



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP – 0381 – 10

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Vertiv Corporation

Manufacturer's Technical Representative: Kiel Stephens

Mailing Address: 1050 Dearborn Drive, Columbus, OH 43085

Telephone: (614) 841-8168

Email: Kiel.Stephens@Vertiv.com

Product Information

Product Name: Liebert CRV

Product Type: Air Conditioning / Air Handling Units - Data Room Air Conditioners – Computer Room Air Conditioners

Product Model Number: CR019, CR020, CR035, CR040, and CR032

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

General Description: CRV units 300mm and 600mm wide, 19, 20, and 35kW air cooled and water/glycol unit, 32kW and 40kW chilled water unit. Seismic enhancements made to the test units and modifications required to address anomalies observed during the tests shall be incorporated into the production.

Mounting Description: Rigid base mount to carbon steel floor stand mounted up to 24" in height.

Applicant Information

Applicant Company Name: Vertiv Corporation


Contact Person: Kiel Stephens

Mailing Address: 1050 Dearborn Drive, Columbus, OH 43085

Telephone: (614) 841-8168

Email: Kiel.Stephens@Vertiv.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: 4/18/2019

Title: Principal Engineer

Company Name: Vertiv Corporation

"Access to Safe, Quality Healthcare Environments that Meet California's



**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: Buehler Engineering, Inc.

Name: Scott R. Hooker, S.E. California License Number: S 3937

Mailing Address: 600 Q Street Suite 200, Sacramento, CA 95811

Telephone: (916) 443-0303 Email: shooker@buehlerengineering.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): _____
- _____
- _____

Testing Laboratory

Company Name: Clark Dynamic Test Laboratory, Inc. /17/2019

Contact Name: John R. Antenucci

Mailing Address: 1801 Route 51, Jefferson Hills, PA 15025

Telephone: (412) 387-1010 Email: jrantenucci@clarckdynamic.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) = 0.6 ($S_{DS} = 0.80$); 1.5 ($S_{DS} = 2.00$)

S_{DS} (Design spectral response acceleration at short period, g) = 0.80 (w/o seismic kit); 2.00 (w/ seismic kit)

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

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1

Equipment or Component Natural Frequencies (Hz) = See UUT Sheets

Overall dimensions and weight (or range thereof) = See Table 1 & 2

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) = OSP-0381-10

Ω_0 (System overstrength factor) = _____

C_d (Deflection amplification factor) = BY: Timothy J Piland

I_p (Importance factor) = 1.5

Height to Center of Gravity above base = DATE: 09/17/2019

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): Equipment Matrices/Tables, Merger Letter/Document

OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2022

Signature: Timothy J. Piland Date: September 17, 2019

Print Name: Timothy J. Piland Title: SSE

Special Seismic Certification Valid Up to: S_{DS} (g) = See Above z/h = 1

Condition of Approval (if applicable): _____

Table 1a. CRV 300mm - Certified Product List (Rigid Base Mounted)

Seismic Parameters $S_{DS} (g) = 0.8$ $z/h = 1.0$ $F_p/W_p = 0.6$ $a_p = 2.5$ $R_p = 6.0$ $\Omega_0 = 2.0$

Model Number	Nominal Capacity (kW)	Unit Length (in)	Unit Width (in)	Unit Height (in)	Unit Maximum Operating Weight (lbs)	Heat Rejection Type	Voltage (V)	Tested / Interpolated	Seismic Kit
CR019RA1Y70D0A13P060PA---	19	43.3	11.81	78.7	514	Air Cooled	208-230 Three Phase	Interpolated	Without
CR019RA1370D0A13P060PA1734	19	43.3	11.81	78.7	504	Air Cooled	460 Three Phase Wye	UUT-1C	Without
CR019RA1370D0A13P060PA---	19	43.3	11.81	78.7	514	Air Cooled	460 Three Phase Wye	Interpolated	Without
CR019RW1Y40D0A73P060PA1734	19	43.3	11.81	78.7	548	Water / Glycol	208-230 Three Phase	UUT-3C	Without
CR019RW1Y40D0A73P060PA---	19	43.3	11.81	78.7	555	Water / Glycol	208-230 Three Phase	Interpolated	Without
CR019RW1340D0A73P060PA---	19	43.3	11.81	78.7	555	Water / Glycol	460 Three Phase Wye	Interpolated	Without
CR032RC1Y30D0AH3P060PA---	32	43.3	11.81	78.7	491	Chilled Water	208-230 Three Phase	Interpolated	Without
CR032RC1330D0AH3P060PA---	32	43.3	11.81	78.7	491	Chilled Water	460 Three Phase Wye	Interpolated	Without
CR032RC1P30D0AH3P060PA---	32	43.3	11.81	78.7	491	Chilled Water	208-230 Single Phase	Interpolated	Without
CR032RC1K30D0CH35060PA598	32	43.3	11.81	78.7	438	Chilled Water	120 Single Phase	UUT-5C	Without
CR032RC1K30D0CH35060PA---	32	43.3	11.81	78.7	491	Chilled Water	120 Single Phase	Interpolated	Without

Notes

- The 9th digit for the above models specifies the 60 Hz. unit voltage. "Y" is for 208-230V three phase, "3" is for 460V wye three phase, "P" is for 208-230V single phase and "K" is for 120V single phase.
- The 10th digit for above CR032 models specifies chilled water piping configuration. A "3" is three way which are listed above and "2" is two way not listed above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
- The 10th digit for above CR019RW models specifies customer piping connections. A "4" is top which are listed above and "5" is bottom not listed above.
- The 14th digit in above model numbers specifies the air filter type. An "A" is Merv 8 and a "C" is Merv 1.
- The 15th digit for above CR019RW models specifies water/glycol piping configuration. A "7" is three way which are listed above and "1" is two way not listed above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
- The 16th digit in above model numbers specifies inclusion of seismic kit. "3" is for models without seismic kits listed above and "4" for models with seismic kit.
- The 19th digit in above model numbers specifies IntelliSlot Card type. All above models are "6" for one IS-Unity-DP Card and one Sitelink-Ecard.
- Above models include condensate pump option.
- See "Model Number Nomenclature" for complete model number nomenclature.
- Unit height includes casters.
- Listed unit maximum operating weights are calculated from actual unit dry weight and fluids operating in the unit.

Table 1a. CRV 300mm - Certified Product List (Rigid Base Mounted) Cont.

Seismic Parameters $S_{DS} (g) = 2.0$ $z/h = 1.0$ $F_p/W_p = 1.5$ $a_p = 2.5$ $R_p = 6.0$ $\Omega_0 = 2.0$

Model Number	Nominal Capacity (kW)	Unit Length (in)	Unit Width (in)	Unit Height (in)	Unit Maximum Operating Weight (lbs)	Heat Rejection Type	Voltage (V)	Tested / Interpolated	Seismic Kit
CR019RA1Y70D0A14P060PA---	19	43.3	11.81	78.7	514	Air Cooled	208-230 Three Phase	Interpolated	With
CR019RA1370D0A14P060PA1734	19	43.3	11.81	78.7	504	Air Cooled	460 Three Phase Wye	UUT-1B	With
CR019RA1370D0A14P060PA---	19	43.3	11.81	78.7	514	Air Cooled	460 Three Phase Wye	Interpolated	With
CR019RW1Y40D0A74P060PA1734	19	43.3	11.81	78.7	548	Water / Glycol	208-230 Three Phase	UUT-3B	With
CR019RW1Y40D0A74P060PA---	19	43.3	11.81	78.7	555	Water / Glycol	208-230 Three Phase	Interpolated	With
CR019RW1340D0A74P060PA---	19	43.3	11.81	78.7	555	Water / Glycol	460 Three Phase Wye	Interpolated	With
CR032RC1Y30D0AH4P060PA---	32	43.3	11.81	78.7	491	Chilled Water	208-230 Three Phase	Interpolated	With
CR032RC1330D0AH4P060PA---	32	43.3	11.81	78.7	491	Chilled Water	460 Three Phase Wye	Interpolated	With
CR032RC1P30D0AH4P060PA---	32	43.3	11.81	78.7	491	Chilled Water	208-230 Single Phase	Interpolated	With
CR032RC1K30D0CH45060PA598	32	43.3	11.81	78.7	438	Chilled Water	120 Single Phase	UUT-5B	With
CR032RC1K30D0CH45060PA---	32	43.3	11.81	78.7	491	Chilled Water	120 Single Phase	Interpolated	With

Notes

1. The 9th digit for the above models specifies the 60 Hz. unit voltage. "Y" is for 208-230V three phase, "3" is for 460V wye three phase, "P" is for 208-230V single phase and "K" is for 120V single phase.
2. The 10th digit for above CR032 models specifies chilled water piping configuration. A "3" is three way which are listed above and "2" is two way not listed above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
3. The 10th digit for above CR019RW models specifies customer piping connections. A "4" is top which are listed above and "5" is bottom not listed above.
4. The 14th digit in above model numbers specifies the air filter type. An "A" is Merv 8 and a "C" is Merv 1.
5. The 15th digit for above CR019RW models specifies water/glycol piping configuration. A "7" is three way which are listed above and "1" is two way not listed above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
6. The 16th digit in above model numbers specifies inclusion of seismic kit. "3" is for models without seismic kits listed above and "4" for models with seismic kit.
7. The 19th digit in above model numbers specifies IntelliSlot Card type. All above models are "6" for one IS-Unity-DP Card and one Sitelink-Ecard.
8. Above models include condensate pump option.
9. See "Model Number Nomenclature" for complete model number nomenclature.
10. Unit height includes casters.
11. Listed unit maximum operating weights are calculated from actual unit dry weight and fluids operating in the unit. Does not include seismic mounting clips (add 3lbs).

