




CATCH VALIDATION USING VOLUMETRICS

Practical measurement of catch by measuring the volume of ships holds and storage areas

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WHAT IS VOLUMETRICS ?

Volumetrics is a way to measure an area and calculate what is stored in it. Fisheries Officers can use Volumetrics as a catch validation tool. A volumetric calculation relates to the capacity of a fishing vessel's hold and measures the volume of fish in the holds. We calculate the space occupied by the fish measured in cubic metres to get an estimate of tonnes per cubic metre, which gives us a number of tonnes of fish in the holds.

A volumetric calculation is usually required if there is a suspicion the master has incorrectly declared the total catch held on his vessel or you suspect the identity of the vessel or its licensed status.

Even if it's not an exact measurement but more of an average, these measurements will show if there has been false figures given for a large amount of catch

MEASURING A HOLD

Cubic metres (m3) = length x width x height

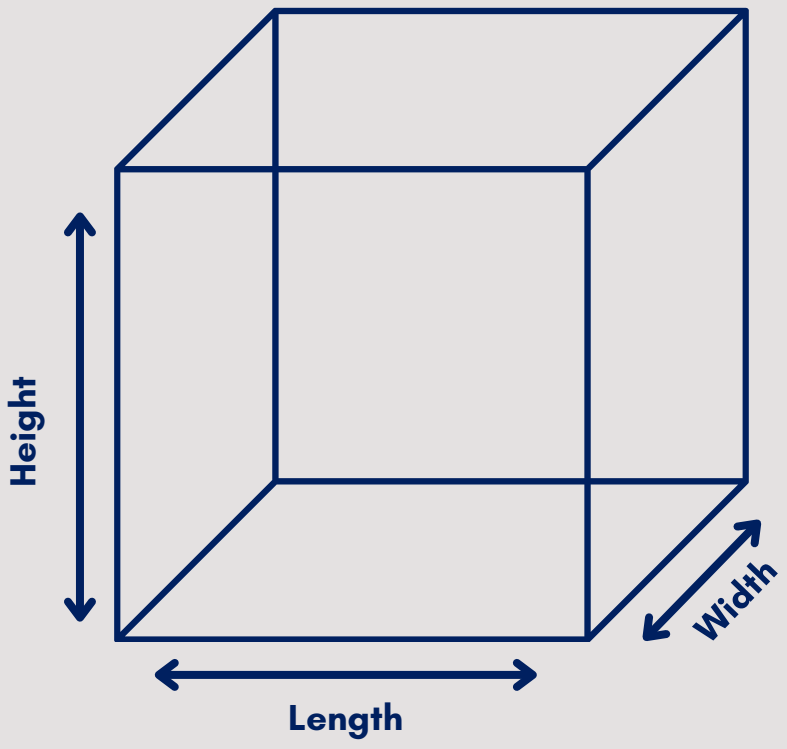
Example : 3.6 x 2.9 x 4.5 = 47 m3

Estimate the area of the hold filled with fish to get a rough estimate of fish quantity (an estimate for the average density of fish is 1 080 kg/m3).

Example : if quarter full, let 11.7 m3 of fish. 11.7 m3 x 1080 kg = 12 636 kg or 12.6 tonnes.

Take of air space between 20% and 30%.
12 636 kg x 0.2 = 10 108.8 kg = 10.1 tonnes
12 636 kg x 0,3 = 8 845.2 kg = 8.9 tonnes
This gives us a range of 8.9 and 10.1 tonnes.

This is an estimate to check against log books



PROCESSED FISH

But we still have to take processing into account. If the catch is gutted, we use a factor of 1.16 for tuna. So, if 100 tonnes of tuna are offloaded, we have to convert it into catch weight.
100 tonnes x 1.16 = 116 tonnes catch weight.

