

DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION OFFICE OF STATEWIDE HOSPITAL PLANNING AND DEVELOPMENT

APPLICATION FOR HCAI PREAPPROVAL OF MANUFACTURER'S CERTIFICATION (OPM)

OFFICE USE ONLY

APPLICATION #: OPM-0747

Type: X New Renewal/Update

Manufacturer Information

Manufacturer: M.W. Saussé & Co., Inc.

Manufacturer's Technical Representative: Nathan Tremblay

Mailing Address: 28744 Witherspoon Parkway, Valencia, CA 91355

Telephone: (661) 257-3311

Email: ntremblay@vibrex.net

Product Information

Product Name: RMU-EQ

Product Type: Floor Mounted Vibration Isolators With Restraints

Product Model Number: RMU-EQ-1, RMU-EQ-2 and RMU-EQ-3

General Description: Floor mounted vibration isolators with steel springs, neoprene elements, and integrated snubbers

Applicant Infor	mation
Applicant Compar	ny Name: M.W. Saussé & Co., Inc.
Contact Person:	Nathan Tremblay
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Telephone: (661) 257-3311 Email: ntremblay@vibrex.net

Title: Principal Engineer

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STATE OF CALIFORNIA – HEALTH AND HUMAN SERVICES AGENCY





DEPARTMENT OF HEALTH CARE ACCESS AND INFORMATION OFFICE OF STATEWIDE HOSPITAL PLANNING AND DEVELOPMENT

fornia License Number: S6481				
fornia License Number: S6481				
Mailing Address: 28744 Witherspoon Parkway, Valencia, CA 913555425				
ntremblay@vibrex.net				

ncal Special Seismic Certification Preapproval (USP)				
Special Seismic Certification is preapproved under OSP OSP Number:				
CODA				
FOR CODE COM				
Certification Method				
Testing in accordance with: ICC-ES AC156 FM 1950-16				
X Other(s) (Please Specify): ASHRAE 171 modified per HCAI/OSHPD (Draft dated March 2nd, 2023)				
*Use of criteria other than those adopted by the California Building Standards Code, 2022 (CBSC 2022) for component supports and attachments are not permitted. For distribution system, interior partition wall, and suspended ceiling seismic bracings, test criteria other than those adopted in the CBSC 2022 may be used when approved by HCAI prior to testing.				
Analysis				
Experience Data				
Combination of Testing, Analysis, and/or Experience Data (Please Specify):				
OPNIS COSt.				
HCAI Approval				
Date: 5/16/2025				
Name: Timothy Piland Title: Senior Structural Engineer				
Condition of Approval (if applicable):				





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OPM-0747

SEISMICALLY RATED SPRING FLOOR MOUNTED VIBRATION ISOLATORS

WITH RESTRAINTS

1st EDITION, 2025

OPM-0747-25



1. General Notes & Seismic Capacity

- a. HCAI Pre-Approval of Manufacturer's Certification is based on the 2022 & 2025 versions of the California Building Code (CBC).
- b. The individual VIWR (vibration isolators with restraints) have been tested using a modified version of the ASHRAE 171, Method of Testing for Rating Seismic & Wind Restraints
- c. For the design of the VIWR under the 2022 CBC, use the ASCE 7-16 Chapter 13 equations to calculate the lateral & vertical seismic loads and apply them at the top of the VIWR:
 - i. The horizontal seismic force, $F_{\rm p}$

$$\rightarrow F_{p} = \frac{0.4a_{p}S_{DS}W_{p}}{\left(\frac{R_{p}}{I_{p}}\right)} \left(1+2\frac{z}{h}\right)$$
 Eqn. 13.3-1

$$\rightarrow F_{p} = 1.6S_{DS}I_{p}W_{p}$$
 Eqn. 13.3-2 (Upper Limit

$$\rightarrow F_{p} = 0.3S_{DS}I_{p}W_{p}$$
 Eqn. 13.3-3 (Lower Limit)

Where per the ASCE 7-16 Table 13.6-1 for equipment using VIWR:

Amplification Factor, $a_p = 2.5$

Component Response Modification Factor, $R_p = 2.0$

Component Importance Factor, Ip:

For Risk Category IV projects & systems, I_p = 1.5

For Risk Category II and III projects & systems, $I_p = 1.0$

- ii. The vertical seismic force, F_{PY} Piland
 - $\rightarrow F_{pv} = \pm 0.2 S_{DS} W_p$ § 13.3.1.2
- iii. The overstrength factor (Ω_0) per footnote c. of table 13.6-1 is for design of the anchorage to concrete & masonry and is not applicable for the design of the VIWR itself.

iv. Utilizing ASCE 7-16 § 2.3.6 (LRFD) & 2.4.5 (ASD)

- 1.2D + 1.0Ev + 1.0Eh LRFD Eqns. 6 & 7 per § 2.3.6
 - 0.9D 1.0Ev + 1.0Eh
 - ASD Eqns. 8 & 10 per § 2.4.5 0.6D - 0.7Ev + 0.7Eh

