



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

APPLICATION FOR OSHPD SPECIAL SEISMIC
CERTIFICATION PREAPPROVAL (OSP)

OFFICE USE ONLY
APPLICATION #: OSP - 0393 - 10

OSHPD Special Seismic Certification Preapproval (OSP)

Type: [] New [X] Renewal

Manufacturer Information

Manufacturer: Powerex, Inc.
Manufacturer's Technical Representative: Joe Abt, Director of Engineering
Mailing Address: 150 Production Drive, Harrison, OH 45030
Telephone: (513) 367-3273 Email: jabt@powerexinc.com

Product Information

Product Name: Medical Vacuum and Laboratory Vacuum Units
Product Type: Medical vacuum systems
Product Model Number: See attachment OSP-0393-10
General Description: Medical vacuum and laboratory vacuum units contain pumps, a receiver tank, controller and filters. Seismic enhancements made to the test units and required to address the anomalies observed during the tests shall be incorporated into the production units.
Mounting Description: Rigid base mounted and neoprene pad mounted - See Tables for allowed configurations.

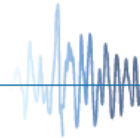
Applicant Information

Applicant Company Name: The VMC Group
Contact Person: John Giuliano
Mailing Address: 113 Main Street, Bloomingdale, NJ 07403
Telephone: (973) 838-1780 Email: john.giuliano@thevmcgroup.com

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2016.

Signature of Applicant: [Signature] Date: 1/29/18
Title: President Company Name: The VMC Group

"Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dynamic Needs"





**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION**

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: 113 Main Street, Bloomingdale, NJ 07403

Telephone: (973) 838-1780 Email: Ken.tarlow@thevmcgroup.com

Supports and Attachments Preapproval

- Supports and attachments are preapproved under OPM- _____
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)
- Supports and attachments are not preapproved

Certification Method

- Testing in accordance with: ICC-ES AC156
- Other (Please Specify): _____
- _____
- _____

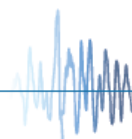
Testing Laboratory

Company Name: Dynamic Certification Laboratories

Contact Name: Josh Sailer, Laboratory Manager

Mailing Address: 1315 Greg Street, Suite 109, Sparks, NV 89431

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





**OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION**

Seismic Parameters

Design in accordance with ASCE 7-10 Chapter 13: Yes No

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

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

a_p (In-structure equipment or component amplification factor) = 2.5 (internally isolated system)

R_p (Equipment or component response modification factor) = 2.0 (internally isolated system)

Ω_0 (System overstrength factor) = 2.0

I_p (Importance factor) = 1.5

z/h (Height factor ratio) = 1

Equipment or Component Natural Frequencies (Hz) = See attachment

Overall dimensions and weight (or range thereof) = See attachment

Equipment or Components @ grade designed in accordance with ASCE 7-10 Chapter 15: Yes No

Design Basis of Equipment or Components (V/W) = _____

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

S_{D1} (Design spectral response acceleration at 1 second period, g) = _____

R (Response modification coefficient) = _____

Ω_0 (System overstrength factor) = BY: Timothy J. Piland

C_d (Deflection amplification factor) = _____

I_p (Importance factor) = 1.5

Height to Center of Gravity above base = _____

Equipment or Component Natural Frequencies (Hz) = _____

Overall dimensions and weight (or range thereof) = _____

Tank(s) designed in accordance with ASME BPVC, 2015: Yes No

List of Attachments Supporting Special Seismic Certification

Test Report(s) Drawings Calculations Manufacturer's Catalog

Other(s) (Please Specify): _____

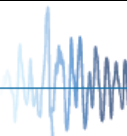
OSHPD Approval (For Office Use Only) – Approval Expires on December 31, 2022

Signature:  Date: April 23, 2018

Print Name: Timothy J. Piland Title: SSE

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

Condition of Approval (if applicable): _____



Special Seismic Certification
Certified Components - Stacked Systems, Lubricated Rotary Vane



Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

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	Sds (g), z/h=1	Fp/Wp	Unit
							Length	Width	Height					
Stacked Systems														
Duplex														
VPD0404	LVPD0404	5 (2)	120 V	2	2	1	55	64	76	1,340	Flexible base (neoprene)	2.50	5.63	UUT1
VPD0405	LVPD0405	5 (2)	200 V	2	2	1	55	64	83	1,600	Flexible base (neoprene)	2.00	4.50	Interpolated
VPD0504	LVPD0504	5 (2)	120 V	2	2	1	55	64	76	1,685	Flexible base (neoprene)	2.00	4.50	Interpolated
VPD0XXX	LVPD0XXX	5 (2)	200 V	2	2	1	70	45	80	1,940	Flexible base (neoprene)	2.00	4.50	UUT5 ²
VPD0754	LVPD0754	7.5 (2)	120 V	2	2	1	55	64	76	1,760	Flexible base (neoprene)	1.95	4.39	Interpolated
VPD0755	LVPD0755	7.5 (2)	200 V	2	2	1	55	64	83	1,960	Flexible base (neoprene)	1.95	4.39	Interpolated
VPD1004	LVPD1004	10 (2)	120 V	2	2	1	55	64	76	2,050	Flexible base (neoprene)	1.95	4.39	Interpolated
VPD1005	LVPD1005	10 (2)	200 V	2	2	1	55	64	83	2,250	Flexible base (neoprene)	1.95	4.39	Interpolated
VPD1505	LVPD1505	15 (2)	200 V	2	2	1	70	90	87	4,280	Flexible base (neoprene)	1.95	4.39	Interpolated
VPD2005	LVPD2005	20 (2)	200 V	2	2	1	70	90	87	4,610	Flexible base (neoprene)	1.95	4.39	Interpolated
VPD2505	LVPD2505	25 (2)	200 V	2	2	1	70	90	87	5,130	Flexible base (neoprene)	1.95	4.39	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)	1.95	4.39	Extrapolated
VPT0505	LVPT0505	5 (3)	200 V	3	2,1	2	55	96	83	2,350	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT0754	LVPT0754	7.5 (3)	120 V	3	2,1	2	55	96	76	2,400	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT0755	LVPT0755	7.5 (3)	200 V	3	2,1	2	55	96	83	2,600	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT1004	LVPT1004	10 (3)	120 V	3	2,1	2	55	96	76	3,000	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT1005	LVPT1005	10 (3)	200 V	3	2,1	2	55	96	83	3,200	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT1505	LVPT1505	15 (3)	200 V	3	2,1	2	70	135	87	5,850	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT2005	LVPT2005	20 (3)	200 V	3	2,1	2	70	135	87	6,250	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT2505	LVPT2505	25 (3)	200 V	3	2,1	2	71	135	87	6,800	Flexible base (neoprene)	1.95	4.39	Extrapolated

(Continued on Next Page)

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.

