

# Report of ASEF/TWG/SWG3 tackling ISO Standard for Vibration on Ships



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*New!*

# Background

- In Oct. 2015, *ISO/TC108/SC2* finalized *ISO/DIS 20283-5* “*Guidelines for measurement, evaluation and reporting of vibration with regard to habitability on **passenger** and **merchant** ships*” so as to replace *ISO 6954:2000*.
- **Significant Trouble:** *ISO/DIS 20283-5* specified unified set of 1 vibration limit, which is **lenient** to almost all of **passenger** ships but **stringent** to numbers of, in particular, large **merchant** ships (e.g., BCs, OTs and CSs).
- In Nov. 2015, *ASEF* established *SWG3* to tackle the trouble.
- In Apr. 2016, *ISO/DIS 20283-5*, however, was approved by voting.
- In Dec. 2016, *ISO 20283-5:2016* was published.





- ◎ ISO 6954:2000 “*Guidelines for measurement, reporting and evaluation of vibration with regard to habitability on **passenger** and **merchant** ships*” had been developed by *ISO/TC108/SC2* (Mechanical vibration & shock as applicable to machines, vehicles and structures).
- ◎ 2 (**Upper** and **Lower**) overall frequency-weighted r.m.s. values had been specified for 3 classification spaces.
  - ◎ **Passenger** Cabins: “4 mm/s – 2 mm/s”
  - ◎ **Crew** Accommodation Areas: “6 mm/s – 3 mm/s”
  - ◎ **Working** Areas: “8 mm/s – 4 mm/s”
    - ◎ Zone between **Upper** and **Lower** values had been defined as “Shipboard vibration environment **commonly experienced and accepted**”.
- ◎ **No** substantial complaints have been made by owners and **crew** of **merchant** ships --- reconfirmed recently by a Japanese Shipowner.

# ILO MLC 2006 Title 3 (effective on 20 Aug. 2013)



- *ILO MLC 2006 Title 3* specifies requirements for Accommodation and Recreational & Catering facilities:
  - 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 onboard living environment for seafarers.
- No quantitative definition, however, is specified for “**hazardous level** of vibration” in *ILO MLC 2006 Title 3*.
  - ABS guide for compliance with *ILO MLC 2006 Title 3* specifies 6.0 mm/s for accommodation areas (but nothing for workspaces).



- Rec. No. 132 “*Human Element Recommendations for structural design of lighting, ventilation, vibration, noise, access & egress arrangements*” was developed by IACS in Dec. 2013.
- Based on ISO 6954:2000, a set of 1 limit for onboard vibration was specified for 2 classification spaces.
  - Accommodation Areas: “5 mm/s”
    - Above Upper value for “Passenger Cabins” specified by ISO 6954:2000; but
    - Below Upper value for “Crew Accommodation Areas” specified by ISO 6954:2000
  - Workspaces: “6 mm/s”
    - Middle value for “Working Areas” specified by ISO 6954:2000
- “HAB” notation specified by ABS guide for crew habitability on ships requires the consistent limits for accommodation areas and workspaces.



- ISO 20283-5:2016 developed by *ISO/TC108/SC2* specifies unified set of 1 limit for both **passengers** and **crew** on board **all** types of ships without due consideration to **technical obstacles** to design for protection against vibration on numbers\* of, in particular, **large merchant ships**.
- \* 20 % ~ 30 % based on the reports submitted by *Japan* and *Korea*.
- No distinction between **passengers** on board **passenger ships** and **crew** on board **merchant ships**, unlike:
  - ISO 6954:2000;
  - IMO SOLAS requirements; and
  - Class voluntary guides for “*Comfort on ships*”



## ● ISO 20283-5:2016 specifies:

● Passenger Cabins, Passenger Public Spaces and Crew Accommodation:  
“3.5 mm/s”;

● Open-deck Passenger Recreation Spaces and Open-deck Crew Recreation Spaces:

“4.5 mm/s”;

● Offices:

“4.5 mm/s”;

● Navigation Bridge and Engine Control Room:

“5.0 mm/s”; and

● Other Work Spaces:

“6.0 mm/s”

Below the limits required by *IACS* Rec. No. 132 and *ABS* guides for *ILO* MLC 2006 Title 3 and “HAB” notation for crew habitability on ships





- In Sept. 2016, *Japan*, at the request of SAJ representing ASEF, made an NWIP to develop a supplementary ISO standard “*Guidelines for measurement, evaluation and reporting of vibration with regard to habitability on **specific ships**\* (ISO 21984)*” under *ISO/TC8/SC8* (Ship design), with a view to minimizing trouble to the maritime Industry.
- Ships\* satisfying one or both of the following conditions:
  - 2-stroke cycle, long-stroke, low-speed diesel engine directly coupled to the fixed-pitch propulsion propeller is installed.
  - length of deck house (L) is limited as compared with its height (H) (i.e., deck house of around 1.0 in slenderness ratio of H to L and above).

