



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0026

OSHPD Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Carrier Corporation

Manufacturer's Technical Representative: Anthony Molavi

Mailing Address: 9701 Old Statesville Road, Charlotte, NC 28269

Telephone: (704) 921-3976

Email: Anthony.Molavi@Carrier.com

Product Information

Product Name: Chillers

Product Type: Condensers

Product Model Number: 19XR and 19XRV Heat Exchanger Frame 2, 3, 4, 5, 6, 7, 8, AA, AB, BC, CC, CD (200 to 3000 tons)

General Description: High efficiency hermetic centrifugal chillers (single and dual stage compressors).

Mounting Description: Rigid, Floor Mounted

Tested Seismic Enhancements: None

Applicant Information

Applicant Company Name: Buehler

Contact Person: Gillian Montgomery

Mailing Address: 600 Q Street, Sacramento, CA 95811

Telephone: (916) 443-0303

Email: gmontgomery@buehlerengineering.com

Title: Senior Associate



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

Company Name: BUEHLER

Name: Scott Hooker

California License Number: S3937

Mailing Address: 600 Q St., Suite 200, Sacramento, CA 95811

Telephone: (916) 443-0303

Email: shooker@bbse.com

Certification Method

☐ GR-63-Core

☒ ICC-ES AC156

☐ IEEE 344

☐ IEEE 693

☐ NEBS 3

☐ Other (Please Specify): _____

Testing Laboratory

Company Name: U.S. ARMY ENGINEER RESEARCH AND DEVELOPMENT CENTER, CONSTRUCTION ENGINEERING
RESEARCH LABORATORY (CERL)

Contact Person: James Wilcoski

Mailing Address: 2902 Newmark Dr., Champaign IL 61822-1076

Telephone: (217) 373-6763

Email: James.Wilcoski@usace.army.mil

Company Name: UNIVERSITY OF BUFFALO (SEESL)

Contact Person: Mark Pitman

Mailing Address: 212 Ketter Hall, Buffalo NY 14260

Telephone: (716) 645-4377

Email: mpitman@buffalo.edu



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Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 1.51 at $z/h = 1.0$ & 1.09 at $z/h = 0.0$ for Frames 2 thru 8; 1.18 at $z/h = 1.0$ & 1.19 at $z/h = 0.0$ for Frames AA thru CD

SDS (Design spectral response acceleration at short period, g) = 2.10 at $z/h = 1.0$ & 2.42 at $z/h = 0.0$ for Frames 2 thru 8; 1.64 at $z/h = 1.0$ & 2.64 at $z/h = 0.0$ for Frames AA thru CD

a_p (Amplification factor) = 1.0

R_p (Response modification factor) = 2.5

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

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

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

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

Date: 8/24/2021

Name: Mohammad Karim

BY: Mohammad Karim

Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: SDS (g) = See Above 8/24/2021

z/h = See Above

Condition of Approval (if applicable):



Special Seismic Certification
OSHPD Preapproval (OSP-0026)
Carrier XR/XRV Product Line



Table 1. Certified Product List

Frame	Evaporator Size	Cooler or Condenser Size	Capacity Range (tons)	Tested/ Interpolated	Length (ft-in)	Width (ft-in)	Height (ft-in)	Operating Weight (lbs)
2	22	22	299	UUT-3	14' - 1 1/4"	6' - 1 1/16"	6' - 3 1/4"	15,209
	20-22	20-22	200-300	Interpolated	14' - 1 1/4"	6' - 1 1/16"	6' - 3 1/4"	15,281
3	30-32	30-32	200-500	Interpolated	16' - 4 3/4"	6' - 1 1/16"	6' - 9 5/8"	24,582
	35-37	35-37	200-500	Interpolated	18' - 1 1/4"	6' - 1 1/16"	6' - 9 5/8"	26,092
4	40-42	40-42	300-550	Interpolated	16' - 4 3/4"	6' - 3 1/4"	7' - 0 3/4"	29,772
	45-47	45-47	300-600	Interpolated	18' - 1 1/4"	6' - 3 1/4"	7' - 0 3/4"	31,872
5	50-54	50-54	300-650	Interpolated	16' - 8 1/2"	6' - 8 7/8"	7' - 2 3/8"	36,305
	5A-5C	5A-5C						
	5K-5R	5K-5R						
	55-59	55-59	300-800	Interpolated	18' - 5"	6' - 8 7/8"	7' - 2 3/8"	38,033
	5F-5H	5F-5H						
	5T-5Z	5T-5Z						
6	60-64	60-64	600-650	Interpolated	16' - 8 3/4"	6' - 11 3/4"	7' - 4 3/8"	38,805
	6K-6R	6K-6R						
	65-69	65-69	600-800	Interpolated	18' - 5 1/4"	6' - 11 3/4"	7' - 4 3/8"	40,910
	6T-6Z	6T-6Z						
7	70-74	70-74	600-1200	Interpolated	19' - 9 3/4"	9' - 6 3/8"	9' - 9 1/2"	50,021
	75-7R	75-7R						
	75-79	75-79	900-1300	Interpolated	21' - 9 3/4"	9' - 6 3/8"	9' - 9 1/2"	55,211
	7T-7Z	7T-7Z						
8	80-84	80-84	900-1300	Interpolated	19' - 10 1/2"	10' - 5"	9' - 11 1/4"	64,938
	8K-8R	8K-8R	900-1500	Interpolated	21' - 10 1/2"	10' - 5"	9' - 11 1/4"	68,911
	85-89	85-89						
	8T-AZ	8T-AZ	1000	UUT-4	21' - 10 1/2"	10' - 5"	9' - 11 1/4"	60,401
	AZ	89		UUT-5	21' - 10 1/2"	10' - 5"	9' - 11 1/4"	68,839
A-A	A40-A42	A40-A42	1500-2250	Interpolated	19' - 2 1/2"	10' - 5 3/8"	11' - 6 1/8"	107,073
	A45-A47	A45-A47						
	A4A-A4C	A4A-A4C		Interpolated	21' - 2 1/2"	10' - 5 3/8"	11' - 6 1/8"	107,073
	A4F-A4H	A4F-A4H						
A-B	A60-A62	A60-A62		Interpolated	19' - 8 1/2"	10' - 9 5/8"	11' - 6 1/8"	107,073
	A65-A67	A65-A67						
	A6A-A6C	A6A-A6C		Interpolated	21' - 6 1/2"	10' - 9 5/8"	11' - 6 1/8"	107,073
	A6F-A6H	A6F-A6H						



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Table 1. Certified Product List Cont.

Frame	Evaporator Size	Condenser Size	Capacity Range (tons)	Tested/ Interpolated	Length (ft-in)	Width (ft-in)	Height (ft-in)	Operating Weight (lbs)
B-C	B60-B62 B65-B67 B6A-B6C B6F-B6H	C60-C62 C65-C67 C6A-C6C C6F-C6H	2250-3000	Interpolated	22' - 0 1/4"	12' - 0"	9' - 0 1/4"	150,000
C-C	C60-C62 C65-C67 C6A-C6C C6F-C6H	C60-C62 C65-C67 C6A-C6C C6F-C6H		Interpolated	22' - 0 1/4"	12' - 0 1/2"	12' - 0 1/2"	155,892
C-D	C60-C62 C65-C67 C6A-C6C C6F-C6H	D60-D62 D65-D67 D6A-D6C D6F-D6H		Interpolated	22' - 0 1/2"	13' - 0 1/4"	12' - 6 1/2"	155,892
	C67	D67	3000	UUT-6	21' - 10 1/2"	13' - 0 1/4"	12' - 6 1/2"	155,892

*maximum height and operating weight listed

UUT-6 was tested in two segments (A and B).

Refer to UUT-6A for condenser and economizer section)

Refer to UUT-6B for cooler and compressor section)

BY: Mohammad Karim

DATE: 08/24/2021



Special Seismic Certification
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Table 2. Certified Sub-Component List

