



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

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

OFFICE USE ONLY

APPLICATION #: OSP-0266

OSHPD Special Seismic Certification Preapproval (OSP)

Type: New Renewal

Manufacturer Information

Manufacturer: Caterpillar (N.I.) Ltd.

Manufacturer's Technical Representative: Ciaran O'flaherty

Mailing Address: Old Glenarm Road, Larne, No BT401EJ

Telephone: (442) 828-2653 Email: oflahrty_ciaran@cat.com

Product Information

Product Name: Emergency and Standby Power Systems

Product Type: Emissions After-Treatments

Product Model Number: Clean Emissions Module (CEM) - 3516C-HD/C175-16 – see Attachment for specific models

General Description: After treatment module which reduces exhaust emissions.

Mounting Description: Rigid base mounted on or off frame.

Tested Seismic Enhancements: None

DATE: 08/16/2021

Applicant Information

Applicant Company Name: Structural Integrity Associates, Inc.

Contact Person: Galen Reid

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

Telephone: (541) 604-7225 Email: greid@structint.com

Title: Manager, TRU Compliance





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

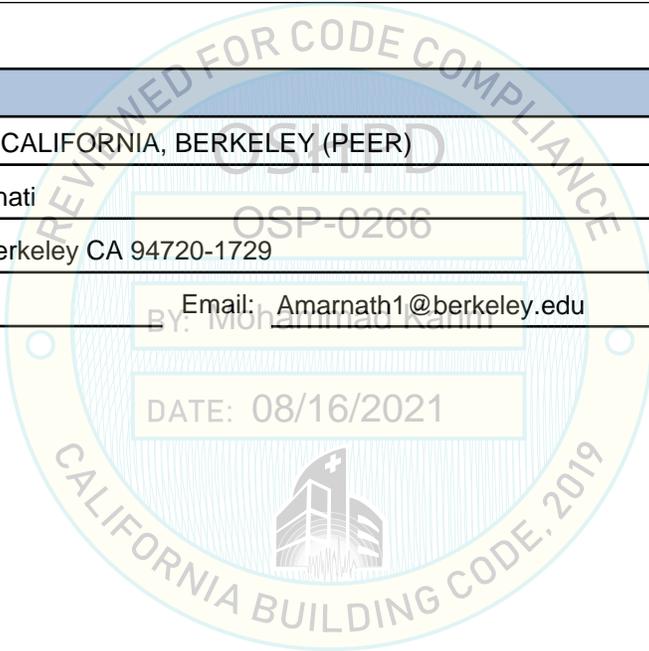
Company Name: STRUCTURAL INTEGRITY ASSOCIATES, INC.
Name: Andrew Coughlin California License Number: S6082
Mailing Address: 5215 Hellyer Ave, Suite 101, San Jose, CA 95138-1025
Telephone: (415) 635-8461 Email: acoughlin@structint.com

Certification Method

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

Testing Laboratory

Company Name: UNIVERSITY OF CALIFORNIA, BERKELEY (PEER)
Contact Person: Amarnath Kasalanati
Mailing Address: 325 Davis Hall, Berkeley CA 94720-1729
Telephone: (510) 642-6475 Email: Amarnath1@berkeley.edu





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Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) =	<u>0.91 (z/h = 1); 1.03 (z/h = 0)</u>
SDS (Design spectral response acceleration at short period, g) =	<u>0.76 (z/h = 1); 2.28 (z/h = 0)</u>
a_p (Amplification factor) =	<u>1.0</u>
R_p (Response modification factor) =	<u>1.5</u>
Ω_0 (System overstrength factor) =	<u>2.0</u>
I_p (Importance factor) =	<u>1.5</u>
z/h (Height ratio factor) =	<u>1 and 0</u>
Natural frequencies (Hz) =	<u>See Attachment</u>
Overall dimensions and weight =	<u>See Attachment</u>

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

Date:	<u>8/16/2021</u>	
Name:	<u>Mohammad Karim</u>	Title: <u>Supervisor, Health Facilities</u>
Special Seismic Certification Valid Up to: SDS (g) =	<u>See Above</u>	z/h = <u>See Above</u>
Condition of Approval (if applicable):	<u>DATE: 08/16/2021</u>	



