Module 2E

Calculating Gross and Net Tonnage According to ITC 69

1. **Introduction**

This module will provide an overview of the International Convention on Tonnage Measurement of Ships, 1969 (ITC 69), and its importance in determining the gross and net tonnage of a ship. We will discuss the key terms and principals involved, and the significance of these measurements in maritime operations.

Tonnage measurements are crucial in various aspects of maritime operations, including safety regulations, port fees, and ship design. They are used by international regulatory bodies, port authorities, and shipping companies worldwide.

In this module, we will explore the key principles and terms of the ITC 69, including gross tonnage (GT) and net tonnage (NT). Gross tonnage is a measure of the overall size of a ship, including all enclosed spaces within the ship. Net tonnage, on the other hand, measures the useful capacity of a ship, taking into account spaces for cargo, passengers, and fuel, but excluding spaces such as engine rooms and crew quarters.

By the end of this module, you will have a solid understanding of the ITC 69, and you will be able to calculate the gross and net tonnage of a ship according to the convention's guidelines. Please note that these calculations should be carried out by a qualified professional and verified by a classification organization or the maritime authority of the ship's flag state. This module is intended to provide a basic understanding of the process and principals involved.

2. ****Understanding ITC 69**: This section will delve into the details of the ITC 69, its history, its purpose, and the key principles it establishes for tonnage measurement.**

The International Convention on Tonnage Measurement of Ships, 1969, commonly known as ITC 69, is a key agreement in the maritime world. It was established by the International Maritime Organization (IMO), a specialized agency of the United Nations responsible for regulating shipping.

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The ITC 69 was adopted on June 23, 1969, and entered into force on July 18, 1982. It was created to standardize the way ship tonnage is calculated. Prior to the convention, different countries used different rules and methods to calculate tonnage, leading to inconsistencies and confusion. The ITC 69 provided a uniform system that could be used internationally.

The main purpose of the ITC 69 is to provide a universal system for measuring ships for the purpose of applying international conventions where ship size is relevant. The convention's regulations apply to all seagoing ships, whether they are cargo ships, passenger ships, or any other type of ship.

The convention introduced two main measurements: gross tonnage (GT) and net tonnage (NT). Gross tonnage is a measure of the ship's overall internal volume, while net tonnage measures the volume of the cargo spaces in the ship. These measurements are used for various purposes, including calculating port dues, safety regulations, and determining the size category of a ship.

The ITC 69 establishes a detailed process for calculating GT and NT, involving various measurements of the ship's internal spaces. The convention also provides for the issuance of an International Tonnage Certificate (1969), which is a document providing evidence of the tonnage of a ship according to the convention's rules.

In the next sections, we will delve into the details of how to calculate GT and NT according to the ITC 69. But before we do that, it's important to understand the key terms and definitions used in the convention, which we will cover in the next section.

3. **Key Terms and Definitions**: Here, we will define and explain key terms such as gross tonnage (GT), net tonnage (NT), and the various factors that influence these measurements.

In this section, we will define and explain some of the key terms used in the ITC 69 and in the field of ship tonnage measurement more generally. Understanding these terms is crucial for understanding how to calculate gross and net tonnage.

- **Gross Tonnage (GT)**: Gross tonnage is a measure of the overall internal volume of a ship. It is calculated based on the moulded volume of all enclosed spaces of the ship, with each 100 cubic feet of volume equal to one gross ton. It's important to note that gross tonnage is a measure of volume, not weight.

- **Net Tonnage (NT)**: Net tonnage is a measure of the useful capacity of a ship. It is calculated based on the moulded volume of all cargo spaces of the ship, with each 100 cubic feet of volume equal to one net ton. The calculation of net tonnage also takes into account the number of passengers that the ship can carry and the space needed for the crew.

- **Moulded Volume**: This is the volume of a space within the ship, measured to the inside of the shell or structural boundary plating.

- **V**: This is a variable used in the calculation of GT and NT, representing the total moulded volume of all enclosed spaces of the ship, measured in cubic meters.

- **Vc**: This is a variable used in the calculation of NT, representing the total moulded volume of all cargo spaces of the ship, measured in cubic meters.

- **D**: This is a variable used in the calculation of NT, representing the moulded depth of the ship, measured in meters.

- **K1, K2, K3**: These are correction factors used in the calculation of GT and NT. They depend on the volume of the ship and are calculated using specific formulas provided in the ITC 69.

