GC7 Carriage of products not covered by the code

(1986)
(Rev.1 June 2016)

Section 4.23.1.2 ~~Interpretation of section~~ ~~4.2.4.4~~ of the IMO INTERNATIONAL CODE FOR THE CONSTRUCTION AND EQUIPMENT OF SHIPS CARRYING LIQUEFIED GASES IN BULK ~~(MSC.5(48))~~(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/mm^2 for ferritic-perlitic, martensitic and austenitic steel;*
- *25 N/mm^2 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 (ρ_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 ~~4.2.4.4~~ 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:

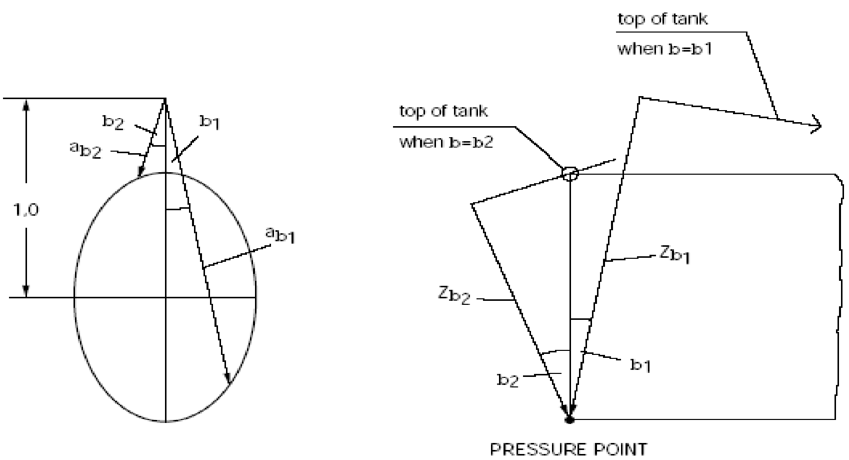
$$\Delta P = \frac{\rho}{1{,}02.10^5}\left(a_{\beta 1} Z_{\beta 1} - a_{\beta 2} Z_{\beta 2}\right)$$

~~where P, a_β, Z_β are as defined in 4.3.2.2 of the Code, see also sketches below. $a_{\beta 1}$ and $Z_{\beta 1}$ are the a_β - and Z_β - values giving the maximum liquid pressure hgd$_{max}$ as defined in 4.3.2 of the Code. $a_{\beta 2}$ and $Z_{\beta 2}$ are the a_β and Z_β values giving the minimum liquid pressure hgd$_{min}$.~~

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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