



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0658

OSHPD Special Seismic Certification Preapproval (OSP)

Type: [X] New [] Renewal

Manufacturer Information

Manufacturer: Industrial Electric Manufacturing

Manufacturer's Technical Representative: Ashok Kulkarni

Mailing Address: 49205 Warm Springs Blvd., Fremont, CA 94539

Telephone: (510) 656-1600 Email: ashok.kulkarni@iemfg.com

Product Information

Product Name: Switchgear/Switchboards

Product Type: Switchgear - Medium Voltage

Product Model Number: 5-38kV Switchgear

General Description: 38kV Switchgear NEMA 1 Indoor and NEMA 3R Outdoor Sections, 15kV Switchgear NEMA 1 Indoor Sections.

Mounting Description: Rigid, Floor Mounted

Tested Seismic Enhancements: Seismic enhancements made to the test units and/or modifications required to address anomalies during the tests shall be incorporated into the production units.

Applicant Information

Applicant Company Name: Forell/Elsesser Engineers

Contact Person: Christopher Tung

Mailing Address: 160 Pine Street, 6th Floor, San Francisco, CA 94111

Telephone: (415) 248-3047 Email: c.tung@forell.com

Title: Engineer





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

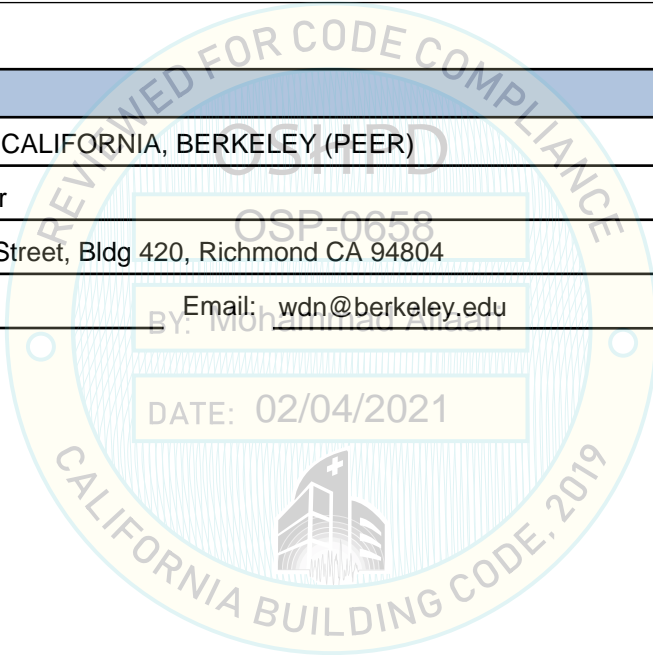
Company Name: FORELL / ELSESSER ENGINEERS, INC.
Name: Marco Scanu California License Number: S4454
Mailing Address: 160 Pine Street, Suite 600, San Francisco, CA 94111
Telephone: (415) 837-0700 Email: scanu@forell.com

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: Wesley Neighbour
Mailing Address: 1301 South 46th Street, Bldg 420, Richmond CA 94804
Telephone: (510) 665-3409 Email: wdn@berkeley.edu





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Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 1.50

SDS (Design spectral response acceleration at short period, g) = 2.00

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

Natural frequencies (Hz) = Varies, see attached

Overall dimensions and weight = Varies, see attached

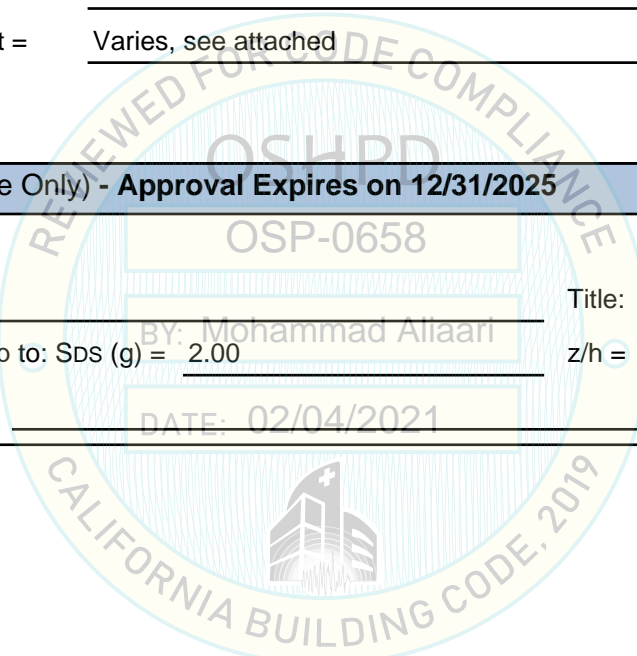
OSHPD Approval (For Office Use Only) - Approval Expires on 12/31/2025