Where:

- D = W_p (Dead/operating load of equipment supported by VIWR
- $E_h = F_p$

$$E_v = F_{pv}$$



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Structural Engineer: N. Tremblay California PE No. S6481

May 14, 2025

Component seismic demands applied at the center of gravity (C.G.), relative to the ٧. center of rigidity (C.R.), using the basic principles of structural mechanics, P/A \pm Mc/I in both orthogonal directions are resisted by the isolators (see 2a.ii) to determine the isolator vertical and lateral demands For curbs:

 $I = I_0 + Ad^2$ (Parallel Axis Theorem for rotation about edge of component)

- d. For the design of the VIWR under the 2025 CBC, use the ASCE 7-22 Chapter 13 equations to calculate the lateral & vertical seismic loads and apply them at the top of the VIWR:
 - i. The horizontal seismic force, F_p

$ ightarrow F_{p} = 0.4 S_{DS} I_{p} W_{p} \left[\frac{H_{f}}{R_{\mu}} \right] \left[\frac{C_{AR}}{R_{po}} \right]$	Eqn. 13.3-1
\rightarrow F _p = 1.6S _{DS} I _p W _p	Eqn. 13.3-2 (Upper Limit)
\rightarrow F _p = 0.3S _{DS} I _p W _p	Eqn. 13.3-3 (Lower Limit)

For H_f, per ASCE 7-22 §13.3.1.1 use of either equation 13.3-4 or 13.3-5 is permitted:

$$\rightarrow H_{f} = 1 + a_{1} \left(\frac{z}{h}\right) + a_{2} \left(\frac{z}{h}\right)^{10}$$
 Eqn. 13.3-4

$$a_{1} = 1/T_{a} \le 2.5$$

$$a_{2} = [1 - (0.4/T_{a})^{2}] \ge 0$$

$$T_{a} = \text{Lowest approximate fundamental period of the supporting structure below.}$$

$$\rightarrow H_{f} = 1 + 2.5 \left(\frac{z}{h}\right)$$

For R_μ, per ASCE 7-22 §13.3.1.2 land

 $\rightarrow R_{\mu} = [1.1R/(I_e \Omega_0)]^{1/2} \ge 1.3$ Egn. 13.3-6

 I_e , R, & Ω_0 are design values used for the design of the main supporting building or non-building structure underneath the equipment.

And per the ASCE 7-22 Table 13.6-1 for equipment using VIWR: Component Resonance Ductility Factor CAR: Supported at or below grade plane, $C_{AR} = 1.8$ Supported above grade plane by a structure, $C_{AR} = 2.2$ Component Strength Factor, $R_{po} = 1.3$

If data of the supporting building or non-building structure is not available, the following simplified version of Eqn. 13.3-1 may be used:

$$\rightarrow F_{p} = 0.4S_{DS}I_{p}W_{p}\left[\frac{1+2.5(z/h)}{1.3}\right]\left[\frac{C_{AR}}{R_{po}}\right]$$



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1.1 Date: Structural Engineer: 🔨 Tremblay

California PE No. S6481

May 14, 2025

Component Importance Factor, Ip:

For Risk Category IV projects & systems, $I_p = 1.5$

For Risk Category II and III projects & systems, Ip = 1.0

ii. The vertical seismic force, F_{pv}

 $\rightarrow F_{pv} = \pm 0.2 S_{DS} W_p \qquad \qquad \S \ 13.3.1.6$

iii. The overstrength factor (Ω_0) per footnote b. of table 13.6-1 is for design of the anchorage to concrete & masonry and is not applicable for the design of the VIWR itself.

iv. Utilizing ASCE 7-22 § 2.3.6 (LRFD) & 2.4.5 (ASD)

1.2D + 1.0Ev + 1.0Eh _____ LRFD Eqns. 6 & 7 per § 2.3.6

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0.9D – 1.0Ev + 1.0Eh ____
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1.0D + 0.7Ev + 0.7Eh ASD Eqns. 8 & 10 per § 2.4.5

0.6D - 0.7Ev + 0.7Eh

Where:

- $D = W_p$ (Dead/operating load of equipment supported by VIWR)
- $E_h = F_p$ $E_v = F_{pv}$
- Component seismic demands applied at the center of gravity (C.G.), relative to the center of rigidity (C.R.), using the basic principles of structural mechanics, P/A ± Mc/I in both orthogonal directions are resisted by the isolators (see 2a.ii) to determine the isolator vertical and lateral demands For curbs:

 $I = I_0 + Ad^2$ (Parallel Axis Theorem for rotation about edge of component)

- e. VIWR capacities are limited to the maximum calculated demands from 1c or 1d.
- f. It is the responsibility of the Registered Design Professional (RDP) in responsible charge to submit to the Structural Engineer of record (SEOR) the following:
 - i. Project specific VIWR demands ≤ OPM listed capacities.
 - ii. Component attachment to the VIWR and VIWR attachment to the structure are in compliance with CBC and corresponding anchor attachment ICC Reports.
 - iii. Component assembly installation, e.g., component, VIWR, and attachments are in compliance with CBC and details within the OPM.
- g. Environment factors, e.g., wind, snow, rain/floods, etc., are beyond the scope of the OPM.