# ISO/NWIP 21984

New!

- Major modifications were limited to vibration limits for 2 spaces to maintain consistency with ISO 20283-5:2016 as far as practicable.
- Crew Accommodation:** “3.5 mm/s  $\Rightarrow$  5.0 mm/s”
- Wheel House excluding Bridge Wings:** “5.0 mm/s  $\Rightarrow$  6.0 mm/s”
  - Modified limits: Consistent with IACS Rec. No. 132 and no substantial complaints
- In Dec. 2016, the NWIP was approved by P-members of ISO/TC8/SC8 with 8 ayes, 0 nay and 2 abstentions.
  - China, Japan, Korea, Turkey and US registered experts.
  - Norway, despite having no right to vote, expressed negative position of ISO/TC108/SC2 on the NWIP.
- Finalization of ISO/WD 21984 and proceeding to DIS stage were approved by ISO/TC8/SC8 in Feb. 2017.

# Discussions with BV (Bureau Veritas) for AFNOR



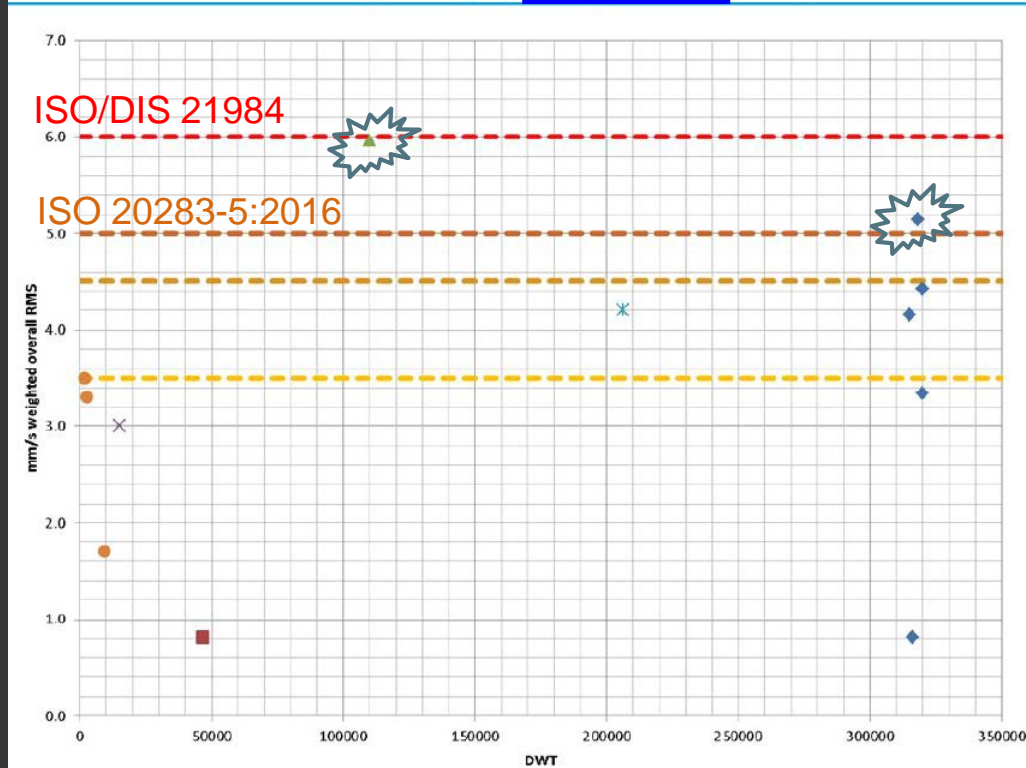
- *France*, P/L and *SWG3* Chair shared following views:
  - The vibration statistics presented by *BV* at the *ISO/TC108/SC2/WG2* meeting held at *AFNOR* on 6-7 July 2015 cannot represent the general vibration statistics measured on board *merchant* ships since the statistics were **dominated** by the majority data measured in the numerous number of *passenger* cabins on board *passenger* ships, and the minority data were also measured on board *merchant* ships or *offshore support* ships whose owners applied to BV for comfort class notation; and
  - The given conditions for design for protection against vibration on board *merchant* ships are very different from those on board *passenger* ships, and therefore *ISO/DIS 21984* may be practicable for **20 % ~ 30 %** of *merchant* ships, although *ISO 20283-5:2016* may also be applicable to remaining **70 % ~ 80 %** of *merchant* ships depending on the design conditions for each ship.

