

Condition of Approval (if applicable):

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

1801293-CR-001-R1

TRU COMPLIANCE

Manufacturer:	Hitachi Energy USA Inc. (formerly ABB)
Model Line:	Transformer Product Family

TABLE 1

Certified Product Construction Summary:

NEMA 3R Enclosure

Certified Options Summary:

Enclosure and Tank: Stainless Steel (SS) or Carbon Steel (CS). **Windings:** Copper, Aluminum or Copper-Aluminum Mix.
Feed: Radial or Loop. **Front:** Live or Dead. See Tables 5-7 for certified subcomponents.
Hitachi Energy Transformers can be rebranded as ABB, Square D (Schneider Electric), Siemens, GE, Eaton and Sunbelt.

Mounting Configuration:

Base mounted - rigid

Note: Installed mounting must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model (kVA)	Dimensions (in)			Weight (lbs.)	Notes	UUT
		Depth	Width	Height			
1ϕ Padmount	10	45.0	42.0	36.0	1,366	*UUT: Al windings, CS tank*	7
	10	56.0	46.0	42.0	1,800		Interp.
	15	56.0	46.0	42.0	1,994		Interp.
	25	56.0	46.0	42.0	1,869		Interp.
	30	56.0	46.0	42.0	1,900		Interp.
	38	56.0	46.0	42.0	2,018		Interp.
	45	56.0	46.0	42.0	1,975		Interp.
	50	56.0	46.0	42.0	2,063		Interp.
	75	56.0	46.0	42.0	2,290		Interp.
	100	56.0	46.0	42.0	2,668		Interp.
	113	56.0	46.0	42.0	2,150		Interp.
	150	56.0	46.0	42.0	2,299		Interp.
	167	56.0	46.0	42.0	2,300		Interp.
	200	56.0	46.0	42.0	2,355		Interp.
	225	56.0	46.0	42.0	2,669		Interp.
	250	56.0	46.0	42.0	2,725	*UUT: Al windings, SS tank*	6

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

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TRU COMPLIANCE

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family

TABLE 1

Certified Product Construction Summary:

NEMA 3R Enclosure

Certified Options Summary:

Enclosure and Tank: Stainless Steel (SS) or Carbon Steel (CS). **Windings:** Copper, Aluminum or Copper-Aluminum Mix.
Feed: Radial or Loop. **Front:** Live or Dead. See Tables 5-7 for certified subcomponents.
Hitachi Energy Transformers can be rebranded as ABB, Square D (Schneider Electric), Siemens, GE, Eaton and Sunbelt.

Mounting Configuration:

Base mounted - rigid

Note: Installed mounting must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model (kVA)	Dimensions (in)			Weight (lbs.)	Notes	UUT
		Depth	Width	Height			
3ϕ Padmount (Carbon Steel Tank)	75	50.0	57.0	48.0	2,300	*UUT: Al windings, CS tank*	1
	112	75.0	74.0	73.0	7,700		Interp.
	150	76.0	76.0	73.0	8,500		Interp.
	225	80.0	84.0	77.0	9,000		Interp.
	250	82.0	88.0	77.0	9,500		Interp.
	300	82.0	92.0	77.0	10,000		Interp.
	500	92.0	102.0	77.0	12,500		Interp.
	750	95.0	102.0	77.0	13,500		Interp.
	780	95.0	102.0	77.0	14,250		Interp.
	1000	95.0	102.0	81.0	15,000		Interp.
	1100	95.0	102.0	81.0	15,500		Interp.
	1200	95.0	102.0	81.0	16,000		Interp.
	1250	95.0	102.0	81.0	16,500		Interp.
	1500	110.0	135.0	81.0	18,200		Interp.
	1750	110.0	135.0	81.0	18,800		Interp.
	2000	116.0	135.0	94.0	19,000		Interp.
	2500	116.0	135.0	94.0	19,500		Interp.
	3000	116.0	135.0	94.0	19,850	*UUT: Al-Cu windings, CS tank*	15

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TRU COMPLIANCE

Manufacturer:	Hitachi Energy USA Inc. (formerly ABB)
Model Line:	Transformer Product Family

TABLE 1

Certified Product Construction Summary:

NEMA 3R Enclosure

Certified Options Summary:

Enclosure and Tank: Stainless Steel (SS) or Carbon Steel (CS). **Windings:** Copper, Aluminum or Copper-Aluminum Mix.
Feed: Radial or Loop. **Front:** Live or Dead. See Tables 5-7 for certified subcomponents.
Hitachi Energy Transformers can be rebranded as ABB, Square D (Schneider Electric), Siemens, GE, Eaton and Sunbelt.

Mounting Configuration:

Base mounted - rigid

Note: Installed mounting must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model (kVA)	Dimensions (in)			Weight (lbs.)	Notes	UUT
		Depth	Width	Height			
3ϕ Padmount (Stainless Steel Tank)	75	50.0	57.0	48.0	2,300		Interp.
	112	72.0	74.0	73.0	7,700		Interp.
	150	76.0	76.0	73.0	8,500		Interp.
	225	80.0	84.0	77.0	9,000		Interp.
	250	82.0	88.0	77.0	9,500		Interp.
	300	82.0	92.0	77.0	10,000		Interp.
	500	89.0	102.0	77.0	12,500		Interp.
	750	89.0	102.0	77.0	13,500		Interp.
	780	89.0	102.0	77.0	1,425		Interp.
	1000	89.0	102.0	81.0	15,000		Interp.
	1100	89.0	102.0	81.0	15,500		Interp.
	1200	89.0	102.0	81.0	16,000		Interp.
	1250	89.0	102.0	81.0	16,500		Interp.
	1500	89.0	135.0	81.0	16,800		Interp.
	1750	89.0	135.0	81.0	17,000		Interp.
	2000	89.0	135.0	81.0	17,050		Interp.
	2500	89.0	135.0	81.0	17,090	*UUT: Cu windings, SS tank*	5

SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

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TRU COMPLIANCE

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family

TABLE 2

Certified Product Construction Summary:

NEMA 3R Carbon Steel Enclosure and Tank

Certified Options Summary:

Windings: Copper (all listed models) or Aluminum (model 225 only)
See Tables 5-7 for certified subcomponents.
Hitachi Energy Transformers can be rebranded as ABB, Square D (Schneider Electric), Siemens, GE, Eaton and Sunbelt.