Special Seismic Certification
Certified Components - Stacked Systems, Lubricated Rotary Vane



Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

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	Sds (g), z/h=1	Fp/Wp	Unit
							Length	Width	Height					
Stacked Systems (Continued)														
Triplex (3-stack)														
VPT0304	LVPT0304	3 (3)	120 V	3	3	1	55	64 or 66	84	1,635	Flexible base (neoprene)	2.00	4.50	Extrapolated
VPT0404	LVPT0404	5 (3)	120 V	3	3	1	55	64 or 66	84	1,710	Flexible base (neoprene)	2.00	4.50	Extrapolated
VPT0504	LVPT0504	5 (3)	120 V	3	3	1	55	64 or 66	87	1,850	Flexible base (neoprene)	2.00	4.50	Extrapolated
VPT0XXX	LVPT0XXX	7.5 (2), 3 (1)	N/A	3	3	1	55	32	85	1,680	Flexible base (neoprene)	2.00	4.50	UUT8 ²
VPT0505	LVPT0505	5 (3)	200V	3	3	1	55	64 or 66	87	1,975	Flexible base (neoprene)	2.00	4.50	Extrapolated
VPT0754	LVPT0754	7.5 (3)	120 V	3	3	1	55	64 or 66	87	2,425	Flexible base (neoprene)	2.00	4.50	Extrapolated
VPT0755	LVPT0755	7.5 (3)	200 V	3	3	1	55	64 or 66	87	2,550	Flexible base (neoprene)	2.00	4.50	Extrapolated
Quadruplex														
VPQ0505	LVPQ0505	5 (4)	200 V	4	2,2	2	55	96	83	2,850	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPQ0755	LVPQ0755	7.5 (4)	200 V	4	2,2	2	55	96	83	3,150	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPQ1005	LVPQ1005	10 (4)	200 V	4	2,2	2	55	96	83	3,900	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPQ1505	LVPQ1505	15 (4)	200 V	4	2,2	2	70	135	87	7,150	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPQ2005	LVPQ2005	20 (4)	200 V	4	2,2	2	70	135	87	7,750	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPQ2505	LVPQ2505	25 (4)	200 V	4	2,2	2	71	135	87	8,600	Flexible base (neoprene)	1.95	4.39	Extrapolated
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)	1.95	4.39	Extrapolated
VPH2506	LVPH2506	25 (6)	240 V	6	2,2,2	3	80	225	96	10,200	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPO2506	LVPO2506	25 (8)	240 V	8	2,2,2,2	4	80	225	96	11,900	Flexible base (neoprene)	1.95	4.39	UUT2, UUT13 ³
Expandable														
VPD0504-EX3	LVPD0504-EX3	5 (2)	120 V	2 (3)	2	1 (2)	55	64	76	1,685	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPD0505-EX3	LVPD0505-EX3	5 (2)	200 V	2 (3)	2	1 (2)	55	64	83	1,905	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPD0754-EX3	LVPD0754-EX3	7.5 (2)	120 V	2 (3)	2	1 (2)	55	64	76	1,760	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPD0755-EX3	LVPD0755-EX3	7.5 (2)	200 V	2 (3)	2	1 (2)	55	64	83	1,960	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPD1004-EX3	LVPD1004-EX3	10 (2)	120 V	2 (3)	2	1 (2)	55	64	76	2,050	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPD1005-EX3	LVPD1005-EX3	10 (2)	200 V	2 (3)	2	1 (2)	55	64	83	2,250	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPD1505-EX3	LVPD1505-EX3	15 (2)	200 V	2 (3)	2	1 (2)	70	90	87	4,280	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPD2005-EX3	LVPD2005-EX3	20 (2)	200 V	2 (3)	2	1 (2)	70	90	87	4,610	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPD2505-EX3	LVPD2505-EX3	25 (2)	200 V	2 (3)	2	1 (2)	71	90	87	5,030	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT0505-EX4	LVPT0505-EX4	5 (3)	200 V	3 (4)	2	2	55	96	83	2,350	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT0755-EX4	LVPT0755-EX4	7.5 (3)	200 V	3 (4)	2	2	55	96	83	2,600	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT1005-EX4	LVPT1005-EX4	10 (3)	200 V	3 (4)	2	2	55	96	83	3,200	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT1505-EX4	LVPT1505-EX4	15 (3)	200 V	3 (4)	2	2	70	135	87	5,850	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT2005-EX4	LVPT2005-EX4	20 (3)	200 V	3 (4)	2	2	70	135	87	6,250	Flexible base (neoprene)	1.95	4.39	Extrapolated
VPT2505-EX4	LVPT2505-EX4	25 (3)	200 V	3 (4)	2	2	71	135	87	6,800	Flexible base (neoprene)	1.95	4.39	Extrapolated

1. V in tank listing indicates vertical orientation

2. 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 tanks and control panels are bookended by UUT1 and UUT2.

3. 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.

4. See Justification Matrix for explanation of extrapolated units

Special Seismic Certification
Certified Components - Stacked Systems, Lubricated Rotary Vane

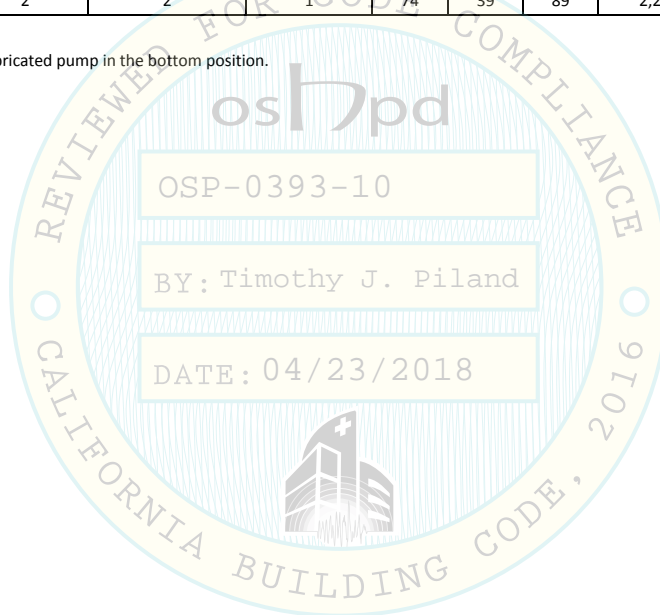


Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

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	Sds (g), z/h=1	Fp/Wp	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)	2.00	4.50	Extrapolated
VPDT0402	LVPDT0402	5 (2)	60 H	2	2	1	74	39	89	1,590		2.00	4.50	Extrapolated
VPDT0502	LVPDT0502	5 (2)	60 H	2	2	1	74	39	89	1,815		2.00	4.50	Extrapolated
VPDT0XXX	LVPDT0XXX	7.5 (1), 3 (1)	60 H	2	2	1	74	39	89	1,450		2.00	4.50	UUT6 ^{2,3}
VPDT0752	LVPDT0752	7.5 (2)	60 H	2	2	1	74	39	89	2,295		2.00	4.50	Extrapolated

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



Special Seismic Certification
Certified Components - Stacked Systems, Lubricated Rotary Vane



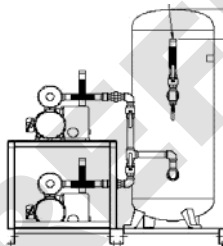
Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

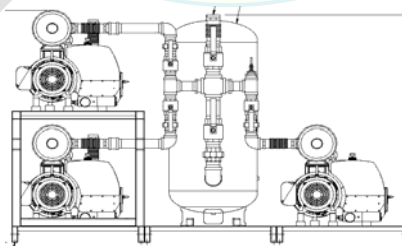
Justification Matrix for Extrapolated Lubricated Rotary Vane Units

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)	
VPQ0755	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 quadruplex 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.
VPQ1005		
VPQ1505		
VPQ2005		
VPQ2505		
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		

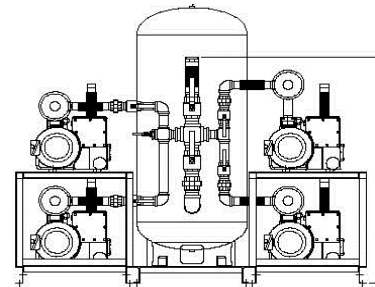
Duplex System



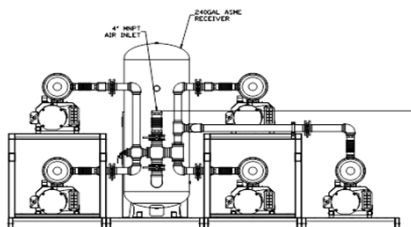
Triplex System



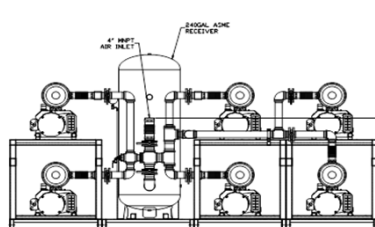
Quadruplex System



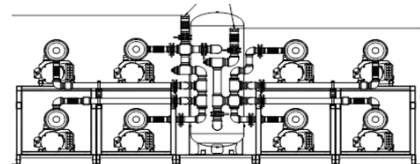
Pentaplex System



Hexaplex System



Octoplex System



Special Seismic Certification
Certified Components - Stacked Systems, Lubricated Rotary Vane

