



**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION**

**APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)**

OFFICE USE ONLY

APPLICATION #: OSP-0714

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

Telephone: (763) 574-3302

Email: b.s.raghukumar@cummins.com

Product Information

Product Name: Emergency and Standby Power Systems

Product Type: Automatic Transfer Switches

Product Model Number: CXS-SE, CXT-SE, CXR-SE

General Description: Automatic transfer switches for transferring power between utility and generator. NEMA 1/3R rating, 400A-2000A, with service entrance option.

Mounting Description: Rigid, Floor Mounted

Tested Seismic Enhancements: None

Applicant Information

Applicant Company Name: Structural Integrity Associates

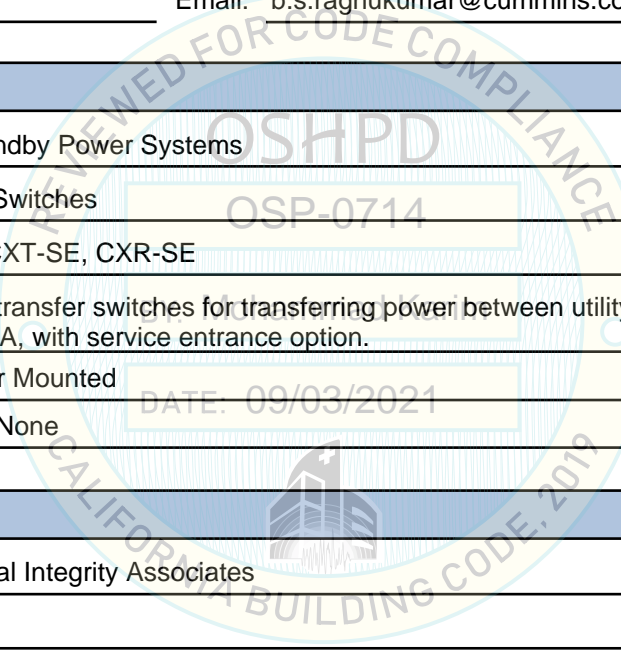
Contact Person: Stephen Reimus

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

Telephone: (541) 292-5820

Email: sreimus@structint.com

Title: Senior Engineer



DATE: 09/03/2021





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

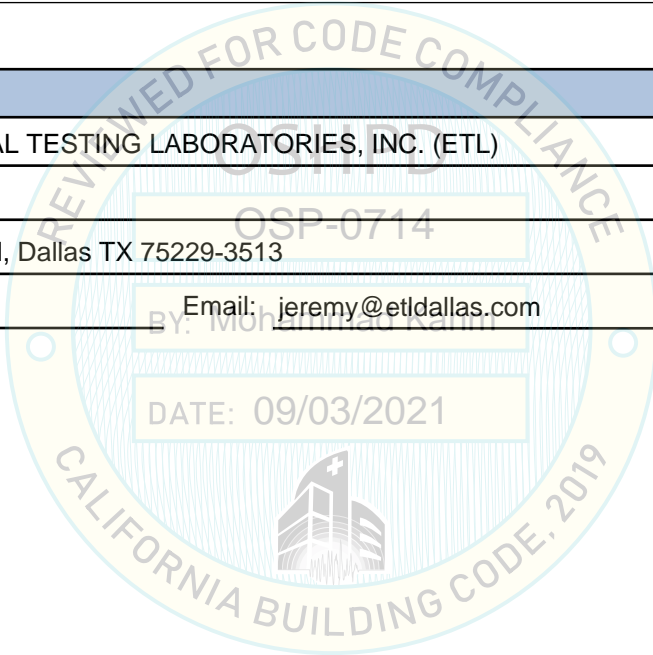
Company Name: STRUCTURAL INTEGRITY ASSOCIATES, INC.
Name: Andrew Coughlin California License Number: S6082
Mailing Address: 5215 Hellyer Ave, Suite 101, San Jose, CA 95138-1025
Telephone: (415) 635-8461 Email: acoughlin@structint.com

Certification Method

GR-63-Core ICC-ES AC156 IEEE 344 IEEE 693 NEBS 3
 Other (Please Specify): _____

Testing Laboratory

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: jeremy@etldallas.com





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Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 1.39 (SDS = 1.85g); 1.33 (SDS = 2.96g)