Mounting Configuration:

Base mounted - rigid

Note: Installed mounting must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model (kVA)	Dimensions (in)[1]			Weight (lbs.)[1]	Notes	UUT
		Depth	Width	Height			
3ϕ Substation Radial Feed Live Front	225	67.0	59.0	73.0	4,900	*UUT: Al windings, CS tank*	3
	225	76.0	59.0	73.0	4,900		Interp.
	300	76.0	111.0	100.9	8,360		Interp.
	500	76.0	118.0	100.9	11,110		Interp.
	750	76.0	120.0	100.9	11,880		Interp.
	1000	83.0	124.0	112.9	14,190		Interp.
	1500	98.7	128.7	112.9	17,160		Interp.
	2000	98.7	128.7	112.9	19,140		Interp.
	2500	98.7	128.7	112.9	19,200		Interp.
	3000	93.0	69.0	85.0	15,900	*UUT: Cu windings, CS tank*	4
	3000	98.7	128.7	119.9	19,200	*UUT: Cu windings, CS tank*	16

Notes:

1. *Values shown are typical sizes for model kVAs. Future changes to efficiency, accessories and customization can increase weight and dimensions shown up to maximum validated values for UUT16*

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TRU COMPLIANCE

Manufacturer:	Hitachi Energy USA Inc. (formerly ABB)	**TABLE 3**
Model Line:	Transformer Product Family	

Certified Product Construction Summary:

NEMA 3R Stainless Steel Enclosure and Tank

Certified Options Summary:

Windings: Copper (all listed models) or Aluminum (radial feed model 75 and loop feed model 45 only)

See Tables 5-7 for certified subcomponents.

Hitachi Energy Transformers can be rebranded as ABB, Square D (Schneider Electric), Siemens, GE, Eaton and Sunbelt.

Mounting Configuration:

Base mounted - rigid

Note: Installed mounting must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model (kVA)	Dimensions (in)			Weight (lbs.)	Notes	UUT
		Depth	Width	Height			
3ϕ UCT Radial Feed Dead Front	75	32.0	68.0	53.0	3,640	*UUT: Al windings, SS tank*	9
	113	26.0	62.0	46.0	3,686		Interp.
	150	30.0	62.0	46.0	4,564		Interp.
	225	30.0	70.0	54.0	7,148		Interp.
	300	30.0	62.0	50.0	6,050		Interp.
	500	34.0	70.0	58.0	8,120		Interp.
	750	34.0	70.0	62.0	10,210		Interp.
	1000	36.0	70.0	62.0	1,070		Interp.
	1500	38.0	70.0	66.0	10,500		Interp.
3ϕ UCT Loop Feed Dead Front	45	30.0	56.0	38.0	3,200		Interp.
	50	30.0	58.0	46.0	3,828		Interp.
	75	30.0	70.0	46.0	4,600		Interp.
	113	30.0	58.0	42.0	3,608		Interp.
	150	34.0	70.0	54.0	5,795		Interp.
	225	30.0	60.0	46.0	4,657		Interp.
	300	34.0	70.0	58.0	6,406		Interp.
	500	34.0	70.0	58.0	7,980		Interp.
	750	38.0	70.0	62.0	8,960		Interp.
	1000	36.0	70.0	62.0	10,305		Interp.
	1500	57.0	79.0	76.0	10,500	*UUT: Cu windings, SS tank*	8

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT MATRIX

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TRU COMPLIANCE

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family

TABLE 4

Certified Product Construction Summary:

NEMA 3R Stainless Steel Enclosure and Tank

Certified Options Summary:

Windings: Copper, Aluminum or Mix Copper-Aluminum.
See Table 5-7 for certified subcomponents. SEOR responsible for anchorage design.
Hitachi Energy Transformers can be rebranded as ABB, Square D (Schneider Electric), Siemens, GE, Eaton and Sunbelt.

Mounting Configuration:

Base mounted - rigid

Note: Installed mounting must be of similar configuration and equivalent strength and stiffness to those tested.

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P= ***1.5***

Model Line	Model (kVA)	Dimensions (in)			Weight (lbs.)	Notes	UUT
		Depth	Width	Height			
1ϕ Horizontal	25	24.0	44.0	29.0	1,096	*UUT: Al windings, SS tank*	10
	50	24.0	40.0	30.0	1,074		Interp.
	75	28.0	40.0	30.0	1,513		Interp.
	100	24.0	40.0	32.0	1,393		Interp.
	167	24.0	40.0	42.0	2,223	*UUT: Al-Cu windings, SS tank*	11
1ϕ DUP Horizontal	25	24.0	47.0	32.0	1,513	*UUT: Al windings, SS tank*	12
	50	24.0	41.0	30.0	1,452		Interp.
	75	28.0	40.0	30.0	1,594		Interp.
	100	30.0	51.0	38.0	2,513	*UUT: Al-Cu windings, SS tank*	13

SPECIAL SEISMIC CERTIFICATION CERTIFIED SUBCOMPONENT MATRIX

1801293-CR-001-R1

TRU COMPLIANCE

Manufacturer:	Hitachi Energy USA Inc. (formerly ABB)	***Table Description:*** Electrical Bushings	**TABLE 5**
Model Line:	Transformer Product Family		

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS} = **2.25 g** ***z/h=0.0*** I_P = **1.5**

Component Type	Manufacturer	Model	Description	Notes	UUT
Bushing - HV	ABB	2B10536H01	*21.1 kV 200A - INTEGRAL STUD*	*UUT3: Qty.(6), UUT4: Qty.(3), UUT6: Qty.(2), UUT14: Qty.(3)*	3, 4, 6, 14
		1ZUA276301-AEB	*25kV 200A BUSHING, 150BIL REM STUD*	*Qty.(2)*	15
	Cooper	2637019B02	*15.2/8.3kV 600A BUSHING*	*Qty. (1)*	15
		DB635B150	*35kV 600A BUSHING*	*Qty. (1)*	15
	Crosslink Technology, Inc.	90-345	*15kV 450A EPOXY BUSHING, L-FRONT*	*Qty. (1)*	15
		90-340	*34.5kV 350A EPOXY BUSHING, L-FRONT*	*Qty. (1)*	15
		30C2554	*CROSSLINK L-FRONT 350A 34.5KV EPOXY*	*Qty. (3)*	16
	ESNA/Elastimold	K1601-PC-T1	*200A (589B821H10)*	*UUT8: Qty.(6), UUT9: Qty.(3), UUT10: Qty.(4), UUT11: Qty.(4), UUT12: Qty.(6), UUT13: Qty.(6)*	8, 9, 10, 11, 12, 13
		K650S1-NF	*25kV 600A BUSHING*	*Qty. (1)*	15
		750S1-NF	*35kV 600A BUSHING*	*Qty. (1)*	15
	H-J Enterprises	28C2465G01	*15kV 200A PORC BUSHING W/2 HL SPD*		Extrap.
		28C3929H01	*15kV 600A PORC BUSHING W/2 HL SPD*	*Qty.(3) Brass Alloy Spade Tested*	1
		30C2137H01	*15kV 600A PORC BUSHING W/ SNGL EYEBOLT*		Interp.
		30C1975H01	*15kV 800A PORC BUSHING W/ 2 HL SPD*		Interp.
		28C2471G01	*25kV 200A PORC BUSHING W/ SNGL EYEBOLT*		Interp.
		30C1926H01	*25kV 200A PORC BUSHING W/ SNGL EYEBOLT*	*Qty. (2)*	7
	Warco	28C5998H01	*15kV 110A PORC BUSHING W/2 HL SPD*		Interp.
		29C1559H01	*25kV 785A PORC BUSHING W/4 HL SPD*		Interp.
		29C2098H01	*35kV 110A PORC BUSHING W/2 HL SPD*		Interp.
		29C5629H01	*35kV 110A PORC BUSHING W/4 HL SPD*		Interp.
		1C19264H01	*34.5kV 55A PORC BUSHING W/ SNGL EYEBOLT*		Interp.

