| APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP) | OFFICE USE ONLY |
| :---: | :---: |
|  | APPLICATION \#: OSP - 0087-10 |
| OSHPD Special Seismic Certification Preapproval (OSP) |  |
| Type: $\square$ New $\boxtimes$ Renewal |  |
| Manufacturer Information |  |
| Manufacturer: Danfoss |  |
| Manufacturer's Technical Representative: Nicholas Fowler |  |
| Mailing Address: 8800 W. Bradley Road, Milwaukee, WI. 53224 |  |
| Telephone: On File Email: On File |  |
| Product Information |  |
| Product Name: VLT Drives, P650 Panels \& P656 Panels |  |
| Product Type: Variable Frequency Drives |  |
| Product Model Number: SEE ATTACHMENT 1 (List all unique product identification numbers and/or part numbers) |  |
| General Description: Drive for variable speed control of 3 phase induction | uction motor with or without bypass backu |

Mounting Description: Rigid wall mounted.

## Applicant Information

Applicant Company Name: EASE LLC.
Contact Person: JONATHAN ROBERSON, S.E.
Mailing Address: 5877 Pine Ave, Suite 210, Chino Hills, CA. 91709
Telephone: (909) 606-7622
Email: On File
I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2016.


OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT FACILITIES DEVELOPMENT DIVISION

California Licensed Structural Engineer Responsible for the Engineering and Test Report(s)
Company Name: EASE LLC.
Name: Jonathan Roberson, S.E. California License Number: S4197
Mailing Address: 5877 Pine Ave, Suite 210, Chino Hills, CA. 91709
Telephone: 909-606-7622
Email: jon@easeco.com

## Supports and Attachments Preapproval

$\square \quad$ Supports and attachments are preapproved under OPM-
(Separate application for OSHPD Preapproval of Manufacturer's Certification (OPM) of Supports and attachments is required)
$\boxtimes$ Supports and attachments are not preapproved

## Certification Method

$\boxtimes$ Testing in accordance with: $\boxtimes$ ICC-ES AC156
$\square$ Other (Please Specify): $\qquad$

Testing Laboratory
Company Name: Environmental Testing Laboratory, Inc.
Contact Name: Brady Richard
Mailing Address: 11034 Indian Trail, Dallas, TX 75229-3513
Telephone: 972-247-9657
Email: brady@etldallas.com

## Seismic Parameters

Design in accordance with ASCE 7-10 Chapter 13: $\boxtimes$ Yes $\square$ No
Design Basis of Equipment or Components $\left(F_{p} / W_{p}\right)=1.95$ Tables $3 \& 4 \mid 1.19$ Table 2, Attachment 1
Sos (Design spectral response acceleration at short period, g ) $=2.60$ Tables $3 \& 4 \mid 1.58$ Table 2, Attachment 1
$\mathrm{a}_{\mathrm{p}}\left(\mathrm{In}\right.$-structure equipment or component amplification factor) $=\mathbf{2 ¹}^{112}$
$\mathrm{R}_{\mathrm{p}}($ Equipment or component response modification factor) $=\underline{6}$
$\Omega_{0}($ System overstrength factor) $=\underline{2}$
$I_{p}($ Importance factor $)=1.5$
z/h $($ Height factor ratio $)=1$
Equipment or Component Natural Frequencies $(\mathrm{Hz})=$ See Attachment 2
Overall dimensions and weight (or range thereof) =
See Attachment 1
Equipment or Components @ grade designed in accordance with ASCE 7-10 Chapter 15: $\square$ Yes $\boxtimes$ No
Design Basis of Equipment or Components (V/W) =
Sbs (Design spectral response acceleration at short period, g ) =
$\mathrm{S}_{\mathrm{D} 1}$ (Design spectral response acceleration at 1 second period, g ) $=$ $\qquad$
R (Response modification coefficient $)=$ $\qquad$
$\Omega_{0}$ (System overstrength factor) =
$\mathrm{C}_{\mathrm{d}}($ Deflection amplification factor $)=$ $\qquad$
$I_{p}($ Importance factor) $=$
Height to Center of Gravity above base =
Equipment or Component Natural Frequencies ( Hz ) $=$ $\qquad$
Overall dimensions and weight (or range thereof) =
Tank(s) designed in accordance with ASME BPVC, 2015: $\square$ Yes $\boxtimes$ No