UNIT UNDER TEST (UUT) SUMMARY SHEET



2100221-CR-001-R0

Manufacturer: Caterpillar Inc.	UUT 1A
Model Line: Clean Emissions Module (CEM)	
Model Number: 3516C-HD Serial Number: N/A	

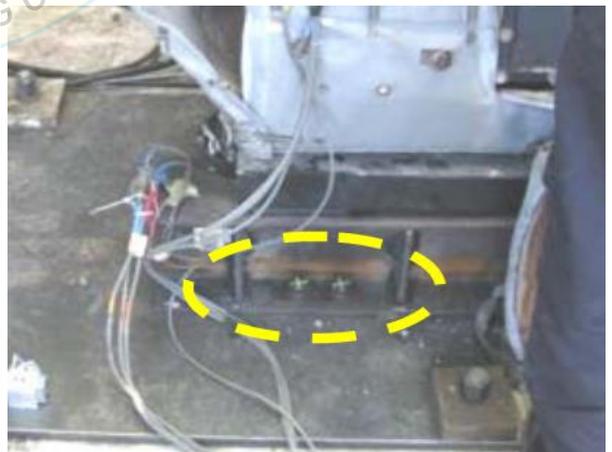
Product Construction Summary:
Carbon steel frame structure with stainless steel cabinet.

Options/Subcomponent Summary:
Support Frame: Helgesen; **DOC Substrates:** (4) Emitec/BASF; **SCR Substrates:** (20) Emitec/BASF; **AMOX Substrates:** (8) Emitec/BASF; **Urea Injection Mixing Tube:** Spraying Systems Helgesen; **Flow Diffuser:** Helgesen; **Divergent/Convergent Mixer:** Helgesen; **Flow Straightener:** Helgesen; **"Cool Box":** Helgesen.

<i>UUT Properties</i>						
Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
3,600	133	89	35	10.6	8.4	8.2

<i>UUT Highest Passed Seismic Run Information</i>									
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 (2018)	2.28	1.0	1.5	3.65	2.74	1.52	0.61	
		2.28	0.0						

Test Mounting Details:



Rigid base mounted to fixture plates with (16) 3/4" A490 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



2100221-CR-001-R0

Manufacturer: Caterpillar Inc.	UUT 1B
Model Line: Clean Emissions Module (CEM)	
Model Number: 3516C-HD Serial Number: N/A	

Product Construction Summary:
Carbon steel frame structure with stainless steel cabinet.

Options/Subcomponent Summary:
Support Frame: Helgesen; **CEM Frame:** Caterpillar - 381-3285 (Short Position); **DOC Substrates:** (4) Emitec/BASF; **SCR Substrates:** (20) Emitec/BASF; **AMOX Substrates:** (8) Emitec/BASF; **Urea Injection Mixing Tube:** Spraying Systems Helgesen; **Flow Diffuser:** Helgesen; **Divergent/Convergent Mixer:** Helgesen; **Flow Straightener:** Helgesen; **"Cool Box":** Helgesen.

<i>UUT Properties</i>						
Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
4,860	133	89	124	5.9	6.5	8.2

<i>UUT Highest Passed Seismic Run Information</i>									
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 (2018)	0.76	1.0	1.5	2.28	0.91	1.52	0.61	
		2.28	0.0						

Test Mounting Details:



CEM rigid base mounted to frame with (16) 3/4" A490 bolts. Frame rigid mounted to fixture plates with (16) 7/8" A490 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



2100221-CR-001-R0

Manufacturer: Caterpillar Inc.	UUT 1C
Model Line: Clean Emissions Module (CEM)	
Model Number: 3516C-HD Serial Number: N/A	

Product Construction Summary:
Carbon steel frame structure with stainless steel cabinet.

Options/Subcomponent Summary:
Support Frame: Helgesen; **CEM Frame:** Caterpillar - 416-5188 (Tall Position); **DOC Substrates:** (4) Emitec/BASF; **SCR Substrates:** (20) Emitec/BASF; **AMOX Substrates:** (8) Emitec/BASF; **Urea Injection Mixing Tube:** Spraying Systems Helgesen; **Flow Diffuser:** Helgesen; **Divergent/Convergent Mixer:** Helgesen; **Flow Straightener:** Helgesen; **"Cool Box":** Helgesen.