Manufacturer: Powerex

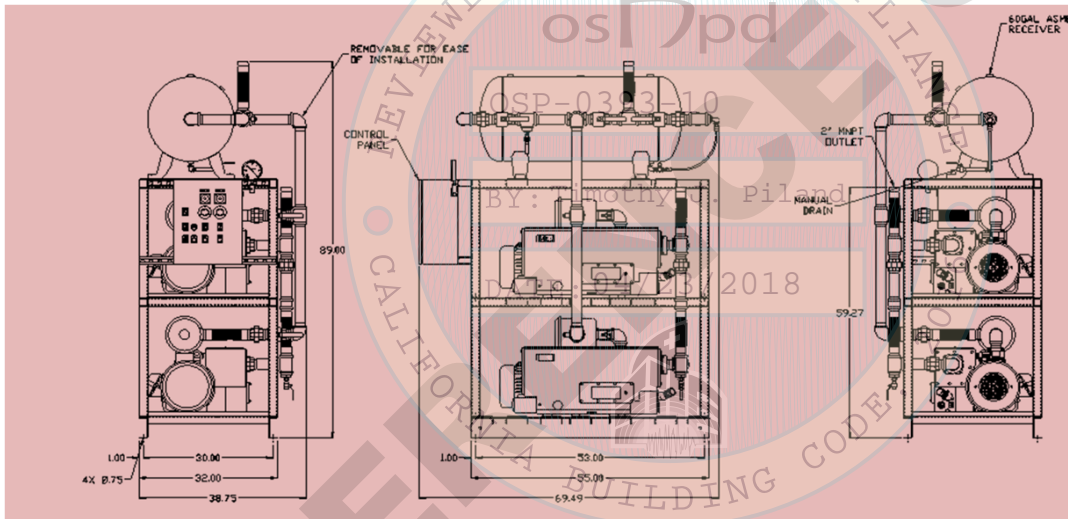
Product Line: Medical Vacuum and Laboratory Vacuum

Justification Matrix for Extrapolated Lubricated Rotary Vane Units (Continued)

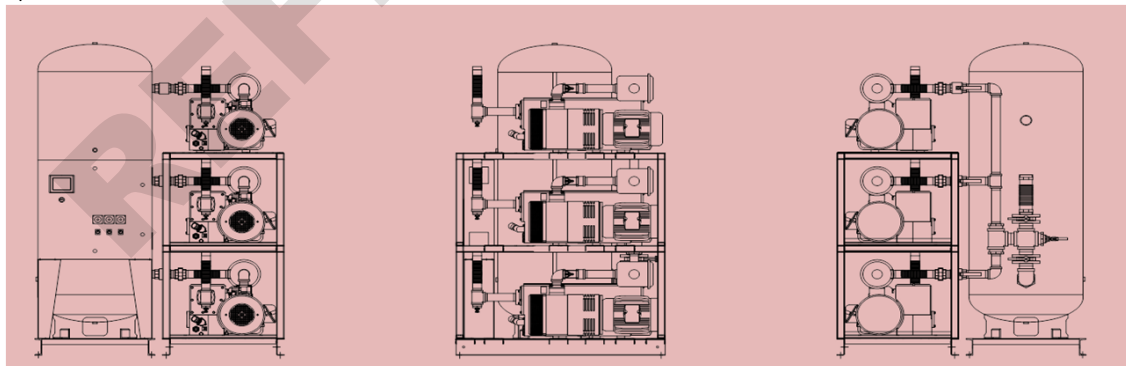
Unit	Units used for extrapolation	Difference from units used for extrapolation
VPD0504	UUT5 (VPD0XXX)	UUT5 consists of a representative frame and base platform with a pump (RA0155A 5 HP) similar to that of UUT 1 in the lower position and a larger claw pump (replacing the pump in UUT4) in the upper position.
VPD0505		
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		
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		

Tank Over Construction

Duplex:



Triplex:



Special Seismic Certification
Certified Components - Stacked Units, Claw Oil-Less



Manufacturer: Powerex

Certified Product Line: Medical Vacuum and Laboratory Vacuum

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	Sds (g), z/h=1	Fp/Wp	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)	2.50	5.63	UUT3
CVPD0504B	LCPD0604 ³	6.4 (2)	120 V	2	2	1	55	64	76	1,925	Flexible base (neoprene)	2.06	1.64	Interpolated
CVPD0754A	LCPD0704	7.0 (2)	120 V	2	2	1	55	64	76	2,175	Flexible base (neoprene)	2.06	4.64	Interpolated
CVPD0754B	LCPD0904 ³	9.1 (2)	120 V	2	2	1	55	64	76	2,400	Flexible base (neoprene)	2.06	4.64	Interpolated
CVPD1005	LCPD1005	10 (2)	200 V	2	2	1	55	64	83	2,875	Flexible base (neoprene)	2.06	4.64	Interpolated
CVPDXXX	LCPDXXX	15 (1), 5 (1)	N/A	2	2	1	70	45	80	1,940	Flexible base (neoprene)	2.00	4.50	UUT5 ⁴
CVPD1505	LCPD1505	15 (2)	200 V	2	2	1	74	90	88	3,800	Flexible base (neoprene)	2.06	4.64	UUT4
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)	2.06	4.64	Extrapolated
CVPT0505A	LCPT0505	5 (3)	200 V	3	2, 1	2	55	96	83	2,275	Flexible base (neoprene)	2.06	4.64	Extrapolated
CVPT0504B	LCPT0604	6.4 (3)	120 V	3	2, 1	2	55	96	76	2,000	Flexible base (neoprene)	2.06	4.64	Extrapolated
CVPT0505B	LCPT0605	6.4 (3)	200 V	3	2, 1	2	55	96	83	2,150	Flexible base (neoprene)	2.06	4.64	Extrapolated
CVPT0755A	LCPT0705	7.0 (3)	200 V	3	2, 1	2	55	96	83	3,200	Flexible base (neoprene)	2.06	4.64	Extrapolated
CVPT0755B	LCPT0905	9.1 (3)	200 V	3	2, 1	2	55	96	83	3,500	Flexible base (neoprene)	2.06	4.64	Extrapolated
CVPT1005	LCPT1005	10 (3)	200 V	3	2, 1	2	55	96	83	4,200	Flexible base (neoprene)	2.06	4.64	Extrapolated
CVPT1505	LCPT1505	15 (3)	200 V	3	2, 1	2	71	135	88	4,800	Flexible base (neoprene)	2.06	4.64	Extrapolated
Triplex (3-stack)														
CVPT0XXX	LCVPT0XXX	7.5 (2), 3 (1)	N/A	3	3	1	55	32	85	1,680	Flexible base (neoprene)	2.00	4.50	UUT8 ⁵
CVPT0304	LCVPT0304	3 (3)	120 V	3	3	1	55	64 or 66	84	2,200	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPT0504A	LCVPT0504	4-5 (3)	120 V	3	3	1	55	64 or 66	84	2,235	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPT0504B	LCVPT0604	5-6.4 (3)	120 V	3	3	1	55	64 or 66	87	2,360	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPT0505A	LCVPT0505	4-5 (3)	200V	3	3	1	55	64 or 66	87	2,275	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPT0505B	LCVPT0605	5-6.4 (3)	200V	3	3	1	55	64 or 66	87	2,400	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPT0754A	LCVPT0754A	6.4-7.5 (2)	120 V	3	3	1	55	64 or 66	87	2,565	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPT0755A	LCVPT0755A	6.4-7.5 (2)	200 V	3	3	1	55	64 or 66	87	2,690	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPT0754B	LCVPT0754B	7.5-9.1 (2)	120 V	3	3	1	55	64 or 66	87	2,600	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPT0755B	LCVPT0755B	7.5-9.1 (2)	200 V	3	3	1	55	64 or 66	87	2,725	Flexible base (neoprene)	2.00	4.50	Extrapolated
Quadruplex														
CVPQ0505A	LCPQ0505	5 (4)	200 V	4	2,2	2	55	96	83	2,500	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPQ0505B	LCPQ0605	6.4 (4)	200 V	4	2,2	2	55	96	83	2,700	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPQ0755A	LCPQ0705	7.0 (4)	200 V	4	2,2	2	55	96	83	3,600	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPQ0755B	LCPQ0905	9.1 (4)	200 V	4	2,2	2	55	96	83	4,000	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPQ1005	LCPQ1005	10 (4)	200 V	4	2,2	2	55	96	83	4,900	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPQ1505	LCPQ1505	15 (4)	200 V	4	2,2	2	71	135	88	5,600	Flexible base (neoprene)	2.00	4.50	Extrapolated

