



Pipe Stress Analysis Software - CAEPIPE

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Pipe Stress professionals' software of choice to perform pipe stress analysis calculations



What's new in CAEPIPE V12.00?

(Release date: August 18, 2023)

In one of the most pivotal shifts in the swiftly evolving landscape of industrial technology, Hydrogen is being used in diverse applications, triggering an exponential surge in the requisite infrastructure, particularly Hydrogen pipelines and analytical systems. CAEPIPE stands as an unwavering vanguard, ceaselessly evolving to cater to the burgeoning needs of its user base. The latest version of CAEPIPE amplifies its capabilities, embracing comprehensive analysis for the Hydrogen sector, Plastic piping, Glass Reinforced Plastic (GRP) piping and Fiber Reinforced Plastic (FRP) piping. Notably, SST Systems takes the lead in introducing a pioneering feature: the capability to analyse Plastic and GRP/FRP piping in accordance with the ASME NM standards. This achievement underlines the pace at which innovation is transpiring, while highlighting CAEPIPE's commitment to driving progress hand in hand with the transformative industrial landscape.

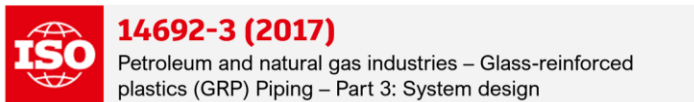
Hydrogen Piping



Plastic Piping



GRP/FRP Piping



New Piping Codes

- ISO 14692-3 (2017) - Glass Reinforced Plastics (GRP) Piping (both above ground and buried piping)
- ASME NM.2 (2020) - Glass-Fiber-Reinforced Thermosetting-Resin Piping Systems (above ground)
- ASME NM.1 (2020) - Thermoplastic Piping Systems (above ground)
- ASME B31.12 PL (2019) - Hydrogen Pipelines (both above ground and buried piping)
- ASME B31.1 (1977)
- ASME B31.1 (1980)

Refer to Piping Code Compliance section of CAEPIPE Code Compliance Manual for details.





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UPDATED CODES: Refer to Piping Code Compliance section of CAEPIPE Code Compliance Manual for details.

- ASME B31.1 (2022)
- ASME B31.4 (2022)
- ASME B31.8 (2022)

MATERIAL LIBRARIES: Material libraries for the following codes are added. Refer to Piping Code Compliance section of CAEPIPE Code Compliance Manual for details.

- ASME B31.1 (2022)
- ASME B31.4 (2022)
- ASME B31.8 (2022)

Enhancements

- Allowable Pressure for Nonmetallic piping is now computed as per Chapter N-II of ASME B31.1 (2022) when the piping code selected for analysis is ASME B31.1 (2022).
- INCREASED NUMBER OF SEISMIC g-LOADS: Number of Seismic g-Loads is increased to 3. These Seismic g's can be input through Layout window > Loads > Seismic 1, Seismic 2 and Seismic 3.
- Two new columns are added in the Element forces results to show and print Allowable stresses and Stress ratios for Expansion and Occasional load cases for ASME Class 2, ASME Class 3, ASME B31.1 (1973), ASME B31.1 (1977), ASME B31.1 (1980) and RCC-M codes. In addition, CSV export of these new columns is available ONLY for ASME Class 2 and ASME Class 3 code years 1986 or later.
- New feature is added to input Specified Displacements at Generic Support for
 - Thermal loads T1 through T10
 - Design Temperature
 - Static Seismic g's (1 through 3)
 - Wind loads (Wind 1 through Wind 4) and
 - Settlement load case
- New feature is added to input Specified Displacements at Anchors and Nozzles for
 - Design Temperature
 - Static Seismic 2 and Static Seismic 3
 - Wind loads (Wind 1 through Wind 4)
- New feature is added to define external Force for Design load case using "Force" data.
- New feature is added to define external Force as part of Static Seismic 2 or Static Seismic 3 load cases using Force Data type.





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- New feature is added to show "Limit Stop" defined in Vertical direction as "Rest. Supp" (Resting Support) in Layout, Limit Stop Loads, Support Load Summary and Limit Stop Displacements. This will help in identifying/differentiating the "Resting Support" among other types of Limit Stops defined at a particular node.
- Branch Connection Stresses are now computed for Wind 2, Wind 3 and Wind 4 load cases in addition to other Occasional load cases for all ASME Section III Class 2 and Class 3 codes.
- Run and Branch Split factors required for Refinement / Auto-refinement of Branches for B31J can now be controlled through Main Frame > Preferences.
- Refine Branches / Auto Refine Branches command will split elements ONLY when the element type is Pipe/Jpipe/Cut Pipe with one of its nodes is defined as Branch SIF.
- New feature is added to include Comment/Description in Lug Evaluation, Flange Qualification and Nozzle Evaluation modules.
- A new column in Material property is added to input Yield Strength (Sy) for piping code EN 13480-3. When input, CAEPIPE will use this Yield Strength (Sy) to compute allowable stress for Buried Piping as per EN 13480-6 (2017).
- New feature is added to obtain Direction of Wind through the Current Element (CE) in the layout. For example, Wind direction normal to a skewed line can be obtained using "Shear y" or "Shear z" option.
- It is now possible to edit ASCE/SEI or EN 1991-1-4 Wind data through Wind Dialog. This can be done by selecting the wind code from the Wind Dialog.
- New feature is added to Export and Import FRP Material properties through MBF file.
- Flange Equivalent Pressure calculation inside CAEPIPE (Flange Report in CAEPIPE Results) in accordance with Eq. 6.6.1-2 of EN 13480-3 (2020) is now updated to exclude Axial force when it is Compressive (-ve). In addition, a new field is added to input the Bolt Circle Diameter of Flange required in computing the Flange Equivalent Pressure.
- Analysis option "Include friction in Dynamic analysis" is turned ON by default.
- Hydrotest Stress evaluation is now added for ASME B31.1 (2022) and ASME NM.1 (2020). This Hydrotest Stress evaluation can be seen through CAEPIPE Results Window > Results > Results... > Sorted Stresses and CAEPIPE Results Window > Results > Results... > Code Compliance.
- CAEPIPE User's Manual, Technical Reference Manual, Code Compliance Manual and Verification Manual have been enhanced and updated to be in line with software version 12.00. These Manuals can be downloaded from the link www.sstusa.com/caepipe-docs.php.





