

GUIDE FOR

PASSENGER COMFORT ON SHIPS SEPTEMBER 2014

Guide to Color Coding Used in Online Version of the Guide

The following summarizes the colors corresponding to Rule Changes, Corrigenda items and editorial changes in the Guide files which are available for download.

Rule Changes:

Changes effective 1 September 2014

Corrigenda:

Editorials:

Editorial Changes



GUIDE FOR

COMPLIANCE WITH THE ILO MARITIME LABOUR CONVENTION, 2006 TITLE 3 REQUIREMENTS

SEPTEMBER 2014

**American Bureau of Shipping
Incorporated by Act of Legislature of
the State of New York 1862**

**Copyright © 2014
American Bureau of Shipping
ABS Plaza
16855 Northchase Drive
Houston, TX 77060 USA**

Foreword

The International Labour Organization (ILO) is the United Nation's (UN) specialized agency that seeks the promotion of social justice and internationally recognized human and labor rights.

The ILO provides legal instruments aimed at protecting and improving working conditions, including those of seafarers. The ILO has produced the Maritime Labour Convention (MLC), 2006 which was adopted during the 94th Session of the ILO on February 23, 2006.

The Regulations and the Code are organized into general areas under five Titles:

- Title 1: Minimum requirements for seafarers to work on a ship
- Title 2: Conditions of employment
- Title 3: Accommodation, recreational facilities, food and catering
- Title 4: Health protection, medical care, welfare, and social security protection
- Title 5: Compliance and enforcement

Title 3, **Regulation 3.1** addresses vessel design issues related to quality of life at sea, including the physical design of seafarer accommodation areas and the characteristics of the ambient environment (e.g., whole-body vibration, noise, indoor climatic variables, and lighting) which seafarers are exposed to during rest and recreation. Guidance for complying with the Title 3, **Regulation 3.1** requirements are provided in this Guide. This Guide is based on the MLC objective requirements and ABS' interpretation of the intent of the Part A requirements and on what ABS considers satisfactory compliance with the Part A subjective requirements.

Note: Additional or different criteria imposed by individual Flag Administrations may also be applicable. As a result, adherence to the criteria in this Guide does not guarantee acceptance by any flag Administration that has ratified the ILO MLC, 2006 as prima facie evidence of compliance with the MLC's Title 3, Regulation 3.1 requirements.

This Guide, originally published in May 2009, has undergone significant revision including requirements from the revised International Maritime Organization (IMO) Code on Noise (Resolution MSC.337(91) *Code on Noise Levels on Board Ships*) and input from industry (i.e., Owners, designers, and construction yards).

This Guide provides the assessment criteria and measurement methodology for obtaining an ABS Maritime Labor Convention (MLC) Accommodation (ACCOM) related notation (**MLC-ACCOM**, **MLC-ACCOM(SPS)**, and **MLC-ACCOM(WB)**). This Guide provides criteria for three categories of vessels seeking an **MLC-ACCOM** notation:

- **MLC-ACCOM** – for vessels complying with the criteria contained in this Guide relating to Regulation 3.1 of the ILO MLC
- **MLC-ACCOM(SPS)** – for special purpose vessels obtaining the ABS **SPS** notation
- **MLC-ACCOM(WB)** – for non-SPS vessels (e.g., offshore/platform support vessels, tow boats, anchor handling vessels, etc.).

For vessels requesting the **MLC-ACCOM** notation, the vessel must meet all the appropriate criteria across the various categories contained in this Guide.

For the **MLC-ACCOM(SPS)** notation, vessels must be awarded (or in the process of being awarded) the ABS Classification Notation of **SPS** and meet all the appropriate criteria in this Guide considering the allowances permitted for special purpose ships as provided in the ILO MLC. These allowances have been included in Appendix 3.

The **MLC-ACCOM(WB)** notation applies to non-SPS vessels (e.g., offshore/platform support vessels, tow boats, anchor handling vessels, etc.) wanting to demonstrate compliance with the ILO MLC with consideration given to specific flag State ILO MLC guidance, as applicable.

Enhanced levels of accommodation area and ambient environmental criteria intended to improve seafarer habitability, safety, and comfort can be found in the following:

- *ABS Guide for Crew Habitability on Ships*
- *ABS Guide for Crew Habitability on Offshore Installations*
- *ABS Guide for Crew Habitability on Workboats*
- *ABS Guide for Crew Habitability on Mobile Offshore Drilling Units*

General guidance for complying with Titles 1, 2, 3, 4 and 5 is provided in a separate document titled the *ABS Guidance Notes on the ILO Maritime Labour Convention, 2006*. The *ABS Guidance Notes on the ILO Maritime Labour Convention, 2006* is intended to assist vessel Owners and Operators in understanding the requirements of the MLC and provide relevant examples for addressing these requirements within a company's management system.

This Guide becomes effective on the first day of the month of publication.

Users are advised to check periodically on the ABS website www.eagle.org to verify that this version of this Guide is the most current.

We welcome your feedback. Comments or suggestions can be sent electronically by email to rsd@eagle.org.

GUIDE FOR COMPLIANCE WITH THE ILO MARITIME LABOUR CONVENTION, 2006 TITLE 3 REQUIREMENTS

CONTENTS

SECTION 1	General	1
1	Introduction	1
2	Application.....	1
3	Scope	1
4	Terminology	2
5	Associated Documentation	2
6	Notations.....	2
7	Data and Plans to be Submitted	3
7.1	General	3
7.2	Accommodation Areas.....	3
7.3	Ambient Environment	3
8	Process for Obtaining a Notation.....	4
8.1	Accommodation Areas.....	4
8.2	Ambient Environment	4
8.3	Results.....	4
9	Initial Requirements	5
10	Surveys after Construction.....	6
10.1	Annual Surveys	6
10.2	Special Periodical Surveys	6
10.3	Requirements for Vessel Alterations.....	7
11	Alternatives	7
11.1	General	7
11.2	National Regulations.....	8
11.3	Departures from Criteria	8
FIGURE 1 Process for Obtaining an MLC-ACCOM, MLC-ACCOM(SPS), or MLC-ACCOM(WB) Notation		5
SECTION 2	Accommodation Areas	9
1	Background	9
2	Scope	9
3	Terminology	9
4	Associated Documentation	10

