APPLICATION FOR HCAI SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY

APPLICATION #: OSP-0393

HCAI Special Seismic Certification Preapproval (OSP)

Type: ☐ New ☒ Renewal

Manufacturer Information

Manufacturer: Powerex, Inc.

Manufacturer's Technical Representative: Joe Abt

Mailing Address: 150 Production Drive, Harrison, OH 45030

Telephone: (513) 367-3273 Email: jabt@powerexinc.com

Product Information

Product Name: Medical Gas and Vacuum Systems

Product Type: Medical Air and Vacuum Systems

Product Model Number: See attachment

General Description: Medical vacuum and laboratory vacuum units contain pumps, a receiver tank, controller and filters.

Mounting Description: Rigid base mounted and neoprene pad mounted, See Certified Product Tables

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

Applicant Information

Applicant Company Name: Dynamic Certification Laboratories

Contact Person: Kelly Laplace

Mailing Address: 1315 Greg Parkway #109, Sparks, NV 89431

Telephone: (775) 358-5085 Email: Kelly@shaketest.com

Title: Business Manager

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

Company Name: THE VMC GROUP

Name: Kenneth Tarlow California License Number: S2851

Mailing Address: 980 9th Street, 16th Floor, Sacramento, CA 95814

Telephone: (832) 627-2214 Email: ken.tarlow@thevmcgroup.com

Certification Method

☐ GR-63-Core ☒ ICC-ES AC156 ☐ IEEE 344 ☐ IEEE 693 ☐ NEBS 3

☐ Other (Please Specify):

Testing Laboratory

Company Name: DYNAMIC CERTIFICATION LABORATORY (DCL)

Contact Person: Kelly Laplace

Mailing Address: 1315 Greg St., Ste 109, Sparks NV 89431

Telephone: (775) 358-5085 Email: Kelly@shaketest.com

Seismic Parameters

Design Basis of Equipment or Components (F_p/W_p) = 1.40 (Rigid); 4.39 (Internally isolated), 3.51 (externally isolated with neoprene elements)

S_{DS} (Design spectral response acceleration at short period, g) = 1.95

a_p (Amplification factor) = 1.0 (Rigid), 2.5 (internally isolated system), 2.5 (externally isolated with neoprene elements)

R_p (Response modification factor) = 2.5 (Rigid), 2.0 (internally isolated system), 2.5 (externally isolated with neoprene elements)

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height ratio factor) = 1

Natural frequencies (Hz) = See Attachment

Overall dimensions and weight = See Attachment

HCAI Approval (For Office Use Only) - Approval Expires on 08/23/2028

Date: 8/23/2022

Name: Mohammad Karim Title: Supervisor, Health Facilities

Special Seismic Certification Valid Up to: S_{DS} (g) = 1.95 z/h = 1

Condition of Approval (if applicable):

Special Seismic Certification

Table 1 - Certified Components - Stacked Systems, Lubricated Rotary Vane, Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Flexible Base Mount

Medical System Model	Laboratory System Model	HP	Tank Size [1] (gallons)	Total Number of Pumps	Vertically Stacked Pumps or Layers	Horizontally Arrayed Pumps	Max. Dimensions (in)			Max. Operating Weight (lb)	Mounting	Unit
							Length	Width	Height			
Stacked Systems												
Duplex												
VPD0404	LVPD0404	5 (2)	120 V	2	2	1	55	64	76	1,340	Flexible base (neoprene) w/ internal isolation	UUT1
VPD0405	LVPD0405	5 (2)	200 V	2	2	1	55	64	83	1,600		Interpolated
VPD0504	LVPD0504	5 (2)	120 V	2	2	1	55	64	76	1,685		Interpolated
VPD0XXX	LVPD0XXX	5 (2)	200 V	2	2	1	70	45	80	1,940		UUT5 [2]
VPD0754	LVPD0754	7.5 (2)	120 V	2	2	1	55	64	76	1,760		Interpolated
VPD0755	LVPD0755	7.5 (2)	200 V	2	2	1	55	64	83	1,960		Interpolated
VPD1004	LVPD1004	10 (2)	120 V	2	2	1	55	64	76	2,050		Interpolated
VPD1005	LVPD1005	10 (2)	200 V	2	2	1	55	64	83	2,250		Interpolated
VPD1505	LVPD1505	15 (2)	200 V	2	2	1	70	90	87	4,280		Interpolated
VPD2005	LVPD2005	20 (2)	200 V	2	2	1	70	90	87	4,610		Interpolated
VPD2505	LVPD2505	25 (2)	200 V	2	2	1	70	90	87	5,130		UUT2
Triplex (based on 2-stack plus 1 layout)												
VPT0504	LVPT0504	5 (3)	120 V	3	2,1	2	55	96	76	1,950	Flexible base (neoprene) w/ internal isolation	Extrapolated [3]
VPT0505	LVPT0505	5 (3)	200 V	3	2,1	2	55	96	83	2,350		Extrapolated [3]
VPT0754	LVPT0754	7.5 (3)	120 V	3	2,1	2	55	96	76	2,400		Extrapolated [3]
VPT0755	LVPT0755	7.5 (3)	200 V	3	2,1	2	55	96	83	2,600		Extrapolated [3]
VPT1004	LVPT1004	10 (3)	120 V	3	2,1	2	55	96	76	3,000		Extrapolated [3]
VPT1005	LVPT1005	10 (3)	200 V	3	2,1	2	55	96	83	3,200		Extrapolated [3]
VPT1505	LVPT1505	15 (3)	200 V	3	2,1	2	70	135	87	5,850		Extrapolated [3]
VPT2005	LVPT2005	20 (3)	200 V	3	2,1	2	70	135	87	6,250		Extrapolated [3]
VPT2505	LVPT2505	25 (3)	200 V	3	2,1	2	71	135	87	6,800		Extrapolated [3]
Triplex (3-stack)												
VPT0304	LVPT0304	3 (3)	120 V	3	3	1	55	64 or 66	84	1,635	Flexible base (neoprene) w/ internal isolation	Extrapolated [3]
VPT0404	LVPT0404	5 (3)	120 V	3	3	1	55	64 or 66	84	1,710		Extrapolated [3]
VPT0504	LVPT0504	5 (3)	120 V	3	3	1	55	64 or 66	87	1,850		Extrapolated [3]
VPT0XXX	LVPT0XXX	7.5 (2), 3 (1)	N/A	3	3	1	55	32	85	1,680		UUT8 [4]
VPT0505	LVPT0505	5 (3)	200V	3	3	1	55	64 or 66	87	1,975		Extrapolated [3]
VPT0754	LVPT0754	7.5 (3)	120 V	3	3	1	55	64 or 66	87	2,425		Extrapolated [3]
VPT0755	LVPT0755	7.5 (3)	200 V	3	3	1	55	64 or 66	87	2,550		Extrapolated [3]

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1. V in tank listing indicates vertical orientation
2. UUT5 as tested was a pump skid only to certify alternate pumps. Skids are structurally independent and flexibly connected.
3. See Justification Matrix for explanation of extrapolated units.
4. UUT8 tested with a 7.5 HP claw pump (upper position), 7.5 HP lubricated pump (middle position), and 3 HP lubricated pump (lower position). Units are modular in nature; UUT8 was tested without a receiver tank and control panel skid. Receiver tanksand control panels are bookended by UUT1 and UUT2.

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Table 1 - Certified Components (Continued) - Stacked Systems, Lubricated Rotary Vane, Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Flexible Base Mount

Medical System Model	Laboratory System Model	HP	Tank Size [1] (gallons)	Total Number of Pumps	Vertically Stacked Pumps or Layers	Horizontally Arrayed Pumps	Max. Dimensions (in)			Max. Operating Weight (lb)	Mounting	Unit
							Length	Width	Height			
Stacked Systems (Continued)												
Quadruplex												
VPQ0505	LVPQ0505	5 (4)	200 V	4	2,2	2	55	96	83	2,850	Flexible base (neoprene) w/ internal isolation	Extrapolated [3]
VPQ0755	LVPQ0755	7.5 (4)	200 V	4	2,2	2	55	96	83	3,150		Extrapolated [3]
VPQ1005	LVPQ1005	10 (4)	200 V	4	2,2	2	55	96	83	3,900		Extrapolated [3]
VPQ1505	LVPQ1505	15 (4)	200 V	4	2,2	2	70	135	87	7,150		Extrapolated [3]
VPQ2005	LVPQ2005	20 (4)	200 V	4	2,2	2	70	135	87	7,750		Extrapolated [3]
VPQ2505	LVPQ2505	25 (4)	200 V	4	2,2	2	71	135	87	8,600		Extrapolated [3]
Penta, Hexa and Octoplex Variants Using The Same Stack Construction												
VPP2506	LVPP2506	25 (5)	240 V	5	2,2,1	3	80	180	96	9,800	Flexible base (neoprene) w/ internal isolation	Extrapolated [3]
VPH2506	LVPH2506	25 (6)	240 V	6	2,2,2	3	80	225	96	10,200		Extrapolated [3]
VPO2506	LVPO2506	25 (8)	240 V	8	2,2,2,2	4	80	225	96	11,900		UUT2, UUT13 [2]
Expandable												
VPD0504-EX3	LVPD0504-EX3	5 (2)	120 V	2 (3)	2	1 (2)	55	64	76	1,685	Flexible base (neoprene) w/ internal isolation	Extrapolated [3]
VPD0505-EX3	LVPD0505-EX3	5 (2)	200 V	2 (3)	2	1 (2)	55	64	83	1,905		Extrapolated [3]
VPD0754-EX3	LVPD0754-EX3	7.5 (2)	120 V	2 (3)	2	1 (2)	55	64	76	1,760		Extrapolated [3]
VPD0755-EX3	LVPD0755-EX3	7.5 (2)	200 V	2 (3)	2	1 (2)	55	64	83	1,960		Extrapolated [3]
VPD1004-EX3	LVPD1004-EX3	10 (2)	120 V	2 (3)	2	1 (2)	55	64	76	2,050		Extrapolated [3]
VPD1005-EX3	LVPD1005-EX3	10 (2)	200 V	2 (3)	2	1 (2)	55	64	83	2,250		Extrapolated [3]
VPD1505-EX3	LVPD1505-EX3	15 (2)	200 V	2 (3)	2	1 (2)	70	90	87	4,280		Extrapolated [3]
VPD2005-EX3	LVPD2005-EX3	20 (2)	200 V	2 (3)	2	1 (2)	70	90	87	4,610		Extrapolated [3]
VPD2505-EX3	LVPD2505-EX3	25 (2)	200 V	2 (3)	2	1 (2)	71	90	87	5,030		Extrapolated [3]
VPT0505-EX4	LVPT0505-EX4	5 (3)	200 V	3 (4)	2	2	55	96	83	2,350		Extrapolated [3]
VPT0755-EX4	LVPT0755-EX4	7.5 (3)	200 V	3 (4)	2	2	55	96	83	2,600		Extrapolated [3]
VPT1005-EX4	LVPT1005-EX4	10 (3)	200 V	3 (4)	2	2	55	96	83	3,200		Extrapolated [3]
VPT1505-EX4	LVPT1505-EX4	15 (3)	200 V	3 (4)	2	2	70	135	87	5,850		Extrapolated [3]
VPT2005-EX4	LVPT2005-EX4	20 (3)	200 V	3 (4)	2	2	70	135	87	6,250		Extrapolated [3]
VPT2505-EX4	LVPT2505-EX4	25 (3)	200 V	3 (4)	2	2	71	135	87	6,800		Extrapolated [3]

1. V in tank listing indicates vertical orientation

2. 2-high 25 HP vacuum pump stack tested in UUT2. Octoplex controller tested in UUT13. 240 gallon tank tested in UUT4b. Dimensions and weight shown here for the VPO2506 are calculated, assuming octoplex system contains of four of the duplex pump stacks as tested in UUT2.