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

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TRU COMPLIANCE

Manufacturer:	Hitachi Energy USA Inc. (formerly ABB)	***Table Description:*** Electrical Bushings	**TABLE 5**
Model Line:	Transformer Product Family		

Building Code: CBC 2022 ***Seismic Certification Limits:*** ***S_{DS}= 2.25 g z/h=0.0*** ***I_P = 1.5***

Component Type	Manufacturer	Model	Description	Notes	UUT
Bushing - HV	Warco	28C4488H01	*35kV 460A PORC BUSHING W/2 HL SPD*	*Qty.(3) Bronze Spade Tested*	2
		29C5672H01	*35kV 460A PORC BUSHING W/4 HL SPD*	*Qty.(2) Cu Spades, (1) Bronze Alloy Spade*	5
		29C4357H01	*35kV 600A PORC BUSHING W/2 HL SPD*		Extrap.
Bushing - LV	ABB	2B10357H01	*0.625" DIA CU*	*UUT4: Qty.(4), UUT7: Qty.(3)*	4, 7
		2B10567H01	*1.00" DIA CU*	*Qty.(3)*	14
		28C2288H01	*1.25" DIA CU*	*Qty.(3)*	6
	Central Moloney	2B12889H01	*0.625" DIA CU*	*UUT10: Qty.(2), UUT12: Qty.(3)*	10, 12
		1B24954H01	*1.00" DIA CU*	*UUT11: Qty.(4), UUT13: Qty.(3)*	11, 13
		1B24955H01	*1.25" DIA CU*	*UUT8: Qty.(4), UUT9: Qty.(4)*	8, 9
	Crosslink Technology, Inc.	1C23252H01	*875A CU BUSH, EPOXY INSULA 4-HOLE*		Extrap.
		28C4159H01	*3100A CU BUSH, EPOXY INSULA 6-H0LE*		Extrap.
		29C1057H01	*3150A AL BUSH, EPOXY INSUL, 4-H0LE*		Extrap.
		28C1016H01	*3150A AL BUSH, EPOXY INSUL, 6-H0LE*	*Qty. (4)*	2
		28C1017H01	*3150A AL BUSH, EPOXY INSUL, 8-H0LE*		Interp.
		28C1018H01	*3150A LV Bushing 10 Hole*		Interp.
		28C1022H01	*4300A CU BUSH, EPOXY INSULA 6-H0LE*	*Qty. (4)*	3
		28C1079H01	*4300A LV Bushing 6 Hole*		Interp.
		28C1023H01	*4300A CU BUSH, EPOXY INSULA 8-H0LE*		Interp.
		28C1024H01	*4300A CU BUSH, EPOXY INSULA 10-H0LE*		Interp.
		28C1080H01	*4300A CU BUSH, EPOXY INSULA 10-H0LE*		Interp.
		28C4372H01	*4512A CU BUSH, EPOXY INSULA 6-HOLE*		Interp.
		28C4822H01	*4512A LV Bushing 10 Hole*		Interp.
		28C4192H01	*5400A CU BUSH, EPOXY INSULA 6-H0LE*		Interp.

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CERTIFIED SUBCOMPONENT MATRIX

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TRU COMPLIANCE

Manufacturer:	Hitachi Energy USA Inc. (formerly ABB)	**Table Description:**	Electrical Bushings	**TABLE 5**
Model Line:	Transformer Product Family			

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS} = ***2.25 g*** ***z/h=0.0*** I_P = ***1.5***

Component Type	Manufacturer	Model	Description	Notes	UUT
Bushing - LV	Crosslink Technology, Inc.	29C4310H01	*5400A CU BUSH, EPOXY INSULA 6-H0LE*		Interp.
		28C4566H01	*5400A LV Bushing 8 Hole*		Interp.
		30C4663H01	*5400A LV Bushing 8 Hole*		Interp.
		28C4565H01	*5400A CU BUSH, EPOXY INSULA 10-H0LE*		Interp.
		29C2998H01	*5400A LV Bushing 12 Hole*		Interp.
		29C2461H01	*5400A LV Bushing 14 Hole*		Interp.
		29C4583H01	*5400A LV BUSH, 18 HOLE, CU SPADE*	*Qty. (1)*	15
	Daheng	30C5033H01	*3150A LV Bushing 6 Hole*		Extrap.
		30C5034H01	*3150A LV Bushing 8 Hole*		Extrap.
		29C4432H01	*3150A AL BUSH, EPOXY INSUL, 10-H0LE*	*Qty. (4)*	5
		30C5035H01	*3150A LV Bushing 10 Hole*		Interp.
		30C5036H01	*3150A LV Bushing 12 Hole*		Interp.
		30C5037H01	*3150A LV bushing, 16 HOLE*	*Qty. (1)*	15
		30C5038H01	*3150A LV Bushing 20 Hole*		Interp.
		30C5193H01	*4300A LV Bushing, 6 HOLE*	*Qty. (1)*	15
		30C5039H01	*4300A LV Bushing 8 Hole*		Interp.
		30C5040H01	*4300A LV Bushing 10 Hole*		Interp.
		30C5041H01	*4300A LV Bushing 12 Hole*		Interp.
		30C5042H01	*4300A LV Bushing 16 Hole*		Interp.
		30C5238H01	*4300A LV Bushing, 18 HOLE*	*Qty. (1)*	15
	ESNA/Elastimold	1601A4CS937	*15KV INSERT BUSHING*	*Qty. (1)*	15
	H-J Enterprises	28C4655H01	*5400A CU-BUSH , EPOXY INSUL,8-HOLE*	*Qty. (4)*	1
		28C2810	*15KV 600A 6 HOLE SPD PORCELAIN BUSHI*	*Qty. (4)*	16

