APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0826

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: BSD Builders, Inc.

Manufacturer's Technical Representative: Jeff Blair

Mailing Address: 8369 Vickers Street #100, San Diego, CA 92111

Telephone: (858) 657-9186 Email: Jeff@BSDBuilders.com

Product Information

Product Name: BSD SSC Microgrid Cogeneration System

Product Model Number(s): BSD SSC 100-420, BSD-SSC-FSS-34MSCF.

Product Category: Emergency and Standby Power Systems

Product Sub-Category: Generators

General Description: Microgrid Cogeneration System consisting of Cogen Power Plant & Fuel Storage System.

Mounting Description: Base Mounted Rigid

Tested Seismic Enhancements: None

Applicant Information

Applicant Company Name: BSD Builders, Inc.

Contact Person: Jeff Blair

Mailing Address: 8369 Vickers Street #100, San Diego, CA 92111

Telephone: (858) 657-9186 Email: Jeff@BSDBuilders.com

Title: President

HCAI OSP-0826 BY: Timothy J. Piland DATE: 08/28/2025

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

Company Name: JUNKER ENGINEERING GROUP

Name: Dan Junker California License Number: S6178

Mailing Address: 8950 Jefferson Ave, La Mesa, CA 91941

Telephone: (619) 606-5058 Email: dan@junkereng.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: info@etldallas.com

Company Name: UNIVERSITY OF CALIFORNIA, BERKELEY (PEER)

Contact Person: Amarnath Kasalanati

Mailing Address: 325 Davis Hall, Berkeley CA 94720-1729

Telephone: (510) 642-3437 Email: amarnath1@berkeley.edu

HCAi OSP-0826 BY: Timothy J. Piland DATE: 08/28/2025
REVIEWED FOR CODE COMPLIANCE CALIFORNIA BUILDING CODE, 2025

Seismic Parameters

Certified Response Spectral Acceleration Factors:(F_p/W_p)

Horizontal	(A Flx-H), g=	2.50	(A Rig-H), g=	1.00
Vertical	(A Flx-V), g=	1.67	(A Rig-V), g=	0.67

S_{DS} (Design spectral response acceleration at short period, g) = 2.5

Hf (Force amplification height factor) = 1.0

Ru (Structure ductility redution factor) = 1.0

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 0

HCAI Approval (For Office Use Only) **- Approval Expires on 08/28/2031**

Date: 8/28/2025

Name: Timothy Piland Title: Senior Structural Engineer

Condition of Approval (if applicable):

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HCAi
OSP-0826
BY: Timothy J. Piland
DATE: 08/28/2025
CALIFORNIA BUILDING CODE, 2025

SPECIAL SEISMIC CERTIFICATION
CERTIFIED COMPONENT SUMMARY

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Manufacturer BSD Builders, Inc.
Product Type Microgrid Cogeneration System
Model Line BSD SSC Power Plant
Table Description **Certified Components**

Table 1

Construction Summary	Certification Parameters
Generator: Steel container with 3.425" thick insulated walls containing an engine, a catalyst, silencers radiator, load bank, gas train, heat exchanger, and various fan, ducts, and electrical components. **Gas Tank:** 48" diameter, 1.25" thick, 11 ft tall carbon fiber tank in structural steel frame and sheet metal enclosure panels.	**Building Code:** CBC 2025 **Component Importance Factor:** I_p = 1.5 S_{DS} = 2.5g for R_μ = 1.0, H_f = 1.0
Mounting Summary	**Notes**
Rigidly base mounted.	Dimensions listed include exterior container subcomponents.

Manufacturer	Model Line	Model Name	Maximum Dimensions (in)			Max Weight (lbs.)	Description	UUT
			Length	Width	Height			
BSD Builders, Inc.	BSD SSC Power Plant	BSD SSC 100	315	118	210	34,750	Alternator power rating = 100 kW	Extrapolated
		BSD SSC 135	315	118	210	34,750	Alternator power rating = 135 kW	Extrapolated
		BSD SSC 170	315	118	210	36,550	Alternator power rating = 170 kW	Extrapolated
		BSD SSC 200	315	118	210	36,550	Alternator power rating = 200 kW	Extrapolated
		BSD SSC 280	315	118	210	39,500	Alternator power rating = 280 kW	2
		BSD SSC 420	315	118	210	41,000	Alternator power rating = 420 kW	1
	BSD SSC Fuel Storage System	BSD-SSC-FSS-34MSCF	58	71	162	6,130		3 & 4

HCAI OSP-0826 REVIEWED BY: Timothy J. Piland DATE: 03/28/2025 CALIFORNIA BUILDING CODE 2025

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT SUMMARY

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Manufacturer Various, See Below
Product Type Microgrid Cogeneration System
Model Line BSD SSC Power Plant
Table Description **Certified Sub-Components**

Table 2

Construction Summary	Certification Parameters
Construction as described below.	**Building Code:** CBC 2025 **Component Importance Factor:** I_p = 1.5 S_{DS} = 2.5g for R_μ = 1.0, H_f = 1.0

Mounting Summary **Notes**

Mounted on component.