PROCESSING FACTORS

Species	Whole	Gutted	Gutted and head off
Tuna	1	1.16	1.36
Marlin	1	1.1	1.3
Toothfish	1	1.1	1.7
Shark	1	1.1	1.2 or 2

EXAMPLE:

We have a hold with the following measures : 8 x 8 x 2.5 metres. The hold contains gutted tuna.
The average density of fish is 1080 kg / m3. Fish density covers 70% of the surface.

Hold size: 8 x 8 x 2.5 m = 160 m3
Fish quantity: 160 x 1080 kg/m3 = 172.800 kg = 172.8 tonnes.
172.8 x 0.7 = 121 tonnes.
The processing factor is 1.16, so: 121 x 1.16 = 140.3 tonnes caught weight

FISH STORAGE

Fish weight also depends on how they are stored when they are stacked (in water or on ice).

Once you have the volume of fish in the holds you can use the appropriate stacking factor to calculate the number of tonnes of fish held on board.

Your can also convert this to the whole weight with an agreed conversion factor.

Weight = volume x stacking factor

- Loose stacking = low stacking factor
- Tight stacking = high stacking factor

Stacking Factors of between 0.45 and 0.54 have been used for whole tuna.
Average it is about 0.51 for stacked tuna. This is what we would then recommend to use when calculating stacking factor.

EXAMPLE:

Hold is: 5 metres x 8 metres x 2 metres = 80 metres^3.

Weight: 80 x 0.51 stacking factor = 40.8 tonnes of fish.

TIPS

Generally one fishery officer determines the quantity, species and condition of fish held on the vessel from fishing log books and records this. He obtains the master estimate of catch. Ask captain what is on the vessel by species and product type. Take the opportunity to check areas fished and Licences.

The other officer(s) make measurements and calculate their estimate of catch using volumetrics. Measure the volume of fish in each cargo hold. The volume of fish should be obtained by direct measurement. If you cannot measure the fish directly then measure the total empty space and subtract this from the total volume of the hold.

When measuring empty spaces in the fish holds, measure only the useable internal space (internal walls). Do not measure externally as walls often have empty spaces that cannot be seen from the outside.

Then compare estimates.

Obtain the ship's drawings (plans) for the various cargo holds if available and calculate the total cubic capacity of each cargo hold, measured in cubic metres. If not specified in ships plans use the stability book to obtain the dimensions or volume of the holds. Sometimes drawings and plans of capacities are just not available. This is often the situation with traditional style vessels that are not made in a large commercial factory.

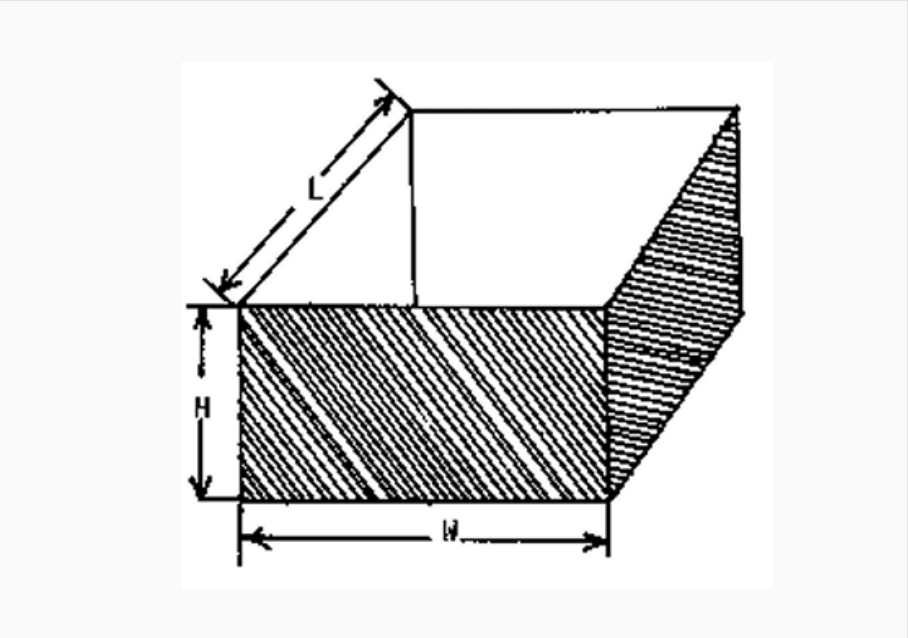
But most fishing vessels have:

- Vessel Plans
- Hull Survey certificates
- General arrangements
- Stability Book

One of these should have the required information you need.
Always check ships beam (width) for verification of vessels principal dimensions. This will confirm information on the plans belongs to that vessel.