Table 1a. CRV 300mm - Certified Product List (Floor Stand Mounted)

Seismic Parameters $S_{DS} (g) = 2.0$ $z/h = 1.0$ $F_p/W_p = 1.5$ $a_p = 2.5$ $R_p = 6.0$ $\Omega_0 = 2.0$

Model Number	Nominal Capacity (kW)	Unit Length (in)	Unit Width (in)	Unit Height (in)	Unit Maximum Operating Weight (lbs)	Heat Rejection Type	Voltage (V)	Tested / Interpolated	Seismic Kit
CR019RA1Y70D0A14P060PA---	19	43.3	11.81	78.7	514	Air Cooled	208-230 Three Phase	Interpolated	With
CR019RA1370D0A14P060PA1734	19	43.3	11.81	78.7	503	Air Cooled	460 Three Phase Wye	UUT-2 18" Floor Stand	With
CR019RA1370D0A14P060PA---	19	43.3	11.81	78.7	503	Air Cooled	460 Three Phase Wye	Interpolated	With
CR019RW1Y40D0A74P060PA1734	19	43.3	11.81	78.7	547	Water / Glycol	208-230 Three Phase	UUT-4 24" Floor Stand	With
CR019RW1Y40D0A74P060PA---	19	43.3	11.81	78.7	555	Water / Glycol	208-230 Three Phase	Interpolated	With
CR019RW1340D0A74P060PA---	19	43.3	11.81	78.7	555	Water / Glycol	460 Three Phase Wye	Interpolated	With
CR032RC1Y30D0AH4P060PA---	32	43.3	11.81	78.7	491	Chilled Water	208-230 Three Phase	Interpolated	With
CR032RC1330D0AH4P060PA---	32	43.3	11.81	78.7	491	Chilled Water	460 Three Phase Wye	Interpolated	With
CR032RC1P30D0AH4P060PA---	32	43.3	11.81	78.7	491	Chilled Water	208-230 Single Phase	Interpolated	With
CR032RC1K30D0CH45060PA598	32	43.3	11.81	78.7	435	Chilled Water	120 Single Phase	UUT-6 12" Floor Stand	With
CR032RC1K30D0CH45060PA---	32	43.3	11.81	78.7	491	Chilled Water	120 Single Phase	Interpolated	With

Notes

1. The 9th digit for the above models specifies the 60 Hz. unit voltage. "Y" is for 208-230V three phase, "3" is for 460V wye three phase, "P" is for 208-230V single phase and "K" is for 120V single phase.
2. The 10th digit for above CR032 models specifies chilled water piping configuration. A "3" is three way which are listed above and "2" is two way not listed above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
3. The 10th digit for above CR019RW models specifies customer piping connections. A "4" is top which are listed above and "5" is bottom not listed above.
4. The 14th digit in above model numbers specifies the air filter type. An "A" is Merv 8 and a "C" is Merv 1.
5. The 15th digit for above CR019RW models specifies water/glycol piping configuration. A "7" is three way which are listed above and "1" is two way not listed above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
6. The 16th digit in above model numbers specifies inclusion of seismic kit. "3" is for models without seismic kits listed above and "4" for models with seismic kit.
7. The 19th digit in above model numbers specifies IntelliSlot Card type. All above models are "6" for one IS-Unity-DP Card and one Sitelink-Ecard.
8. Above models include condensate pump option.
9. See "Model Number Nomenclature" for complete model number nomenclature.
10. Unit height includes casters. Unit height does not include floor stand.
11. Listed unit maximum operating weights are calculated from actual unit dry weight and fluids operating in the unit. Does not include floorstand (70 lbs to 88 lbs).

Table 1b. CRV 600mm - Certified Product List (Rigid Base Mounted)

Seismic Parameters $S_{DS} (g) = 0.8$ $z/h = 1.0$ $F_p/W_p = 0.6$ $a_p = 2.5$ $R_p = 6.0$ $\Omega_0 = 2.0$

Model Number	Nominal Capacity (kW)	Unit Length (in)	Unit Width (in)	Unit Height (in)	Unit Maximum Operating Weight (lbs)	Heat Rejection Type	Voltage (V)	Tested / Interpolated	Seismic Kit
CR020RA1C7SD1813P060PA----	20	46.25	22.63	78.75	758	Air Cooled	208	Interpolated	Without
CR020RA1A7SD1813P060PA----	20	46.25	22.63	78.75	758	Air Cooled	460	Interpolated	Without
CR020RW1C7SD1873P060PA----	20	46.25	22.63	78.75	834	Water / Glycol	208	UUT-7C	Without
CR020RW1A7SD1873P060PA----	20	46.25	22.63	78.75	834	Water / Glycol	460	Interpolated	Without
CR035RA1C7SD1813P060PA----	35	46.25	22.63	78.75	827	Air Cooled	208	Interpolated	Without
CR035RA1A7SD1813P060PA----	35	46.25	22.63	78.75	827	Air Cooled	460	Interpolated	Without
CR035RW1C7SD1973P060PA----	35	46.25	22.63	78.75	938	Water / Glycol	208	Interpolated	Without
CR035RW1A7SD1973P060PA----	35	46.25	22.63	78.75	938	Water / Glycol	460	UUT-8C	Without
CR040RC1C3SD19H3P060PA----	40	46.25	22.63	78.75	790	Chilled Water	208	Interpolated	Without
CR040RC1A3SD19H3P060PA----	40	46.25	22.63	78.75	790	Chilled Water	460	Interpolated	Without

Notes

- The 9th digit for the above models specifies the 60 Hz. unit voltage. "C" is for 208-230V three phase, "A" is for 460V three phase and "K" is for 120V single phase.
- The 10th digit specifies chilled water piping configuration. A "7" is for all 600 mm units and "3" is three way valve which was tested in 300 mm units. Above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
- The 14th digit in above model numbers specifies the air filter type. An "8" specifies Merv 8 and "9" specifies Merv 9, additional tested in 300mm.
- The 15th digit specifies water/glycol piping configuration. A "7" is three way which are listed above, "1" is two way and "H" is default. listed above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
- The 16th digit in above model numbers specifies inclusion of seismic kit. "3" is for models without seismic kits listed above and "4" for models with seismic kit.
- The 19th digit in above model numbers specifies IntelliSlot Card type. All above models are "6" for one IS-Unity-DP Card and one Sitelink-Ecard.
- Above models include humidifier, reheat, condensate pump and 65KA SCCR disconnect options.
- Air cooled units listed above are identical to the Water/Glycol without following parts condenser plate heat exchanger, refrigerant receiver, heat rejection control valve and actuator. No additional structural support is included in the Water/Glycol units compared to Air-Cooled. Center of Gravity of both units are substantially similar.
- See "Model Number Nomenclature" for complete model number nomenclature.
- Unit height includes casters.
- Listed unit maximum operating weights are calculated from actual unit dry weight and fluids operating in the unit.

Table 1b. CRV 600mm - Certified Product List (Rigid Base Mounted) Cont.

Seismic Parameters $S_{DS} (g) = 2.0$ $z/h = 1.0$ $F_p/W_p = 1.5$ $a_p = 2.5$ $R_p = 6.0$ $\Omega_0 = 2.0$

Model Number	Nominal Capacity (kW)	Unit Length (in)	Unit Width (in)	Unit Height (in)	Unit Maximum Operating Weight (lbs)	Heat Rejection Type	Voltage (V)	Tested / Interpolated	Seismic Kit
CR020RA1C7SD1814P060PA----	20	46.25	22.63	78.75	758	Air Cooled	208	Interpolated	With
CR020RA1A7SD1814P060PA----	20	46.25	22.63	78.75	758	Air Cooled	460	Interpolated	With
CR020RW1C7SD1874P060PA----	20	46.25	22.63	78.75	834	Water / Glycol	208	UUT-7B	With
CR020RW1A7SD1874P060PA----	20	46.25	22.63	78.75	834	Water / Glycol	460	Interpolated	With
CR035RA1C7SD1814P060PA----	35	46.25	22.63	78.75	827	Air Cooled	208	Interpolated	With
CR035RA1A7SD1814P060PA----	35	46.25	22.63	78.75	827	Air Cooled	460	Interpolated	With
CR035RW1C7SD1974P060PA----	35	46.25	22.63	78.75	938	Water / Glycol	208	Interpolated	With
CR035RW1A7SD1974P060PA----	35	46.25	22.63	78.75	938	Water / Glycol	460	UUT-8B	With
CR040RC1C3SD19H4P060PA----	40	46.25	22.63	78.75	790	Chilled Water	208	Interpolated	With
CR040RC1A3SD19H4P060PA----	40	46.25	22.63	78.75	790	Chilled Water	460	Interpolated	With

Notes

- The 9th digit for the above models specifies the 60 Hz. unit voltage. "C" is for 208-230V three phase, "A" is for 460V three phase phase and "K" is for 120V single phase.
- The 10th digit specifies chilled water piping configuration. A "7" is for all 600 mm units and "3" is three way valve which was tested in 300 mm units. above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
- The 14th digit in above model numbers specifies the air filter type. An "8" specifies Merv 8 and "9" specifies Merv 9, additional tested in 300mm.
- The 15th digit specifies water/glycol piping configuration. A "7" is three way which are listed above, "1" is two way and "H" is default. listed above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
- The 16th digit in above model numbers specifies inclusion of seismic kit. "3" is for models without seismic kits listed above and "4" for models with seismic kit.
- The 19th digit in above model numbers specifies IntelliSlot Card type. All above models are "6" for one IS-Unity-DP Card and one Sitelink-Ecard.
- Above models include humidifier, reheat, condensate pump and 65KA SCCR disconnect options.
- Air cooled units listed above are identical to the Water/Glycol without following parts condenser plate heat exchanger, refrigerant receiver, heat rejection control valve and actuator. No additional structural support is included in the Water/Glycol units compared to Air-Cooled. Center of Gravity of both units are substantially similar.
- See "Model Number Nomenclature" for complete model number nomenclature.
- Unit height includes casters.
- Listed unit maximum operating weights are calculated from actual unit dry weight and fluids operating in the unit. Does not include seismic braces (add 14lbs).

