Our energy working for you.™

Power topic #9012 | Technical information from Cummins Power Generation

OSHPD and OSP: seismic certification and preapproval of emergency power generation equipment for California healthcare facilities

White Paper

By Aniruddha Natekar, sales application engineer, Cummins Power Generation, and George Williams, regional sales manager, Cummins West

San Francisco. Sylmar. Loma Prieta. Northridge. Ferndale. The state of California is famously susceptible to severe earthquakes. Less serious localized earthquakes occur frequently without much publicity, although they can do substantial damage in the immediate area.

In response to this pervasive risk, the California state legislature passed a series of laws starting in the 1970s to ensure that hospitals would be built to high construction standards so they would be capable of functioning even after a major disaster.

OSHPD establishes Facilities Development Division to oversee healthcare facility construction, statewide

Figure 1 - A seismic map of California.

In the 1980s the responsibility for reviewing all hospital construction plans for the State of California was moved to the Office of Statewide Health Planning and Development (OSHPD), and the Division of the State Architect. This legislation created a building department within the Office of Statewide Health Planning, called the Facilities Development Division (FDD).

In the 1990s the legislature established a single point of accountability and authority for plan review and construction-observation activities relating to hospitals, by transferring

all duties and functions to the FDD. As a result, the hospital design and construction industry had a single enforcement agency to provide all application services and technical guidance for health facility projects in California.

Today, the FDD reviews construction plans for code compliance and certifies that buildings and critical life-safety equipment, including emergency standby power systems, meet the agency's strict standards for earthquake survivability.

OSHPD, IBC and CBC

The current OSHPD seismic standards, detailed in OSHPD's Code Application Notice CAN 2-1708A.5 (October 31, 2008), build on those previously established by the IBC (International Building Code, 2006 edition) and the CBC (California Building Code, 2007 edition). The CBC Chapter 1613A, on "Earthquake Loads," also specifies ASCE/SEI 7-05 Minimum Design Loads for Buildings and Other Structures as the basis for design.

> CAN 2-1708A.5 says that "active parts or energized components shall be certified exclusively on the bases of approved shake table testing in accordance with Section 13.2.5, ASCE/SEI 7-05 or experience data in accordance with Section 13.2.6, ASCE.SEI 7-05, unless it can be shown that the component is inherently rugged by comparison with similar seismically qualified components."

Prior to the introduction of a preapproval process, proving that all of the critical equipment specified for each hospital installation met these stringent OSHPD codes required a substantial effort. In the case of power generation equipment, the units to be delivered often had to be physically tested on a shake table and the results documented in an application for certification before the equipment could be delivered to the site and installed. This was an expensive and time-consuming process for the building designers and equipment suppliers, and OSHPD's Facility Development Division's resources were strained by the numerous applications that were submitted.

OSP, or OSHPD Special Seismic Certification Preapproval

To help resolve this problem, in 2009 OSHPD instituted a process called Special Seismic Certification Preapproval, or OSP, for life-safety equipment. Manufacturers meeting the OSP standard can have equipment preapproved and do not have to shake-test the actual units to be delivered. That means faster installation and commissioning, and lower costs to contractors and end users.

Rigorous OSP requirements

The requirements for preapproval under OSP are strict. For a product line with similar structural configurations, OSHPD allows three methods of qualification: mechanical testing, experience data, or structural simulation analysis.

- Mechanical testing requires the simulation of forces associated with a seismic event. Typically this includes use of a shake table and sensors to record the dynamic forces applied as well as verification of the duration of the test. All alternative mounting configurations (e.g., wall mounted and floor mounted) must be tested for both units.
- Historical experience data from a previous seismic event is acceptable, but difficult to obtain because in most cases, insufficient information is available after the fact.
- Structural simulation analysis can be submitted, but the parameters must be validated by mechanical testing of at least two units, typically the smallest and the largest in the product range. Assuming the similarity among the different-size nodes of the product line can be demonstrated, a similarity matrix can be used to validate the interpolated units between the two test sizes.