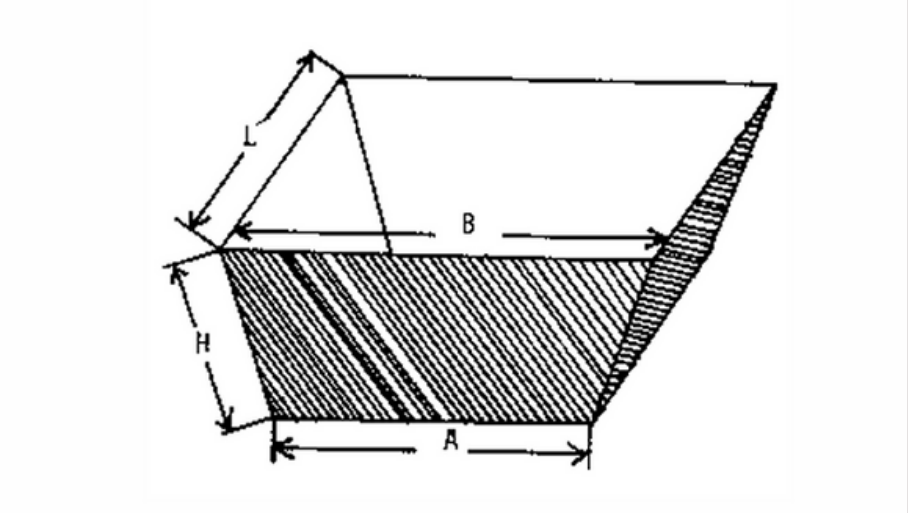
ANNEXES

CALCULATING VOLUME FOR SIMPLE HOLDS



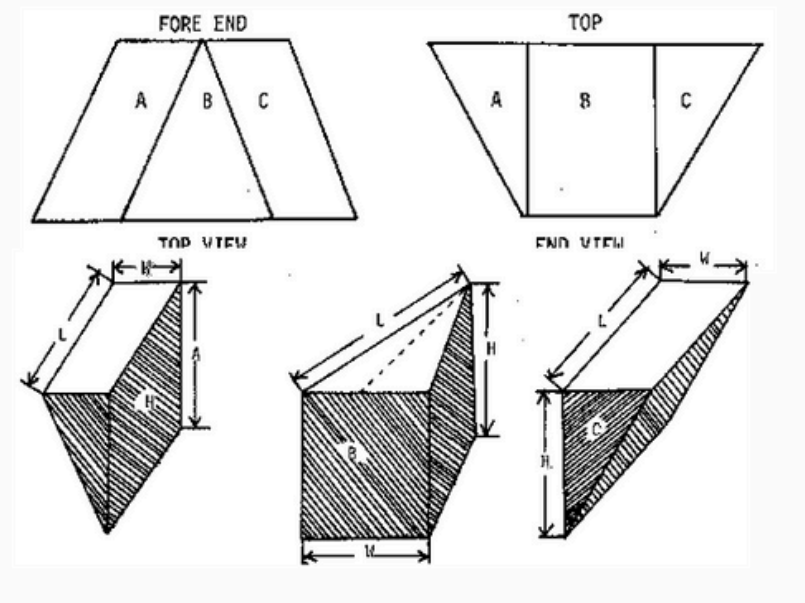
LENGTH x WIDTH x HEIGHT

CALCULATING VOLUME FOR UNUSUAL SHAPED HOLDS

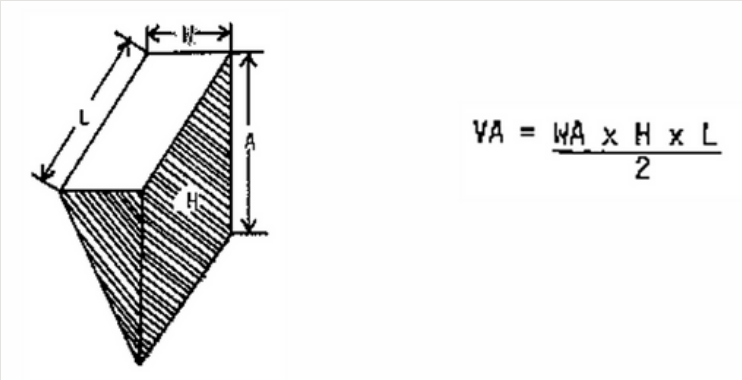


WIDTH of A + WIDTH of B x LENGTH x HEIGHT ÷ 2 = total metre^3

The following shapes are what you might have to measure in the bow of a ship or other areas that are not square in shape. To calculate the size of these holds you need to separate them into a shape you can measure and then use the below formulas.



