ASME NML-1–2024
(Revision of ASME NML-1–2019)

Rules for the Movement of Loads Using Overhead Handling Equipment in Nuclear Facilities

AN AMERICAN NATIONAL STANDARD



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FOREWORD

ASME NML-1, Rules for the Movement of Loads Using Overhead Handling Equipment in Nuclear Facilities, was developed by the ASME Committee on Cranes for Nuclear Facilities (CNF) to define the requirements and guidelines for a safe, effective load-handling program at commercial nuclear facilities using overhead handling equipment.

In July 1980, the Nuclear Regulatory Commission (NRC) issued NUREG-0612, Control of Heavy Loads at Nuclear Power Plants. Since then, this report has been used to define and control load-handling programs at commercial nuclear power plants.

In 1981, the NRC issued Generic Letter 81-07 asking utilities with nuclear power plants to demonstrate that they were in compliance with the requirements of NUREG-0612, Section 5.1. The nuclear power plants were asked to respond in two phases. For Phase I, nuclear power plants were asked to demonstrate their compliance to the seven guidelines in Section 5.1.1. For Phase II, nuclear power plants were asked to demonstrate their compliance with Sections 5.1.2 through 5.1.6. The Phase II demonstration of compliance required a description of all overhead handling systems used at a nuclear facility; a comparison of the facility's overhead cranes to those described in NUREG-0554, Single-Failure-Proof Cranes for Nuclear Power Plants; and identification of all hazards within the facility and potential methods for eliminating those identified hazards. Generic Letter 85-11 cancelled Phase II requirements (except for any licensing commitments made by a facility) for most nuclear power plants.

One of the seven guidelines of NUREG-0612, Section 5.1, states that facilities shall have administrative controls in place to control the movement of heavy loads. The NRC defines a heavy load as "any load, carried in a given area after a plant becomes operational, that weighs more than the combined weight of a single spent fuel assembly and its associated handling tool for the specific plant in question." Thus, facilities developed procedures to control the movement of loads in excess of the heavy-load limit. The procedures defined crane operator qualifications, specified the locations of safe load paths, and identified special lifting devices.

NUREG-0612, Section 5.1, invokes ANSI N14.6-1978 for guidelines on the design, construction, fabrication, and testing of special lifting devices, and ANSI B30.9-1971 for guidelines on slings used for the movement of heavy loads. ANSI N14.6-1978 was superseded by revised editions in 1986 and 1993 and has since been withdrawn. Since 1971, ASME has issued numerous revisions to ANSI B30.9, and it redesignated the standard as ASME B30.9 in 1990.

Given the age of NUREG-0612, the ASME CNF Committee recognized the need for a new standard to address the control of heavy loads in nuclear power plants. This Standard has been written to maintain consistency with principles found in NUREG-0612. Thus, lifting evolutions with potential radiological consequences greater than a fuel-handling accident are still considered critical, and the seven guidelines have been incorporated into this Standard. However, ASME NML-1 invokes newer standards for requirements specific to overhead handling equipment, below-the-hook lifting devices, slings, and rigging hardware.

As its title indicates, this Standard includes requirements for the movement of all loads using overhead handling equipment within a nuclear facility. It applies a graded approach to the level of controls required for the variety of lifts performed in a nuclear facility, separating lifts into three classifications: standard, special, and critical.

The risk of performing a lift determines the classification of the lift. The risk is quantified based on an evaluation of the factors that may increase the probability of a malfunction or load-handling event and an evaluation of the potential consequences of such an occurrence.

The lift classifications represent increasing levels of risk: a standard lift has the lowest risk, a special lift has a moderate risk, and a critical lift has the highest risk. Special lifts may be appropriate for managing material-handling activities having moderate levels of risk. Within the critical lift classification, this Standard includes a distinct classification, nuclear safety critical lifts, for lifts similar to those characterized in NUREG-0612. Because of the safety-related risks inherent to nuclear safety critical lifts, these lifts require more stringent safety measures than do the other lift classifications.

This Standard also provides requirements for crane design, inspection, and testing and for personnel involved in lifting operations. It also includes three Nonmandatory Appendices. Nonmandatory Appendix A provides a matrix showing conformance of ASME NML-1 to NUREG-0612. Nonmandatory Appendix B provides guidance on adopting ASME NML-1 to operating nuclear power plants or other nuclear facilities licensed under the Code of Federal Regulations, Title 10, Part 50. And Nonmandatory Appendix C provides examples of lift classifications based on the risk associated with the evolution. The lift planner may use these examples as guidance to ensure the correct classification of the lift and the appropriate level of rigor and oversight.

This Standard or portions thereof may be applied to load handling, operations, and maintenance at facilities other than nuclear where enhanced safety may be required.