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1801293-CR-001-R1

TRU COMPLIANCE

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Table Description: Electrical Bushings

TABLE 5

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS} = ***2.25 g*** ***z/h=0.0*** I_P = ***1.5***

Component Type	Manufacturer	Model	Description	Notes	UUT
Bushing - Inserts	ESNA/Elastimold	1B23941H01	*15 kV class*	*Qty. (3)*	7
		1B23942H01	*25 kV class*	*Qty. (2)*	6
		4931B50H01	*21.1/36.6 kV class*	*Qty. (3)*	14
Bushing - Standoff	H-J Enterprises	POB-014	*5.0 kV, 60 kV BIL*	*Qty. (1)*	5
		POB-015	*7.5 kV, 75 kV BIL*		Interp.
		POB-016	*8.7 kV, 95 kV BIL*		Interp.
		POB-017	*25 kV, 110 kV BIL*		Interp.
		PO 0097-001	*25 kV, 150 kV BIL*	*UUT5: Qty. (2), UUT7: Qty. (1)*	5, 7

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1801293-CR-001-R1

TRU COMPLIANCE

Manufacturer:	Hitachi Energy USA Inc. (formerly ABB)	**Table Description:** Fuses	**TABLE 6**
Model Line:	Transformer Product Family		

Building Code: CBC 2022 **Seismic Certification Limits:** S_{DS}= 2.25 g z/h=0.0 I_P = 1.5

Component Type	Manufacturer	Model	Description	Notes	UUT
Fusing (Isolation Link)	ABB	1B25455H01	*ISOLATION LINK 1C11130G01 A1*		Extrap.
		1B25455H02	*ISOLATION LINK 1C11130G02 A2*	*Qty. (1)*	7
		1B25455H03	*ISOLATION LINK 1C11130G03 A3*		Interp.
		1B25455H05	*ISOLATION LINK 1C11130G05 A5*		Interp.
		1B25455H06	*ISOLATION LINK 1C11130G06 A6*		Interp.
		1B25455H07	*ISOLATION LINK 1C11130G07 A7*	*Qty. (1)*	9
	RTE	3637803B01	*ISOLATION LINK - MAGNEX E01*		Extrap.
		3637803B08	*ISOLATION LINK - MAGNEX E03*	*Qty. (3)*	10
		3637803B02	*ISOLATION LINK - MAGNEX E06*		Interp.
		3637803B09	*ISOLATION LINK - MAGNEX E10*		Interp.
		3637803B10	*ISOLATION LINK - MAGNEX E12*		Interp.
		3637803B03	*ISOLATION LINK - MAGNEX E18/E25*	*Qty. (3)*	11
		3637803B05	*ISOLATION LINK - MAGNEX E30/E40/E50*		Extrap.[1]
Fusing (Link Bay-O-Net)	RTE	3A18440H01	*125A MFR'S ID: 4038361C05CB*	*Qty. (3)*	14
Expulsion Fuse	ABB	592B581G/5750D27G	*15.0 kV LINK*	*Qty.(1) 5750D27G14 Tested*	5
		779C667G	*19.9kV LINK*		Interp.
		779G667G	*23.0kV LINK*		Interp.
		345B995G	*34.5kV LINK*	*Qty.(2) 345B995G32 Tested*	5
	ERMCO	9F54DAA	*5.2 kV LINK*		Extrap.
		9F54DAB	*5.2 kV LINK*		Extrap.

Notes:
1. *Subcomponent size and weight match tested subcomponent*

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SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1801293-CR-001-R1

Manufacturer: Hitachi Energy USA Inc. (formerly ABB) **Table Description:** Fuses

Model Line: Transformer Product Family

TABLE 6

Building Code: CBC 2022 **Seismic Certification Limits:** S_{DS}= **2.25 g** **z/h=0.0** I_P = **1.5**

Component Type	Manufacturer	Model	Description	Notes	UUT
Expulsion Fuse	ERMCO	9F54DBA	*8.4 kV LINK*		Extrap.
		9F54DBB	*8.4 kV LINK*		Extrap.
		9F54DDA	*15.0 kV LINK*		Extrap.
		9F54DDA	*15.0 kV LINK*		Extrap.
		9F54DCA	*23.0 kV LINK*	*Qty.(3) 9F54DCA701 Tested*	12
		9F54DCB	*23.0 kV LINK*	*Qty.(3) 9F54DCB001 Tested*	12
Expulsion Fuse (Type-DO-III)	ABB	3A21026H03	*3AMP DUAL SEN FUSE 1B11144G03*		Extrap.
		3A21027H03	*5AMP DUAL ELE FUSE 1B11145G03*		Extrap.
		3A21027H04	*6AMP DUAL ELE FUSE 1B11145G04*		Extrap.
		3A21025H04	*6AMP CUR SEN FUSE 1B11143G04*		Extrap.
		3A21027H05	*8AMP DUAL ELE FUSE 1B11145G05*	*Qty. (1)*	9
		3A21026H05	*8AMP DUAL SEN FUSE 1B11144G05*	*Qty. (2)*	9
		3A21025H06	*10AMP CUR SEN FUSE 1B11143G06*	*Qty. (1)*	7
		3A21027H06	*12AMP DUAL ELE FUSE 1B11145G06*		Interp.
		3A21027H07	*15AMP DUAL ELE FUSE 1B11145G07*		Interp.
		3A21026H08	*15AMP DUAL SEN FUSE 1B11144G08*		Interp.
		3A21025H08	*15AMP CUR SEN FUSE 1B11143G08*		Interp.
		3A21027H09	*25AMP DUAL ELE FUSE 1B11145G09*		Interp.
		3A21026H10	*25AMP DUAL SEN FUSE 1B11144G10*		Interp.
		3A21025H10	*25AMP CUR SEN FUSE 1B11143G10*		Interp.
		3A21027H11	*40AMP DUAL ELE FUSE 1B11145G11*		Interp.