3. See Justification Matrix for explanation of extrapolated units

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Table 2 - Justification Matrix for Extrapolation -
Stacked Systems, Lubricated Rotary Vane, Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Flexible Base Mount

Unit	Units Used For Extrapolation	Difference From Units Used For Extrapolation
VPT0504	UUT 1 (VPD0404)	The duplex units tested in UUT1 and UUT2 consist of two pumps mounted on one side of the vertical tank. The extrapolated triplex systems consist of two pumps mounted on one side of the vertical tank and one pump mounted on the other side of the vertical tank. The pumps are mounted to independent skids.
VPT0505	↑	
VPT0754		
VPT0755		
VPT1004		
VPT1005		
VPT1505		
VPT2005	↓	
VPT2505	UUT 2 (VPD2505)	
VPQ0505	UUT 1 (VPD0404)	The duplex units tested in UUT1 and UUT2 consist of two pumps mounted on one side of the vertical tank. The extrapolated quadraplex systems consist of two pumps mounted on one side of the vertical tank and two pump mounted on the other side of the vertical tank. The pumps are mounted to independent skids.
VPQ0755	↑	
VPQ1005		
VPQ1505		
VPQ2005	↓	
VPQ2505	UUT 2 (VPD2505)	
VPP2505	UUT 2 (VPD2505)	The duplex unit tested in UUT2 consists of two 25 HP pumps mounted on one side of the vertical tank. The extrapolated pentaplex, hexaplex and octoplex systems consist of two pumps mounted on one side of the vertical tank and two additional two-pump stacks mounted on the other side of the vertical tank. The pumps are mounted to independent skids. The octoplex controller was tested in UUT13.
VPH2505	UUT 2 (VPD2505)	
VPO2505	UUT 2 (VPD2505)	
VPD0504-EX3	UUT 1 (VPD0404)	The extrapolated expandable units consist of an independent receiver tank/control panel skid and an independent pump skid. The tested units UUT1 and UUT2 consisted of independent receiver tank/control panel skid and an independent pump skid.
VPD0505-EX3	↑	
VPD0754-EX3		
VPD0755-EX3		
VPD1004-EX3		
VPD1005-EX3		
VPD1505-EX3		
VPD2005-EX3		
VPD2505-EX3		
VPT0505-EX4		
VPT0755-EX4		
VPT1005-EX4		
VPT1505-EX4		
VPT2005-EX4	↓	
VPT2505-EX4	UUT 2 (VPD2505)	

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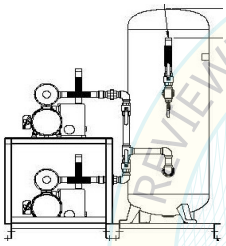
Table 2 - Justification Matrix for Extrapolation (Cont.) -

Stacked Systems, Lubricated Rotary Vane, Flexible Base Mount

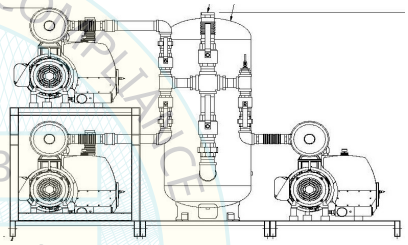
DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Flexible Base Mount

Unit	Units Used For Extrapolation	Difference From Units Used For Extrapolation
VPD0504	UUT5 (VPD0XXX)	UUT5 consists of a representative frame and base platform with a pump (RA0155A 5 HP) similar to that of UUT 1 in the lower position and a larger claw pump (replacing the pump in UUT4) in the upper position.
VPD0505		
VPT0304	UUT8 (VPT0XXX)	UUT8 consists of a representative base and frame structure. The top position is occupied by a claw pump heavier than the certified lube models, with the lowest position occupied by the lightest of the certified lube models and the mid position by the largest pump in the certified list. Control and tank skid for certified units are the same as was tested in UUT1 and UUT2.
VPT0404		
VPT0504		
VPT0505		
VPT0754		
VPT0755		

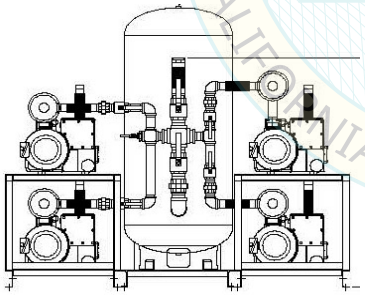
Duplex System



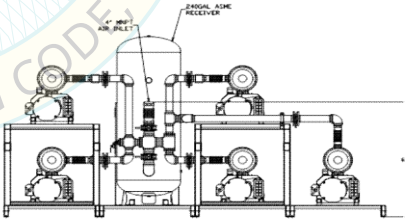
Triplex System



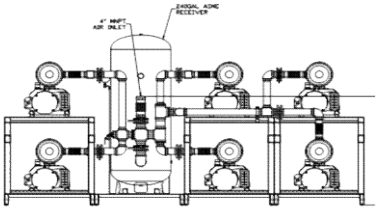
Quadruplex System



Pentaplex System



Hexaplex System



Octoplex System

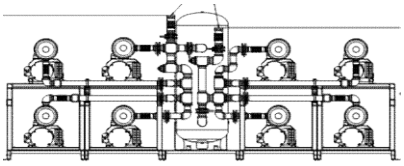


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Table 3 - Certified Components - Stacked Units, Claw Oilless, Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Flexible Base Mount

Medical System Model	Laboratory System Model	HP	Tank Size [1]	Total Number of Pumps	Vertically Stacked Pumps or Layers	Horizontally Arrayed Pumps	Max. Dimensions (in)			Maximum Operating Weight (lb)	Mounting	Unit
							Length	Width [2]	Height			
Stacked Systems												
Duplex												
CVPD0504A	LCPD0504 [3]	5 (2)	120 V	2	2	1	55	64	76	1,690	Flexible base (neoprene) w/ internal isolation	UUT3
CVPD0504B	LCPD0604 [3]	6.4 (2)	120 V	2	2	1	55	64	76	1,925		Interpolated
CVPD0754A	LCPD0704	7.0 (2)	120 V	2	2	1	55	64	76	2,175		Interpolated
CVPD0754B	LCPD0904 [3]	9.1 (2)	120 V	2	2	1	55	64	76	2,400		Interpolated
CVPD1005	LCPD1005	10 (2)	200 V	2	2	1	55	64	83	2,875		Interpolated
CVPDXXXX	LCPDXXXX	15 (1), 5 (1)	N/A	2	2	1	70	45	80	1,940		UUT5 [4]
CVPD1505	LCPD1505	15 (2)	200 V	2	2	1	74	90	88	3,800		UUT4 [6]
Triplex (based on 2-stack plus 1 layout)												
CVPT0504A	LCPT0504	5 (3)	120 V	3	2, 1	2	55	96	76	2,150	Flexible base (neoprene) w/ internal isolation	Extrapolated [7]
CVPT0505A	LCPT0505	5 (3)	200 V	3	2, 1	2	55	96	83	2,275		Extrapolated [7]
CVPT0504B	LCPT0604	6.4 (3)	120 V	3	2, 1	2	55	96	76	2,000		Extrapolated [7]
CVPT0505B	LCPT0605	6.4 (3)	200 V	3	2, 1	2	55	96	83	2,150		Extrapolated [7]
CVPT0755A	LCPT0705	7.0 (3)	200 V	3	2, 1	2	55	96	83	3,200		Extrapolated [7]
CVPT0755B	LCPT0905	9.1 (3)	200 V	3	2, 1	2	55	96	83	3,500		Extrapolated [7]
CVPT1005	LCPT1005	10 (3)	200 V	3	2, 1	2	55	96	83	4,200		Extrapolated [7]
CVPT1505	LCPT1505	15 (3)	200 V	3	2, 1	2	71	135	88	4,800		Extrapolated [7]
Triplex (3-stack)												
CVPT0XXXX	LCVPT0XXXX	7.5 (2), 3 (1)	N/A	3	3	1	55	32	85	1,680	Flexible base (neoprene) w/ internal isolation	UUT8 [5]
CVPT0304	LCVPT0304	3 (3)	120 V	3	3	1	55	64 or 66	84	2,200		Extrapolated [7]
CVPT0504A	LCVPT0504	4-5 (3)	120 V	3	3	1	55	64 or 66	84	2,235		Extrapolated [7]
CVPT0504B	LCVPT0604	5-6.4 (3)	120 V	3	3	1	55	64 or 66	87	2,360		Extrapolated [7]
CVPT0505A	LCVPT0505	4-5 (3)	200V	3	3	1	55	64 or 66	87	2,275		Extrapolated [7]
CVPT0505B	LCVPT0605	5-6.4 (3)	200V	3	3	1	55	64 or 66	87	2,400		Extrapolated [7]
CVPT0754A	LCVPT0754A	6.4-7.5 (2)	120 V	3	3	1	55	64 or 66	87	2,565		Extrapolated [7]
CVPT0755A	LCVPT0755A	6.4-7.5 (2)	200 V	3	3	1	55	64 or 66	87	2,690		Extrapolated [7]
CVPT0754B	LCVPT0754B	7.5-9.1 (2)	120 V	3	3	1	55	64 or 66	87	2,600		Extrapolated [7]
CVPT0755B	LCVPT0755B	7.5-9.1 (2)	200 V	3	3	1	55	64 or 66	87	2,725		Extrapolated [7]

Continued on Next Page

1. V or H in tank listing indicates vertical or horizontal orientation
2. When touchscreen controls are used, additional 2 inch space is required between skids
3. No drawing available for these models - configuration is same as equivalent Medical unit
4. UUT5 was tested as a pump skid only to certify alternate pumps
5. UUT8 was tested as a pump skid only to certify alternate pumps. UUT8 tested with a 7.5 HP claw pump (upper position), 7.5 HP lubricated pump (middle position), and 3 HP lubricated pump (lower position). 3 HP claw pump tested in UUT6. Receiver tanks and control panels bookended by UUT3 and UUT4.
6. Octoplex controller tested in UUT13; 2-high 15 HP vacuum pump stack tested in UUT4. Dimensions and weight shown here for the CVPO1506 are calculated, assuming octoplex system consists of four of the duplex pump stacks as tested in UUT4.
7. See Justification Matrix for explanation of extrapolated units.