Manufacturer & Product Line	Model Number	Max Dimensions (in)			Max Weight (lbs.)	Notes	UUT
		Length	Width	Height			
Natural Gas Generators Subcomponents							
Enclosure							
2G Energy AG	8m Avus500+	315	118	118	16,535	Steel container with 3.425" panels, insulated with sound dampening mineral glass and 2-hour fire-protection	1, 2
Alternator							
Leroy-Somer	LSA 44.3 L10 / 4p	32	22.5	25.5	439	Steel frame, cast-iron flanges and shields, ip 23 protection rating	Extrapolated
	LSA 46.3 S4 / 4p	35	22.5	30	888		2
	LSA 47.3 VS3 / 4p	40	28	32	1392		1
Load Bank							
Crestchic	DC Load Bank	40	34.5	27	265	20" Diameter fan, stainless steel fins, 3-phase	1, 2
Silencer							
Discom Exhaust Technology	L25	56	30	30	496	Primary Silencer; S235JR steel	1,2
	L45	87	24	24	540	Secondary Silencer; S235JR steel	1,2
Generator							
2G Energy AG	Aura 404	126	39	76	7,165	Cast-iron engine block & cylinder head, copper-brass oil cooler, stainless steel & brass inner cooler	Extrapolated
	Aura 406	157	44	83	9,667		Extrapolated
	Aura 408	160	52	91	12,258		2
	Aura 412	179	52	91	14,191		1
Gas Train							
Dungs Combustion Controls Heat Engine Base	50045-00238	27.5	12	10	108	Galvanized steel shut-off valve, cat-aluminum gas pressure regulator, cast-iron housing	Extrapolated
	50045-00239	32	12	10	110		2
	50045-00240	35	12	11	117		1
Ventilation Fan							
Ziehl-Abegg	FC063	32	10	32	20	Aluminum die-cast blades, 3-phase fan, diameter= 27.75"	1,2
Radiator							
Friga-Bohn FC Neostar Axial Fan Dry Cooler	FCH SN 08D P02 B2-1C-50V-M60-SCU	79	91	52.5	925	Two-speed motor, galvanized sheet metal, 2 26" diameter fans	2
	FC PN 06D P04 A3- 1C-134V	112	91	52.5	1430	Two-speed motor, galvanized sheet metal, 4 26" diameter fans	1
Catalyst							
Interkat Catalyst	61014-26611	13	13	5	27.3	Stainless steel 304	Extrapolated
	61014-26612	14	14	5	29.2		Extrapolated
	61014-26613	15	15	5	30.5		2
	61014-26614	18	18	5	41.9		1

SPECIAL SEISMIC CERTIFICATION
CERTIFIED SUBCOMPONENT SUMMARY

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Manufacturer Various, See Below
Product Type Microgrid Cogeneration System
Model Line BSD SSC Power Plant
Table Description **Certified Sub-Components**

Table 2

Construction Summary	Certification Parameters
Construction as described below.	**Building Code:** CBC 2025 **Component Importance Factor:** I_p = 1.5 S_{DS} = 2.5g for R_μ = 1.0, H_f = 1.0

Mounting Summary **Notes**

Mounted on component.

Manufacturer & Product Line	Model Number	Max Dimensions (in)			Max Weight (lbs.)	Notes	UUT
		Length	Width	Height			
Heat Exchanger							
GEA WTT Plate Heat Exchanger GBS910M	20212135-2	8	10	24.5	130	Stainless steel	Extrapolated
	20212135-3	11	10	24.5	135		Extrapolated
	20212135-4	14	10	24.5	145		2
	20212135-5	20	10	24.5	205		1

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Manufacturer Various, See Below
Product Type BSD SSC Fuel Storage System
Model Line: BSD SSC FSS
Table Description **Certified Sub-Components**

Table 3

Construction Summary	Certification Parameters
Construction as described below.	**Building Code:** CBC 2025 **Component Importance Factor:** I_p = 1.5 S_{DS} = 2.5g for R_μ = 1.0, H_f = 1.0

Mounting Summary **Notes**

Mounted on component.