Evaporator (aka Cooler)						
Frame	Evaporator Size	Tube Size	Weight (lb)	Manufacturer	Material	Tested / Interpolated
2	20	3/4"Ø	3407	Carrier	copper tubes & carbon steel shell	extrapolated
	21	3/4"Ø	3555	Carrier	copper tubes & carbon steel shell	extrapolated
	22	3/4"Ø	3711	Carrier	copper tubes & carbon steel shell	UUT-3
3	30	3/4"Ø	4071	Carrier	copper tubes & carbon steel shell	interpolated
	31	3/4"Ø	4253	Carrier	copper tubes & carbon steel shell	interpolated
	32	3/4"Ø	4445	Carrier	copper tubes & carbon steel shell	interpolated
	35	3/4"Ø	4343	Carrier	copper tubes & carbon steel shell	interpolated
	36	3/4"Ø	4551	Carrier	copper tubes & carbon steel shell	interpolated
	37	3/4"Ø	4769	Carrier	copper tubes & carbon steel shell	interpolated
4	40	3/4"Ø	4908	Carrier	copper tubes & carbon steel shell	interpolated
	41	3/4"Ø	5078	Carrier	copper tubes & carbon steel shell	interpolated
	42	3/4"Ø	5226	Carrier	copper tubes & carbon steel shell	interpolated
	45	3/4"Ø	5363	Carrier	copper tubes & carbon steel shell	interpolated
	46	3/4"Ø	5559	Carrier	copper tubes & carbon steel shell	interpolated
	47	3/4"Ø	5730	Carrier	copper tubes & carbon steel shell	interpolated
5	5A	3/4"Ø	5124	Carrier	copper tubes & carbon steel shell	interpolated
	5B	3/4"Ø	5177	Carrier	copper tubes & carbon steel shell	interpolated
	5C	3/4"Ø	5243	Carrier	copper tubes & carbon steel shell	interpolated
	5F	3/4"Ø	5577	Carrier	copper tubes & carbon steel shell	interpolated
	5G	3/4"Ø	5640	Carrier	copper tubes & carbon steel shell	interpolated
	5H	3/4"Ø	5716	Carrier	copper tubes & carbon steel shell	interpolated
	5K	1"Ø	4993	Carrier	copper tubes & carbon steel shell	interpolated
	5L	1"Ø	5090	Carrier	copper tubes & carbon steel shell	interpolated
	5M	1"Ø	5165	Carrier	copper tubes & carbon steel shell	interpolated
	5P	1"Ø	5041	Carrier	copper tubes & carbon steel shell	interpolated
	5Q	1"Ø	5131	Carrier	copper tubes & carbon steel shell	interpolated
	5R	1"Ø	5214	Carrier	copper tubes & carbon steel shell	interpolated
	5T	1"Ø	5425	Carrier	copper tubes & carbon steel shell	interpolated
	5U	1"Ø	5534	Carrier	copper tubes & carbon steel shell	interpolated
	5V	1"Ø	5620	Carrier	copper tubes & carbon steel shell	interpolated
	5X	1"Ø	5484	Carrier	copper tubes & carbon steel shell	interpolated
	5Y	1"Ø	5584	Carrier	copper tubes & carbon steel shell	interpolated
	5Z	1"Ø	5678	Carrier	copper tubes & carbon steel shell	interpolated
	50	3/4"Ø	5713	Carrier	copper tubes & carbon steel shell	interpolated
	51	3/4"Ø	5940	Carrier	copper tubes & carbon steel shell	interpolated
	52	3/4"Ø	6083	Carrier	copper tubes & carbon steel shell	interpolated
	53	3/4"Ø	6141	Carrier	copper tubes & carbon steel shell	interpolated
	54	3/4"Ø	6192	Carrier	copper tubes & carbon steel shell	interpolated
	55	3/4"Ø	6257	Carrier	copper tubes & carbon steel shell	interpolated
	56	3/4"Ø	6517	Carrier	copper tubes & carbon steel shell	interpolated
	57	3/4"Ø	6682	Carrier	copper tubes & carbon steel shell	interpolated
	58	3/4"Ø	6751	Carrier	copper tubes & carbon steel shell	interpolated
	59	3/4"Ø	6811	Carrier	copper tubes & carbon steel shell	interpolated



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Table 2. Certified Sub-Component List Cont.

Evaporator (aka Cooler)						
Frame	Evaporator Size	Tube Size	Weight (lb)	Manufacturer	Material	Tested / Interpolated
6	6K	1"Ø	5716	Carrier	copper tubes & carbon steel shell	interpolated
	6L	1"Ø	5804	Carrier	copper tubes & carbon steel shell	interpolated
	6M	1"Ø	5894	Carrier	copper tubes & carbon steel shell	interpolated
	6P	1"Ø	5768	Carrier	copper tubes & carbon steel shell	interpolated
	6Q	1"Ø	5852	Carrier	copper tubes & carbon steel shell	interpolated
	6R	1"Ø	5938	Carrier	copper tubes & carbon steel shell	interpolated
	6T	1"Ø	6230	Carrier	copper tubes & carbon steel shell	interpolated
	6U	1"Ø	6330	Carrier	copper tubes & carbon steel shell	interpolated
	6V	1"Ø	6433	Carrier	copper tubes & carbon steel shell	interpolated
	6X	1"Ø	6293	Carrier	copper tubes & carbon steel shell	interpolated
	6Y	1"Ø	6388	Carrier	copper tubes & carbon steel shell	interpolated
	6Z	1"Ø	6487	Carrier	copper tubes & carbon steel shell	interpolated
	60	3/4"Ø	6719	Carrier	copper tubes & carbon steel shell	interpolated
	61	3/4"Ø	6895	Carrier	copper tubes & carbon steel shell	interpolated
	62	3/4"Ø	7038	Carrier	copper tubes & carbon steel shell	interpolated
	63	3/4"Ø	7103	Carrier	copper tubes & carbon steel shell	interpolated
	64	3/4"Ø	7161	Carrier	copper tubes & carbon steel shell	interpolated
	65	3/4"Ø	7392	Carrier	copper tubes & carbon steel shell	interpolated
	66	3/4"Ø	7594	Carrier	copper tubes & carbon steel shell	interpolated
	67	3/4"Ø	7759	Carrier	copper tubes & carbon steel shell	interpolated
	68	3/4"Ø	7839	Carrier	copper tubes & carbon steel shell	interpolated
	69	3/4"Ø	7905	Carrier	copper tubes & carbon steel shell	interpolated
7	7K	1"Ø	8728	Carrier	copper tubes & carbon steel shell	interpolated
	7L	1"Ø	8959	Carrier	copper tubes & carbon steel shell	interpolated
	7M	1"Ø	9161	Carrier	copper tubes & carbon steel shell	interpolated
	7P	1"Ø	8792	Carrier	copper tubes & carbon steel shell	interpolated
	7Q	1"Ø	9023	Carrier	copper tubes & carbon steel shell	interpolated
	7R	1"Ø	9929	Carrier	copper tubes & carbon steel shell	interpolated
	7T	1"Ø	9431	Carrier	copper tubes & carbon steel shell	interpolated
	7U	1"Ø	9698	Carrier	copper tubes & carbon steel shell	interpolated
	7V	1"Ø	9932	Carrier	copper tubes & carbon steel shell	interpolated
	7X	1"Ø	9510	Carrier	copper tubes & carbon steel shell	interpolated
	7Y	1"Ø	9777	Carrier	copper tubes & carbon steel shell	interpolated
	7Z	1"Ø	10016	Carrier	copper tubes & carbon steel shell	interpolated
	70	3/4"Ø	9942	Carrier	copper tubes & carbon steel shell	interpolated
	71	3/4"Ø	10330	Carrier	copper tubes & carbon steel shell	interpolated
	72	3/4"Ø	10632	Carrier	copper tubes & carbon steel shell	interpolated
	73	3/4"Ø	10715	Carrier	copper tubes & carbon steel shell	interpolated
	74	3/4"Ø	10790	Carrier	copper tubes & carbon steel shell	interpolated
	75	3/4"Ø	10840	Carrier	copper tubes & carbon steel shell	interpolated
	76	3/4"Ø	11289	Carrier	copper tubes & carbon steel shell	interpolated
	77	3/4"Ø	11638	Carrier	copper tubes & carbon steel shell	interpolated
	78	3/4"Ø	11738	Carrier	copper tubes & carbon steel shell	interpolated
	79	3/4"Ø	11828	Carrier	copper tubes & carbon steel shell	interpolated



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Table 2. Certified Sub-Component List Cont.