Table 1b. CRV 600mm - Certified Product List (Floor Stand Mounted)

Seismic Parameters $S_{DS} (g) = 2.0$ $z/h = 1.0$ $F_p/W_p = 1.5$ $a_p = 2.5$ $R_p = 6.0$ $\Omega_0 = 2.0$

Model Number	Nominal Capacity (kW)	Unit Length (in)	Unit Width (in)	Unit Height (in)	Unit Maximum Operating Weight (lbs)	Heat Rejection Type	Voltage (V)	Tested / Interpolated	Seismic Kit
CR020RA1C7SD1814P060PA----	20	46.25	22.63	78.75	758	Air Cooled	208	Interpolated	With
CR020RA1A7SD1814P060PA----	20	46.25	22.63	78.75	758	Air Cooled	460	Interpolated	With
CR020RW1C7SD1874P060PA----	20	46.25	22.63	78.75	834	Water / Glycol	208	UUT-9 12" Floor Stand	With
CR020RW1A7SD1874P060PA----	20	46.25	22.63	78.75	834	Water / Glycol	460	Interpolated	With
CR035RA1C7SD1814P060PA----	35	46.25	22.63	78.75	827	Air Cooled	208	Interpolated	With
CR035RA1A7SD1814P060PA----	35	46.25	22.63	78.75	827	Air Cooled	460	Interpolated	With
CR035RW1C7SD1974P060PA----	35	46.25	22.63	78.75	938	Water / Glycol	208	Interpolated	With
CR035RW1A7SD1974P060PA----	35	46.25	22.63	78.75	938	Water / Glycol	460	UUT-10 24" Floor Stand	With
CR040RC1C3SD19H4P060PA----	40	46.25	22.63	78.75	790	Chilled Water	208	Interpolated	With
CR040RC1A3SD19H4P060PA----	40	46.25	22.63	78.75	790	Chilled Water	460	Interpolated	With

Notes

- The 9th digit for the above models specifies the 60 Hz. unit voltage. "C" is for 208-230V three phase, "A" is for 460V three phase phase and "K" is for 120V single phase.
- The 10th digit specifies chilled water piping configuration. A "7" is for all 600 mm units and "3" is three way valve which was tested in 300 mm units. above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
- The 14th digit in above model numbers specifies the air filter type. An "8" specifies Merv 8 and "9" specifies Merv 9, additional tested in 300mm.
- The 15th digit specifies water/glycol piping configuration. A "7" is three way which are listed above, "1" is two way and "H" is default. listed above. Both two and three way piping use the same valve. Piping is the same except for two way has no bypass piping connection to bypass of valve.
- The 16th digit in above model numbers specifies inclusion of seismic kit. "3" is for models without seismic kits listed above and "4" for models with seismic kit.
- The 19th digit in above model numbers specifies IntelliSlot Card type. All above models are "6" for one IS-Unity-DP Card and one Sitelink-Ecard.
- Above models include humidifier, reheat, condensate pump and 65KA SCCR disconnect options.
- Air cooled units listed above are identical to the Water/Glycol without following parts condenser plate heat exchanger, refrigerant receiver, heat rejection control valve and actuator. No additional structural support is included in the Water/Glycol units compared to Air-Cooled. Center of Gravity of both units are substantially similar.
- See "Model Number Nomenclature" for complete model number nomenclature.
- Unit height includes casters. Unit height does not include floor stand.
- Listed unit maximum operating weights are calculated from actual unit dry weight and fluids operating in the unit. Does not include seismic braces (add 14lbs). Does not include floorstand (84 lbs to 100 lbs).

Table 2a. CRV 300mm - Certified Sub-Component List

Cooling Fans						
Type	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
EC Fan	208-230 Single Phase	EBM	315021P2	Aluminum blades. Carbon Steel & Copper Motor	CR032RC1P	Interpolated
	All CR019 Models		315021P2		CR019RA1Y / CR019RW1Y / CR032RC1Y / CR019RA13 / CR019RW13 / CR032RC13	UUT-1,2,3 & 4
	120 Single Phase		315021P3		CR035RC1K	UUT-5 & 6

Cooling Coils						
Type	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
Cooling Coil 3 Row 30" height	All CR019 Models	Vertiv Corporation	315051G1	Copper Tube/ Alum. Fins	CR019RA1Y / CR019RW1Y / CR019RA13 / CR019RW13	UUT-1,2,3 & 4
Cooling Coil 3 Row 36" height	All CR032 Models		316672G1		CR032RC	UUT-5 & 6

Electrical Panel Assemblies						
Type	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
Electrical Panel Assemblies	208-230 Three Phase	Vertiv Corporation	315033G1	18 Gauge Painted Cold Rolled Steel box	CR019RA1Y	Interpolated
	208-230 Three Phase		315033G2		CR019RW1Y	UUT-3 & 4
	460 Wye Three Phase		315033G3		CR019RA13	UUT-1 & 2
	460 Wye Three Phase		315033G4		CR019RW13	Interpolated
	208-230 Three Phase		315033G5		CR032RC1Y	Interpolated
	460 Wye Three Phase		315033G6		CR032RC13	Interpolated
	208-230 Single Phase		315033G7		CR032RC1P	Interpolated
	120 Single Phase		315033G8		CR032RC1K	UUT-5 & 6

Electrical Panel Disconnects						
Type	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
60A Fused 65KA SCCR	208-230 Three Phase	Allen Bradley	303397P2	Aluminum shaft, plated carbon steel body, copper contacts and plastic body	CR019RA1Y / CR019RW1Y	UUT-3 & 4
30A Fused 65KA SCCR	460 Wye Three Phase		303397P1		CR019RA13 / CR019RW13 / CR032RC13	UUT-1 & 2
30A Fused 65KA SCCR	208-230 Three Phase		303397P1		CR032RC1Y	Interpolated
30A Fused 65KA SCCR	208-230 Single Phase		303397P1		CR032RC1P	Interpolated
Fused 5KA	120 Single Phase	ABB & Mersen	320064P1		CR032RC1K	UUT-5 & 6

Scroll Compressors						
Type	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
ZPD72KCE-TF5	208-230 three phase	Copeland	315631P1	Shell is painted cold rolled carbon steel	CR019RA1Y & CR019RW1Y	UUT-3 & 4
ZPD72KCE-TFD	460 Wye Three Phase		315631P2		CR019RA13 & CR019RW13	UUT-1 & 2

Table 2a. CRV 300mm - Certified Sub-Component List Cont.

Condenser : Brazed Plate Heat Exchanger						
Type	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
Condenser Plate 26 plates	All CR019RW Models	SWEP	257382P2	All 316 stainless steel HX with copper Braze	CR019RW	UUT-3 & 4
Filter						
Type	Type	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
Air Filter	MERV1	Koch Filter Corp.	155419P4	Metal galvanized steel frame, washable quadrafoam filter, MERV media metal mesh backing on both sides	ALL MODELS	UUT-5 & 6
	MERV8		315029P1		ALL MODELS	UUT-1,2,3 & 4
Condensate Pump						
Type	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
1/10 HP Condensate Pump	120	Hartell	319860G2	Carbon Steel (motor), Stainless steel shaft, copper (motor windings), plastic (pump housing, impeller and piping connections).	CR032RC1K	UUT-5 & 6
	208-230 Single Phase		319860G1		CR032RC1P	Interpolated
	208-230 Three Phase		319860G1		CR019RA1Y / CR019RW1Y / CR032RC1Y	UUT-3 & 4
	460 Wye Three Phase		319860G3		CR019RA13 / CR019RW13 / CR032RC13	UUT-1 & 2
TEV						
Type	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
Thermal Expansion Valve	All CR019 Models	Emerson Climate Technologies	315077P1	Brass (body), copper (piping) and stainless steel (internals).	CR019RA / CR019RW	UUT-1,2,3 & 4
Electrical Panel Transformer						
Type	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
Low Voltage Control Isolation Transformer	All	Emerson (Emermex)	180792P1	Carbon Steel laminations and copper windings	All Models	UUT-1,2,3,4,5 & 6
Electrical Panel High Voltage Transformer	120		317839P1		CR032RC1K	UUT-5 & 6
	208-230 Single Phase		136201P1		CR032RC1P	Interpolated
	208-230 Three Phase		136201P1		CR019RA1Y / CR019RW1Y / CR032RC1Y	UUT-3 & 4
	460 Wye Three Phase		136201P3		CR019RA13/CR019RW1 3 /CR032RC13	UUT-1 & 2
Miscellaneous						
Sub-component	Unit Voltage	Manufacturer	P/N	Material	Designed Model Usage	Tested / Interpolated
Display	All	Vertiv Corporation	314979G2	Electrical parts and plastic	All Models	UUT-1,2,3,4,5 & 6
Heat Rejection Control Valve	All CR019RW	Siemens	257271P1		CR019RW	UUT-3 & 4
Actuator	All CR019RW	Siemens	257371P1		CR019RW	UUT-3 & 4
3 Way Valve/Actuator	All CR032 Models	Belimo	185661P13	Stainless steel valve. Electrical parts and plastic actuator	CR032RC	UUT-5 & 6
2 Way Valve/Actuator	All	Belimo	185660P13		CR032RC	UUT-5 & 6
Communication Card	All	Vertiv Corporation	191944G3	Plastic, solder, semiconductors	All Models	UUT-1,2,3,4,5 & 6

Table 2b. CRV 600mm - Certified Sub-Component List

Cooling Fans					
Type	Unit Voltage	Manufacturer	P/N	Material	Tested / Interpolated
EC Fan	208/460	EBM	191881P1	Aluminum blades. Carbon Steel & Copper Motor	UUT-7 & UUT-8
	208		257241P1		Interpolated
	460		257240P1		UUT-9 & UUT-10

Cooling Coils					
Type	Manufacturer	P/N	Material	Tested / Interpolated	
Cooling Coil 4 Row	Vertiv Corporation	197515G1	Copper Tube/ Alum. Fins	UUT-7 & UUT-8	
Cooling Coil 5 Row		197479G1		Interpolated	
Cooling Coil 6 Row		197542G1		UUT-9 & UUT10	

Electrical Panel Assemblies					
Type	Unit Voltage	Manufacturer	P/N	Material	Tested / Interpolated
Electrical Panel Assemblies	208	Vertiv Corporation	191986G1	Galvanized G90 Steel panel	UUT-7 & UUT-8
	460		191850G3		Interpolated
	208		191986G2		Interpolated
	460		191986G4		UUT-9 & UUT-10
	208		191986G5		Interpolated
	460		191986G6		Interpolated

Electrical Panel Disconnects					
Type	Unit Voltage	Manufacturer	P/N	Material	Tested / Interpolated
100A Fused 65KA SCCR	208/460	Socomec	303399P3	Aluminum shaft, plated carbon steel body, copper contacts and plastic body	UUT-7 & UUT-8
60A Fused 65KA SCCR	208/460	Allen Bradley	303397P2		UUT-7, UUT-8, UUT-9 & UUT-10
30A Fused 65KA SCCR	208/460	Socomec	303399P1		UUT-8 & UUT-10

Scroll Compressors					
Type	Unit Voltage	Manufacturer	P/N	Material	Tested / Interpolated
ZPD72KCE-TF5	208	Copeland	257220P1	Shell is painted cold rolled carbon steel	UUT-7 & UUT-9
ZPD72KCE-TFD	460		257220P2		Interpolated
ZPD120KCE-TF5	208		257223P1		Interpolated
ZPD120KCE-TFD	460		257223P2		UUT-8 & UUT-10

Condenser : Braze Plate Heat Exchanger					
Type	Manufacturer	P/N	Material	Tested / Interpolated	
Condenser Plate 26 plates	SWEP	257382P2	All 316 stainless steel HX with copper Braze	UUT-7 & UUT-8	
Condenser Plate 42 plates		257383P2		UUT-8 & UUT-10	

Humidifier					
Type	Unit Voltage	Manufacturer	P/N	Material	Tested / Interpolated
Humidifier	208	Nortec	257521P3	Electrical parts, carbon steel sheetmetal and plastic	UUT-7 & UUT-9
	460		257521P4		UUT-8 & UUT-10

Table 2b. CRV 600mm - Certified Sub-Component List Cont.

