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Ships and marine technology — Computer applications — Shipboard loading instruments

*Navires et technologie maritime — Applications informatiques —
Instruments de chargement embarqués*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16155 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 10, *Computer applications*.

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Introduction

A computer tool to assess technical operational properties of a ship, such as stability or longitudinal strength, has become more or less standard equipment on board vessels and other floating objects. There is a great variety of such instruments available, in terms of both calculation method and appearance. This International Standard was developed to guide both producers and shipowners in determining the suitability of a particular instrument. In order to guarantee a minimum quality level, this International Standard specifies certain minimum requirements for loading instruments; however, it leaves sufficient freedom for producers to apply innovative solutions.

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Ships and marine technology — Computer applications — Shipboard loading instruments

1 Scope

This International Standard is applicable where computer equipment is used to perform functions related to loading and associated ship safety issues, such as, but not limited to, intact and damaged stability and longitudinal strength.

This International Standard defines requirements on a shipboard loading instrument that are supplementary to IMO MSC/Circ. 836, IMO MSC/Circ. 854, IMO MSC/Circ. 891 and IACS Recommendation No. 48.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IACS Recommendation No. 48, *Recommendations on Loading Instruments*

IEC 61996:2000, *Maritime navigation and radiocommunication equipment and systems — Shipborne voyage data recorder (VDR) — Performance requirements — Methods of testing and required test results*

IMO Resolution A.739(18), *Guidelines for the authorization of organizations acting on behalf of the Administration*

IMO Resolution A.789(19), *Specifications on the survey and certification functions of recognized organizations acting on behalf of the Administration*

IMO MSC/Circ. 836, *Recommendation on loading instruments*

IMO MSC/Circ. 854, *Guidelines for shipboard loading and stability computer programs*

IMO MSC/Circ. 891, *Guidelines for the on-board use and application of computers*

IMO MSC/Circ. 920, *Model loading and stability manual*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

direct calculation

first-principles calculation

physics-based calculation which involves only primary entities of the ship, such as loading, hull geometry, internal geometry (e.g. holds and compartments) and the shape of sounding pipes

3.2 loading instrument
instrument consisting of loading software, hardware and probably also an operating system, which in their combination can determine characteristics and properties related to a particular loading of a particular vessel or other floating object

3.3 loading software
software consisting of a combination of computer instructions and preprogrammed static data of a particular vessel or object in question

3.4 hardware
at least a central processing unit, means for permanent storage and means for input and output

NOTE Hardware can be stand-alone, or form part of a computer network.

4 Abbreviated terms

COG	centre of gravity
FSM	free surface moment
KM_T	transverse metacentre above base line
KG or VCG	vertical centre of gravity above base line
KG' or VCG'	virtual vertical centre of gravity above base line (corrected for free surface effects)
$G'M_T$	transverse metacentric height (corrected for free surface effects)
Lpp	length between perpendiculars
LCG	longitudinal centre of gravity
TCG	transverse centre of gravity
TEU	twenty foot equivalent unit

5 Categories of loading instrument

5.1 Categories of functions

This International Standard should be applicable for all types of instrument, which will be suitable for a variety of purposes; therefore, segregation into categories of functions, each for different purposes, is made.

5.1.1 Category A functions are designed and intended for basic calculations and analysis. Its information generating capacities are comparable with information and calculations which can be made with a traditional Loading and Stability Manual.

Examples of functions are

- upright hydrostatics;
- draft and trim;

- verify transverse metacentric height $G'M_T$ against the minimum required $G'M_T$ (or the KG' against the maximum allowable KG'), based on intact stability requirements;
- verify transverse metacentric height $G'M_T$ against one or more enveloped minimum required $G'M_T$ values (or the KG' against one or more enveloped maximum allowable KG' values), based on damage stability criteria;
- intact stability;
- tank soundings/volumes.

5.1.2 *Category B functions* are designed and intended for calculations and analysis which extend beyond calculations or information which can be made with standard Loading and Stability Manuals.

Examples of functions are

- intact or damaged longitudinal strength;
- intact stability for extreme conditions (e.g. draft, trim, or list outside the range of the tables as included in the Loading and Stability Manual);
- damage stability calculations, to verify whether an actual loading condition complies with statutory requirements;
- damage stability calculations, in order to assess sinkage, heel, trim and residual stability for an actual loading and damage case;
- exact determination of tank contents, taking into account effects of list and trim;
- advise on countermeasures for actual damage situations, intended to improve residual stability, bending moments, etc. <https://standards.iteh.ai/catalog/standards/sist/75835c07-dad0-4586-8eaa-f89d2a2a43e2/iso-16155-2006>

5.1.3 *Category C functions* fulfil auxiliary roles, within the framework of a loading instrument. Examples are

- container loading utilities;
- grain loading utilities;
- utilities to create voyage-/cargo-specific loading plans for chemical parcel tankers, taking into account chemical compatibility data;
- tank-/cargo-expansion effects, due to temperature variations, for oil and oil product tankers;
- roll-on roll-off (RoRo) loading utilities.

5.2 Categories of instrument

Loading instruments may contain combinations of function categories.

EXAMPLE An instrument might contain an intact stability function (which is comparable with the function of the Loading and Stability Manual, and hence of Category A), a longitudinal strength function (which is by its nature beyond Loading and Stability Manual level, and hence of Category B) and a container loading module (which is auxiliary, of Category C).

The instruments shall be categorized by the combinations of categories of functions it can perform. In the above example, it would be A/B/C.