



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP – 0623

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☒ New ☐ Renewal

Manufacturer Information

Manufacturer: Cummins Power Generation

Manufacturer's Technical Representative: B.S. Raghukumar

Mailing Address: 1400 73rd Ave N.E. Fridley, MN 55432 USA

Telephone: (763) 574-3302

Email: b.s.raghukumar@cummins.com

Product Information

Product Name: Hercules Automatic Transfer Switch

Product Type: Automatic Transfer Switch

Product Model Number: See Attachment

(List all unique product identification numbers and/or part numbers)

General Description: Automatic Transfer Switches for transferring power between utility and generator. NEMA 1/3R/4/12/4X rating, 1200A-3000A. Seismic enhancements made to the test units and modifications required to address anomalies observed during the tests shall be incorporated into the production units.

Mounting Description: Rigid base mounted

Applicant Information

Applicant Company Name: Structural Integrity Associates, Inc. dba TRU Compliance

Contact Person: Andrew Coughlin, SE

Mailing Address: 5215 Hellyer Ave, Suite 210, San Jose, CA 94608

Telephone: (844) 878-0200

Email: acoughlin@structint.com

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2016.

Signature of Applicant:  Date: 10/11/2019

Title: Director, TRU Compliance Company Name: Structural Integrity Associates, Inc.

"Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dynamic Needs"



**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
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California Licensed Structural Engineer Responsible for the Engineering and Test Report(s)

Company Name: Structural Integrity Associates, Inc. dba TRU Compliance

Name: Andrew Coughlin, SE California License Number: S6082

Mailing Address: 5215 Hellyer Ave, Suite 210, San Jose, CA 94608

Telephone: (844) 878-0200 Email: acoughlin@structint.com

Supports and Attachments Preapproval

- ☐ Supports and attachments are preapproved under OPM-
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)
- ☒ Supports and attachments are not preapproved

Certification Method

- ☒ Testing in accordance with: ☒ ICC-ES AC156
- ☐ Other (Please Specify): _____

BY: Mohammad Aliaari

DATE: 12/08/2020

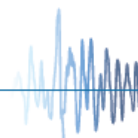
Testing Laboratory

Company Name: Seismic Test Co.

Contact Name: Matt Settergren

Mailing Address: 5959 Trenton Lane N., Plymouth, MN 55442

Telephone: (763) 551-7535 Email: msettergren@tcf.com





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Seismic Parameters

Design in accordance with ASCE 7-10 Chapter 13: ☒ Yes ☐ No

Design Basis of Equipment or Components (F_p/W_p) = 1.39 ($S_{DS} = 1.85g$); 1.33 ($S_{DS} = 2.96g$)

S_{DS} (Design spectral response acceleration at short period, g) = 1.85g ($z/h = 1.0$); 2.96g ($z/h = 0.0$)

a_p (In-structure equipment or component amplification factor) = 2.5

R_p (Equipment or component response modification factor) = 6.0

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1.0 ($S_{DS} = 1.85g$); 0.0 ($S_{DS} = 2.96g$)

Equipment or Component Natural Frequencies (Hz) = See Attachment

Overall dimensions and weight (or range thereof) = See Attachment

Equipment or Components @ grade designed in accordance with ASCE 7-10 Chapter 15: ☐ Yes ☒ No

Design Basis of Equipment or Components (V/W) = _____

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

S_{D1} (Design spectral response acceleration at 1 second period, g) = _____

R (Response modification coefficient) = _____

Ω_0 (System overstrength factor) = by: Mohammad Aliaari

C_d (Deflection amplification factor) = _____

I_p (Importance factor) = 1.5

Height to Center of Gravity above base = _____

Equipment or Component Natural Frequencies (Hz) = _____

Overall dimensions and weight (or range thereof) = _____

Tank(s) designed in accordance with ASME BPVC, 2015: ☐ Yes ☒ No

List of Attachments Supporting Special Seismic Certification

☒ Test Report(s) ☐ Drawings ☐ Calculations ☐ Manufacturer's Catalog

☒ Other(s) (Please Specify): Product and Subcomponent Matrices, UUT Summaries

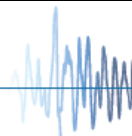
OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2025