Filter					
Type	Type	Manufacturer	P/N	Material	Tested / Interpolated
Air Filter	MERV8	Koch Filter Corp.	196968P1	Beverage board frame, pleated polypropylene blend MERV media & metal mesh backing	UUT-7 & UUT-9
	MERV11		196968P2		UUT-8 & UUT-10

Reheat Assembly					
Type	Unit Voltage	Manufacturer	P/N	Material	Tested / Interpolated
6 kW Reheat Assembly	208	Vertiv Corporation	257604G13	Galvanized steel (mounting plates) , nickel plated steel (mounting nuts), stainless steel (electrical connections) and silicone rubber (insulating terminals).	UUT-7 & UUT-9
	460		257604G14		UUT-8 & UUT-10

Condensate Pump					
Type	Unit Voltage	Manufacturer	P/N	Material	Tested / Interpolated
1/3 HP Condensate Pump	208	Hartell	1A19271P1	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).	UUT-7 & UUT-9
	460		1A19271P2		UUT-8 & UUT-10

TEX					
Type	Unit Voltage	Manufacturer	P/N	Material	Tested / Interpolated
Thermal Expansion Valve	208/460	Sporlan Valve	257260P2	Brass (body), copper (piping) and stainless steel (internals).	UUT-7 & UUT-9
	208/460		257261P1		UUT-8 & UUT-10

Electrical Panel Transformer					
Type	Unit Voltage	Manufacturer	P/N	Material	Tested / Interpolated
Electrical Panel Transformer	208	Emerson (Emermex)	136202P1	Carbon Steel laminations and copper windings	UUT-7 & UUT-9
	460		136202P2		UUT-8 & UUT-10

Miscellaneous				
Sub-component	Manufacturer	P/N	Material	Tested / Interpolated
Refrigerant Receiver	Westermeyer	300842P1	Carbon Steel Shell attached to unit base frame	UUT-7, UUT-8, UUT-9 & UUT-10
Heat Rejection Control Valve	Siemens	257271P1	Electrical parts and plastic	UUT-7, UUT-8, UUT-9 & UUT-10
Actuator	Siemens	257371P1	Electrical parts and plastic	UUT-7, UUT-8, UUT-9 & UUT-10
Transformer	ACME	1C23973P1	Carbon Steel and Copper	UUT-7, UUT-8, UUT-9 & UUT-10
Communication Card	Vertiv Corporation	191944G3	Plastic, solder, semiconductors	UUT-7, UUT-8, UUT-9 & UUT-10

UUT-1B Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 14-1292
 Testing Unit Num: 1B

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction	Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR019RA1371734 (CR019RA1370D0A14P060PA1734)	19	Rigid Base Mounted	X Front - Back Y Side - Side Z Vertical	17.8 5.3 >33.3	43	11 7/8	78 3/4	504

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight within 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Seismic kits (part # 317816G0), consisting of seismic plates & angle brackets were installed on each end of the unit. The plates of the kit were attached with four (4)-1/4"Ø self tapping screws. The angles of the kit attached with six (6)-1/4"Ø self tapping and anchored to the shake table with 1/2" diameter Grade 8 bolts per bracket.	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00 2.50	1.0 0.0	3.20g	2.40g	1.68g	0.68g



Figure 1B.1: Unit on the shake table



Figure 1B.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-1B Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (200-277V 1 phase)	315021P2	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	3 Row Tube & Fin Coil	315051G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR019RA13 460V	315033G3	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	30 Amp 65KA SCCR	303397P1	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body, and copper contacts
Display	ICOM Control CRV300	314979G2	Vertiv Corporation	Electrical parts and plastic
Compressor	Scroll ZPD72KCE-TFD	315631P2	Copeland	Shell is painted cold rolled carbon steel
Condensate Pump	1/10 HP 266VAC	319860G3	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Thermal Expansion Valve	6 Ton Expansion Valve	315077P1	Emerson Climate Tech	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV8 Filter	315029P1	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 8 media & metal mesh backing
Electrical Panel Transformer	200VA 460-600 Volt X 24 Volt 60 Hz.	136201P3	Emerson (Emermex)	Carbon Steel laminations and copper windings
Electrical Panel Transformer	45VA 24Volt X 22 Volt	180792P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

UUT-1C Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 14-1292
 Testing Unit Num: 1C

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction		Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR019RA1371734 (CR019RA1370D0A13P060PA1734)	19	Rigid Base Mounted	X	Front - Back	17.1	43	11 7/8	78 3/4	504
			Y	Side - Side	4.2				
			Z	Vertical	>33.3				

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight within 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method	Carbon steel angles (part # 317816G2) were installed on each end of the unit with (6) 1/4"Ø self tapping screws and anchored to the shake table with (4) -1/2"Ø Grade 8 bolts (8 per bracket).	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	0.80	1.0	1.28g	0.96g	0.54g	0.22g

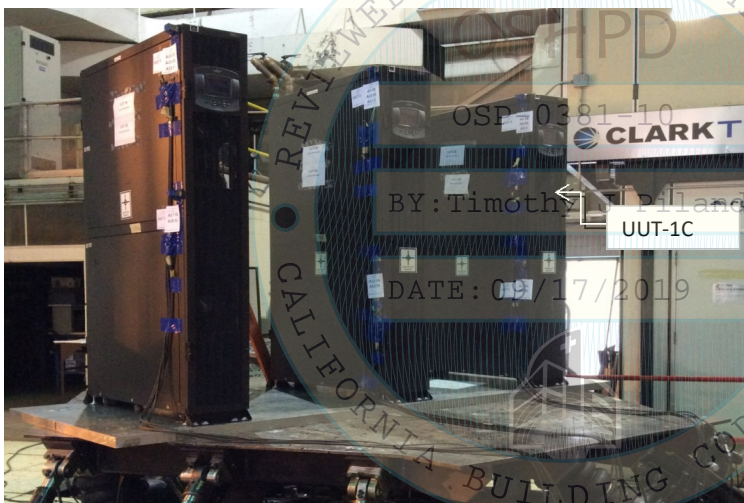


Figure 1C.1: Unit on the shake table



Figure 1C.2: Mounting Details

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturing operational limits

UUT-1C Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (200-277V 1 phase)	315021P2	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	3 Row Tube & Fin Coil	315051G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR019RA13 460V	315033G3	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	30 Amp 65KA SCCR	303397P1	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body, and copper contacts
Display	ICOM Control CRV300	314979G2	Vertiv Corporation	Electrical parts and plastic
Compressor	Scroll ZPD72KCE-TFD	315631P2	Copeland	Shell is painted cold rolled carbon steel
Condensate Pump	1/10 HP 266VAC	319860G3	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Thermal Expansion Valve	6 Ton Expansion Valve	315077P1	Emerson Climate Tech.	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV8 Filter	315029P1	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 8 media & metal mesh backing
Electrical Panel Transformer	200VA 460-600 Volt X 24 Volt 60 Hz.	136201P3	Emerson (Emermex)	Carbon Steel laminations and copper windings
Electrical Panel Transformer	45VA 24Volt X 22 Volt	180792P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

UUT-2 Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 14-1292
 Testing Unit Num: 2

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction	Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR019RA1371734 (CR019RA1370D0A14P060PA1734)	19	Rigid on 18" Floor Stand	X Front - Back Y Side - Side Z Vertical	24.0 5.0 >33.3	43	11 7/8	78 3/4	503

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight within 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Holdown brackets (part # 317816G4) were installed on the front and back of the unit with (14) 1/4"Ø self tapping screws (each bracket) attaching the unit to the floorstand.	Seismic Parameters							
	The floor stand is anchored to the shake table with (2) -1/2" diameter Grade 8 bolts per bracket (8 total).	Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00 2.50	1.0 0.0	3.20g	2.40g	1.68g	0.68g

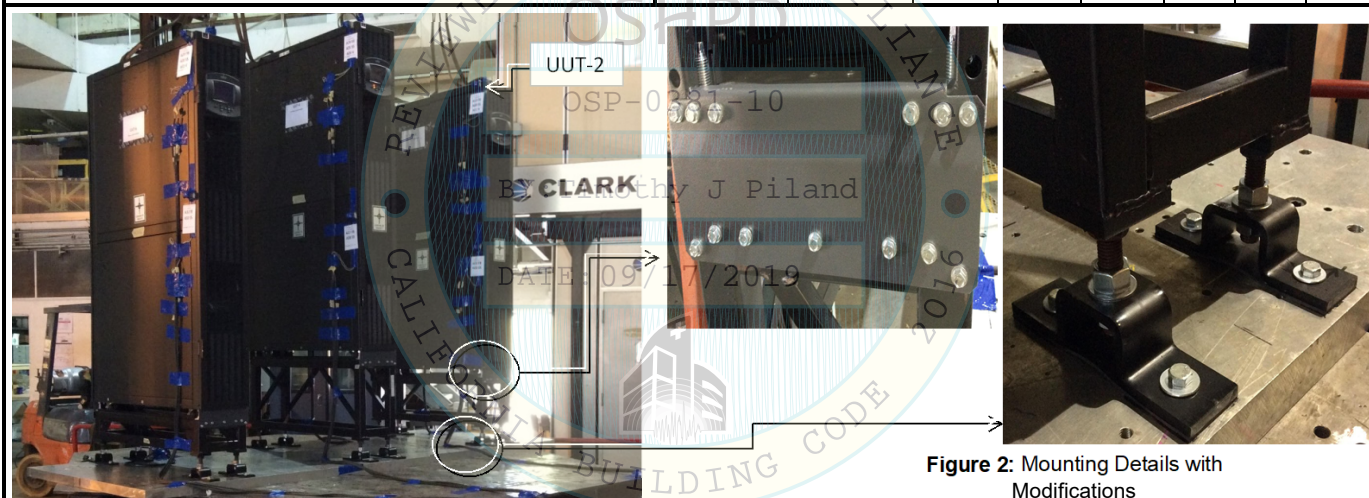


Figure 2: Unit on the shake table

Figure 2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-2 Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (200-277V 1 phase)	315021P2	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	3 Row Tube & Fin Coil	315051G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR019RA13 460V	315033G3	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	30 Amp 65KA SCCR	303397P1	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Display	ICOM Control CRV300	314979G2	Vertiv Corporation	Electrical parts and plastic
Compressor	Scroll ZPD72KCE-TFD	315631P2	Copeland	Shell is painted cold rolled carbon steel
Condensate Pump	1/10 HP 266VAC	319860G3	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Thermal Expansion Valve	6 Ton Expansion Valve	315077P1	Emerson Climate Tech	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV8 Filter	315029P1	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 8 media & metal mesh backing
Electrical Panel Transformer	200VA 460-600 Volt X 24 Volt 60 Hz.	136201P3	Emerson (Emermex)	Carbon Steel laminations and copper windings
Electrical Panel Transformer	45VA 24Volt X 22 Volt	180792P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