SDS (Design spectral response acceleration at short period, g) = 1.85g (z/h = 1.0); 2.96g (z/h = 0.0)

a_p (Amplification factor) = 2.5

R_p (Response modification factor) = 6.0

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 1 and 0

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

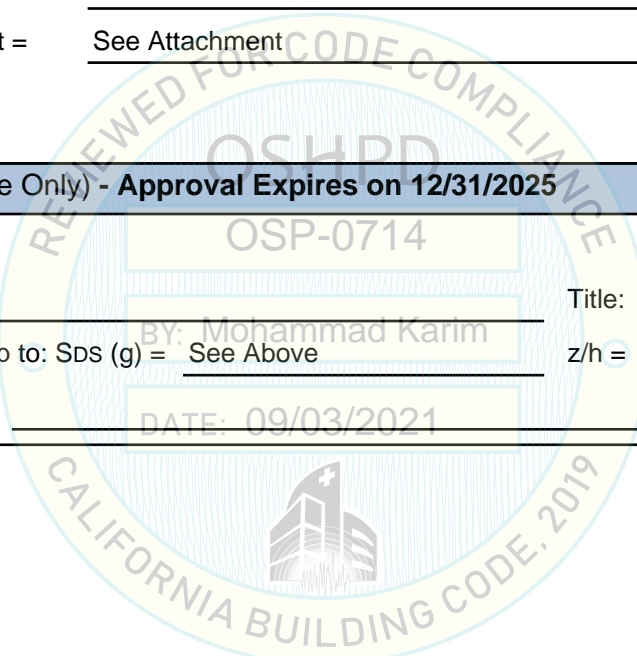
OSHPD Approval (For Office Use Only) - Approval Expires on 12/31/2025

Date: 9/3/2021

Name: Mohammad Karim Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: SDS (g) = See Above z/h = See Above

Condition of Approval (if applicable): DATE: 09/03/2021



SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

2000294-CR-001-R1



Manufacturer: Cummins Power Generation	TABLE 1
Model Line: CXS-SE, CXT-SE, CXR-SE Automatic Transfer Switches	

Certified Product Construction Summary:
Enclosure Material: Carbon Steel (12 gage)

Certified Options Summary:
Amperage: 400 - 2000
Voltage: 120, 208, 240, 480, 600
NEMA Rating: 1 and 3R, Service Entrance

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:** $S_{DS} = 1.85g$ $z/h = 1.0$ $I_p = 1.5$
 $S_{DS} = 2.96g$ $z/h = 0.0$

Model Line	Model	Dimensions (in)				Weight (lb)	Ten ¹ (lb)	Notes	UUT
		Depth	Width	Height	CG Height				
CXS-SE	CXSB8SE, 3 Poles	21.3	33.1	58.9	59.4	436	1216	Carbon Steel, NEMA 1	Extrap.
		24.4	33.1	58.9	59.4	519	1263	Carbon Steel, NEMA 3R	Extrap.
	CXSB8SE, 4 Poles	21.3	33.1	58.9	59.4	510	1421	Carbon Steel, NEMA 1	1
		24.4	33.1	58.9	59.4	525	1278	Carbon Steel, NEMA 3R	Interp.
CXT-SE	CXTC8SE, 3 Poles	25	39.8	76.8	63	980	2470	Carbon Steel, NEMA 1	Interp.
		28.3	39.8	76.8	63	1132	2520	Carbon Steel, NEMA 3R	Interp.
	CXTC8SE, 4 Poles	25	39.8	76.8	63	1010	2545	Carbon Steel, NEMA 1	Interp.
		28.3	39.8	76.8	63	1163	2589	Carbon Steel, NEMA 3R	Interp.
	CXTD8SE, 3 Poles	25	50.6	85.7	64.6	1148	2966	Carbon Steel, NEMA 1	Interp.
		28.3	50.6	85.7	64.6	1346	3072	Carbon Steel, NEMA 3R	Interp.
	CXTD8SE, 4 Poles	25	50.6	85.7	64.6	1189	3072	Carbon Steel, NEMA 1	Interp.
		28.3	50.6	85.7	64.6	1421	3243	Carbon Steel, NEMA 3R	2
CXR-SE	CXRE8SE, 3 poles	58.3	71.3	89.6	49.0	2474	2079	Carbon Steel, NEMA 1	Interp.
		65	71.3	89.6	49.0	2768	2087	Carbon Steel, NEMA 3R	Interp.
	CXRE8SE, 4 poles	58.3	71.3	89.6	49.0	2674	2247	Carbon Steel, NEMA 1	Interp.
		65	71.3	89.6	49.0	2968	2237	Carbon Steel, NEMA 3R	Interp.
	CXRF8SE, 3 poles	58.3	71.3	89.6	50.0	2272	1949	Carbon Steel, NEMA 1	Interp.
		65	71.3	89.6	50.0	2954	2272	Carbon Steel, NEMA 3R	Interp.
	CXRF8SE, 4 poles	58.3	71.3	89.6	50.0	2860	2453	Carbon Steel, NEMA 1	Interp.
		65	71.3	89.6	50.0	3154	2426	Carbon Steel, NEMA 3R	Interp.
	CXRG8SE, 3 poles	58.3	71.3	89.6	49.0	2886	2426	Carbon Steel, NEMA 1	Interp.
		65	71.3	89.6	49.0	3180	2397	Carbon Steel, NEMA 3R	Interp.

