STD API650 STRENGTH CALCULATION

API 650-Storage Tank-1998 Edition, W/2005 Add.-Dia <60m-Shell

INPUT DATA PGM ***V1.1***

* ITEM NO.	E-1004		* DESCRIPTION	pes21	

DESIGN DATA

* Shell material	A516-70		* Design specific gravity of liquid stored, G	1.523	
* Nominal Diameter of Tank, D	30	m	* Height from bottom to top of the shell, H	15.4	m
* Height of Max. design liquid level, Hd	15.4	m	* Internal pressure corresponding to static head, Hi	0	m
* Design Temperature, T	95	oC	* Corrosion allowance, CA	1.6	m
* Shell used thickness-in top, Tu	8	mm	* Shell course width	2438	mm
* Shell used thickness-in bottom,Ta	25	mm	* Design specific gravity of liqDesign wind velocity, V	45	m/sec

RESULT OF CALCULATION

1. Material proporties & General requiremenst as per API650 STD

* Limition Check for Para 3.6.3 below 60m of Diameter	O.K		* Min. shell thickness	6.35	mm
* Yield Stress reduction factor as per table M.3, k	0.88		* Used top plate check	O.K	
* Yield Strength @ ambient temp.	2,671.7	Kg/cm^2	* Tensile Strength @ ambient temp.	4,921.5	Kg/cm^2

Allowable stress in Design condition

* 2/3xYield Strength*k	1,567.4	Kg/cm^2	* 2/5xTensile Strength	1,968.6	Kg/cm^2
			* Allowable stress, Sd	1,567.4	Kg/cm^2

Allowable stress in Hydro. Test condition

* 3/4xYield Strength	2,003.7	Kg/cm^2	* 3/7xTensile Strength	2,109.2	Kg/cm^2
			* Allowable stress, St	2,003.7	Kg/cm^2

Shell Thickness in Design condition={50xDx(Hd(i)+Hi-0.3048)xG}/Sd(i) + CA(i)

Course No.	No.1	No.2	No.3	No.4	No.5	No.6
Height,(m), Hd(i)	15.400	12.962	10.524	8.086	5.648	3.210
Thickness,(mm), td (i)	23.60	20.05	16.49	12.94	9.39	5.83

Shell Thickness in Hydro. test condition={50xDx(Hd(i)-0.3048)}/St(i)

Course No.	No.1	No.2	No.3	No.4	No.5	No.6
Height,(m), Hd(i)	15.400	12.962	10.524	8.086	5.648	3.210
Thickness,(mm), tt(i)						

	11.30	9.48	7.65	5.82	4.00	2.17

2. Shell Used Thickness,The greater of Design or Hydro test

Used Thickness (mm), Ut(i)	25	21	17	14	10	8
Shell weight in used Thickness (Kg)	45.1	37.9	30.7	25.3	18.0	14.4

3. Shell stability and intermediate wind girder deign

3.1 Max. available height of unstiffened shell width as per API650, Para 3.9.7.2, Wtr=Wx {(Tu/Ta)}^(5/2)

Wtr(i) Unstiffened Width(mm)	141	218	370	602	1,396	2,438

* Total Transposed Width, Wtr= 7,603 mm

3.2 Critical Bucking vertical distance of last shell course as per,Para 3.9.7.1, API650 ,H1= 9.46465 x Tu x { Tu/D}^1.5 x {44.7/V}^2 x k

=9.46465*8*(8/30)^1.5*(44.7/45)^2*0.88 9,054 mm

3.3 Intermediate wind girder requirement and Location

If H1>= Wtr then, Intermediate Wind Girder is not required or Required Not required !

Weight & Volume Calculation

* Full Volume 10.89 m^3

* Total Weight of Shell Course@used thickness 171.4 Kg

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