# APPLICATION FOR OSHPD SPECIAL SEISMIC CERTIFICATION PREAPPROVAL (OSP)

| OFFICE USE ONLY | |
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| APPLICATION #: | OSP – 0528 – 10 |

## OSHPD Special Seismic Certification Preapproval (OSP)

**Type:** ☒ New ☐ Renewal

## Manufacturer Information

Manufacturer: **Toshiba International Corporation**

Manufacturer's Technical Representative: Jesús Peñalver

Mailing Address: 13131 West Little York Road, Houston, TX 77041

Telephone: 855.803.7087 ext. 3649 Email: jesus.penalver@toshiba.com

## Product Information

Product Name: **G9000 & G2020 Uninterruptible Power Systems**

Product Type: Uninterruptible Power System

Product Model Number: See Attachment 1
(List all unique product identification numbers and/or part numbers)

General Description: UPS with carbon steel enclosures and Si & SiC power modules.
Seismic enhancements made to the test unit shall be incorporated into the respective production units.

Mounting Description: Rigid floor mounted

## Applicant Information

Applicant Company Name: **Manwill Engineering LLC**

Contact Person: Derek Manwill, SE

Mailing Address: PO Box 1194, Bend, OR 97709

Telephone: 541.241.2102 Email: derek@manwillSE.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: June 30, 2017

Title: President Company Name: **Manwill Engineering LLC**

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

Company Name: **Manwill Engineering LLC**

Name: Derek Manwill, SE California License Number: S6266

Mailing Address: PO Box 1194, Bend, OR 97709

Telephone: 541.241.2102 Email: derek@manwillSE.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: Environmental Testing Laboratory

Contact Name: Jeremy Lange

Mailing Address: 11034 Indian Trail, Dallas, TX 75229

Telephone: 972.247.9657 Email: jeremy@etldallas.com

## Seismic Parameters

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

Design Basis of Equipment or Components ($F_p/W_p$) = 1.16 ($S_{DS}$ = 1.54g); 0.90 ($S_{DS}$ = 2.0g)

$S_{DS}$ (Design spectral response acceleration at short period, g) = 1.54 (z/h = 1); 2.0 (z/h = 0)

$a_p$ (In-structure equipment or component amplification factor) = 2.5

$R_p$ (Equipment or component response modification factor) = 6.0

$\Omega_0$ (System overstrength factor) = 2.0

$I_p$ (Importance factor) = 1.5

z/h (Height factor ratio) = 1 ($S_{DS}$ = 1.54g); 0 ($S_{DS}$ = 2.0g)

Equipment or Component Natural Frequencies (Hz) = See Attachment 2

Overall dimensions and weight (or range thereof) = See Attachments 1 & 2

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): Attachments 1, 2, & 3

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

Signature: Date: July 27, 2017

Print Name: Timothy J. Piland Title: SSE

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

Condition of Approval (if applicable):

| | |
|---|---|
| **MANUFACTURER:** | **TOSHIBA INTERNATIONAL CORPORATION** |
| **PRODUCT FAMILY:** | **G9000 AND G2020 UNINTERRUPTIBLE POWER SYSTEMS** |

| MODEL NUMBER | DIMENSIONS (in) | | | MAX. WT. (lb) | DESCRIPTION / NOTES | BASIS |
|---|---|---|---|---|---|---|
| | DEPTH | WIDTH | HEIGHT | | | |
| **G9000 Uninterruptible Power Systems** | | | | | | |
| T9X[1]S3S10KS6XSN2 (100kVA) | 32.7 | 27.6 | 78.7 | 772 | See Note 1 below | EXTRAP |
| T9XS3S10KS6XSN (100kVA) | 32.8 | 27.6 | 78.7 | 866 | Si power modules, carbon steel encl. | **UUT 1** |
| T9XS3S16KS6XSN2 (160kVA) | 32.7 | 27.6 | 78.7 | 860 | | INTERP |
| T9XS3S16KS6XSN (160kVA) | 32.7 | 35.4 | 78.7 | 1200 | | INTERP |
| T9XS3S22KS6XSN2 (225kVA) | 32.7 | 35.4 | 78.7 | 1080 | | INTERP |
| T9XS3S22KS6XSN (225kVA) | 32.7 | 35.4 | 78.7 | 1250 | | INTERP |
| T9XS3S30KS6XSN (300kVA) | 32.8 | 51.2 | 78.7 | 2260 | | INTERP |
| T9XS3S50KS6XSN (500kVA) | 32.8 | 70.9 | 78.7 | 3300 | | INTERP |
| T9XS3S65KS6XSN (650kVA) | 32.8 | 90.6 | 78.7 | 4062 | | INTERP |
| T9XS3S75KS6XSN (750kVA) | 32.8 | 90.6 | 78.7 | 4062 | Si power modules, carbon steel encl. | **UUT 2** |
| **G2020 Uninterruptible Power Systems** | | | | | | |
| T200H0500KWWW (500kVA) | 33.5 | 59.1 | 78.7 | 2756 | | INTERP |
| T200H0750KWWW (750kVA) | 33.5 | 81.6 | 78.7 | 3565 | SiC power module, carbon steel encl. | **UUT 3** |

