Surface Facilities for Oil and Gas Handling

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Wall Thickness Criteria

Good morning. We already started the topic pipe line sizing. So, when you are sizing a line or pipe, so you have to know the burst pressure or hoop stress you have to understand. Then what is the thickness? Wall thickness you should consider. High thick if you are considering it will be requiring lots of money because material amount of material will be increasing and handling in the field also will be difficult. So, in that case what you do? You have to optimize the thickness.

So, for that you have drawn formula T equals P dO 2 sigma plus P. I am rewriting again the same equation because sometime when you watch the video that printed equation does not come well. And thickness we have if we have considered many other parameter then formula changes like T equals T c plus T h plus P dO 2 s e plus P y then this will be whole square bracket 100 minus T dO 1. Now what are the parameters? Parameters is corrosion allowance, T h is your thread or groove depth thread or groove depth in inch, corrosion allowance then again in inch because all unit should be same, P means pressure and D means outer dia outer and S is allowable stress.

E efficiency factor you have already seen, weld joint factor or E is weld joint factor, weld joint end factor. And what is this? T O 1, T O 1 is manufacturer allowance, manufacturer C T U R E R allowance. So, this y is your factor equals 0.4 for ferrous metal below 900 degree Fahrenheit. On the temperature below 900 degree Fahrenheit you can use this 0.

4. If I have more than that then you can use different factor but for simplicity I am not giving other values just because we will be solving some problem using this value. And previous formula also I have to write the term actually, P is your internal pipe pressure,

internal pressure that will be in psi. D again outer dia dia inch, sigma is your hoop stress, actually it is tensile stress in the pipe wall, the pipe wall and unit is again P s i. What are the terms are there? P d, P p already pipe pressure fine, T T H is C 100, P d o. And E, E value will be 1 if it is for seamless design, d e s i g n, seamless design and it will be 0.

85, 0.85 if it this is for welded joint. So, it will be like 1 and 0.85 within that range normally. Now, we have seen this thread allowance you have to give.

For nominal pipe size if you know then actually thread allowance you can get from the table and this table is taken from the book the K. Arnold Morris and Morris. From this book you have I have taken the table. And if you know the temperature also then you can see this allowable stress values for different temperature. So, if you increase temperature allowable value decreases.

And if you know this API different grade, so grade and with temperature how this allowable stress changes you can see from this table. In problem if I do not give data sometime I will give table from table actually you have to identify which value you need for your allowable stress or T T H. Now, we will go for one problem based on the formula. A pipe transports liquid transports liquid given data pipe length 7000 feet inlet pressure 900 psi temperature 80 degree Fahrenheit pipe outlet diameter 2.375 inch that means d o is given T is given inlet pressure P given pipe length is given manufacturer allowance is given T o 1 longitudinal joint factor is given that means E is given igno thread or groove allowance.

Liquid flows to a low pressure separator operating 150 psi. Psi line is rated for 1480 psi. So, wall thickness of the pipe you have to calculate and pipe is should be calculated based on NCB 31.3 standard formula. So, formula I have given actually if you change NCB 31.

3 to 31.4 or other so your formula will be changing. So, you can remember the formula or for simplicity I have given you the formula based on that you have to calculate. So, here P T given pipe diameter also given T c, T c is equal to 0.05. So, corrosion allowance if not given just assume 0.

05 inch and T th is thread allowance. So, here it is written there thread allowance you have to ignore. So, thread allowance is 0 actually and P P value is given pressure it is 1480 and d outer 2.375 divided by 2 S value 20000 I think it is given here I think it is not given. So, sigma should be 20000 you can get from table also but for simplicity I will give this value.

And E value I have given 1, P again it is given 1480, y value 0.4 this is factor I told already and T o 1 so in that case it is 12.5, 12.5. So, if you simplify this one it will give 0.

155 inch because this will be your thickness. Thank you very much for today lecture. Next day we will start new topic. Thank you very much. .