Cameron Piping Manual Calculation

TOTAL HEAD, N.P.S.H. AND OTHER CALCULATION EXAMPLES ...
2 (/) (/) ( ) 2 2 2 g fts v ft s ?H. FF ft fluid= K. For example a 2 ½" inch screwed elbow has a K factor of 0.85 according to Figure 1 and using a velocity of 10 ft/s (this is determined from the flow rate). The fittings friction loss will be: 1.3 2 32.17 10 ( ) 0.85. 2.

Piping Estimator Man Hour Manual | pdf Book Manual Free ...

Download piping calculations manual by e shashi menon

#Pipefitter What is 1.414 and 60,30,22.5 Degree? - PipingWeldingNonDestructiveExamination-NDT ~~Chapter 1: Introduction to PIPE STRESS ANALYSIS~~ ~~Isometric rolling pipe drawing formula/how to calculate rolling degree/(Hindi) pipe degree formula~~ Piping Double Rolling calculation | Updated ~~How to Calculate Simple and Rolling Offsets | Pipe Trades Pro~~ **Natural gas pipe sizing Piping Size and Pipe Schedule - Pipe Design -part-12 Formula To Get TAKEOFF 90 \u0026 45 Degrees Elbow LR** ~~pipe elbow center calculation formula pdf/elbow center chart/pipe fitter training~~ PIPE SIZING | LINE SIZING | EXAMPLE | HYDRAULICS | PIPING MANTRA | ~~pipe offset formula manual/how to find travel length off pipe/ (HINDI)~~

Are You Experience Piping Interview?How to Compute Takeoff, Spool, Center to Center 90, 45 Degrees Elbow Pipefitter

Piping basics for Engineers | Designers | Draughtsmen | Piping Analysis~~Piping Take Off 90 Degrees and 45 Degrees the New and old Ways Formula's~~ ~~how to calculate pipe diameter, velocity and flow rate in plumbing engineering~~ Piping Formula Secant 45 degree 1.414 Set Run Travel Take Off *Calculating a 45 degree offset piping system* ~~How to Find Set,Travel, Spool and Take Off Given the Degree \u0026 Elevation - PipingWeldingNDT~~

How to read p\u0026id(pipe \u0026 instrument drawings)*5. Plumbing: 45º Parallel Offset: Using Constants* **PIPING 45 DEGREE ROLLING OFFSET CALCULATION AND FORMULA** Hydro test water volume calculation | Piping

PIPING THERMAL EXPANSION | PIPING FLEXIBILITY \u0026 ANCHOR LOCATION | PIPING MANTRA | WITH EXAMPLES~~Pipe OD ID CF Formula || Pipe Schedule Explained~~ Pipe Weight calculation | Piping Analysis ~~Pipe Weight Calculation~~ **rolling pipe degree formula with PDF chart /how to calculate rolling pipe degree Series vs Parallel Circuits**

Cameron Piping Manual Calculation
Download Cameron Piping Manual Calculation book pdf free download link or read online here in PDF. Read online Cameron Piping Manual Calculation book pdf free download link book now. All books are in clear copy here, and all files are secure so don't worry about it. This site is like a library, you could find million book here by using search ...

Cameron Piping Manual Calculation | pdf Book Manual Free ...
Manual Calculation Cameron Piping Manual Calculation This is likewise one of the factors by obtaining the soft documents of this cameron piping manual calculation by online. You might not require more period to spend to go to the ebook instigation as with ease as search for them. In some cases, you likewise accomplish not discover the ...

Cameron Piping Manual Calculation

Frequent reference to this index is suggested for quickly locating the information desired. iv. Contents Section ?. Hydraulic principles ..... Selected formulas and equivalents .....2 3. Friction data.....

CAMERON HYDRAULIC DATA - Pump Technical Books

Download Piping Calculations Manual book pdf free download link or read online here in PDF. Read online Piping Calculations Manual book pdf free download link book now. All books are in clear copy here, and all files are secure so don't worry about it. This site is like a library, you could find million book here by using search box in the header.

