

GC7

(1986)
(Rev.1
June
2016)

Carriage of products not covered by the code

Section 4.23.1.2 of the IMO INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING LIQUEFIED GASES IN BULK (MSC.370(93)) reads:

“4.23.1.2 The design vapour pressure shall not be less than:

$$P_o = 0.2 + AC(\rho_r)^{1.5} \text{ (MPa)}$$

where:

$$A = 0.00185 \left(\frac{\sigma_m}{\Delta\sigma_A} \right)^2$$

with:

σ_m = design primary membrane stress;
 $\Delta\sigma_A$ = allowable dynamic membrane stress (double amplitude at probability level $Q = 10^{-8}$) and equal to:

- 55 N/mm² for ferritic-perlitic, martensitic and austenitic steel;
- 25 N/mm² for aluminium alloy (5083-O);

C = a characteristic tank dimension to be taken as the greatest of the following:

h , $0.75b$ or 0.45ℓ ,

with:

h = height of tank (dimension in ship's vertical direction) (m);
 b = width of tank (dimension in ship's transverse direction)(m);
 ℓ = length of tank (dimension in ship's longitudinal direction) (m);
 ρ_r = the relative density of the cargo ($\rho_r = 1$ for fresh water) at the design temperature.

When a specified design life of the tank is longer than 10^8 wave encounters, $\Delta\sigma_A$ shall be modified to give equivalent crack propagation corresponding to the design life.”

Note:

1. Rev.1 of this UI is to be uniformly implemented by IACS Societies on ships the keels of which are laid or which are at a similar stage of construction on or after 1 July 2016.

GC 7 (cont)

Interpretation

1. If the carriage of products not covered by the Code* is intended, it should be verified that the double amplitude of the primary membrane stress $\Delta\sigma_m$ created by the maximum dynamic pressure differential ΔP does not exceed the allowable double amplitude of the dynamic membrane stress $\Delta\sigma_A$ as specified in paragraph 4.23.1.2 of the Code, ie:

$$\Delta\sigma_m \leq \Delta\sigma_A$$

2. The dynamic pressure differential ΔP in MPa should be calculated as follows:

$$\Delta P = \frac{\rho}{1,02 \cdot 10^5} (a_{\beta 1} Z_{\beta 1} - a_{\beta 2} Z_{\beta 2})$$

where:

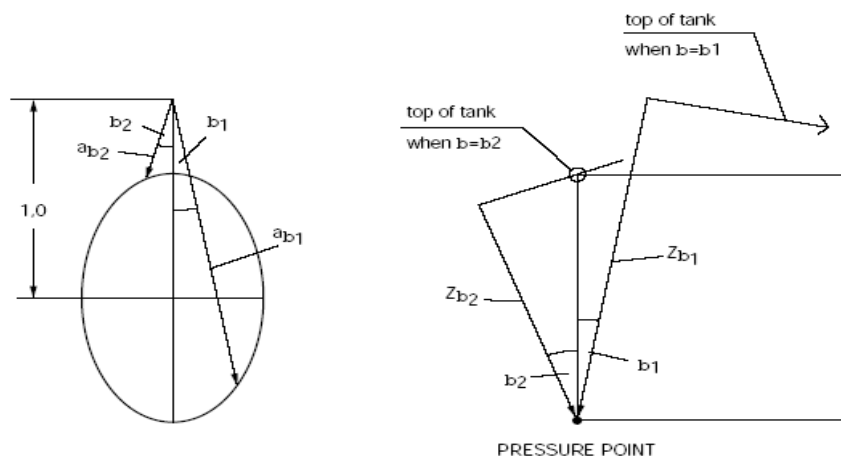
ρ is maximum liquid cargo density in kg/m^3 at the design temperature

a_β, Z_β are as defined in 4.28.1.2 of the Code, see also Figure below

$a_{\beta 1}, Z_{\beta 1}$ are the a_β and Z_β values giving the maximum liquid pressure $(P_{gd})_{\max}$

$a_{\beta 2}, Z_{\beta 2}$ are the a_β and Z_β values giving the minimum liquid pressure $(P_{gd})_{\min}$

In order to evaluate the maximum pressure differential ΔP , pressure differentials should be evaluated over the full range of the acceleration ellipse as shown in the sketches given below.



NOTE:

*The outlined procedure is only applicable to products having a relative density exceeding 1.0.

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