All tests must be performed by an independent laboratory with ISO (International Standards Organization) accreditation, or conducted under the supervision of a California-licensed structural engineer. Alternatively, a California-licensed civil engineer or mechanical engineer can conduct the testing, as long as the results are evaluated and signed off by a licensed structural engineer.

OSHPD recommends that the equipment manufacturer, the facility owner (where relevant), and the licensed engineer conducting the tests work with OSHPD in advance to agree on a test plan prior to any testing, thus ensuring that the OSP preapproval requirements will be met.

When testing is completed, an application for preapproval, a certification report summarizing the test results, and any engineering analysis and experience data must be submitted to OSHPD for review.

OSHPD's Facilities Development Division (FDD) maintains a list of preapproved equipment on its web page, http://www.oshpd.ca.gov/FDD/Pre-Approval/special_seismic_cert_pre-approval.html

Figure 2 - Representatives from Cummins Power Generation and Panache Engineering, at the PEER (Pacific Earthquake Engineering Research) lab at the University of California Berkeley, July 2010. The group was shake-testing a 2000 kW, 35,000 lb generator set as part of the preapproval requirements.

OSP-0028-10	Cummins Power Generation	Gensets	Several	2.28	1	December 31, 2013
OSP-0029-10	Cummins Power Generation	Automatic Transfer Switches	BTPC, OTPC, OTEC, CHPC, & OHPC	2.17	1	December 31, 2012
OSP-0030-10	Cummins Power Generation	Digital Master Controls	DMC 200, DMC 300, & DMC 1000	1.88	1	December 31, 2013

Figure 3 - Part of the listing of preapproved Cummins Power Generation products on the OSHPD website.

Cummins Power Generation and OSP

CAN 2-1708A.5 requires Special Seismic Certification for all components of a standby power generation system. Cummins Power Generation was the first manufacturer to earn preapproval for a complete family of system components, including:

- Diesel generators from 10 kW to 2500 kW
- Automatic transfer switches including bypass switches with redundant transfer capability and UL-listed 30 cycle switches suitable for selective coordination
- Digital master controls for paralleling systems

Cummins Power Generation can now provide complete, preapproved standby power generation systems for California hospitals, without any additional testing.

Figure 4 - Shake table test of 125 amp OTPC automatic transfer switch.

Power Generation

Our energy working for you.™
www.cumminspower.com

About the author

Aniruddha Natekar started with Cummins Power Generation in 2007. As a sales application engineer, he provides technical recommendations on installations and engineering support to customers, assists the sales force with technical training, and supports technical seminars.

Aniruddha has an M.S. in automotive engineering from Lawrence Technological University (Southfield, Michigan) and a B.S. in mechanical engineering from the University of Pune (India). He has held positions in research and development, market research, engineering and product development with a number of automotive companies prior to joining Cummins Power Generation.

About the author

George Williams started working at Cummins Power Generation in 2004 and is currently the regional sales manager for the Western Region. He has 25 years of experience in the power industry, including stints at Emerson Power Network/ASCO and GEZ Zenith. He has served as an instructor at EGSA (Electrical Generating Systems Association) and for the State of Washington Electrical Board. His professional credentials include Journeyman Line Technician certification from the IBEW and a Master Electrician license from the Arkansas Board of Labor.

George has a B.A. in management from St. Mary's College in Moraga, California, and is an Associate Member of IEEE Power Engineering Society/IAEI Northwest Chapter.

Bibliography

Dunger, G. Code Application Notices (CANs) and Policy Intent Notices (PINs). A presentation and outline given to the OSHPD Ad Hoc Committee on Seminars and Education. Available from OSHPD staff.

Karim, M.R. Special Seismic Certification. A presentation given March 26, 2010, to IEEE San Francisco. Available at: http://ewh.ieee.org/r6/san_francisco/ias/pdf/2010ShortCourse/Special_Seismic_Certification_Karim_OSHPD_Mar_2010.pdf

OSHPD Special Seismic Certification Preapproval (OSP). A presentation on the OSHPD website: http://www.oshpd.ca.gov/FDD/Pre-Approval/OSHPD%20Special%20Seismic%20Certification%20Preapproval.pdf

Power Generation

Our energy working for you.™
www.cumminspower.com

PT-9012 (7/10)