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Why Line Sizes above 24" Are Avoided as far as possible?

Question Mark

Student

What is the difference between a pipe larger than 24 inch and 24 inch?
What are the design considerations for pipes larger than 24"?
Why keeping the size below 24" is so attractive from cost viewpoint?

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Narendra Janiwarad, AMIChemE likes this

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Wilfredo

Wilfredo Garcia

Process Specialist at Ecopetrol

Dear,

Please find here below my answers:

- 1.- I don't know what you want to see as an answer to this question.
- 2.- The design considerations for pipe sizing are the same: velocity and pressure drop criteria.
- 3.- Pipeline sizes depends on the fluid flowrate / capacity. As a fast sizing, you may use a velocity = 10ft/s for liquids and 100ft/s for gases.

Cheers

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Arun

Arun kumar

Senior Process Engineer at Saipem

Dear Concerned,

Please, can you explain more clearly .. what your query is ...

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Saeid Rahimi Mofrad

Senior Specialty Process Engineer at Fluor

In order to avoid the purchase of many different sizes of pipe and fittings, most of the Clients/Project Owners specify 30" as the next pipe size above 24", unless it is economically justified to use 28". Almost all of them take 26" as non-acceptable pipe size.

The material cost of the large pipes changes with diameter², so the cost of 30" pipe (with the same material and design condition) is 1.5 times of 24". The total cost difference between 24" and 30" pipe further increases when the cost of valves and fittings together with shipping and construction costs are included.

Furthermore, it seems that 24" has been used as the limit above which the design requirements are different. Below items are some of the examples;

- Piping up to and including DN 600 (NPS 24) shall be designed for full vacuum (FV) at ambient

temperature.

Piping DN 600 (NPS 24) and larger shall be designed for full vacuum when containing condensable gases such as steam and in situations where sub-atmospheric pressure may occur as the result of liquid surge or steam-out.

This reflects the fact that smaller scheduled pipe have better resistance to vacuum condition and most probably applying FV of lines below 24" won't increase the pipe thickness. However, for pipes larger than 24" FV can govern the pipe thickness (rather than internal pressure).

- Flanges shall be raised-face in accordance with ASME B16.5 or calculated in accordance with ASME Section VIII. Flanges over DN 600 (NPS 24) shall be in accordance with ASME B16.47 series A (preferably) or B, and from ISO 10423/API 6A for wellhead and X-mas tree connections. I don't know what could be the implication of using ASME B16.47 for flange design.

- From the piping design perspective, the carbon steel pipes 24" and below are easily selected from standard schedule (XS, 40, etc) based on the pressure rating (no thickness calculation is needed) whereas for line sizes larger than 24", pipe thickness should be calculated for each pipe and separately ordered.

- In areas accessible to heavy traffic and at road crossings, the depth of buried pipes for pipes of DN 600 (NPS 24) and smaller should be minimum 0.6m. For pipe over DN 600 (NPS 24), this should be 0.9m.

- For lines smaller than 24", the minimum branch size is 2" in sour service and 1" in non-sour service. For lines larger than 24", the minimum size of the branch pipe is 2" (in both sour and non-sour services).

- You will find lots of such typical examples.....

A typical example where a simple change can save a lot of money is the flare system, when using a relief valve with higher allowable backpressure (balanced bellows instead of conventional – pilot operated instead of balanced bellows) for governing relief rate may enable the designer to keep the size of network below 24".

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Fahad Al-Sadoon

Process Engineer at Petrofac Engineering Ltd

Saeid,

Fahad

Can you please elaborate on the point where the next pipe size from 24" should be 30"? Are you saying that the cost difference of 26"/28" is negligible as compared with 30"?

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Saeid Rahimi Mofrad

Senior Specialty Process Engineer at Fluor

The material cost of pipe will anyway change with diameter² but the point is that if 26" and 28" pipes are not acceptable in the project, you need to put all your efforts into keeping the pipe size at 24" rather than simply selecting 30".

The effect of change in the design requirements above 24" on the project cost is another motivating factor to avoid pipe sizes larger than 24" as far as it is practically possible.

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