UUT-3B Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 14-1292
 Testing Unit Num: 3B

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction	Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR019RW1Y41734 (CR019RW1Y40D0A74P060PA1734)	19	Rigid Base Mounted	X Front - Back Y Side - Side Z Vertical	17.8 5.3 >33.3	43	11 7/8	78 3/4	548

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight within 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Seismic kits (part # 317816G0), consisting of seismic plates & angle brackets were installed on each end of the unit. The plates of the kit were attached with four (4)-1/4"Ø self tapping screws. The angles of the kit attached with six (6)-1/4"Ø self tapping and anchored to the shake table with four(4) 1/2" diameter Grade 8 bolts per bracket.	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00	1.0	3.20g	2.40g	1.68g	0.68g



Figure 3B.1: Unit on the shake table



Figure 3B.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-3B Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (200-277V 1 phase)	315021P2	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	3 Row Tube & Fin Coil	315051G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR019RW1Y 208-230V	315033G2	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	60 Amp 65KA SCCR	303397P2	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Display	ICOM Control CRV300	314979G2	Vertiv Corporation	Electrical parts and plastic
Compressor	Scroll ZPD120KCE-TF5	315631P2	Copeland	Shell is painted cold rolled carbon steel
CP - Heat Exchanger	Condenser PL B80X26 UL	257382P2	Swep	All 316 stainless steel HX with copper Braze
Condensate Pump (CP)	1/10 HP 208VAC	319860G3	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Thermal Expansion Valve	6 Ton Expansion Valve	315077P1	Emerson Climate Tech.	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV8 Filter	315029P1	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 8 media & metal mesh backing
Electrical Panel Transformer	200VA 208-230 Volt X 24 Volt 60 Hz.	136201P3	Emerson (Emermex)	Carbon Steel laminations and copper windings
Electrical Panel Transformer	45VA 24Volt X 22 Volt	180792P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Heat rejection control valve	3 way globe valve	257271P1	Siemens	Electrical parts and plastic
Actuator	Actuator 24V 0-10V	257371P1	Siemens	Electrical parts and plastic
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

UUT-3C Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 14-1292
 Testing Unit Num: 3C

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction	Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR019RW1Y41734 (CR019RW1Y40D0A73P060PA1734)	19	Rigid Base Mounted	X	Front - Back	17.1	43	11 7/8	78 3/4
			Y	Side - Side	4.2			
			Z	Vertical	>33.3			
								548

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight within 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method	Carbon steel angles (part # 317816G2) were installed on each end of the unit with (6) 1/4"Ø self tapping screws and anchored to the shake table with (4) -½"Ø Grade 8 bolts (8 per bracket).	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	0.80	1.0	1.28g	0.96g	0.54g	0.22g

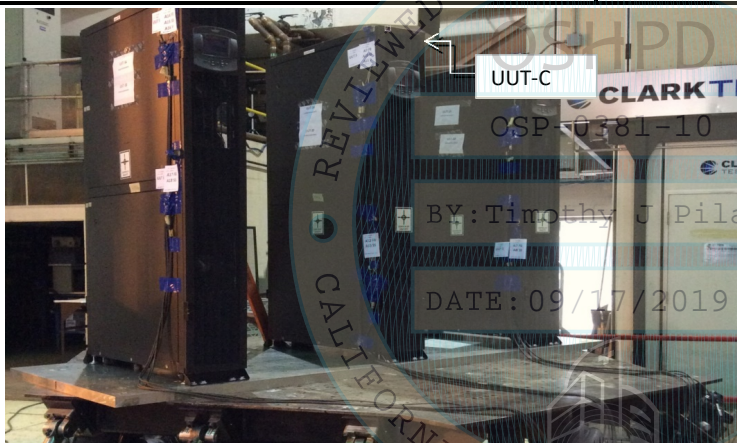


Figure 3C.1: Unit on the shake table



Figure 3C.2: Mounting Details

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-3C Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (200-277V 1 phase)	315021P2	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	3 Row Tube & Fin Coil	315051G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR019RW1Y 208-230V	315033G2	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	60 Amp 65KA SCCR	303397P2	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Display	ICOM Control CRV300	314979G2	Vertiv Corporation	Electrical parts and plastic
Compressor	Scroll ZPD120KCE-TF5	315631P2	Copeland	Shell is painted cold rolled carbon steel
CP - Heat Exchanger	Condenser PL B80X26 UL	257382P2	Swep	All 316 stainless steel HX with copper Braze
Condensate Pump (CP)	1/10 HP 208VAC	319860G3	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Thermal Expansion Valve	6 Ton Expansion Valve	315077P1	Emerson Climate Tech	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV8 Filter	315029P1	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 8 media & metal mesh backing
Electrical Panel Transformer	200VA 208-230 Volt X 24 Volt 60 Hz.	136201P3	Emerson (Emermex)	Carbon Steel laminations and copper windings
Electrical Panel Transformer	45VA 24Volt X 22 Volt	180792P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Heat rejection control valve	3 way globe valve	257271P1	Siemens	Electrical parts and plastic
Actuator	Actuator 24V 0-10V	257371P1	Siemens	Electrical parts and plastic
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

UUT-4 Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 14-1292
 Testing Unit Num: 4

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction	Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR019RW1Y41734 (CR019RW1Y40D0A74P060PA1734)	19	Rigid on 24" Floor Stand	X Front - Back Y Side - Side Z Vertical	24.0 5.0 >33.3	43	11 7/8	78 3/4	547

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight within 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Holdown brackets (part # 317816G4) were installed on the front and back of the unit with (14) 1/4"Ø self tapping screws (each bracket) attaching the unit to the floor stand.	Seismic Parameters							
	The floor stand is anchored to the shake table with (2) -1/2" diameter Grade 8 bolts per bracket (8 total).	Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00 2.50	1.0 0.0	3.20g	2.40g	1.68g	0.68g

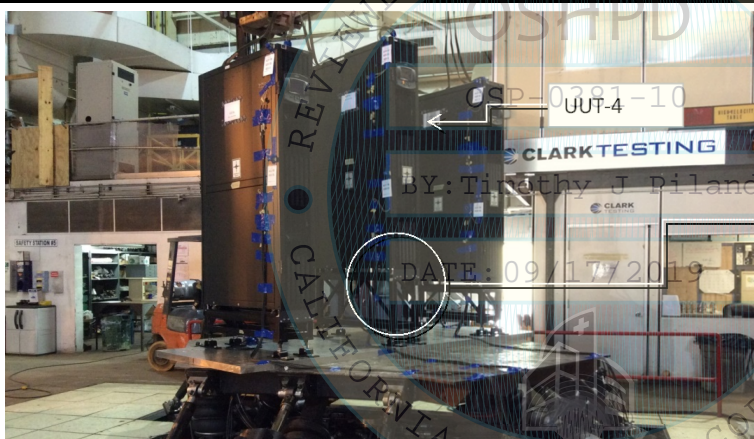


Figure 4.1: Unit on the shake table



Figure 4.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-4 Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (200-277V 1 phase)	315021P2	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	3 Row Tube & Fin Coil	315051G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR019RW1Y 208-230V	315033G2	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	60 Amp 65KA SCCR	303397P2	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body, and copper contacts
Display	ICOM Control CRV300	314979G2	Vertiv Corporation	Electrical parts and plastic
Compressor	Scroll ZPD120KCE-TF5	315631P2	Copeland	Shell is painted cold rolled carbon steel
CP - Heat Exchanger	Condenser PL B80X26 UL	257382P2	Swep	All 316 stainless steel HX with copper Braze
Condensate Pump (CP)	1/10 HP 208VAC	319860G3	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Thermal Expansion Valve	6 Ton Expansion Valve	315077P1	Emerson Climate Tech.	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV8 Filter	315029P1	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 8 media & metal mesh backing
Electrical Panel Transformer	200VA 208-230 Volt X 24 Volt 60 Hz.	136201P3	Emerson (Emermex)	Carbon Steel laminations and copper windings
Electrical Panel Transformer	45VA 24Volt X 22 Volt	180792P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Heat rejection control valve	3 way globe valve	257271P1	Siemens	Electrical parts and plastic
Actuator	Actuator 24V 0-10V	257371P1	Siemens	Electrical parts and plastic
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

UUT-5B Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 14-1292
 Testing Unit Num: 5B

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction	Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR032RC1K3L598 (CR032RC1K30D0CH45060PA598)	32	Rigid Base Mounted	X	Front - Back	43	11 7/8	78 3/4	438
			Y	Side - Side				
			Z	Vertical				

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight is approximately 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Seismic kits (part # 317816G0), consisting of seismic plates & angle brackets were installed on each end of the unit. The plates of the kit were attached with four (4)-1/4"Ø self tapping screws. The angles of the kit attached with six (6)-1/4"Ø self tapping and anchored to the shake table with 1/2" diameter Grade 8 bolts per bracket.	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00 2.50	1.0 0.0	3.20g	2.40g	1.68g	0.68g