Piping Calculations Manual | pdf Book Manual Free download

Document about Cameron Piping Manual Calculation Download is available on print and digital edition. This pdf ebook is one of digital edition of Cameron Piping Manual Calculation Download that can be search along internet in google, bing, yahoo and other mayor seach engine. This special edition

---

Cameron Piping Manual Calculation

Cameron Piping Manual Calculation australian master human resources guide how to find the right size pool pump - poolsupplyworld blog engineering training manual yokogawa centum connect with earthlink, the award-winning internet of material 5th edition manual 880 series ultrasonic flowmeter transmitter user

---

Cameron Piping Manual Calculation - wsntech.net

The Technical Calculation And Estimator's Manhour Manual is a result of 30 years of experience in dealing with problems an estimator Page 14/30. File Type PDF Piping Estimator Man Hour Manual encounters when working on technical calculations for specific ...

Piping Estimator Man Hour Manual | pdf Book Manual Free ...

1. Calculate the total head and select the pump. 2. Calculate the NPSH available and check with respect to the NPSH required. 3. Calculate the specific speed and predict the pump efficiency. Calculate the suction specific speed and Thoma number and check the prediction of the Thoma number regarding cavitation. 4. Calculate the temperature rise of the fluid within the pump and compare with the maximum recommended. 5.

TOTAL HEAD, N.P.S.H. AND OTHER CALCULATION EXAMPLES ...

2 (/) (/) ( ) 2 2 2 g fts v ft s ?H. FF ft fluid= K. For example a 2 ½” inch screwed elbow has a K factor of 0.85 according to Figure 1 and using a velocity of 10 ft/s (this is determined from the flow rate). The fittings friction loss will be: 1.3 2 32.17 10 ( ) 0.85. 2.

PIPE FITTING FRICTION CALCULATION can be calculated based ...

It is expressed in this Manual in Newton per square meter (N/m2 = Pa). 1 bar = 105= 10 Pa Atmospheric pressure is the force exerted on a unit area by the weight of the atmosphere. It depends on the height above sea level (see Fig. 8). At sea level the absolute pressure is approximately 1 bar = 105 N / m2.

Manual for the Design of Pipe Systems and Pumps

Disted Camosun 5 years ago 4 minutes, 30 seconds 341,070 views Piping Size and Pipe Schedule - Pipe … Cameron Piping Manual Calculation Piping Calculations Manual (Mcgraw-Hill Calculations) - Kindle edition by Menon, Shashi Download it once and read it on your Kindle device, PC, ...

Mcgraw Hill Piping Calculation Manual

Cameron Balloons provides unparalleled support and service, assisting and helping balloonists worldwide. Bespoke hot-air balloon equipment instructions, service information and real answers from the experts behind the worlds' most popular brand of hot-air balloons

Cameron Balloons Support Page — Cameron Balloons

Piping stress analysis is a discipline which is highly interrelated with piping layout (Chap. B3) and support design (Chap. B5). The layout of the piping system should be performed with the requirements of piping stress and pipe supports in mind

(PDF) STRESS ANALYSIS OF PIPING SYSTEMS | Raymundo Cordero ...

From modal analysis the pipe stress engineer has found that the first mode of vibration for a given pipe span has a natural frequency, fn, = 20 Hz corresponding to a periodic time, T = 1/ fn= 1/20 = 0.05s. The dynamic load factor are then found by calculating the td/T ratio = 0.15/0.05 = 3.0.

DNVGL-RP-D101 Structural analysis of piping systems

And is given there in terms of the torsional moment and pipe dimensions as follows. (at r = ro) = MT ro / RT = MT ro / (2I) = MT / 2Z RT is the torsional resistance (= twice the moment of inertia). All known loads on the pipe should be used to calculate contributions to SL, SH and t.

manual stress analysis - SlideShare

In between these two values (2000<Re<4000) the flow is a mixture of the two types and it is difficult to predict the behavior of the fluid. μ ? × × × = 1000 u d Re. Where: ? = Density (kg/m3) u = Mean velocity in the pipe (m/s) d = Internal pipe diameter (mm) μ = Dynamic viscosity (Pa s) 2.2 Types of Fluid Flow:

BEST PRACTICE MANUAL - NREDCAP

Piping Calculations Manual Shashi Menon No preview available - 2004. Common terms and phrases. approximately Assume average branch calculate the pressure capacity coefficient compared compressibility Consider constant cost critical curve Darcy equation defined delivery density depends determine difference dimensionless discharge discussed due ...

