# APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

| OFFICE USE ONLY | |
|---|---|
| APPLICATION #: | OSP – 0192-10 |

## OSHPD Special Seismic Certification Preapproval (OSP)

**Type:** ☐ New ☑ Renewal

## Manufacturer Information

Manufacturer: IEA, LLC, an Engendren Corporation Subsidiary

Manufacturer's Technical Representative: Greg Guthrie

Mailing Address: 9625 55th Street, Kenosha, WI 53144

Telephone: (262) 942-1414 Email: gguthrie@iearad.com

## Product Information

Product Name: HCR, ECC, and EC Radiators

Product Type: Radiators

Product Model Number: See Attached OSP Product Summary
(List all unique product identification numbers and/or part numbers)

General Description: HCR units are modular radiators consisting of a varying number of individual core and fan sections, and the ECC units and EC units are engine coolers with fans.

Mounting Description: HCR units are rigidly mounted to floor and ECC & EC units are floor mounted with external isolators and snubbers.

## 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:  Date: 1/3/17

Title: President Company Name: The VMC Group

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

Company Name: The VMC Group

Name: Ken Tarlow California License Number: SE2851

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

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, LLC

Contact Name: Kelly Laplace, Quality Manager

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

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

## Seismic Parameters

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

Design Basis of Equipment or Components ($F_p/W_p$) = 1.39 (rigid mount), 4.34 (spring isolated)

$S_{DS}$ (Design spectral response acceleration at short period, g) = 1.93

$a_p$ (In-structure equipment or component amplification factor) = 1.0 (rigid mount), 2.5 (spring isolated)

$R_p$ (Equipment or component response modification factor) = 2.5 (rigid mount), 2.0 (spring isolated)

$\Omega_0$ (System overstrength factor) = 2.0

$I_p$ (Importance factor) = 1.5

z/h (Height factor ratio) = 1.0

Equipment or Component Natural Frequencies (Hz) = See Attachments

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

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 ) =

$\Omega_0$ (System overstrength factor) =

$C_d$ (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): Previous OSP

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

Signature:  Date: 1/31/17

Print Name: M. R. Karim Title: SHFR

Special Seismic Certification Valid Up to : $S_{DS}$ (g) = 1.93 z/h = 1.0

Condition of Approval (if applicable):

**Manufacturer: IEA**

**Table 1 - Certified Components**

| Model | Dimensions (in) | | | Approx. Weight (lb) | Construction | Mounting | Sds (g), z/h=1 | UUT |
|---|---|---|---|---|---|---|---|---|
| | Depth | Width | Height | | | | | |
| HCR-Q036 | 91.75 | 75.00 | 125.50 | 4, 720 | Carbon Steel | Rigid floor mounted | 1.93 | UUT 1 |
| HCR-Q072 | 163.70 | 75.00 | 127.80 | 6, 155 | | | | Interpolated |
| HCR-Q108 | 235.70 | 75.00 | 127.80 | 7, 590 | | | | Interpolated |
| HCR-Q058 | 114.00 | 90.00 | 131.75 | 6, 950 | | | | Interpolated |
| HCRQ116 | 211.70 | 90.00 | 131.75 | 9, 936 | | | | Interpolated |
| HCR-Q174 | 307.75 | 90.00 | 131.75 | 11, 400 | | | | UUT 2 |
| ECC-S072 | 87.00 | 118.50 | 131.75 | 7, 238 | | Floor mounted with vibration isolator | | UUT 3 |
| EC-100 | 97.75 | 124.25 | 153.00 | 9, 315 | | | | UUT 4 |