UUT-5B

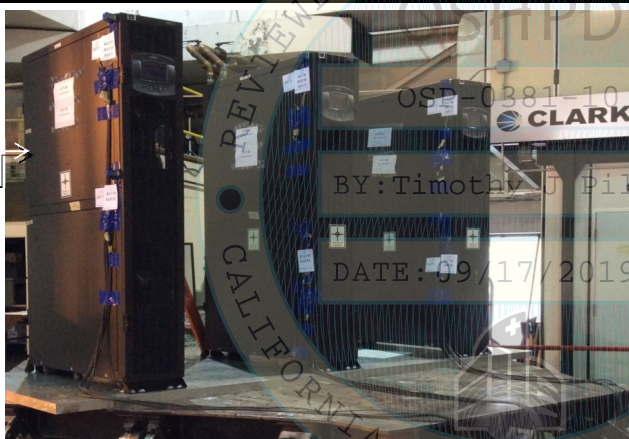


Figure 5B.1: Unit on the shake table



Figure 5B.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-35 Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (200-277V 1 phase)	315021P3	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	3 Row Tube & Fin Coil	316672G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR032RC1K 120V	315033G8	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	5KA	300308P2	ABB & Socomec (1)	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Display	ICOM Control CRV300	314979G2	Vertiv Corporation	Electrical parts and plastic
Condensate Pump	1/10 HP 120VAC	319860G2	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Air Filter	MERV1 Filter	155419P4	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 81 media & metal mesh backing
Electrical Panel Transformer	200VA 120 Volt X 24 Volt 60 Hz.	317839P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Electrical Panel Transformer	45VA 24Volt X 22 Volt	180792P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
3 Way Valve / Actuator	Motorized 3 Way 24VAC	185661P13	Belimo	Stainless steel valve. Electrical parts and plastic actuator
2 Way Valve / Actuator	Motorized 2 Way 24VAC	185660P13	Belimo	Stainless steel valve. Electrical parts and plastic actuator
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

1. UUT-5B has both PN 320064P1 disconnect sources (ABB and Mersen) installed within the unit disconnect enclosure.

UUT-5C Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 14-1292
 Testing Unit Num: 5C

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction	Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR032RC1K3L598 (CR032RC1K30D0CH35060PA598)	32	Rigid Base Mounted	X	Front - Back	17.1	43	11 7/8	78 3/4
			Y	Side - Side	4.2			
			Z	Vertical	>33.3			
								438

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight is approximately 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method	Carbon steel angles (part # 317816G2) were installed on each end of the unit with (6) 1/4"Ø self tapping screws and anchored to the shake table with (4) -½"Ø Grade 8 bolts (8 per bracket).	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	0.80	1.0	1.28g	0.96g	0.54g	0.22g

UUT-5C



Figure 5C.1: Unit on the shake table



Figure 5C.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-5C Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (200-277V 1 phase)	315021P3	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	3 Row Tube & Fin Coil	316672G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR032RC1K 120V	315033G8	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	5KA	300308P2	ABB & Socomec (1)	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Display	ICOM Control CRV300	314979G2	Vertiv Corporation	Electrical parts and plastic
Condensate Pump	1/10 HP 120VAC	319860G2	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Air Filter	MERV1 Filter	155419P4	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 81 media & metal mesh backing
Electrical Panel Transformer	200VA 120 Volt X 24 Volt 60 Hz.	317839P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Electrical Panel Transformer	45VA 24Volt X 22 Volt	180792P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
3 Way Valve / Actuator	Motorized 3 Way 24VAC	185661P13	Belimo	Stainless steel valve. Electrical parts and plastic actuator
2 Way Valve / Actuator	Motorized 2 Way 24VAC	185660P13	Belimo	Stainless steel valve. Electrical parts and plastic actuator
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

1. UUT-5C has both PN 320064P1 disconnect sources (ABB and Mersen) installed within the unit disconnect enclosure.

UUT-6 Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 14-1292
 Testing Unit Num: 6

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction		Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR032RC1K3L598 (CR032RC1K30D0CH45060PA598)	32	Rigid on 12" Floor Stand	X	Front - Back	24.0	43	11 7/8	78 3/4	435
			Y	Side - Side	5.0				
			Z	Vertical	>33.3				

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight is approximately 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Holdown brackets (part # 317816G4) were installed on the front and back of the unit with (14) 1/4"Ø self tapping screws (each bracket) attaching the unit to the floorstand. The floor stand is anchored to the shake table with (2) -1/2" diameter Grade 8 bolts per bracket (8 total).	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00 2.50	1.0 0.0	3.20g	2.40g	1.68g	0.68g

UUT-6

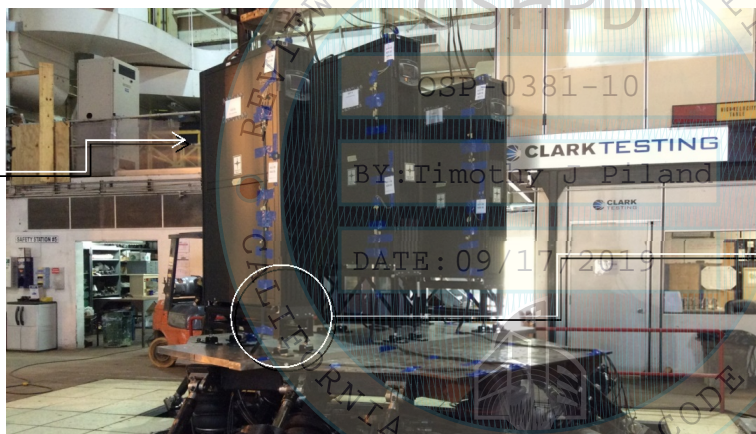


Figure 6.1: Unit on the shake table



Figure 6.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-6 Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (200-277V 1 phase)	315021P3	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	3 Row Tube & Fin Coil	316672G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR032RC1K 120V	315033G8	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	5KA	300308P2	ABB & Socomec (1)	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Display	ICOM Control CRV300	314979G2	Vertiv Corporation	Electrical parts and plastic
Condensate Pump	1/10 HP 120VAC	319860G2	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Air Filter	MERV1 Filter	155419P4	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 81 media & metal mesh backing
Electrical Panel Transformer	200VA 120 Volt X 24 Volt 60 Hz.	317839P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Electrical Panel Transformer	45VA 24Volt X 22 Volt	180792P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
3 Way Valve / Actuator	Motorized 3 Way 24VAC	185661P13	Belimo	Stainless steel valve. Electrical parts and plastic actuator
2 Way Valve / Actuator	Motorized 2 Way 24VAC	185660P13	Belimo	Stainless steel valve. Electrical parts and plastic actuator
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

1. UUT-6 has both PN 320064P1 disconnect sources (ABB and Mersen) installed within the unit disconnect enclosure.

UUT-7B Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 2672-R
 Testing Unit Num: 1

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction		Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR020RW1C7SD1871P (CR020RW1C7SD1874P060PA-----)	20	Rigid Base Mounted	X	Front - Back	10.6	46.25	22.63	78.75	834
			Y	Side - Side	7.9				
			Z	Vertical	>33.3				

* Frequencies are for units prior to ICC ES AC-156 testing.
 Unit length, width, height and operating weight within 10% of those listed in Table 1.
 Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Seismic kits (part # 317816G0) was attached to unit with eight (8) 1/4"Ø self tapping screws on each end of the unit. Each bracket was attached to table with three (3) 1/2"-13 Grade 5 bolts (6 bolts per unit). Cross brace (PN 313743G1), shown below was installed	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00 2.50	1.0 0.0	3.20 g	2.40 g	1.68 g	0.68 g

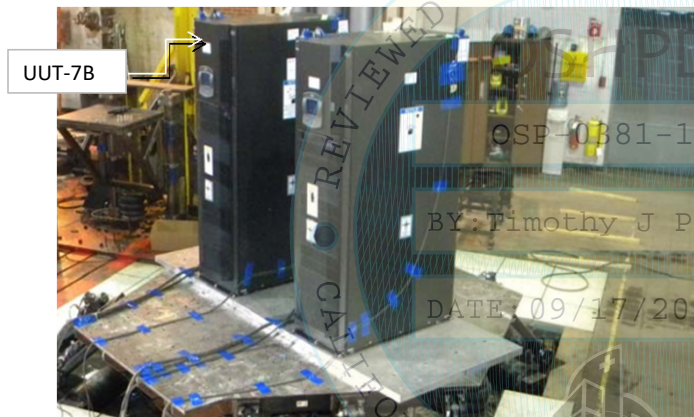


Figure 7B.1: Unit on the shake table



Figure 7B.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-7B Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (208VAC)	191881P1	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	4 Row Tube & Fin Coil	197515G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR020 208V	191986G1	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	60 Amp 65KA SCCR	303397P2	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Disconnect	100 Amp 65KA SCCR	303399P3	Socomec	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Compressor	Scroll ZPD72KCE-TF5	257220P1	Copeland	Shell is painted cold rolled carbon steel
Condensate Pump	1/3 HP Pump condensate 208VAC	1A19271P1	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Condensate Plate Heat Exch	B80X26 UL	257382P2	Swep	All stainless steel 316 HX with copper Braze
Humidifier	208V	257521P3	Nortec	Electrical parts, carbon steel sheetmetal and plastic
Reheat Assembly	Heaters 6 KW 208V	257604G13	Vertiv Corporation	Galvanized steel (mtg PLs), nickel plated steel (mtg nuts), stainless steel (electrical connections) & silicone rubber (insulating terminals).
Thermal Expansion Valve	6 Ton Expansion Valve	257261P2	Sporlan Valve	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV8 Filter	196968P1	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 8 media & metal mesh backing
Electrical Panel Transformer	300VA 460-600 Volt X 24 Volt 60 Hz.	136202P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Refrigerant Receiver	Receiver 6" X14"	300842P1	Westermeyer	Carbon Steel shell attached to unit base pan
Heat Rejection Control Valve	3 way globe valve	257271P1	Siemens	Electrical parts and plastic
Actuator	Actuator 24V 0-10V	257371P1	Siemens	Electrical parts and plastic
Transformer	1.5KVA 240-480/120-240	1C23973P1	ACME	Carbon Steel and Copper
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

UUT-7C Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 2672-R
 Testing Unit Num: 1

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction		Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR020RW1C7SD1871P (CR020RW1C7SD1873P060PA----	20	Rigid Base Mounted	X	Front - Back	11.0	46.25	22.63	78.75	834
			Y	Side - Side	4.2				
			Z	Vertical	>33.3				