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Table 3 - Certified Components (Continued) - Stacked Units, Claw Oilless, Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Flexible Base Mount

Medical System Model	Laboratory System Model	HP	Tank Size [1]	Total Number of Pumps	Vertically Stacked Pumps or Layers	Horizontally Arrayed Pumps	Max. Dimensions (in)			Maximum Operating Weight (lb)	Mounting	Unit
							Length	Width [2]	Height			
Stacked Systems												
Quadruplex												
CVPQ0505A	LCPQ0505	5 (4)	200 V	4	2,2	2	55	96	83	2,500	Flexible base (neoprene) w/ internal isolation	Extrapolated [4]
CVPQ0505B	LCPQ0605	6.4 (4)	200 V	4	2,2	2	55	96	83	2,700		Extrapolated [4]
CVPQ0755A	LCPQ0705	7.0 (4)	200 V	4	2,2	2	55	96	83	3,600		Extrapolated [4]
CVPQ0755B	LCPQ0905	9.1 (4)	200 V	4	2,2	2	55	96	83	4,000		Extrapolated [4]
CVPQ1005	LCPQ1005	10 (4)	200 V	4	2,2	2	55	96	83	4,900		Extrapolated [4]
CVPQ1505	LCPQ1505	15 (4)	200 V	4	2,2	2	71	135	88	5,600		Extrapolated [4]
Penta, Hexa and Octoplex Variants Using the Same Stack Construction												
CVPP1506	LCPP1506	15 (5)	240 v	5	2,2,1	2	180	80	96	6,200	Flexible base (neoprene) w/ internal isolation	Extrapolated [4]
CVPH1506	LCPH1506	15 (6)	240 v	6	2,2,2	2	225	80	96	6,800		Extrapolated [4]
CVPO1506	LCPO1506	15 (7)	240 v	8	2,2,2,2	2	225	80	96	9,850		UUT4, UUT13 [3]

1. V or H in tank listing indicates vertical or horizontal orientation
2. When touchscreen controls are used, additional 2 inch space is required between skids
3. Octoplex controller tested in UUT13; 2-high 15 HP vacuum pump stack tested in UUT4. Dimensions and weight shown here for the CVPO1506 are calculated, assuming octoplex system consists of four of the duplex pump stacks as tested in UUT4.
4. See Justification Matrix for explanation of extrapolated units.

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Table 4 - Justification Matrix for Extrapolation -

Stacked Systems, Claw Oilless, Flexible Base Mount

DCL Project Number:

Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Flexible Base Mount

Unit	Units Used For Extrapolation	Difference From Units Used For Extrapolation
CVPT0504A	UUT 3 (CVPD0504A)	The duplex units tested in UUT3 and UUT4 consist of two pumps mounted on one side of the vertical tank. The extrapolated triplex systems consist of two pumps mounted on one side of the vertical tank and one pump mounted on the other side of the vertical tank. The pumps are mounted to independent skids.
CVPT0505A	↕	
CVPT0504B		
CVPT0505B		
CVPT0755A		
CVPT0755B		
CVPT1005		
CVPT1505	UUT 4 (CVPD1505)	
CVPQ0505A	UUT 3 (CVPD0504A)	The duplex units tested in UUT3 and UUT4 consist of two pumps mounted on one side of the vertical tank. The extrapolated quadraplex systems consist of two pumps mounted on one side of the vertical tank and two pump mounted on the other side of the vertical tank. The pumps are mounted to independent skids.
CVPQ0505B	↕	
CVPQ0755A		
CVPQ0755B		
CVPQ1005		
CVPQ1505	UUT 4 (CVPD1505)	
CVPP1506	UUT 4 (CVPD1505)	The duplex unit tested in UUT4 consists of two 15 HP pumps mounted on one side of the vertical tank. The extrapolated pentaplex, hexaplex and octoplex systems consist of two pumps mounted on one side of the vertical tank and two additional two-pump stacks mounted on the other side of the vertical tank. The pumps are mounted to independent skids. The octoplex controller was tested in UUT13.
CVPH1506	UUT 4 (CVPD1505)	
CVPO1506	UUT 4 (CVPD1505)	

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Table 4 - Justification Matrix for Extrapolation (Cont.) -

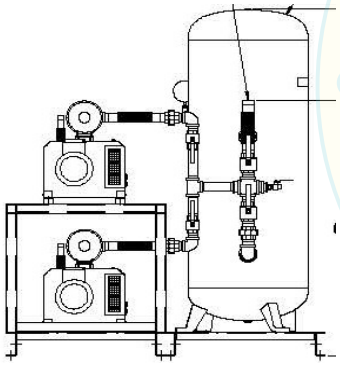
Stacked Systems, Claw Oilless, Flexible Base Mount

DCL Project Number:

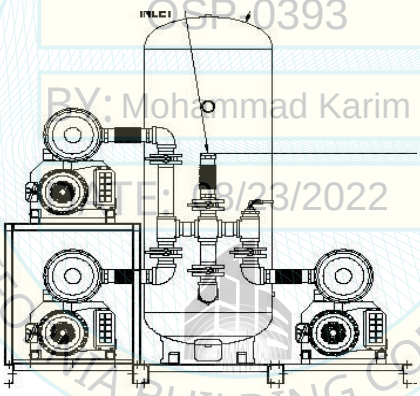
Manufacturer:	Powerex
Product Line:	Medical Vacuum and Laboratory Vacuum
Mounting:	Flexible Base Mount

CVPD1505	UUT5	UUT5 demonstrates an alternate 15HP claw pump; as the pump used in UUT4 is replaced by a similar, yet structurally different pump designated MM1502. The MM1502 pump is tested in the upper position of the frame set.
CVPT0303	UUT8	UUT8 consists of a triplex stack utilizing a base and frame as tested in previously certified models. UUT8 has the 7.5 Oilless Claw pump in the highest (top) position and alternate pumps in the lower positions. Tank and Control skids are the same as tested in UUT3, UUT4.
CVPT0503A		
CVPT0504A		
CVPT0505A		
CVPT0504B		
CVPT0505B		
CVPT0754A		
CVPT0754B		
CVPT0755A		
CVPT0755B		

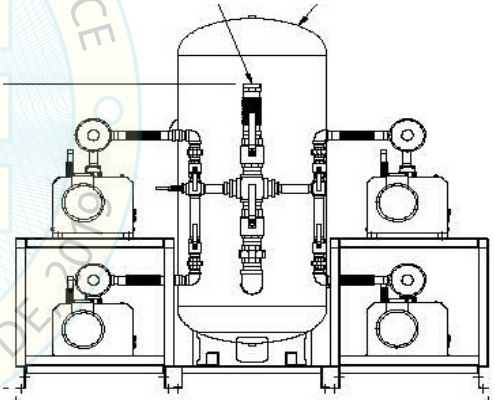
Duplex System



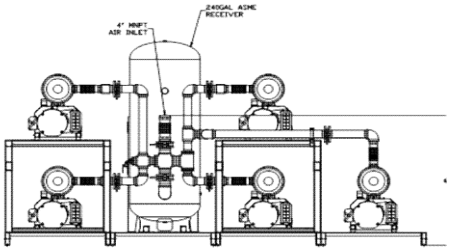
Triplex System



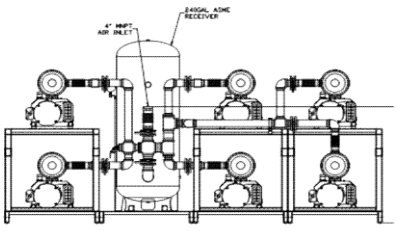
Quadruplex System



Pentaplex System



Hexaplex System



Octoplex System

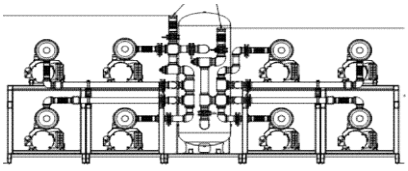


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Table 5 - Certified Components - Tank Over Systems, Lubricated Rotary Vane, Rigid or Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Rigid or Flexible Base Mount

Medical System Model	Laboratory System Model	HP	Tank Size [1] (gallons)	Total Number of Pumps	Vertically Stacked Pumps or Layers	Horizontally Arrayed Pumps	Max. Dimensions (in)			Max. Operating Weight (lb)	Mounting	Unit
							Length	Width	Height			
Tank Over Systems												
VPDT0302	LVPT0302	3(2)	60 H	2	2	1	74	39	89	1,440	Rigid or flexible base mount (neoprene) w/ internal isolation	Extrapolated [4]
VPDT0402	LVPDT0402	5 (2)	60 H	2	2	1	74	39	89	1,590		Extrapolated [4]
VPDT0502	LVPDT0502	5 (2)	60 H	2	2	1	74	39	89	1,815		Extrapolated [4]
VPDT0XXX	LVPDT0XXX	7.5 (1), 3 (1)	60 H	2	2	1	74	39	89	1,450	Rigid base w/ internal isolation	UUT6 [2,3]
VPDT0752	LVPDT0752	7.5 (2)	60 H	2	2	1	74	39	89	2,295	Rigid or flexible base mount (neoprene) w/ internal isolation	Extrapolated [4]

1. H in tank listing indicates horizontal orientation
2. UUT6 tested with a 7.5 HP lubricated pump in the top position, and a 3 HP lubricated pump in the bottom position.
3. See UUT7, tested in flexible base mounted condition for bookending of tank-over systems.
4. See Justification Matrix for explanation of extrapolated units.