Piping Calculations Manual - Shashi Menon - Google Books

Fluid flow characteristics are very sensitive to the absolute roughness of the pipe inner sur- face. The absolute roughness of NOV Fiber Glass Systems piping is (0.00021 inches) 1.7 x 10-5feet(1). This is less than 1/8 the average value for (non-corroded) new steel of (0.0018 inch) 15 x 10-5feet(2).

Engineering & Piping Design Guide

Performing a range of subsea piping and pipeline design engineering activities including; • Subsea Manifolds, PLEMs, SSIVs and associated spools detailed design and analysis using AutoPIPE and manual calculations. • Piping GA and isometric checking, MTO creation and valve datesheets.

Download Cameron Piping Manual Calculation book pdf free download link or read online here in PDF. Read online Cameron Piping Manual Calculation book pdf free download link book now. All books are in clear copy here, and all files are secure so don't worry about it. This site is like a library, you could find million book here by using search ...

Piping Calculations Manual Shashi Menon No preview available - 2004. Common terms and phrases. approximately Assume average branch calculate the pressure capacity coefficient compared compressibility Consider constant cost critical curve Darcy equation defined delivery density depends determine difference dimensionless discharge discussed due ...

PIPE FITTING FRICTION CALCULATION can be calculated based ...

From modal analysis the pipe stress engineer has found that the first mode of vibration for a given pipe span has a natural frequency, fn, = 20 Hz corresponding to a periodic time, T = 1/ fn= 1/20 = 0.05s. The dynamic load factor are then found by calculating the td/T ratio = 0.15/0.05 = 3.0.

(PDF) STRESS ANALYSIS OF PIPING SYSTEMS | Raymundo Cordero ...

1. Calculate the total head and select the pump. 2. Calculate the NPSH available and check with respect to the NPSH required. 3. Calculate the specific speed and predict the pump efficiency. Calculate the suction specific speed and Thoma number and check the prediction of the Thoma number regarding cavitation. 4. Calculate the temperature rise of the fluid within the pump and compare with the maximum recommended. 5.

Performing a range of subsea piping and pipeline design engineering activities including; • Subsea Manifolds, PLEMs, SSIVs and associated spools detailed design and analysis using AutoPIPE and manual calculations. • Piping GA and isometric checking, MTO creation and valve datesheets.

Piping Calculations Manual - Shashi Menon - Google Books

Fluid flow characteristics are very sensitive to the absolute roughness of the pipe inner sur- face. The absolute roughness of NOV Fiber Glass Systems piping is (0.00021 inches) 1.7 x 10-5feet(1). This is less than 1/8 the average value for (non-corroded) new steel of (0.0018 inch) 15 x 10-5feet(2).

Manual Calculation Cameron Piping Manual Calculation This is likewise one of the factors by obtaining the soft documents of this cameron piping manual calculation by online. You might not require more period to spend to go to the ebook instigation as with ease as search for them. In some cases, you likewise accomplish not discover the ...

Cameron Piping Manual Calculation - wsntech.net

Manual for the Design of Pipe Systems and Pumps

Mcgraw Hill Piping Calculation Manual
Cameron Piping Manual Calculation australian master human resources guide how to find the right size pool pump - poolsupplyworld blog engineering training manual yokogawa centum connect with earthlink, the award-winning internet of material 5th edition manual 880 series ultrasonic flowmeter transmitter user

Piping Calculations Manual | pdf Book Manual Free download
Download Piping Calculations Manual book pdf free download link or read online here in PDF. Read online Piping Calculations Manual book pdf free download link book now. All books are in clear copy here, and all files are secure so don't worry about it. This site is like a library, you could find million book here by using search box in the header.

Download piping calculations manual by e shashi menon

#Pipefitter What is 1.414 and 60,30,22.5 Degree? - PipingWeldingNonDestructiveExamination-NDT~~Chapter 1: Introduction to PIPE STRESS ANALYSIS~~ ~~Isometric rolling pipe drawing formula/how to calculate rolling degree/(Hindi) pipe degree formula~~ Piping Double Rolling calculation | Updated ~~How to Calculate Simple and Rolling Offsets | Pipe Trades Pro~~ **Natural gas pipe sizing Piping Size and Pipe Schedule - Pipe Design -part-12 Formula To Get TAKEOFF 90 \u0026 45 Degrees Elbow LR** ~~pipe elbow center calculation formula pdf/elbow center chart/pipe fitter training~~ PIPE SIZING | LINE SIZING | EXAMPLE | HYDRAULICS | PIPING MANTRA | ~~pipe offset formula manual/how to find travel length off pipe/ (HINDI)~~