Continued on Next Page

Special Seismic Certification
Certified Components - Stacked Units, Claw Oil-Less

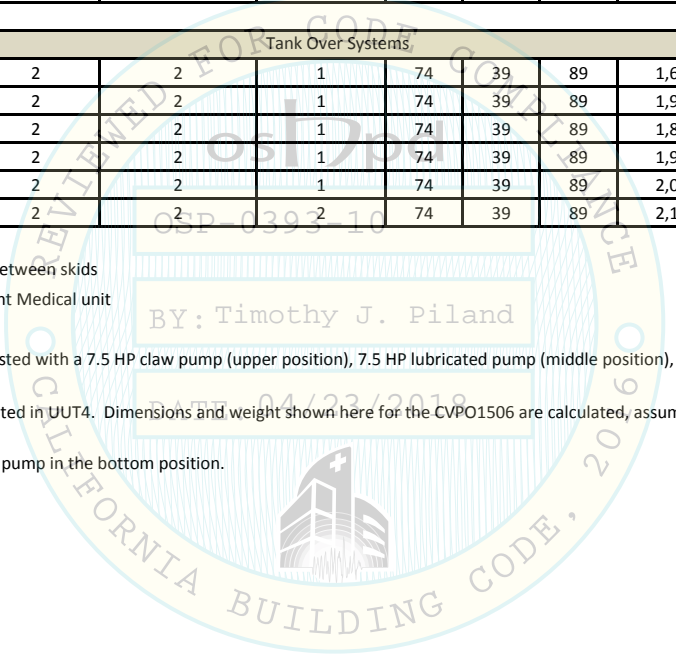


Manufacturer: Powerex

Certified Product Line: Medical Vacuum and Laboratory Vacuum

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	Sds (g), z/h=1	Fp/Wp	Unit
							Length	Width ²	Height					
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)	2.00	4.50	Extrapolated
CVPH1506	LCPH1506	15 (6)	240 v	6	2,2,2	2	225	80	96	6,800	Flexible base (neoprene)	2.00	4.50	Extrapolated
CVPO1506	LCPO1506	15 (7)	240 v	8	2,2,2,2	2	225	80	96	9,850	Flexible base (neoprene)	2.00	4.50	UUT4, UUT13 ⁶
Tank Over Systems														
CVPDT0302	LCVPT0302	3(2)	60 H	2	2	1	74	39	89	1,600	Rigid or flexible base (neoprene)	2.00	4.50	Extrapolated
CVPDT0XXX	LCVPT0XXX	7.5 (1), 3 (1)	60 H	2	2	1	74	39	89	1,910		2.00	4.50	UUT7 ^{7,8}
CVPDT0502A	LCVPT0502	4-5 (2)	60 H	2	2	1	74	39	89	1,860		2.00	4.50	Extrapolated
CVPDT0502B	LCVPT0602	5-6.4 (2)	60 H	2	2	1	74	39	89	1,910		2.00	4.50	Extrapolated
CVPDT0752A	LCVPT0702	6.4-7.5 (2)	60 H	2	2	1	74	39	89	2,030		2.00	4.50	Extrapolated
CVPDT0752B	LCVPT0752	7.5-9.1 (2)	60H	2	2	1	74	39	89	2,145		2.00	4.50	Extrapolated

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. UUT7 tested with a 7.5 HP claw pump in the top position, and a 3 HP claw pump in the bottom position.
8. See UUT6 for bookending of tank-over systems.
9. See Justification Matrix for explanation of extrapolated units.





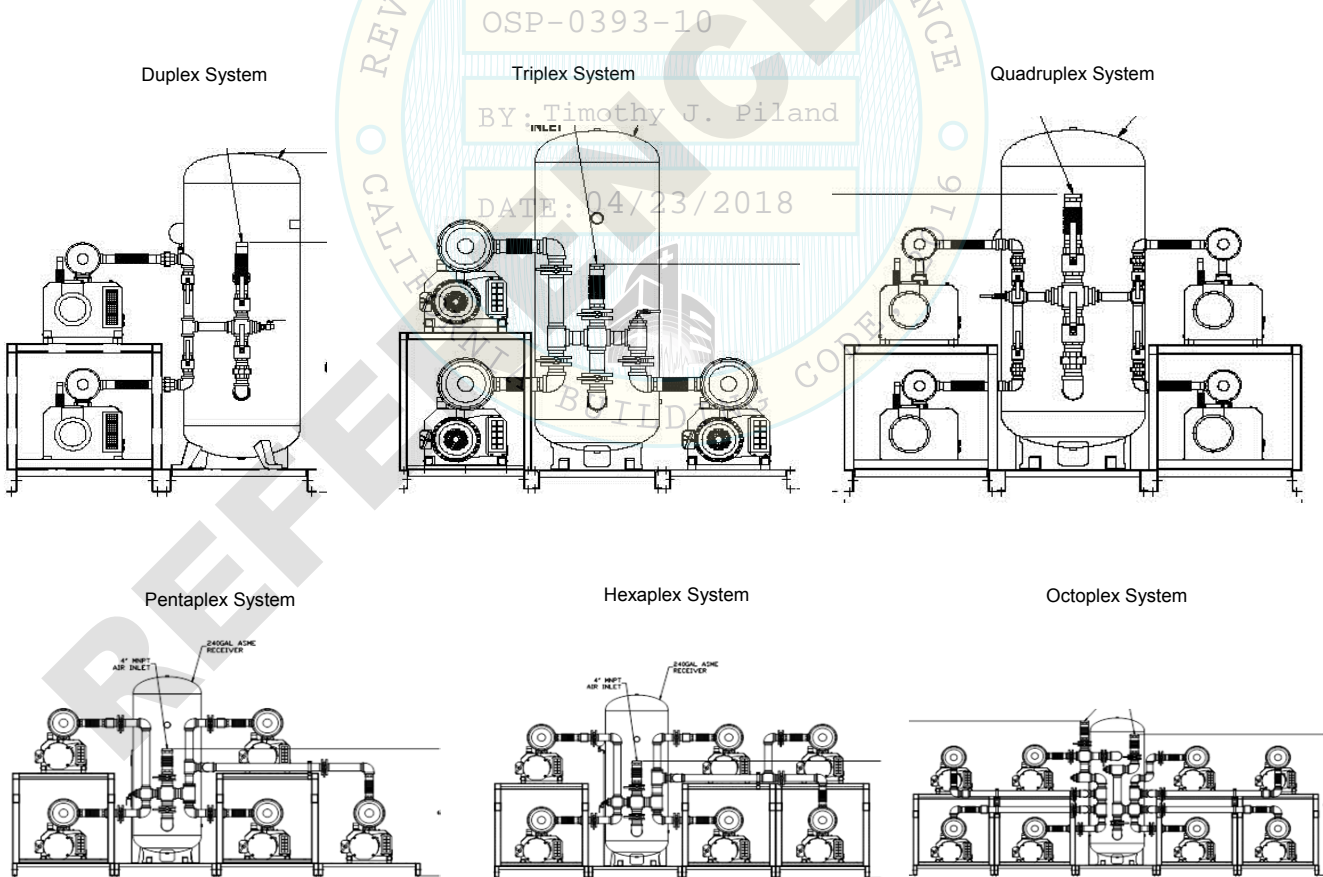
Special Seismic Certification
Certified Components - Stacked Systems, Claw Oil-Less