Date: 2/4/2021

Name: Mohammad Aliaari Title: Senior Structural Engineer

Special Seismic Certification Valid Up to: SDS (g) = 2.00 z/h = 1

Condition of Approval (if applicable): DATE: 02/04/2021



**IEM 5-38 kV Switchgear
I. Certified Products Table**

Description	Height ¹ (in)	Width ² per section (in)	Depth (in)	Max. Weight per section (lbs)	NEMA Rating ³	Test Status
5-15 kV - 1200A - 3000A	91.5	72	98	4,200 - 7,500 lbs	Type 1, 3R	Extrapolated ⁵
15 kV - 097950-0002- 3000A	91.5	72	98	6,080 lbs	Type 1	UUT-4 ⁵
15 kV -109828-2-3000A	94	72	99	3650 lbs	Type 1	UUT-5 ⁴
15 kV - 097950-0001- 2000A	96	72	98	7,430 lbs	Type 1	UUT-3 ⁵
IEM-38KV-SWGR-NEMA 1 - 1200A	95	42	123	4,200 lbs	Type 1	UUT-2 ⁵
38 kV - 1200A - 3000A	95	84	123	4,200 lbs	Type 1, 3R	Interpolated
IEM-38KV-SWGR-NEMA 3R - 1200A	107	84	123	10,500 lbs	Type 3R	UUT-1 ⁴
IEM-38KV-SWGR-NEMA 3R - 1200A-2000A	107	84	123	10,500 lbs	Type 3R	Extrapolated
IEM-15KV-SWGR-NEMA 3R - 1200A-3000A	107	84	123	10,500 lbs	Type 3R	Extrapolated

Notes

1. Height shown does not include optional 4"-high steel channel under base of unit.
2. 72" & 84"-wide units consist of (2) 36" or (2) 42"-wide sections, respectively in the typical breaker+auxiliary configuration.
3. NEMA-3R includes walk-in enclosure: This adds +9"H x +0"W x +12"D per section, which is included in UUT-1's dimensions.
4. UUT1 and UUT5 consisted of two sections of the same dimensions with differing weights.
5. 36" wide units must be ganged to a minimum of 72" wide. 42" units are only certified to be 4,200 lbs.
6. All units are rigidly floor mounted



