



GUIDE FOR

ICE LOADS MONITORING SYSTEMS

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**American Bureau of Shipping
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Foreword

This Guide provides requirements for the installation of, and the information to be provided by, Ice Loads Monitoring Systems fitted on ice-classed ABS vessels. These systems are intended as an aid to the Master and navigating officers when a vessel is operating in ice infested waters so that appropriate action can be taken to minimize the likelihood of the vessel sustaining structural damage from interaction with the ice. The Ice Loads Monitoring Systems specified by this Guide extend from basic monitoring systems to sophisticated, integrated systems, the selection of which is left to the Owner. The information provided in the Guide is intended to assist the Owner in selecting the most appropriate system for a vessel based on the vessel's probable operating parameters.

The Guide describes the Ice Loads Monitoring process and the procedures for collecting, recording, processing, evaluating, and presenting the data in a manner that permits the Master and or navigating officer to better measure vessel performance in ice and determine if remedial action should be taken. The monitoring systems specified in the Guide can assist in identifying when the vessel is operating in ice in a manner that could lead to structural damage or failure by providing early warning to the navigator when the performance parameters relating to vessel strength are approaching the preset allowable levels.

It is emphasized that the scope of the ice loads monitoring system selected for a specific vessel, the nature of the display and the form and aims of data processing are decisions that should be made by the vessel's Owner in conjunction with the system supplier as appropriate. If requested, ABS is able to provide technical assistance to an Owner considering installing an ice loads monitoring system based upon the information contained in this Guide.

ABS considers that it would be of mutual benefit to ABS and the Owner of an ABS-classed vessel that is fitted with an ice loads monitoring system for the recorded in-service data to be made available to ABS for evaluation for the purpose of further refining these requirements and improving safety, in accordance with the ABS mission.

An ABS-classed vessel that is fitted with an ice loads monitoring system that complies with the requirements of this Guide may, at the request of the Owner, be assigned the appropriate notation for entry in the *ABS Record*.

The requirements of this Guide are applicable to all types and sizes of ice-class vessels. The requirements are applicable both to new construction and to the retrofitting of an approved ice loads monitoring system to existing vessels.

The effective date of this Guide is the first day of the month of publication.

ABS welcomes comments and suggestions for improvement of this Guide. *Comments or suggestions can be sent electronically to rsd@eagle.org.*

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SECTION 1 General

1 Application

This Guide is applicable to new construction and existing ABS-classed vessels for which any of the ice load monitoring system notations indicated in Subsection 1/9 of this Guide have been requested by the applicant.

The ice loads monitoring system is intended to:

- Provide to the bridge near real-time information of the measured data while transiting in ice.
- Warn the vessel's personnel that the near real-time parameters specified in Subsection 1/5 are approaching permissible levels so that corrective actions may be taken.
- Warn the vessel's personnel that during the voyage the value(s) of these parameters could be equal to or higher than corresponding permissible level(s) in the near future based on recent impacts.

The permissible level of the selected parameter(s) should be derived from applicable recognized criteria. While the ice loads monitoring system is intended to aid in the operation of a vessel, it is not a substitute for the judgment and the responsibility of the Master to take appropriate corrective action when operating the vessel.

The Guide also recommends onboard prediction of the short-term extreme value(s) of parameters specified in Subsection 1/5.

The term "Guide" in this document denotes the *ABS Guide for Ice Loads Monitoring Systems*, and "Rules" denotes the *ABS Rules for Building and Classing Steel Vessels* or the *ABS Rules for Building and Classing Steel Vessels Under 90 Meters (295 Feet) in Length*, as applicable.

3 Scope

This Guide describes the general conditions and procedures for assessing, evaluating and recording structural conditions of a vessel navigating in ice by measuring and monitoring parameters related to the structural response of the vessel. This Guide addresses "active" monitoring which provides near real-time onboard operational support.

The type of monitoring system, the methods of recording and processing data and the derivation of warning signals are largely decisions that should be made by the vessel's Owner, in conjunction with the system's supplier as appropriate.

The general recommendations given in this Guide are intended to assist the Owner in selecting, installing and using the system for collecting, processing, and evaluating the necessary data for predicting vessel behavior in ice.

5 Terminology

Performance. Performance defined by the measurement, calculation or both of one or more parameters which provide information about the vessel's structural condition and/or response when in ice.

Parameters. Conditions and properties that could indicate that a structural defect(s) and/or abnormal vessel behavior may occur and that corrective actions are advisable. The most important parameters for ice loads are local stresses in the icebelt structure.

Monitoring System. The system that monitors parameters and compares them with permissible levels that were established using recognized applicable criteria.

7 Modifications and Alternatives

ABS may consider ice loads monitoring system arrangements which do not fully comply with the requirements of this Guide provided they can be shown to be equally effective in meeting the overall standards of this Guide. Such alternative systems may be considered provided that details of any modifications, additions and alternatives to the system are submitted to ABS for satisfactory review.

Any modification, addition or alternative to the approved systems is to be carried out under survey.

9 Notations

At the request of the vessel's Owner or the shipyard, when a vessel is fitted with an ice loads monitoring system that complies with requirements of this Guide, it may be eligible to be assigned the **ILM** notation and the applicable optional extensions.

9.1 Basic Ice loads Monitoring System, ILM

The notation **ILM** may be assigned when the vessel has been provided with the basic ice loads monitoring system to monitor the local icebelt stresses in compliance with Section 2 of this Guide. The system warns the vessel's navigators when these stresses are approaching the permissible levels and a corrective action is advisable.

9.3 Optional Ice Loads Monitoring Systems

When requested, any or all of the following optional extension(s), specified in Section 3, may be added to the notation **ILM** (e.g., **ILM (n) + optional extension(s)**), when the approved ice loads monitoring system has been provided with the appropriate equipment:

- (n)** Number of additional strain gauge locations
- T** Turning ice loads monitoring for quarter
- G** Global ice loads monitoring
- L** Local ice loads recording
- P** Local pressure recording

9.5 Table of Notations

<i>Notation</i>	<i>Definition</i>	<i>Description</i>
ILM	Basic Ice loads Monitoring System	This notation is assigned to a vessel having the basic system that monitors the hull girder bending stress
Additional Optional Notations		
(n)	Number of additional strain gauge locations (e.g., 2, 4 etc.)	This notation is assigned to a vessel having strain gauge locations in addition to those required for the basic ice loads monitoring system. (n) denotes the additional number of additional strain gauge locations
+T (Turning Ice Loads)	Turning ice loads monitoring on the quarter	This optional notation, in addition to ILM , may be assigned to a vessel having ice loads monitoring systems with the additional purpose of monitoring the ice loads induced at the quarters of the vessel due to turning in ice.
+G (Hull Girder Loads due to Ice Impact)	Global ice loads monitoring	This optional notation, in addition to ILM , may be assigned to a vessel having ice loads monitoring systems for hull girder bending and shear monitoring due to operation in ice, typically ramming loads.