Signature: M. Aliari Date: December 08, 2020

Print Name: Mohammad Aliaari Title: Senior Structural Engineer

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

Condition of Approval (if applicable): _____



SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

1801393-CR-001-R1



Manufacturer: Cummins Power Generation							TABLE 1		
Model Line: CXR Automatic Transfer Switches									
Certified Product Construction Summary: Enclosure Material: Carbon and Stainless Steels (12 gage)									
Certified Options Summary: Amperage: 1200-3000 Voltage: 208, 480, 600 NEMA Rating: 1, 3R, 4, 12, 4X									
Mounting Configuration: Base mounted - rigid Note: Installed mounting configuration must be of similar configuration and equivalent strength and stiffness to those tested.									
Building Code: CBC 2019			Seismic Certification Limits:				$S_{DS}= 1.85 g \quad z/h=1.0$ $S_{DS}= 2.96 g \quad z/h=0.0$		$I_P= 1.5$
Model Line	Model	Dimensions (in)				Weight (lb)	Ten ¹ (lb)	Notes	UUT
		Depth	Width	Height	CG Height				
CXR	CXRE8, 3 poles	48.9	39.6	89.6	47	1432	1700	Carbon Steel, NEMA 1	2
		48.9	39.6	89.6	47	1600	1899	Carbon Steel, NEMA 3R	Interp.
		46.6	39.1	90.1	47	1400	1683	Carbon Steel, NEMA 4, & 12	Interp.
		46.6	39.1	90.1	47	1300	1563	Stainless Steel, NEMA 4X	Interp.
	CXRE8, 4 poles	48.9	39.6	89.6	47	1700	2018	Carbon Steel, NEMA 1	Interp.
		48.9	39.6	89.6	47	1800	2136	Carbon Steel, NEMA 3R	Interp.
		46.6	39.1	90.1	47	1000	1202	Carbon Steel, NEMA 4, & 12	Interp.
		46.6	39.1	90.1	47	1500	1803	Stainless Steel, NEMA 4X	Interp.
	CXRF8, 3 poles	57.6	47	89.6	47	2100	2100	Carbon Steel, NEMA 1	Interp.
		57.6	47	89.6	47	2200	2200	Carbon Steel, NEMA 3R	Interp.
		55.1	46.4	90.1	47	2000	2026	Carbon Steel, NEMA 4, & 12	Interp.
		55.1	46.4	90.1	47	1850	1874	Stainless Steel, NEMA 4X	Interp.
	CXRF8, 4 poles	57.6	47	89.6	47	2300	2300	Carbon Steel, NEMA 1	Interp.
		57.6	47	89.6	47	2400	2400	Carbon Steel, NEMA 3R	Interp.
		55.1	46.4	90.1	47	2200	2228	Carbon Steel, NEMA 4, & 12	Interp.
		55.1	46.4	90.1	47	1854	1878	Stainless Steel, NEMA 4X	Interp.
	CXRG8, 3 poles	57.6	47	89.6	47	2200	2200	Carbon Steel, NEMA 1	Interp.
		57.6	47	89.6	47	2300	2300	Carbon Steel, NEMA 3R	Interp.
		55.1	46.4	90.1	47	2000	2026	Carbon Steel, NEMA 4, & 12	Interp.
		55.1	46.4	90.1	47	1854	1878	Stainless Steel, NEMA 4X	3

Additional Notes:

¹Ten = Weight*CG Height/Smaller of Depth and Width

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¹Ten = Weight*CG Height/Smaller of Depth and Width

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SPECIAL SEISMIC CERTIFICATION CERTIFIED SUBCOMPONENT MATRIX

1801393-CR-001-R1



Manufacturer: Cummins Power Generation		Table Description: Various Subcomponents			TABLE 2
Model Line: CXR Automatic Transfer Switches					
Building Code: CBC 2019		Seismic Certification Limits:		$S_{DS} = 1.85\text{ g}$ $z/h = 1.0$ $S_{DS} = 2.96\text{ g}$ $z/h = 0.0$	$I_p = 1.5$
Component Type	Manufacturer	Model	Description	Notes	UUT
Controller	Cummins	PC80	Level 2 Controller, Electronics & Plastic	under 10 lbs., 10 amps	1-3
Transfer Switch	Cummins	CXRE8	3 pole	Weight: 400 lbs.	2
		CXRF8	3 pole	Weight: 600 lbs.	Interp.
		CXRG8	3 pole	Weight: 800 lbs.	3
		CXRH8	3 pole	Weight: 1000 lbs.	Interp.
		CXRE8	4 pole	Weight: 600 lbs.	Interp.
		CXRF8	4 pole	Weight: 800 lbs.	Interp.
		CXRG8	4 pole	Weight: 1000 lbs.	Interp.
		CXRH8	4 pole	Weight: 1200 lbs.	1
		Solid Neutral	Cummins	A060P743	Accessory for 3 pole E -Frame TS
A060U561	Accessory for 3 pole F/G -Frame TS				3
A058X344	Accessory for 3 pole H -Frame TS				1
Transformer	Hammond HPS	PH500SP	Transformer for heat accessory	Weight: 14 lbs	2
		PF500MBMH	Transformer for heat accessory	Weight: 16 lbs	1
Thermostat	Stego	01160.0-00	Thermostat for heater	under 10 amps and lbs	1, 2
Heater	Stego	02810.9-00	Heater	under 10 amps and lbs	1, 2
Surge Suppressor	Square D	N/A	Display for Surge Device	Weight: 0.5 lbs	1, 3
		TVS8HIMA18O1	Surge Suppressor	Weight: 8.4 lbs	3
		TVS9IMA18O1	Surge Suppressor	Weight: 8.4 lbs	1
Protective Relays	Electroswitch Co.	78PJ03A-011	Lockout Relay		1, 2
	Basler Electric	BE1-32R-E2E-E1R-A0N1F	Power Relay		1, 2
	Time Mark Co.	360-24V-.1SEC	Timing Relay		1, 2