**IEM 5-38kV Switchgear
II. Certified Subcomponents Table**

Internal Components	Manufacturer	Part #	Testing Status
Digital Relay			
SEL-311 Differential and Distance Protection Relay	Schweitzer	0311LXXB4	Extrapolated
SEL-351A Protection Relay	Schweitzer	0351AXXB4	Extrapolated
SEL-387 Current Differ. And Overcurrent Relay	Schweitzer	0387XXB4	Extrapolated
SEL-451 Protection Relay	Schweitzer	045144151XXB4	UUT-1
SEL-487B Bus Differential Protection Relay	Schweitzer	0487BXXB4	Interpolated
SEL-501 Overcurrent Relay	Schweitzer	0501XXB4	Interpolated
SEL-751A Feeder Protection Relay	Schweitzer	0751AXXB4	Interpolated
SEL-751A Feeder Protection Relay	Schweitzer	SEL-751- A02C0X0X7185	UUT-4
SEL-787 Transformer Differential Relay	Schweitzer	0787EX1A1A0X	UUT-1
BE1 Voltage Protective Relay	Basler	BE1-27-A3E-E1J	UUT-2
BE1 Current Differential Protective Relay	Basler	BE1-CDS240-0N5F	Interpolated
BE1 Overcurrent Protection System	Basler	BE1-951-B3ED0N1F	Interpolated
BE1 Bus Differential Relay	Basler	BE1-87B-ED0N1F	Interpolated
BE1 Under/Over Frequency Protective Relay	Basler	BE1-810/U-XXX	Interpolated
BE1 Directional Power Relay	Basler	BE1-32R-B3ED1PA	UUT-2
BE1 Overcurrent Relay	Basler	BE1-51K1EZ10A2C6F	UUT-3
Power Monitors/Meters			
Power Monitor 3000	Allen Bradley	1404-M405A-ENT	UUT-1
GE Electronic Power Monitor (EPM) 5300P	GE	PL53002A0A00	Extrapolated
GE Electronic Power Monitor (EPM) 783	GE	783X9011001	UUT-2
GE Electronic Meter	GE	783X901001	UUT-2
SEL-734 Advanced Metering System	Schweitzer	0734009V1D11	UUT-1
SEL-735 Power Quality and Revenue Meter	Schweitzer	735BX00944CX0000016102XX	UUT-3
Powerlogic ION 7330 Power Meter	Square D	S7330A0B0B0A	UUT-2
SQD Power Meter	Square D	PM-870	UUT-4
Switches			
FT1 Test Switch 6 Pole	ABB	FT129A516G01	UUT-1
24 Control Switch	Electroswitch	24202D	UUT-1, UUT-2, UUT-4
Breaker Control Switch	Electroswitch	2438D	UUT5
20 Rotary Switch	Electroswitch	20KC-1101A8	UUT-3
Indicating Light			
Heavy Duty Indicating Light Red	GE	CR104PLT93R	UUT-1, UUT-2
Heavy Duty Indicating Light Green	GE	CR104PLT93G	UUT-1, UUT-2
Power Components			
Potential Transformer	ABB	1VLT5212003507	UUT-1
15kVA Transformer	IEM	89067-AFP-CT	UUT-1
PT Rollout Truck	IEM	IEM-SIEMENS-PT-ROLLOUT-TRUCK	UUT-3
CPT Rollout Truck	IEM	IEM-SIEMENS-CPT-ROLLOUT-TRUCK	UUT-3
Fuse Rollout Truck	IEM	IEM-SIEMENS-FUSE-ROLLOUT-TRUCK	UUT-4
Current Transformer	ITI	785-202	UUT-1
	ITI	785-122MR	UUT-2
15 kV 1200A Vacuum Breaker	Siemens	SIEMENS-15 kV-1200A	UUT-3
15 kV 1200A Vacuum Breaker	Eaton	EATON-VCP-W-1200A	Interpolated
15 kV 2000A Vacuum Breaker	Siemens	SIEMENS-15 kV-2000A	UUT-3
15 kV 2000A Vacuum Breaker	Eaton	EATON-VCP-W-2000A	Interpolated
15 kV 3000A Vacuum Breaker	Siemens	SIEMENS-15 kV-3000A	UUT-4
15 kV 3000A Vacuum Breaker	Eaton	EATON-VCP-W-3000A	UUT-5
Fuse Truck Seismic Drawer	Eaton	1A30133G22	UUT-5
Current Limiting Fuse	Eaton	15CLPT-5E	UUT-5
Fuse Clip Mounting Kit	Eaton	3A38296G01	UUT-5
3000A Main Bus Support Insulator and Snubber	Eaton	1A30269G03	UUT-5
3000A Power Module 15 kV, 2-High Structure	Eaton	1C1999G236	UUT-5
Auxiliary Power Module 15 kV, 2-High Structure	Eaton	3A38303G08	UUT-5
38kV 1200A Vacuum Breaker	Innovative Power Technologies	VVAG-38140MABB	UUT-2
38kV 2000A Vacuum Breaker	Innovative Power Technologies	VVAG-38240M-ABBBBBA	UUT-1

Test Report 2014-08 – UUT 1

NEMA 3R Outdoor Unit – 1200A
 Model Number: IEM-38KV-SWGR-NEMA 3R
 Cold Formed Carbon Steel
 Total weight and dimensions:
 84”W x 123”D x 107”H, 10,500 lbs
 Rigidly Floor mounted w/: (10) – 1/2” Gr. 5 bolts



Latches (Catalog # ES-18-25) are moved closer to the edge of the door by approximately 1/4”

Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2019	ICC-ES AC 156	2.13	1	3.41g	2.56g	1.43g	0.57g
Natural Frequencies			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test.				
10.2 Hz	4.7 Hz	14.3 Hz					
			The unit was full of content during testing.				