# Discussions with SN (Standard Norge)

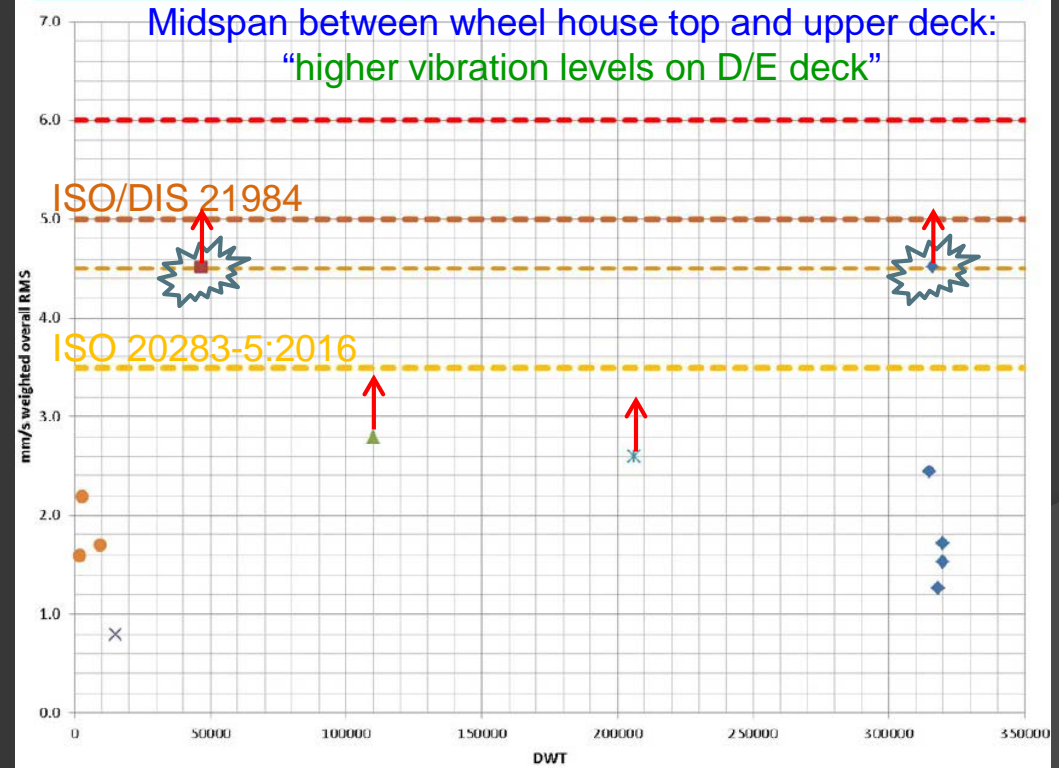


- DNV-GL provided data measured on board 13 merchant ships with 2-stroke cycle low-speed diesel engines.

Measured data of cargo ships, Bridge deck, longitudinal max



Measured data of cargo ships, C/D deck, transverse max



# Discussions with SN (Standard Norge)



- *Norway, P/L and SWG3* Chair reached the consensus:
  - A study on “Human response to vibration – Task, relaxation and restitution interference” is required to have a better basis for the setting of vibration limits. This will take time and will not solve the immediate problem for these **specific** ships.
  - A single standard that copes with both **passenger** and **merchant** ships is the best solution but with acceptable limits for both types of ships based on the results from the study.
- *Norway, P/L and SWG3* Chair agreed to disagree on the particular vibration limits to be set for critical areas on **merchant** ships pending the results of the proposed study.
  - Insufficient information so far for technical justification of the limits specified by **ISO 20283-5:2016** and **ISO/DIS 21984**



# ISO/DIS 21984



- The issue of **ISO/DIS 21984** was also discussed face to face with *Denmark (DS)*, *UK (BSI)* and *Germany (DIN)*.
- In May 2017, voting on **ISO/DIS 21984** was opened.
- In Aug. 2017, voting on **ISO/DIS 21984** was closed.
- As a result, **ISO/DIS 21984** was approved by members of *ISO* with 17 ayes (14 P-members and 3 O-members of *ISO/TC8/SC8*), 0 nay and 6 “explicit” abstentions.
  - *China, India, Japan, Korea, Malaysia* and *Turkey* approved.
  - *Indonesia, Sri Lanka, Thailand* and *Viet Nam* abstained.
  - *France, Germany* and *Norway* abstained, too.
  - Modifications were suggested by *China, Turkey, UK* and *US*.