**Table 2 - Certified Subcomponents: Motors**

| Model | HP | Dimensions (in) | | | Approx. Weight (lb) | Component Mfg. | Casing Material | UUT |
|---|---|---|---|---|---|---|---|---|
| | | Depth | Width | Height | | | | |
| EP0154 Type AEHH-8N | 15 | 23.78 | 13.15 | 14.84 | 304 | TECO Westinghouse | Cast Iron | UUT 1 |
| EP0204 Type AEHH-8N | 20 | 25.52 | 13.15 | 14.84 | 344 | | | Interpolated |
| EP0254 Type AEHH-8N | 25 | 26.8 | 15.04 | 16.52 | 429 | | | Interpolated |
| EP0304 Type AEHH-8N | 30 | 28.3 | 15.04 | 16.88 | 486 | | | UUT 2 |
| U30P2D NEMA Premium | | 28.25 | 13.38 | 13.69 | 325 | US Motors | | UUT 2 |
| W22 - NEMA Premium | | 27.93 | 14.17 | 14.07 | 450 | WEG Electric | | UUT 2 |

**Table 3 - Certified Subcomponents: Fuel Coolers**

| Model | Dimensions (in) | | | Approx. Weight (lb) | Component Mfg. | Construction Material | UUT |
|---|---|---|---|---|---|---|---|
| | Depth | Width | Height | | | | |
| DH-326-211292 | 26.75 | 24.25 | 1.50 | 16.00 | Thermal Transfer | Copper / Aluminum | UUT 1, UUT 2, UUT 3 |
| DH-326-1-1 | 25.00 | 24 | 1.50 | 8.00 | | | UUT 4 |

**Table 4 - Certified Subcomponents: Fans**

| Model | Dimensions | | Component Mfg. | Material | UUT |
|---|---|---|---|---|---|
| | Diameter (in) | Approx. Weight (lb) | | | |
| 10000 Class, Series 24SD | 60 | 105 | Moore Fan | Aluminum | UUT 1 |
| 10000 Class, Series 30SD | 84 | 171 | | | UUT 2, UUT 4 |
| 15/10201 | 84 | 431 | Truflo | Carbon Steel | UUT 3 |

**Table 5 - Certified Subcomponents: Fan Shaft Bearing**

| Model | Dimensions (in) | | | Approx. Weight (lb) | Component Mfg. | Casing Material | UUT |
|---|---|---|---|---|---|---|---|
| | Depth | Width | Height | | | | |
| 5-2000 Series | 5.13 | 5.13 | 2.97 | 1.00 | Dodge | Cast Iron | UUT 1, UUT 2 |
| 2000 Series | 6.13 | 6.13 | 3.52 | 1.81 | | | UUT 1, UUT 2 |
| USRBE5000-307 | 4.47 | 13.50 | 7.38 | 39.0 | Seal-Master | | UUT 4 |

**Table 6 - Certified Subcomponents: Idler Sheave Bearing**

| Model | Dimensions | | Component Mfg. | Material | UUT |
|---|---|---|---|---|---|
| | Diameter (mm) | Approx. Weight (lb) | | | |
| 5309-C | 1.77 | 5.00 | MRC | 52100 Steel | UUT 3 |
| 5312-C | 2.36 | 6.28 | | | UUT 4 |

**Table 7 - Certified Subcomponents: Miscellaneous**

| Model | Dimensions (in) | | | Approx. Weight (lb) | Component Mfg. | Construction Material | Description | UUT |
|---|---|---|---|---|---|---|---|---|
| | Depth | Width | Height | | | | | |
| 913-NLU-TD10-T | 4.00 | 1.75 | 1.75 | 0.19 | Cooper-Standard | Brass | Low Level Alarm Probe | UUT 3 |
| SM6-165-A | 2.25 | 3.25 | 1.65 | 0.14 | Isolation Dynamics | Stainless Steel | Pipe Isolators | UUT 3 |
| 0.0075 AL Fins, 0.625 x 0.20 CU Tubes | 15.00 | 90.00 | 300.00 | 2380.00 | Super Coils | Copper / Aluminum | Cooling Coil | UUT 1, UUT 2 |
| 0.0075 AL Fins, 0.625 x 0.32 CU Tubes | 9.50 | 75.00 | 85.00 | 555.00 | | | | UUT 1, UUT 2 |
| EL150K1 | 2.75 | 4.75 | 5.00 | 2.63 | Murphy Industries | Cast Iron | Liquid Level | UUT 1, UUT 2 |