Internal Subcomponents	Manufacturer	Part #
SEL-451 Protection Relay	Schweitzer	045144151XXB4
SEL-787 Transformer Differential Protection Relay	Schweitzer	0787EX1A1A0X75850200
Power Monitor 3000	Allen Bradley	1404-M405A-ENT
SEL-734 Advanced Metering System	Schweitzer	0734009V1D11
FT1 Test Switch 6 Pole	ABB	FT129A516G01
Heavy Duty Indicating Light Red	GE	CR104PLT93R
Heavy Duty Indicating Light Green	GE	CR104PLT93G
38kV 2000A Vacuum Breaker	Innovative Power Technologies	VVAG-38240M-ABBBBBBA
Potential Transformer	ABB	1VLT5212003507
15kVA Transformer	IEM	89067-AFP-CT
Current Transformer	ITI	785-202
Control Switch	Electroswitch	24202D

Test Report 2014-08 – UUT 2 – Set Up B

NEMA 1 Indoor Unit – 1200A
 Model Number: IEM-38KV-SWGR-NEMA 1
 Cold Formed Carbon Steel
 42"W x 123"D x 95"H, 4,200 lbs
 Rigidly floor mounted w/: (19) – 1/2" Gr. 5 bolts

Latches (Catalog # ES-18-25) are moved closer to the edge of the door by approximately 1/4"
 Setup B – bottom plate is located on the bottom of the UUT

Note that bottom plates are optional.

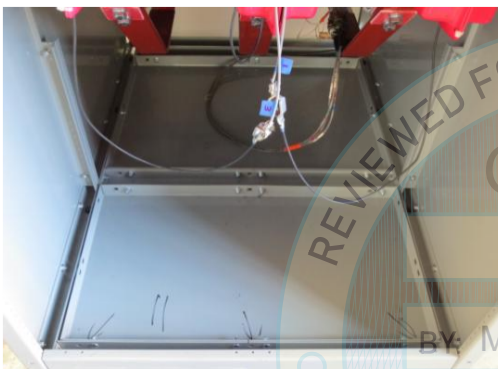


Figure 4. Setup B, UUT2 bottom plates were in place as part of the test specimen



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2019	ICC-ES AC 156	2.05	1	3.28g	2.46g	1.37g	0.55g
Natural Frequencies*			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test.				
7.5 Hz	14.1 Hz	25.9 Hz					
*as measured in Setup B			The unit was full of content during testing.				

Internal Subcomponents	Manufacturer	Part #
BE-127 Voltage Relay	Basler	BE1-27-A3E-E1J
BE1-32R Directional Power Relay	Basler	BE1-32R-B3ED1PA
Powerlogic ION 7330 Power Meter	Square D	S7330A0B0B0A
KVV2C Electronic Switchboard Meter	GE	783X901001
Heavy Duty Indicating Light Red	GE	CR104PLT93R
Heavy Duty Indicating Light Green	GE	CR104PLT93G
38kV 1200A Vacuum Breaker	Innovative Power Technologies	VVAG-38140MABB
Current Transformer	ITI	785-122MR
Control Switch	Electroswitch	24202D

Test Report 2014-08 – UUT 2 – Set Up C

NEMA 1 Indoor Unit – 1200A
 Model Number: IEM-38KV-SWGR-NEMA 1
 Cold Formed Carbon Steel
 42"W x 123"D x 95"H, 4,200 lbs
 Rigidly floor mounted w/: (19) – 1/2" Gr. 5 bolts

Latches (Catalog # ES-18-25) are moved closer to the edge of the door by approximately 1/4"
 Setup C – bottom plates removed

Note that bottom plates are optional.



Figure 5. Setup B, UUT2 bottom plates were not in place as part of the test specimen

BY: Mohammad Aliaari

Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2019	ICC-ES AC 156	2.05	1	3.28g	2.46g	1.37g	0.55g
Natural Frequencies*				Test Results			
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test.				
5.9 Hz	13.4 Hz	15.4 Hz					
*as measured in Setup C			The unit was full of content during testing.				