Are You Experience Piping Interview?How to Compute Takeoff, Spool, Center to Center 90, 45 Degrees Elbow Pipefitter

Piping basics for Engineers | Designers | Draughtsmen | Piping Analysis ~~Piping Take Off 90 Degrees and 45 Degrees the New and old Ways Formula's~~ ~~how to calculate pipe diameter, velocity and flow rate in plumbing engineering~~ Piping Formula Secant 45 degree 1.414 Set Run Travel Take Off *Calculating a 45 degree offset piping system* ~~How to Find Set,Travel, Spool and Take Off Given the Degree \u0026 Elevation - PipingWeldingNDT~~

How to read p\u0026id(pipe \u0026 instrument drawings)*5. Plumbing: 45 º Parallel Offset: Using Constants* **PIPING 45 DEGREE ROLLING OFFSET CALCULATION AND FORMULA** Hydro test water volume calculation | Piping

PIPING THERMAL EXPANSION | PIPING FLEXIBILITY \u0026 ANCHOR LOCATION | PIPING MANTRA | WITH EXAMPLES~~Pipe OD ID CF Formula || Pipe Schedule Explained~~ Pipe Weight calculation | Piping Analysis ~~Pipe~~

Weight Calculation **rolling pipe degree formula with PDF chart /how to calculate rolling pipe degree Series vs Parallel Circuits**

Cameron Piping Manual Calculation

Document about Cameron Piping Manual Calculation Download is available on print and digital edition. This pdf ebook is one of digital edition of Cameron Piping Manual Calculation Download that can be search along internet in google, bing, yahoo and other mayor seach engine. This special edition

It is expressed in this Manual in Newton per square meter (N/m2 = Pa). 1 bar = 105= 10 Pa Atmospheric pressure is the force exerted on a unit area by the weight of the atmosphere. It depends on the height above sea level (see Fig. 8). At sea level the absolute pressure is approximately 1 bar = 105 N / m2.

manual stress analysis - SlideShare

Download piping calculations manual by e shashi menon

#Pipefitter What is 1.414 and 60,30,22.5 Degree? - PipingWeldingNonDestructiveExamination-NDTChapter 1: Introduction to PIPE STRESS ANALYSIS Isometric rolling pipe drawing formula/how to calculate rolling degree/(Hindi) pipe degree formula Piping Double Rolling calculation | Updated How to Calculate Simple and Rolling Offsets | Pipe Trades Pro **Natural gas pipe sizing Piping Size and Pipe Schedule - Pipe Design -part-12 Formula To Get TAKEOFF 90 \u0026 45 Degrees Elbow LR** pipe elbow center calculation formula pdf/elbow center chart/pipe fitter training PIPE SIZING | LINE SIZING | EXAMPLE | HYDRAULICS | PIPING MANTRA | pipe offset formula manual/how to find travel length off pipe/ (HINDI)

Are You Experience Piping Interview?How to Compute Takeoff, Spool, Center to Center 90, 45 Degrees Elbow Pipefitter

Piping basics for Engineers | Designers | Draughtsmen | Piping Analysis Piping Take Off 90 Degrees and 45 Degrees the New and old Ways Formula's how to calculate pipe diameter, velocity and flow rate in plumbing engineering Piping Formula Secant 45 degree 1.414 Set Run Travel Take Off *Calculating a 45 degree offset piping system* How to Find Set,Travel, Spool and Take Off Given the Degree \u0026 Elevation - PipingWeldingNDT

How to read p\u0026id(pipe \u0026 instrument drawings) *5. Plumbing: 45 º Parallel Offset: Using Constants* **PIPING 45 DEGREE ROLLING OFFSET CALCULATION AND FORMULA** Hydro test water volume calculation | Piping

PIPING THERMAL EXPANSION | PIPING FLEXIBILITY \u0026 ANCHOR LOCATION | PIPING MANTRA | WITH EXAMPLESPipe OD ID CF Formula || Pipe Schedule Explained Pipe Weight calculation | Piping Analysis Pipe Weight Calculation **rolling pipe degree formula with PDF chart /how to calculate rolling pipe degree Series vs Parallel Circuits**

Cameron Piping Manual Calculation

Download Cameron Piping Manual Calculation book pdf free download link or

read online here in PDF. Read online Cameron Piping Manual Calculation book pdf free download link book now. All books are in clear copy here, and all files are secure so don't worry about it. This site is like a library, you could find million book here by using search ...