Evaporator (aka Cooler)						
Frame	Evaporator Size	Tube Size	Weight (lb)	Manufacturer	Material	Tested / Interpolated
8	8K	1"Ø	11153	Carrier	copper tubes & carbon steel shell	interpolated
	8L	1"Ø	11400	Carrier	copper tubes & carbon steel shell	interpolated
	8M	1"Ø	11650	Carrier	copper tubes & carbon steel shell	interpolated
	8P	1"Ø	11219	Carrier	copper tubes & carbon steel shell	interpolated
	8Q	1"Ø	11470	Carrier	copper tubes & carbon steel shell	interpolated
	8R	1"Ø	11719	Carrier	copper tubes & carbon steel shell	interpolated
	8T	1"Ø	12069	Carrier	copper tubes & carbon steel shell	interpolated
	8U	1"Ø	12357	Carrier	copper tubes & carbon steel shell	interpolated
	8V	1"Ø	12645	Carrier	copper tubes & carbon steel shell	interpolated
	8X	1"Ø	12152	Carrier	copper tubes & carbon steel shell	interpolated
	8Y	1"Ø	12444	Carrier	copper tubes & carbon steel shell	interpolated
	8Z	1"Ø	12733	Carrier	copper tubes & carbon steel shell	UUT-4
	80	3/4"Ø	12664	Carrier	copper tubes & carbon steel shell	interpolated
	81	3/4"Ø	12998	Carrier	copper tubes & carbon steel shell	interpolated
	82	3/4"Ø	13347	Carrier	copper tubes & carbon steel shell	interpolated
	83	3/4"Ø	13437	Carrier	copper tubes & carbon steel shell	interpolated
	84	3/4"Ø	13523	Carrier	copper tubes & carbon steel shell	interpolated
	85	3/4"Ø	13804	Carrier	copper tubes & carbon steel shell	interpolated
	86	3/4"Ø	14191	Carrier	copper tubes & carbon steel shell	interpolated
	87	3/4"Ø	14597	Carrier	copper tubes & carbon steel shell	interpolated
	88	3/4"Ø	14705	Carrier	copper tubes & carbon steel shell	interpolated
	89	3/4"Ø	14808	Carrier	copper tubes & carbon steel shell	UUT-5
A4	A4A	1"Ø	15540	Carrier	copper tubes & carbon steel shell	interpolated
	A4B	1"Ø	15794	Carrier	copper tubes & carbon steel shell	interpolated
	A4C	1"Ø	16063	Carrier	copper tubes & carbon steel shell	interpolated
	A4F	1"Ø	15592	Carrier	copper tubes & carbon steel shell	interpolated
	A4G	1"Ø	15845	Carrier	copper tubes & carbon steel shell	interpolated
	A4H	1"Ø	16249	Carrier	copper tubes & carbon steel shell	interpolated
	A40	3/4"Ø	16877	Carrier	copper tubes & carbon steel shell	interpolated
	A41	3/4"Ø	17270	Carrier	copper tubes & carbon steel shell	interpolated
	A42	3/4"Ø	17690	Carrier	copper tubes & carbon steel shell	interpolated
	A45	3/4"Ø	16968	Carrier	copper tubes & carbon steel shell	interpolated
A6	A46	3/4"Ø	17371	Carrier	copper tubes & carbon steel shell	interpolated
	A47	3/4"Ø	17761	Carrier	copper tubes & carbon steel shell	interpolated
	A6A	1"Ø	16465	Carrier	copper tubes & carbon steel shell	interpolated
	A6B	1"Ø	16758	Carrier	copper tubes & carbon steel shell	interpolated
	A6C	1"Ø	17070	Carrier	copper tubes & carbon steel shell	interpolated
	A6F	1"Ø	16535	Carrier	copper tubes & carbon steel shell	interpolated
	A6G	1"Ø	16829	Carrier	copper tubes & carbon steel shell	interpolated
	A6H	1"Ø	17296	Carrier	copper tubes & carbon steel shell	interpolated
	A60	3/4"Ø	18354	Carrier	copper tubes & carbon steel shell	interpolated
	A61	3/4"Ø	18807	Carrier	copper tubes & carbon steel shell	interpolated
	A62	3/4"Ø	19295	Carrier	copper tubes & carbon steel shell	interpolated
	A65	3/4"Ø	19295	Carrier	copper tubes & carbon steel shell	interpolated
	A66	3/4"Ø	18936	Carrier	copper tubes & carbon steel shell	interpolated
	A67	3/4"Ø	18936	Carrier	copper tubes & carbon steel shell	interpolated



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Table 2. Certified Sub-Component List Cont.

Evaporator						
Frame	Evaporator Size	Tube Size	Weight (lb)	Manufacturer	Material	Tested / Interpolated
B6	B6A	1"Ø	22819	Carrier	copper tubes & carbon steel shell	interpolated
	B6B	1"Ø	23299	Carrier	copper tubes & carbon steel shell	interpolated
	B6C	1"Ø	23829	Carrier	copper tubes & carbon steel shell	interpolated
	B6F	1"Ø	23139	Carrier	copper tubes & carbon steel shell	interpolated
	B6G	1"Ø	23648	Carrier	copper tubes & carbon steel shell	interpolated
	B6H	1"Ø	24171	Carrier	copper tubes & carbon steel shell	interpolated
	B60	3/4"Ø	24704	Carrier	copper tubes & carbon steel shell	interpolated
	B61	3/4"Ø	25337	Carrier	copper tubes & carbon steel shell	interpolated
	B62	3/4"Ø	25964	Carrier	copper tubes & carbon steel shell	interpolated
	B65	3/4"Ø	25014	Carrier	copper tubes & carbon steel shell	interpolated
	B66	3/4"Ø	25631	Carrier	copper tubes & carbon steel shell	interpolated
C6	B67	3/4"Ø	26264	Carrier	copper tubes & carbon steel shell	interpolated
	C6A	1"Ø	28641	Carrier	copper tubes & carbon steel shell	interpolated
	C6B	1"Ø	29167	Carrier	copper tubes & carbon steel shell	interpolated
	C6C	1"Ø	29750	Carrier	copper tubes & carbon steel shell	interpolated
	C6F	1"Ø	28929	Carrier	copper tubes & carbon steel shell	interpolated
	C6G	1"Ø	29478	Carrier	copper tubes & carbon steel shell	interpolated
	C6H	1"Ø	30083	Carrier	copper tubes & carbon steel shell	interpolated
	C60	3/4"Ø	30825	Carrier	copper tubes & carbon steel shell	interpolated
	C61	3/4"Ø	31536	Carrier	copper tubes & carbon steel shell	interpolated
	C62	3/4"Ø	32467	Carrier	copper tubes & carbon steel shell	interpolated
	C65	3/4"Ø	31135	Carrier	copper tubes & carbon steel shell	interpolated
Condenser	C66	3/4"Ø	31851	Carrier	copper tubes & carbon steel shell	interpolated
	C67	3/4"Ø	32777	Carrier	copper tubes & carbon steel shell	UUT-6A
Condenser						
Frame	Condenser Size	Tube Size	Weight (lb)	Manufacturer	Material	Tested / Interpolated
2	20	3/4"Ø	3373	Carrier	copper tubes & carbon steel shell	extrapolated
	21	3/4"Ø	3540	Carrier	copper tubes & carbon steel shell	extrapolated
	22	3/4"Ø	3704	Carrier	copper tubes & carbon steel shell	UUT-3
3	30	3/4"Ø	3694	Carrier	copper tubes & carbon steel shell	interpolated
	31	3/4"Ø	3899	Carrier	copper tubes & carbon steel shell	interpolated
	32	3/4"Ø	4100	Carrier	copper tubes & carbon steel shell	interpolated
	35	3/4"Ø	4606	Carrier	copper tubes & carbon steel shell	interpolated
	36	3/4"Ø	4840	Carrier	copper tubes & carbon steel shell	interpolated
	37	3/4"Ø	5069	Carrier	copper tubes & carbon steel shell	interpolated
4	40	3/4"Ø	5039	Carrier	copper tubes & carbon steel shell	interpolated
	41	3/4"Ø	5232	Carrier	copper tubes & carbon steel shell	interpolated
	42	3/4"Ø	5424	Carrier	copper tubes & carbon steel shell	interpolated
	45	3/4"Ø	5602	Carrier	copper tubes & carbon steel shell	interpolated
	46	3/4"Ø	5824	Carrier	copper tubes & carbon steel shell	interpolated
	47	3/4"Ø	6044	Carrier	copper tubes & carbon steel shell	interpolated



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Table 2. Certified Sub-Component List Cont.

Condenser						
Frame	Condenser Size	Tube Size	Weight (lb)	Manufacturer	Material	Tested / Interpolated
5	50	3/4"Ø	6090	Carrier	copper tubes & carbon steel shell	interpolated
	51	3/4"Ø	6283	Carrier	copper tubes & carbon steel shell	interpolated
	52	3/4"Ø	6464	Carrier	copper tubes & carbon steel shell	interpolated
	53	3/4"Ø	6529	Carrier	copper tubes & carbon steel shell	interpolated
	54	3/4"Ø	6591	Carrier	copper tubes & carbon steel shell	interpolated
	55	3/4"Ø	6785	Carrier	copper tubes & carbon steel shell	interpolated
	56	3/4"Ø	7007	Carrier	copper tubes & carbon steel shell	interpolated
	57	3/4"Ø	7215	Carrier	copper tubes & carbon steel shell	interpolated
	58	3/4"Ø	7291	Carrier	copper tubes & carbon steel shell	interpolated
	59	3/4"Ø	7363	Carrier	copper tubes & carbon steel shell	interpolated
6	60	3/4"Ø	6764	Carrier	copper tubes & carbon steel shell	interpolated
	61	3/4"Ø	6949	Carrier	copper tubes & carbon steel shell	interpolated
	62	3/4"Ø	7130	Carrier	copper tubes & carbon steel shell	interpolated
	63	3/4"Ø	7199	Carrier	copper tubes & carbon steel shell	interpolated
	64	3/4"Ø	7264	Carrier	copper tubes & carbon steel shell	interpolated
	65	3/4"Ø	7682	Carrier	copper tubes & carbon steel shell	interpolated
	66	3/4"Ø	7894	Carrier	copper tubes & carbon steel shell	interpolated
	67	3/4"Ø	8102	Carrier	copper tubes & carbon steel shell	interpolated
	68	3/4"Ø	8182	Carrier	copper tubes & carbon steel shell	interpolated
	69	3/4"Ø	8258	Carrier	copper tubes & carbon steel shell	interpolated
7	70	3/4"Ø	10786	Carrier	copper tubes & carbon steel shell	interpolated
	71	3/4"Ø	11211	Carrier	copper tubes & carbon steel shell	interpolated
	72	3/4"Ø	11622	Carrier	copper tubes & carbon steel shell	interpolated
	73	3/4"Ø	11737	Carrier	copper tubes & carbon steel shell	interpolated
	74	3/4"Ø	11775	Carrier	copper tubes & carbon steel shell	interpolated
	75	3/4"Ø	11859	Carrier	copper tubes & carbon steel shell	interpolated
	76	3/4"Ø	12345	Carrier	copper tubes & carbon steel shell	interpolated
	77	3/4"Ø	12814	Carrier	copper tubes & carbon steel shell	interpolated
	78	3/4"Ø	12949	Carrier	copper tubes & carbon steel shell	interpolated
	79	3/4"Ø	12994	Carrier	copper tubes & carbon steel shell	interpolated
8	80	3/4"Ø	12753	Carrier	copper tubes & carbon steel shell	interpolated
	81	3/4"Ø	13149	Carrier	copper tubes & carbon steel shell	interpolated
	82	3/4"Ø	13545	Carrier	copper tubes & carbon steel shell	interpolated
	83	3/4"Ø	13872	Carrier	copper tubes & carbon steel shell	interpolated
	84	3/4"Ø	14217	Carrier	copper tubes & carbon steel shell	interpolated
	85	3/4"Ø	14008	Carrier	copper tubes & carbon steel shell	interpolated
	86	3/4"Ø	14465	Carrier	copper tubes & carbon steel shell	interpolated
	87	3/4"Ø	14923	Carrier	copper tubes & carbon steel shell	interpolated
	88	3/4"Ø	15311	Carrier	copper tubes & carbon steel shell	interpolated
	89	3/4"Ø	15721	Carrier	copper tubes & carbon steel shell	UUT-4 UUT-5