## List of Attachments Supporting Special Seismic Certification

| $\boxtimes$ | Test Report(s) $\quad \square$ | $\square$ Drawings $\quad \square$ | Calculations | $\boxtimes$ | Manufacturer's Catalog |
| :--- | :--- | :--- | :--- | :--- | :--- |
| $\boxtimes$ | Other(s) (Please Specify): $\quad \underline{\text { Attachments } \mathbf{1} \& \mathbf{2}} \quad$ |  |  |  |  |

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

Signature:


Date: April 27, 2017
Print Name: Timothy J. Piland
Title: SSE
Special Seismic Certification Valid Up to : $\mathrm{S}_{\mathrm{DS}}(\mathrm{g})=\underline{\text { See Above }} \mathrm{z} / \mathrm{h}=\underline{1}$
Condition of Approval (if applicable): $\qquad$

## TABLE 1: DANFOSS VLT DRIVE PRODUCTS ${ }^{[A]}$

| PRODUCT LINE | DRIVE MODELS |  |  | NOTES |
| :---: | :---: | :---: | :---: | :---: |
|  | DRIVE CHASSIS | TRADITIONAL PANEL (P650) | VERTICAL PANEL (P656) |  |
| Danfoss VLT FC100 HVAC Drives | FC101 | N/A | N/A | Table 4 |
|  | $\begin{aligned} & \text { FC102 } \\ & \text { FC103 } \end{aligned}$ | $\begin{aligned} & \hline \text { S102 } \\ & \text { S103 } \end{aligned}$ | $\begin{aligned} & \hline \text { S102 } \\ & \text { S103 } \end{aligned}$ | $\begin{aligned} & \hline \text { Table } 2 \text { (P650) } \\ & \text { Table } 3 \text { (P656) } \\ & \hline \end{aligned}$ |
| Danfoss VLT FC200 AQUA Drives | FC202 | S202 | FC202 | Table 2 (P650) <br> Table 3 (P656) |
| Danfoss VLT FC300 INDUSTRIAL Drives | $\begin{aligned} & \text { FC301 } \\ & \text { FC302 } \\ & \text { FC322 } \end{aligned}$ | $\begin{aligned} & \hline \text { S301 } \\ & \text { S302 } \\ & \text { S322 } \end{aligned}$ | $\begin{aligned} & \hline \text { N/A } \\ & \text { S302 } \\ & \text { S322 } \end{aligned}$ | Table 2 (P650) <br> Table 3 (P656) |

NOTES:
A) Seismic Certification is limited to the models listed in this table possessing the physical, mechanical and electrical characteristics and product options presented in the tables noted above.
B) Identification: Labels are provided on both the panels and the drive chassis. The labels include a Typecode (T/C), Material Number, and a Serial Number ( $\mathrm{S} / \mathrm{N}$ ):
a. Type Codes (T/C) are alphanumeric sequences that reflect physical, mechanical and electrical features and options present in the panel or drive.
b. Material Numbers are alphanumeric sequences that are unique to a particular project
c. Serial Numbers $(\mathrm{S} / \mathrm{N})$ are unique numbers assigned to a panel or drive