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

SPECIAL SEISMIC CERTIFICATION CERTIFIED COMPONENT MATRIX

2000294-CR-001-R1



Manufacturer: Cummins Power Generation	TABLE 1
Model Line: CXS-SE, CXT-SE, CXR-SE Automatic Transfer Switches	

Certified Product Construction Summary:
Enclosure Material: Carbon Steel (12 gage)

Certified Options Summary:
Amperage: 400 - 2000
Voltage: 120, 208, 240, 480, 600
NEMA Rating: 1 and 3R, Service Entrance

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:** $S_{DS} = 1.85 g \quad z/h = 1.0$ $I_p = 1.5$
 $S_{DS} = 2.96 g \quad z/h = 0.0$

Model Line	Model	Dimensions (in)				Weight (lb)	Ten ¹ (lb)	Notes	UUT
		Depth	Width	Height	CG Height				
CXR-SE	CXRG8SE, 4 poles	58.3	71.3	89.6	49.0	3086	2594	Carbon Steel, NEMA 1	3
		65	71.3	89.6	49.0	3380	2548	Carbon Steel, NEMA 3R	4

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

SPECIAL SEISMIC CERTIFICATION CERTIFIED SUBCOMPONENT MATRIX

2000294-CR-001-R1



Manufacturer: Cummins Power Generation Model Line: CXS-SE, CXT-SE, CXR-SE Automatic Transfer Switches		Table Description: Various Subcomponents			TABLE 2	
Building Code: CBC 2019		Seismic Certification Limits:			$S_{DS} = 1.85 g \quad z/h = 1.0$ $S_{DS} = 2.96 g \quad z/h = 0.0$	
					$I_p = 1.5$	
Component Type	Manufacturer	Model	Description	Notes	UUT	
Breakers	Schneider	JRL36250U33X	250A Circuit Breaker-J	Weight: 5 lbs	Extrap.	
		LRL36400U33X	400A Circuit Breaker-L	Weight: 15 lbs	1	
		LLL36600U33X	600A Circuit Breaker	Weight: 15 lbs	Interp.	
		RLF36080U33A	800A Circuit Breaker	Weight 52 lbs	2	
		A063L693	1600A Circuit Breaker	Weight: 109 lbs.	Interp.	
		A063C470	1600A Circuit Breaker Cradle	Weight: 126.5 lbs.	Interp.	
		A063T867	1200A Circuit Breaker	Weight: 109 lbs.	3, 4	
		A063L263	1200A Circuit Breaker Cradle	Weight: 126.5 lbs.	3, 4	
		A063P195	Breaker Selector Switch	under 10 lbs., 10 amps	3, 4	
		A063P198	Breaker Pilot Light	under 10 lbs., 10 amps	3, 4	
		A061V532	Breaker Selector Switch Cover	under 10 lbs., 10 amps	3, 4	
A063R146	Breaker NCT ground fault sensor	under 10 lbs., 10 amps	3, 4			
Controller	Cummins	A053N529	Level 2 Controller, Electronics & Plastic	under 10 lbs., 10 amps	3, 4	
Heater	Stego	A056Z405	Heater	under 10 amps and lbs	3, 4	
Protective Relays	Electroswitch Co.	0307-2981-02	Lockout Relay		3, 4	
	Basler Electric	0307-2661-21	Power Relay		3, 4	
	Time Mark Co.	0307-3135	Timing Relay		3, 4	
Service Phase Bus	Cummins	A064G393	Phase Bus for 3 pole B-Frame SE	Weight: 47 lbs	Extrap.	
		A064G102	Phase Bus for 4 pole B-Frame SE	Weight: 50 lbs	1	
		A064E152	Phase Bus for 3 pole C-Frame SE	Weight: 135 lbs	Interp.	
		A063P733	Phase Bus for 4 pole C-Frame SE	Weight: 140 lbs	Interp.	
		A064E153	Phase Bus for 3 pole D-Frame SE	Weight: 170 lbs	Interp.	
A066N356	Phase Bus for 3 pole E-Frame SE	Weight: 174 lbs.	Interp.			