These are just a few of the key terms used in the ITC 69. In the next sections, we will see how these terms are used in the calculation of gross and net tonnage.

4. **Calculating Gross Tonnage (GT)**: This section will provide a step-by-step guide on how to calculate the gross tonnage of a ship according to ITC 69. We will discuss the formula, the variables involved, and how to accurately measure and calculate these.

Gross Tonnage (GT) is a measure of the overall internal volume of a ship. It is calculated based on the moulded volume of all enclosed spaces of the ship. Here's a step-by-step guide on how to calculate GT according to the ITC 69:

1. **Measure the Moulded Volume (V)**: The first step in calculating GT is to measure the moulded volume of all enclosed spaces of the ship. This should be done by a qualified professional (Naval architech or naval engliner) duly approved in accordance with the service supplier procedure of ICS Class using accurate measuring tools and techniques. The moulded volume is measured in cubic meters. Enclosed spaces are all those spaces which are bounded by the ship's structure and are neither intended for use in direct connection with the propulsion machinery nor solely for the accommodation of the crew.

2. Calculate the Correction Factor (K1): The next step is to calculate the correction factor K1. This factor depends on the moulded volume of the ship. For ships with a moulded volume of less than or equal to 125,000 cubic meters, K1 is calculated using the following formula:

$$K_1 = 0.2 + 0.02 \log_{10} V$$

   For ships with a moulded volume greater than 125,000 cubic meters, K1 is set to a constant value of 0.32.

3. **Calculate Gross Tonnage (GT)**: Once you have measured the moulded volume and calculated the correction factor, you can calculate the gross tonnage. This is done using the following formula:

$$GT = K_1 V$$

   This will give you the gross tonnage of the ship, which is a measure of its overall size and capacity.

5. **Calculating Net Tonnage (NT)**: Similarly, this section will guide you through the process of calculating the net tonnage of a ship, discussing the formula, the variables, and the calculation process.

5. Calculating Net Tonnage (NT):

Net Tonnage (NT) is a measure of the useful capacity of a ship. It is calculated based on the moulded volume of all cargo spaces of the ship, taking into account the number of passengers that the ship can carry. Here's a step-by-step guide on how to calculate NT according to the ITC 69:

1. **Measure the Moulded Volume of Cargo Spaces (Vc)**: The first step in calculating NT is to measure the moulded volume of all cargo spaces of the ship. This should be done by a service supplier duly approved according to the ICS Class service supplier procedure. The moulded volume is measured in cubic meters. Cargo spaces are all those spaces that are used or can be used for the carriage of cargo or stores.

2. **Measure the Moulded Depth (D)**: The moulded depth is the vertical distance measured from the top of the keel to the underside of the upper deck at side. It should be measured by a service supplier duly approved according to the ICS Class service supplier procedure.

3. **Calculate the Correction Factors (K2 and K3)**: The next step is to calculate the correction factors K2 and K3. These factors depend on the moulded volume and the moulded depth of the ship. K2 is calculated using the following formula:

$$K_2 = 0.2 + 0.02 \log_{10} V_c$$

   For ships with a moulded volume greater than 125,000 cubic meters, K2 is set to a constant value of 0.32.

   K3 is calculated using the following formula:

$$K_3 = 1.25 \, (GT + 10{,}000) / 10{,}000,$$

For ships with a moulded depth less than 38 meters, K3 is set to a constant value of 1.25.

5. **Calculate Net Tonnage (NT)**: Once you have measured the moulded volume of cargo spaces, the moulded depth, and calculated the correction factors, you can calculate the net tonnage. This is done using the following formula:

$$NT = K_2 V_c (4d/3D)^2 + K_3 (N_1 + N_2/10)$$

where N1 is the number of passengers in cabins with not more than 8 berths, and N2 is the number of other passengers. This will give you the net tonnage of the ship, which is a measure of its useful capacity.

6. ****Practical Examples**: In this section, we will go through several practical examples of how to calculate GT and NT for different types of ships, to help solidify your understanding of the process.**

In this section, we will go through several practical examples of how to calculate GT and NT for different types of ships. These examples will help solidify your understanding of the process.

Example 1: Calculating GT for a Cargo Ship

Let's say we have a cargo ship with a total moulded volume (V) of 10,000 cubic meters.

