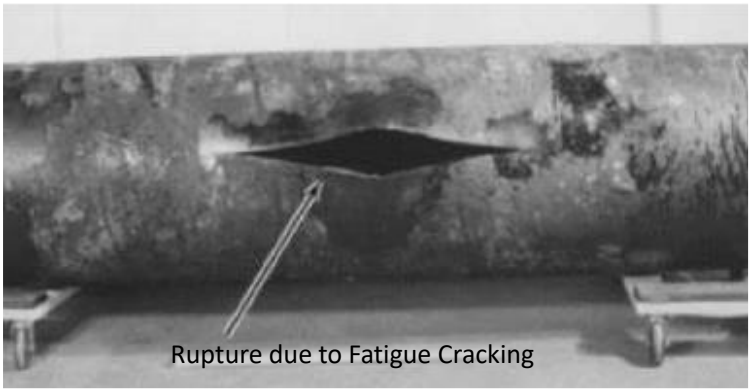
What's new in CAEPIPE V13.00?

(Release date: October 11,2024)

Fatigue evaluation is essential for assessing how repeated stress cycles can affect the reliability and durability of pipes and piping components, particularly in systems that experience temperature fluctuations, pressure variations, and/or mechanical vibrations. By identifying potential fatigue failures early, engineers can ensure system integrity and prevent costly breakdowns or accidents. In this version of CAEPIPE, Detailed Fatigue Evaluation is performed only for thermal stress cycles.

Marine piping systems, used in offshore platforms, ships, and underwater pipelines, face unique challenges such as corrosive and erosive environments, high external pressure, and dynamic loads from waves and currents. Proper analysis of marine piping is crucial to ensure safety, durability, and compliance with stringent industry regulations. In this version of CAEPIPE, analysis of above-water marine piping systems is performed in accordance with the requirements of DNV-ST-F101 (2021) applicable for submarine piping systems.

Fatigue Evaluation



Rupture due to Fatigue Cracking

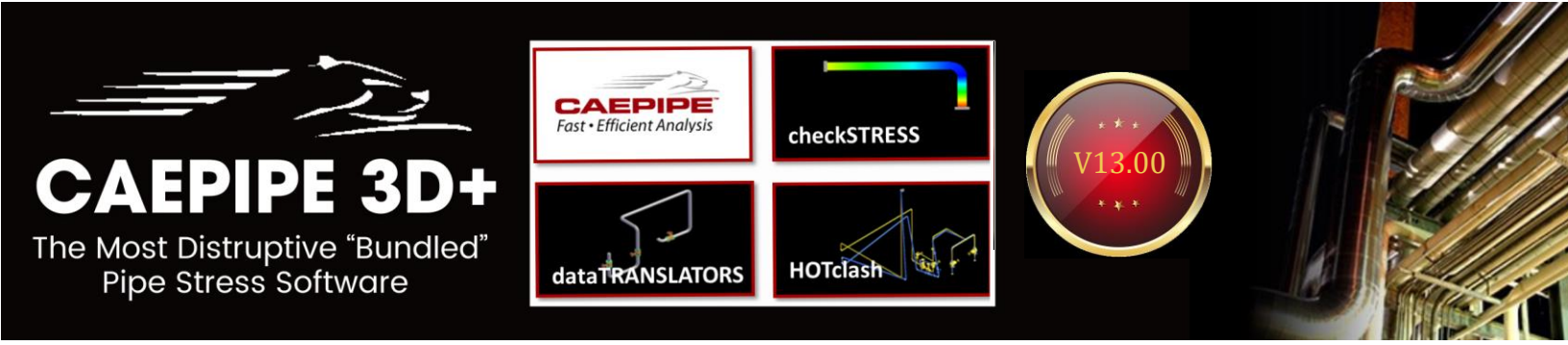
Marine Piping

New Piping Codes

The following new piping codes are added.