ASME NML-1–2024 has been updated to clarify requirements, to better align with NRC Regulatory Guide 1.244, and to add more flexibility to load classification. Revisions include adding a definition for load block and changing the use of lower block to load block; clarifying requirements on the use of shelf rigging used for critical lifts; clarifying requirements for continuing compliance testing; adding a nuclear safety critical lift category to para. 4-1.1; providing requirements that allow a nuclear safety critical lift to be classified as a special lift; removing references to ASME NUM-1 Type III Cranes (now CMAA 74); and correcting the use of single-failure-proof to single-failure-proof features.

Following approval by the ASME CNF Committee and ASME, and after public review, ASME NML-1 was approved by the American National Standards Institute on July 29, 2024.

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(1) to permit early implementation of a revision based on an urgent need

(2) to provide alternative requirements

(3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Standard

(4) to permit the use of a new material or process

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(1) a statement of need and background information

(2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)

(3) the Standard and the paragraph, figure, or table number

(4) the editions of the Standard to which the proposed case applies

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ASME NML-1–2024
SUMMARY OF CHANGES

Following approval by the ASME NML-1 Standards Committee and ASME, and after public review, ASME NML-1–2024 was approved by the American National Standards Institute on July 29, 2024.

ASME NML-1–2024 includes the following changes identified by a margin note, **(24)**.

Page	*Location*	*Change*
1	1-5	Definition of *load block* added
3	1-6	Updated
9	2-5.3	Subparagraph (a) revised
9	2-6.1	New subparagraph (c) added and subsequent paragraph redesignated
15	4-1.1	Revised in its entirety
18	5-1.2.2	Revised in its entirety
18	5-1.2.3	Revised in its entirety
19	5-2	Revised
21	Table A-1-1	Under ASME NML-1, para. 4-1.1(a), Requirement or Recommendation revised

Section 1
Introduction

1-1 GENERAL

Movement of loads covered by this Standard shall be in accordance with the Standard's requirements but not necessarily with its recommendations. The word "shall" is used to denote a requirement, the word "should" is used to denote a recommendation, and the word "may" is used to denote permission, which is neither a requirement nor a recommendation.

1-2 SCOPE

This Standard specifies requirements for the movement of loads using overhead handling systems at commercial nuclear facilities.

(a) For the purposes of this Standard, overhead handling systems are limited to the following:

(1) those types covered by the following standards:

(-a) ASME B30.1, Chapter 1-6, Telescopic Hydraulic Gantry Systems; and Chapter 1-7, Strand Jack Systems

(-b) ASME B30.2

(-c) ASME B30.5

(-d) ASME B30.16

(-e) ASME B30.17

(-f) ASME B30.21

(-g) ASME NOG-1

(-h) ASME NUM-1

(2) those defined as engineered temporary lift assemblies per subsection 1-5

(3) those qualified as special designed equipment per ASME HRT-1

(b) This Standard does not cover the individual movement of irradiated fuel assemblies that are bounded by a facility accident analysis.

(c) Lifts licensed under 10 C.F.R. 72 are within the scope of this Standard.

1-3 APPLICABILITY

This Standard applies to all lifting and handling operations at nuclear facilities, including the training and certification of personnel, and the maintenance, inspection, testing, and rework and modification of overhead handling systems and other lifting devices.

The application of this Standard shall begin at the point of initial fuel load at the affected unit under construction.

1-4 RESPONSIBILITY

Compliance with this Standard is the responsibility of the owner.

1-5 DEFINITIONS (24)

cascading failures: a process in a system of interconnected parts in which the failure of one or a few parts can trigger the failure of other parts and so on.

design rated torque: the torque required to hold the design rated load of the hoist at the point of brake application.

double-rigging arrangement: a system in which two independent sets of load-carrying elements, each capable of carrying the load, are used to connect the load to the overhead handling equipment.

emergency response plan: a set of actions necessary to mitigate the consequences of the worst possible outcomes of a load-handling accident.

engineered temporary lift assembly (ETLA): specially designed lifting equipment that is not general purpose but has a special temporary intended purpose. These assemblies are not standard design items and are not available from a commercial source, and there is no generally accepted consensus standard applicable to the equipment. Examples of ETLAs include special gin poles and derricks; special crane supports such as runways or overhead gantry columns and frames; and special load-handling equipment such as up-end and down-end devices and jacking towers (unless used with the guidance of the applicable volume of ASME B30). ETLAs are required for lifts that cannot be accomplished with standard lifting devices.

essential safety function (ESF): a function performed by a plant system, structure, or component that is necessary to remove decay heat from irradiated fuel, provide shielding, contain radioactive material, or control nuclear reactivity. For the purposes of this Standard, ESFs are defined as follows:

(a) maintaining adequate decay heat removal.

(b) maintaining reactor coolant system and spent fuel pool inventory necessary for adequate shielding, removal of decay heat, and containment of radioactive material. This may be accomplished by preventing leakage from the reactor vessel (during refueling) and spent fuel pool in excess of safety-related makeup capability.