



Standard Guide for Reporting and Recording of Near-Misses for Maritime Industry¹

This standard is issued under the fixed designation F3256; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This guide provides near-miss reporting criteria and terminology for maritime vessels.

1.2 The purpose of this near-miss reporting guide is to standardize near-miss reporting, including terminology, for the maritime industry.

1.3 The criteria contained within this guide should be applied as a minimum to all near-miss reporting in the maritime industry unless otherwise specified.

1.4 This guide is divided into the following sections and appendixes:

Sections and Subsections	Table of Contents	Title
1	Scope	
2	Terminology	
3	Significance and Use	
4	Near-Miss Standardization	
5	Procedure	
6	Keywords	
Appendix X1	Probability, Severity, and Risk Assessment	
Appendix X2	Sample Near-Miss Reporting Form	

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Terminology

2.1 Definitions of Terms Specific to This Standard:

2.1.1 *accident, n*—an incident with unexpected or undesirable consequences that may be related to personnel injury or fatality, property loss, environmental impact, business loss, etc., or a combination of these.

¹ This guide is under the jurisdiction of ASTM Committee F25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.07 on General Requirements.

Current edition approved May 1, 2017. Jan. 1, 2023. Published July 2017. January 2023. Originally approved in 2017. Last previous edition approved in 2017 as F3256 – 17. DOI: [10.1520/F3256-17](https://doi.org/10.1520/F3256-17); [10.1520/F3256-23](https://doi.org/10.1520/F3256-23).

2.1.2 *activity/task*, *n*—an action or job that was being performed during the time of the near-miss, unsafe act/behavior, or hazardous/unsafe condition.

2.1.3 *causal factor*, *n*—a structural/machinery/equipment/outfitting problem, human factors, or external factors that contributed to an incident, allowed an incident to occur, or allowed the consequences of the incident to be worse than they might have been.

2.1.4 *consequences*, *n*—the undesirable or unexpected outcomes that may result in negative effects for an organization. These outcomes can range from minor injuries to major events involving loss of life, extensive property loss, environmental damage, and breaches related to security.

2.1.5 *corrective actions*, *n*—improvements to an organization’s processes taken to eliminate causes of hazards, non-conformities, or other undesirable situations.

2.1.6 *event*, *n*—a happening caused by humans, automatically operating equipment/components, external events or the result of a natural phenomenon.

2.1.6.1 *Discussion*—

Event descriptions typically include action verbs such as walked, turned, opened, said, radioed, discovered, decided, saw, etc. If negative (an error, failure or external factor), then the event may also be a causal factor, intermediate cause, or root cause.

2.1.7 *external factors*, *n*—issues outside the control of the organization. Examples include uncharted/unknown hazards to navigation, some sea or weather conditions, suicides or homicides, and external events.

2.1.8 *hazard*, *n*—a condition with the potential to cause injury, illness, or death of personnel; damage to or loss of equipment or property; or degradation of voyage/activity/task degradation capabilities.

2.1.9 *hazardous/unsafe condition*, *n*—any condition that may adversely affect the safety of any seafarer, equipment, vessel, bridge, structure, or shore area or the environmental quality of any port, harbor, or navigable waterway.

2.1.10 *human errors*, *n*—performance of humans that deviates from the desired performance.

<https://standards.iteh.ai/catalog/standards/sist/dc2636e0-359a-4be7-8f7e-b2d00dd42bac/astm-f3256-23>

2.1.11 *incident*, *n*—an unplanned sequence of events or conditions, or both, that results in, or could have reasonably resulted in, a loss event.

2.1.12 *incident category*, *n*—for near-miss reporting the typical categories are near-miss, unsafe act/behavior, or hazardous/unsafe condition.

2.1.13 *incident type*, *n*—*for near-miss reporting*, the typical types are near struck near struck by, near struck against, near trapped in, near slip, near trip, near fall (same level or different level), near fire, near spill, near strain/overexertion, near caught between, near contacted by, near contacted with, near exposure, etc.

2.1.14 *injury*, *n*—damage or harm caused to the structure or function of the human body as a result of an outside physical agent or force.

2.1.15 *intermediate causes*, *n*—an underlying reason why a causal factor occurred, but it is not deep enough to be a root cause.

2.1.15.1 *Discussion*—

Intermediate causes are underlying causes that link causal factors and items-of-note to root causes.

2.1.16 *lagging indicator*, *n*—measure of a company’s safety performance in the form of past incident/accident statistics.