<i>UUT Properties</i>						
Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
5,100	133	89	148	4.9	5.3	8.2

<i>UUT Highest Passed Seismic Run Information</i>									
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 (2018)	0.76	1.0	1.5	2.28	0.91	1.52	0.61	
		2.28	0.0						

Test Mounting Details:



CEM rigid base mounted to frame with (16) 3/4" A490 bolts. Frame rigid mounted to fixture plates with (16) 7/8" A490 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



2100221-CR-001-R0

Manufacturer: Caterpillar Inc.	UUT 2
Model Line: Clean Emissions Module (CEM)	
Model Number: Dosing Cabinet - 374-2499 Serial Number: N/A	

Product Construction Summary:
Stainless steel cabinet, plastic buffer tank.

Options/Subcomponent Summary:
Enclosure: Helgesen; **Pump:** Grundfos; **Pump Motor:** 0.082 HP, 100-240V; **Buffer Tank:** Shaw Development; **ECM:** Continental; **Electric Heaters:** Chromalox; **Dosing/Purge Manifold:** Impro.

UUT Properties

Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
265	31	14	41	15.1	5.6	6.6

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 (2018)	0.76	1.0	1.5	2.28	0.91	1.52	0.61
		2.28	0.0					

Test Mounting Details:



Rigid base mounted to fixture plate with (8) 3/8" A490 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



2100221-CR-001-R0

Manufacturer: Caterpillar Inc.	UUT 3A
Model Line: Clean Emissions Module (CEM)	
Model Number: C175-16	
Serial Number: N/A	

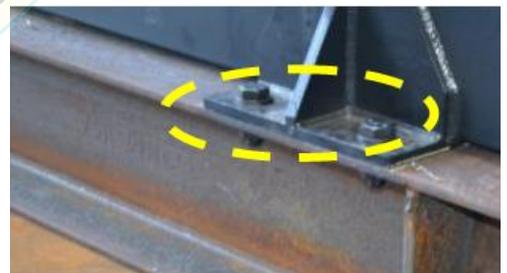
Product Construction Summary:
Carbon steel frame structure with stainless steel cabinet.

Options/Subcomponent Summary:
Support Frame: Helgesen; DOC Sub-Strates: (6) Emitec/BASF; SCR Sub-Strates: (24) Emitec/BASF; AMOX Sub-Strates: Emitec/BASF; Urea Injection Mixing Tube: Spraying Systems Helgesen; Flow Diffuser: Helgesen; Divergent/Convergent Mixer: Helgesen; Flow Straightener: Helgesen; "Cool Box": Helgesen.

<i>UUT Properties</i>						
Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
6,400	180	89	78	11.0	15.3	21.8

<i>UUT Highest Passed Seismic Run Information</i>									
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 (2018)	2.28	1.0	1.5	3.65	2.74	1.52	0.61	
		2.28	0.0						

Test Mounting Details:



CEM rigid base mounted to beams with (16) 7/8" Grade 8 bolts. Beams rigid mounted to fixture plates with (8) 3/4" 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



2100221-CR-001-R0

Manufacturer: Caterpillar Inc.	UUT 3B
Model Line: Clean Emissions Module (CEM)	
Model Number: C175-16	
Serial Number: N/A	

Product Construction Summary:
Carbon steel frame structure with stainless steel cabinet.

Options/Subcomponent Summary:
Support Frame: Helgesen; CEM Frame: Caterpillar - 363-2739; DOC Sub-Strates: (6) Emitec/BASF; SCR Sub-Strates: (24) Emitec/BASF; AMOX Sub-Strates: Emitec/BASF; Urea Injection Mixing Tube: Spraying Systems Helgesen; Flow Diffuser: Helgesen; Divergent/Convergent Mixer: Helgesen; Flow Straightener: Helgesen; "Cool Box": Helgesen.

<i>UUT Properties</i>						
Weight (lb)	Dimension (in)			Lowest Natural Frequency (Hz)		
	Depth	Width	Height	Front-Back	Side-Side	Vertical
9,300	180	89	242	6.0	3.7	18.3

<i>UUT Highest Passed Seismic Run Information</i>									
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 (2018)	0.76	1.0	1.5	2.28	0.91	1.52	0.61	
		2.28	0.0						

Test Mounting Details:



CEM rigid base mounted to frame with (16) 7/8" Grade 8 bolts. Frame rigid mounted to fixture plates with (24) 3/4" 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.