Cameron Piping Manual Calculation | pdf Book Manual Free ...
Manual Calculation Cameron Piping Manual Calculation This is likewise one of the factors by obtaining the soft documents of this cameron piping manual calculation by online. You might not require more period to spend to go to the ebook instigation as with ease as search for them. In some cases, you likewise accomplish not discover the ...

Cameron Piping Manual Calculation
Frequent reference to this index is suggested for quickly locating the information desired. iv. Contents Section . Hydraulic principles ..... Selected formulas and equivalents .....2 3. Friction data.....

CAMERON HYDRAULIC DATA - Pump Technical Books
Download Piping Calculations Manual book pdf free download link or read online here in PDF. Read online Piping Calculations Manual book pdf free download link book now. All books are in clear copy here, and all files are secure so don't worry about it. This site is like a library, you could find million book here by using search box in the header.

Piping Calculations Manual | pdf Book Manual Free download
Document about Cameron Piping Manual Calculation Download is available on print and digital edition. This pdf ebook is one of digital edition of Cameron Piping Manual Calculation Download that can be search along internet in google, bing, yahoo and other mayor seach engine. This special edition

---

Cameron Piping Manual Calculation
Cameron Piping Manual Calculation australian master human resources guide how to find the right size pool pump - poolsupplyworld blog engineering training manual yokogawa centum connect with earthlink, the award-winning internet of material 5th edition manual 880 series ultrasonic flowmeter transmitter user

---

Cameron Piping Manual Calculation - wsntech.net

The Technical Calculation And Estimator's Manhour Manual is a result of 30 years of experience in dealing with problems an estimator Page 14/30. File Type PDF Piping Estimator Man Hour Manual encounters when working on technical calculations for specific ...

Piping Estimator Man Hour Manual | pdf Book Manual Free ...
1. Calculate the total head and select the pump. 2. Calculate the NPSH available and check with respect to the NPSH required. 3. Calculate the specific speed and predict the pump efficiency. Calculate the suction specific speed and Thoma number and check the prediction of the Thoma number regarding cavitation. 4. Calculate the temperature rise of the fluid within the pump and compare with the maximum recommended. 5.

TOTAL HEAD, N.P.S.H. AND OTHER CALCULATION EXAMPLES ...
2 (/) (/) ( ) 2 2 2 g fts v ft s ΔH. FF ft fluid= K. For example a 2 ½ ” inch screwed elbow has a K factor of 0.85 according to Figure 1 and using a velocity of 10 ft/s (this is determined from the flow rate). The fittings friction loss will be: 1.3 2 32.17 10 ( ) 0.85. 2.

PIPE FITTING FRICTION CALCULATION can be calculated based ...
It is expressed in this Manual in Newton per square meter (N/m2 = Pa). 1 bar = 105= 10 Pa Atmospheric pressure is the force exerted on a unit area by the weight of the atmosphere. It depends on the height above sea level (see Fig. 8). At sea level the absolute pressure is approximately 1 bar = 105 N / m2.

Manual for the Design of Pipe Systems and Pumps
Disted Camosun 5 years ago 4 minutes, 30 seconds 341,070 views Piping Size and Pipe Schedule - Pipe ⋯ Cameron Piping Manual Calculation Piping Calculations Manual (Mcgraw-Hill Calculations) - Kindle edition by Menon, Shashi Download it once and read it on your Kindle device, PC, ...

Mcgraw Hill Piping Calculation Manual
Cameron Balloons provides unparalleled support and service, assisting and helping balloonists worldwide. Bespoke hot-air balloon equipment instructions, service information and real answers from the experts behind the worlds' most popular brand of hot-air balloons

---

Cameron Balloons Support Page — Cameron Balloons
Piping stress analysis is a discipline which is highly interrelated with piping layout (Chap. B3) and support design (Chap. B5). The layout of the piping

system should be performed with the requirements of piping stress and pipe supports in mind

---

(PDF) STRESS ANALYSIS OF PIPING SYSTEMS | Raymundo Cordero ...
From modal analysis the pipe stress engineer has found that the first mode of vibration for a given pipe span has a natural frequency, fn, = 20 Hz corresponding to a periodic time, T = 1/ fn= 1/20 = 0.05s. The dynamic load factor are then found by calculating the td/T ratio = 0.15/0.05 = 3.0.