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SPECIAL SEISMIC CERTIFICATION CERTIFIED SUBCOMPONENT MATRIX

1801393-CR-001-R1



Manufacturer: Cummins Power Generation		Table Description: Various Subcomponents			TABLE 2
Model Line: CXR Automatic Transfer Switches					
Building Code: CBC 2019		Seismic Certification Limits:		$S_{DS} = 1.85\text{ g}$ $z/h = 1.0$	$I_p = 1.5$
				$S_{DS} = 2.96\text{ g}$ $z/h = 0.0$	
Component Type	Manufacturer	Model	Description	Notes	UUT
Solenoid	Cummins	A061V064	E-Frame, 3-P & 4-P, 600V		Extrap.
		A059B822	H&F-Frame 3-P, G-Frame 3-P & 4-P, 600V		Extrap.
		A059B832	H-Frame 4-P, 600V		Extrap.
		A061V062	E-Frame, 3-P & 4-P, 480V		2
		A059B794	H&F-Frame 3-P, G-Frame 4-P, 480V		Interp.
		A056H913	E-Frame, 3-P & 4-P, 208V		Interp.
		A054M111	H&F-Frame 3-P, G-Frame 4-P, 208V		Interp.
		A055L403	H-Frame 4-P, 208V		Interp.
		A063H825	F-Frame 4-P, G-Frame 3-P, 480V		3
		A063H826	F-Frame 4-P, G-Frame 3-P, 208V		Interp.
		A063H827	F-Frame 4-P, G-Frame 3-P, 600V		Interp.
		A059B800	H-Frame 4-P, 480V		1
Manual Switch	Cummins	A059A165	Manual Lock Switch/Actuator		1, 3
Solid State Relays	Crydom	H16WD6050G	Solid State Relay		1
	TE	SSR-480D50R	Solid State Relay		1
	Allen Bradley	700-SH25VZ25	Solid State Relay		1

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¹No differences between construction of the stainless and carbon steel enclosures other than material used to construct the enclosure.

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UNIT UNDER TEST (UUT) SUMMARY SHEET

1801393-CR-001-R1



Manufacturer:	Cummins Power Generation	UUT 1
Model Line:	CXR Automatic Transfer Switches	
Model Number:	CXRH8, 4 Pole	
		Serial Number: N/A

Product Construction Summary:
12 Gage Carbon Steel Enclosure

Options/Subcomponent Summary:

Controller: Cummins PC80; **Transfer Switch:** Cummins 4 Poles A/B/C/N; **Solid Neutral:** Cummins; **Transformer:** (1) Hammond HPS & (3) Micron; **Power Supply:** Delta Electric; **Heater:** Stego; **Thermostat:** Stego; **Fuse Holder:** Ferraz Shawmut; **Power Monitoring:** Shneider Power Logic Meter, Cummins; **Surge Suppressor:** Square D Display, Square D Suppressor; **Protective Relays:** Electrosswitch Co. Lockout Relay, Basler Electric Power Relay, Time Mark Co. Timing Relay; **Solenoid:** Cummins; **Manual Switch:** Cummins; **Solid State Relays:** Crydom, TE, Allen Bradley; **NEMA Rating:** 3R; **Amperage:** 2600-3000; **Voltage:** 480V

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
2980	65	55.2	89.6	25.7	6.3	7.1

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 2019	ICC-ES AC156	1.85	1.0	1.5	2.96	2.22	1.97	0.79
		2.96	0.0					

Test Mounting Details:



Unit was rigid mounted to test fixture using twelve (12) 3/8" Grade 8 bolts with 1/2" plate washers and 3/8" flat 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

1801393-CR-001-R1



Power
Systems



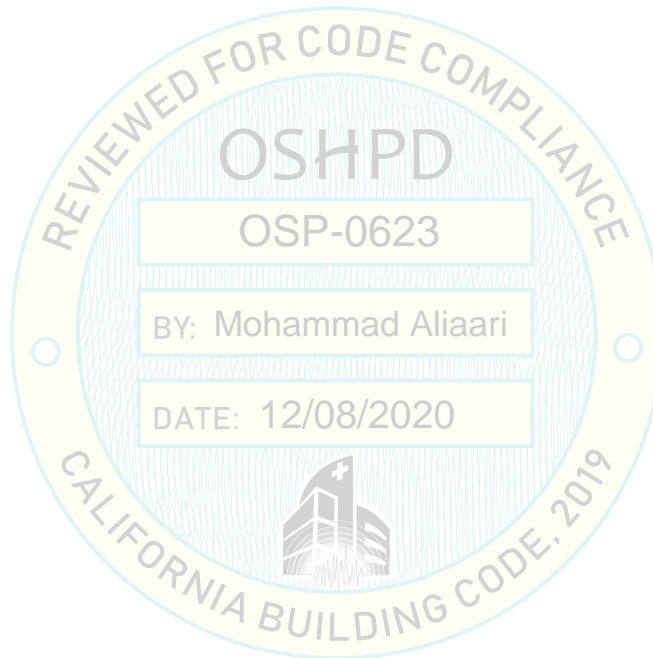
Manufacturer: Cummins Power Generation
Model Line: CXR Automatic Transfer Switches
Model Number: CXRH8, 4 Pole

Serial Number: N/A

UUT 1

Seismic Upgrades Implemented:

Top and bottom vertical rods attached to the cabinet latch were lengthened by 1/2".



UNIT UNDER TEST (UUT) SUMMARY SHEET

1801393-CR-001-R1



Manufacturer:	Cummins Power Generation	UUT 2
Model Line:	CXR Automatic Transfer Switches	
Model Number:	CXRE8, 3 Pole	
Serial Number:		N/A

Product Construction Summary:

12 Gage Carbon Steel Enclosure

Options/Subcomponent Summary:

Controller: Cummins PC80; **Transfer Switch:** Cummins 3 Poles A/B/C; **Solid Neutral:** Cummins; **Transformer:** Hammond HPS; **Power Supply:** Delta Electric Group; **Thermostat:** Stego; **Heater:** Stego; **Fuse Holder:** Ferraz Shawmut; **Power Monitoring:** Cummins; **Protective Relays:** Electrosswitch Co. Lockout Relay, Basler Electric Power Relay, Time Mark Co. Timing Relay; **Solenoid:** Cummins; **NEMA Rating:** 1; **Amperage:** 1200; **Voltage:** 208V

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1432	48.9	39.6	89.6	18.0	7.5	17.0

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 2019	ICC-ES AC156	2.00 3.20	1.0 0.0	1.5	3.20	2.40	2.13	0.85

Test Mounting Details:



Unit was rigid mounted to test fixture using twelve (12) 3/8" Grade 8 bolts with 1/2" plate washers and 3/8" flat 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

1801393-CR-001-R1



Manufacturer:	Cummins Power Generation	UUT 3
Model Line:	CXR Automatic Transfer Switches	
Model Number:	CXRG8, 3 Pole	
Serial Number:		N/A

Product Construction Summary:
Stainless Steel Hoffman Enclosure

Options/Subcomponent Summary:
Controller: Cummins PC80; **Transfer Switch:** Cummins 3 Poles A/B/C; **Solid Neutral:** Cummins; **Power Supply:** Delta Electronics Group; **Surge Suppressor:** Square D Display, Square D Suppressor; **Solenoid:** Cummins; **Manual Switch:** Cummins; **NEMA Rating:** 4X; **Amperage:** 2000; **Voltage:** 480V

UUT Properties										
Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)						
	Depth	Width	Height	Front-Back		Side-Side		Vertical		
1854	55.1	46.4	90.1	29.6		4.7		6.2		
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 2019		ICC-ES AC156		2.00	1.0	1.5	3.20	2.40	2.13	0.85
				3.20	0.0					

Test Mounting Details:



Unit was rigid mounted to test fixture using six (6) 5/8" Grade 8 bolts with 1/2" plate washers.
Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.
Contents were included in testing per operating conditions.