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Justification Matrix for Extrapolated Oilless Claw Type

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)	
CVPQ0505B	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 quadruplex 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.
CVPQ0755A		
CVPQ0755B		
CVPQ1005		
CVPQ1505	UUT 4 (CVPD1505)	
CVPP1506	UUT 4 (CVPD1505)	
CVPH1506	UUT 4 (CVPD1505)	
CVPO1506	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.



Special Seismic Certification
List of Certified Units - Claw Oil-Less

Manufacturer: Powerex

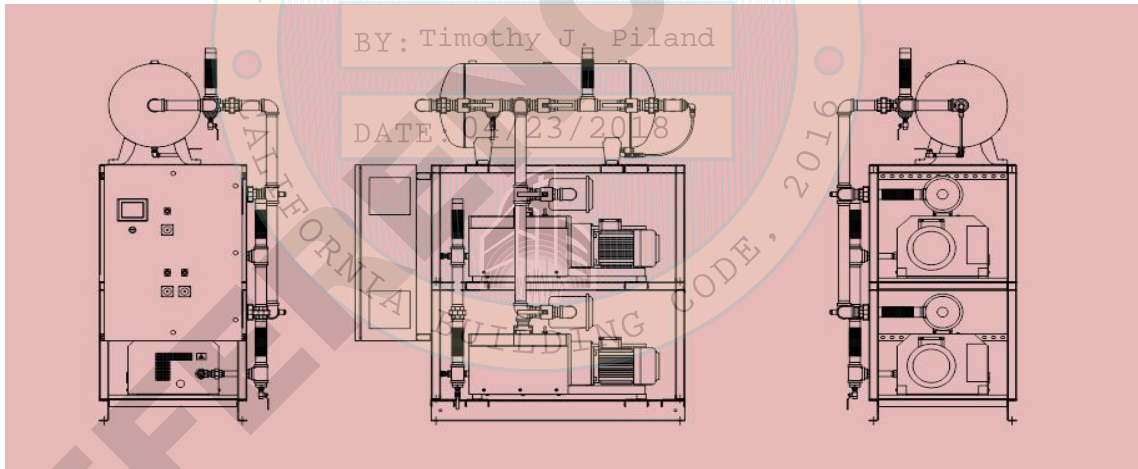
Product Line: Medical Vacuum and Laboratory Vacuum

Justification Matrix for Extrapolated Oilless Claw Type (Continued)

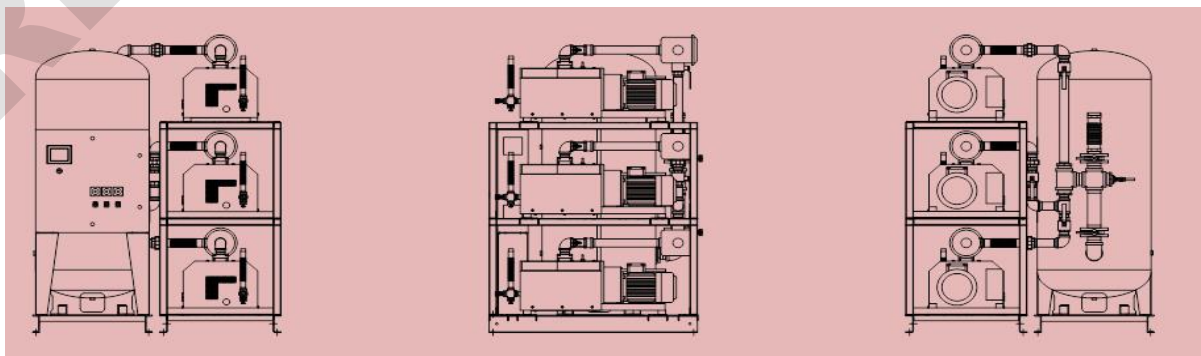
Unit	Units used for extrapolation	Difference from units used for extrapolation
CVPD1505	UUT5	UUT5 demonstrates an alternate 15HP claw pump; as the pump used in UUT4 is replaced by a similar, yet structurally different pump designated MM1502. The MM1502 pump is tested in the upper position of the frame set.
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		
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		

OSP-0393-10

Tank Over Construction
 Duplex:



Triplex:



**Special Seismic Certification
Certified Subcomponents - Stacked Systems**



Lubricated Vane Vacuum Pumps										
Model ¹	Manufacturer	Material	Dimensions (in) L x W x H	HP	Voltage tested	Voltage certified	Mounting	Sds (g) z/h=1	Fp/Wp	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	Flexible base (neoprene)	2.00	4.50	UUT8
RC0101	Busch		29 x 19 x 12	5	208V			2.50	5.63	UUT1
RA0101	Busch		29 x 19 x 12	5	n/a			2.00	4.50	Interpolated
RC0155	Busch		38 x 22 x 16.5	5	n/a			2.00	4.50	Interpolated
RA0155A	Busch		31.5 x 20 x 13.5	5	460V			2.00	4.50	UUT5
RC0205	Busch		41 x 24 x 16.5	7.5 or 8	n/a			2.00	4.50	Interpolated
RA0205	Busch		41 x 24 x 16.5	7.5 or 8	208V			2.00	4.50	UUT8
RC0305	Busch		44 x 24 x 16.5	10	n/a			1.95	4.39	Interpolated
RA0255	Busch		44 x 24 x 16.5	10	n/a			1.95	4.39	Interpolated
RA0305	Busch		44 x 24 x 16.5	10	n/a			1.95	4.39	Interpolated
RC0400	Busch		54 x 38 x 26.5	15	n/a			1.95	4.39	Interpolated
RC0502	Busch		65.5 x 38 x 26.5	20	n/a			1.95	4.39	Interpolated
RC0630	Busch		69 x 40 x 26.5	25	460 V			1.95	4.39	UUT2

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

BY: Timothy J. Piland

Claw Oil-Less Vacuum Pumps										
Model	Manufacturer	Material	Dimensions (in) L x W x H	HP	Voltage tested	Voltage certified	Mounting	Sds (g) z/h=1	Fp/Wp	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	Flexible base (neoprene)	2.50	5.63	UUT3
MM1142	Busch		42 x 17 x 16	5 to 6.4	n/a			2.00	4.50	Interpolated
MM1202	Busch		43 x 20 x 18	6.4 to 7	n/a			2.00	4.50	Interpolated
MM1252	Busch		43 x 20 x 18	7.5 to 9.1	208V / 230V			2.00	4.50	UUT8
MM1402	Busch		48 x 20 x 18	9 to 10.2	n/a			2.00	4.50	Interpolated
MM1322	Busch		48 x 20 x 18	9 to 10.2	n/a			2.00	4.50	Interpolated
MI1502	Busch		48 x 31 x 27	15	460V			2.06	4.64	UUT4
MM1502	Busch		54.5 x 20 x 18	15	460V			2.00	4.50	UUT5