**Table 8 - Tested Unit Matrix**

| Model | Dimensions (in) | | | Approx. Weight (lb) | Construction | Mounting | Sds (g), z/h=1 | UUT |
|---|---|---|---|---|---|---|---|---|
| | Depth | Width | Height | | | | | |
| HCR-Q036 | 91.75 | 75.00 | 125.50 | 4, 720 | Carbon Steel | Rigid floor mounted | 1.93 | UUT 1 |
| HCR-Q174 | 307.75 | 90.00 | 131.75 | 11, 400 | | | | UUT 2 |
| ECC-S072 | 87.00 | 118.50 | 131.75 | 7, 238 | | Floor mounted with vibration isolator | | UUT 3 |
| EC-100 | 97.75 | 124.25 | 153.00 | 9, 315 | | | | UUT 4 |

# UNIT UNDER TEST (UUT)
## SUMMARY SHEET

**UUT-01**

88135-1001

| Model Line | Model Number | Manufacturer |
|---|---|---|
| HCR Modular Radiators | HCR Q036 | IEA, LLC |

**Product Construction Summary**

Fabricated carbon steel structure with aluminum fins, copper tubes, aluminum fans and multi-voltage 15 HP electric motor

**Options / Subcomponent Summary**

36 square foot Radiator, SR Coils, 6" Flange

**UUT Properties**

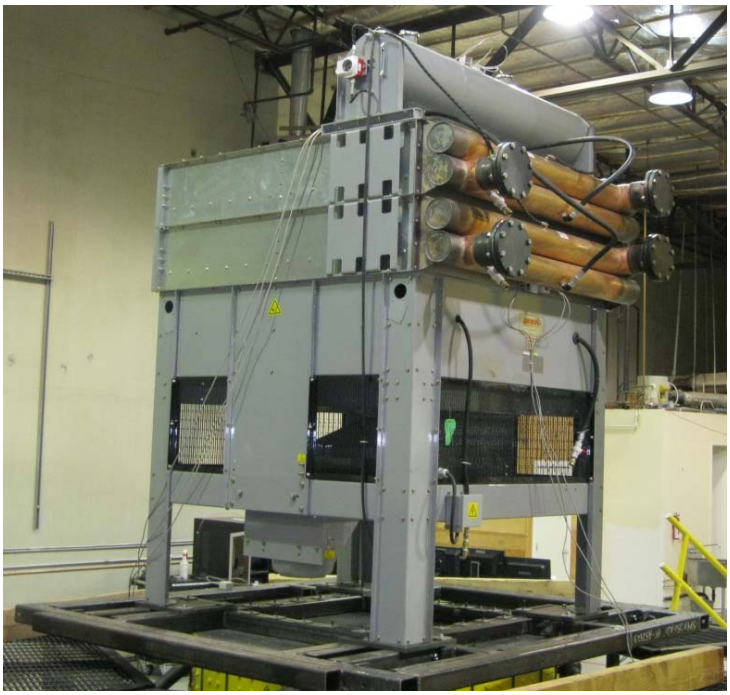
| Weight [ lb ] | Dimensions [ in ] | | | Lowest Nat. Freq. [ Hz ] | | |
|---|---|---|---|---|---|---|
| | Length | Width | Height | F-B | S-S | V |
| 4,720 | 92.0 | 75.0 | 125.6 | 5.0 | 5.8 | 23.3 |

**UUT Highest Passed Seismic Run Information**

| Building Code | Test Criteria | $S_{DS}$ (g) | z/h | $I_P$ | $A_{FLX-H}$ (g) | $A_{RIG-H}$ (g) | $A_{FLX-V}$ (g) | $A_{RIG-V}$ (g) |
|---|---|---|---|---|---|---|---|---|
| CBC 2016 | ICC-ES AC156 | 2.26 | 1 | 1.5 | 3.2 | 2.71 | 1.51 | 0.6 |

**Test Mounting Details**

The unit was mounted to the DCL-provided steel shake table interface frame at four corners through each of the unit's legs using Grade 8, 3/4-inch bolts (four bolts total). The steel interface frame was bolted to the shake table using M12 threaded rod at a spacing of approximately 8-inches on-center.