Internal Subcomponents	Manufacturer	Part #
BE-127 Voltage Relay	Basler	BE1-27-A3E-E1J
BE1-32R Directional Power Relay	Basler	BE1-32R-B3ED1PA
Powerlogic ION 7330 Power Meter	Square D	S7330A0B0B0A
KVV2C Electronic Switchboard Meter	GE	783X901001
Heavy Duty Indicating Light Red	GE	CR104PLT93R
Heavy Duty Indicating Light Green	GE	CR104PLT93G
38kV 1200A Vacuum Breaker	Innovative Power Technologies	VVAG-38140MABB
Current Transformer	ITI	785-122MR
Control Switch	Electroswitch	24202D

Test Report 2017-18 – UUT 3
 NEMA 1 Indoor Unit – 2000A
 Model Number: 15 kV - 097950-0001
 Cold Formed Carbon Steel
 98”W x 72”D x 96”H, 7,430 lbs
 Rigidly Floor mounted w/: (18) – 1/2” Gr. 5 bolts



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2019	ICC-ES AC 156	2.13	1	3.41g	2.56g	1.43g	0.57g
Natural Frequencies			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test.				
15.2 Hz	10.6 Hz	>33 Hz					
			The unit was full of content during testing.				

Internal Subcomponents	Manufacturer	Part #
2000A Circuit breaker	Siemens	SIEMENS-15 kV-2000A
1200A Circuit breaker	Siemens	SIEMENS-15 kV-1200A
PT Rollout Truck	IEM	IEM-SIEMENS-PT-ROLLOUT-TRUCK
CPT Rollout Truck	IEM	IEM-SIEMENS-CPT-ROLLOUT-TRUCK
ON/OFF Switch	Electroswitch	20KC-1101A8
BE1 Overcurrent Relay	Basler	BE1-51K1EZ10A2C6F
SEL-735 Power Quality and Revenue Meter	Schweitzer	735BX00944CXXXXXX16102XX

Test Report 2017-18 – UUT 4

NEMA 1 Indoor Unit – 3000A
 Model Number: 15 kV - 097950-0002
 Cold Formed Carbon Steel
 98”W x 72”D x 92”H, 6,080 lbs
 Rigidly Floor mounted w/: (12) – 1/2” Gr. 5 bolts



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2019	ICC-ES AC 156	2.13	1	3.41g	2.56g	1.43g	0.57g
Natural Frequencies			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test.				
13.5 Hz	12.1Hz	>33 Hz					
			The unit was full of content during testing.				

Internal Subcomponents	Manufacturer	Part #
3000A Circuit breaker	Siemens	SIEMENS-15 kV-3000A
Fuse Rollout Truck	IEM	IEM-SIEMENS-FUSE-ROLLOUT-TRUCK
Breaker Switch	Electroswitch	24202D- 24
SEL-751A Feeder Protection Relay	Schweitzer	SEL-751- A02C0X0X7185
Power Meter	Schneider Electric	PM-870

Test Report PEER STI 2020-11– UUT 5

NEMA 1 Indoor Unit – 3000A
 Model Number: 15 kV -109828-2
 Cold Formed Carbon Steel
 99”W x 72”D x 94”H, 3,650 lbs
 Rigidly Floor mounted w/: (12) – 1/2” A325 bolts



Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
				A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
CBC 2019	ICC-ES AC 156	2.00	1	3.20g	2.40g	1.34g	0.53g
Natural Frequencies			Test Results				
F-B	S-S	V	The UUT maintained structural integrity and functionality after the AC156 test. The unit was full of content during testing.				
17.4 Hz	8.1Hz	21.6 Hz					

Internal Subcomponents	Manufacturer	Part #
Breaker Control Switch	Electroswitch	2438D
15 kV 3000A Vacuum Breaker	Eaton	EATON-VCP-W-3000A
Fuse Truck Seismic Drawer	Eaton	1A30133G22
Current Limiting Fuse	Eaton	15CLPT-5E
Fuse Clip Mounting Kit	Eaton	3A38296G01
3000A Main Bus Support Insulator and Snubber	Eaton	1A30269G03
3000A Power Module 15 kV, 2-High Structure	Eaton	1C1999G236
Auxiliary Power Module 15 kV, 2-High Structure	Eaton	3A38303G08