Notes:

1. *Subcomponent size and weight match tested subcomponent*

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1801293-CR-001-R1

TRU COMPLIANCE

Manufacturer: Hitachi Energy USA Inc. (formerly ABB) ***Table Description:*** Fuses

Model Line: Transformer Product Family

TABLE 6

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P = ***1.5***

Component Type	Manufacturer	Model	Description	Notes	UUT
Expulsion Fuse (Type-DO-III)	ABB	3A21025H12	*40AMP CUR SEN FUSE 1B11143G12*		Interp.
		3A21027H12	*50AMP DUAL ELE FUSE 1B11145G12*		Interp.
		3A21026H12	*50AMP DUAL SEN FUSE 1B11144G12*		Interp.
		3A21026H14	*65AMP DUAL SEN FUSE 1B11144G14*		Interp.
		3A21025H14	*65AMP CUR SEN FUSE 1B11143G14*	*Qty. (1)*	6
		3A21025H16	*100AMP CUR SEN FUSE 1B11143G16*		Extrap.[1]
		3A21025H17	*140AMP CUR SEN FUSE 1B11143G17*		Extrap.[1]
Current-Limiting Fuse	Cooper	CBUC38140D100	*38 kV, 140A*	*Qty. (2)*	15
	Hi-Tech (30A-165A)	HTSS232	*8.3 kV*	*Qty.(3) HTSS232040 Tested*	9
		HTSS240	*17.2 kV*	*Qty.(3) HTSS242150 Tested*	14
		HTSS242	*15.5 kV*		Interp.
		HTSS252	*23.0 kV*	*Qty.(2) HTSS252100 Tested*	5
		HTSS372	*38.0 kV*	*UUT5: Qty.(2) HTSS372100 Tested, UUT15: Qty.(2) HTSS372165 Tested*	5, 15

Notes:

1. *Subcomponent size and weight match tested subcomponent*

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1801293-CR-001-R1

Manufacturer: Hitachi Energy USA Inc. (formerly ABB) **Table Description:** Misc. Electrical Components

Model Line: Transformer Product Family

TABLE 7

Building Code: CBC 2022 **Seismic Certification Limits:** S_{DS}= 2.25 g z/h=0.0 I_P = 1.5

Component Type	Manufacturer	Model	Description	Notes	UUT
Switch	ABB	1C23376H01	*100A 1 DECK DV SWITCH*	*Qty. (1)*	6
		1C08872H01	*125A 3 DECK TAP CHANGES*	*UUT1: Qty. (1), UUT5: Qty. (1)*	1, 5
		1C08823H01	*300A 1 DECK LBOR*	*Qty. (1)*	7
		1C08825H01	*300A 3 DECK LBOR*	*UUT5: Qty. (1), UUT6: Qty. (1)*	5, 6
		1C08872H01	*3PH TC*	*Qty. (1)*	1
		29C2190H01	*3PH TC SILVER CONTACTS*	*UUT3: Qty. (1), UUT4: Qty. (1)*	3, 4
		5543C55G47	*300A 3 DECK LBOR W/ HANDLE*	*UUT8-11: Qty. (1) each, UUT13: Qty. (1)*	8-11, 13
	Cooper	LS4BH3T12M	*T_BLADE, 4 POSITION SWITCH, "LS4" FAMILY, LOAD BREAK SWITCH*	*Qty. (1)*	15
		2237179C02M	*300A TAP CHANGES*	*Qty. (1)*	15
	RTE	8608C31H01	*150A 6 DECK DV SWITCH*	*UUT4: Qty. (1), UUT8: Qty. (1)*	4, 8
		1B24985H01	*150A 3 DECK DV SWITCH*	*UUT10: Qty. (1), UUT11: Qty. (1), UUT13: Qty. (1)*	10, 11, 13
Breaker	ERMCO	1B24028H01	*T-12 BREAKER*	*Qty. (1)*	7
		28C2517H01	*T-13 BREAKER*		Interp.
		2B11057H01	*T-15 BREAKER*	*Qty. (1)*	13
	RTE	29C2161H01	*MAGNEX INTERRUPTER*	*Qty. (1)*	10
		29C4597H01	*MAGNEX INTERRUPTER*	*Qty. (1)*	11
Gauges	Elmek	572015-00-04	*LIQUID LEVEL GAUGE*	*Qty. (1)*	5
	Heartland	HLG-1065	*LIQUID SIGHT GAUGE*	*UUT7-13: Qty. (1) each*	7-13
	HJ	INT001-001K-SS	*VACUUM PRESSURE GAUGE*	*UUT1: Qty. (1), UUT2: Qty. (1), UUT4: Qty. (4)*	1, 2, 4
	Qualitrol	QUAL 020-550-01	*LIQUID LEVEL GAUGE*	*UUT4: Qty. (1), UUT6: Qty. (1)*	4, 6
		QUAL 151-100-01	*LIQUID TEMPERATURE GAUGE*	*UUT2: Qty. (1), UUT5: Qty. (1)*	2, 5
		QUAL 030-017-03	*LIQUID LEVEL GAUGE*	*UUT1: Qty. (1), UUT2: Qty. (1)*	1, 2

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT MATRIX

1801293-CR-001-R1

TRU COMPLIANCE

Manufacturer:	Hitachi Energy USA Inc. (formerly ABB)	***Table Description:*** Misc. Electrical Components	**TABLE 7**
Model Line:	Transformer Product Family		

Building Code: CBC 2022 ***Seismic Certification Limits:*** S_{DS}= ***2.25 g*** ***z/h=0.0*** I_P = ***1.5***

Component Type	Manufacturer	Model	Description	Notes	UUT
Pressure Relief	Hardware	3A25842H01	*PRESSURE RELIEF*	*UUT10-13: Qty. (1) each*	10-13
	Qualitrol	QUAL 201-020-01	*PRESSURE RELIEF*	*UUT1-5: Qty. (1) each, UUT15: Qty. (1)*	1-5, 15
		QUAL 202-014-02	*PRESSURE RELIEF*	*UUT8 & 9: Qty. (1) each*	8, 9
		QUAL 208-60E	*PRESSURE RELIEF*	*Qty. (1)*	15
Control Cabinet	Weigmann	8D12182M13	*CONTROL CABINET*	*Qty. (1)*	1
	South Star Corp.	3D50040	*CONTROL BOX AND WIRING*	*Qty. (1)*	16
Fans	Krenz Vent	A-9875	*12" FAN*	*Qty. (1)*	1
		…			Interp.
		A-8477	*16" FAN*	*Qty. (1)*	1
APID Pressure Rise Relay	Qualitrol	910-010-33	*RAPID RISE RELAY*	*Qty. (1)*	15
Current Transformer	ABB	1A3389	*B/O CT 5485:5 MNTG INSIDE TANK*	*Qty. (1)*	15
		2B12407	*2500/5 C200 CABLE MOUNTED CT*	*Qty. (1)*	16
Thermometer	Qualitrol	120-005-03	*DIRECT MT THERM*	*Qty. (1)*	15
Under Oil Arrester	Cooper	CLU23C36	*36kV, "CLU" Arresters*	*Qty. (1)*	15