* Frequencies are for units prior to ICC ES AC-156 testing.
 Unit length, width, height and operating weight within 10% of those listed in Table 1.
 Model Number in parenthesis is full model number based on current nomenclature

Attachment Method	Carbon steel angles (part # 317816G0) were installed on each end of the unit eight (8) 1/4"Ø self tapping screws and anchored to the shake table with (3)-1/2" diameter Grade 5 bolts per bracket.	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	0.80	1.0	1.28g	0.96g	0.54g	0.22g

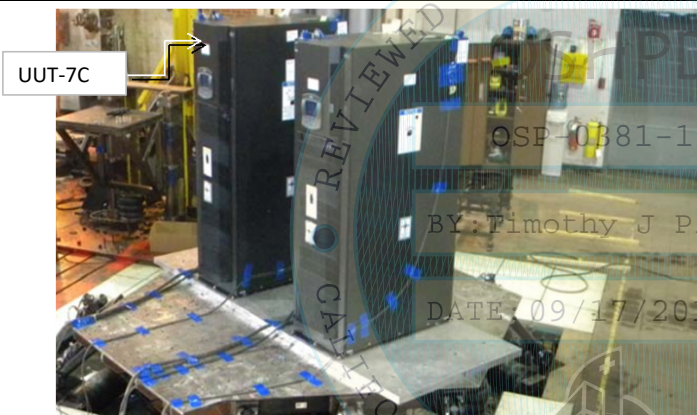


Figure 7C.1: Unit on the shake table

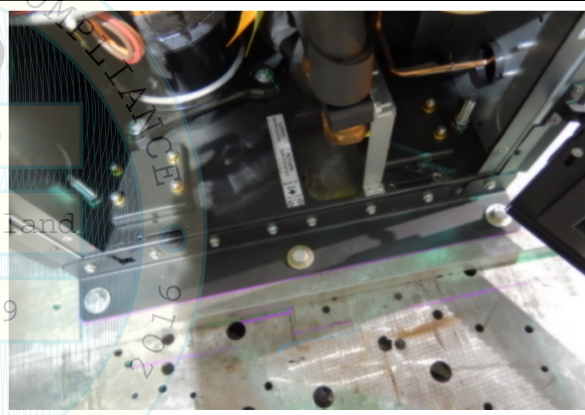


Figure 7C.2: Mounting Details

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-7C Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (208VAC)	191881P1	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	4 Row Tube & Fin Coil	197515G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR020 208V	191986G1	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect	60 Amp 65KA SCCR	303397P2	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Disconnect	100 Amp 65KA SCCR	303399P3	Socomec	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Compressor	Scroll ZPD72KCE-TF5	257220P1	Copeland	Shell is painted cold rolled carbon steel
Condensate Pump	1/3 HP Pump condensate 208VAC	1A19271P1	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Condensate Plate Heat Exch	B80X26 UL	257382P2	Swep	All stainless steel 316 HX with copper Braze
Humidifier	208V	257521P3	Nortec	Electrical parts, carbon steel sheetmetal and plastic
Reheat Assembly	Heaters 6 KW 208V	257604G13	Vertiv Corporation	Galvanized steel (mtg PLs), nickel plated steel (mtg nuts), stainless steel (electrical connections) & silicone rubber (insulating terminals).
Thermal Expansion Valve	6 Ton Expansion Valve	257261P2	Sporlan Valve	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV8 Filter	196968P1	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 8 media & metal mesh backing
Electrical Panel Transformer	300VA 460-600 Volt X 24 Volt 60 Hz.	136202P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Refrigerant Receiver	Receiver 6" X14"	300842P1	Westermeyer	Carbon Steel shell attached to unit base pan
Heat Rejection Control Valve	3 way globe valve	257271P1	Siemens	Electrical parts and plastic
Actuator	Actuator 24V 0-10V	257371P1	Siemens	Electrical parts and plastic
Transformer	1.5KVA 240-480/120-240	1C23973P1	ACME	Carbon Steel and Copper
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

UUT-8B Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 2672-R
 Testing Unit Num: 2

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction		Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR035RW1A7SD1971P (CR035RW1A7SD1974P060PA---	35	Rigid Base Mounted	X	Front - Back	10.2	46.25	22.63	78.75	938
			Y	Side - Side	6.6				
			Z	Vertical	>33.3				

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight within 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Seismic kits (part # 317816G0) was attached to unit with eight (8) 1/4"Ø self tapping screws on each end of the unit. Each bracket was attached to table with three (3) 1/2"-13 Grade 5 bolts (6 bolts per unit). Cross brace (PN 313743G1), shown below was installed	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00 2.50	1.0 0.0	3.20g	2.40g	1.68g	0.68 g

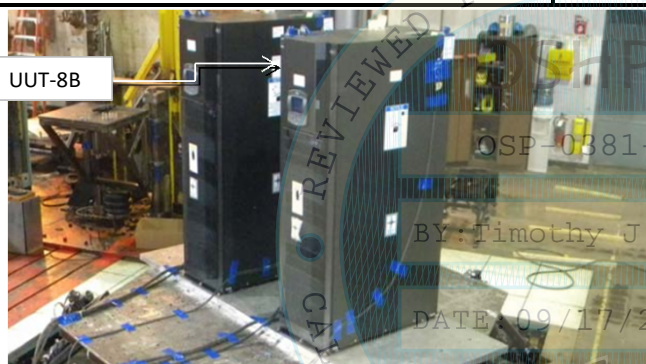


Figure 8B.1: Unit on the shake table



Figure 8B.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-8B Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (460VAC)	257240P1	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	6 Row Tube & Fin Coil	197542G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR035 460V	191986G4	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect (1)	60 Amp 65KA SCCR	303397P2	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Disconnect (1)	30 Amp 65KA SCCR	303399P3	Socomec	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Compressor	Scroll ZPD120KCE-TFD	257223P2	Copeland	Shell is painted cold rolled carbon steel
Condensate Pump	1/3 HP Pump condensate 460VAC	1A19271P2	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Condensate Plate Heat Exch	B80X42 UL	257382P2	Swep	All stainless steel 316 HX with copper Braze
Humidifier	460V	257521P2	Nortec	Electrical parts, carbon steel sheetmetal and plastic
Reheat Assembly	Heaters 6 KW 460V	257604G14	Vertiv Corporation	Galvanized steel (mtg PLs), nickel plated steel (mtg nuts), stainless steel (electrical connections) & silicone rubber (insulating terminals).
Thermal Expansion Valve	6 Ton Expansion Valve	257261P1	Sporlan Valve	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV11 Filter	196968P2	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 11 media & metal mesh backing
Electrical Panel Transformer	300VA 460-600 Volt X 24 Volt 60 Hz.	136202P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Refrigerant Receiver	Receiver 6" X14"	300842P1	Westermeyer	Carbon Steel shell attached to unit base pan
Heat Rejection Control Valve	3 way globe valve	257271P1	Siemens	Electrical parts and plastic
Actuator	Actuator 24V 0-10V	257371P1	Siemens	Electrical parts and plastic
Transformer (2)	1.5KVA 240-480/120-240	1C23973P1	ACME	Carbon Steel and Copper
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

(1) UUT-8B includes PN 303397P2 as normally wired and installed. PN 303399P3 was installed behind wired to voltage but not to load.

(2) PN 1C23973P1 will be mounted in same place as designed. The primary side will be wired and the secondary side will not since there is no 230V fan load.

UUT-8C Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 2672-R
 Testing Unit Num: 2

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction		Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR035RW1A7SD1971P (CR035RW1A7SD1973P060PA---)	35	Rigid Base Mounted	X	Front - Back	10.5	46.25	22.63	78.75	938
			Y	Side - Side	4.0				
			Z	Vertical	>33.3				

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight within 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method	Seismic Parameters
Carbon steel angles (part # 317816G0) were installed on each end of the unit with eight (8) 1/4"Ø self tapping screws and anchored to the shake table with three (3)-1/2"Ø Grade 5 bolts per bracket.	Building Code
	Test Criteria
	S _{DS} (g)
	z/h
	Horizontal
	Vertical
	A _{FLX-H}
	A _{RIG-H}
	A _{FLX-V}
	A _{RIG-V}
	CBC 2016
	AC 156
	0.80
	1.0
	1.28 g
	0.96 g
	0.54 g
	0.22 g

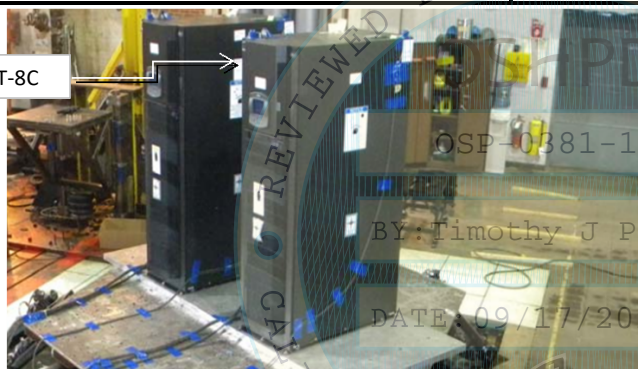


Figure 8C.1: Unit on the shake table

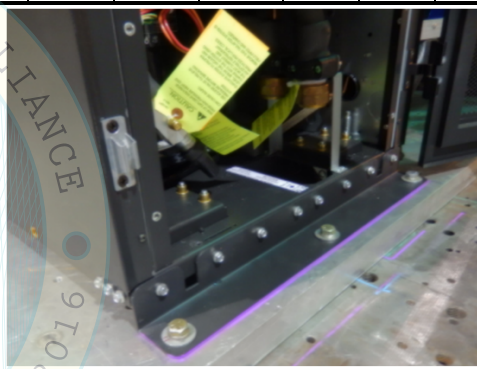


Figure 8C.2: Mounting Details

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-8C Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (460VAC)	257240P1	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	6 Row Tube & Fin Coil	197542G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR035 460V	191986G4	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect (1)	60 Amp 65KA SCCR	303397P2	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Disconnect (1)	30 Amp 65KA SCCR	303399P3	Socomec	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Compressor	Scroll ZPD120KCE-TFD	257223P2	Copeland	Shell is painted cold rolled carbon steel
Condensate Pump	1/3 HP Pump condensate 460VAC	1A19271P2	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Condensate Plate Heat Exch	B80X42 UL	257382P2	Swep	All stainless steel 316 HX with copper Braze
Humidifier	460V	257521P2	Nortec	Electrical parts, carbon steel sheetmetal and plastic
Reheat Assembly	Heaters 6 KW 460V	257604G14	Vertiv Corporation	Galvanized steel (mtg PLs), nickel plated steel (mtg nuts), stainless steel (electrical connections) & silicone rubber (insulating terminals).
Thermal Expansion Valve	6 Ton Expansion Valve	257261P1	Sporlan Valve	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV11 Filter	196968P2	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 11 media & metal mesh backing
Electrical Panel Transformer	300VA 460-600 Volt X 24 Volt 60 Hz.	136202P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Refrigerant Receiver	Receiver 6" X14"	300842P1	Westermeyer	Carbon Steel shell attached to unit base pan
Heat Rejection Control Valve	3 way globe valve	257271P1	Siemens	Electrical parts and plastic
Actuator	Actuator 24V 0-10V	257371P1	Siemens	Electrical parts and plastic
Transformer (2)	1.5KVA 240-480/120-240	1C23973P1	ACME	Carbon Steel and Copper
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

(1) UUT-8C includes PN 303397P2 as normally wired and installed. PN 303399P3 was installed behind wired to voltage but not to load.