**Special Seismic Certification
Certified Subcomponents - Stacked Systems**



Tanks									
Model ¹	Manufacturer	Material	Dimensions (in)	Capacity (gal)	Orientation	Mounting	Sds (g) z/h=1	Fp/Wp	Unit
AR0274xxxx	Campbell Hausfeld ²	Steel, ASME construction 200 psig ³	24" Dia x 71" H	120	Vertical	Flexible base (neoprene)	2.5	5.63	UUT1 UUT3
AR0512xxxx			30" Dia x 77" H	200			2.06	4.64	UUT4
AR05130xAJ			30" Dia x 89"H	240			2.42	4.36	UUT4b

- xxxx in model number is for variations in paint color and threaded port sizes, not affecting structural elements.
- Campbell Hausfeld is alternately branded as Twin Lakes Manufacturing
- 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)	Mounting	Sds (g), z/h=1	Fp/Wp	Unit
BASIC_PVM (24x20x8)	Powerex	No Touchscreen	Powder coated carbon steel	12	24"H x 20"W x 8"D	Flexible base (neoprene)	1.95	4.39	Extrapolated ¹
BASIC_PVM (30x24x8)	Powerex	No Touchscreen	Powder coated carbon steel	12	30"H x 24"W x 8"D		1.95	4.39	Extrapolated ¹
BASIC_PVM (36x30x8)	Powerex	No Touchscreen	Powder coated carbon steel	12	36"H x 30"W x 8"D		1.95	4.39	Extrapolated ¹
HMI_PXMI (30x24x8)	Powerex	Human Machine Interface: Touchscreen	Powder coated carbon steel	12	30"H x 24"W x 8"D		2.50	5.63	UUT1
HMI_PXMI (36x30x8)	Powerex		36"H x 30"W x 8"D	1.95	4.39		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		1.95	4.39	Interpolated
PBMI_PXMI (36x30x8)	Powerex		36"H x 30"W x 8"D	1.95	4.39		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		2.06	4.64	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		2.00	3.60	UUT13

- BASIC_PVM controller can be extrapolated because it is a depopulated version of the controllers tested in UUT1, 2, 3 and 4.

Intake Filters									
Model	Manufacturer	Material	Dimensions (in)	Connection certified	Mounting	Sds (g), z/h=1	Fp/Wp	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	Flexible base (neoprene)	2.50	5.63	UUT1, UUT3	
CSL-200C	Solberg Mfg.		10.3 L x 8.8 Dia.	2" NPT		2.06	4.64	Interpolated	
CSL-300C	Solberg Mfg.		15.8 L x 13.3 Dia.	3" NPT		2.06	4.64	UUT4	

Special Seismic Certification
Certified Subcomponents - Tank-Over Systems

Vacuum Pumps											
Model ¹	Manufacturer	Material	Dimensions (in) L x W x H	HP	Voltage tested	Voltage certified	Mounting	Sds (g) z/h=1	Fp/Wp	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	Rigid or flexible base (neoprene)	2.00	4.50	UUT6	
RC0101	Busch		29 x 19 x 12	5	208V			2.00	4.50	Interpolated	
RA0101	Busch		29 x 19 x 12	5	n/a			2.00	4.50	Interpolated	
RC0155	Busch		38 x 22 x 16.5	5	n/a			2.00	4.50	Interpolated	
RA0155A	Busch		31.5 x 20 x 13.5	5	460V			2.00	4.50	Interpolated	
RC0205	Busch		41 x 24 x 16.5	7.5 or 8	n/a			2.00	4.50	Interpolated	
RA0205	Busch		41 x 24 x 16.5	7.5 or 8	208V			2.00	4.50	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	2.00	4.50	UUT7
MM1102	Busch			40 x 17 x 16	4.5 to 5			230V	2.00	4.50	Interpolated
MM1142	Busch			42 x 17 x 16	5 to 6.4			n/a	2.00	4.50	Interpolated
MM1202	Busch	43 x 20 x 18		6.4 to 7	n/a	2.00	4.50	Interpolated			
MM1252	Busch	43 x 20 x 18		7.5 to 9.1	208V / 230V	2.00	4.50	UUT7			

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

BY: Timothy J. Piland

Tank

Model ¹	Manufacturer	Material	Dimensions (in)	Capacity (gal)	Orientation	Mounting	Sds (g) z/h=1	Fp/Wp	Unit
AR8029xxx	Campbell Hausfeld ²	Steel, ASME construction 200 psig ³	20" Dia x 47" L	60	Horizontal	Rigid or flexible base (neoprene)	2.00	4.50	UUT6, UUT7

1. xxx in model number is for variations in paint color and threaded port sizes, not affecting structural elements.

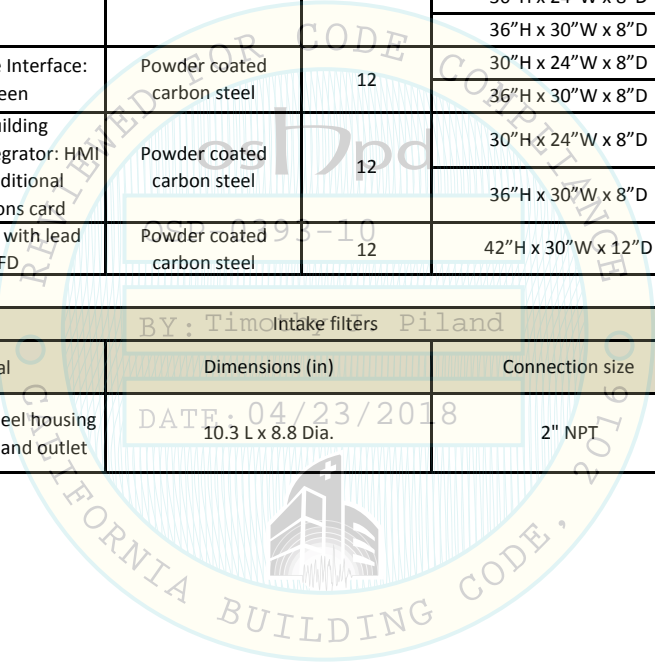
2. Campbell Hausfeld is alternately branded as Twin Lakes Manufacturing

3. Constructed in accordance with ASME BPVC Section VIII. Tanks have an allowable working pressure rating of 200 psig.

Special Seismic Certification
Certified Subcomponents - Tank-Over Systems

Controllers									
Model	Manufacturer	Description	Material	NEMA rating	Dimensions (in)	Mounting	Sds (g), z/h=1	Fp/Wp	Unit
BASIC_PVM (24x20x8)	Powerex	No Touchscreen	Powder coated carbon steel	12	24"H x 20"W x 8"D	Rigid or flexible base (neoprene)	2.00	4.50	UUT6
BASIC_PVM (30x24x8)					30"H x 24"W x 8"D		2.00	4.50	Interpolated
BASIC_PVM (36x30x8)					36"H x 30"W x 8"D		2.00	4.50	Interpolated
HMI_PXMI (30x24x8)		Human Machine Interface: Touchscreen	Powder coated carbon steel	12	30"H x 24"W x 8"D		2.00	4.50	Interpolated
HMI_PXMI (36x30x8)					36"H x 30"W x 8"D		2.00	4.50	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		2.00	4.50	Interpolated
PBMI_PXMI (36x30x8)					36"H x 30"W x 8"D		2.00	4.50	Interpolated
PBMI_VFD (42x30x12)					Same as above with lead pump VFD		Powder coated carbon steel	12	42"H x 30"W x 12"D