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)

Model Line: Transformer Product Family

UUT	Unit Description (mounting)	Report Number (UUT#)	Testing Lab	Year Tested	ISO 17025 Accredited?	S_{DS}	z/h	I_P
1	75kVA 3ϕ Padmount (NEMA 3R Painted Carbon Steel Enclosure w/o skirt)	EL:9243 (Transformer "C")	Clark Testing	2010	No[1]	2.25	0.0	1.5
2	3000kVA 3ϕ Padmount (NEMA 3R Painted Carbon Steel Enclosure w/o skirt)	EL:9243 (Transformer "B")	Clark Testing	2010	No[1]	2.25	0.0	1.5
3	225kVA Unit Substation (NEMA 3R Painted Carbon Steel Enclosure w/o skirt)	EL:9243 (Transformer "A")	Clark Testing	2010	No[1]	2.25	0.0	1.5
4	3000kVA Unit Substation (NEMA 3R Painted Carbon Steel Enclosure w/o skirt)	EL:9295	Clark Testing	2010	No[1]	2.25	0.0	1.5
5	2500kVA 3ϕ Padmount & Unit Substation (NEMA 3R Painted Carbon Steel Enclosure)	13512 (UUT5)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5
6	250kVA 1ϕ Padmount & Unit Substation (NEMA 3R Painted Carbon Steel Enclosure)	13512 (UUT5)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5
7	10kVA 1ϕ Padmount & Unit Substation (NEMA 3R Painted Carbon Steel Enclosure)	13512 (UUT5)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5
8	1500kVA 3ϕ UCT (NEMA 3R Stainless Steel Enclosure w/o skirt)	13512 (UUT5)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5
9	75VA 3ϕ UCT (NEMA 3R Stainless Steel Enclosure w/o skirt)	13512 (UUT5)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5
10	25kVA 1ϕ Horizontal (NEMA 3R Stainless Steel Enclosure w/o skirt)	13512 (UUT5)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5
11	167kVA 1ϕ Horizontal (NEMA 3R Stainless Steel Enclosure w/o skirt)	13512 (UUT5)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5

Notes:

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)

Model Line: Transformer Product Family

UUT	Unit Description (mounting)	Report Number (UUT#)	Testing Lab	Year Tested	ISO 17025 Accredited?	S_{DS}	z/h	I_P
12	25kVA 1ϕ DUP Horizontal (NEMA 3R Stainless Steel Enclosure w/o skirt)	13512 (UUT12)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5
13	100kVA 1ϕ DUP Horizontal (NEMA 3R Stainless Steel Enclosure w/o skirt)	13512 (UUT13)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5
14	780kVA 3ϕ Padmount & Unit Substation (NEMA 3R Painted Carbon Steel Enclosure w/o skirt)	13512 (UUT14)	Environmental Testing Lab (ETL)	2014	Yes	2.25	0.0	1.5
15	3000kVA 3ϕ Padmount (NEMA 3R Painted Carbon Steel Enclosure & Tank w/o skirt)	1801293-TR-001 (UUT15)	ERDC-CERL	2018	No[1]	2.25	0.0	1.5
16	3000kVA 3ϕ Unit Substation (NEMA 3R Painted Carbon Steel Enclosure w/o skirt)	2301373-TR-001 (UUT1)	ERDC-CERL	2024	No[1]	2.25	0.0	1.5

Notes:

1. *ERDC-CERL is not ISO/IEC 17025 accredited but has been reviewed by TRU Compliance and found to meet the applicable requirements of ISO/IEC 17025 testing. Review form is on file with TRU Compliance .*

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 1

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 75kVA 3ϕ Padmount ***Serial Number:*** 07J804259

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure without skirt.

Options/Subcomponent Summary:
Carbon Steel Tank. Aluminum Windings. Phase: 3ϕ. Radial Feed. Dead Front.
Bushing-HV: H-J Enterprises (28C3929H01 x3); **Bushing-LV:** H-J Enterprises (28C4655H01 x4);
Switch: ABB (1C08872H01, 1C08872H01); **Gauges:** HJ (INT001-001K-SS), Qualitrol (QUAL 030-017-03);
Pressure Relief: Qualitrol (QUAL 201-020-01); **Control Cabinet:** Weigmann (8D12182M13); **Fans:** Krenz Vent (A-9875, A-8477)

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2,300	50.2	56.9	48.3	26.1	26.9	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: EL:9243 (Transformer "C"))*

UUT1 was base - mounted rigid to the table using four (4) 1"-8 Grade 5 hex head bolts with flat washers and lock washers. Torqued to 250 ft-lbs.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 2

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 3000kVA 3ϕ Padmount ***Serial Number:*** JC153380001 (10J482001)

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure without skirt.

Options/Subcomponent Summary:
Carbon Steel Tank. Aluminum Windings. Phase: 3ϕ. Loop Feed. Dead Front.
Bushing-HV: Warco (28C4488H01 x3); **Bushing-LV:** Crosslink Technology, Inc. (28C1016H01 x4);
Gauges: HJ (INT001-001K-SS), Qualitrol (QUAL 151-100-01, QUAL 030-017-03); **Pressure Relief:** Qualitrol (QUAL 201-020-01);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
14,400	74.8	100.6	72.0	14.3	25.2	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: EL:9243 (Transformer "B")*

UUT2 was base - mounted rigid to the table using four (4) 1"-8 and two (2) 1/2"-13 Grade 5 hex head bolts with flat washers and lock washers. 1" mounting hardware was torqued to 250 ft-lbs and 1/2" mounting hardware was torqued to 75 ft-lbs.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 3

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 225kVA Unit Substation ***Serial Number:*** JC344180001 (10J482031)

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure without skirt.

Options/Subcomponent Summary:
Carbon Steel Tank. Aluminum Windings. Phase: 3ϕ. Radial Feed. Live Front.
Bushing-HV: ABB (2B10536H01 x6); **Bushing-LV:** Crosslink Technology, Inc. (28C1022H01 x4); **Switch:** ABB (29C2190H01); **Pressure Relief:** Qualitrol (QUAL 201-020-01)

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
4,900	67.3	59.0	73.0	13.1	14.3	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: EL:9243 (Transformer "A")*

UUT3 was base - mounted rigid to the table using four (4) 1"-8 Grade 5 hex head bolts with flat washers and lock washers. Torqued to 250 ft-lbs.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 4

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 3000kVA Unit Substation ***Serial Number:*** JC530650001 (999998)

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure without skirt.