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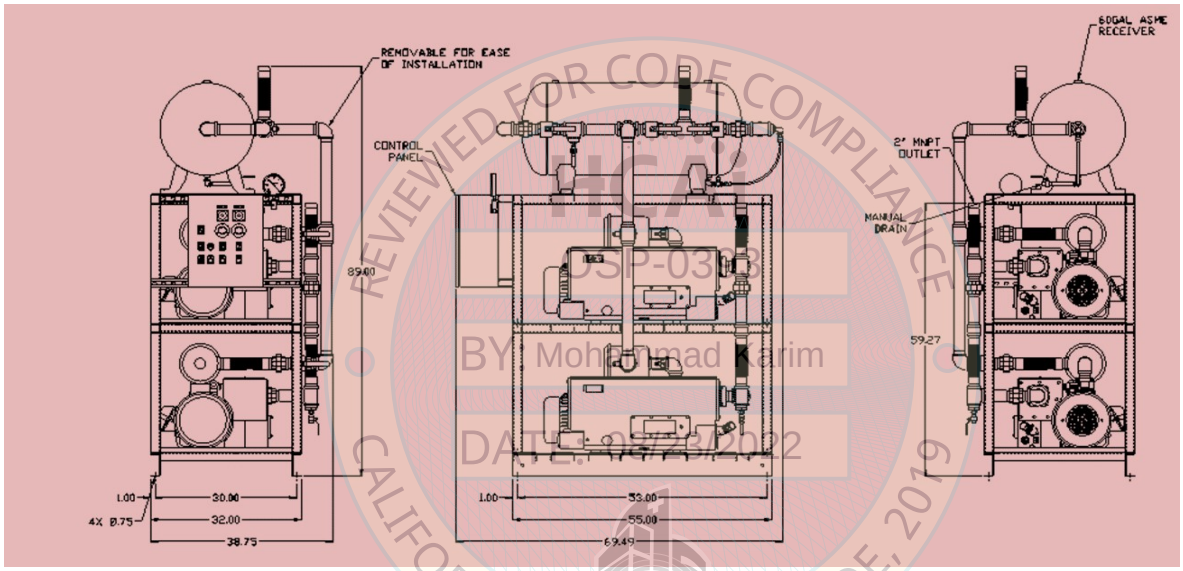
Table 6 - Justification Matrix for Extrapolation -

Tank Over Systems, Lubricated Rotary Vane, Rigid or Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Rigid or Flexible Base Mount

Unit	Units Used For Extrapolation	Difference From Units Used For Extrapolation
VPDT0302	UUT6 (VPDT0XXX)	UUT6 consists of a representative base and frame structure with a 3HP vacuum pump in the lower tier and a 7.5 HP vacuum pump in the upper pump tier, with a 60 gallon horizontal tank rigidly bolted above, plumbed and with electrical control panel mounted to the frame system. Also see UUT7 for bookending of tank-over systems.
VPDT0402		
VPDT0502		
VPDT0752		

Tank Over Construction
Duplex:



Triplex:

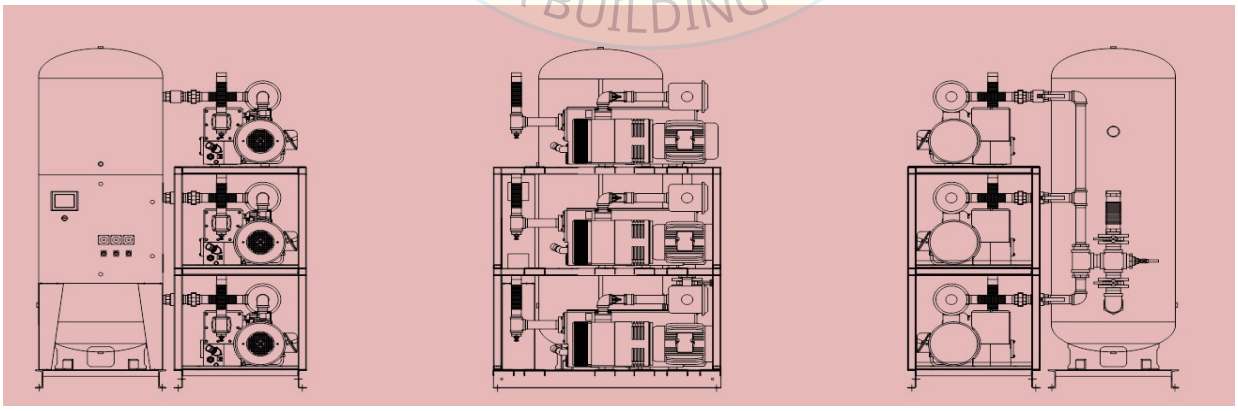


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Table 7 - Certified Components - Tank Over Units, Claw Oilless

Rigid or Flexible Base Mount

DCL Project Number: 32579-2201

Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Rigid or Flexible Base Mount

Medical System Model	Laboratory System Model	HP	Tank Size [1]	Total Number of Pumps	Vertically Stacked Pumps or Layers	Horizontally Arrayed Pumps	Max. Dimensions (in)			Maximum Operating Weight (lb)	Mounting	Unit
							Length	Width [2]	Height			
Tank Over Systems												
CVPDT0302	LCVPT0302	3(2)	60 H	2	2	1	74	39	89	1,600	Rigid or flexible base (neoprene) w/ internal isolation	Extrapolated [5]
CVPDT0XXX	LCVPT0XXXX	7.5 (1), 3 (1)	60 H	2	2	1	74	39	89	1,910	Flexible base (neoprene) w/ internal isolation	UUT7 [3, 4]
CVPDT0502A	LCVPDT0502	4-5 (2)	60 H	2	2	1	74	39	89	1,860	Rigid or flexible base (neoprene) w/ internal isolation	Extrapolated [5]
CVPDT0502B	LCVPDT0602	5-6.4 (2)	60 H	2	2	1	74	39	89	1,910		Extrapolated [5]
CVPDT0752A	LCVPDT0702	6.4-7.5 (2)	60 H	2	2	1	74	39	89	2,030		Extrapolated [5]
CVPDT0752B	LCVPDT0752	7.5-9.1 (2)	60 H	2	2	2	74	39	89	2,145		Extrapolated [5]

1. V or H in tank listing indicates vertical or horizontal orientation
2. When touchscreen controls are used, additional 2 inch space is required between skids
3. UUT7 tested with a 7.5 HP claw pump in the top position, and a 3 HP claw pump in the bottom position.
4. See UUT6 for bookending of tank-over systems.
5. See Justification Matrix for explanation of extrapolated units.

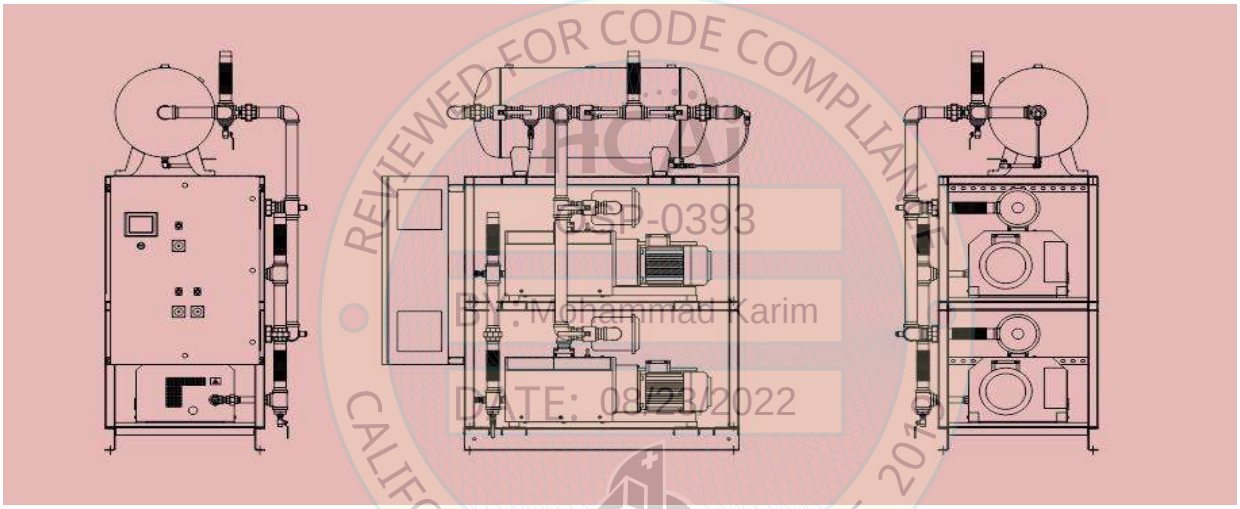
Special Seismic Certification
Table 8 - Justification Matrix for Extrapolation -
Tank Over Systems, Claw Oilless, Rigid or Flexible Base Mount

DCL Project Number:

Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Rigid or Flexible Base Mount

Unit	Units Used For Extrapolation	Difference From Units Used For Extrapolation
CVPDT0302	UUT7	UUT7 consists of a representative frame and base platform with a pump, MM1144, similar to that of UUT 3 in the lower position and a 7.5HP pump MM1252 in the upper position. These two pumps encompass the range for the Tank-Over construction.
CVPDT0502A		
CVPDT0502B		
CVPDT0752A		
CVPDT0752B		

Tank Over Construction
Duplex:



Triplex:

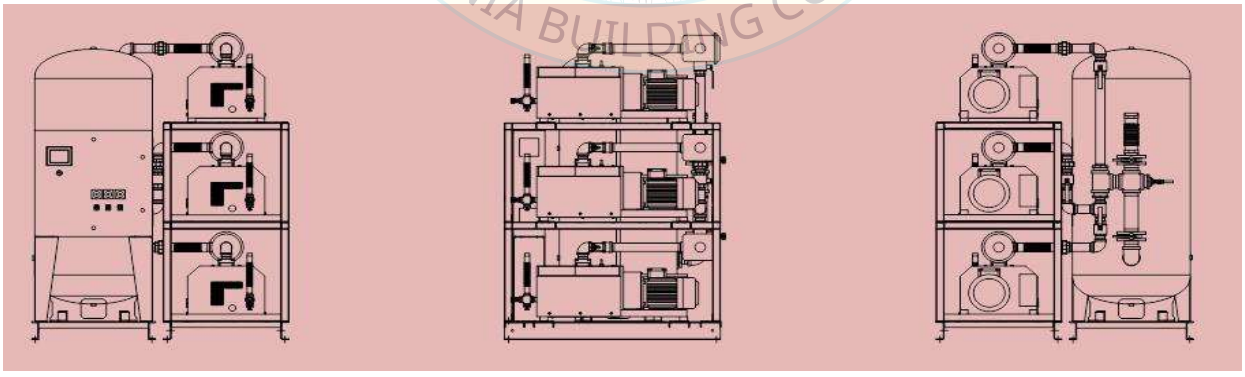


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Table 9 - Certified Components - Tank Mounted Vertical Systems, Rigid or Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Rigid or Flexible Base Mount

Medical System Model	Laboratory System Model [1]	HP	Tank Size (gallons)	Total Number of Pumps	Vertically Stacked Pumps or Layers	Horizontally Arrayed Pumps	Max. Dimensions (in)			Maximum Operating Weight (lb)	Tested Mounting	Certified Mounting	Unit
							Length	Width	Height				
Tank Mounted Vertical Systems with Oilless Rotary Vane Pumps													
VVOTD0153	LVVOD0153	1.5	80	2	1	2	43	30	74	710	Rigid base	Rigid or flexible base (neoprene) w/ internal isolation	UUT21 [2,4]
VVOTD0203	LVVOD0203	2	80	2	1	2	53	34	80	930	N/A		Interpolated
VVOTD0303	LVVOD0303	3	80	2	1	2	53	34	80	1,100	N/A		Interpolated
VVOTD0304	LVVOD0304	3	120	2	1	2	53	34	89	1,180	N/A		Interpolated
VVOTD0403	LVVOD0403	4	80	2	1	2	53	34	80	1,125	N/A		Interpolated
VVOTD0404	LVVOD0404	4	120	2	1	2	53	34	89	1,200	N/A		Interpolated
VVOTD0503	LVVOD0503	5	80	2	1	2	53	34	90	1,320	N/A		Interpolated
VVOTD0504	LVVOD0504	5	120	2	1	2	53	34	90	1,170	Flexible base (neoprene)		UUT23 [3,4]

1. Lab systems identical to medical systems (software change only).
2. UUT21 tested with conventional 80 gal tank, one 1.5 HP lubricated rotary vane pump and one 1.5HP oilless rotary vane pump.
3. UUT23 tested with conventional style 120 gal tank and two 5 HP oilless rotary vane pumps.
4. UUT21 was tested in rigid base configuration and serves as the lower bookend, UUT 23 was tested in flexible base confiugration and serves as the upper bookend.

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Table 9 - Certified Components (Cont.) - Tank Mounted Vertical Systems, Rigid Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum
Mounting: Rigid Base Mount

Medical System Model	Laboratory System Model [1]	HP	Tank Size (gallons)	Total Number of Pumps	Vertically Stacked Pumps or Layers	Horizontally Arrayed Pumps	Max. Dimensions (in)			Maximum Operating Weight (lb)	Tested Mounting	Certified Mounting	Unit
							Length	Width	Height				
Tank Mounted Vertical Systems with Lubricated Rotary Vane Pumps													
VVTD0153	LVVD0153	1.5	80	2	1	2	43	30	74	710	Rigid base	Rigid base w/ internal isolation	UUT21 [2]
VVTD0203	LVVD0203	2	80	2	1	2	42	30	75	835	N/A		Interpolated
VVTD0204	LVVD0204	2	120	2	1	2	44	50	75.5	880	N/A		Interpolated
VVTD0303	LVVD0303	3	80	2	1	2	55	30	85	1,260	Rigid base		UUT22 [3]
VVTD0304	LVVD0304	3	120	2	1	2	54	37	84	1,475	N/A		Interpolated
VVTD0403	LVVD0403	4	80	2	1	2	54	37	84.5	1,350	N/A		Interpolated
VVTD0404	LVVD0404	4	120	2	1	2	54	37	84.5	1,500	N/A		Interpolated
VVTD0503	LVVD0503	5	80	2	1	2	58	37	87	1,260	N/A		Interpolated
VVTD0504	LVVD0504	5	120	2	1	2	59	35	85	1,670	Rigid base		UUT24 [4]
Tank Mounted Vertical Systems with Oilless Claw pumps													
CVTD0203V	LCVD0203	2	80	2	1	2	55	30	85	1,260	Rigid base	Rigid base w/ internal isolation	UUT22 [3]
CVTD0303V	LCVD0303	3	80	2	1	2	35	56	82	1,500	N/A		Interpolated
CVTD0504AV	LCVD0504AV	4	120	2	1	2	59	35	84	1,650	N/A		Interpolated
CVTD0504BV	LCVD0604	5	120	2	1	2	59	35	85	1,670	Rigid base		UUT24 [4]

1. Lab systems identical to medical systems (software change only).
2. UUT21 tested with conventional 80 gal tank, one 1.5 HP lubricated rotary vane pump and one 1.5HP oilless rotary vane pump.
3. UUT22 tested with frame style 80 gal tank, one 3 HP lubricated rotary vane pump and one 2 HP oilless claw pump.
4. UUT24 tested with frame style 120 gal tank, one 5 HP lubricated rotary vane pump and one 5 HP oilless claw pump.

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Table 10 - Certified Subcomponents - Stacked Units, Lubricated Rotary Vane and Claw Oilless, Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum

Lubricated Vane Vacuum Pumps							
Model [1]	Manufacturer	Material	Dimensions (in) L x W x H	HP	Voltage Tested	Voltage Certified	Unit
RA0063	Busch	Cast Iron lubricated vane vacuum pump with Face mounted TEFC motor, steel and aluminum body. Pump has rubber isolation feet.	28 x 19 x 12	3	208 V	208-230/460	UUT8
RC0101	Busch		29 x 19 x 12	5	208V		UUT1
RA0101	Busch		29 x 19 x 12	5	n/a		Interpolated
RC0155	Busch		38 x 22 x 16.5	5	n/a		Interpolated
RA0155A	Busch		31.5 x 20 x 13.5	5	460V		UUT5
RC0205	Busch		41 x 24 x 16.5	7.5 or 8	n/a		Interpolated
RA0205	Busch		41 x 24 x 16.5	7.5 or 8	208V		UUT8
RC0305	Busch		44 x 24 x 16.5	10	n/a		Interpolated
RA0255	Busch		44 x 24 x 16.5	10	n/a		Interpolated
RA0305	Busch		44 x 24 x 16.5	10	n/a		Interpolated
RC0400	Busch		54 x 38 x 26.5	15	n/a		Interpolated
RC0502	Busch		65.5 x 38 x 26.5	20	n/a		Interpolated
RC0630	Busch		69 x 40 x 26.5	25	460 V		UUT2

1. Pumps with Model No. RA0101, RA0205, RA0255 and RA0305 are structurally identical to RCXXXX models, interpolated based on UUT1 and UUT2.

Claw Oilless Vacuum Pumps							
Model	Manufacturer	Material	Dimensions (in) L x W x H	HP	Voltage Tested	Voltage Certified	Unit
MM1102	Busch	Cast Iron lubricated vane vacuum pump with Face mounted TEFC motor, steel and aluminum body. Pump has rubber isolation feet.	40 x 17 x 16	4.5 to 5	230V	208-230/460	UUT3
MM1142	Busch		42 x 17 x 16	5 to 6.4	n/a		Interpolated
MM1202	Busch		43 x 20 x 18	6.4 to 7	n/a		Interpolated
MM1252	Busch		43 x 20 x 18	7.5 to 9.1	208V / 230V		UUT8
MM1402	Busch		48 x 20 x 18	9 to 10.2	n/a		Interpolated
MM1322	Busch		48 x 20 x 18	9 to 10.2	n/a		Interpolated
MI1502	Busch		48 x 31 x 27	15	460V		UUT4
MM1502	Busch		54.5 x 20 x 18	15	460V		UUT5

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Table 10 - Certified Subcomponents (Cont.) - Stacked Units, Lubricated Rotary Vane and Claw Oilless, Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum

Tanks

Model [1]	Manufacturer	Material	Dimensions (in)	Capacity (gal)	Orientation	Unit
AR0274xxxx	Campbell Hausfeld [2]	Steel, ASME construction 200 psig [3]	24" Dia x 71" H	120	Vertical	UUT1, UUT3
AR0512xxxx			30" Dia x 77" H	200		UUT4
AR05130xAJ			30" Dia x 89"H	240		UUT4b
VES04767	Morganton	Steel, ASME construction 200 psig [3]	24" Dia x 70" H	120	Vertical	UUT 31b
VES07303			30" Dia x 80" H	200		interpolated
VES07072			30" Dia x 92"H	240		UUT 30b

1. xxxx in model number is for variations in paint color and threaded port sizes, not affecting structural elements.
2. Campbell Hausfeld is alternately branded as Twin Lakes Manufacturing.
3. Construction in accordance with ASME BPVC Section VIII. Tanks have an allowable working pressure rating of 200 psig.

Controllers

Model	Manufacturer	Description	Material	NEMA Rating	Dimensions (in)	Unit
BASIC_PVM (24x20x8)	Powerex	No Touchscreen	Powder coated carbon steel	12	24”H x 20”W x 8”D	Extrapolated [1]
BASIC_PVM (30x24x8)	Powerex	No Touchscreen	Powder coated carbon steel	12	30”H x 24”W x 8”D	Extrapolated [1]
BASIC_PVM (36x30x8)	Powerex	No Touchscreen	Powder coated carbon steel	12	36”H x 30”W x 8”D	Extrapolated [1]
HMI_PXMI (30x24x8)	Powerex	Human Machine Interface: Touchscreen	Powder coated carbon steel	12	30”H x 24”W x 8”D	UUT1
HMI_PXMI (36x30x8)	Powerex				36”H x 30”W x 8”D	Interpolated
PBMI_PXMI (30x24x8)	Powerex	Powerex Building Management Integrator: HMI panel with additional communications card	Powder coated carbon steel	12	30”H x 24”W x 8”D	Interpolated
PBMI_PXMI (36x30x8)	Powerex				36”H x 30”W x 8”D	UUT2
PBMI_VFD (42x30x12)	Powerex	Same as above with lead pump VFD	Powder coated carbon steel	12	42”H x 30”W x 12”D	UUT3, UUT4
PBMI_PXMI (42 x 30 x12)	Powerex	Powerex Building Management Integrator: HMI panel with additional communications card. Control configured for up to 8 pumps.	Powder coated carbon steel	12	42”H x 30”W x 12”D	UUT13

1. BASIC_PVM controller can be extrapolated because it is a depopulated version of the controllers tested in UUT 1, 2, 3 and 4.