~~2.1.17 *lessons learned*, *n*—information gained and shared through the study of incidents that serves to help prevent those incidents from occurring in the future.~~

2.1.17 *leading indicator, n*—a measure preceding or indicating a future event used to drive and measure activities carried out to prevent and control incidents/accidents.

2.1.18 *lessons learned, n*—information gained and shared through the study of incidents that serves to help prevent those incidents from occurring in the future.

2.1.19 *loss, n*—human injury, environmental damage, or negative business impact (for example, repair or replacement costs, schedule delays, contract violations, loss of reputation, etc.).

2.1.20 *loss event, n*—undesirable consequences resulting from events or conditions or a combination of these.

2.1.21 *management system, n*— a methodology devised and put in place by management to encourage desirable behaviors and discourage undesirable behaviors.

2.1.22 *near-miss, n*—a near-miss is a non-loss sequence of events ~~and/or conditions/acts~~ or conditions/acts, or both, that could have resulted in a loss, or in an outcome with more severe consequences than actually occurred. This loss was prevented only by a fortuitous or intentional break in the chain of events or conditions/acts, or both. The potential loss could result from human injury, environmental damage, or negative business impact (for example, repair or replacement costs, scheduling delays, contract violations, loss of reputation, etc.).

2.1.23 *near-miss frequency (NMF), n*—the total number of near-miss cases multiplied by 200 000 (or 1 million), divided by the number of exposure (working) hours over the past year.

2.1.24 *root cause, n*—deficiency of a management system component that allowed the causal factors to occur or exist. Root causes must be within the control of management to address. For a typical causal factor, there are one to four root causes. Root causes are usually as deep as a typical root cause analysis will go in attempting to identify the underlying causes of an incident. Organizational culture issues, which are deeper than root causes, could also be identified and addressed.

2.1.25 *root cause analysis (RCA), n*—an analysis by a person(s), appropriately trained in RCA, that identifies the causal factors, intermediate causes, and root causes of an incident and develops recommendations to address each level of the analysis.

<https://standards.iteh.ai/catalog/standards/sist/dc2636e0-359a-4be7-8f7e-b2d00dd42bac/astm-f3256-23>
2.1.26 *safeguard, n*—a physical, procedural or administrative control that prevents or mitigates consequences associated with an incident.

2.1.27 *unsafe act/behavior, n*—any act/behavior of a seafarer(s) that may adversely affect the safety of any seafarer, the vessel, the bridge, any structure, shore area, or the environmental quality of any port, harbor, or navigable waterway.

2.2 Acronyms:

2.2.1 *IMO*—International Maritime Organization

2.2.2 *ISM*—International Safety Management

3. Significance and Use

3.1 The objective of this guide is to provide near-miss reporting guidance for maritime vessels to promote standardization of near-miss reporting which will allow for better use of the data industrywide.

3.2 Importance of Near-Miss Reporting:

3.2.1 Most accidents/incidents are preceded by a chain of events, circumstances, acts, or conditions. If any of these events, circumstances, acts, or conditions had transpired another way, at another time, or had been corrected, the accident/incident may have been avoided. Reporting near-misses can play an important role in learning from mistakes, preventing accidents, and suffering from their serious consequences.

3.3 Near-miss reporting can provide information that can be used to improve most any safety system, often complementing other safety system components such as accident/incident investigations, hazard analyses, safety reporting, prioritizing, root cause analysis, solution identification, communication, identifying corrective actions, sharing lessons learned, leading safety indicator analyses, and safety culture enhancement. In addition, in terms of human life and property damage, near-misses are very low cost learning tools for training, prevention of re-occurrence, and a new data source on what may work to break the chain of events before an accident occurs. Finally, near-misses may provide key data that can prevent low probability-high consequence accidents by providing safer alternatives.

3.4 *Barriers to Near-Miss Reporting:*

3.4.1 It is generally agreed that effective near-miss reporting can reduce hazardous conditions and situations in the workplace, resulting in a reduction in accidents, or at least provide an opportunity for hazard identification and abatement. However, there remain significant challenges and obstacles to implementing near-miss recording/reporting systems. The barriers to near-miss recording/reporting can be related to the employees and management as well as outside influences. The barriers to near-miss recording/reporting can lead to underreporting in the maritime industry. Common near-miss reporting barriers include, but are not limited to:

- Employees lack adequate near-miss training. Employees must be trained to report near-misses, how to report near-misses, what constitutes a near-miss, and the benefits of near-miss reporting.
- Employees not being fully engaged in the development and operation of near-miss reporting. Employees should be involved in the development and implementation of near-miss reporting.
- Employees feel their near-miss reports are not being followed up on. If the reports are not actively followed up on and there is not clear communication between ship and shore, near-miss reporting efforts will fail.
- Employees fear some type of reprimand or discipline. Employees must not fear any disciplinary action, peer teasing, or supervisory belittling. A means of anonymous or confidential reporting should exist and a positive, no-blame near-miss reporting culture needs to be nurtured.
- Employee lack adequate motivation to report near-misses or even disincentives. Participation in near-miss reporting cuts across all levels of an organization and management must fully support near-miss reporting through their words, actions, and support.
- Management not providing unwavering support to near-miss reporting. This includes providing adequate time for the employee to complete the near-miss report. Additionally, this includes any financial support or support from external experts, if necessary to correct potentially hazardous conditions. Management commitment to safety has a positive effect on reporting, while underreporting has been linked to lack of management commitment to safety.
- Near-miss reporting is viewed as overly time consuming. Near-miss reporting forms must be streamlined to be easily completed, easily available, easily submitted, easily reviewed, and lessons learned easily disseminated.
- Management may fear legal liability or recrimination. When deciding to formalize a near-miss reporting system, organizations have both legitimate and unsubstantiated fears of liability and recrimination. Regardless, if legislators, enforcement agencies, and the legal community give companies legitimate fear of liability based on their near-miss reporting or the fear is unfounded, the result most likely will be the same; companies will not report near-misses. Near-miss reporting must be viewed by all stakeholders (companies, legislators, enforcement agencies, and the legal system) as one of the most effective ways to identify hazards and reduce accidents/incidents and not used for recrimination of any type.

4. **Near-Miss Standardization**

4.1 The maritime industry does not have a standardized definition of a near-miss or near-miss reporting methodology, therefore providing industry-wide lessons learned, trending, and benchmarking proves to be challenging.

4.2 *Near-Miss Reporting in Current Practice:*

4.2.1 Studies of maritime companies show a wide-range of near-miss reporting system maturity ranging from no system to systems being in place for over 10 years.

4.2.2 Studies of maritime companies' near-miss reporting programs and other guidance on near-miss reporting highlight the fact that there exists varying definitions of what constitutes a near-miss and various interpretations within companies of their own definition.

4.2.3 Based on analyses of over 100 000 maritime near-miss reports, approximately 75 % of the reported near-misses are related

to hazardous/unsafe conditions and unsafe acts and approximately 25 % are related to a non-loss incident. A review of near-miss reporting practices and literature suggests that a majority of maritime companies do capture hazardous/unsafe conditions and unsafe acts in their near-miss reports, regardless of their near-miss definition.

4.2.4 Near-miss reports across the maritime industry vary in their data collection fields. This also creates a challenge for industry-wide trending and benchmarking.

4.2.5 While most maritime companies that are recording/reporting near-misses use computer technology to capture near-misses, some still use paper. One of the challenges in the maritime industry is paperwork load. The computer technology used varies widely. Computer technology is preferred.

4.2.6 Some maritime companies require near-miss quotas, while others do not. If seafarers are expected to complete a minimum number of near-miss reports in a given time, processes should be in place that prevent erroneous near-miss reporting.

4.2.7 Some maritime companies normalize their near-miss data based on exposure (for example, hours worked), while others do not. It is best practice to normalize near-miss data. Refer to 5.10.

5. Procedure

5.1 Near-Miss Definition:

5.1.1 Maritime companies should have a clear definition of what constitutes a near-miss. A definition is provided in 2.1.22.

5.2 Maritime companies should provide adequate near-miss reporting training. Minimally, this training should include what constitutes a near-miss, how to report near-misses, and the benefits of near-miss reporting.

5.3 Maritime companies should involve their employees in the development, updating, improving, and implementation of their near-miss reporting program.

5.4 Maritime companies should have and follow a policy of actively and promptly following up on near-miss reports, communicating any corrective actions and lessons learned to their vessels, and throughout their fleet when necessary, and have clear and unambiguous communication between ship and shore.

5.5 Employees should not fear any disciplinary action, peer teasing, or supervisory belittling. A means of anonymous or confidential near-miss reporting should exist and a positive, no-blame near-miss reporting culture should exist.

5.6 Employees should be motivated and supported to properly and promptly complete near-miss reports. This support should include training and time to complete the near-miss reports and should not have any disincentives. Participation in near-miss reporting cuts across all levels of an organization and management should fully support near-miss reporting through their words, actions, and support.