Options/Subcomponent Summary:
Carbon Steel Tank. Copper Windings. Phase: 3ϕ. Radial Feed. Live Front.
Bushing-HV: ABB (2B10536H01 x3); **Bushing-LV:** ABB (2B10357H01 x4); **Switch:** ABB (29C2190H01), RTE (8608C31H01);
Gauges: HJ (INT001-001K-SS x4), Qualitrol (QUAL 020-550-01); **Pressure Relief:** Qualitrol (QUAL 201-020-01);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
15,900	93.1	69.0	85.0	10.3	10.7	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: EL:9295)*

UUT4 was base - mounted rigid to the table using four (4) 1"-8 Grade 5 hex head bolts with flat washers and lock washers. Torqued to 400 ft-lbs.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 5

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 2500kVA 3ϕ Padmount & Unit Substation ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure.

Options/Subcomponent Summary:
Stainless Steel Tank. Copper Windings. Phase: 3ϕ. Loop Feed. Live Front.
Bushing-HV: Warco (29C5672H01 x2); **Bushing-LV:** Daheng (29C4432H01 x4);
Bushing-Standoff: H-J Enterprises (POB-014, PO 0097-001 x2); **Expulsion Fuse:** ABB (5750D27G14, 345B995G32 x2);
Current-Limiting Fuse: Hi-Tech (HTSS252100 x2, HTSS372100 x2); **Switch:** ABB (1C08872H01, 1C08825H01);
Gauges: Elmek (572015-00-04), Qualitrol (QUAL 151-100-01); **Pressure Relief:** Qualitrol (QUAL 201-020-01);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
17,090	89.0	135.0	81.0	5.87	10.01	28.12

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT5))*

UUT5 was base - mounted rigid to the table using four (4) 1" Grade 5 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

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UUT 6

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 250kVA 1ϕ Padmount & Unit Substation ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure.

Options/Subcomponent Summary:
Stainless Steel Tank. Aluminum Windings. Phase: 1ϕ. Loop Feed. Dead Front.
Bushing-HV: ABB (2B10536H01 x2); **Bushing-LV:** ABB (28C2288H01 x3); **Bushing-Inserts:** ESNA/Elastimold (1B23942H01 x2);
Expulsion Fuse (Type-DO-III): ABB (3A21025H14); **Switch:** ABB (1C23376H01, 1C08825H01);
Gauges: Qualitrol (QUAL 020-550-01);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2,725	56.0	46.0	42.0	11.50	12.15	14.63

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT6))*

UUT6 was base - mounted rigid to the table using two (2) 1/2" Grade 8 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 7

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 10kVA 1ϕ Padmount & Unit Substation ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure.

Options/Subcomponent Summary:
Carbon Steel Tank. Aluminum Windings. Phase: 1ϕ. Radial Feed. Live Front.
Bushing-HV: H-J Enterprises (30C1926H01 x2); **Bushing-LV:** ABB (2B10357H01 x3);
Bushing-Inserts: ESNA/Elastimold (1B23941H01 x3); **Bushing-Standoff:** H-J Enterprises (PO 0097-001);
Fusing (Isolation Link): ABB (1B25455H02); **Expulsion Fuse (Type-DO-III):** ABB (3A21025H06);
Switch: ABB (1C08823H01); **Breaker:** ERMCO (1B24028H01); **Gauges:** Heartland (HLG-1065);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,366	45.0	42.0	36.0	11.30	15.01	11.75

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT7))*

UUT7 was base - mounted rigid to the table using two (2) 1/2" Grade 8 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 8

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 1500kVA 3ϕ UCT ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Stainless Steel Enclosure without skirt.

Options/Subcomponent Summary:
Stainless Steel Tank. Copper Windings. Phase: 3ϕ. Loop Feed. Dead Front.
Bushing-HV: ESNA/Elastimold (K1601-PC-T1 x6); **Bushing-LV:** Central Moloney (1B24955H01 x4);
Switch: ABB (5543C55G47), RTE (8608C31H01); **Gauges:** Heartland (HLG-1065); **Pressure Relief:** Qualitrol (QUAL 202-014-02);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
10,500	57.0	79.0	76.0	9.24	9.33	>33.33

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT8))*

UUT8 was base - mounted rigid to the table using four (4) 1" Grade 5 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 9

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 75VA 3ɸ UCT ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Stainless Steel Enclosure without skirt.

Options/Subcomponent Summary:
Stainless Steel Tank. Aluminum Windings. Phase: 3ɸ. Radial Feed. Dead Front.
Bushing-HV: ESNA/Elastimold (K1601-PC-T1 x3); **Bushing-LV:** Central Moloney (1B24955H01 x4);
Fusing (Isolation Link): ABB (1B25455H07); **Expulsion Fuse (Type-D0-III):** ABB (3A21027H05, 3A21026H05 x2);
Current-Limiting Fuse: Hi-Tech (HTSS232040 x3); **Switch:** ABB (5543C55G47); **Gauges:** Heatland (HLG-1065);
Pressure Relief: Qualitrol (QUAL 202-014-02);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
3,640	32.0	68.0	53.0	15.01	15.64	31.88

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT9))*

UUT9 was base - mounted rigid to the table using four (4) 1" Grade 5 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 10

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 25kVA 1ϕ Horizontal ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Stainless Steel Enclosure without skirt.

Options/Subcomponent Summary:
Stainless Steel Tank. Aluminum Windings. Phase: 1ϕ. Radial Feed. Dead Front.
Bushing-HV: ESNA/Elastimold (K1601-PC-T1 x4); **Bushing-LV:** Central Moloney (2B12889H01 x2);
Fusing (Isolation Link): RTE (3637803B08 x3); **Switch:** ABB (5543C55G47), RTE (1B24985H01); **Breaker:** RTE (29C2161H01);
Gauges: Heartland (HLG-1065); **Pressure Relief:** Hardware (3A25842H01);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,096	24.0	44.0	29.0	31.69	9.85	25.90

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT10))*

UUT10 was base - mounted rigid to the table using two (2) 1" Grade 5 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 11

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 167kVA 1ϕ Horizontal ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Stainless Steel Enclosure without skirt.

