



## **MOTOR ALIGNMENT PINS ON HORIZONTAL PUMPS**

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During the past year, some individuals who have been performing USI A-46 and IPEEE walkdown screening evaluations have questioned whether the lack of motor alignment pins on horizontal pumps may be a potential seismic issue (i.e., as a "no other concerns" caveat). The SQUG Steering Group initiated a study to determine if the lack or the presence of the motor alignment pins has any potential adverse effect on the seismic capacity of horizontal pumps when using the SQUG Bounding Spectrum to define the seismic capacity. The purpose of this article is to describe the results of this study and provide the Steering Group's recommendation for resolving this issue.

The first conclusion reached by the study is that none of the few instances of damage to horizontal pumps is attributed to the lack or the presence of motor alignment pins. The next part of the study assessed which configurations were actually represented at the earthquake experience database sites.

Several pump manufacturers were contacted, to inquire whether the tapered alignment pins were required for seismic loads. These manufacturers include BW/IP International (Byron-Jackson), PACKO Pumps, Ingersoll-Dresser Pumps, Sulzer Bingham Pumps, and Westinghouse, USPPRA. In summary, the manufacturers declared that these pins are primarily designed as an alignment tool. However some manufacturers have used the pins to seismically qualify the pumps, as a convenient alternative to evaluating the clamping force of the holddown bolts, and the shear resistance due to friction.

Example instances where the pins are at times recommended to be kept in place include pumps where significant thermal expansion of the motor is expected. The pins are then usually placed next to the front bolts on the motor (i.e., those anchor bolts nearest the pump) so that the expansion will take place away from the pump. In general the front bolts on the motor are also torqued at higher loads than the rear bolts for the same purpose.

Mill-wright union halls were contacted and asked about the common installation practice of alignment pins on horizontal pumps. The craftsmen contacted said that

the common practice is to use these pins to set the alignment of the pump and motor. Once the alignment is within tolerance, the main bolts are torqued, and the pins are then removed and kept for future use. If the motor has to be removed for maintenance, the pins are then used to facilitate realignment of the motor and the pump.

Pumps are in general very rugged devices. Design parameters such as start-up loads and torques, as well as operational loads including those from vibration, are typically much larger than the seismic inertial load reactions.

A spot check review of the database was performed to ascertain if the alignment pins are typically left in place or removed. Several data base sites were reviewed in detail, including the Glendale Power Plant, Valley Steam Plant, and El Centro Steam Plant (subject to the 1971 San Fernando earthquake), the Adak Power Plant (subject to the 1986 Adak, Alaska earthquake), and the Coolwater Plant (subject to the 1992 Landers earthquake). Based on the review, it is concluded that the presence or the lack of the alignment pins has no influence on the seismic adequacy of horizontal pump-motor assemblies. Some manufacturers recommend that the pins remain in place; the data base has examples of these types of pumps both with and without the motor alignment pins in place. Other manufacturers recommend that the pins be removed; again the data base includes examples of these pumps both with and without the motor alignment pins removed. Note again that all of these pumps performed satisfactorily following the earthquake.

Based on the results of this study, the motor alignment pin issue is considered to be closed. SQUG Seismic Capability Engineers need not evaluate for this feature. Any previously noted potential concerns relative to this issue may be resolved based on the results of this study.

### **SQUG Calendar of Events**

The remaining SQUG events for 1995 are shown in the table on the next page. Note that spaces are still available for the remaining sessions of the New and Replacement Equipment (NARE) course. Contact Nancy Richardson, SQUG Registrar, at 703-519-0200 for a Registration Form.

**SQUG 1995 CALENDAR OF EVENTS**

Event	Date(s)	Location
NARE Training Course <sup>1</sup>	May 1-3	Boston, MA
SQUG Summer Meeting	June 26-27	Hilton Head, SC
European Members A-46 Walkdown Course <sup>1</sup>	May 15-19	Brussels, Belgium
SQUG Workshop <sup>1,2</sup>	August 21-22	Chicago, IL
NARE Training Course <sup>1</sup>	<b>September 11-13<sup>3</sup></b>	San Antonio, TX
SQUG Workshop <sup>1,2</sup>	October 23-24	Nashville, TN
SQUG Winter Meeting	December 11-12	Palm Beach, FL

Notes:

1. *SQUG Training Courses and Workshops are open to SQUG member utility/company personnel and their contractors. Others may attend for a fee. For more information or a Registration Form, please call Nancy Richardson, SQUG Registrar, at 703-519-0200.*
2. *Workshops address Equipment Selection, Relay Evaluation, A-46 Walkdown, Licensing, IPEEE issues, and NARE.*
3. *Note that the dates of the September session of the NARE course are changed to match the availability of minimum hotel accommodations.*

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**SEISMIC QUALIFICATION UTILITY GROUP (SQUG)**

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- William Metevia (Yankee Atomic)
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*The Seismic Qualification Utility Group (SQUG) was formed in 1982 to develop a technically sound and cost effective alternative for verifying the seismic adequacy of equipment installed in older nuclear power plants. This newsletter reports on the generic activities of the SQUG program as well as the results and lessons learned from utility implementation of the SQUG methodology.*

*Comments, questions, suggestions, and contribution of articles may be forwarded to:*

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