Intake Filters

Model	Manufacturer	Material	Dimensions (in)	Connection Certified	Unit
CSL-150C	Solberg Mfg.	Powder coated steel housing with NPT intake and outlet	6.8 L x 7.3 Dia.	1-1/2" NPT	UUT1, UUT3
CSL-200C	Solberg Mfg.		10.3 L x 8.8 Dia.	2" NPT	Interpolated
CSL-300C	Solberg Mfg.		15.8 L x 13.3 Dia.	3" NPT	UUT4

Special Seismic Certification

Table 11 - Certified Subcomponents - Tank Over Systems, Lubricated Rotary Vane or Claw Oilless, Rigid or Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum

Vacuum Pumps							
Model [1]	Manufacturer	Material	Dimensions (in) L x W x H	HP	Voltage Tested	Voltage Certified	Unit
RA0063	Busch	Cast iron lubricated vane vacuum pump with face mounted TEFC motor, steel and aluminum body, rubber isolation feet attached to pump	28 x 19 x 12	3	208 V	208-230/460	UUT6
RC0101	Busch		29 x 19 x 12	5	208V		Interpolated
RA0101	Busch		29 x 19 x 12	5	n/a		Interpolated
RC0155	Busch		38 x 22 x 16.5	5	n/a		Interpolated
RA0155A	Busch		31.5 x 20 x 13.5	5	460V		Interpolated
RC0205	Busch		41 x 24 x 16.5	7.5 or 8	n/a		Interpolated
RA0205	Busch		41 x 24 x 16.5	7.5 or 8	208V		UUT6
MM1144	Busch	Oilless claw pump, with integrated lubricated cast iron drive gearbox, exhaust box, C face motor with aluminum finned shell, rubber isolation feet attached to steel foot rails	41 x 17 x 16	3	208V		UUT7
MM1102	Busch		40 x 17 x 16	4.5 to 5	230V		Interpolated
MM1142	Busch		42 x 17 x 16	5 to 6.4	n/a		Interpolated
MM1202	Busch		43 x 20 x 18	6.4 to 7	n/a		Interpolated
MM1252	Busch		43 x 20 x 18	7.5 to 9.1	208V / 230V		UUT7

1. Pumps with Model No. RA0101, RA0205, RA0255 and RA0305 are structurally identical to RCXXXX models, interpolated based on UUT6 test.

Tank						
Model [1]	Manufacturer	Material	Dimensions (in)	Capacity (gal)	Orientation	Unit
AR8029xxx	Campbell Hausfeld [2]	Steel, ASME construction 200 psig [3]	20" Dia x 47" L	60	Horizontal	UUT6, UUT7

1. xxxx in model number is for variations in paint color and threaded port sizes, not affecting structural elements.
2. Campbell Hausfeld is alternately branded as Twin Lakes Manufacturing.
3. Constructed in accordance with ASME BPVC Section VIII. Tanks have an allowable working pressure rating of 200 psig.

Special Seismic Certification

Table 11 - Certified Subcomponents (Cont.)- Tank Over Systems, Lubricated Rotary Vane or Claw Oilless, Rigid or Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum

Controllers						
Model	Manufacturer	Description	Material	NEMA rating	Dimensions (in)	Unit
BASIC_PVM (24x20x8)	Powerex	No Touchscreen	Powder coated carbon steel	12	24”H x 20”W x 8”D	UUT6
BASIC_PVM (30x24x8)					30”H x 24”W x 8”D	Interpolated
BASIC_PVM (36x30x8)					36”H x 30”W x 8”D	Interpolated
HMI_PXMI (30x24x8)		Human Machine Interface: Touchscreen	Powder coated carbon steel	12	30”H x 24”W x 8”D	Interpolated
HMI_PXMI (36x30x8)					36”H x 30”W x 8”D	Interpolated
PBMI_PXMI (30x24x8)		Powerex Building Management Integrator: HMI panel with additional communications card	Powder coated carbon steel	12	30”H x 24”W x 8”D	Interpolated
PBMI_PXMI (36x30x8)					36”H x 30”W x 8”D	Interpolated
PBMI_VFD (42x30x12)		Same as above with lead pump VFD	Powder coated carbon steel	12	42”H x 30”W x 12”D	UUT7

Intake Filters					
Model	Manufacturer	Material	Dimensions (in)	Connection size	Unit
CSL-200C	Solberg Mfg.	Powder coated steel housing with NPT intake and outlet	10.3 L x 8.8 Dia.	2" NPT	UUT6, UUT7

Special Seismic Certification

Table 12 - Certified Subcomponents - Tank Mounted Vertical Systems, Rigid or Flexible Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum

Oilless Rotary Vane Pumps							
Model	Manufacturer	Material	Dimensions (L x W x H, in)	HP	Voltage tested	Voltage available	Unit
SV1025	Busch	Oilless vane type vacuum pump with flange mounted motor assembly, rubber isolation feet on pump/motor	20 x 10 x 11	1.5	208 V	208-230/460	UUT21
SV1040	Busch		22 x 10 x 11	2	n/a		Interpolated
SV1063	Busch		30 x 17 x 14	3	n/a		Interpolated
SV1080	Busch		31 x 17 x 14	4	n/a		Interpolated
SV1100	Busch		33 x 17 x 14	5	460V		UUT23

Tanks						
Model [1]	Manufacturer	Material	Dimensions (in)	Capacity (gal)	Type	Unit
AR0630xxx	Campbell Hausfeld [2]	Steel, ASME construction 200 psig [3]	24" Dia x 53" H	80	Conventional	UUT21
AR0568xxx			30" Dia x 53" H	120	Conventional	UUT23

1. xxx in model number is for variations in paint color and threaded port sizes, not affecting structural elements.
2. Campbell Hausfeld is alternately branded as Twin Lakes Manufacturing.
3. Construction is in accordance with ASME BPVC Section VIII. Tanks have an allowable working pressure rating of 200 psig.

Controllers							
Type	Model	Manufacturer	Description	Material	NEMA Rating	Dimensions (W x H x D, in)	Unit
Basic Duplex controller	PVM239xxAB or CB [1]	Powerex	NEMA 12 Enclosure integrated to Enclosure frame, containing PLC, transformers, relays, motor contactor and motor protector circuit breaker for up to 2 motors, optional HMI and Optional VFD.	Powder coated carbon steel	12	20 x 24 x 8	UUT21
						24 x 24 x 8	Interpolated
Premium Duplex controller includes HMI	PBMIV269xxAB or CB [1]					30 x 30 x 8	Interpolated
						30 x 36 x 8	Interpolated
						24 x 36 x 8	UUT23

1. Where First x = 1,2,3,5,7,A for HP, Second x = 2, 3, 4 for voltage (208, 230, 460V), and A or C relates to the value of the temperature switch.
2. Where First x = 1,2,3,5,7,A for HP, Second x = 2, 3, 4 for voltage (208, 230, 460V).

Special Seismic Certification

Table 13 - Certified Subcomponents - Tank Mounted Vertical Systems, Rigid Base Mount

DCL Project Number: 32579-2201
Manufacturer: Powerex
Product Line: Medical Vacuum and Laboratory Vacuum

Model	Manufacturer	Material	Dimensions (L x W x H, in)	HP	Voltage Tested	Voltage Available	Unit
Lubricated Rotary Vane Pumps							
RA0025	Busch	Cast iron pump with face mounted TEFC motor, steel and aluminum body, rubber isolation feet on pump/motor	25 x 14 x 10.5	1.5	208 V	208-230/460	UUT21
RA0040	Busch		26 x 14 x 10.5	2	n/a		Interpolated
RA0063	Busch		28 x 19 x 12	3	n/a		UUT22
RA0101	Busch		29 x 19 x 12	5	n/a		Interpolated
RA0155A	Busch		31.5 x 20 x 13.5	5	460V		UUT24
Oilless Claw Pumps							
MM1104	Busch	Oilless claw pump, with integrated lubricated cast iron drive gearbox, exhaust box, C face motor with aluminum finned shell, rubber isolation feet attached to steel foot rails	40 x 17 x 16	2	460V	208-230/460	UUT22
MM1144	Busch		41 x 17 x 16	3	n/a		Interpolated
MM1102	Busch		40 x 17 x 16	4.5 to 5	n/a		Interpolated
MM1142	Busch		42 x 17 x 16	5 to 6.4	460V		UUT24

1. UUT 23 was tested in flexible base configuration and serves as the upper bookend.

Model [1]	Manufacturer	Material	Dimensions (in)	Capacity (gal)	Type	Unit
Tanks						
AR0630xxx	Campbell Hausfeld [2]	Steel, ASME construction 200 psig [3]	24" Dia x 53" H	80	Conventional	UUT21
AR0568xxx			30" Dia x 53" H	120	Conventional	Extrapolated
AR0273xxx	Campbell Hausfeld [2]	Steel, ASME construction 200 psig [3]	24" Dia x 50.5" H	80	Frame	UUT22
AR0614xxx			30" Dia x 52" H	120	Frame	UUT24
VES07285	Morganton	Steel, ASME construction 200 psig [3]	24" Dia x 49" H	80	Frame	UUT31a
VES04865			30" Dia x 52" H	120		Interpolated
VES07072			30" Dia x 92"H	240		UUT30a

1. xxx in model number is for variations in paint color and threaded port sizes, not affecting structural elements.
2. Campbell Hausfeld is alternately branded as Twin Lakes Manufacturing.
3. Construction is in accordance with ASME BPVC Section VIII. Tanks have an allowable working pressure rating of 200 psig.

