

1. Definitions

STOWAGE FACTOR is the number of cubic feet required to stow one Long Ton of a particular commodity, making no allowance for lost space.

BROKEN STOWAGE PERCENTAGE is the percent of loss space that occurs when loading commodities into a given amount of space.

Broken stowage is caused by:

- (1) Dunnage
- (2) Irregular
- (3) Shape of vessel compartment
- (4) Experience level of Longshoremen

2. Mathematical formulas

- a. To determine **the stowage factor** (cubic feet per long ton) of a packaged commodity, multiply the volume of one package (in cubic feet) by one long ton (2240) and divide the sum by the weight of one package (in pounds).

f= Stowage factor

v= volume of package (cubic feet)

w= weight of package (pounds)

$$f = \frac{2240 * v}{w}$$

- b. To determine **the Broken Stowage Percentage** of a commodity subtract from the volume of space the volume of one item then multiply by 100, the result will be divided by the volume of space being loaded.

L= Broken Stowage percentage

V= Volume of space

v= volume of cargo stowed

$$L = \frac{(V - v) * 100}{V}$$

- c. To find **how many long tons will fit in a space**, subtract the estimated broken stowage percentage (in decimal form) from one, multiply this figure by the Volume of the space in cubic feet and divide the result by the stowage factor of the cargo.

T= Longs tons to fill the space

V= Volume of the space

L= broken stowage percentage

$$T = \frac{V(1 - L)}{f}$$

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- d. To find **the number of pieces that will fit in a space**, subtract the estimated broken stowage percentage from one, multiply this figure by the volume of the space in cubic feet and divide the results by the volume of one piece.

V= Space occupied
v= Volume of one piece
L= Broken stowage percentage

$$P = \frac{V(1 - L)}{v}$$

- e. To find **the volume of space needed to stow a given tonnage**, multiply the number of long tons by the stowage factor of the commodity and divide the result by one minus the estimated broken stowage percentage.

T= Tons of cargo
f= Stowage factor of cargo
L= Broken Stowage percentage

$$V = \frac{T * f}{(1 - L)}$$

- f. To determine **how high you can stow cargo on a given deck**, multiply the deck load limit (in pounds per square ft / PSF) by the stowage factor of the cargo and divide the result by 2240.

h= Maximum height of stowage
c= deck capacity
f= stowage factor

$$h = \frac{c * f}{2240}$$

- g. To find **weight of a commodity** in long tons, given its volume and stowage factor, divide the volume of the cargo by its stowage factor.

W= weight of commodity
v= volume of the cargo (cubic feet)
f= stowage factor

$$W = \frac{v}{f}$$