TABLE 2: DANFOSS VLT DRIVE CHASSIS \& TRADITIONAL PANEL CONFIGURATION (P650) CHARACTERISTICS

| PANEL | $\begin{gathered} \text { DRIVE }^{[1]} \\ \text { HP RANGE } \end{gathered}$ | TIER ${ }^{\text {[2] }}$ | MAX. DIMENSIONS (IN.) ${ }^{[3]}$ |  |  | MAX WT <br> (LBS.) | BASIS ${ }^{\lfloor 4\rfloor}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| SIZE |  |  | WIDTH | DEPTH | HEIGHT |  |  |
| NEMA/UL TYPE 1 / TYPE 12 / TYPE 4X ENCLOSURES |  |  |  |  |  |  |  |
| A2 Frame | 0.33-5 | 1 | 3.5 to 5.2 | 8.1 to 8.7 | 13.4 to 19.1 | 30 | INT |
|  |  | 2 | 7.6 | 8.3 to 8.8 | 31.7 | 40 | INT |
| A3 Frame | 1-10 | 1 | 5.1 to 5.3 | 8.1 to 8.7 | 10.6 to 19.1 | 30 | INT |
|  |  | 2 | 7.6 | 8.3 to 8.8 | 31.7 | 40 | UUT1 \& UUT2 |
| A5 Frame | 0.5-10 | 1 | 9.5 | 8 | 16.5 | 35 | INT |
|  |  | 2 | 19.2 | 8.6 | 18.9 | 55 | INT |
| B1 Frame | 7.5-25 | 1 | 9.5 | 10.2 | 18.9 | 65 | INT |
|  |  | 2 | 19.1 | 10.8 | 21.5 | 85 | INT |
| B2 Frame | 14-50 | 1 | 9.5 | 10.2 | 25.6 | 79 | INT |
|  |  | 2 | 19.1 | 10.9 | 28.2 | 105 | INT |
| C1 Frame | 20-75 | 1 | 12.1 | 12.2 | 26.8 | 100 | INT |
|  |  | 2 | 24.4 | 12.7 | 29.9 | 145 | INT |
| C2 Frame | 40-125 | 1 | 14.6 | 13.2 | 30.3 | 130 | INT |
|  |  | 2 | 29.3 | 13.8 | 33.5 | 221 | UUT3 |
| NEMA/UL TYPE 3R ENCLOSURES |  |  |  |  |  |  |  |
| 1 | 0.5HP - 10HP | N/A | 28.8 | 11 | 30 | 225 | INT |
| 2 | 5HP - 25HP | N/A | 31.1 | 12.25 | 38 | 300 | INT |
| 3 | 15HP - 40HP | N/A | 31.1 | 12.25 | 38 | 300 | UUT7 |
| 4 | 25HP - 75HP | N/A | 38.2 | 15.6 | 47.1 | 360 | UUT5 \& UUT6 |
| CERTIFIED ENCLOSURE | NEMA/UL Type 1 <br> NEMA/UL Type 3R (NEMA 3R Drive are identical to NEMA 12 Drive except for addition of 6 mm diameter weep hole at bottom.) <br> NEMA/UL Type 4X (identical to NEMA 12 enclosure with the addition of a protective spray-on coating). <br> NEMA/UL Type 12 |  |  |  |  |  |  |
| MOUNTING | Wall-mounted: fully supported by a building wall structure. NEMA 3R enclosures may either be surface-mounted to wall or mounted to 12 ga . Unistrut/ Power-Strut backing which is surface mounted to wall at the top and bottom of the unit. Strut backing shall project not more than $15 / 8$ " from the face of the wall. |  |  |  |  |  |  |
| NOTES | 1. Includes voltages of 200-240VAC Single or 3-Phase, 380-480VAC Single Phase, 380-500VAC 3-Phase, 525-600VAC 3 Phase (A, B \& C Frames), 525-690VAC 3 phase (D Frames). <br> 2. See Figure 1: Traditional Panel (P650) Tier Visual Identification <br> 3. Depth dimension excludes door handle. Width of NEMA 3R enclosures excludes rain hoods. <br> 4. BASIS: <br> - UUT\#: Indicates that a test specimen matching these characteristics was tested as part of this testing program. <br> - INT (Interpolate/Extrapolate): indicates a model that was not specifically tested, and by which seismic certification is established through evaluation of testing of other, similar models in the product line. |  |  |  |  |  |  |



Note: Tier 3 is shown for identification purposes only. See Table 1 for approved tiers.