5	Criteria.....	10
6	Accommodation Area Documentation	10
6.1	Data Requirements	10
7	Submittal Review and Verification	10
8	Results	10
SECTION 3	Whole-body Vibration	11
1	Background	11
2	Scope	11
3	Terminology	12
4	Associated Documentation	13
5	Criteria.....	13
6	Test Plan.....	14
6.1	Documentation	14
6.2	Test Personnel	14
6.3	Test Conditions	14
6.4	Measurement Locations	14
6.5	Data Acquisition and Instruments.....	14
6.6	Data Analysis	15
6.7	Test Schedule	15
7	Test Requirements.....	15
7.1	General.....	15
7.2	Data Acquisition and Instruments.....	15
7.3	Test Conditions	17
7.4	Measurement Locations	17
8	Test Report	19
8.1	Test Details	19
8.2	Transducer Measurement Positions.....	19
8.3	Measurement Equipment Details	19
8.4	Results	19
8.5	Deviations.....	20
8.6	Surveyor Witnessing Documentation	20
9	Results	20
TABLE 1	Maximum Weighted Root-Mean-Square Acceleration Level.....	13
TABLE 2	Distribution of Transducer Positions within Spaces.....	18
FIGURE 1	Measurement Axes	14
FIGURE 2	Process for the Measurement and Analysis of Whole-body Vibration	16
SECTION 4	Noise	21
1	Background	21
2	Scope	21
3	Terminology	22

4	Associated Documentation	22
5	Criteria.....	23
5.1	Equivalent Continuous A-weighted Sound Pressure Level	23
5.2	Acoustic Insulation.....	23
6	Test Plan	24
6.1	Documentation	24
6.2	Test Personnel	24
6.3	Test Conditions.....	24
6.4	Measurement Locations	24
6.5	Data Acquisition and Instruments	24
6.6	Data Analysis.....	24
6.7	Test Schedule.....	24
7	Test Requirements.....	24
7.1	General.....	24
7.2	Data Acquisition and Instruments	24
7.3	Test Conditions.....	25
7.4	Measurement Locations	25
7.5	Measurement Procedures and Recorded Results	26
8	Test Report	27
8.1	Test Details.....	27
8.2	Measurement Equipment Details.....	27
8.3	Results.....	27
8.4	Deviations.....	27
8.5	Surveyor Witnessing Documentation.....	28
9	Results	28

TABLE 1	Noise Criteria	23
---------	----------------------	----

SECTION 5	Indoor Climate	29
1	Background	29
2	Scope	29
3	Terminology	30
4	Associated Documentation	31
5	Criteria.....	31
5.1	Air Temperature.....	31
5.2	Relative Humidity.....	31
5.3	Air Velocity.....	31
5.4	Air Exchange Rate.....	31
5.5	Summary	32
6	Test Plan	32
6.1	Documentation	32
6.2	Test Personnel	32
6.3	Test Conditions.....	32
6.4	Measurement Locations	32
6.5	Data Acquisition and Instruments	32
6.6	Data Analysis.....	33
6.7	Test Schedule.....	33

7	Test Requirements.....	33
7.1	General.....	33
7.2	Data Acquisition and Instruments.....	33
7.3	Test Conditions	33
7.4	Measurement Locations	34
8	Test Report	35
8.1	Test Details	35
8.2	Transducer Measurement Positions.....	35
8.3	Measurement Equipment Details	35
8.4	Results	35
8.5	Deviations.....	36
8.6	Surveyor Witnessing Documentation	36
9	Results	36

TABLE 1	Summary of Indoor Climate Requirements.....	32
---------	---	----

SECTION 6	Lighting.....	37
1	Background.....	37
2	Scope	37
3	Terminology	38
4	Associated Documentation	38
5	Criteria.....	38
5.1	General and Task Lighting	39
6	Test Plan.....	39
6.1	Documentation	40
6.2	Test Personnel	40
6.3	Test Conditions	40
6.4	Measurement Locations	40
6.5	Data Acquisition and Instruments.....	40
6.6	Data Analysis	40
6.7	Test Schedule	40
7	Test Requirements.....	40
7.1	General.....	40
7.2	Data Acquisition and Instruments.....	40
7.3	Test Conditions	41
7.4	Measurement Locations	41
8	Test Report	43
8.1	Test Details	43
8.2	Measurement Positions.....	43
8.3	Measurement Equipment Details	43
8.4	Results	43
8.5	Deviations.....	44
8.6	Surveyor Witnessing Documentation	44
9	Results	44

TABLE 1	Lighting Criteria.....	39
---------	------------------------	----

TABLE 2	Distribution of Measurement Positions within Spaces	42
---------	---	----

APPENDIX 1	References	45
1	General References	45
2	Accommodation Area References	45
3	Whole-body Vibrations References	46
4	Noise References	46
5	Indoor Climate References	46
6	Lighting References	47
APPENDIX 2	Procedural Requirements for ABS Recognized Ambient Environmental Testing Specialists	48
1	Terminology	48
2	Objective	48
3	Application.....	48
4	Procedure for Approval and Certification.....	49
4.1	Documentation Requirements	49
4.2	General Requirements.....	49
4.3	Auditing of the Testing Specialist	50
4.4	Certification.....	50
4.5	Quality Assurance System.....	50
4.6	Testing Specialist Relations with the Test Equipment Manufacturer	51
5	Certificate of Approval.....	51
5.1	Renewal.....	51
6	Alterations	51
7	Cancellation of Approval.....	51
8	Detailed Requirements by Ambient Environmental Aspect.....	52
8.1	Whole-body Vibration	52
8.2	Noise	53
8.3	Indoor Climate	54
8.4	Lighting	55
APPENDIX 3	Accommodation Area Criteria.....	56
	Accommodation Area Criteria – General	56
	Accommodation Area Criteria – General	57
	Accommodation Area Criteria – Cabins	58
	Accommodation Area Criteria – Food Service.....	61
	Accommodation Area Criteria – Sanitary Spaces.....	62
	Accommodation Area Criteria – Recreation	64
	Accommodation Area Criteria – Laundry.....	65
APPENDIX 4	Acronyms and Abbreviations.....	66
APPENDIX 5	Associated Documentation	68

SECTION 1 General

1 Introduction

Accommodation standards are a measure of the acceptability of seafarer accommodation **areas** for living and working. The *ABS Guide for Compliance with the ILO Maritime Labour Convention, 2006 Title 3 Requirements* has been developed to assist vessel Owners and Operators **in** understanding and fulfilling the Maritime Labour Convention's (MLC) Title 3, "Accommodation, Recreational Facilities, Food and Catering" requirements. This Guide is intended for use by vessel Owners or companies requesting the optional notation of **MLC-ACCOM, MLC-ACCOM(SPS), or MLC-ACCOM(WB)**.