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Structural Engineer: N. Tremblay Date: California PE No. S6481

May 14, 2025

1.2

2. General VIWR Design Procedure

- a. The VIWR selection process is as follows:
 - i. Based upon project requirements, select the appropriate VIWR family.
 - ii. Lateral and vertical seismic demands are resisted per isolator.
 - iii. Calculate the seismic demands for each isolator support the equipment per 1c or 1d.
 - For the selected isolator, the calculated seismic demand loads (uplift load and shear/horizontal load) must plot within the corresponding interaction curves on pages 1.5 (LRFD) & 1.6 (ASD).

3. Anchorage and Attachment Requirements

- a. It is the responsibility of the Registered Design Professional (RDP) in responsible charge to submit to the Structural Engineer of Record (SEOR) the following:
 - i. Equipment attachment to the isolator.
 - ii. Anchorage of the isolator to building structure.







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Page No.: 1.3 Date: Structural Engineer: M. Tremblay

tructural Engineer: N. Tremblay California PE No. S6481

May 14, 2025

4. Tested Isolator Capacities

a. Nominal Tested Capacities

VIWR	R _x ¹	R _y ²	R _{xz} ³	Rz
	(Lat. Shear)	(Lng. Shear)	(45° Shear/Tens.)	(Tension)
RMU-EQ-1	815	n/a	1,257	1,801
RMU-EQ-2	1,441	2,106	1,694	2,054
RMU-EQ-3	2,539	n/a	3,925	4,715

- b. To use these tested values in the design of a system supporting MEP/Non-structural equipment, the following strength reduction factors have been applied to the values based on the selected design methodology:
 - i. LRFD or SD methodology: $\phi_i = 0.80$

•
$$T_s = \phi_i R_z$$
 or $T_s = \Omega_i R_z$

ii. ASD: $\Omega_i = 1/1.8 = 0.56$



VIWR LOADING FIGURE





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c. Design Capacity Graphs

$\underline{ERT D DESIGN CAPACITIES(\psi_1 = 0.80)}$				
VIWR	R _x ¹	Ry ²	R _{xz} ³	Rz
	(Lat. Shear)	(Lng. Shear)	(45° Shear/Tens.)	(Tension)
RMU-EQ-1	652	n/a	1006	1441
RMU-EQ-2	1153	1685	1355	1643
RMU-EQ-3	2031	n/a	3140	3772

LRFD DESIGN CAPACITIES ($\phi_i = 0.80$)

1. R_x is the transverse shear across the VIWR baseplate length.

R_y is the longitudinal shear along the VIWR baseplate length. Only RMU-EQ-2 was tested for R_y values for its use in cold formed sheet steel roof curb assemblies which utilize a wall action design approach (VIWRs parallel to the system lateral load (F_p) resist the shear loads while VIWRs perpendicular to the system shear force resist the uplift/downforce of the system lateral load (F_p).

3. R_{xz} is the is the combined tension and lateral shear with the load applied to 45°. The load shown on the capacity graph for R_{xz} is R_z and R_x equal to 0.707* R_{xz} .

4. Tested load values are in pounds force.

5. See figure 1 below for typical axis orientation for a VIWR.





ASD DESIGN CAPACITIES ($\Omega_l = 1.80$)				
VIWR	R _x ¹	Ry ²	R _{xz} ³	Rz
	(Lat. Shear)	(Lng. Shear)	(45° Shear/Tens.)	(Tension)
RMU-EQ-1	453	n/a	698	1001
RMU-EQ-2	801	1170	941	1141
RMU-EQ-3	1411	n/a	2181	2619

1. R_x is the transverse shear across the VIWR baseplate length.

2. R_y is the longitudinal shear along the VIWR baseplate length. Only RMU-EQ-2 was tested for R_y values for its use in cold formed sheet steel roof curb assemblies which utilize a wall action design approach (VIWRs parallel to the system lateral load (F_p) resist the shear loads while VIWRs perpendicular to the system shear force resist the uplift/downforce of the system lateral load (Fp)).

3. R_{xz} is the is the combined tension and lateral shear with the load applied to 45°. The load shown on the capacity graph for R_{xz} is R_z and R_x equal to 0.707*R_{xz}.

4. Tested load values are in pounds force. See figure 1 below for typical axis orientation for a VIWR.









7. DESIGN OF ADDITIONAL FRAMING SUPPORTING THE EQUIPMENT AND ATTACHED TO THE VIWR BY REGISTERED DESIGN PROFESSIONAL.



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SEAL OF REGISTERED DESIGN PROFESSIONAL

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