(2) PN 1C23973P1 will be mounted in same place as designed. The primary side will be wired and the secondary side will not since there is no 230V fan load.

UUT-9 Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 2672-R
 Testing Unit Num: 3

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction		Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR020RW1C7SD1871P (CR020RW1C7SD1874P060PA----	20	Rigid to 12" Floor Stand	X	Front - Back	16.3	46.25	22.63	78.75	834
			Y	Side - Side	6.6				
			Z	Vertical	12.0				

* Frequencies are for units prior to ICC ES AC-156 testing.
 Unit length, width, height and operating weight within 10% of those listed in Table 1.
 Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Holdown brackets (part # 319314G4) were installed on the front & back of unit with ten (10)-1/4"Ø self tapping screws (each bracket). The floor stand is anchored to the shake table with two (2) 1/2" Grade 5 bolts per bracket (8 total). Cross brace (see UUT-7B) was installed.	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00 2.50	1.0 0.0	3.2 g	2.4 g	1.68 g	0.68 g

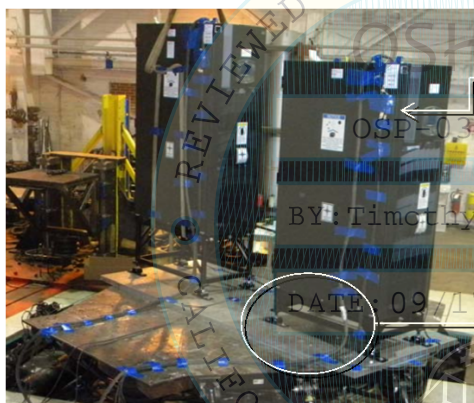


Figure 9.1: Unit on the shake table

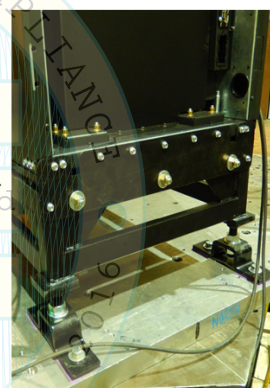


Figure 9.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-9 Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (208VAC)	191881P1	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	4 Row Tube & Fin Coil	197515G1	Vertiv Corporation	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Electrical Panel Assembly	CR020 208V	191986G1	Vertiv Corporation	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Disconnect	60 Amp 65KA SCCR	303397P2	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Disconnect	100 Amp 65KA SCCR	303399P3	Socomec	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Compressor	Scroll ZPD72KCE-TF5	257220P1	Copeland	Shell is painted cold rolled carbon steel
Condensate Pump	1/3 HP Pump condensate 208VAC	1A19271P1	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Condensate Plate Heat Exchanger	B80X26 UL	257382P2	Swep	All stainless steel 316 HX with copper Braze
Humidifier	208V	257521P3	Nortec	Electrical parts, carbon steel sheetmetal and plastic
Reheat Assembly	Heaters 6 KW 208V	257604G13	Vertiv Corporation	Galvanized steel (mtg PLs), nickel plated steel (mtg nuts), stainless steel (electrical connections) & silicone rubber (insulating terminals).
Thermal Expansion Valve	6 Ton Expansion Valve	257261P2	Sporlan Valve	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV8 Filter	196968P1	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 8 media & metal mesh backing
Electrical Panel Transformer	300VA 460-600 Volt X 24 Volt 60 Hz.	136202P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Refrigerant Receiver	Receiver 6" X14"	300842P1	Westermeyer	Carbon Steel shell attached to unit base pan
Heat Rejection Control Valve	3 way globe valve	257271P1	Siemens	Electrical parts and plastic
Actuator	Actuator 24V 0-10V	257371P1	Siemens	Electrical parts and plastic
Transformer	1.5KVA 240-480/120-240	1C23973P1	ACME	Carbon Steel and Copper
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

UUT-10 Test Summary

Testing Lab: Clark Testing Lab
 Testing Report: JID 2672-R
 Testing Unit Num: 4

Model Number	Nominal Capacity (kW)	Mounting	Excitation Direction		Frequency * (Hz)	Length (in)	Width (in)	Height (in)	Tested Operating Weight (lbs)
CR035RW1A7SD1971P (CR035RW1A7SD1974P060PA---)	35	Rigid to 24" Floor Stand	X	Front - Back	15.0	46.25	22.63	78.75	938
			Y	Side - Side	5.4				
			Z	Vertical	>33.3				

* Frequencies are for units prior to ICC ES AC-156 testing.

Unit length, width, height and operating weight within 10% of those listed in Table 1.

Model Number in parenthesis is full model number based on current nomenclature

Attachment Method with Seismic Modifications	Holdown brackets (part # 319314G4) were installed on the front & back of unit with ten (10) 1/4"Ø self tapping screws (each bracket). The floor stand is anchored to the shake table with two (2) 1/2" Grade 5 bolts per bracket (8 total). Cross brace (see UUT-8B) was installed.	Seismic Parameters							
		Building Code	Test Criteria	S _{DS} (g)	z/h	Horizontal		Vertical	
						A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
		CBC 2016	AC 156	2.00 2.50	1.0 0.0	3.20g	2.40 g	1.68 g	0.68 g

UUT-10

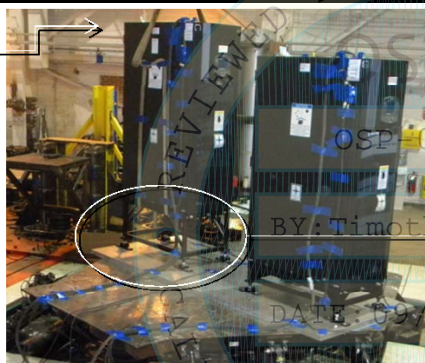


Figure 10.1: Unit on the shake table

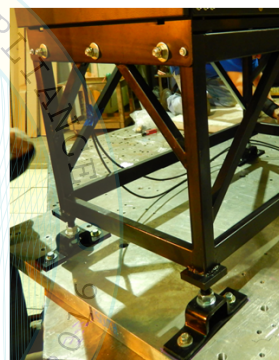


Figure 10.2: Mounting Details with Modifications

Notes: The UUTs were full of contents (refrigerant & water) during the test.
 The structural integrity of the component attachment and force-resisting systems was maintained.
 After the test, the UUT was functional and operated within the manufacturer operational limits

UUT-10 Summary Tested Sub-Component

Sub-Component	Description	PN	Manufacturer	Material
Cooling Fan	EC (460VAC)	257240P1	EBM	Aluminum blades. Carbon Steel & Copper Motor
Cooling Coil Assembly	6 Row Tube & Fin Coil	197542G1	Vertiv Corporation	Aluminum fin, Copper Tube, Galv. Tube sheets
Electrical Panel Assembly	CR035 460V	191986G4	Vertiv Corporation	Galvanized G90 Steel panel
Disconnect (1)	60 Amp 65KA SCCR	303397P2	Allen Bradley	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Disconnect (1)	30 Amp 65KA SCCR	303399P3	Socomec	Aluminum shaft, plated carbon steel/plastic body and copper contacts
Compressor	Scroll ZPD120KCE-TFD	257223P2	Copeland	Shell is painted cold rolled carbon steel
Condensate Pump	1/3 HP Pump condensate 460VAC	1A19271P2	Hartell	Carbon Steel (motor), copper (motor windings), plastic (pump housing and impeller) and brass (piping connections).
Condensate Plate Heat Exch	B80X42 UL	257382P2	Swep	All stainless steel 316 HX with copper Braze
Humidifier	460V	257521P2	Nortec	Electrical parts, carbon steel sheetmetal and plastic
Reheat Assembly	Heaters 6 KW 460V	257604G14	Vertiv Corporation	Galvanized steel (mtg PLs), nickel plated steel (mtg nuts), stainless steel (electrical connections) & silicone rubber (insulating terminals).
Thermal Expansion Valve	6 Ton Expansion Valve	257261P1	Sporlan Valve	Brass (body), copper (piping) and stainless steel (internals).
Air Filter	MERV11 Filter	196968P2	Koch Filter Corp.	Beverage board frame, pleated polypropylene blend MERV 11 media & metal mesh backing
Electrical Panel Transformer	300VA 460-600 Volt X 24 Volt 60 Hz.	136202P1	Emerson (Emermex)	Carbon Steel laminations and copper windings
Refrigerant Receiver	Receiver 6" X14"	300842P1	Westermeyer	Carbon Steel shell attached to unit base pan
Heat Rejection Control Valve	3 way globe valve	257271P1	Siemens	Electrical parts and plastic
Actuator	Actuator 24V 0-10V	257371P1	Siemens	Electrical parts and plastic
Transformer (2)	1.5KVA 240-480/120-240	1C23973P1	ACME	Carbon Steel and Copper
Communication Card	1-WEBL card	191944G3	Vertiv Corporation	Plastic, solder, semiconductors

(1) UUT-10 includes PN 303397P2 as normally wired and installed. PN 303399P3 was installed behind wired to voltage but not to load.

(2) PN 1C23973P1 will be mounted in same place as designed. The primary side will be wired and the secondary side will not since there is no 230V fan load.