The criteria provided in this Guide **have been extracted from Regulation 3.1 of the MLC and derived from** human factors, ergonomics, and safety practices and principles, as well as **currently** available research data and standards. These criteria establish levels of safety and health consistent with the intent of the MLC. The criteria are based on **the MLC objective requirements and** ABS' interpretation of the intent of the Part A requirements and on what ABS considers satisfactory compliance with the Part A requirements of the MLC Regulation 3.1.

2 Application

Except **where** otherwise **stated**, the ILO Maritime Labour Convention applies to **any vessel engaged in international voyages or flying the flag of a member state and operating from a port, or between ports, in another country**. It defines **international voyage as a voyage from a country to a port outside such a country**. The Convention does not apply to vessels engaged in fishing or in similar pursuits, vessels which navigate exclusively in inland waters or waters within, or closely adjacent to, sheltered waters or areas where port regulations apply; and vessels of traditional build such as dhows and junks. The Convention does not apply to warships or naval auxiliaries.

In the event of doubt as to whether this Convention applies to a vessel or particular category of vessels, the question shall be determined by the competent authority in each ILO Member State after consultation with the vessel Owners' and the seafarers' organizations concerned. [Article II, paragraphs 4 and 5]

3 Scope

This Guide focuses on five (5) aspects of vessel design and layout that can be controlled, measured, and assessed. These five (5) aspects are broken into two (2) **categories** in this Guide: accommodation **area** design and characteristics of the ambient environment.

Accommodation **area** criteria pertain to dimensional **and outfitting** aspects of spaces where seafarers, eat, sleep, recreate, and **perform** routine **daily** activities.

The ambient environmental aspects pertain to the environment that seafarers are exposed to during periods of leisure and rest. Specifically, this Guide provides criteria, and measurement methodologies for the following:

- i) Whole-body Vibration**
- ii) Noise**
- iii) Indoor Climate**
- iv) Lighting**

The criteria associated with the **MLC-ACCOM**, the **MLC-ACCOM(SPS)**, and the **MLC-ACCOM(WB)** notations is applicable only to accommodation spaces where seafarers sleep, rest, dine, and recreate.

For the purposes of this Guide, the criteria do not include seafarer workspaces. Section 3, “Whole-body Vibration” and Section 4, “Noise”, provide additional guidance related to seafarer work spaces that can be used if any voluntary ambient environmental testing is to be done in seafarer work spaces. This testing is recommended, but not required.

While producing this Guide, ABS has taken a practical approach to measurements, test personnel (Testing Specialists), and test equipment.

4 Terminology

ABS Recognized Ambient Environmental Testing Specialists: Companies providing test or measurement services on behalf of the Owner of a vessel or shipyard for the purposes of meeting the **MLC-ACCOM**, **MLC-ACCOM(SPS)**, or **MLC-ACCOM(WB)** notation.

Accommodation Areas/Accommodation Block: Vessel areas where the primary purpose is to rest and recreate. Accommodation spaces include cabins and staterooms, medical facilities (sick bays), recreation rooms, and other similar manned spaces within the accommodation block. For the purposes of this Guide, accommodation areas also include service spaces such as mess rooms, laundry, changing rooms and storerooms.

Ambient Environment: Ambient environment refers to the environmental conditions that the seafarer is exposed to during periods of work, leisure, or rest. Specifically, this Guide provides criteria and limits for whole-body vibration, noise, indoor climate, and lighting.

Associated Documentation: Documents referenced in this Guide that are needed to provide measuring techniques and further guidance.

Manned Space: Any accommodation space where a seafarer may be present for twenty (20) minutes or longer at one time during normal, routine daily activities.

Recreational and Public Spaces: Those portions of the seafarer accommodation areas which are used for halls, dining rooms, lounges, and similar spaces.

Seafarer: Any person who is employed or engaged or works in any capacity on board a ship to which the ILO MLC applies.

Seafarer Spaces: All areas on a vessel intended for seafarers only, such as seafarer accommodation spaces.

Shall: Expresses a provision that is necessary.

Test Plan: Document containing the requisite information regarding vessel design and layout, test personnel, test conditions, measurement locations, data acquisition, instruments, data analysis, and test schedule necessary for verifying the measurements for the ambient environmental aspects of accommodation areas.

Test Report: Document containing the actual testing results from the ambient environmental tests including details of the testing conditions, measurement locations, measurement equipment, and the results of the data collected and analyzed.

5 Associated Documentation

- Appendix 2, “Procedural Requirements for ABS Recognized Ambient Environmental Testing Specialists”

6 Notations

At the request of the Owner or shipyard, a vessel complying with the criteria contained in this Guide for seafarer accommodation areas and the associated ambient environmental characteristics (i.e., whole-body vibration, noise, indoor climate, and lighting) may be assigned a notation of **MLC-ACCOM**, **MLC-ACCOM(SPS)**, or **MLC-ACCOM(WB)**.

7 Data and Plans to be Submitted

7.1 General

The following General Arrangement type drawings of the vessel shall be submitted:

- i) Inboard profile detailing the location of the main vertical zone boundaries, the location of the main watertight bulkheads, as well as the various deck levels
- ii) Plan view of each deck annotating the various spaces on each deck

7.2 Accommodation Areas

At a minimum, scaled arrangement drawings of the various seafarer accommodation spaces (elevation and plan views) and the vessel's accommodation **area** specifications shall be submitted to ABS Engineering. Details of the seafarer accommodation **area** data requirements are provided in Subsection 2/6, "Accommodation **Area** Documentation".

7.3 Ambient Environment

The following items are to be submitted **separately** for each ambient environmental aspect.

7.3.1 Test Plans

Test Plans shall serve as the principal means for verifying the measurements for the ambient environmental aspects of accommodation **areas**. Separate Test Plans are required for whole-body vibration, noise, indoor climate, and lighting. Specific Test Plan details for the various ambient environmental criteria are outlined in later sections of this Guide as follows:

<i>Environmental Aspect</i>	<i>Test Plan Details</i>
Whole-body Vibration	Subsection 3/6
Noise	Subsection 4/6
Indoor Climate	Subsection 5/6
Lighting	Subsection 6/6

The test plans require approval by ABS Engineering before any measurements are made. ABS shall notify the vessel Owner or shipyard whether the test plans have been approved or require alteration. An ABS-approved copy of the Test Plan shall become part of the vessel's official documentation.