SPECIAL SEISMIC CERTIFICATION CERTIFIED SUBCOMPONENT MATRIX

2000294-CR-001-R1



Manufacturer: Cummins Power Generation Model Line: CXS-SE, CXT-SE, CXR-SE Automatic Transfer Switches		Table Description: Various Subcomponents		TABLE 2	
Building Code: CBC 2019		Seismic Certification Limits:		$S_{DS} = 1.85 g \quad z/h = 1.0$ $S_{DS} = 2.96 g \quad z/h = 0.0$	
				$I_p = 1.5$	
Component Type	Manufacturer	Model	Description	Notes	UUT
Service Phase Bus	Cummins	A063V497	Phase Bus for 4 pole D-Frame SE	Weight: 175 lbs	2
		A066R307	Phase Bus for 4 pole E-Frame SE	Weight: 194 lbs.	Interp.
		A066S006	Phase Bus for 3 pole F-Frame SE	Weight: 253 lbs.	Interp.
		A066N846	Phase Bus for 3 pole G-Frame SE	Weight: 261 lbs.	Interp.
		A066S012	Phase Bus for 4 pole F-Frame SE	Weight: 296 lbs.	Interp.
		A066N451	Phase Bus for 4 pole G-Frame SE	Weight: 312 lbs.	3, 4
Solenoid	Cummins	A058D675	B-Frame, 3-P & 4-P, 208V	Under 10 lbs and 10 amps	1
		A058D854	B-Frame, 3-P & 4-P, 208V-Release	Under 10 lbs and 10 amps	1
		A058D848	B-Frame, 3-P & 4-P, 208V-Changeover	Under 10 lbs and 10 amps	1
		A064D144	C-Frame, 4-P, D-Frame, 3-P & 4-P, 600V	Weight: 17.8 lbs	2
Solid Neutral	Cummins	A063T138	Service Neutral for Service Entrance Transfer Switches	Weight: 77 lbs.	3, 4
Surge Suppressor	Square D	N/A	Display for Surge Device	Weight: 0.5 lbs	3, 4
		A058R962	Surge Suppressor	Weight: 8.4 lbs	3, 4
Thermostat	Stego	A056Z695	Thermostat for heater	under 10 amps and lbs	3, 4
Transfer Switch	Cummins	CXSB8SE	3 pole	Weight: 44 lbs	Extrap.
		CXSB8SE	4 pole	Weight: 51 lbs	1
		CXTC8SE	3 pole	Weight: 150 lbs	Interp.
		CXTC8SE	4 pole	Weight: 180 lbs	Interp.
		CXTD8SE	3 pole	Weight: 180 lbs	Interp.
		CXTD8SE	4 pole	Weight: 220 lbs	2
		CXRE8SE	3 pole	Weight: 400 lbs.	Interp.
		CXRE8SE	4 pole	Weight: 600 lbs.	Interp.

SPECIAL SEISMIC CERTIFICATION CERTIFIED SUBCOMPONENT MATRIX

2000294-CR-001-R1



Manufacturer: Cummins Power Generation Model Line: CXS-SE, CXT-SE, CXR-SE Automatic Transfer Switches		Table Description: Various Subcomponents			TABLE 2	
Building Code: CBC 2019		Seismic Certification Limits:			$S_{DS} = 1.85 g \quad z/h = 1.0$ $S_{DS} = 2.96 g \quad z/h = 0.0$	
Component Type	Manufacturer	Model	Description	Notes	UUT	
Transfer Switch	Cummins	CXRF8SE	3 pole	Weight: 600 lbs.	Interp.	
		CXRF8SE	4 pole	Weight: 800 lbs.	Interp.	
		CXRG8SE	3 pole	Weight: 800 lbs.	Interp.	
		CXRG8SE	4 pole	Weight: 1000 lbs.	3, 4	
Transformer	Hammond HPS	A065S758	B Frame Mechanism Power, C-D Frame Transformer for heater power supply	Weight: 11 lbs	1	
		PH500SP	Transformer for heat accessory	Weight: 14 lbs	3, 4	