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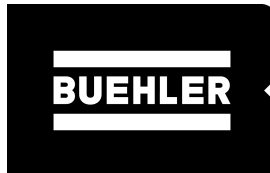


Table 2. Certified Sub-Component List Cont.

Condenser						
Frame	Condenser Size	Tube Size	Weight (lb)	Manufacturer	Material	Tested / Interpolated
A4	A4A	1"Ø	17089	Carrier	copper tubes & carbon steel shell	interpolated
	A4B	1"Ø	17472	Carrier	copper tubes & carbon steel shell	interpolated
	A4C	1"Ø	17812	Carrier	copper tubes & carbon steel shell	interpolated
	A4F	1"Ø	17076	Carrier	copper tubes & carbon steel shell	interpolated
	A4G	1"Ø	17405	Carrier	copper tubes & carbon steel shell	interpolated
	A4H	1"Ø	17821	Carrier	copper tubes & carbon steel shell	interpolated
	A40	3/4"Ø	18542	Carrier	copper tubes & carbon steel shell	interpolated
	A41	3/4"Ø	19062	Carrier	copper tubes & carbon steel shell	interpolated
	A42	3/4"Ø	19565	Carrier	copper tubes & carbon steel shell	interpolated
	A45	3/4"Ø	18493	Carrier	copper tubes & carbon steel shell	interpolated
	A46	3/4"Ø	19063	Carrier	copper tubes & carbon steel shell	interpolated
A6	A6A	1"Ø	18359	Carrier	copper tubes & carbon steel shell	interpolated
	A6B	1"Ø	18806	Carrier	copper tubes & carbon steel shell	interpolated
	A6C	1"Ø	19202	Carrier	copper tubes & carbon steel shell	interpolated
	A6F	1"Ø	18356	Carrier	copper tubes & carbon steel shell	interpolated
	A6G	1"Ø	18739	Carrier	copper tubes & carbon steel shell	interpolated
	A6H	1"Ø	19225	Carrier	copper tubes & carbon steel shell	interpolated
	A60	3/4"Ø	20139	Carrier	copper tubes & carbon steel shell	interpolated
	A61	3/4"Ø	20745	Carrier	copper tubes & carbon steel shell	interpolated
	A62	3/4"Ø	21330	Carrier	copper tubes & carbon steel shell	interpolated
	A65	3/4"Ø	20095	Carrier	copper tubes & carbon steel shell	interpolated
	A66	3/4"Ø	20758	Carrier	copper tubes & carbon steel shell	interpolated
B4	B4A	1"Ø	19217	Carrier	copper tubes & carbon steel shell	interpolated
	B4B	1"Ø	19793	Carrier	copper tubes & carbon steel shell	interpolated
	B4C	1"Ø	20254	Carrier	copper tubes & carbon steel shell	interpolated
	B4F	1"Ø	19217	Carrier	copper tubes & carbon steel shell	interpolated
	B4G	1"Ø	19721	Carrier	copper tubes & carbon steel shell	interpolated
	B4H	1"Ø	20318	Carrier	copper tubes & carbon steel shell	interpolated
	B40	3/4"Ø	21217	Carrier	copper tubes & carbon steel shell	interpolated
	B41	3/4"Ø	21965	Carrier	copper tubes & carbon steel shell	interpolated
	B42	3/4"Ø	22581	Carrier	copper tubes & carbon steel shell	interpolated
	B45	3/4"Ø	21173	Carrier	copper tubes & carbon steel shell	interpolated
	B46	3/4"Ø	21909	Carrier	copper tubes & carbon steel shell	interpolated
B6	B6A	1"Ø	20794	Carrier	copper tubes & carbon steel shell	interpolated
	B6B	1"Ø	21465	Carrier	copper tubes & carbon steel shell	interpolated
	B6C	1"Ø	22002	Carrier	copper tubes & carbon steel shell	interpolated
	B6F	1"Ø	20806	Carrier	copper tubes & carbon steel shell	interpolated
	B6G	1"Ø	21393	Carrier	copper tubes & carbon steel shell	interpolated
	B6H	1"Ø	22088	Carrier	copper tubes & carbon steel shell	interpolated
	B60	3/4"Ø	23061	Carrier	copper tubes & carbon steel shell	interpolated
	B61	3/4"Ø	23932	Carrier	copper tubes & carbon steel shell	interpolated
	B62	3/4"Ø	24649	Carrier	copper tubes & carbon steel shell	interpolated
	B65	3/4"Ø	23022	Carrier	copper tubes & carbon steel shell	interpolated
	B66	3/4"Ø	23849	Carrier	copper tubes & carbon steel shell	interpolated
	B67	3/4"Ø	24745	Carrier	copper tubes & carbon steel shell	interpolated



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Table 2. Certified Sub-Component List Cont.

Condenser						
Frame	Condenser Size	Tube Size	Weight (lb)	Manufacturer	Material	Tested / Interpolated
C6	C6A	1"Ø	27676	Carrier	copper tubes & carbon steel shell	interpolated
	C6B	1"Ø	28315	Carrier	copper tubes & carbon steel shell	interpolated
	C6C	1"Ø	28918	Carrier	copper tubes & carbon steel shell	interpolated
	C6F	1"Ø	27774	Carrier	copper tubes & carbon steel shell	interpolated
	C6G	1"Ø	28457	Carrier	copper tubes & carbon steel shell	interpolated
	C6H	1"Ø	29223	Carrier	copper tubes & carbon steel shell	interpolated
	C60	3/4"Ø	29857	Carrier	copper tubes & carbon steel shell	interpolated
	C61	3/4"Ø	30881	Carrier	copper tubes & carbon steel shell	interpolated
	C62	3/4"Ø	31872	Carrier	copper tubes & carbon steel shell	interpolated
	C65	3/4"Ø	29982	Carrier	copper tubes & carbon steel shell	interpolated
D6	C66	3/4"Ø	31064	Carrier	copper tubes & carbon steel shell	interpolated
	C67	3/4"Ø	32186	Carrier	copper tubes & carbon steel shell	interpolated
	D6A	1"Ø	35286	Carrier	copper tubes & carbon steel shell	interpolated
	D6B	1"Ø	36328	Carrier	copper tubes & carbon steel shell	interpolated
	D6C	1"Ø	37288	Carrier	copper tubes & carbon steel shell	interpolated
	D6F	1"Ø	34447	Carrier	copper tubes & carbon steel shell	interpolated
	D6G	1"Ø	35637	Carrier	copper tubes & carbon steel shell	interpolated
	D6H	1"Ø	36663	Carrier	copper tubes & carbon steel shell	interpolated
	D60	3/4"Ø	38296	Carrier	copper tubes & carbon steel shell	interpolated
	D61	3/4"Ø	39624	Carrier	copper tubes & carbon steel shell	interpolated
	D62	3/4"Ø	41031	Carrier	copper tubes & carbon steel shell	interpolated
	D65	3/4"Ø	37624	Carrier	copper tubes & carbon steel shell	interpolated
	D66	3/4"Ø	38837	Carrier	copper tubes & carbon steel shell	interpolated
	D67	3/4"Ø	40460	Carrier	copper tubes & carbon steel shell	UUT-6B

Compressor						
Comp Frame	Type	Voltage	Weight (lb)	Manufacturer	Material	Tested / Interpolated
XR2	Standard	200-575V	2300	Carrier	Carbon Steel/Copper	extrapolated
	High	200-575V	2300	Carrier	Carbon Steel/Copper	UUT-3
XR3	Standard	200-575V	2816	Carrier	Carbon Steel/Copper	interpolated
	High	200-575V	2816	Carrier	Carbon Steel/Copper	interpolated
XR4	Low	200-575V	3425	Carrier	Carbon Steel/Copper	interpolated
	Low	200-575V	4211	Carrier	Carbon Steel/Copper	interpolated
	Standard	2400-4160V	3425	Carrier	Carbon Steel/Copper	interpolated
	Standard	2400-4160V	4211	Carrier	Carbon Steel/Copper	interpolated
	Standard	6300-6900V	3425	Carrier	Carbon Steel/Copper	interpolated
	Standard	6300-6900V	4211	Carrier	Carbon Steel/Copper	interpolated
	High	200-575V	3425	Carrier	Carbon Steel/Copper	interpolated
	High	200-575V	4211	Carrier	Carbon Steel/Copper	interpolated
	High	2400-4160V	3425	Carrier	Carbon Steel/Copper	interpolated
	High	2400-4160V	4211	Carrier	Carbon Steel/Copper	interpolated
	High	6300-6900V	3425	Carrier	Carbon Steel/Copper	interpolated
	High	6300-6900V	4211	Carrier	Carbon Steel/Copper	interpolated



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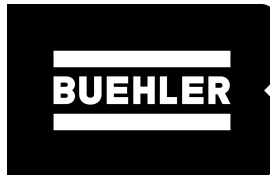


Table 2. Certified Sub-Component List Cont.