# ISO 21984:2017 to be published



- *China* suggested that vibration limit for Open-deck recreation space, which is lower than that for Accommodation spaces, is to be reconsidered.
- *ISO/TC8/SC8/WG12* replied that, as the 1<sup>st</sup> principle, vibration limits specified in *ISO 21984* must follow those specified in *ISO 20283-5:2016* as far as “practicably achievable” for most of the *specific* ships.
- Accommodation spaces for senior officers on board the *specific* ships are located just below “Navigation Bridge Deck” which is inevitably vulnerable to horizontally large vibration, while open-deck recreation space may be located on lower deck including upper deck.



# ISO 21984:2017 to be published



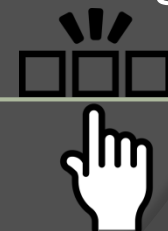
- Turkey suggested that ISO 21984 may also be applicable to medium-sized ships with 2-stroke cycle, long-stroke, low-speed diesel engine but with CPP.
- ISO/TC8/SC8/WG12 replied that such ships are unusual and excessive vibration, if found, may be managed by changing both engine speed and propeller pitch without reduction in ship's speed, while the increase in FOC is limited as compared to the usual ships with FPP.
- Because of a “standard”, ISO 21984 cannot be relaxed explicitly to cover unusual ships in various combinations of design conditions.



# ISO 21984:2017 to be published



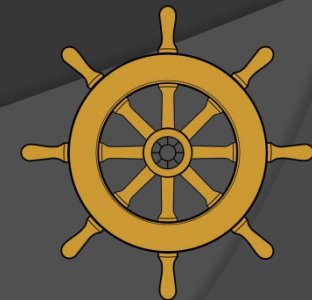
- *UK* suggested that every attempt should be made to protect users from having *ISO 21984* and *ISO 20283-5:2016* with different acceptance criteria on the same subject, and showed 3 Options to adopt.
- *ISO/TC8/SC8/WG12* replied that users are provided with an additional guide as follows in the “Scope” part for clarity, although original *ISO/DIS 21984* did satisfy Option 1 as shown by *UK*.
- The Shipbuilder may select either of this document (i.e., *ISO 21984*) or *ISO 20283-5* to apply to any *specific* ship upon due consideration to individual design conditions of the ship and, if any, experience in building sister or similar ships, and that particular selection should be agreed on by the Shipowner.



# ISO 21984:2017 to be published



- *US* suggested that rudder actions need to be conditioned during vibration measurements like *ABS* guide for *ILO* *MLC* 2006 Title 3 (or *ISO* 6954:2000).
- *ISO/TC8/SC8/WG12* replied that the condition is specified in the original “Definition” part of *ISO* 21984, following *ISO* 20283-5:2016, *ISO* 20283-4:2012 and *ISO* 20283-2:2008.
  - 3.7 free route  
condition achieved when the ship is proceeding at a constant speed and course with helm adjustment of 2° or less and no throttle adjustment
  - *US* agreed to withdraw the comment.
- Switzerland made sympathetic comments.





# Plan for the future



- On 24 Oct. 2017, *ISO/TC8/SC8/WG12* agreed to request *ISO/TC8/SC8* Chair to decide to skip FDIS stage and ask *ISO/CS* to publish *ISO 21984 (:2017 or :2018)* by incorporating only editorial modifications into *ISO/DIS 21984*.
- *SWG3* members have shared information in a timely manner and taken cooperative actions. Following the successful achievements:
  - *SWG3* is going to be dissolved in due course as approved by the *Council*; and
  - Shipbuilders, Shipowners, Class, etc. need to be notified of *ISO 21984*.
- Unification of *ISO 21984* and *ISO 20283-5:2016* in the future, however, needs to be explored internationally.
- Each *ASEF* member needs to stay in close contact with national *ISO* body who handles at least *ISO/TC8* items.

***Thank you for your cooperation!***