Options/Subcomponent Summary:
Stainless Steel Tank. Aluminum-Copper Windings. Phase: 1ϕ. Radial Feed. Dead Front.
Bushing-HV: ESNA/Elastimold (K1601-PC-T1 x4); **Bushing-LV:** Central Moloney (1B24954H01 x4);
Fusing (Isolation Link): RTE (3637803B03 x3); **Switch:** ABB (5543C55G47), RTE (1B24985H01); **Breaker:** RTE (29C4597H01);
Gauges: Heartland (HLG-1065); **Pressure Relief:** Hardware (3A25842H01);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2,223	24.0	40.0	42.0	18.68	5.77	>33.33

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT11))*

UUT11 was base - mounted rigid to the table using two (2) 1" Grade 5 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 12

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 25kVA 1ϕ DUP Horizontal ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Stainless Steel Enclosure without skirt.

Options/Subcomponent Summary:
Stainless Steel Tank. Aluminum Windings. Phase: 1ϕ. Radial Feed. Dead Front.
Bushing-HV: ESNA/Elastimold (K1601-PC-T1 x6); **Bushing-LV:** Central Moloney (2B12889H01 x3);
Expulsion Fuse: ERMCO (9F54DCA701 x3, 9F54DCB001 x3); **Gauges:** Heartland (HLG-1065);
Pressure Relief: Hardware (3A25842H01);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,513	24.0	47.0	32.0	>33.33	11.08	26.20

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT12))*

UUT12 was base - mounted rigid to the table using two (2) 1" Grade 5 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 13

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 100kVA 1ϕ DUP Horizontal ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Stainless Steel Enclosure without skirt.

Options/Subcomponent Summary:
Stainless Steel Tank. Aluminum-Copper Windings. Phase: 1ϕ. Radial Feed. Dead Front.
Bushing-HV: ESNA/Elastimold (K1601-PC-T1 x6); **Bushing-LV:** Central Moloney (1B24954H01 x3);
Switch: ABB (5543C55G47), RTE (1B24985H01); **Breaker:** ERMCO (2B11057H01); **Gauges:** Heartland (HLG-1065);
Pressure Relief: Hardware (3A25842H01);

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2,513	30.0	51.0	38.0	>33.33	5.92	15.90

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT13))*

UUT13 was base - mounted rigid to the table using two (2) 1" Grade 5 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 14

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 780kVA 3ϕ Padmount & Unit Substation ***Serial Number:*** N/A

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure without skirt.

Options/Subcomponent Summary:
Carbon Steel Tank. Aluminum-Copper Windings. Phase: 3ϕ. Radial Feed. Dead Front.
Bushing-HV: ABB (2B10536H01 x3); **Bushing-LV:** ABB (2B10567H01 x3); **Bushing-Inserts:** ESNA/Elastimold (4931B50H01 x3);
Fusing (Link Bay-O-Net): RTE (3A18440H01 x3); **Current-Limiting Fuse:** Hi-Tech (HTSS242150 x3);

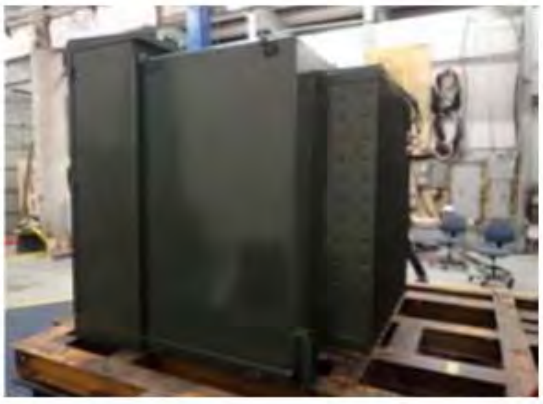
UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
9,990	71.0	70.0	72.0	10.39	29.65	10.87

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 13512 (UUT14))*



UUT14 was base - mounted rigid to the table using four (4) 1" Grade 5 bolts.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 15

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 3000kVA 3ϕ Padmount ***Serial Number:*** 18JC092760001

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure without skirt.

Options/Subcomponent Summary:
Carbon Steel Tank. Aluminum (high voltage) & Copper Windings (low voltage). Phase: 3ϕ. Loop & Radial Feed. Live & Dead Front.
Bushing-HV: ABB (1ZUA276301-AEB x2), Cooper (2637019B02, DB635B150), Crosslink Technology, Inc. (90-345, 90-340), ESNA/Elastimold (K650S1-NF, 750S1-NF); **Bushing-LV:** Crosslink Technology (29C4583H01), ESNA/Elastimold (1601A4CS937), Daheng (30C5037H01, 30C5193H01, 30C5238H01); **Switch:** Cooper (LS4BH3T12M, 2237179C02M);
Current-Limiting Fuse: Cooper (CBUC38140D100 x2), Hi-Tech (HTSS372165 x2); **Thermometer:** Qualitrol (120-005-03);
Pressure Relief: Qualitrol (QUAL 201-020-01, QUAL 208-60E); **Current Transformer:** ABB (1A3389);
APID Pressure Rise Relay: Qualitrol (910-010-33); **Under Oil Arrester:** Cooper (CLU23C36);

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
19,850	116.4	134.6	93.5	13.0	20.0	>33.3

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 1801293-TR-001 (UUT15))*

UUT15 was base - mounted rigid to the table using four (4) 1" Grade 8 bolts with flat washers and lock washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.

UNIT UNDER TEST (UUT) SUMMARY SHEET

1801293-CR-001-R1

UUT 16

Manufacturer: Hitachi Energy USA Inc. (formerly ABB)
Model Line: Transformer Product Family
Model Number: 3000kVA 3ϕ Unit Substation ***Serial Number:*** JC259320001

Product Construction Summary:
NEMA 3R Painted Carbon Steel Enclosure without skirt.

Options/Subcomponent Summary:
Carbon Steel Tank. Copper Windings. Phase: 3ϕ. Radial Feed. Live Front.
Bushing-HV: Crosslink Technology, Inc. (30C2554 x3); **Bushing-LV:** H-J Enterprises (28C2810 x4);
Control Cabinet: South Star Corp. (3D50040); **Current Transformer:** ABB (2B12407)

UUT Properties

Weight (lbs.)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
19,200	98.7	128.7	119.9	11.20	13.59	23.26

UUT Highest Passed Seismic Run Information

Building Code	Test Criteria	S_{DS} (g)	z/h	I_P	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
CBC 2022, IBC 2021	ICC-ES AC156 (2010)	2.25	0.0	1.5	2.25	0.90	1.50	0.60

Test Mounting Details: *(Test Report: 2301373-TR-001 (UUT1))*

UUT16 was base - mounted rigid to the table using four (4) 1" Grade 8 bolts and washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.