7.3.2 Test Reports

Upon completion of the ambient environmental testing, **Test Reports** shall be submitted to the ABS Surveyor. In addition, a copy of the **Test Reports** shall become part of the vessel's official documentation. These reports contain ambient environmental information such as test results, testing details, measurement equipment details, etc. The specific **Report** contents for the various ambient environmental criteria are outlined in later sections of this Guide as follows:

<i>Environmental Aspect</i>	<i>Test Report Details</i>
Whole-body Vibration	Subsection 3/8
Noise	Subsection 4/8
Indoor Climate	Subsection 5/8
Lighting	Subsection 6/8

8 Process for Obtaining a Notation

Prior to scheduling accommodation **area** verification or ambient environmental testing activities, the vessel Owner or shipyard shall certify the operational status of the vessel as being fully operational and/or inclusive of all equipment and furnishings. If the vessel is not fully operational, a complete listing of deficiencies of areas, components, equipment, etc., shall be submitted to ABS for review.

ABS shall then make a determination and notify the vessel Owner or shipyard as to whether verification activities or ambient environmental testing can commence. **The intent is to align sea trials with the ambient environmental testing so that all testing is completed during sea trials.**

Section 1, Figure 1, "Process for Obtaining an **MLC-ACCOM, MLC-ACCOM(SPS), or MLC-ACCOM(WB)** Notation", charts the process for obtaining an **MLC-ACCOM, MLC-ACCOM(SPS), or MLC-ACCOM(WB)** notation. The following Paragraphs briefly describe the notation process.

8.1 Accommodation **Areas**

Arrangement drawings, plans, and vessel design specifications for seafarer accommodation spaces shall be prepared and submitted to ABS Engineering for review. For new construction, the drawings shall be provided to ABS Engineering during the detailed design phase. For existing vessels, the arrangement drawings and plans reflecting the current accommodation **area** configurations shall be provided to and approved by ABS Engineering, in advance of ABS Surveyor verifications.

Follow-up physical verification measurements of accommodation **area** criteria shall be performed by an ABS Surveyor. The ABS Surveyor shall select verification measurement sites.

The results of the ABS Engineering review and actual ABS Surveyor verification shall be reviewed by the ABS Surveyor during the notation confirmation process.

8.2 Ambient Environment

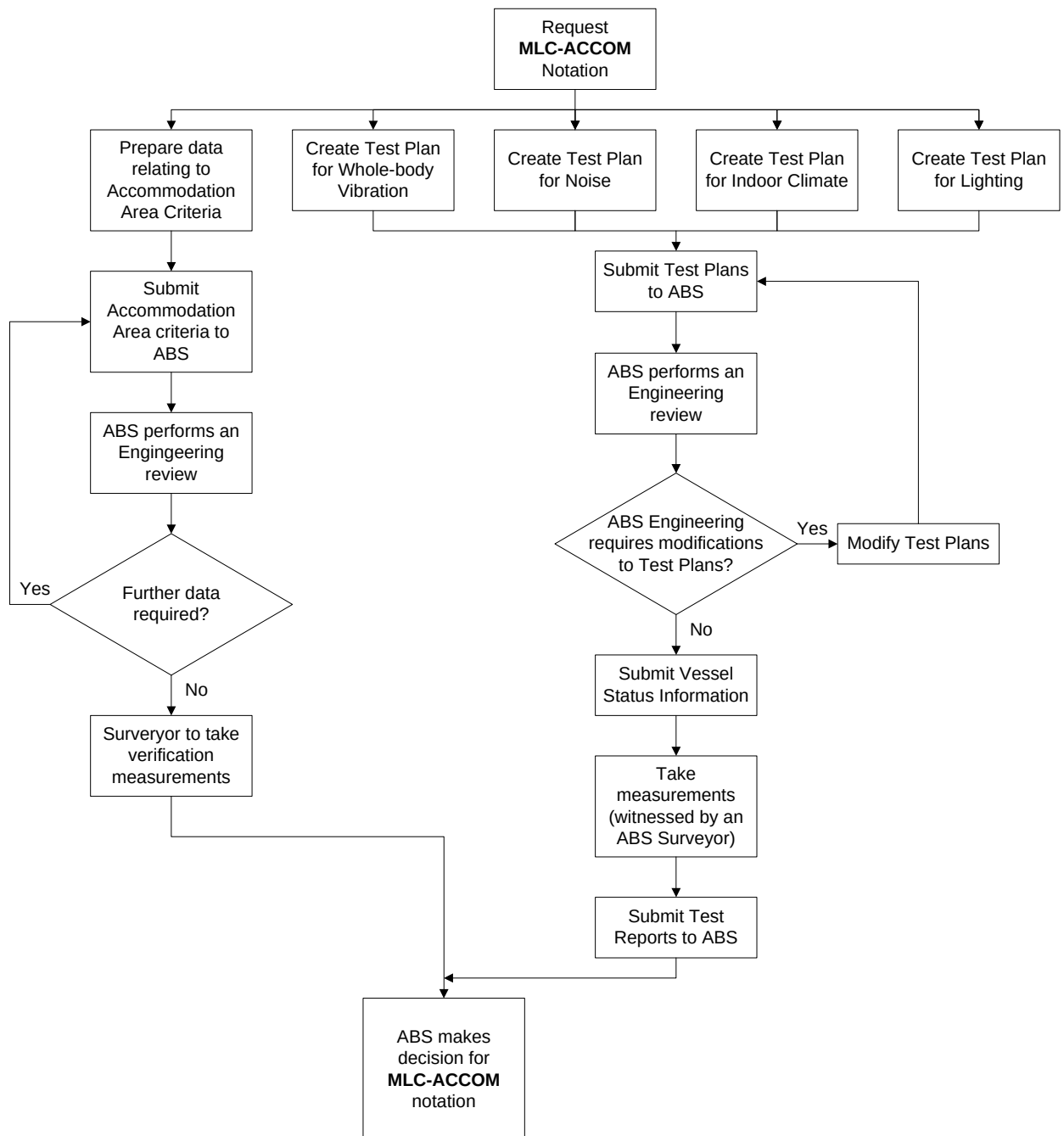
Ambient environmental Test Plans for whole-body vibration, noise, indoor climate, and lighting shall be prepared and submitted to ABS Engineering. These Test Plans shall serve as a primary **means** for verifying the measurement locations and measurement process, as well as specifying the **Testing Specialist** who will perform the ambient environmental testing.

Testing, inspections, and data collection shall be performed by **the Testing Specialists** and witnessed by an ABS Surveyor. Test Reports for ambient environmental testing shall be prepared by **the Testing Specialists** and submitted to the ABS Surveyor for review.

