



## Purpose:

The e-learning module (ELM) is designed for theoretical training of navigators in accordance with Chapter II of the STCW Convention in the part concerning of shiphandling in ice conditions.

*The ELM is included in the "Shiphandling basics" library.*

## What is an e-learning module?

E-learning module is the electronic textbook on one or more sections. Theoretical materials can be accompanied by drawings, diagrams, photos, animations and videos. There is a test for assessment of knowledge gained at the end of each section.

## Contents:

- Navigation Features of Sea Ices
- Classification of Ships and Icebreakers
- Preparing Ship for Ice Navigation in Restricted and Shallow Waters
- Cargo Ship's Independent Navigation in Ice Covered Waters
- Speed of Sailing in Ice Conditions
- Icebreaking Support of Cargo Ships
- Icebreaker Operation when Escorting Ships in Ice
- Control of Cargo Ship Proceeding in Convoy
- Ship Towing by Icebreakers in Ice Covered Waters
- Glossary of English Ice Related Terms

## Target groups

Deck - Management  
Deck - Operational

## Ship types

Operating in polar waters





## Regulations

### Table A-II/2 STCW Code

Competence:	Manoeuvre and handle a ship in all conditions
Knowledge, understanding and proficiency:	Manoeuvring and handle a ship in all conditions, including: .17 practical measures to be taken when navigating in or near ice or in conditions of ice accumulation on board.

### Table A-V/4-1 STCW Code

Competence:	Contribute to safe operation of vessels operating in polar waters
Knowledge, understanding and proficiency:	Basic knowledge of ice characteristics and areas where different types of ice can be expected in the area of operation...

### Table A-V/4-2 STCW Code

Competence:	Manage the safe operation of vessels operating in polar waters
Knowledge, understanding and proficiency:	Knowledge and ability to operate and manoeuvre a vessel in ice...

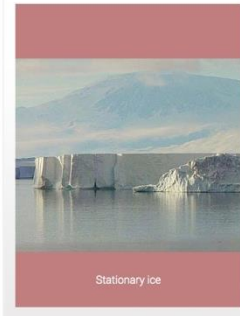


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Section 1. Navigation Features of Sea Ice

According to the dynamic criterion, ice is classified into:

- Stationary (submerged land-fast ice, coast ice, ice foot, ground ice, anchor ice).
- Drift or pack (large and small ice fields distributed over vast areas, small floes and ice cakes, ice blocks, brash ice).



Stationary ice

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Section 6. Icebreaking Support of Cargo Ships

### Icebreaking Support of Cargo Ships.

#### Organization of Ice Navigation.

Sailing of ships in the ice of freezing seas is accurately organized and regulated by rules for the ships escorted through ice by the icebreakers. These rules are published in the sailing directions for seas. Direct supervision of escorting one ship or an ice convoy of ships is the duty of the leading icebreaker master or the appointed icebreaker support controller. Masters of ships receiving assistance from the icebreaker take orders from the master of the icebreaker.

If several ships are required to be escorted through ice, they come together to form ice convoys. An ordinary convoy is a group of ships assisted by several icebreakers. Depending on the duties they are charged with during the ice channelling, icebreakers may be leading, auxiliary and support ones.



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Section 7. Icebreaker Operation when Escorting Ships in Ice

### Icebreaker Speed, Breaking Ice.


A place in the convoy is assigned with regard to the ship dimensions, strength of her hull, engine output, manoeuvring capabilities, state of loading technical condition and specific ice situation.

Large vessels whose beam is only slightly smaller than that of the icebreaker are as a rule set first after the icebreaker.

Placed at the end are ships which have powerful engines and are commanded by experienced captains, since they have to proceed in the most adverse conditions.

In the heavy ice, a ship with a weak hull is preceded by a ship with a strong hull and powerful propulsion plant, which smoothenes out the channel behind the icebreaker and clears it of the remaining large ice floes.

An ordinary convoy consists of one icebreaker and ships which follow it. The number of ships depends on the length of the clear-of-ice channel formed behind the icebreaker.



Scheme of the channel behind the icebreaker in consolidated ice.

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Section 7. Icebreaker Operation when Escorting Ships in Ice

To free ship stuck in ice, the master of the icebreaker performs **ice shattering**. When this is done, two methods are primarily used:

- Ice shattering on the move: an icebreaker leaves the echelon formation, describes a complete circle and approaches the stern of the icebound vessel. Having passed along her side, it brings its stern to the stern of the ship around which ice is being shattered, and leads it out of ice.
- Ice shattering with the icebreaker stern: the icebreaker is backing, her stern moving along the icebound ship and shattering ice on its side, then makes headway and gives the "I am going ahead, follow me" signal. The master of the ship around which ice is being shattered should fetch way by the moment when the icebreaker stern draws level with the ship's midship frame.

The second method is faster and handier.



The simplest schemes for ice shattering of a ship by an icebreaker.

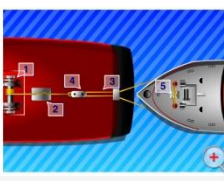
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Section 9. Ship Towing by Icebreakers in Ice Covered Waters

Modern icebreakers are fitted out with towing winches with tow ropes, special bits, tow pads and stoppers for the tow lines. Used for close towing is a special sling arms type tow rope which is a short wire rope with eye splicers on its ends which are passed through the hawse holes of the towed ship.



Icebreaker tow gear:


- 1 – winch;
- 2 – Bullivan stopper;
- 3 – joining link;
- 4 – Nikolayev unit;
- 5 – lashing ropes.

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Test tasks



Test of questions

How many categories are defined for the ice-going ships?

Choose the correct answer:

- 5.
- 8.
- 9.
- 6.
- 4.
- 7.

Attempts: 1

COMMENT

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