| | | | | |
|---|---|---|---|---|
| MOUNTING: | Rigid floor mounted. | SEISMIC LEVEL(S) | $S_{DS}$ = 1.54g for z/h = 1<br>$S_{DS}$ = 2.0g for z/h = 0 | $I_P$ = 1.5 |

NOTES:

**Product Construction:** Carbon steel cabinet. The G9000 and G2020 have similar construction, configuration, and mounting.

**Options/Subcomponents:** The G9000 and G2020 have the same configuration, manufacturers, and materials of subcomponents, except for the material of the power modules. The G9000 uses silicon (Si) for the power modules, while the G2020 uses silicon carbide (SiC); the configuration is similar and the manufacturers are the same for the power modules.

**1.** X in 3rd digit of G9000 model number denotes main controller generation: 0 for Generation 1, 1 for Generation 2. Generation 1 tested in UUT 1 and UUT 2; Generation 2 tested in UUT 3.

## UUT 1 - G9000 100kVA

| | |
|---|---|
| **MANUFACTURER:** | TOSHIBA INTERNATIONAL CORPORATION |
| **MODEL NUMBER:** | T90S3S10KS6XSN (100kVA) |
| **UNIT FUNCTION:** | Uninterruptible power system |
| **SERIAL NUMBER:** | 08-7E445120012 |

| DIMENSIONS (in) | | | WEIGHT | RES. FREQ. (Hz) | | |
|---|---|---|---|---|---|---|
| DEPTH | WIDTH | HEIGHT | (lb) | F-B | S-S | V |
| 32.8 | 27.6 | 78.7 | 866 | 7.9 | 5.0 | 18.9 |

| BUILDING CODE | TEST CRITERIA | LAB REPORT NO. |
|---|---|---|
| 2016 CBC | ICC-ES AC156 | ETL SQ37-1010-1 |

| $S_{DS}$ (g) | z/h | $A_{FLX-H}$ (g) | $A_{RIG-H}$ (g) | $A_{FLX-V}$ (g) | $A_{RIG-V}$ (g) |
|---|---|---|---|---|---|
| 1.54 | 1 | 2.46 | 1.85 | 1.34 | 0.54 |
| 2.0 | 0 | | | | |

**IMPORTANCE FACTOR, $I_P$ = 1.5**

Unit was full of operating content during the shake table test. Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.

| | |
|---|---|
| **MOUNTING:** | Rigid floor mounted using (4) 1/2" ASTM A307 bolts. |
| **CONSTRUCTION:** | NEMA 1 carbon steel enclosure, Si power modules. |
| **SUBCOMPONENTS:** | Subcomponents uniquely identified by model number. |
| **TESTING NOTES:** | No 45-degree performed on uniaxial. Therefore, values have been adjusted down by a factor of 1.3 for orthogonality. |

## UUT 2 - G9000 750kVA

| | |
|---|---|
| **MANUFACTURER:** | TOSHIBA INTERNATIONAL CORPORATION |
| **MODEL NUMBER:** | T90S3S75KS6XSN (750kVA) |
| **UNIT FUNCTION:** | Uninterruptible power system |
| **SERIAL NUMBER:** | 09-7E415710081 |

| DIMENSIONS (in) | | | WEIGHT | RES. FREQ. (Hz) | | |
|---|---|---|---|---|---|---|
| DEPTH | WIDTH | HEIGHT | (lb) | F-B | S-S | V |
| 32.8 | 90.6 | 78.7 | 4062 | 5.8 | 5.4 | 5.7 |

| BUILDING CODE | TEST CRITERIA | LAB REPORT NO. |
|---|---|---|
| 2016 CBC | ICC-ES AC156 | ETL SQ37-1010-1 |

| $S_{DS}$ (g) | z/h | $A_{FLX-H}$ (g) | $A_{RIG-H}$ (g) | $A_{FLX-V}$ (g) | $A_{RIG-V}$ (g) |
|---|---|---|---|---|---|
| 1.54 | 1 | 2.46 | 1.85 | 1.34 | 0.54 |
| 2.0 | 0 | | | | |