SPECIAL SEISMIC CERTIFICATION CERTIFIED SUBCOMPONENT MATRIX

2000294-CR-001-R1



Manufacturer: Cummins Power Generation	Table Description: Enclosures	TABLE 3
Model Line: CXS-SE, CXT-SE, CXR-SE Automatic Transfer Switches		

Building Code: CBC 2019	Seismic Certification Limits:	$S_{DS} = 1.85\text{ g}$ $z/h = 1.0$	$I_P = 1.5$
		$S_{DS} = 2.96\text{ g}$ $z/h = 0.0$	

Model Line (Manufacturer)	Model	Dimension (in)			Weight (lb)	Material	Notes	UUT
		Depth	Width	Height				
Hoffman	Transfer Switch Enclosure	21.3	33.1	58.9	287	Carbon Steel	Carbon Steel, NEMA 1	1
		24.4	33.1	58.9	381		Carbon Steel, NEMA 3R	Interp.
		25	39.8	76.8	567		Carbon Steel, NEMA 1	Interp.
		28.3	39.8	76.8	712		Carbon Steel, NEMA 3R	Interp.
		25	50.6	85.7	642		Carbon Steel, NEMA 1	Interp.
		28.3	50.6	85.7	831		Carbon Steel, NEMA 3R	2
Cummins	Transfer Switch Enclosure	58.3	71.3	89.6	1642	Carbon Steel	Carbon Steel, NEMA 1	3
		65	71.3	89.6	1947		Carbon Steel, NEMA 3R	4

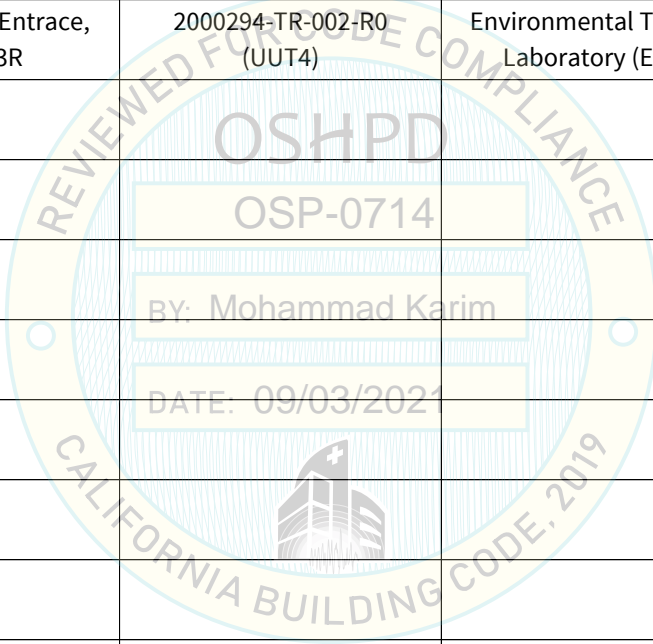
**UNIT UNDER TEST (UUT)
SUMMARY SHEET**

2000294-CR-001-R1



Manufacturer: Cummins Power Generation
Model Line: CXS, CXT, CXR Automatic Transfer Switches

UUT	Unit Description	Report Number	Testing Laboratory	S_{DS}	z/h	I_p
1	B-Frame w/ Service Entrance, 4 Pole, NEMA 1	2000294-TR-002-R0 (UUT1)	Environmental Testing Laboratory (ETL)	1.85 2.96	1.0 0.0	1.5
2	D-Frame w/ Service Entrance, 4 Pole, NEMA 3R	2000294-TR-002-R0 (UUT2)	Environmental Testing Laboratory (ETL)	1.85 2.96	1.0 0.0	1.5
3	G-Frame w/ Service Entrance, 4 Pole, NEMA 1	2000294-TR-002-R0 (UUT3)	Environmental Testing Laboratory (ETL)	1.85 2.96	1.0 0.0	1.5
4	G-Frame w/ Service Entrance, 4 Pole, NEMA 3R	2000294-TR-002-R0 (UUT4)	Environmental Testing Laboratory (ETL)	1.85 2.96	1.0 0.0	1.5