FIGURE 1: TRADITIONAL PANEL (P650) TIER VISUAL IDENTIFICATION

TABLE 3: DANFOSS VLT DRIVE VERTICAL PANEL CONFIGURATION (P656) CHARACTERISTICS

| PANEL SIZE | $\begin{aligned} & \text { DRIVE }^{[7]} \\ & \text { HP RANGE } \end{aligned}$ | TIER ${ }^{\text {[2] }}$ | MAX. DIMENSIONS (IN.) |  |  | $\begin{gathered} \hline \text { MAX WT } \\ \text { (LBS.) } \end{gathered}$ | BASIS ${ }^{[3]}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | WIDTH | DEPTH | HEIGHT |  |  |
| B3 Frame | 7.5-25 | 1 | 9.1 | 11.5 | 30.0 | 39 | UUT A1 |
|  |  | 2 | 9.2 | 16.0 | 41.8 | 90 | UUT A2 |
| B4 Frame | 20-50 | 1 | 9.8 | 11.3 | 34.5 | 72 | UUT A3 |
|  |  | 2 | 9.8 | 17.7 | 43.3 | 112 | INT |
| C3 Frame | 25-75 | 1 | 12.7 | 14.8 | 39.6 | 112 | INT |
|  |  | 2 | 12.7 | 18.0 | 54.4 | 180 | INT |
| C4 Frame | 40-125 | 1 | 15.2 | 14.8 | 45.8 | 170 | INT |
|  |  | 2 | 15.2 | 18.1 | 59.7 | 268 | UUT A4 |
| $\begin{aligned} & \text { CERTIFIED } \\ & \text { ENCLOSURE } \end{aligned}$ | IP21 / NEMA/UL Type 1 enclosures with carbon steel back panels. B3 Frames have carbon Steel stiffening elements and plastic drive cover. All other Frame sizes have extruded aluminum stiffening elements with carbon steel covers. |  |  |  |  |  |  |
| MOUNTING | Wall-mounted: fully supported by a building wall structure. |  |  |  |  |  |  |
| NOTES | 1. Includes voltages of 200-208VAC, 200-240VAC, 380-480VAC, and 525-600VAC 3 Phase <br> 2. See Figure 2: Vertical Panel (P656) Tier Visual Identification <br> 3. BASIS: <br> - UUT\#: Indicates that a test specimen matching these characteristics was tested as part of this testing program. <br> - INT (Interpolate/Extrapolate): indicates a model that was not specifically tested, and by which seismic certification is established through evaluation of testing of other, similar models in the product line. |  |  |  |  |  |  |

TIER 1: NON BYPASS


B3 FRAME
Drive with:
Fuses
Disconnect

B4/C3/C4 FRAME


TIER 2: BYPASS


B3 FRAME

## Drive with bypass:

Fuses
Disconnect
contactors

Power Supply Control Module

FIGURE 2: VERTICAL PANEL (P656) TIER VISUAL IDENTIFICATION

TABLE 4: DANFOSS VLT BASIC (FC101) DRIVE CHASSIS CHARACTERISTICS

| FRAME SIZE | $\begin{aligned} & \text { DRIVE }^{[7]} \\ & \text { HP RANGE } \end{aligned}$ | MAX. DIMENSIONS (IN.) ${ }^{[2]}$ |  |  | $\begin{gathered} \hline \text { MAX WT }^{[3]} \\ \text { (LBS.) } \\ \hline \end{gathered}$ | BASIS ${ }^{[4]}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | WIDTH | DEPTH | HEIGHT |  |  |
| H1 Frame | 0.33-2 | 3.2 | 6.8 | 11.5 | 6 | UUT B1 |
| H2 Frame | 3-5.4 | 3.8 | 7.7 | 12.7 | 9 | INT |
| H3 Frame | 5-10 | 4.2 | 8.3 | 13.7 | 11 | INT |
| H4 Frame | 7.5-20 | 5.6 | 9.7 | 14.8 | 17 | INT |
| H5 Frame | 15-30 | 6.4 | 10.3 | 16.5 | 23 | UUT B2 |
| H6 Frame | 20-60 | 10.3 | 9.6 | 26.1 | 60 | UUT B3 |
| H7 Frame | 30-120 | 13.0 | 13.2 | 31.8 | 90 | INT |
| H8 Frame | 50-125 | 15.4 | 13.2 | 37.2 | 124 | UUT B4 |
| CERTIFIED ENCLOSURE | NEMA/UL Type 1 <br> $\mathrm{H} 1-\mathrm{H} 5$ includes carbon steel mounting features, with plastic covers. <br> $\mathrm{H} 6-\mathrm{H} 8$ includes carbon steel mounting features and sides and plastic covers. |  |  |  |  |  |
| MOUNTING | Wall-mounted: fully supported by a building wall structure. |  |  |  |  |  |
| NOTES | 1. Includes voltages of 200-208VAC, 200-240VAC, 380-480VAC, and 525-600VAC 3 Phase <br> 2. Dimensions and weight include NEMA / UL Type 1 Kit \& door handle. <br> 3. Max. Wt. includes weight of NEMA 1 rain shield <br> 4. BASIS: <br> - UUT\#: Indicates that a test specimen matching these characteristics was tested as part of this testing program. <br> - INT (Interpolate/Extrapolate): indicates a model that was not specifically tested, and by which seismic certification is established through evaluation of testing of other, similar models in the product line. |  |  |  |  |  |