**IMPORTANCE FACTOR, $I_P$ = 1.5**

Unit was full of operating content during the shake table test. Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.

| | |
|---|---|
| **MOUNTING:** | Rigid floor mounted using (10) 5/8" ASTM A307 bolts. |
| **CONSTRUCTION:** | NEMA 1 carbon steel enclosure, Si power modules. |
| **SUBCOMPONENTS:** | Subcomponents uniquely identified by model number. |
| **TESTING NOTES:** | No 45-degree performed on uniaxial. Therefore, values have been adjusted down by a factor of 1.3 for orthogonality. LCD display will be secured with screws instead of friction clip to ensure separation of display parts does not occur. Enhancements will be incorporated into production units. |

## UUT 3 - G2020 750kVA

| | |
|---|---|
| **MANUFACTURER:** | TOSHIBA INTERNATIONAL CORPORATION |
| **MODEL NUMBER:** | T200H0750KWWW (750kVA) |
| **UNIT FUNCTION:** | Uninterruptible power system |
| **SERIAL NUMBER:** | 17530069 |

| DIMENSIONS (in) | | | WEIGHT | RES. FREQ. (Hz) | | |
|---|---|---|---|---|---|---|
| DEPTH | WIDTH | HEIGHT | (lb) | F-B | S-S | V |
| 33.5 | 81.6 | 78.7 | 3565 | 5.6 | 9.1 | 17.3 |

| BUILDING CODE | TEST CRITERIA | LAB REPORT NO. |
|---|---|---|
| 2016 CBC | ICC-ES AC156 | ETL 17011TR1 |

| $S_{DS}$ (g) | z/h | $A_{FLX-H}$ (g) | $A_{RIG-H}$ (g) | $A_{FLX-V}$ (g) | $A_{RIG-V}$ (g) |
|---|---|---|---|---|---|
| **2.0** | **1** | **3.20** | **2.40** | **1.34** | **0.54** |

**IMPORTANCE FACTOR, $I_P$ = 1.5**

Unit was full of operating content during the shake table test. Unit maintained structural integrity and remained functional per manufacturer requirement after shake table test.

| | |
|---|---|
| **MOUNTING:** | Rigid floor mounted using (6) 5/8" Grade 8 bolts. |
| **CONSTRUCTION:** | NEMA 1 carbon steel enclosure, SiC power modules. |
| **SUBCOMPONENTS:** | Subcomponents uniquely identified by model number. |
| **TESTING NOTES:** | Upper latch assembly modified to ensure door closure. Enhancements will be incorporated into production units. |

## G9000

| DIGIT: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE: | T | 9 | 0 | S | 3 | S | 1 | 0 | K | S | 6 | X | S | N | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| DIGIT | DIGIT DESCRIPTION | CODES | DEFINITIONS |
|---|---|---|---|
| 1-2 | Product line | T9 | G9000 Series |
| 3 | Controller Generation | 0 | Generation 1 |
| | | 1 | Generation 2 |
| 4 | Input/Output Voltage | S | 480V 3-Phase/3-Wire + Gnd |
| 5 | Phase Input/Output | 3 | Three Phase Input/Output |
| 6 | Input/Output Voltage | S | 480V 3-Phase/3-Wire + Gnd |
| 7-9 | kVA Rating | 10K | 100kVA |
| | | 16K | 160kVA |
| | | 22K | 225kVA |
| | | 30K | 300kVA |
| | | 50K | 500kVA |
| | | 65K | 650kVA |
| | | 75K | 750kVA |
| 10 | Alternate Input | S | 480V 3-Phase/3-Wire |
| 11 | Output Frequency | 6 | 60Hz |
| 12 | Maintenance Bypass Option | X | Not Included |
| 13 | Options 1 Model | S | Single Module (Standard) |
| 14 | UPS Type | N | New Unit |
| | | R | Refurbished |
| 15 | Enhanced Model | - | Generation 1 Model |
| | | 2 | Enhanced Model (Generation 2) |

## G2020

| DIGIT: | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SAMPLE: | T | 2 | 0 | 0 | H | 0 | 7 | 5 | 0 | K | W | W | W | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

| DIGIT | DIGIT DESCRIPTION | CODES | DEFINITIONS |
|---|---|---|---|
| 1-3 | Product line | T20 | G2020 Series |
| 4 | Revision Number | 0 | 0 |
| 5 | Phase/Frequency | H | 3 Phase in/3 Phase Out 60 Hz |
| 6-10 | kVA Rating | 0500K | 500kVA |
| | | 0750K | 750kVA |
| 11 | Input Voltage | W | 480V |
| 12 | Output Voltage | W | 480V |
| 13 | Bypass Voltage | W | 480V |