Compressor						
Comp Frame	Type	Voltage	Weight (lb)	Manufacturer	Material	Tested / Interpolated
XR5	Standard	200-575V	7285	Carrier	Carbon Steel/Copper	interpolated
	Standard	2400-4160V	7285	Carrier	Carbon Steel/Copper	interpolated
	Standard	6300-6900V	7285	Carrier	Carbon Steel/Copper	interpolated
	High	200-575V	7285	Carrier	Carbon Steel/Copper	interpolated
	High	2400-4160V	7285	Carrier	Carbon Steel/Copper	interpolated
	High	6300-6900V	7285	Carrier	Carbon Steel/Copper	interpolated
	High	10000-11000V	7285	Carrier	Carbon Steel/Copper	interpolated
XRC	High	13800V	7285	Carrier	Carbon Steel/Copper	UUT-4
	High	230-575V	3265	Carrier	Carbon Steel/Copper	interpolated
	High	3000-6900V	3265	Carrier	Carbon Steel/Copper	interpolated
	High	10000V	3265	Carrier	Carbon Steel/Copper	interpolated
XRE	High	11000V	3265	Carrier	Carbon Steel/Copper	interpolated
	High	380 / 60	4853	Carrier	Carbon Steel/Copper	interpolated
	High	416 / 60	4853	Carrier	Carbon Steel/Copper	interpolated
	High	460 / 60	4853	Carrier	Carbon Steel/Copper	UUT-5
	High	460 / 60	4853	Carrier	Carbon Steel/Copper	interpolated
XR6	High	400 / 50	4853	Carrier	Carbon Steel/Copper	interpolated
	High	380V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	400V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	460V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	2400V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	3000V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	3300V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	4160V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	6300V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	6900V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	10000V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	11000V	10287	Carrier	Carbon Steel/Copper	interpolated
XR7	High	13800V	10287	Carrier	Carbon Steel/Copper	interpolated
	High	2400V	16024	Carrier	Carbon Steel/Copper	interpolated
	High	3000V	16024	Carrier	Carbon Steel/Copper	interpolated
	High	3300V	16024	Carrier	Carbon Steel/Copper	interpolated
	High	4160V	16024	Carrier	Carbon Steel/Copper	interpolated
	High	6300V	16024	Carrier	Carbon Steel/Copper	interpolated
	High	6900V	16024	Carrier	Carbon Steel/Copper	interpolated
	High	10000V	16024	Carrier	Carbon Steel/Copper	interpolated
	High	11000V	16024	Carrier	Carbon Steel/Copper	interpolated
	High	13800V	16024	Carrier	Carbon Steel/Copper	UUT-6A



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Table 2. Certified Sub-Component List Cont.

Oil Pump						
Comp Frame	Nominal Capacity	Voltage/ Hertz	Weight (lb)	Manufacturer	Material	Tested / Interpolated
XR2	13	208/60	125	Carrier	Carbon Steel	interpolated
	13	230/60	125	Carrier	Carbon Steel	interpolated
	13	380/60	125	Carrier	Carbon Steel	interpolated
	13	416/60	125	Carrier	Carbon Steel	interpolated
	13	460/60	125	Carrier	Carbon Steel	UUT-3
	13	230/50	125	Carrier	Carbon Steel	interpolated
	13	400/50	125	Carrier	Carbon Steel	interpolated
XR3	13	380/60	125	Carrier	Carbon Steel	interpolated
	13	416/60	125	Carrier	Carbon Steel	interpolated
	13	460/60	125	Carrier	Carbon Steel	interpolated
	13	400/50	125	Carrier	Carbon Steel	interpolated
XR4 & XRC	13	380/60	125	Carrier	Carbon Steel	interpolated
	13	416/60	125	Carrier	Carbon Steel	interpolated
	13	460/60	125	Carrier	Carbon Steel	interpolated
	13	400/50	125	Carrier	Carbon Steel	interpolated
XR5 & XRE	15	208/60	125	Carrier	Carbon Steel	interpolated
	15	230/60	125	Carrier	Carbon Steel	interpolated
	15	380/60	125	Carrier	Carbon Steel	interpolated
	15	460/60	125	Carrier	Carbon Steel	UUT-4 & UUT-5
	15	575/60	125	Carrier	Carbon Steel	interpolated
	15	230/50	125	Carrier	Carbon Steel	interpolated
	15	400/50	125	Carrier	Carbon Steel	interpolated
XR6	20	380/60	124	Carrier	Carbon Steel	interpolated
	20	415/60	124	Carrier	Carbon Steel	interpolated
	20	416/60	124	Carrier	Carbon Steel	interpolated
	20	440/60	124	Carrier	Carbon Steel	interpolated
	20	460/60	124	Carrier	Carbon Steel	interpolated
	20	480/60	124	Carrier	Carbon Steel	interpolated
	20	346/50	124	Carrier	Carbon Steel	interpolated
	20	380/50	124	Carrier	Carbon Steel	interpolated
	20	400/50	124	Carrier	Carbon Steel	interpolated
	20	415/50	124	Carrier	Carbon Steel	interpolated
	20	440/50	124	Carrier	Carbon Steel	interpolated
	20	380/60	124	Carrier	Carbon Steel	interpolated
XR7	20	415/60	124	Carrier	Carbon Steel	interpolated
	20	416/60	124	Carrier	Carbon Steel	interpolated
	20	440/60	124	Carrier	Carbon Steel	interpolated
	20	460/60	124	Carrier	Carbon Steel	interpolated
	20	480/60	124	Carrier	Carbon Steel	interpolated
XR7	20	346/50	124	Carrier	Carbon Steel	interpolated
	20	380/50	124	Carrier	Carbon Steel	UUT-6A



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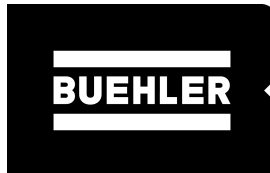


Table 2. Certified Sub-Component List Cont.

Motor						
Comp Frame	Part Number	Frame Size	Weight (lb)	Manufacturer	Material	Tested / Interpolated
XR2	02XR24001501	2	1650	Reliance	Carbon Steel	UUT-3
XR3	02XR34014801	3	2057	Reliance	Carbon Steel	interpolated
XR4	02XR44007301	4	3312	Reliance	Carbon Steel	interpolated
XR5	02XR54015201	5	5304	Reliance	Carbon Steel	UUT-4
XRC	02XF44022201	C	3700	Regal Beloit	Carbon Steel	extrapolated
XRE	02XF54014101	E	5304	Regal Beloit	Carbon Steel	UUT-5
XR6	02XF64009201	6	9370	Regal Beloit	Carbon Steel	interpolated
XR7	02XF74009201	7	10414	Regal Beloit	Carbon Steel	UUT-6A

Control Box Assembly						
Comp Frame	Control Panel Part Number	Panel Voltage / Hertz	Weight (lb)	Manufacturer	Material	Tested / Interpolated
XR2 XR3 XR4 XR5 XRE XRC	19XR0403070*	115 / 60	106	Gaston	Painted Carbon Sheet Metal	UUT-7, UUT-8
XR6 & XR7	19XF04030901	380-480 / 50-60	190	UTEC	Painted Carbon Sheet Metal	UUT-6A

VFD (includes control panel)						
Comp Frame	Drive Code	Drive Amperage	Weight (lb)	Manufacturer	Material	Tested / Interpolated
XR2	2AA	440	650	Rockwell	Painted Carbon Sheet Metal	interpolated
	R0230	230	650	Rockwell	Painted Carbon Sheet Metal	interpolated
	R0335	335	650	Rockwell	Painted Carbon Sheet Metal	UUT-3
	R0445	445	650	Rockwell	Painted Carbon Sheet Metal	interpolated
XR3	2AA	440	650	Rockwell	Painted Carbon Sheet Metal	interpolated
	2CC	608	726	Rockwell	Painted Carbon Sheet Metal	interpolated
	R0230	230	650	Rockwell	Painted Carbon Sheet Metal	interpolated
	R0335	335	650	Rockwell	Painted Carbon Sheet Metal	interpolated
	R0445	445	650	Rockwell	Painted Carbon Sheet Metal	interpolated
XR4 & XRC	2CC	608	1600	Rockwell	Painted Carbon Sheet Metal	interpolated
	4AA	900	2800	Rockwell	Painted Carbon Sheet Metal	interpolated
	4CC	1200	2850	Rockwell	Painted Carbon Sheet Metal	interpolated
XR5 & XRE	4AA	900	2800	Rockwell	Painted Carbon Sheet Metal	interpolated
	4CC	1200	2850	Rockwell	Painted Carbon Sheet Metal	UUT-4 & UUT-5



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Table 2. Certified Sub-Component List Cont.