Manufacturer	Model Number	Max Dimensions (in)			Weight (lbs.)	Notes	UUT
		Length	Width	Height			
Fuel Tank Assembly Subcomponents							
Enclosure							
Hydria	NA	58	71	162	3,850	Carbon steel frame, 12 ga stainless steel sheet metal	3 & 4
Gas Tank							
Hydria	CAT1502 105	46.5	46.5	132	1,200	Carbon fiber tank, 1.25" thick wall	3 & 4
Heat Exchanger							
Hydria	SCBP-HX	36	25	25	1,015	Carbon steel	3 & 4
Regulator							
Swagelok	RSN2-02-LLK	-	-	-	3	3,600 PSI to 2,800 PSI; Stainless steel	3 & 4
Swagelok	RSHN6-02-3-LLK-GN2	-	-	-	5	2,800 PSI to 100 PSI; Stainless steel	3 & 4
Belgas	P301H4008043F0	-	-	-	16	100 PSI to 5 PSI; Cast-iron body, aluminum lower casing	3 & 4
Pressure Relief Valve							
Crosby	951100MFA	-	-	-	7	Pressure Relief, Direct Spring Oper Type, 0.5"X1" MXF NPT, Setpoint: 125 PSIG, ASME8 Orifice; Stainless steel base, carbon steel cylinder	3 & 4
	981105MFA	-	-	-	33	Pressure Relief, Direct Spring Oper Type, 1.5"X2" MXF NPT, Setpoint: 7 PSIG, ASME 8 Orifice; Stainless steel base, carbon steel cylinder	3 & 4
Particulate Filter							
Parker	FFC-116-10	-	-	-	2	Filter, Particulate/Coalescent, 40-micron, 4500 psig min Rating; Stainless steel	3 & 4
Pressure Sensors							
Core Sensors	CS50-2A02000PS4Z0001-01	-	-	-	1	Pressure range 0-200psi. Output: 4-20mA, Supply 10-28 VDC; Stainless steel	3 & 4
	CS50-2A05000PS4Z0002-02	-	-	-	1	Pressure range 0-5000 psi. Output: 4-20mA, Supply 10-28 VDC; Stainless steel	3 & 4
Temperature Probe							
Sandelius Instruments	RTD	-	-	-	1	Platinum, Max temp 500°F	3 & 4

Manufacturer: BSD Builders, Inc.

Model Line: Microgrid Cogeneration System

Model Number: BSD SSC 420 Serial #: G6463

UUT **1**

Construction Summary:

Steel container with 3.425" thick insulated wall panels. Certified component construction shall be identical to construction of UUT's.

Options Summary:

Container: 8m Avus500+, **Generator:** 2G Energy Aura 412, **Gas Train:** Heat Engine Base 50045-00240, **Alternator:** Leroy-Somer LSA 47.3 VS3 / 4p, **Load Bank:** Crestchic DC Load Bank, **Silencers:** Discom Exhaust Technology L256 & L45, **Ventilation Fan:** Ziehl-Abegg FC063 **Radiator:** Friga-Bohn FC PN 06D P04 A3- 1C-134V, **Catalyst:** Interkat 61014-26614, **Heat Exchanger:** GEA WTT Plate Heat Exchanger 20212135-5

Mounting Summary:

Rigid floor mounted. Fastened to test fixture using eight (8) manufacturer provided angles with 8-3/4" diameter A325 thru bolts.

Test Parameters:

Building Code: CBC 2025
Component Importance Factor: I_p = 1.5
Test Criteria: AC-156
Test Report:
PEER # 2023-238-SQTR-01-00; UUT 1

Notes:

Contents were included in testing per operating conditions.

UUT Image



UUT Properties

Dimensions (in)			Weight (lbs.)	Min. First Natural Frequency (Hz)		
Length	Width	Height		F-B	S-S	Vert
315	118	210	41,000	9.0	8.4	N/A

Unit maintained structural integrity and remained operational
per manufacturer requirement when subjected to AC 156 test with the following test parameters

S_{DS} (g)	R_μ	H_f	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
2.50	1.0	1.0	2.50	1.00	1.67	0.67

SPECIAL SEISMIC CERTIFICATION
UNIT UNDER TEST (UUT) DESCRIPTION

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Manufacturer: BSD Builders, Inc.

Model Line: Microgrid Cogeneration System

Model Number: BSD SSC 280 Serial #: G6462

UUT **2**

Construction Summary:

Steel container with 3.425" thick insulated wall panels. Certified component construction shall be identical to construction of UUT's.

Options Summary:

Container: 8m Avus500+, **Generator:** 2G Energy Aura 408, **Gas Train:** Dungs Combustion Controls Heat Engine Base 50045-00239, **Alternator:** Leroy-Somer LSA 46.3 S4 / 4p, **Load Bank:** Crestchic DC Load Bank, **Silencers:** Discom Exhaust Technology L256 & L45, **Ventilation Fan:** Ziehl-Abegg FC063, **Radiator:** Friga-Bohn FCH SN 08D P02 B2-1C-50V-M60-SCU, **Catalyst:** Interkat 61014-26613, **Heat Exchanger:** GEA WTT Plate Heat Exchanger 20212135-4

Test Parameters:

Building Code: CBC 2025
Component Importance Factor: I_p = 1.5
Test Criteria: AC-156
Test Report:
PEER # 2023-238-SQTR-01-00; UUT 2

Mounting Summary:

Rigid floor mounted. Fastened to test fixture using eight (8) manufacturer provided angles with 8-3/4" diameter A325 thru bolts.