First, we calculate the correction factor K1:

K1 = 0.2 + 0.02 * log10(V)

  = 0.2 + 0.02 * log10(10000)

  = 0.2 + 0.02 * 4

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= 0.28

Then, we calculate the gross tonnage (GT):

GT = K1 * V

  = 0.28 * 10000

  = 2800

So, the gross tonnage of this cargo ship is 2800.

Example 2: Calculating NT for a Passenger Ship

Now, let's say we have a passenger ship with a total moulded volume of cargo spaces (Vc) of 5000 cubic meters, a moulded depth (D) of 10 meters, and it can carry 100 passengers in cabins with not more than 8 berths (N1) and 200 other passengers (N2).

First, we calculate the correction factors K2 and K3:

K2 = 0.2 + 0.02 * log10(V)

  = 0.2 + 0.02 * log10(5000)

  = 0.2 + 0.02 * 3.7

  = 0.274

K3 = 1.25 * (D + 38)

  = 1.25 * (10 + 38)

  = 1.25 * 48

  = 60

Then, we calculate the net tonnage (NT):

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NT = K3 * (Vc * K2 + 0.25 * N1 + 0.3 * N2)

  = 60 * (5000 * 0.274 + 0.25 * 100 + 0.3 * 200)

  = 60 * (1370 + 25 + 60)

  = 60 * 1455

  = 87300

So, the net tonnage of this passenger ship is 87300.

7. **Common Mistakes and How to Avoid Them**: This section will highlight some common mistakes made during the calculation process and provide tips on how to avoid them.

7. Common Mistakes and How to Avoid Them:

In this section, we will highlight some common mistakes made during the calculation process of Gross Tonnage (GT) and Net Tonnage (NT) and provide tips on how to avoid them.

Mistake 1: Incorrect Measurement of Moulded Volume

One of the most common mistakes is incorrect measurement of the moulded volume of the ship or its cargo spaces. This can significantly affect the calculation of GT and NT.

How to Avoid: Ensure that the moulded volume is measured by a service supplier duly approved according to the ICS Class service supplier procedure. Use accurate measuring tools and techniques, and double-check all measurements.

Mistake 2: Incorrect Calculation of Correction Factors

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Another common mistake is incorrect calculation of the correction factors K1, K2, and K3. These factors are crucial for the calculation of GT and NT.

How to Avoid: Double-check all calculations of correction factors. Remember that K1 and K2 are calculated using the logarithm to base 10 of the moulded volume, and K3 is calculated based on the moulded depth of the ship.

Mistake 3: Not Considering All Passengers

When calculating NT, it's important to consider all passengers that the ship can carry, not just those in cabins with not more than 8 berths.

How to Avoid: Make sure to include all passengers in the calculation of NT, both those in cabins with not more than 8 berths (N1) and other passengers (N2).

8. **Conclusion and Assessment**: We will conclude the module with a summary of the key points covered, followed by an assessment to test your understanding of the material.

8. Conclusion and Assessment:

In this final section, we will summarize the key points covered in this module and provide an assessment to test your understanding of the material.

Conclusion:

Throughout this module, we have covered the principles of the International Convention on Tonnage Measurement of Ships, 1969 (ITC 69) and how it is used to calculate the Gross Tonnage (GT) and Net Tonnage (NT) of a ship. We have defined key terms such as moulded volume, correction factors, and the different types of passengers. We have also provided step-by-step guides on how to calculate GT and NT, highlighted common mistakes and how to avoid them, and provided practical examples to solidify your understanding.

Remember, these calculations should be carried out by a service supplier duly approved according to the ICS Class service supplier procedure. As a technical staff member of ICS Class, a recognized organization by Panama for issuing statutory certificates, it's crucial to ensure the accuracy and integrity of these calculations.

Assessment:

Following the conclusion, an assessment will be provided. This will consist of a series of questions designed to test your understanding of the material covered in this module. The questions will cover all sections of the module, including the principles of ITC 69, the calculation of GT and NT, common mistakes and how to avoid them, and the practical examples.

The assessment is an important part of the learning process as it allows you to apply what you have learned and identify any areas where you may need further study or clarification. It is recommended that you take the time to complete the assessment and review any sections of the module where you feel you need more understanding.

Upon successful completion of the assessment, you will have demonstrated your understanding of how to calculate the Gross Tonnage and Net Tonnage of a ship according to the ITC 69, and your readiness to apply this knowledge in a practical setting.

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