All units were filled with contents and maintained structural integrity and functionality after shake table test

# UNIT UNDER TEST (UUT) SUMMARY SHEET

**UUT-02**

88135-1001

| Model Line | Model Number | Manufacturer |
|---|---|---|
| HCR Modular Radiators | HCR Q174 | IEA, LLC |

**Product Construction Summary**

Fabricated carbon steel structure with aluminum fins, copper tubes, aluminum fans and multi-voltage 30 HP electric motor

**Options / Subcomponent Summary**

174 square foot Radiator, SR Coils, 6" Flange

**UUT Properties**

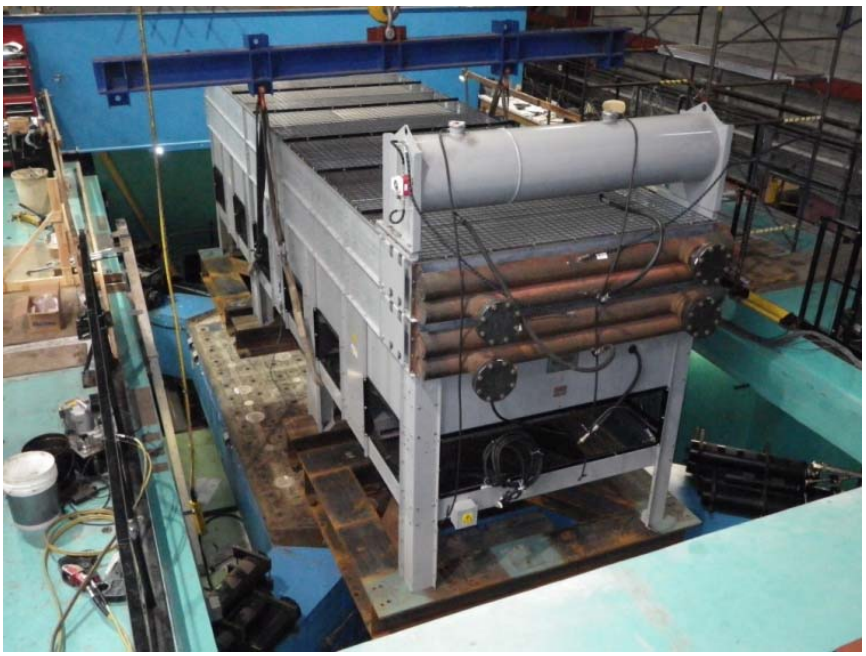
| Weight [ lb ] | Dimensions [ in ] | | | Lowest Nat. Freq. [ Hz ] | | |
|---|---|---|---|---|---|---|
| | Length | Width | Height | F-B | S-S | V |
| 11,400 | 308.0 | 90.0 | 132.0 | 11.5 | 8.2 | 24.8 |

**UUT Highest Passed Seismic Run Information**

| Building Code | Test Criteria | $S_{DS}$ (g) | z/h | $I_P$ | $A_{FLX-H}$ (g) | $A_{RIG-H}$ (g) | $A_{FLX-V}$ (g) | $A_{RIG-V}$ (g) |
|---|---|---|---|---|---|---|---|---|
| CBC 2016 | ICC-ES AC156 | 1.93 | 1.00 | 1.50 | 3.09 | 2.32 | 1.29 | 0.52 |

**Test Mounting Details**

The unit was mounted to the DCL-provided steel shake table interface frame at twelve points through each of the unit's legs using Grade 8, 3/4-inch bolts (twelve total). The steel interface frame was mounted to the shake table using A490 1 1/2-inch diameter bolts at a spacing of approximately 12-inches on-center.