Notes:

Contents were included in testing per operating conditions.

UUT Image



UUT Properties

Dimensions (in)			Weight (lbs.)	Min. First Natural Frequency (Hz)		
Length	Width	Height		F-B	S-S	Vert
315	118	210	39,500	9.6	9.2	N/A

Unit maintained structural integrity and remained operational
per manufacturer requirement when subjected to AC 156 test with the following test parameters

S_{DS} (g)	R_μ	H_f	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
2.50	1.0	1.0	2.50	1.00	1.67	0.67

SPECIAL SEISMIC CERTIFICATION
UNIT UNDER TEST (UUT) DESCRIPTION

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Manufacturer: BSD Builders, Inc.

Model Line: BSD SSC FSS

Model Number: BSD-SSC-FSS-34MSCF

UUT **3**

Construction Summary:

Steel HSS welded frame with 12 Ga sheet metal panels containing a 48" diameter, 1.25" thick, 11 ft tall carbon fiber tank and subcomponents as listed.

Options Summary:

Gas Tank: Hydria CAT1502 105, **Heat Exchanger:** Hydria SCBP-HX, **Regulators:** Swagelok RSN2-02-LLK & RSHN6-02-3-LLK-GN2, Belgas P301H4008043F0, **Pressure Relief Valves:** Crosby 95100MFA & 981105MFA, **Particulate Filter:** Parker Particulate/Coalescent Filter FCC-116-10, Pressure Sensors: Core Sensors CS50-2A02000PS4Z0001-01 & 02, **Temperature Probe:** Sandelius Instruments RTD.

Mounting Summary:

The unit is mounted to the shake-table with (4) 1" Grade 8 bolts.

Test Parameters:

Building Code: CBC 2025
Component Importance Factor: $I_p = 1.5$
Test Criteria: AC-156
Test Report:
ETL # 17578 Rev. 1; UUT 1

Notes:

Contents were included in testing per operating conditions

UUT Image



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UUT Properties

Dimensions (in)			Weight (lbs.)	Min. First Natural Frequency (Hz)		
Length	Width	Height		F-B	S-S	Vert
58	71	162	6,124	7.46	11.15	>33.3

Unit maintained structural integrity and remained operational
per manufacturer requirement when subjected to AC 156 test with the following test parameters

S_{DS} (g)	R_μ	H_f	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
2.50	1.0	1.0	2.50	1.00	1.67	0.67

SPECIAL SEISMIC CERTIFICATION
UNIT UNDER TEST (UUT) DESCRIPTION

Manufacturer: BSD Builders, Inc.

Model Line: BSD SSC FSS

Model Number: BSD-SSC-FSS-34MSCF

UUT **4**

Construction Summary:

Steel HSS welded frame with 12 Ga sheet metal panels containing a 48" diameter, 1.25" thick, 11 ft tall carbon fiber tank and subcomponents as listed.

Options Summary:

Gas Tank: Hydria CAT1502 105, **Heat Exchanger:** Hydria SCBP-HX, **Regulators:** Swagelok RSN2-02-LLK & RSHN6-02-3-LLK-GN2, Belgas P301H4008043F0, **Pressure Relief Valves:** Crosby 95100MFA & 981105MFA, **Particulate Filter:** Parker Particulate/Coalescent Filter FCC-116-10, Pressure Sensors: Core Sensors CS50-2A02000PS4Z0001-01 & 02, **Temperature Probe:** Sandelius Instruments RTD.

Test Parameters:

Building Code: CBC 2025
Component Importance Factor: $I_p = 1.5$
Test Criteria: AC-156
Test Report:
ETL # 17578 Rev. 1; UUT 2

Mounting Summary:

The unit is mounted to the shake-table with (4) 1" Grade 8 bolts.

Notes:

Contents were included in testing per operating conditions

UUT Image



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UUT Properties

Dimensions (in)			Weight (lbs.)	Min. First Natural Frequency (Hz)		
Length	Width	Height		F-B	S-S	Vert
58	71	162	6,130	4.76	5.19	>33.3

Unit maintained structural integrity and remained operational
per manufacturer requirement when subjected to AC 156 test with the following test parameters

S_{DS} (g)	R_μ	H_f	A_{FLX-H} (g)	A_{RIG-H} (g)	A_{FLX-V} (g)	A_{RIG-V} (g)
2.50	1.0	1.0	2.50	1.00	1.67	0.67