Water Box						
Frame	Type	Pressure	Weight Adder (lb)	Manufacturer	Material	Tested / Interpolated
2	Nozzel in Head	300psi	450	Macor	Carbon Steel	UUT-3
	Marine	300psi	860	Macor	Carbon Steel	UUT-3
3	Nozzel in Head	300psi	450	Macor	Carbon Steel	interpolated
	Marine	300psi	860	Macor	Carbon Steel	interpolated
4	Nozzel in Head	300psi	2977	Macor	Carbon Steel	interpolated
	Marine	300psi	3193	Macor	Carbon Steel	interpolated
5	Nozzel in Head	300psi	3294	Macor	Carbon Steel	interpolated
	Marine	300psi	3874	Macor	Carbon Steel	interpolated
6	Nozzel in Head	300psi	3496	Macor	Carbon Steel	interpolated
	Marine	300psi	4876	Macor	Carbon Steel	interpolated
7	Nozzel in Head	300psi	6255	Macor	Carbon Steel	interpolated
	Marine	300psi	8792	Macor	Carbon Steel	interpolated
8	Nozzel in Head	300psi	8160	Macor	Carbon Steel	UUT-4 & UUT-5
	Marine	300psi	9511	Macor	Carbon Steel	UUT-4 & UUT-5
A-A	Nozzel in Head	150psi	0	Macor	Carbon Steel	interpolated
	Marine	300psi	1082	Macor	Carbon Steel	interpolated
A-B	Nozzel in Head	150psi	0	Macor	Carbon Steel	interpolated
	Marine	300psi	12524	Macor	Carbon Steel	interpolated
B-C	Nozzel in Head	150psi	0	Macor	Carbon Steel	interpolated
	Marine	150psi	16019	Macor	Carbon Steel	interpolated
C-C	Nozzel in Head	150psi	0	Macor	Carbon Steel	interpolated
	Marine	300psi	18422	Macor	Carbon Steel	interpolated
C-D	Nozzel in Head	150psi	0	Macor	Carbon Steel	UUT-6A
	Marine	300psi	21589	Macor	Carbon Steel	UUT-6B

Oil Cooler						
Comp Frame	Part Number	Description	Weight (lb)	Manufacturer	Material	Tested / Interpolated
XR2 XR3 XR4 XR5 XRC XRE	02XR05013301	Oil Cooler	12	Alfa Laval	Brazed Plate Stainless Steel	UUT-3, UUT-4 & UUT-5
XR6	02XF65008101	Oil Cooler	12	Alfa Laval	Brazed Plate Stainless Steel	interpolated
XR7	02XF75002701	Oil Cooler	22	Alfa Laval	Brazed Plate Stainless Steel	UUT-6A

Pump Out Unit						
Comp Frame	Part Number	Description	Weight (lb)	Manufacturer	Material	Tested / Interpolated
XR2-5,C,E	19XR04035801	Pump Out Unit	165	Carrier	Carbon and Stainless Steel	UUT-5

UUT-3 Test Summary

Testing Lab:	US Army CEERD-CERL
Testing Report:	2012-0211 and 2013-0216 appendix B
Testing Unit Num:	UUT-3

Model Number	Nominal Capacity (tons)	Measured Operating Weight (lbs)	Mounting	Excitation Direction	Frequency (Hz)	Length (in)	Width (in)	Height (in)
19XR Frame 2 19XRV222287BHH64	299	15,209	Rigid Base Mount	X	Front-Back	19.0	169.25	73.06
				Y	Side-Side	20.0		
				Z	Vertical	25.0		

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

Attachment Method	Unit legs welded to adapter plates	Seismic Parameters					
Adapter plates bolted with four (4) - 1 1/4"Ø grade 5 bolts each leg four (4) locations. 24 total		Building Code	Test Criteria	S _{DS} (g) & z/h	Horizontal		Vertical
		A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}		
Seismic Modifications	none	CBC 2019	AC 156	2.10 @ 1.0 2.42 @ 0.0	3.36g	2.52g	1.40g
Test Anomaly	none						0.56g



Figure 3.1: Unit on the shake table



Figure 3.2: Mounting Detail

Notes: The UUTs were full of contents during the test.
Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-3 Summary Tested Sub-Component

Sub-Component	Weight	Part Number	Manufacturer	Material
Evaporator/Cooler Assembly	4730 lb	10WR24046901	Carrier	Carbon Steel & Copper
Evaporator	3711 lb		Carrier	Carbon Steel & Copper
Cooler Nozzle Arrangement	815 lb	10XR34001501	Carrier	Carbon Steel
Water Box - Nozzel in Head	450 lb		Macor	Carbon Steel
Condenser Assembly	4482 lb	09XR24008101	Carrier	Carbon Steel & Copper
Condenser	3704 lb		Carrier	Carbon Steel & Copper
Condenser Nozzle Arrangement	1225 lb	09XR34004003	Carrier	Carbon Steel
Water Box - Marine	860 lb		Macor	Carbon Steel
Compressor/Motor Assembly	3950 lb	02XR24020001	Carrier	Carbon Steel & Copper
Compressor	2300 lb		Carrier	Carbon Steel & Copper
Motor	1650 lb	02XR24001501	Reliance	Carbon Steel
Oil Pump	125 lb	02XR44050602	Carrier	Carbon Steel
Control Box (no VFD)	34 lb	19XR04030701	Whitepath	Carbon Steel
VFD	650 lb	19XVA2AA5KA	Rockwell	Carbon Steel
Oil Cooler	12 lb	02XR05013301	Alfa Laval	Stainless Steel

UUT-4 Test Summary

Testing Lab:	US Army CEERD-CERL
Testing Report:	2012-0211 and 12/29/2019 add analysis
Testing Unit Num:	UUT-4

Model Number	Nominal Capacity (tons)	Measured Operating Weight (lbs)	Mounting	Excitation Direction	Frequency (Hz)	Length (in)	Width (in)	Height (in)
19XR Frame 8 19XRV8Z8955DMBH64	1000	60,401	Rigid Base Mount	X Front-Back	6.1	262.5	125	119.25
				Y Side-Side	8.5			
				Z Vertical	15.0			

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

Attachment Method	Unit legs welded to adapter plates	Seismic Parameters					
Adapter plates bolted with six (6) -3/4"Ø grade 5 bolts each leg four (4) locations. 24 total		Building Code	Test Criteria	S _{DS} (g) & z/h	Horizontal		Vertical
		A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}		
Seismic Modifications	none	CBC 2019	AC 156	2.10 @ 1.0 2.42 @ 0.0	3.36g	2.52g	1.40g
Test Anomaly	none						0.56g

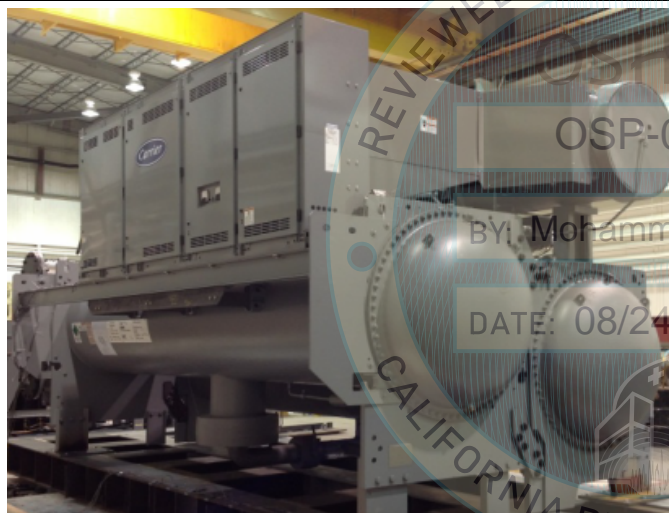


Figure 4.1: Unit on the shake table

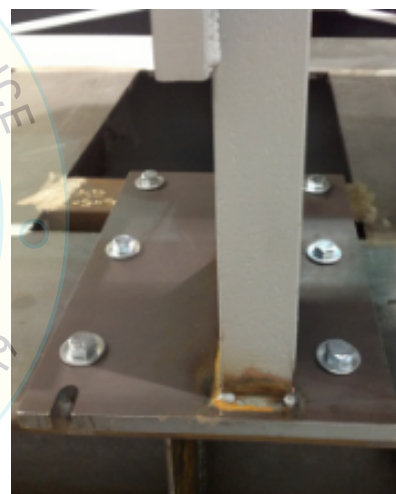


Figure 4.2: Mounting Detail

Notes: The UUTs were full of contents during the test.
Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-4 Summary Tested Sub-Component

