

1 Scope and purpose

A process hazards analysis is used to identify the safety functions necessary to reduce the risk of identified hazardous events. When a safety function is implemented in a safety instrumented system (SIS), the risk reduction required from the safety instrumented function (SIF) is related to one of four discrete safety integrity levels (SIL). The function and system are designed and managed according to ANSI/ISA-84.00.01, which establishes requirements necessary to claim the specified SIL for the SIS throughout its life.

A critical aspect of maintaining the SIL is the implementation of a mechanical integrity (MI) program that monitors the installed performance of the SIS equipment and takes corrective action when the performance does not meet the requirements. This technical report is an informative document providing guidance on establishing an effective MI program that demonstrates through traceable and auditable documentation that the SIS and its equipment is maintained in the “as good as new” condition

This edition of ISA-TR84.00.03 provides considerations for establishing an MI program for SIS; it focuses on how to plan and implement a comprehensive MI program rather than including specific test procedures as in the previous edition. This technical report does not provide complete details on how to safely or fully execute all MI activities in an operating facility. Individuals who are assigned responsibility for MI activities must determine what is necessary to maintain the safety integrity of a specific SIS.

The MI program involves many activities that occur throughout the SIS lifecycle, but it predominantly focuses on the timely detection and correction of incipient/degraded conditions and complete failures to ensure that the SIS operates as specified when required. Rigorous inspection and complete proof testing is required for all SIS equipment whether existing or new. While the frequency of these activities may vary due to the required SIL, the purpose and goal of inspection and proof testing are not affected by the SIL.

Inspection and proof testing is required to:

- meet regulatory requirements
- meet ANSI/ISA-84.00.01 requirements
- meet equipment manufacturer requirements (e.g., safety manual)
- demonstrate through witnessed test and preventive maintenance records that the equipment is being maintained in the “as good as new” condition
- detect and correct unrevealed failures
- verify that the MI program and test interval are sufficient to ensure functional and integrity requirements are met for the equipment life
- monitor equipment for degradation mechanisms (incipient and degraded) which may compromise future performance
- identify when equipment has reached wear-out and requires replacement
- provide data and information to facilitate the evaluation of MI program success and to support continuous improvement

The technical report addresses:

- the identification of personnel roles and responsibilities when developing an MI plan,
- important considerations in establishing an effective MI program, and
- detailed guidance and examples to support user-specific work processes as part of an overall MI program.