

Rev.1

A-155468-C1-C-01

Tag No. 06-V-305

:

, UAE

FileName : IGC Fuel Gas Filter-----

Wind Load Calculation : Step: 10 9:24a Nov 29, 2011

Note: Using the User Defined Wind Profile ...

Wind Vibration Calculations

This evaluation is based on work by Kanti Mahajan and Ed Zorilla

Nomenclature

Cf - Correction factor for natural frequency

D - Average internal diameter of vessel mm

Df - Damping Factor < 0.75 Unstable, > 0.95 Stable

Dr - Average internal diameter of top half of vessel mm

f - Natural frequency of vibration (Hertz)

f1 - Natural frequency of bare vessel based on a unit value of $(D/L^2)(10^4)$

L - Total height of structure mm

Lc - Total length of conical section(s) of vessel mm

tb - Uncorroded plate thickness at bottom of vessel mm

V30 - Design Wind Speed provided by user km/hr

Vc - Critical wind velocity km/hr

Vw - Maximum wind speed at top of structure km/hr

W - Total corroded weight of structure kN

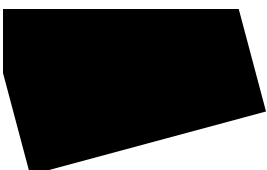
Ws - Cor. vessel weight excl. weight of parts which do not effect stiff. kN

Z - Maximum amplitude of vibration at top of vessel mm

Dl - Logarithmic decrement (taken as 0.03 for Welded Structures)

Vp - Vib. Chance, $\leq 0.314E-08$ (High); $0.314E-08 < 0.393E-08$ (Probable)

P30 - wind pressure 30 feet above the base



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Check other Conditions and Basic Assumptions:

#1 - Total Cone Length / Total Length < 0.5

$$0.000 / 3452.226 = 0.000$$

#2 - (D / L²) * 10⁴ < 8.0 (English Units)

$$- (2.84 / 11.33^2) * 10^4 = 221.344 \text{ [Geometry Violation]}$$

Compute the vibration possibility. If Vp > 0.393E-08 no chance. [Vp]:

$$= W / (L * Dr^2)$$

$$= 28 / (3452.23 * 682.000^2)$$

$$= 0.18032E-07$$

Since Vp is > 0.393E-08 no further vibration analysis is required !

Wind Loads on Masses/Equipment/Piping

ID	Wind Area	Elevation	Pressure	Force
	mm ²	mm	N/m ²	kN

FILTER ELEMEN	0.00	1865.00	1531.25	0.00

The Natural Frequency for the Vessel (Ope...) is 19.8952 Hz.

Wind Load Calculation

From	To	Wind Height	Wind Diameter	Wind Area	Wind Pressure	Element Wind Load
		mm	mm	mm ²	N/m ²	kN



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10	20	357.500	846.000	604890.	1531.25	0.92622
20	30	740.000	1074.00	53700.0	1531.25	0.082226
30	40	1966.50	1093.20	2.627E+06	1531.25	4.02244
40	50	3264.90	1054.80	204422.	1531.25	0.31301
50	60	3407.01	1054.80	95379.2	1531.25	0.14605

The Natural Frequency for the Vessel (Empty.) is 19.9140 Hz.

Wind Load Calculation

Please provide detail calculation.

From	To	Wind Height	Wind Diameter	Wind Area	Wind Pressure	Element Wind Load
		mm	mm	mm ²	N/m ²	kN

10	20	357.500	846.000	604890.	1531.25	0.92622
20	30	740.000	1074.00	53700.0	1531.25	0.082226
30	40	1966.50	1093.20	2.627E+06	1531.25	4.02244
40	50	3264.90	1054.80	204422.	1531.25	0.31301
50	60	3407.01	1054.80	95379.2	1531.25	0.14605

Please show calculation basis.

The Natural Frequency for the Vessel (Filled) is 18.5910 Hz.

Wind Load Calculation

From	To	Wind Height	Wind Diameter	Wind Area	Wind Pressure	Element Wind Load
		mm	mm	mm ²	N/m ²	kN



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