Special Seismic Certification

Table 13 - Certified Subcomponents (Cont.) - Tank Mounted Vertical Systems, Rigid Base Mount

DCL Project Number: 32579-2201

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Controllers							
Type	Model	Manufacturer	Description	Material	NEMA Rating	Dimensions (W x H x D, in)	Unit
Basic Duplex controller	PVM239xxAB or CB [1]	Powerex	NEMA 12 Enclosure integrated to Enclosure frame, containing PLC, transformers, relays, motor contactor and motor protector circuit breaker for up to 2 motors, optional HMI and Optional VFD.	Powder coated carbon steel	12	20 x 24 x 8	UUT21
						24 x 24 x 8	Interpolated
Premium Duplex controller includes HMI	PBMIV269xxAB or CB [1]					30 x 30 x 8	Interpolated
						30 x 36 x 8	Interpolated
						24 x 36 x 8	Interpolated
Premium with VFD	PBMIV269xxCV [2]					30 x 40 x 12	UUT24

1. Where First x = 1,2,3,5,7,A for HP, Second x = 2, 3, 4 for voltage (208, 230, 460V), and A or C relates to the value of the temperature switch.
2. Where First x = 1,2,3,5,7,A for HP, Second x = 2, 3, 4 for voltage (208, 230, 460V).

Special Seismic Certification

Table 14 - Tested Units

DCL Project Number: 32579-2201

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number	Type	Pump HP	Tank Size (gal)	Vertically Stacked Pumps	Horizontally Arrayed Pumps	Dimensions (inches)			Weight (lb)	Mounting	Unit
						Length	Width	Height			
Stacked Systems											
VPD04042L1	Duplex	(2) 5HP	120	2	1	55.0	64.0	76.0	1,340	Flexible base (neoprene)	UUT1
VPQ2505S5588940	Duplex	(2) 25HP	200	2	1	70.0	90.0	87.0	5,130	Flexible base (neoprene)	UUT2
CVPD0504A3F1	Duplex	(2) 5HP	120	2	1	55.0	64.0	76.0	1,690	Flexible base (neoprene)	UUT3
CVPQ150S5588940	Duplex	(2) 15HP	200	2	1	74.0	90.0	88.0	3,800	Flexible base (neoprene)	UUT4
VPD0xxx/CVPD0xxx	Duplex	(1) 15HP, (1) 5HP	N/A	2	1	70.0	45.0	80.0	1,940	Flexible base (neoprene)	UUT5
VPT0xxx/CVPT0xxx	Triplex	(2) 7.5HP, (1) 3HP	N/A	3	1	55.0	32.0	85.0	1,680	Flexible base (neoprene)	UUT8
VPO150x/CVPO150x controller	Octoplex controller	N/A	N/A	N/A	N/A	55.0	32.0	65.0	410	Flexible base (neoprene)	UUT13
Tank Over Systems											
VPDT0xxx	Duplex	(1) 7.5HP, (1) 3HP	60	2	1	74.0	39.0	89.0	1,450	Rigid base	UUT6
CVPDT0xxx	Duplex	(1) 7.5HP, (1) 3HP	60	2	1	74.0	39.0	89.0	1,910	Flexible base (neoprene)	UUT7
Medical Air Stacked Scroll Systems [1]											
MSD15064L5 (controller/pump skid)	Duplex	15	240	2	3	84.0	34.0	96.0	1,510	Flexible base (neoprene), w/ internal isolation	UUT4a
MSD15064L5 (receiver/dryer skid)	N/A	N/A	240	N/A	N/A	84.0	32.0	96.0	1,310	Flexible base (neoprene)	UUT4b

Model Number	Type	Pump HP	Tank Size (gal)	Tank Style	Vertically Stacked Pumps	Horizontally Arrayed Pumps	Max.Dimensions (in)			Weight (lb)	Mounting	Unit
							Length	Width	Height			
Vertical Tank Mounted Systems												
VVTD0153 / VVOTD0153	Duplex	(1) 1.5 HP lube vane, (1) 1. 5 HP oilless vane	80	Conventional	1	2	43.0	30.0	74.0	710	Rigid base	UUT21
VVTD0303 / CVTD0203V	Duplex	(1) 3 HP lube vane, (1) 2 HP oilless claw	80	Frame	1	2	55.0	30.0	85.0	1,260	Rigid base	UUT22
VVOTD0504	Duplex	(2) 5 HP oilless vane	120	Conventional	1	2	53.0	34.0	90.0	1,170	Flexible base (neoprene)	UUT23
VVTD0504 / CVTD0504BV	Duplex	(1) 5 HP lube vane, (1) 5 HP oilless claw	120	Frame	1	2	59.0	35.0	85.0	1,670	Rigid base	UUT24
Morganton Tanks												
Tank Skid		120 gallon and 240 gallon vertical tank on a platform frame base	120, 240	Frame [2]	NA	NA	33.5	60.0	94.0	1,010	Rigid base	UUT 30a
		120 gallon and 240 gallon vertical tank on a platform frame base	120, 240	Frame [2]	NA	NA	33.5	60.0	94.0	1,010	Flexible base (neoprene)	UUT 30b
		80 gallon, 120 gallon vertical tank on a ladder frame base	80, 120	Frame [2]	NA	NA	32.0	55.0	75.0	630	Rigid base	UUT31a
		80 gallon, 120 gallon vertical tank on a ladder frame base	80, 120	Frame [2]	NA	NA	32.0	55.0	75.0	630	Flexible base (neoprene)	UUT31b

1. Medical Air Stacked Scroll System included here for bookending of Campbell Hausfeld 240 gallon vertical tank.

2. Larger tank on skid is associated with stack style tank mounting.

UUT1

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VPD0404(2L1)

Product Construction Summary: Powder coated carbon steel skid and frame

Options / Component Summary: Duplex system. Lubricated vane vacuum pump (5 HP), 208V. 120 gallon vertical receiver tank. HMI_PXMI controller in NEMA 12 enclosure. 1-1/2" intake filter element.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

UUT 1	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
	1,340	55	64	76	7.0	6.5	21.3

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.50	1.0	1.5	4.00	3.00	1.68	0.68

Unit Mounting Description:

UUT1, view from front right

UUT1, view from left

Base mounted using Airloc model 32 neoprene vibration isolation pads. Both skids were anchored to the shake table interface plate with four 1/2"-diameter Grade 5 bolts and washers spaced approximately 30'' widthwise and 53'' lengthwise on center for each skid (eight total).

UUT2

UNIT UNDER TEST (UUT) Summary Sheet

DCL DYNAMIC CERTIFICATION LABORATORIES,LLC

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VPQ2505(S5588940)

Product Construction Summary: Powder coated carbon steel skid and frame

Options / Component Summary: Duplex system. Lube vane vacuum pump (25 HP), 460V. 200 gallon vertical receiver tank. PBMI_PXMI controller in NEMA 12 enclosure.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

UUT 2	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
	5,130	70	90	87	4.50	3.80	10.25

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	1.95	1.0	1.5	3.12	2.34	1.31	0.53

Unit Mounting Description:

UUT2, view from front

UUT2, view from left

Base mounted using Airloc model 32 neoprene vibration isolation pads. Both skids were anchored to the shake table interface plate with four 1/2"-diameter Grade 5 bolts and washers spaced approximately 88'' widthwise and 34'' lengthwise on center for each skid (eight total).

UUT3

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: CVPD0504(A3F1)

Product Construction Summary: Powder coated carbon steel skid and frame

Options / Component Summary: Duplex system. Oilless Claw pump (5 HP), 230V. 120 gallon vertical receiver tank. PBMI_VFD controller in NEMA 12 enclosure. 1-1/2" intake filter element.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

UUT 3	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
	1,690	55	64	76	6.25	6.25	13.00

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.50	1.0	1.5	4.00	3.00	1.68	0.68

Unit Mounting Description:

UUT3, view from front

UUT3, view from left

Base mounted using Airloc model 32 neoprene vibration isolation pads. Both skids were anchored to the shake table interface plate with four 1/2"-diameter Grade 5 bolts and washers spaced approximately 30'' widthwise and 48'' lengthwise for each skid (eight total). The control panel was braced to the skid with one piece of B-Line B45 14 gage galvanized carbon steel channel, attached with B-Line B230 brackets (one bracket per channel end) and two 1/2"- diameter Grade 2 bolts and nuts with flat washers per bracket.

UUT4

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: CVPQ150S5588940 (CVPD1505, since 2-high vacuum pump stack was tested; also, S was substituted for 5 in the test specimen model number because this was a "special" build for the test)

Product Construction Summary: Powder coated carbon steel skid and frame

Options / Component Summary: Duplex system. Oilless claw pump (15 HP), 460V. 200 gallon vertical receiver tank. PBMI_VFD controller in NEMA 12 enclosure. 3" intake filter element.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

UUT 4	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
	3,800	74	90	88	4.50	4.75	11.75

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.06	1.0	1.5	3.30	2.47	1.38	0.56

Unit Mounting Description:

UUT4, view from front right

UUT4, view from left

Base mounted using Airloc model 32 neoprene vibration isolation pads. Both skids were anchored to the shake table interface plate with four 1/2"-diameter Grade 5 bolts and washers (eight total).

UUT5

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VPD0XXX/CVPD0XXX

Product Construction Summary: Powder coated carbon steel skid and frame

Options / Component Summary: Duplex system. Lubricated vane vacuum pump (5 HP), oilless claw pump (5 HP), 460V.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

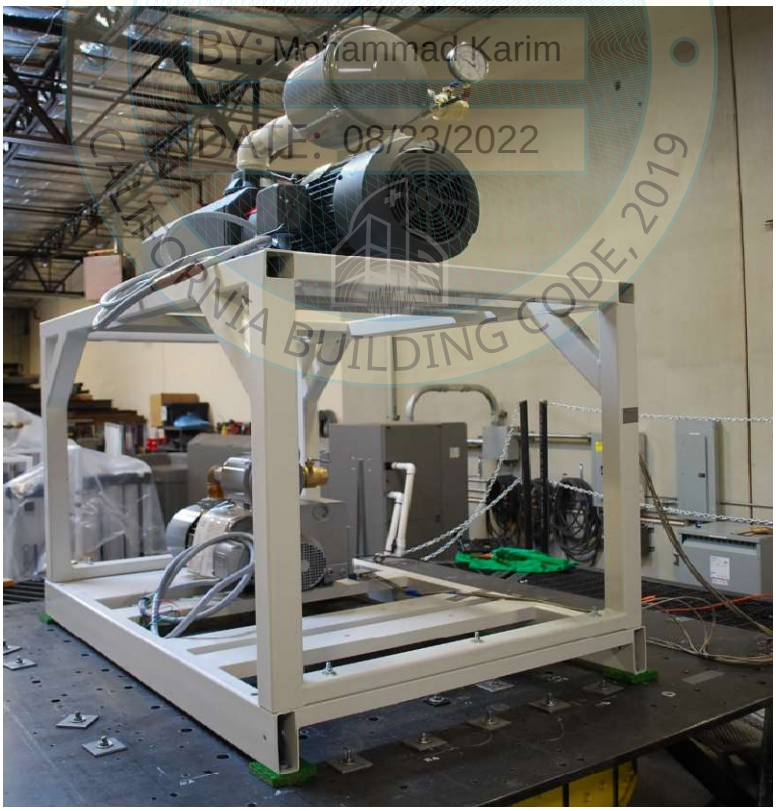
UUT Properties

UUT 5	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
	1,940	70	45	80	6.0	4.0	10.0

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:



Base mounted using Airloc model 32 neoprene vibration isolation pads. The skid was anchored to the shake table interface plate with four 1/2"-diameter Grade 5 bolts and washers spaced at approximately 43'' widthwise and 68'' lengthwise on center.

