

06 December 2005

Reference: Customer Advisory - 05

**Re: OSHA Mechanical Integrity Requirements do NOT allow
"Breakdown Maintenance"**

To Our Customers:

The users of safety automation equipment in the process industries are often subject to the requirements of the OSHA Process Safety Management (PSM) standard 29 CFR 1910.119. There has been some confusion within industry over what constitutes an adequate Mechanical Integrity program under the OSHA PSM standard. This brief company advisory provides information that clarifies confusion over the issue of "breakdown maintenance" of Safety Instrumented Systems (SIS).

When OSHA evaluated the need for a PSM standard in the late 1980's, far too many process-industry accidents were occurring, and many could be attributed to lack of effective maintenance of process equipment, including pressure vessels, piping, storage tanks, rotating equipment, relief systems, instrumentation, and controls. Therefore, OSHA determined it was necessary to implement a "Mechanical Integrity" requirement in the PSM standard in order to address this problem.

Mechanical Integrity (MI) requirements of the PSM standard apply to Safety Instrumented Systems in addition to other process equipment. Companies covered under PSM are required to conduct inspection and testing on SIS equipment, as per recognized and generally accepted good engineering practices. In order to aid in specifying SIS design and maintenance requirements, ANSI/ISA 84.01 *Application of Safety Instrumented Systems for the Process Industry* was published in 1996 by the Instrumentation, Systems, and Automation Society (ISA). OSHA considers ISA S84.01-1996 to be a recognized and generally accepted good engineering practice for SIS. In fact, OSHA stated this in a year 2000 letter of interpretation. In other words, a company that effectively implements S84.01 can be reasonably assured that this will satisfy the PSM requirements for mechanical integrity of SIS equipment.

It is widely acknowledged by SIS engineering experts that failure data for equipment such as transmitters, controllers, and shutoff valves is needed to determine an appropriate design basis for that equipment and an appropriate frequency for functional testing. You should know that failure rate data used in SIS engineering calculations are only valid when the equipment is used within the "useful life" of the equipment. The data do not include failure mechanisms that would be described as "wear out failures". Wear out failures occur when the equipment has exceeded the useful life of the

equipment, and the rate of failure increases significantly beyond the useful life. It has come to the attention of Kenexis that some companies will use equipment in SIS service as long as data indicates the equipment performed adequately during the most recent functional test. In fact, some equipment is being used beyond the manufacturer's recommendations for useful life of the equipment. Occasionally, even SIS equipment, such as Solenoid Operated Valves (SOV), switches, and relays have no defined replacement intervals and are replaced only when an overt failure occurs – the result of which most likely results in a spurious activation of the shutdown system rather than inhibiting the safety action.

Is it acceptable to allow equipment to remain in service longer than the useful life, even if functional testing demonstrates the absence of a failure? Breakdown maintenance is certainly a required activity, but should it be relied upon to assert compliance with Mechanical Integrity requirements of PSM? You should be aware that OSHA does not consider breakdown maintenance to satisfy PSM.

In its compliance directive for the Process Safety Management Standard, CPL 02-02-045, OSHA provides the following guidelines on PSM enforcement procedures.

29CFR 1910.119 (j) Mechanical integrity (j)(2) Written Procedures

The purpose of this provision is to require written procedures in adequate detail to ensure that the specific process equipment receives careful, appropriate, regularly scheduled maintenance to ensure its continued safe operation. A "breakdown" maintenance program (i.e., a program wherein action is taken only when something breaks down) does not meet the requirements of this paragraph.

Relying solely on breakdown maintenance for SIS equipment is not advisable, and does not satisfy PSM requirements. Relying on functional testing of SIS equipment to be the sole means to determine if equipment needs to be replaced is equally inadvisable. Kenexis recommends that companies consider tracking the manufacturer's recommendations for equipment replacement intervals. In some cases, equipment may need to be replaced more frequently than the manufacturer recommends based on company- or site-specific service history data. By testing SIS equipment at regularly-defined intervals and replacing equipment before wear-out failures become an issue, companies can increase the level of availability of automated shutdown systems and ensure a high degree of operational integrity.

Keep Safe,

Kevin J. Mitchell
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This customer advisory provides information of a general nature concerning some industry practices involving engineered safeguards. These should not be taken as typical, suggested, or recommended levels of protection. The application of engineered safeguards is highly dependent on process-specific and site-specific factors that have a great deal of influence on the actual degree of hazard control strategy. Neither Kenexis nor its corporate officers make any representations, warranties, or guarantees concerning the content of this document.