Intake filters									
Model	Manufacturer	Material	Dimensions (in)	Connection size	Mounting	Sds (g), z/h=1	Fp/Wp	Unit	
CSL-200C	Solberg Mfg.	Powder coated steel housing with NPT intake and outlet	10.3 L x 8.8 Dia.	2" NPT	Rigid or flexible base (neoprene)	2.00	4.50	UUT6, UUT7	



Special Seismic Certification
Certified Components - Tank Mounted Vertical Systems



Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

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	Sds (g), z/h=1	Fp/Wp	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	2.00	4.50	UUT21 ²
VVTD0203	LVVD0203	2	80	2	1	2	42	30	75	835	N/A		2.00	4.50	Interpolated
VVTD0204	LVVD0204	2	120	2	1	2	44	50	75.5	880	N/A		2.00	4.50	Interpolated
VVTD0303	LVVD0303	3	80	2	1	2	55	30	85	1,260	Rigid base		2.00	4.50	UUT22 ³
VVTD0304	LVVD0304	3	120	2	1	2	54	37	84	1,475	N/A		2.00	4.50	Interpolated
VVTD0403	LVVD0403	4	80	2	1	2	54	37	84.5	1,350	N/A		2.00	4.50	Interpolated
VVTD0404	LVVD0404	4	120	2	1	2	54	37	84.5	1,500	N/A		2.00	4.50	Interpolated
VVTD0503	LVVD0503	5	80	2	1	2	58	37	87	1,260	N/A		2.00	4.50	Interpolated
VVTD0504	LVVD0504	5	120	2	1	2	59	35	85	1,670	Rigid base		2.00	4.50	UUT24 ⁵
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)	2.00	4.50	UUT21 ²
VVOTD0203	LVVOD0203	2	80	2	1	2	53	34	80	930	N/A		2.00	4.50	Interpolated
VVOTD0303	LVVOD0303	3	80	2	1	2	53	34	80	1,100	N/A		2.00	4.50	Interpolated
VVOTD0304	LVVOD0304	3	120	2	1	2	53	34	89	1,180	N/A		2.00	4.50	Interpolated
VVOTD0403	LVVOD0403	4	80	2	1	2	53	34	80	1,125	N/A		2.00	4.50	Interpolated
VVOTD0404	LVVOD0404	4	120	2	1	2	53	34	89	1,200	N/A		2.00	4.50	Interpolated
VVOTD0503	LVVOD0503	5	80	2	1	2	53	34	90	1,320	N/A		2.00	4.50	Interpolated
VVOTD0504	LVVOD0504	5	120	2	1	2	53	34	90	1,170	Flexible base (neoprene)		2.00	4.50	UUT23 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	2.00	4.50	UUT22 ³
CVTD0303V	LCVD0303	3	80	2	1	2	35	56	82	1,500	N/A		2.00	4.50	Interpolated
CVTD0504AV	LCVD0504AV	4	120	2	1	2	59	35	84	1,650	N/A		2.00	4.50	Interpolated
CVTD0504BV	LCVD0604	5	120	2	1	2	59	35	85	1,670	Rigid base		2.00	4.50	UUT24 ⁵

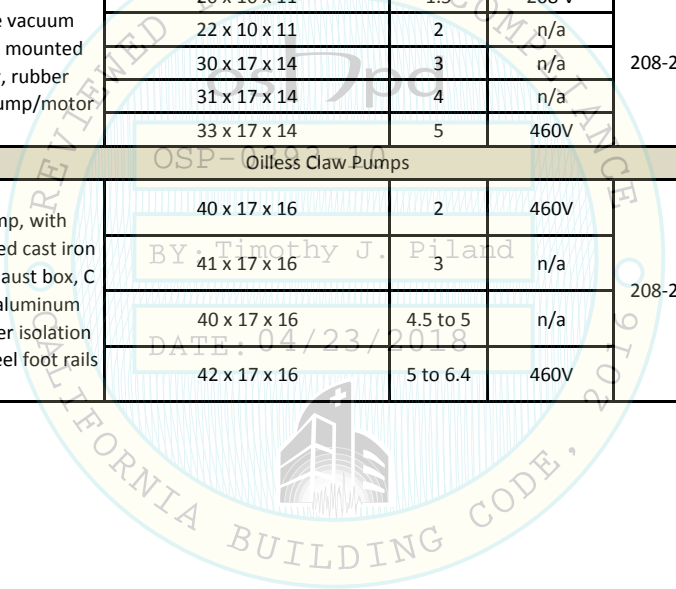
1. Lab systems identical to medical systems (software change only).
2. UUT21 tested with conventional 80 gal tank, one 1.5HP lubricated rotary vane pump and one 1.5HP oilless rotary vane pump.
3. UUT22 tested with frame style 80 gal tank, one 3 HP lubricated rotary vane pump and one 2 HP oilless claw pump.
4. UUT23 tested with conventional style 120 gal tank and two 5 HP oilless rotary vane pumps.
5. UUT24 tested with frame style 120 gal tank, one 5 HP lubricated rotary vane pump and one 5 HP oilless claw pump.

Special Seismic Certification

Certified Subcomponents - Tank Mounted Vertical Systems



Model	Manufacturer	Material	Dimensions (L x W x H, in)	HP	Voltage tested	Voltage available	Mounting	Sds (g), z/h=1	Fp/Wp	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	Rigid base	2.00	4.50	UUT21
RA0040	Busch		26 x 14 x 10.5	2	n/a			2.00	4.50	Interpolated
RA0063	Busch		28 x 19 x 12	3	n/a			2.00	4.50	UUT22
RA0101	Busch		29 x 19 x 12	5	n/a			2.00	4.50	Interpolated
RA0155A	Busch		31.5 x 20 x 13.5	5	460V			2.00	4.50	UUT24
Oilless Rotary Vane Pumps										
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	Rigid or flexible base (neoprene)	2.00	4.50	UUT21
SV1040	Busch		22 x 10 x 11	2	n/a			2.00	4.50	Interpolated
SV1063	Busch		30 x 17 x 14	3	n/a			2.00	4.50	Interpolated
SV1080	Busch		31 x 17 x 14	4	n/a			2.00	4.50	Interpolated
SV1100	Busch		33 x 17 x 14	5	460V			2.00	4.50	UUT23
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	Rigid base	2.00	4.50	UUT22
MM1144	Busch		41 x 17 x 16	3	n/a			2.00	4.50	Interpolated
MM1102	Busch		40 x 17 x 16	4.5 to 5	n/a			2.00	4.50	Interpolated
MM1142	Busch		42 x 17 x 16	5 to 6.4	460V			2.00	4.50	UUT24



Special Seismic Certification
Certified Subcomponents - Tank Mounted Vertical Systems



Tanks									
Model ¹	Manufacturer	Material	Dimensions (in)	Capacity (gal)	Type	Mounting	Sds (g) z/h=1	Fp/Wp	Unit
AR0630xxx	Campbell Hausfeld ²	Steel, ASME construction 200 psig ³	24" Dia x 53" H	80	Conventional	Rigid or flexible base (neoprene)	2.00	4.50	UUT21
AR0568xxx			30" Dia x 53" H	120	Conventional		2.00	4.50	UUT23
AR0273xxx	Campbell Hausfeld ²	Steel, ASME construction 200 psig ³	24" Dia x 50.5" H	80	Frame	Rigid base	2.00	4.50	UUT22
AR0614xxx			30" Dia x 52" H	120	Frame		2.00	4.50	UUT24