8.3 Results

The ABS Engineering accommodation **area** assessment, ABS Surveyor verification measurements **and** ambient environmental **Test Reports** shall be reviewed by the ABS Surveyor for determination of notation confirmation.

FIGURE 1
Process for Obtaining an MLC-ACCOM, MLC-ACCOM(SPS), or MLC-ACCOM(WB) Notation



9 Initial Requirements

The initial process for obtaining an **MLC-ACCOM, MLC-ACCOM(SPS), or MLC-ACCOM(WB)** notation shall comprise ABS Engineering reviews, **ambient environmental testing**, and ABS Surveyor verifications. Testing shall be in accordance with the submitted Test Plans reviewed and approved by ABS Engineering in advance of the testing. Testing shall be witnessed by an ABS Surveyor. If the criteria specified in this Guide have been met, then the notation **may** be confirmed.

10 Surveys after Construction

It is intended that all surveys after construction are to be aligned with Classification Surveys. Harmonization of surveys is to be carried out at the first available opportunity.

10.1 Annual Surveys

In order to maintain the **MLC-ACCOM**, **MLC-ACCOM(SPS)**, or **MLC-ACCOM(WB)** notation, an Annual Survey shall be made within three (3) months before or after each annual anniversary date of the crediting of the Initial Survey or the previous Special Periodical Survey. The following information shall be reviewed by the attending ABS Surveyor for issues that could affect the Accommodation notation.

- i) Collision and grounding reports since previous Initial, Annual, or Special Periodical Survey
- ii) Fire, repair, and damage reports since previous Initial, Annual, or Special Periodical Survey
- iii) A list of all **structural or mechanical modifications** to the vessel since previous Initial, Annual, or Special Periodical Survey
- iv) Verification that equipment and facilities continue to be fit for purpose and are operating in accordance with **accommodation area** criteria stated within this Guide

During the attending ABS Surveyor's review of the **submitted** information, a determination will be made as to whether changes or alterations have taken place that could affect the notation. As a result, the vessel may be subject to the review, ambient environmental testing, and inspection requirements of this Guide.

10.2 Special Periodical Surveys

In order to maintain the **MLC-ACCOM**, **MLC-ACCOM(SPS)**, or **MLC-ACCOM(WB)** notation, a Special Periodical Survey shall be completed within five (5) years after the date of build or after the crediting date of the previous Special Periodical Survey. A Special Periodical Survey will be credited as of the completion date of the survey but not later than five (5) years from date of build or from the date recorded for the previous Special Periodical Survey. If the Special Periodical Survey is completed within three (3) months prior to the due date, the Special Periodical Survey will be credited to agree with the effective due date. The Special Periodical Survey may be commenced fifteen (15) months prior to the due date and be continued with completion by the due date.

10.2.1 Survey Requirements

The Survey shall comprise ABS Engineering reviews, ABS Surveyor verifications, and ambient environmental testing. The Survey will cover all five (5) accommodation aspects.

The following shall be submitted to ABS three (3) months prior to carrying out the ambient environmental testing:

- i) Fire, repair, or damage reports since previous Annual Survey
- ii) A list of all **structural or mechanical modifications** to the vessel since previous Annual Survey
- iii) Drawings/arrangements of seafarer spaces, HVAC, electrical, etc., affected by alterations
- iv) **Copy of approved Initial Test Plans and Test Reports**
- v) **Test Plans and Test Reports resulting from Annual Surveys**
- vi) **Previous Special Periodical Survey Test Plans and Reports, if applicable**
- vii) **Proposed Special Periodical Survey Test Plans for the current survey**

The Special Periodical Survey data submittal serves **three** purposes. The first is to perform an ABS Engineering review of seafarer spaces against any alterations to the vessel since the Initial Survey, **with measurements verified by an ABS Surveyor. The second purpose is to provide a history of ambient environmental testing, as well as the Special Periodical Survey ambient environmental Test Plans for review and approval. The third is to allow scheduling of measurement verifications and ambient environmental testing.**

A Special Periodical Survey Test Plan for each ambient environmental aspect of accommodation areas shall be submitted in accordance with the criteria stated below. The approved initial Test Plans should be used as a basis for creating the Special Periodical Survey Test Plans.

For creation of the Special Periodical Survey Test Plans, Subsection 6, “Test Plan”, and Subsection 7, “Test Requirements”, of this Guide specify the requirements for each ambient environmental aspect (i.e., 3/6, 3/7, 4/6, 4/7, etc.). For specifying measurement locations for the Special Periodical Survey Test Plans, the following changes to 7.4.1, “Selection of Spaces where Measurements are to be Conducted”, of each ambient environmental aspect shall be followed.

- i) Measurements shall be taken in all areas affected by vessel alterations. Measurements are limited to the ambient environmental aspect affected by the alteration. For example, structural changes require both whole-body vibration and noise measurements. Structural changes do not necessarily require indoor climate or lighting measurements. Changes to luminaires require lighting measurements but not whole-body vibration, noise, or indoor climate measurements.
- ii) For all ambient environmental aspects, measurements shall be taken in all worst case or problem area locations based on the requirements set forth in 7.4.1, “Selection of Spaces where Measurements are to be Conducted”, of the appropriate Section of this Guide. [For example, worst case for whole-body vibration is described in 3/7.4.1i)].
- iii) For all ambient environmental aspects, measurements shall be taken in twenty-five (25) percent of crew cabins and staterooms identified in the initial Test Plans. The cabin locations must be representative of locations port, starboard, fore, amidships, and aft on each deck. Any worst case locations can be considered part of the representative sample for crew cabins and staterooms, if applicable.
- iv) For all ambient environmental aspects, measurements shall be taken where a single instance of one (1) type of a manned space exists within the vessel (e.g., officer’s mess, gymnasium, library, etc.). The worst case locations can be considered part of the single instance representative sample, if applicable.
- v) Where multiple instances of the same type space exist, a representative sample of at least twenty-five (25) percent of each type shall be selected for measurement for all ambient environmental aspects. The worst case locations are to be considered part of the representative sample, if applicable.

For all ambient environmental conditions, visual/walkthrough verification inspection locations shall be conducted in accordance with 7.4, “Measurement Locations” of the appropriate Section of this Guide.

10.3 Requirements for Vessel Alterations

No alterations which affect or may affect the Accommodation notation awarded, including alterations to the structure, machinery, electrical systems, piping, furnishings, or lighting systems, are to be made to the vessel unless plans of the proposed alterations are submitted to and approved by ABS before the work of alteration is commenced. If ABS determines that the alteration will affect the Accommodation notation, the altered vessel may be subject to the review, verification, and ambient environmental testing requirements of this Guide.