DNVGL-RP-D101 Structural analysis of piping systems
And is given there in terms of the torsional moment and pipe dimensions as follows. (at r = ro) = MT ro / RT = MT ro / (2I) = MT / 2Z RT is the torsional resistance (= twice the moment of inertia). All known loads on the pipe should be used to calculate contributions to SL, SH and t.

---

manual stress analysis - SlideShare
In between these two values (2000<Re<4000) the flow is a mixture of the two types and it is difficult to predict the behavior of the fluid. μ ρ × × × = 1000 u d Re. Where: ρ = Density (kg/m3) u = Mean velocity in the pipe (m/s) d = Internal pipe diameter (mm) μ = Dynamic viscosity (Pa s) 2.2 Types of Fluid Flow:

BEST PRACTICE MANUAL - NREDCAP
Piping Calculations Manual Shashi Menon No preview available - 2004. Common terms and phrases. approximately Assume average branch calculate the pressure capacity coefficient compared compressibility Consider constant cost critical curve Darcy equation defined delivery density depends determine difference dimensionless discharge discussed due ...

Piping Calculations Manual - Shashi Menon - Google Books
Fluid flow characteristics are very sensitive to the absolute roughness of the pipe inner sur- face. The absolute roughness of NOV Fiber Glass Systems piping is (0.00021 inches) 1.7 x 10-5feet(1). This is less than 1/8 the average value for (non-corroded) new steel of (0.0018 inch) 15 x 10-5feet(2).

Engineering & Piping Design Guide
Performing a range of subsea piping and pipeline design engineering activities including; • Subsea Manifolds, PLEMs, SSIVs and associated spools detailed design and analysis using AutoPIPE and manual calculations. • Piping GA and isometric checking, MTO creation and valve datesheets.

BEST PRACTICE MANUAL - NREDCAP

Cameron Piping Manual Calculation | pdf Book Manual Free ...

Engineering & Piping Design Guide
Disted Camosun 5 years ago 4 minutes, 30 seconds 341,070 views Piping Size and Pipe Schedule - Pipe ⋯ Cameron Piping Manual Calculation Piping Calculations Manual (Mcgraw-Hill Calculations) - Kindle edition by Menon, Shashi Download it once and read it on your Kindle device, PC, ...

Cameron Piping Manual Calculation

CAMERON HYDRAULIC DATA - Pump Technical Books

Piping stress analysis is a discipline which is highly interrelated with piping layout (Chap. B3) and support design (Chap. B5). The layout of the piping system should be performed with the requirements of piping stress and pipe supports in mind
Cameron Balloons provides unparalleled support and service, assisting and helping balloonists worldwide. Bespoke hot-air balloon equipment instructions, service information and real answers from the experts behind the worlds' most popular brand of hot-air balloons
And is given there in terms of the torsional moment and pipe dimensions as follows. (at r = ro) = MT ro / RT = MT ro / (2I) = MT / 2Z RT is the torsional resistance (= twice the moment of inertia). All known loads on the pipe should be used to calculate contributions to SL, SH and t.

Cameron Balloons Support Page — Cameron Balloons

In between these two values (2000<Re<4000) the flow is a mixture of the two types and it is difficult to predict the behavior of the fluid. μ ρ × × × = 1000 u d Re. Where: ρ = Density (kg/m3) u = Mean velocity in the pipe (m/s) d = Internal pipe diameter (mm) μ = Dynamic viscosity (Pa s) 2.2 Types of Fluid Flow:
The Technical Calculation And Estimator's Manhour Manual is a result of 30 years of experience in dealing with problems an estimator Page 14/30. File Type PDF Piping Estimator Man Hour Manual encounters when working on technical calculations for specific ...
Frequent reference to this index is suggested for quickly locating the information desired. iv. Contents Section . Hydraulic principles ..... Selected formulas and equivalents .....2 3. Friction data.....

DNVGL-RP-D101 Structural analysis of piping systems