- xxx in model number is for variations in paint color and threaded port sizes, not affecting structural elements.
- Campbell Hausfeld is alternately branded as Twin Lakes Manufacturing
- 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)	Mounting	Sds (g) z/h=1	Fp/Wp	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	Rigid or flexible base (neoprene)	2.00	4.50	UUT21
						24 x 24 x 8		2.00	4.50	Interpolated
Premium Duplex controller includes HMI	PBMIV269xxAB or CB ¹					30 x 30 x 8		2.00	4.50	UUT22
						30 x 36 x 8		2.00	4.50	Interpolated
						24 x 36 x 8		2.00	4.50	UUT23
Premium with VFD	PBMIV269xxCV ²					30 x 40 x 12	Rigid base	2.00	4.50	UUT24

- 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
- Where First x = 1,2,3,5,7,A for HP, Second x = 2, 3, 4 for voltage (208, 230, 460V)

**Special Seismic Certification
Tested Units**



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	Sds (g), z/h=1	Fp/Wp	Unit
						Length	Width	Height					
Stacked Systems													
VPD04042L1	Duplex	(2) 5HP	120	2	1	55	64	76	1,340	Flexible base (neoprene)	2.50	5.63	UUT1
VPQ25055588940	Duplex	(2) 25HP	200	2	1	70	90	87	5,130	Flexible base (neoprene)	1.95	4.39	UUT2
CVPD0504A3F1	Duplex	(2) 5HP	120	2	1	55	64	76	1,690	Flexible base (neoprene)	2.50	5.63	UUT3
CVPQ15055588940	Duplex	(2) 15HP	200	2	1	74	90	88	3,800	Flexible base (neoprene)	2.06	4.64	UUT4
VPD0xxx/CVPD0xxx	Duplex	(1) 15HP, (1) 5HP	N/A	2	1	70	45	80	1,940	Flexible base (neoprene)	2.00	4.50	UUT5
VPT0xxx/CVPT0xxx	Triplex	(2) 7.5HP, (1) 3HP	N/A	3	1	55	32	85	1,680	Flexible base (neoprene)	2.00	4.50	UUT8
VPO150x/CVPO150x controller	Octoplex controller	N/A	N/A	N/A	N/A	55	32	65	410	Flexible base (neoprene)	2.00	3.60	UUT13
Tank Over Systems													
VPDT0xxx	Duplex	(1) 7.5HP, (1) 3HP	60	2	1	74	39	89	1,450	Rigid base	2.00	4.50	UUT6
CVPDT0xxx	Duplex	(1) 7.5HP, (1) 3HP	60	2	1	74	39	89	1,910	Flexible base (neoprene)	2.00	4.50	UUT7
Medical Air Stacked Scroll Systems ¹													
MSD15064L5 (receiver/dryer skid)	N/A	N/A	240	N/A	N/A	84	32	96	1,310	Flexible base (neoprene)	2.42	4.36	UUT4b

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

Model number	Type	Pump HP	Tank size (gal)	Tank style	Vertically stacked pumps	Horizontally arrayed pumps	Max. dimensions (in)			Weight (lb)	Mounting	Sds (g), z/h=1	Fp/Wp	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	30	74	710	Rigid base	2.00	4.50	UUT21
VVTD0303 / CVTD0203V	Duplex	(1) 3 HP lube vane, (1) 2 HP oilless claw	80	Frame	1	2	55	30	85	1,260	Rigid base	2.00	4.50	UUT22
VVOTD0504	Duplex	(2) 5 HP oilless vane	120	Conventional	1	2	53	34	90	1,170	Flexible base (neoprene)	2.00	4.50	UUT23
VVTD0504 / CVTD0504BV	Duplex	(1) 5 HP lube vane, (1) 5 HP oilless claw	120	Frame	1	2	59	35	85	1,670	Rigid base	2.00	4.50	UUT24

UUT1

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VPD04042L1

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 2016	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 (eight total).

UUT2

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: VPQ250S5588940

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 2016	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 (eight total).

UUT3

UNIT UNDER TEST (UUT) Summary Sheet

Manufacturer: Powerex

Product Line: Medical Vacuum and Laboratory Vacuum

Model Number: CVPD0504A3F1

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 2016	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 (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: CVPQ15054R2

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 2016	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.

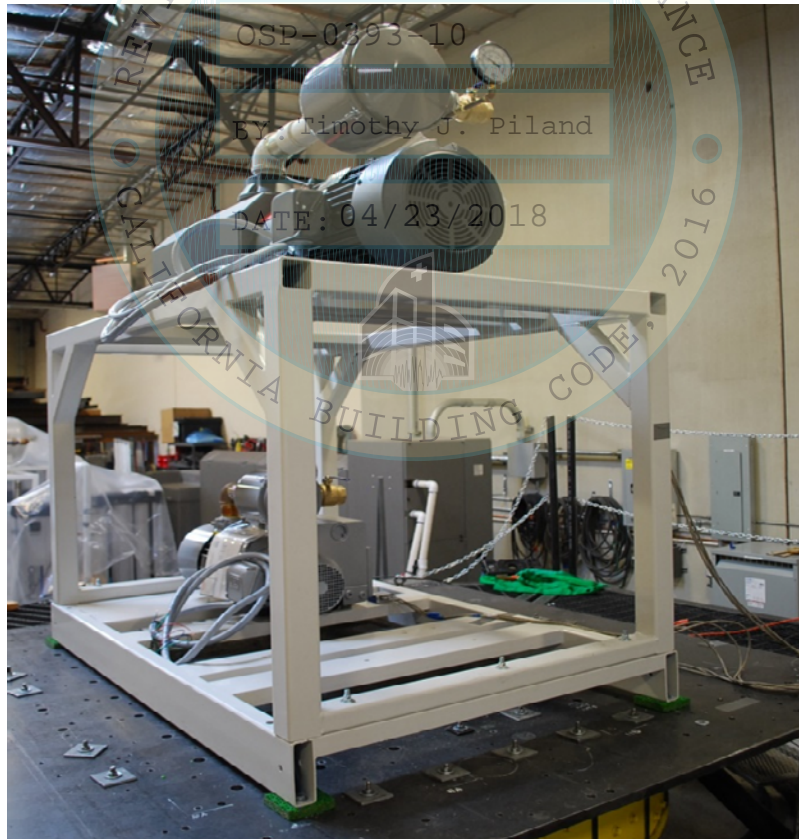
UUT Properties

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 2016	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.34	0.54

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.

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

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

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 2016	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.34	0.54

OSP-0393-10

Unit Mounting Description:



The skid was anchored to the shake table interface plate with four 1/2"-diameter Grade 5 bolts and washers.

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

UUT 7	Operating Weight (lb)	Dimensions (in)			Lowest Natural Frequency (Hz)		
		Length	Width	Height	Front-Back	Side-Side	Vertical
		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 2016	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.34	0.54

OSP-0393-10

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.

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 2016	ICC-ES AC156	2.00	1.0	1.5	3.20	2.40	1.34	0.54

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.

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 2016	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 (reference DCL Test Report 33299-1301).

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.

UUT13

UNIT UNDER TEST (UUT) Summary Sheet

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 2016	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, 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.

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 2016	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.

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 2016	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 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 2016	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, 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.

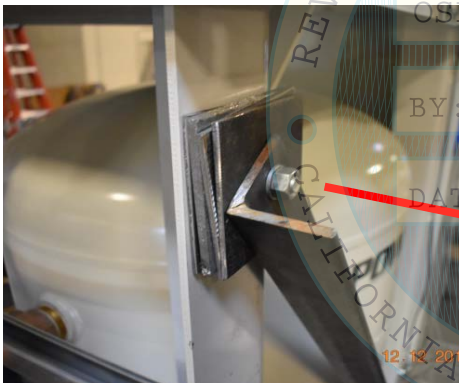
UUT Properties

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 2016	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 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.