TABLE 1: SHAKE TABLE TEST PARAMETERS: UUT-1 THROUGH UUT-7

| TEST CRITERIA | $\mathbf{S}_{\text {DS }}$ | $\mathbf{z} / \mathbf{h}$ | $\mathbf{I P}_{\mathbf{P}}$ | A $_{\text {FLX-H }}$ | $\mathbf{A}_{\text {RIG-H }}$ | A $_{\text {FLX-V }}$ | A $_{\text {RIG-V }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ICC-ES AC156 | 2.05 | 1.0 | 1.5 | 3.28 | 2.46 | 1.37 | 0.55 |

UUT-1: $\quad$ Traditional (P650) 10 Hp 460 V drive panel w/ ECB control

$\left.\begin{array}{lll}\hline \text { UUT-5: } & \text { 75HP 460V Drives in NEMA 3R Enclosure } \\ \hline \text { DESCRIPTION: } & \text { NEMA 3R Enclosure with: } \\ & \bullet & \text { Drive Fuses } 150 \text { Amp } \\ & \bullet & \text { Main Fuses } 150 \text { Amp }\end{array}\right]$

TABLE 2: SHAKE TABLE TEST PARAMETERS: UUT-A1 THROUGH UUT-A4

| TEST CRITERIA | $\mathbf{S}_{\text {DS }}$ | $\mathbf{z} / \mathbf{h}$ | $\mathbf{I P}_{\mathbf{P}}$ | A $_{\text {FLX-H }}$ | $\mathbf{A}_{\text {RIG-H }}$ | $\mathbf{A}_{\text {FLX-v }}$ | A $_{\text {RIG-v }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ICC-ES AC156 | 2.6 | 1.0 | 1.5 | 4.16 | 3.12 | 1.74 | 0.70 |



WEIGHT: 36.5 lbs
Unit maintained structural integrity and remained functional per manufacturer requirement after AC156 test.

UUT-A2: Vertical Bypass (P656) Panel, 25 HP, 460 V
DESCRIPTION: B3 Frame Tier 2 NEMA 1 enclosure with:

- Drive Fuses: 60 amp
- Main Fuses: 50 amp
- 3 Contactor Bypass
- Standard RFI Filter H2 / A2
- Main Disconnect Switch
- Electro-Mechanical Bypass (EMB2) Control
- Graphical Display

Unit was full of content during test.
MOUNTING Wall Mounted $\mathrm{w} /(4)-1 / 4$ " TEK screws \& standard washers (wide series) to 16 ga backing.
DIMENSIONS: 9.2" W x 16" D x $41.8^{\prime \prime}$ H
WEIGHT: 81 lbs
Unit maintained structural integrity and remained functional per manufacturer requirement after AC156 test.