Sub-Component	Weight	Part Number	Manufacturer	Material
Evaporator/Cooler Assembly	17933 lb	10XR84046904	Carrier	Carbon Steel & Copper
Evaporator	12733 lb		Carrier	Carbon Steel & Copper
Cooler Nozzle Arrangement	10342 lb	10XR840011301	Carrier	Carbon Steel
Water Box - Nozzel in Head	8160 lb		Macor	Carbon Steel
Condenser Assembly	20675 lb	09XR84013602	Carrier	Carbon Steel & Copper
Condenser	15721 lb		Carrier	Carbon Steel & Copper
Condenser Nozzle Arrangement	11262 lb	09XR84013602	Carrier	Carbon Steel
Water Box - Marine	9511 lb		Macor	Carbon Steel
Compressor/Motor Assembly	12125 lb	02XR54020001	Carrier	Carbon Steel & Copper
Compressor	7285 lb		Carrier	Carbon Steel & Copper
Motor	5304 lb	02XR54015201	Reliance	Carbon Steel
Oil Pump	125 lb	02XR44050602	Carrier	Carbon Steel
Control Box (no VFD)	32 lb	19XR04030704	Whitepath	Carbon Steel
VFD	2850 lb	19XVA4CC5KA	Rockwell	Carbon Steel
Oil Cooler	12 lb	02XR05013301	Alfa Laval	Stainless Steel

UUT-5 Test Summary

Testing Lab: US Army CEERD-CERL
Testing Report: 2013-0216
Testing Unit Num: UUT-5

Model Number	Nominal Capacity (tons)	Measured Operating Weight (lbs)	Mounting	Excitation Direction	Frequency (Hz)	Length (in)	Width (in)	Height (in)
19XR Frame 8 19XR-8989E61EPCD68	1500	68,839	Rigid Base Mount	X Front-Back	8.1	262.5	125	119.25
				Y Side-Side	11.7			
				Z Vertical	21.8			

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

Attachment Method	Unit legs welded to adapter plates	Seismic Parameters
Adapter plates bolted with six (6) -3/4"Ø grade 5 bolts each leg four (4) locations. 24 total		Building Code
Seismic Modifications	none	Test Criteria
Test Anomaly	none	S _{DS} (g) & z/h
		Horizontal
		Vertical
		A _{FLX-H} A _{RIG-H} A _{FLX-V} A _{RIG-V}
		CBC 2019 AC 156 2.10 @ 1.0 2.60 @ 0.0 3.36g 2.52g 1.73g 0.69g

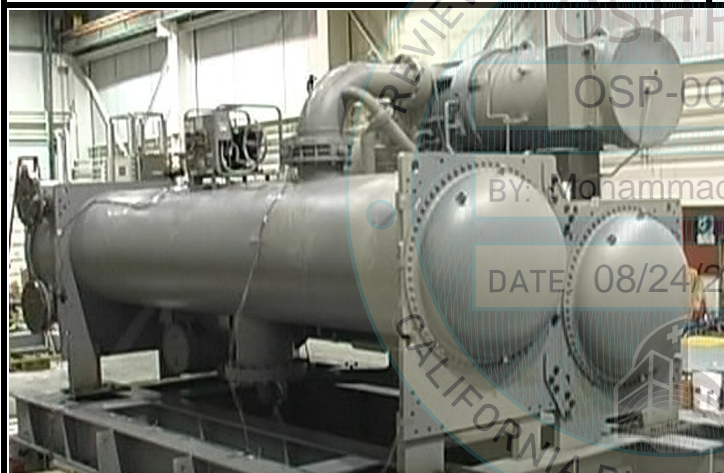


Figure 5.1: Unit on the shake table



Figure 5.2: Mounting Detail

Notes: The UUTs were full of contents during the test.
Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-5 Summary Tested Sub-Component

Sub-Component	Weight	Part Number	Manufacturer	Material
Evaporator/Cooler Assembly	20285 lb	10XF84000102	Carrier	Carbon Steel & Copper
Evaporator	14808 lb		Carrier	Carbon Steel & Copper
Cooler Nozzle Arrangement	10342 lb	10XR840011301	Carrier	Carbon Steel
Water Box - Nozzel in Head	8160 lb		Macor	Carbon Steel
Condenser Assembly	20675 lb	09XR84013602	Carrier	Carbon Steel & Copper
Condenser	15721 lb		Carrier	Carbon Steel & Copper
Condenser Nozzle Arrangement	11262 lb	09XR84013602	Carrier	Carbon Steel
Water Box - Marine	9511 lb		Macor	Carbon Steel
Compressor/Motor Assembly	10803 lb	02XF54000001	Carrier	Carbon Steel & Copper
Compressor	4853 lb		Carrier	Carbon Steel & Copper
Motor	5304 lb	02XF54014101	Regal Beloit	Carbon Steel
Oil Pump	125 lb	02XR44050602	Carrier	Carbon Steel
Control Box (no VFD)	32 lb	19XR04030704	Whitepath	Carbon Steel
VFD	2850 lb	19XVA4CC5KA	Rockwell	Carbon Steel
Oil Cooler	12 lb	02XR05013301	Alfa Laval	Stainless Steel
Pump Out Unit	165 lb	19XR04035801	Carrier	Carbon and Stainless Steel

UUT-6A Test Summary

Testing Lab:	US Army CEERD-CERL
Testing Report:	2014-0418
Testing Unit Num:	UUT-6A Condenser & Economizer

Model Number	Nominal Capacity (tons)	Measured Operating Weight (lbs)	Mounting	Excitation Direction	Frequency (Hz)	Length (in)	Width (in)	Height (in)
19XR Dual Stage XR7 19XR-C67D67736ZZG	3000	77,334	Rigid Base Mount	X Front-Back	7.0	264.5	79	132.18
				Y Side-Side	11.0			
				Z Vertical	17.0			

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

Attachment Method		Seismic Parameters						
Unit legs welded to adapter plates		Building Code	Test Criteria	S _{DS} (g) & z/h	Horizontal		Vertical	
Adapter plates bolted with six (6) - 1 1/4"Ø grade 8 bolts each leg four (4) locations. 16 total.					A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
Seismic Modifications	none	CBC 2019	AC 156	1.64 @ 1.0 2.64 @ 0.0	2.64g	1.97g	1.76g	0.71g
Test Anomaly	steel frame to represent condenser section. Rigid connector plates and bolted pipe connection.							



Figure 6A.1: Unit on the shake table



Figure 6A.2: Mounting Detail



Figure 6A.3: Modifications/Anomaly

Notes: The UUTs were full of contents during the test.

Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-6A Summary Tested Sub-Component

Sub-Component	Weight	Part Number	Manufacturer	Material
Evaporator/Cooler Assembly	32777 lb	10XF34000101	Carrier	Carbon Steel & Copper
Evaporator	32777 lb		Carrier	Carbon Steel & Copper
Cooler Nozzle Arrangement	21589 lb	10XR34001001	Carrier	Carbon Steel
Water Box - Nozzel in Head			Macor	Carbon Steel
Compressor/Motor Assembly	26438 lb	02XF74000001	Carrier	Carbon Steel & Copper
Compressor	16024 lb		Carrier	Carbon Steel & Copper
Motor	10414 lb	02XF74009201	Regal Beloit	Carbon Steel
Oil Pump	124 lb	02XF64050607	Carrier	Carbon Steel
Oil Cooler	22 lb	02XR05013301	Alfa Laval	Stainless Steel
Control Panel (no VFD)	190 lb	19XF04030901	UTEC	Carbon Steel

UUT-6B Test Summary

Testing Lab:	US Army CEERD-CERL
Testing Report:	2014-0418
Testing Unit Num:	UUT-6B Cooler & Compressor

Model Number	Nominal Capacity (tons)	Measured Operating Weight (lbs)	Mounting	Excitation Direction	Frequency (Hz)	Length (in)	Width (in)	Height (in)
19XR Dual Stage XR7 19XR-C67D67736ZZG	3000	78,558	Rigid Base Mount	X Front-Back	9.0	264.5	77.5	150.3
				Y Side-Side	12.0			
				Z Vertical	22.0			

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

Attachment Method		Seismic Parameters						
Unit legs welded to adapter plates		Building Code	Test Criteria	S _{DS} (g) & z/h	Horizontal		Vertical	
Adapter plates bolted with six (6) - 1 1/4"Ø grade 8 bolts each leg four (4) locations. 16 total.					A _{FLX-H}	A _{RIG-H}	A _{FLX-V}	A _{RIG-V}
Seismic Modifications	none	CBC 2019	AC 156	1.64 @ 1.0 2.64 @ 0.0	2.64g	1.97g	1.76g	0.71g
Test Anomaly	steel frame to represent cooler section. Rigid connector plates and bolted pipe connection.							