11 Alternatives

11.1 General

ABS will consider alternative arrangements, criteria, and procedures, which can be shown to meet the criteria directly cited or referred to in this Guide. The demonstration of an alternative’s acceptability can be made through either the presentation of satisfactory service experience or systematic analysis based on valid engineering principles.

11.2 National Regulations

ABS will consider for its acceptance alternative arrangements and details, which can be shown to comply with standards recognized in the country (flag State) in which the vessel is registered or built, provided they are **deemed** not less effective.

11.3 Departures from Criteria

The criteria contained in this Guide **are** envisioned **to apply** to vessels that are engaged in the usual trades and services expected of such vessels, within the scope of the following:

- *ABS Rules for Building and Classing Steel Vessels*
- *ABS Rules for Building and Classing Steel Vessels Under 90 meters (295 feet) in Length*
- *ABS Rules for Building and Classing High-Speed Craft*
- *ABS Rules for Building and Classing Offshore Support Vessels*

It is recognized that unusual or unforeseen conditions may lead to a case where one or more of the parameters of interest in granting a notation may temporarily fall outside the range of acceptability.

When a departure from criteria is identified, during either the notation's initial issuance or reconfirmation process, it shall be reviewed by ABS in consultation with the Owner. When the design of the accommodation **areas** or ambient environmental test results contain departures from the stated criteria, these will be subject **to** special consideration upon the receipt of details about the departure. Depending on the degree and consequences of the departure, the **shipyard or** Owner may be required to provide an assessment and remediation plan to obtain or maintain the notation. Failure to complete the agreed remediation by the due date will lead to withdrawal of the notation.

SECTION 2 Accommodation Areas

1 Background

To promote maritime safety, efficiency, and habitability, it is important that seafarers maintain appropriate levels of mental and physical fitness while onboard vessels. To help accomplish this, seafarers should be provided with suitable accommodation areas. Appropriate accommodation area design helps promote reliable performance by reducing the potential for fatigue and human error. Appropriate accommodation areas may also enhance morale, recruiting, retention, comfort, and overall quality of life at sea.

Conversely, inappropriate accommodation areas can adversely impact a seafarer's ability to reliably perform assigned duties, fully relax, sleep, and recover from mentally and physically demanding work activities. This in turn can impact their ability to carry out duties on succeeding watches with the required diligence, accuracy, and attention to safety procedures. Providing an onboard environment that increases seafarer alertness and well-being should be of concern to vessel Owners.

2 Scope

This Section and Appendix 3, "Accommodation Area Criteria", provide the assessment and measurement criteria for accommodation spaces. In particular, Appendix 3 encompasses the criteria for cabins, sanitary spaces, food services, recreation areas, laundry, and medical spaces.

Compliance with this Section and Appendix 3, "Accommodation Area Criteria" is a prerequisite for the **MLC-ACCOM**, **MLC-ACCOM(SPS)**, and **MLC-ACCOM(WB)** notation confirmation. For vessels requesting the **MLC-ACCOM** notation, the vessel must meet all the appropriate criteria contained in Appendix 3. For the **MLC-ACCOM(SPS)** notation vessels must be awarded (or in the process of being awarded) the ABS Classification Notation of **SPS** and meet all the appropriate criteria considering the allowances permitted for special purpose ships as provided in the MLC and included in Appendix 3. The **MLC-ACCOM(WB)** applies to non-SPS vessels (e.g., offshore/platform support vessels, tow boats, anchor handling vessels, etc.) wanting to demonstrate compliance with the ILO MLC with consideration given to specific flag State ILO MLC guidance, as applicable.

Note: Additional or different criteria imposed by individual flag Administrations may also be applicable.

Enhanced levels of accommodation area criteria intended to improve seafarer habitability, comfort, and safety can be found in the following:

- *ABS Guide for Crew Habitability on Ships*
- *ABS Guide for Crew Habitability on Offshore Installations*
- *ABS Guide for Crew Habitability on Workboats*
- *ABS Guide for Crew Habitability on Mobile Offshore Drilling Units*

3 Terminology

Accommodation Areas/Accommodation Block: Vessel areas where the primary purpose is to rest and recreate. Accommodation spaces include cabins and staterooms, medical facilities (sick bays), offices, recreation rooms, and other similar manned spaces within the accommodation.

4 Associated Documentation

- Appendix 3, “Accommodation Area Criteria”
- International Maritime Labour Organization (ILO) Maritime Labour Convention (MLC), 2006

5 Criteria

The Accommodation area criteria for the **MLC-ACCOM**, **MLC-ACCOM(SPS)**, and **MLC-ACCOM(WB)** notations are provided in Appendix 3, “Accommodation Area Criteria”.

6 Accommodation Area Documentation

As stated in 1/7.2, “Accommodation Area”, accommodation area documentation shall be prepared and submitted to ABS Engineering for review. Confirmatory verification measurements shall be performed by an ABS Surveyor. The following data shall be submitted to ABS Engineering:

6.1 Data Requirements

The submitted data shall serve as a means for verifying that the vessel meets the accommodation area criteria specified in Appendix 3, “Accommodation Area Criteria”.

6.1.1 New Construction

For new construction, scaled arrangement drawings of the accommodation spaces (elevation and plan views), details of the accommodation area outfitting, and vessel’s design specification in relation to the accommodation spaces shall be submitted to ABS Engineering.

6.1.2 Existing Vessels

For existing vessels, appropriate arrangement drawings and plans, reflecting the current accommodation area configurations shall be provided to ABS Engineering along with any current vessel accommodation area design specifications.

7 Submittal Review and Verification

Arrangement drawings, plans, and vessel specifications for the accommodation areas shall be prepared and submitted for review by ABS Engineering. For new construction, the drawings shall be provided to ABS Engineering during the detailed design phase. For existing vessels, the arrangement drawings and plans, reflecting the current accommodation area configurations shall be provided to ABS Engineering, in advance of onboard ABS Surveyor verifications.

ABS Engineering shall review the submitted accommodation area documentation. ABS Engineering shall report any deviation from criteria to the Owner/shipyard for resolution and shall also identify any criteria that the ABS Surveyors must field verify.

The ABS Surveyor shall verify that the submitted drawings match the constructed vessel. The ABS Surveyor shall also verify any criteria that are outstanding from the ABS Engineering review and document deviations from criteria.

