ICE CONSIDERATIONS FOR PORTS AND WATERWAYS

PROPOSED TECHNICAL WORKING GROUP

TERMS OF REFERENCE

1. Historical Background Definition of the problem

Many ports and waterways in the northern and southern hemisphere are more or less affected by ice throughout the year. Operations in icy conditions can be a challenge, but also constructions work.

Ice may occur as frozen water surface, floes, drift ice and/or drifting icebergs. Ports and waterways in cold conditions located in estuaries, channels and/or, rivers may also be affected by local ice build-up during spring ice breakup.

Ice may cause damage to equipment, make equipment useless, and/or complicate regular operation like berthing of the vessel and lead to the need for icebreakers. Vessels operating in such conditions, also need to have an ice-classification.

Ice may also come in a wide range of different firmness which will in various ways cause tear and wear.

All parties involved from Clients, users, engineers, consultants, contractors and operators are required to work together or be able to give input to ensure that suitable operations can be performed with sufficient safety for employees and without damage to equipment.

As naval infrastructure is a world-wide business with most ports not located in icy conditions, knowhow regarding equipment and the handling of these conditions may not be sufficient throughout the supplier chains which again might result in non-functional equipment. Information may be found in different books and recommendations, but except from ice-classification of vessels, there are not specific regulations limiting what is working or not.

PIANC is setting the standard for the design of terminals, navigation aids, marine and maritime infrastructure in cold areas. A good perspective on the planning and operational aspects can help in achieving the above stated goals.

2. Objectives

The objective for this new working group will be to provide a guidance document on how icy conditions in general should be handled in ports and waterways. It should include a clear process with addressing responsibilities and limitations for different conditions. The following topics should be included:

- Description of sea-ice and freshwater-ice
- Actions from drifting ice
- Actions from thermal expansion of the solid ice
- Ice bustles problems
- Ice rubble accumulation problems
- Frozen approach channels
- Berthing in icy areas
- Ice pile-up
- Beach erosion
- Abrasion of equipment
- Uplift forces due to ice
- Drifting icebergs (damage to infrastructure and entrance blockage)
- Icing and risk of freezing spray
- Design recommendations and how to include and combine actions form ice with other actions
- Describe impact on design
- Describe systems for decreasing ice and impact from ice

Cold temperature effects on operations and materials should be described or where relevant, referred to PIANC WGs. (e.g. WG211 for fenders)

3. Earlier reports to be reviewed

List of relevant PIANC and third-party reports on related issues; other published or unpublished sources of information.

- **PIANC MarCom WG 3**: Ice Navigation
- **Eurocodes**

4. Scope of work

Identify the scope of work expected to be necessary to achieve the objectives; matters or terms to be investigated; methods to be used; appropriate level of detail; proposed collection and use of case studies.

- Existing recommendations and regulations
- Existing book's

5. Intended product

Describe the nature and main purposes of the Working Group report (e.g. technical guidance, good practice document): the suggested final product of the Working Group.

- A complete guidance for both planners and operators for the handling of ice in ports and channels.

6. Working Group membership

Desirable disciplines and experience amongst WG membership; need for representatives from third-party organisations if appropriate; any special considerations (e.g. for wider consultation)

- Experts from Ports, shipping companies, contractors, consultants and/or universities with relevant knowhow/experience with ice handling in ports and/or handling of ships in icy areas.

7. Target audience

List the intended users; the type of readers the WG report is intended to help (the product should use the language of these readers)

- Port owners/authorities/employees
- Shipping companies
- Contractors
- Consultants
- Universities

8. Relevance

8.1. Relevance to countries in transition, etc.

As most countries in transition/development/Small Island Developing States (SIDS) and similar are located in mild climate zones without icy conditions, the relevance will be limited.

8.2. Climate Change and Adaptation

As global temperature is rising with reduced ice in arctic areas, new shipping routes will be available and operation times for existing shipping routes will increase regularity. At the same time new areas will be available for the establishment of new ports and harbours.

https://www.pianc.org/uploads/files/COP/PIANC-Declaration-on-Climate-Change.pdf

8.3. Working with Nature

If relevant, how can the Working with Nature philosophy be integrated into the WG report? For example, does the topic enable the provision of tools to better implement WwN as a planning and design philosophy or can it contribute technological tools for implementation?

8.4. UN Sustainable Development Goals

- 1 No poverty
- 8 Decent work and economic growth
- 9 Industry, innovation and infrastructure
- 11 Sustainable cities and communities
- 14 Life below zero