UUT-A3: $\quad$ Vertical Non Bypass (P656) Panel, 25 HP, 230 V (200-240 V)

| DESCRIPTION: | B4 Frame Tier 1 NEMA 1 Enclosure with: <br> - Drive Fuses: $80 \mathrm{amp}, 300 \mathrm{~V}$ <br> - Main Disconnect Switch <br> - Standard RFI Filter H2 / A2 <br> - Graphical Display <br> Unit was full of content during test. |
| :---: | :---: |
| MOUNTING | Wall Mounted $\mathrm{w} /(4)-1 / 4$ " TEK screws \& standard washers (wide series) to 16 ga backing. |
| DIMENSIONS: | 9.8" W x 11.3 " D x 34.5 " H |
| WEIGHT: | 66 lbs |
|  | Unit maintained structural integrity and remained functional per manufacturer requirement after AC156 test. |



Unit maintained structural integrity and remained functional per manufacturer requirement after AC156 test.

## UUT-A4: Vertical Bypass (P656) Panel, 125 HP, 460 V (380 - 480V), C4 Frame

DESCRIPTION: C4 Frame Tier 2 NEMA 1 Enclosure with:

- Circuit Breaker: 174N6850-200 amp
- Drive Fuses: 250 amp
- 3 Contactor Bypass
- Option C Card: Electronically Controlled Bypass (ECB) control
- Transformer: 100VA
- Standard RFI Filter H2 / A2
- Graphical Display

Unit was full of content during test.
MOUNTING Wall Mounted w/ (4) - $1 / 4$ " TEK screws \& standard washers (wide series)
 to 16ga backing.
DIMENSIONS: 15.2" W x 18.1" D x 59.7" H
WEIGHT: 234 lbs
Unit maintained structural integrity and remained functional per manufacturer requirement after AC156 test.

EQUIPMENT ANCHORAGE \& SEISMIC ENGINEERING

TABLE 3: SHAKE TABLE TEST PARAMETERS: UUT-B1 THROUGH UUT-B4

| TEST CRITERIA | $\mathbf{S}_{\text {DS }}$ | $\mathbf{z} / \mathbf{h}$ | $\mathbf{I P}_{\mathbf{P}}$ | A $_{\text {FLX-H }}$ | $\mathbf{A}_{\text {RIG-H }}$ | A $_{\text {FLX-v }}$ | A $_{\text {RIG-v }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| ICC-ES AC156 | 2.6 | 1.0 | 1.5 | 4.16 | 3.12 | 1.74 | 0.70 |

UUT- B1: H1 Frame 2 HP Drive


Unit maintained structural integrity and remained functional per manufacturer requirement after AC156 test.

| UUT-B2: | H5 Frame VLT Basic 30 HP Drive |  |
| :---: | :---: | :---: |
| DESCRIPTION: | Product Group: Danfoss |  |
|  | Product Line FC101-HVAC | 4) |
|  | Power Size 22 KW |  |
|  | Voltage 380 to 480 VAC 3 Phase |  |
|  | Enclosure IP20 Open Chassis with NEMA 1 Enclosure Kit |  |
|  | RFI Filter H4 / A1 |  |
|  | Display Local Control Panel |  |
|  | Unit was full of content during test. |  |
| MOUNTING | Wall Mounted $\mathrm{w} /(4)-1 / 4$ " TEK screws \& standard washers (wide series) to 16ga backing. |  |
| DIMENSIONS: | 6.34" W X 10.24" D X 16.46" H | * SS |
| WEIGHT: | 22 LBS |  |


| UUT-B3: | H6 Frame 50 HP Drive |  |
| :---: | :---: | :---: |
| DESCRIPTION: | Product Group: Danfoss | $\xrightarrow{\text { map }} \longrightarrow 55$ |
|  | Product Line FC101-HVAC |  |
|  | Power Size 37KW |  |
|  | Voltage 380 to 480 VAC 3 Phase |  |
|  | Enclosure IP20 Open Chassis with back plate \& NEMA 1 Enclosure Kit |  |
|  | RFI Filter H3 / A1/B |  |
|  | Display Local Control Panel |  |
|  | Unit was full of content during test. |  |
| MOUNTING | Wall Mounted $\mathrm{w} /(4)-1 / 4$ " TEK screws \& standard washers (wide series) to 16 ga backing. |  |
| DIMENSIONS: | 10.24" W X 9.53" D X $26.1{ }^{\prime \prime}$ H |  |
| WEIGHT: | 54 LBS |  |
|  | Unit maintained structural integrity and remained functional per manufacturer requir | ment after AC156 test. |