8 Results

The results of the ABS Engineering review and the ABS Surveyor verification shall be reviewed by the ABS Surveyor against the appropriate **MLC-ACCOM**, **MLC-ACCOM(SPS)**, or **MLC-ACCOM(WB)** criteria for notation confirmation.

SECTION 3 Whole-body Vibration

1 Background

Working and/or living **onboard** vessels imposes a series of **generally** low-frequency mechanical vibrations as well as single-impulse shock loads on the human body.

Low-frequency vibrations are **also** imposed by vessel motions, which are produced by the various sea states in conjunction with vessel speed. **These motions can** result in motion sickness, body instability, fatigue, and increased health risk aggravated by shock loads induced by vessel slamming. Vessel slamming may be caused by dynamic impact loads being exerted on the vessel's bottom or bow flare **due to** vessel size, speed, and wave conditions.

Higher-frequency vibration **influencing comfort** is often associated with rotating machinery. The imposition of higher frequency vibrations (**about 1 to 80 Hz**) induces corresponding motions and forces within the human body, creating discomfort and possibly resulting in degraded performance and health (Griffin, 1990).

2 Scope

The 2006 MLC has Regulations relating to whole-body vibration levels aboard vessels. They are contained in the following list:

- i) Regulation A3.1.6(h) states: *"accommodation and recreational and catering facilities shall meet the requirements in Regulation 4.3, and the related provisions in the Code, on health and safety protection and accident prevention, with respect to preventing the risk of exposure to hazardous levels of noise and **vibration** and other ambient factors and chemicals on board ships, and to provide an acceptable occupational and on-board living environment for seafarers."*
- ii) MLC Regulation A3.1.6(h) calls out Regulation 4.3. Below is listed the physical design and arrangement related aspects of Regulation 4.3:
 - A4.3.1(b) *"reasonable precautions to prevent occupational accidents, injuries and diseases on board ship, including measures to reduce and prevent the risk of exposure to harmful levels of ambient factors and chemicals as well as the risk of injury or disease that may arise from the use of equipment and machinery on board ships;"*
 - A4.3.2(a) *"take account of relevant international instruments dealing with occupational safety and health protection in general and with specific risks, and address all matters relevant to the prevention of occupational accidents, injuries and diseases that may be applicable to the work of seafarers and particularly those which are specific to maritime employment;"* and
 - A4.3.4 *"Compliance with the requirements of applicable international instruments on the acceptable levels of exposure to workplace hazards on board ships and on the development and implementation of ships' occupational safety and health policies and programmes shall be considered as meeting the requirements of this Convention."*

ABS considers compliance with the whole-body vibration criteria in this Section satisfactory for compliance with the hazardous vibration aspects of A3.1.6(h).

The criteria in this Section provide an acceptable level of exposure to and methods for assessing whole-body vibration relating to seafarer accommodation **areas** onboard vessels. The criteria were selected to limit potential vibration-related interference with **seafarer** tasks and to promote the seafarers living conditions. Whole-body vibration limits defined in this Section are based on currently available standards and research.

Consideration of the **vibration** loads imposed on the body is restricted to motions transmitted from surrounding structures to the entire human body through the feet of a standing person in the frequency range 1 to 80 Hertz (Hz). Motions transmitted to the body of a seated or recumbent person have been omitted from this Guide. Due to the provision of resilient or non-rigid surfaces on seats and beds, these surfaces will generally attenuate the transfer of vibration to levels that are lower than those experienced when standing. The motions transmitted through the feet are expected to be the highest vibration levels to which crew will be exposed.

Whole-body vibration limits in this Section are based on currently available standard and research. Compliance with this Section is a prerequisite for being awarded the Accommodation notations **MLC-ACCOM**, **MLC-ACCOM(SPS)**, or **MLC-ACCOM(WB)** notation.

3 Terminology

Acceleration: The rate of change of velocity over time (i.e., meters-per-second squared, m/s²).

Dynamic Positioning: A system to automatically maintain a vessel's position and heading by controlling propellers and/or thrusters. Dynamic positioning can maintain a position to a fixed point over the bottom, or in relation to a moving object (such as another vessel). It can also be used to position the vessel at a favorable angle towards wind, waves, and current.

Frequency: The number of complete cycles of a periodic process occurring per unit time. Frequency is expressed in Hertz (Hz) which corresponds to the number of cycles observed-per-second.

Frequency Weighting: A transfer function used to modify a signal according to a required dependence on vibration frequency.

- In human response to vibration, various frequency weightings have been defined in order to reflect known or hypothesized relationships between vibration frequency and human response.
- The frequency weighting used to evaluate whole-body vibration in this Guide is W_m (whole-body) for all three axes (x, y, and z), in accordance with ISO 6954.

Multi-Axis Acceleration Value: The Multi-Axis Acceleration Value is calculated from the root-sums-of-squares of the weighted RMS acceleration values in each axis (a_{xw} , a_{yw} and a_{zw}) at the measurement point using the following expression:

$$a_w = \sqrt{a_{xw}^2 + a_{yw}^2 + a_{zw}^2}$$

where a_{xw} , a_{yw} and a_{zw} are the weighted RMS acceleration values measured in the x-, y- and z-axes, respectively.

Multi-Axis Vibration: Mechanical vibration or shock acting in more than one (1) direction simultaneously.

Reference Calibration: Calibration of a measuring instrument conducted by an accredited Testing and Calibration Laboratory with traceability to a national or international standard.

Transit Conditions: Those conditions where the vessel is transitioning (moving) from one location to another.

Velocity: The rate of change of distance over time (i.e., millimeters per second, mm/s)

Vibration: The variation with time of the magnitude of a quantity which is descriptive of the motion or position of a mechanical system, when the magnitude is alternately greater and smaller than some average value.

Weighted Root-Mean-Square Acceleration Value (a_w): The weighted root-mean-square (RMS) acceleration a_w , in meters-per-second squared, is defined by the expression:

$$a_w = \sqrt{\frac{1}{T} \int_0^T a_w^2(t) dt}$$

where $a_w(t)$ is the weighted acceleration as a function of time in meters-per-second squared (m/s²) and T is the duration of the measurement in seconds.

Whole-body Vibration: Mechanical vibration (or shock) transmitted to the human body as a whole. Whole-body vibration is often due to the vibration of a surface supporting the body.