UUT8

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VPT0XXX/CVPT0XXX

Product Construction Summary: Powder coated carbon steel skid and frame

Options / Component Summary: Triplex system. Lubricated vane vacuum pump (3 and 7.5 HP), oilless claw pump (7.5 HP), 208V.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

UUT 8	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
	1,680	55	32	85	4.0	3.5	11.5

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

Base mounted using Airloc model 32 neoprene vibration isolation pads. The skid was anchored to the shake table interface plate with four 1/2"-diameter Grade 5 bolts and washers spaced at approximately 30'' widthwise and 53'' lengthwise on center.

UUT13

UNIT UNDER TEST (UUT) Summary Sheet

DCL DYNAMIC CERTIFICATION LABORATORIES,LLC

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VPO150x/CVPO150x controller

Product Construction Summary: Powder coated structural steel skid

Options / Component Summary: PBMI_PXMI octoplex controller

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
410	UUT13	55	32	65	9.0	9.0	>33.3

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

Base mounted using Airloc model 32 neoprene vibration isolation pads. The skid was attached to the shake table interface plate with four 1/2"-diameter, Grade 5 bolts and washers spaced at 30'' widthwise and 53'' lengthwise on center, and four 1 1/4"x1 1/4" x 3/8" malleable iron bevel washers, plain finish. The control panel was braced to the skid with one piece of B-Line B45 14 gage galvanized carbon steel channel, attached with B-Line B230 brackets (one bracket per channel end) and two Grade 2, 1/2"-diameter bolts and nuts with flat washers per bracket.

UUT6

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VPDT0XXX

Product Construction Summary: Powder coated carbon steel skid and frame

Options / Component Summary: Duplex tank-over system. Lubricated vane vacuum pump (3 and 7.5 HP), 208V, 60 gallon horizontal tank, 24" BASIC_PVM controller, 2" NPT intake filter.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
UUT 6	1,450	70 (74 to outside of pipe)	32 (39 to outside of pipe)	89	6.5	6.0	13.0

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

The skid was anchored to the shake table interface plate with four 1/2"-diameter Grade 5 bolts and washers spaced at approximately 30'' widthwise and 54'' lengthwise on center.

UUT7

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: CVPDT0XXX

Product Construction Summary: Powder coated carbon steel skid and frame

Options / Component Summary: Duplex tank-over system. Oilless claw pump (3 and 7.5 HP), 208V, 60 gallon horizontal tank, 42" PBMI_VFD controller, 2" NPT intake filter.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
UUT 7	1,910	70 (74 to outside of pipe)	32 (39 to outside of pipe)	89	4.5	4.5	11.0

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

Base mounted using Airloc model 32 neoprene vibration isolation pads. The skid was anchored to the shake table interface plate with four 1/2"-diameter Grade 5 bolts and washers spaced at approximately 30'' widthwise and 54'' lengthwise on center.

UUT4a

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Air and Laboratory Air

Model Number: MSD15064L5 (controller/pump skid)

Product Construction Summary: Powder coated structural steel skid and frame. Unit is internally isolated.

Options / Component Summary:

5HP scroll pump with WEG motor, dew point monitor, CO monitor, PBMI_PXMI controller in NEMA 12 enclosure, timer drain, aftercooler, intake filter element and check valve.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
1,510	UUT4a	84*	34	96*	6.8	5.5	12.0

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

*Note: Length and height are combined dimensions for UUT4a and UUT4b.

Unit Mounting Description:

The unit was base mounted to the shake table interface frame through the skid using four Airloc model 32 neoprene pads and four 1/2"-diameter, Grade 5 bolts and washers spaced approximately 32'' widthwise and 74'' lengthwise on center.

UUT4b

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Air and Laboratory Air

Model Number: MSD15064L5 (receiver/dryer skid)

Product Construction Summary: Powder coated structural steel skid and frame

Options / Component Summary:

240 gallon vertical receiver tank and PMD111 desiccant air dryer.

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
1,310	UUT4b	84*	32	96*	5.5	5.0	22.5

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.42	1.0	1.5	3.87	2.90	1.61	0.65

*Note: Length and height are combined dimensions for UUT4a and UUT4b.

Unit Mounting Description:

Base mounted using Airloc model 32 neoprene vibration isolation pads. The skid was mounted to the shake table interface frame using four 1/2"-diameter, Grade 5 bolts and washers spaced approximately 30'' widthwise and 82'' lengthwise on center.

UUT21

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VVTD0153 / VVOTD0153

Product Construction Summary: Powder coated structural steel skid

Options / Component Summary: 1.5 HP lubricated rotary vane pump, 1.5 HP oilless rotary vane pump, 80 gallon conventional tank and duplex PVM controller

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
710	UUT21	43	30	74	15.0	13.5	15.0

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

The unit was base mounted with three 1/2"-diameter Grade 5 bolts and washers spaced approximately 27'' on center from eachother in a triangular pattern.

UUT22

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VVTD0303 / CVTD0203V

Product Construction Summary: Powder coated structural steel skid

Options / Component Summary: 3 HP lubricated rotary vane pump, 2 HP oilless claw pump, 80 gallon frame tank and duplex PBM controller with HMI

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
1,260	UUT22	55	30	85	4.5	4.5	7.5

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

The unit was base mounted with four 1/2"-diameter Grade 5 bolts and washers spaced approximately 38'' widthwise and 30'' lengthwise on center and four 1 1/4"x1 1/4" x 3/8" malleable iron bevel washers, plain finish.

UUT23

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VVOTD0504

Product Construction Summary: Powder coated structural steel skid

Options / Component Summary: 5 HP oilless rotary vane pumps, 80 gallon conventional tank and duplex PBM controller with HMI

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
1,170	UUT23	53	34	90	7.5	7.5	28.4

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

The unit was base mounted with four Airloc model 32 neoprene pads, four 1/2"-diameter Grade 5 bolts and washers spaced approximately 19'' widthwise and 19'' lengthwise on center, and four 2"x2"x3/16" low carbon steel black oxide finish plate washers.

UUT24

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VVTD0504 / CVTD0504BV

Product Construction Summary: Powder coated structural steel skid

Options / Component Summary: 5 HP lubricated rotary vane pump, 5 HP oilless claw oilless rotary vane pump, 120 gallon frame tank and premium PBM controller with VFD

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
1,670	UUT24	59	35	85	4.5	19.5	>33.3

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

Brace attachment detail

The unit was base mounted with four 1/2"-diameter Grade 5 bolts and washers spaced approximately 38'' widthwise and 31'' lengthwise on center and four 1 1/4"x1 1/4" x 3/8" malleable iron bevel washers, plain finish. The right and left sides were braced with 2.5" wide, 1/4" thick structural steel angle, with each end of the angle attached to the vertical members of the UUT frame with one 1/2"-diameter Grade 5 bolt and four 4"x4"x1/4" galvanized finish low carbon steel washers at each attachment location.

UUT30a

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VES07285 (80gal tank) , VES07072 (240gal tank)

Product Construction Summary: Powder coated structural steel skid

Options / Component Summary: Platform frame mounted tanks

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
1,010	UUT30a	34	60	94	4.0	5.5	31.5

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

UUT 30a was rigidly base mounted with four 1/2'' diameter Grade 5 bolts and washers spaced approximately 50'' widthwise and 31'' lengthwise on center.

UUT30b

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VES07285 (80gal tank) , VES07072 (240gal tank)

Product Construction Summary: Powder coated structural steel skid

Options / Component Summary: Platform frame mounted tanks

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
1,010	UUT30b	34	60	94	3.0	3.5	10.5

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

UUT 30b was flexibly base mounted with four 1/2'' diameter Grade 5 bolts and washers spaced approximately 50'' widthwise and 31'' lengthwise on center through an Airloc model 32 neprene pad.

UUT31a

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VES07285 (80gal tank) , VES04767 (120gal tank)

Product Construction Summary: Powder coated structural steel skid

Options / Component Summary: Ladder frame mounted tanks

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
630	UUT31a	32	55	75	8.5	11.5	>33.3

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

UUT 31a was rigidly base mounted with four 1/2'' diameter Grade 5 bolts and washers spaced approximately 53'' widthwise and 30'' lengthwise on center and four 1 1/4"x1 1/4" x 3/8" malleable iron bevel washers.

UUT31b

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VES07285 (80gal tank) , VES04767 (120gal tank)

Product Construction Summary: Powder coated structural steel skid

Options / Component Summary: Ladder frame mounted tanks

Note: The UUT was operational before and after shaking and was full of operating content during the tests. The structural integrity of the component and attachment system and force-resisting systems was maintained.

UUT Properties

Operating Weight (lb)	Dimensions (in)				Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
630	UUT31b	32	55	75	8.0	9.5	16.0

Seismic Test Parameters

Building Code	Test Criteria	Sds (g)	z/h	Ip	Aflx-H (g)	Arig-H (g)	Aflx-V (g)	Arig-V (g)
CBC 2022	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.33	0.53

Unit Mounting Description:

UUT 31b was flexibly base mounted with four 1/2'' diameter Grade 5 bolts and washers spaced approximately 53'' widthwise and 30'' lengthwise on center and four 1 1/4"x1 1/4" x 3/8" malleable iron bevel washers through an Airloc model 32 neprene pad.