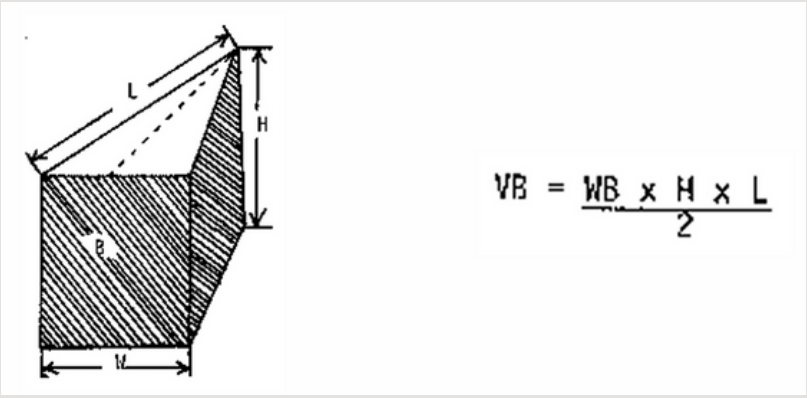
Total area in metre^3 = VA + VB + VC



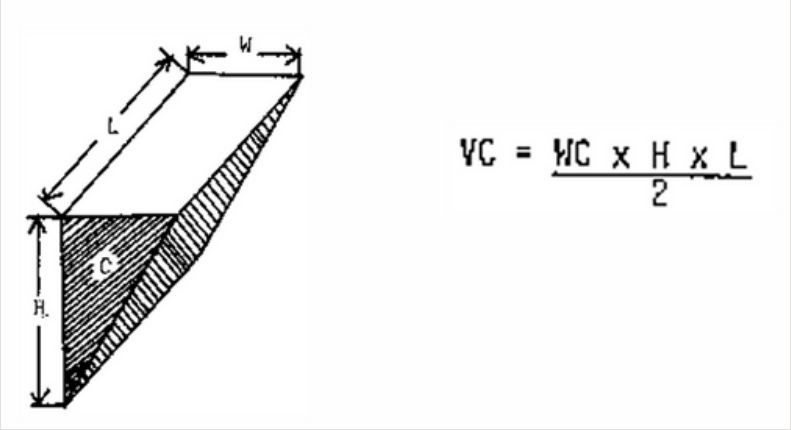
$$VA = \frac{WA \times H \times L}{2}$$

Volume of A (VA) = width of A (W) x HEIGHT (H) x LENGTH (L) ÷ 2

Volume of B (VB) = width of B (W) x HEIGHT (H) x LENGTH (L) ÷ 2



$$VB = \frac{WB \times H \times L}{2}$$



$$VC = \frac{WC \times H \times L}{2}$$

Volume of C (VC) = width of C (W) x HEIGHT (H) x LENGTH (L) ÷ 2