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Bug Fixes

- Bug Correction: Refine Branch / Auto Refine Branch command was NOT splitting the element when both nodes of the element are Branch Points with the end node of the element is defined with Branch SIF.
- Bug Correction: When a model is defined with Limit Stops and Friction, then the total vertical load obtained by adding vertical loads from Sustained load case of all supports is not matching against the total weight of the system. This issue was happening at Random and not true for all models with Limit Stops and friction defined.
- Bug Correction: Reducing the number of thermal loads from 3 to 2 without turning off the load cases corresponding to T3 and P3 was issuing Assertion failure.
- Bug Correction: Flange Report was using the pressure input at P3 while computing the Flange Equivalent Pressure for Operating 4 through Operating 10 load cases.

CAEPIPE Code Compliance Checks

Table given below lists the Piping Codes that are built into CAEPIPE Version 12.00 for Code Compliance checks with their piping type and analysis type covered.

Sl. No.	Piping Code and Description	Metallic / Nonmetallic Piping	Above Ground	Buried Piping
1	ASME B31.1 (2022) - Power Piping	Metallic	Yes	---
2	ASME B31.1 (1967) - Power Piping	Metallic	Yes	---
3	ASME B31.1 (1973) - Power Piping	Metallic	Yes	---
4	ASME B31.1 (1977) - Power Piping	Metallic	Yes	---
5	ASME B31.1 (1980) - Power Piping	Metallic	Yes	---
6	ASME B31.3 (2020) - Process Piping	Metallic	Yes	---
7	ASME B31.4 (2022) - Pipeline Transportation Systems for Liquids and Slurries	Metallic	Yes	Yes
8	ASME B31.5 (2019) - Refrigeration Piping and Heat Transfer Components	Metallic	Yes	---
9	ASME B31.8 (2022) - Gas Transmission and Distribution Piping Systems	Metallic	Yes	Yes
10	ASME B31.9 (2020) - Building Services Piping	Metallic	Yes	---
11	ASME B31.12 IP (2019) - Hydrogen Piping	Metallic	Yes	---
12	ASME B31.12 PL (2019) - Hydrogen Pipelines	Metallic	Yes	Yes
13	ASME NM.1 (2020) - Thermoplastic Piping Systems	Nonmetallic	Yes	---





Sl. No.	Piping Code and Description	Metallic / Nonmetallic Piping	Above Ground	Buried Piping
14	ASME NM.2 (2020) - Glass-Fiber-Reinforced Thermosetting-Resin Piping Systems (GRP/FRP)	Nonmetallic	Yes	---
15	ASME Class 2 (1980) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
16	ASME Class 2 (1986) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
17	ASME Class 2 (1992) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
18	ASME Class 2 (2015) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
19	ASME Class 2 (2017) ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
20	ASME Class 2 (2021) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
21	ASME Class 3 (2017) - ASME Section III, Subsection ND - Class 3	Metallic	Yes	---
22	ASME Class 3 (2021) - ASME Section III, Subsection ND - Class 3	Metallic	Yes	---
23	ISO 14692-3 (2017) - Petroleum and Natural Gas Industries - Glass Reinforced Plastics (GRP/FRP) Piping	Nonmetallic	Yes	Yes
24	EN 13480 (2020) - Metallic industrial piping	Metallic	Yes	Yes
25	EN 13941 (2019) - District heating pipes	Metallic	No	Yes
26	BS 806 (1986) - Construction of Ferrous Piping Installations for and in Connection with Land Boilers (British)	Metallic	Yes	---
27	IGEM (2012) - Institution of Gas Engineers and Managers (IGEM) IGE/TD/12 Edition 2 (UK)	Metallic	Yes	---
28	Norwegian (1983) - Process design	Metallic	Yes	---
29	Norwegian (1990) - Process design	Metallic	Yes	---
30	RCC-M (1985) - Design and Construction Rules for Mechanical Components of PWR Nuclear Islands (French)	Metallic	Yes	---
31	CODETI (2013) - CODE DE CONSTRUCTION DES TUYAUTERIES INDUSTRIELLES (French)	Metallic	Yes	---
32	Stoomwezen (1989) - Dutch Power piping code	Metallic	Yes	---
33	Swedish (1978) - Swedish piping code	Metallic	Yes	---
34	Z183 (1990) - Oil Pipeline Systems (Canadian)	Metallic	Yes	---
35	Z184 (1992) - Gas Pipeline Systems (Canadian)	Metallic	Yes	---
36	Z662 (2019) - Oil & Gas Pipeline Systems (Canadian)	Metallic	Yes	Yes
37	NONE (for AWWA M11 applications, and for applications in aircraft, aerospace & defence industries)	Metallic	Yes	Yes

CAEPIPE Demo: Download an evaluation version of CAEPIPE from the link <https://www.sstusa.com/piping-software-download.php>.