4 Associated Documentation

The following documents provide details about Test Plan preparation, test measurement procedures and/or Test Reporting:

- ISO 6954: 2000, Mechanical Vibration and Shock – Guidelines for the Measurement, Reporting and Evaluation of Vibration with Regard to Habitability on Passenger and Merchant Ships
- ISO 2631-2:2003, Mechanical Vibration and Shock – Evaluation of Human Exposure to Whole Body Vibration – Part 2, Vibration in Buildings.
- ISO 8041:2007, Human Response to Vibration – Measuring Instrumentation
- ISO 5348:1998, Mechanical Vibration and Shock – Mechanical Mounting of Accelerometers.
- WMO: 1995, Sea State Code

Further guidance can be found in:

- ISO 20283-2:2008, Mechanical Vibration – Measurements of Vibration on Ships – Part 2: Measurement of Structural Vibration.

5 Criteria

The whole-body vibration criteria for the **MLC-ACCOM**, **MLC-ACCOM(SPS)**, and **MLC-ACCOM(WB)** notations are provided in Section 3, Table 1, “Maximum Weighted Root-Mean-Square Acceleration Level”. The severity of the vibration shall be indicated by the weighted root-mean-square acceleration value (a_w) as defined in ISO 8041.

Whole-body vibration measurements shall only be taken in manned accommodation spaces. A space is considered “manned” if it is occupied by a seafarer for twenty (20) minutes or longer at a time for normal, routine daily activities. Specific locations are referred to in 3/7.4, “Measurement Locations”.

The maximum vibration levels in Section 3, Table 1, “Maximum Weighted Root-Mean-Square Acceleration Level”, shall not be exceeded under normal operating conditions. Expression and assessment of vibration levels can be based on acceleration or velocity values. The maximum vibration level is primarily aimed at preventing severe discomfort and interference with seafarer’s task performance.

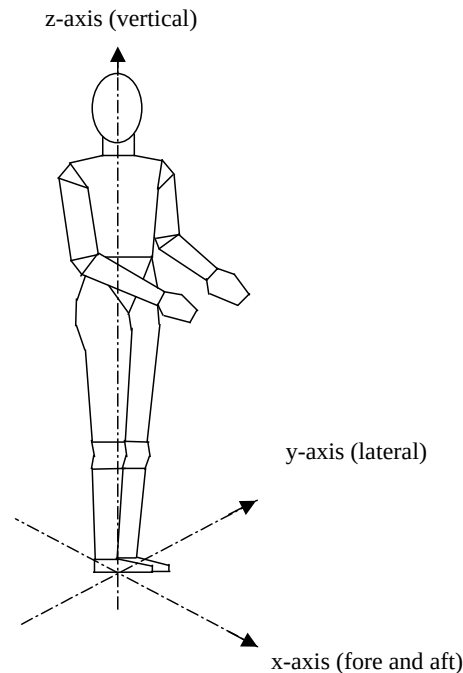
TABLE 1
Maximum Weighted Root-Mean-Square Acceleration Level

Notation	Frequency Range	Acceleration Measurement	Maximum RMS Level	
			Transit Conditions	Dynamic Positioning Conditions
MLC-ACCOM MLC-ACCOM(SPS) MLC-ACCOM(WB)	1 - 80 Hz	a_w	214 mm/s ² (6.0 mm/s)	286 mm/s ² (8.0 mm/s)

For the purpose of this Section, the notation applies to the vibration levels occurring on the deck supporting the human body in the three (3) translational (x-, y- and z-) axes as shown in Section 3, Figure 1, “Measurement Axes”. The vibration levels are computed for each axis individually, as well as combined as a multi-axis acceleration value. Each is expressed as a frequency weighted root-mean-square (a_w) value. To meet the vibration criteria, the multi-axis a_w level must be less than or equal to the maximum level expressed in Section 3, Table 1.

Please note that flag States may have different whole-body vibration requirements from those presented in this Guide. If the flag State’s requirements are more stringent, they take precedence. If this Guide’s criteria are more stringent, this Guide takes precedence.

FIGURE 1
Measurement Axes



6 Test Plan

As stated in 1/7.3.1, “Test Plans”, a Test Plan shall be developed to serve as the principal means for verifying the measurements to be performed to verify compliance with whole-body vibration criteria. The Test Plan shall include the following:

6.1 Documentation

The Test Plan shall include appropriate drawings indicating the location of all vibration sources.

6.2 Test Personnel

The Test Plan shall provide information about the **Testing** Specialist who **will** be conducting the test and their approval and certification in accordance with Appendix 2, “Procedural Requirements for **ABS Recognized** Ambient Environmental Testing **Specialists**”.

6.3 Test Conditions

The Test Plan shall detail the conditions under which the tests are expected to be performed. Further details about test conditions are given in 3/7.3, “Test Conditions”.

6.4 Measurement Locations

The Test Plan shall document, in detail, on appropriate drawings, all spaces where measurements will be taken. In addition, transducer measurement positions shall be indicated. Details on selecting measurement locations and determining transducer measurement positions are provided in 3/7.4, “Measurement Locations”.

6.5 Data Acquisition and Instruments

The Test Plan shall provide information regarding the methods and instrumentation to be used for measurement and data collection. Instrumentation specification details shall include type of instruments to be used, accuracy, calibration, sensitivity, conformance with ISO 8041, and frequency range. More details on data acquisition and instruments are provided in 3/7.2, “Data Acquisition and Instruments”.

6.6 Data Analysis

The Test Plan shall provide information regarding the methods, software and instrumentation to be used for data analysis.

6.7 Test Schedule

The Test Plan shall provide information regarding the proposed test schedule. It shall include the following: Date of measurements, list of measurement locations per date, list of measuring personnel, and test duration.

7 Test Requirements

7.1 General

Whole-body vibration measurements shall be in accordance with the procedures described in ISO 6954. When the procedures described in this Guide deviate from any requirements or procedures mentioned in ISO 6954, the more stringent requirement shall take precedence.

The relationship between the various factors to be considered when taking whole-body vibration measurements and computing results is illustrated in Section 3, Figure 2, “Process for the Measurement and Analysis of Whole-body Vibration”.

7.2 Data Acquisition and Instruments

For the **MLC-ACCOM**, **MLC-ACCOM(SPS)**, and **MLC-ACCOM(WB)** notations, a sample of data shall be recorded for each whole-body vibration measurement position. Each whole-body vibration measurement sample shall be at least sixty (60) seconds in duration. For each location measured, a data sample shall be taken in accordance with the requirements of 3/7.3, “Test Conditions”

The above measurement samples shall all be taken using the appropriate Type 1 instrumentation (ISO 8041), then frequency weighted and analyzed in accordance with ISO 6954. It is desirable to employ equipment that records and stores acceleration time histories.