Figure 6B.1: Unit on the shake table

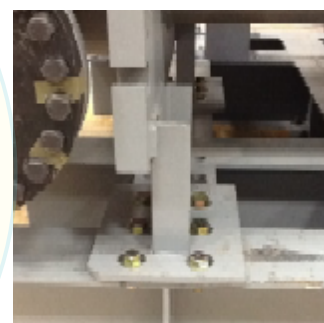


Figure 6B.2: Mounting Detail



Figure 6B.3: Modifications/Anomaly

Notes: The UUTs were full of contents during the test.
Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-6B Summary Tested Sub-Component

Sub-Component	Weight	Part Number	Manufacturer	Material
Condenser Assembly	40460 lb	09XF44001101	Carrier	Carbon Steel & Copper
Condenser	40460 lb		Carrier	Carbon Steel & Copper
Condenser Nozzle Arrangement	31560 lb	09XF44001803	Carrier	Carbon Steel
Water Box - Marine	21589 lb		Macor	Carbon Steel
Economizer Assembly	2467 lb	08XF74001101	Carrier	Carbon Steel

UUT-7 Test Summary

Testing Lab:	University of Buffalo SEESL
Testing Report:	UB CSEE/SEESL-2020-03
Testing Unit Num:	UUT-1

Subcomponent Part Number	Nominal Capacity (tons)	Measured Operating Weight (lbs)	Mounting	Excitation Direction	Frequency (Hz)	Width (in)	Depth (in)	Height (in)
19XR0403070*	n/a	106	Rigid Mount	X Front-Back	n/a	32	6.5	30
				Y Side-Side	n/a			
				Z Vertical	n/a			

Notes: Frequencies are not applicable for wall mount units/subcomponents

Attachment Method	8-1/4" sheet metal screw into cooler bracket. Bolted to cooler freestanding support. Freestanding support bolted to table	Seismic Parameters					
Seismic Modifications	L Brackets provided by manufacture w/2-#8 sheet metal screws each	Building Code	Test Criteria	S _{DS} (g) & z/h	Horizontal		Vertical
		CBC 2019	AC 156	2.0 @ 1.0 2.5 @ 0.0	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}
					3.2g	2.4g	1.67g

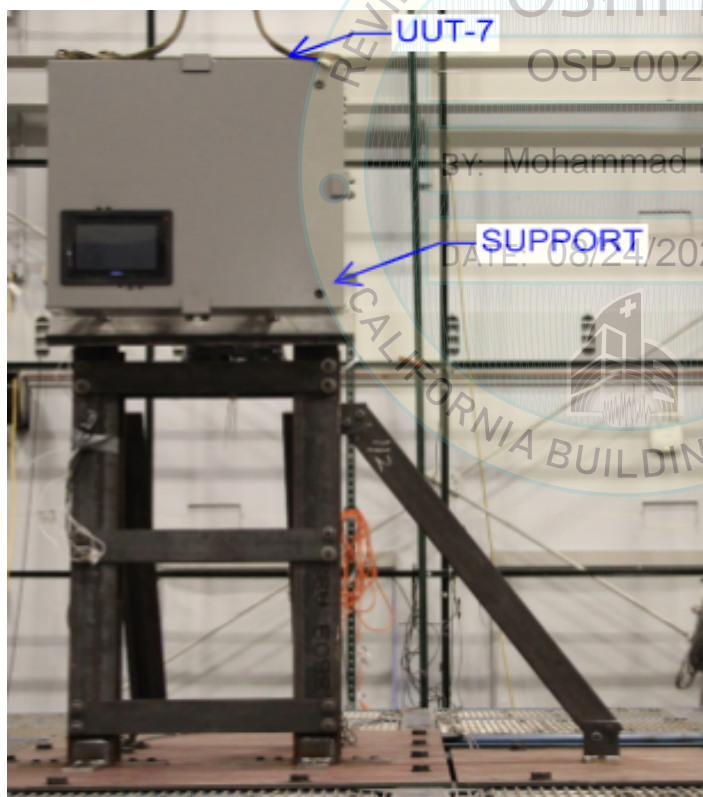


Figure 7.1: Unit on the shake table



Figure 7.2: Mounting Detail

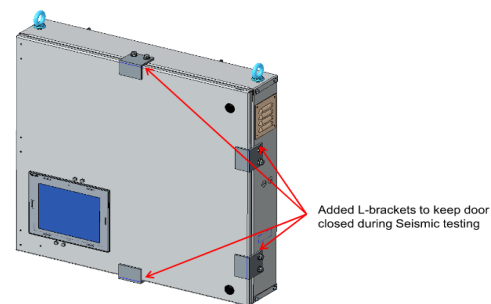


Figure 7.3: Seismic Modifications

Notes: The UUTs were full of contents during the test.
Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-7 Summary Tested Sub-Component

Sub-Component	Weight	Part Number	Manufacturer	Material
PIC6 Control Box (no VFD)	106 lb	19XR04037229	Gaston	Carbon Steel

UUT-8 Test Summary

Testing Lab:	University of Buffalo SEESL
Testing Report:	UB CSEE/SEESL-2020-03
Testing Unit Num:	UUT-2

Subcomponent Part Number	Nominal Capacity (tons)	Measured Operating Weight (lbs)	Mounting	Excitation Direction	Frequency (Hz)	Width (in)	Depth (in)	Height (in)
19XR0403070*	n/a	106	Isolated Mount	X Front-Back	n/a	32	6.5	30
				Y Side-Side	n/a			
				Z Vertical	n/a			

Notes: Frequencies are not applicable for wall mount units/subcomponents

Attachment Method	8-1/4" sheet metal screw into cooler bracket. Bolted to cooler freestanding support. Freestanding support bolted to table	Seismic Parameters					
Seismic Modifications	L Brackets provided by manufacture w/2-#8 sheet metal screws each	Building Code	Test Criteria	S _{DS} (g) & z/h	Horizontal		Vertical
		CBC 2019	AC 156	2.0 @ 1.0 2.5 @ 0.0	A _{FLX-H}	A _{RIG-H}	A _{FLX-V}
					3.2g	2.4g	1.67g

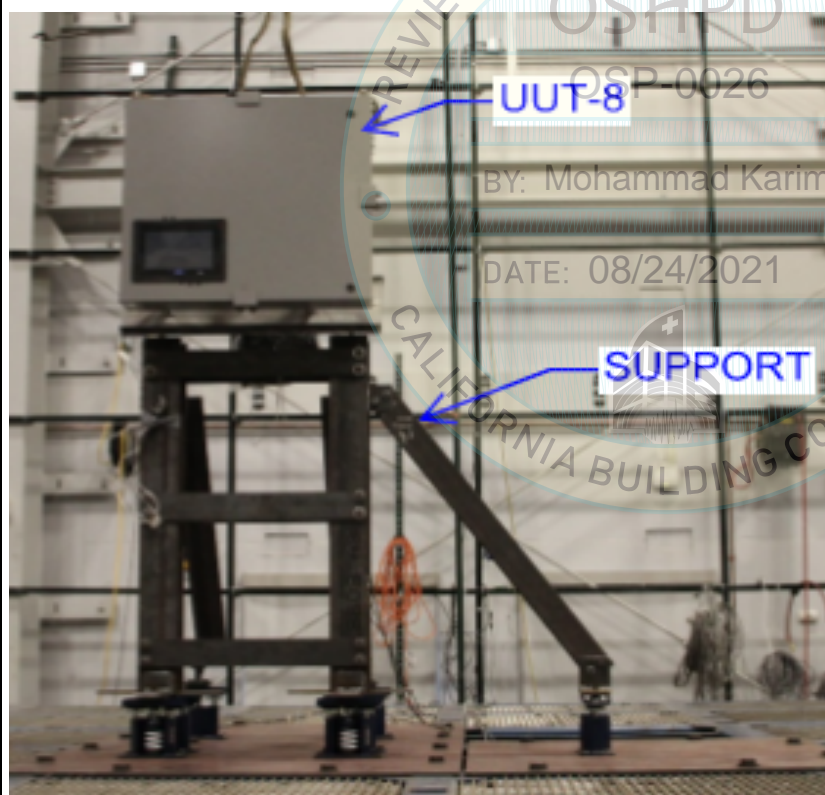


Figure 8.1: Unit on the shake table



Figure 8.2: Mounting Detail

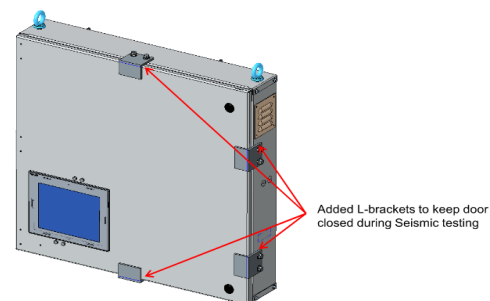


Figure 8.3: Seismic Modifications

Notes: The UUTs were full of contents during the test.
Unit maintained structural integrity and remained functional per manufacture requirements after shake table test

UUT-8 Summary Tested Sub-Component

Sub-Component	Weight	Part Number	Manufacturer	Material
PIC6 Control Box (no VFD)	106 lb	19XR04037229	Gaston	Carbon Steel