5.7 Near-miss reporting should not be viewed as overly time consuming, confusing, or burdensome. Near-miss reporting forms should be streamlined to be easily completed, easily available, easily submitted, easily reviewed, and lessons learned easily disseminated. The initial reporter (initiator) fields should not require more than 10 minutes to complete and the investigator fields should not require more than 15 minutes to complete, except in cases of potentially serious near-misses or other necessity. Near-miss reporting systems should be automated as much as possible and not require input of redundant/repetitive information.

5.8 See **Appendix X1** for an example probability/severity risk assessment matrix. This or an equivalent probability/severity risk assessment should be used to determine level of near-miss investigation.

5.9 Minimum Near-Miss Reporting Data Fields:

5.9.1 At a minimum, the following information should be gathered about any near-miss. This core near-miss information can be then used across the industry.

- Who and what was involved?
- What happened, where, when, and in what sequence?

- What were the potential losses and the potential severity?
- What was the likelihood of a loss being realized?
- What is the likelihood of a recurrence of the chain of events or conditions/acts, or both, that led to the near-miss?
- Were corrective actions taken?
- What were the lessons learned?

5.9.2 Example – Near-Miss Reporting Best Practices:

5.9.2.1 The near-miss reporting fields should be separated into two different categories – items to be entered by the initial reporter of the incident and items to be entered by the investigation team. This separation is necessary because a number of the fields require an investigation to be done or specific training in order to be able to enter the information accurately.

(a) *Near-Miss Report Initiator Fields*—The number of fields to be entered by the initial reporter should be limited, only including fields that may be difficult for the investigator to ascertain later or fields that would add value to the investigation process. The minimal near-miss report initiator fields are listed in **Table 1**.

(b) *Near-Miss Report Investigator Fields*—The remainder of the fields that should be included in incident reporting should be entered after the initial entry of the incident. These details may not be available until the incident has been investigated. Additionally, these fields typically require more than basic knowledge of incident investigation, for this reason these fields should only be entered by trained personnel. The minimal near-miss report investigator fields are listed in **Table 2**.

5.10 Near-miss frequency calculations should be used to assist in benchmarking activities. This normalization is needed in order to benchmark near-misses based on exposure. The following calculation can be used for the most basic near-miss normalization for all vessels in an organization:

$$\frac{(\# \text{ near-misses across all vessels} \times 200\,000)}{(\# \text{ hours worked across all vessels in the past year})} \quad (1)$$

5.10.1 Numerous other variants of the above basic normalization calculation can be used.

iTeH Standards
(<https://standards.iteh.ai>)
Document Preview

[ASTM F3256-23](#)

<https://standards.iteh.ai/catalog/standards/sist/dc2636e0-359a-4be7-8f7e-b2d00dd42bac/astm-f3256-23>

TABLE 1 Report Initiator Fields for Near-Miss Reporting

Fields	Details
Identifier (ID)	Automatically assigned
Vessel flag	Drop down or automatically assigned
Vessel name	Drop down or automatically assigned
Master's name	Drop down or automatically assigned
Date and time	Menu/system driven
Incident category	Check boxes for hazardous/unsafe conditions, unsafe act, or non-loss incident
Time in shift?	Menu driven for hours into shift; hours left in shift
Time in voyage assignment	Check boxes for beginning, middle, end
Name(s) and demographics of personnel involved (optional if anonymous)	Free text if not automatically assigned
Description of event	Free text if not automatically assigned
Activity and task	Free text
Incident type	Drop down with near struck by, near struck against, near trapped in, near slip, near trip, near fall (same level or different level), near fire, near explosion, near spill, near strain/overexertion, near caught between, near contacted by, near contacted with, near exposure, etc., and other)
Equipment involved	Free text
Vessel type	Drop down based on company's vessels if not automatically assigned
General location on vessel	Drop down (accommodations, engine room, machinery space, deck, etc.)
Specific location on vessel	Free text
Weather conditions	Drop downs for temperature, precipitation, wind, sea state, visibility, etc.
Other conditions	Drop downs for noise, vibration, lighting, etc.
Crew rank	Drop down based on company's crew ranks
Type of crewmember	Drop down for regular crew, temporary crew, or contractor
Attachment	If necessary

5.10.2 Representative Examples:

5.10.2.1 A company only is interested in the near-miss frequency from the previous 6 months:

$$\frac{(\# \text{ near-misses across all vessels} \times (200\,000 \times 0.5))}{(\# \text{ hours worked in that 6 months})}$$

(2)