Notes:

UNIT UNDER TEST (UUT) SUMMARY SHEET

2000294-CR-001-R1



Manufacturer: Cummins Power Generation	UUT 1
Model Line: CXS-SE Automatic Transfer Switch	
Model Number: CXSB8SE, 4 Pole Serial Number: N/A	

Product Construction Summary:
B-Frame with Service Entrance, Carbon Steel, NEMA 1

Options/Subcomponent Summary:
Breaker: Schneider (400A); **Service Phase Bus:** Cummins; **Solenoid:** Cummins 208V, 208V-Release, 208V-Changeover; **Transfer Switch:** Cummins 4 Pole A/B/C/N; **Transformer:** Hammond HPS; **NEMA Rating:** 1; **Amperage:** 400; **Voltage:** 208V

UUT Properties						
Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
510	21.3	33.1	58.9	15.6	19.3	9.5

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 mounted to test fixture using four (4) 3/8" Grade 8 bolts with 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



2000294-CR-001-R1

Manufacturer: Cummins Power Generation	UUT 2
Model Line: CXT-SE Automatic Transfer Switch	
Model Number: CXTD8SE, 4 Pole	
Serial Number: N/A	

Product Construction Summary:
D-Frame with Service Entrance, Carbon Steel, NEMA 3R

Options/Subcomponent Summary:
Breaker: Schneider (800A); **Service Phase Bus:** Cummins; **Solenoid:** Cummins 600V; **Transfer Switch:** Cummins 4 Pole A/B/C/N;
NEMA Rating: 3R; **Amperage:** 800; **Voltage:** 480V

UUT Properties						
Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
1,421	28.3	50.6	85.7	7.00	24.62	>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 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 mounted to test fixture using four (4) 3/8" Grade 8 bolts with 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

2000294-CR-001-R1



Manufacturer: Cummins Power Generation	UUT 3
Model Line: CXR-SE Automatic Transfer Switch	
Model Number: CXRG8SE, 4 Pole	
Serial Number: N/A	

Product Construction Summary:
G-Frame with Service Entrance, Carbon Steel, NEMA 1

Options/Subcomponent Summary:
Breakers: Schneider 1200A Breaker and Breaker Cradle, Breaker Selector Switch, Breaker Pilot Light, Breaker Selector Switch Cover, Breaker NCT ground fault sensor; **Controller:** Cummins; **Heater:** Stego; **Protective Relays:** Electroswitch Co. Basler Electric, Time Mark Co.; **Service Phase Bus:** Cummins; **Solid Neutral:** Cummins; **Surge Suppressor:** Square D; **Thermostat:** Stego; **Transfer Switch:** Cummins 4 Pole A/B/C/N; **Transformer:** Hammond HPS; **NEMA Rating:** 1; **Amperage:** 2000; **Voltage:** 208V

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
3,086	58.3	71.3	89.6	6.75	20.7	20.7

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 mounted to test fixture using sixteen (16) 3/8" Grade 8 bolts with 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



2000294-CR-001-R1

Manufacturer: Cummins Power Generation	UUT 4
Model Line: CXR-SE Automatic Transfer Switch	
Model Number: CXRG8SE, 4 Pole	
Serial Number: N/A	

Product Construction Summary:
G-Frame with Service Entrance, Carbon Steel, NEMA 3R

Options/Subcomponent Summary:
Breakers: Schneider 1200A Breaker and Breaker Cradle, Breaker Selector Switch, Breaker Pilot Light, Breaker Selector Switch Cover, Breaker NCT ground fault sensor; **Controller:** Cummins; **Heater:** Stego; **Protective Relays:** Electroswitch Co. Basler Electric, Time Mark Co.; **Service Phase Bus:** Cummins; **Solid Neutral:** Cummins; **Surge Suppressor:** Square D; **Thermostat:** Stego; **Transfer Switch:** Cummins 4 Pole A/B/C/N; **Transformer:** Hammond HPS; **NEMA Rating:** 3R; **Amperage:** 2000; **Voltage:** 208V

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
3,380	65	71.3	89.6	6.6	>33.3	23.9

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 sixteen (16) 3/8" 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.