All units were filled with contents and maintained structural integrity and functionality after shake table test

# UNIT UNDER TEST (UUT) SUMMARY SHEET

**UUT-03**

88135-1001

| Model Line | Model Number | Manufacturer |
|---|---|---|
| ECC S072 (Stand-Alone Product) | ECC S072 | IEA, LLC |

**Product Construction Summary**

Fabricated carbon steel structure with aluminum fins, copper tubes, aluminum fan

**Options / Subcomponent Summary**

Fuel Cooler, Fan, Fan Shaft Bearing, Idler Sheave Bearing, Low Level Alarm Probe, Pipe Isolators, and Vibration Isolators

**UUT Properties**

| Weight [ lb ] | Dimensions [ in ] | | | Lowest Nat. Freq. [ Hz ] | | |
|---|---|---|---|---|---|---|
| | Length | Width | Height | F-B | S-S | V |
| 7,238 | 87.0 | 119.0 | 132.0 | 2.5 | 4.3 | 7.6 |

**UUT Highest Passed Seismic Run Information**

| Building Code | Test Criteria | $S_{DS}$ (g) | z/h | $I_P$ | $A_{FLX-H}$ (g) | $A_{RIG-H}$ (g) | $A_{FLX-V}$ (g) | $A_{RIG-V}$ (g) |
|---|---|---|---|---|---|---|---|---|
| CBC 2016 | ICC-ES AC156 | 1.93 | 1.00 | 1.50 | 3.09 | 2.32 | 1.29 | 0.52 |

**Test Mounting Details**

The unit was mounted at the base in six loactions to vibration isolators supplied by CalDyne using Grade 8, 3/4-inch bolts. Four of the isolators were CalDyne model RJJEQ A-3040, mounted on the heavy side of the unit; two furthers from the center of gravity and two at the approximate mid-point of the unit. Two of the isolators were CalDyne model RJJEQ A-2120, mounted on the light side of the unit. The isolators were mounted to steel I-beams using a total of four (4) Grade 8, 5/8-inch bolts per isolator and the I-beams were attached to the shake table using 1 1/2-inch A490 bolts.

All units were filled with contents and maintained structural integrity and functionality after shake table test

# UNIT UNDER TEST (UUT) SUMMARY SHEET

**UUT-04**

88135-1001

| Model Line | Model Number | Manufacturer |
|---|---|---|
| EC 100 (Stand-Alone Product) | EC 100 | IEA, LLC |

**Product Construction Summary**

Fabricated carbon steel structure with aluminum fins, copper tubes, aluminum fan

**Options / Subcomponent Summary**

Fuel Cooler, Fan, Fan Shaft Bearing, Idler Sheave Bearing, and Vibration Isolators

**UUT Properties**

| Weight [ lb ] | Dimensions [ in ] | | | Lowest Nat. Freq. [ Hz ] | | |
|---|---|---|---|---|---|---|
| | Length | Width | Height | F-B | S-S | V |
| 9,315 | 98.0 | 125.0 | 153.0 | 4.3 | 5.1 | 13.7 |

**UUT Highest Passed Seismic Run Information**

| Building Code | Test Criteria | $S_{DS}$ (g) | z/h | $I_P$ | $A_{FLX-H}$ (g) | $A_{RIG-H}$ (g) | $A_{FLX-V}$ (g) | $A_{RIG-V}$ (g) |
|---|---|---|---|---|---|---|---|---|
| CBC 2016 | ICC-ES AC156 | 1.93 | 1.00 | 1.50 | 3.09 | 2.32 | 1.29 | 0.52 |

**Test Mounting Details**

The unit was mounted at the base in six loactions to vibration isolators supplied by CalDyne using Grade 8, 3/4-inch bolts. Four of the isolators were CalDyne model RJJEQ D-4560, mounted on the heavy side of the unit; two further from the center of gravity and two approximately 1/3 of the distance from the heavy end of the unit. Two of the isolators were CalDyne model RJJEQ D-2403, mounted on the light side of the unit. The isolators were mounted to steel I-beams using a total of four (4) Grade 8, 7/8-inch bolts per isolator and the I-beams were attached to the shake table using 1 1/2-inch A490 bolts.

All units were filled with contents and maintained structural integrity and functionality after shake table test