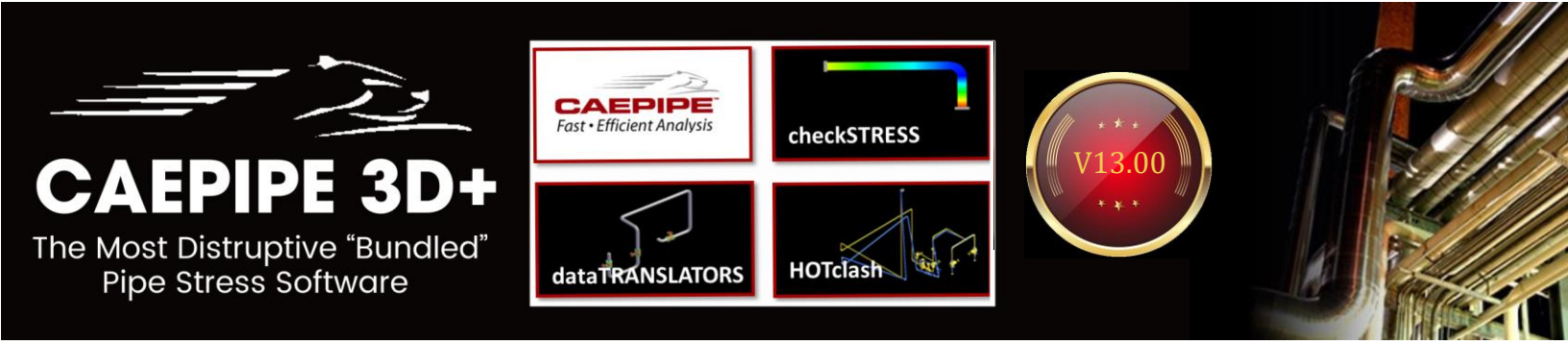
- DNV-ST-F101 (2021) - Submarine pipeline systems (Norwegian)
- ASME Section III, NC - Class 2 (2023)
- ASME Section III, ND - Class 3 (2023)

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



Other Enhancements

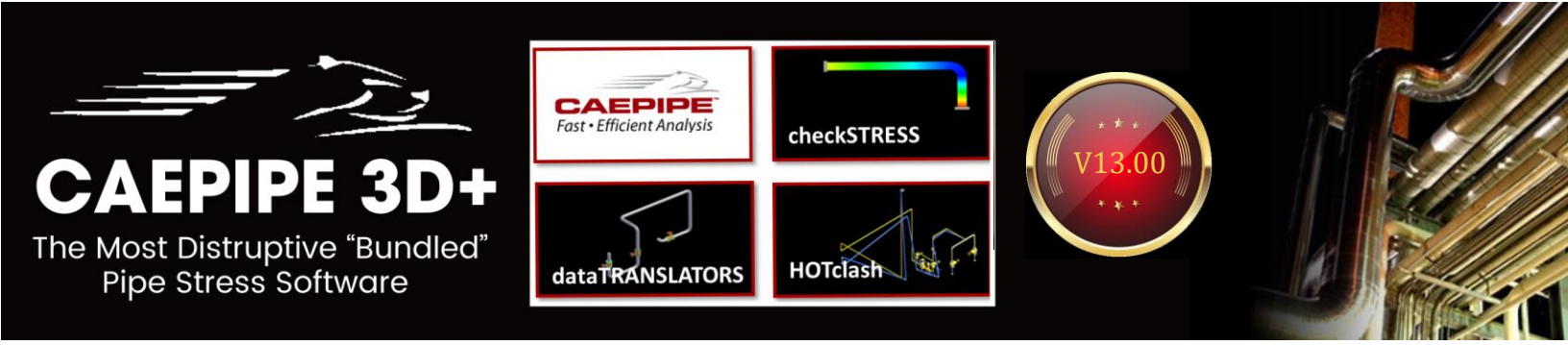
- Dynamic Susceptibility is updated as per the recommendation provided in Clause A.2.7 of SS EN 13480-3 2017/A3-2020.
- New feature is added to perform Detailed Fatigue Evaluation for cyclic thermal loads with applicable guidelines from ASME Section VIII Division 2 (2021). For details, refer to the section titled “Fatigue Evaluation” in CAEPIPE Technical Refernce Manual.
- Fatigue Curves corresponding to Figures 3-F.1 through 3-F.7 of ANNEX 3-F in ASME Section VIII, Division 2 (2021) are included in this version under "Fatigue_Curves" folder.
- New feature is added to perform Simplified Fatigue Evaluation as per the applicable Piping Codes. For details, refer to the section titled “Simplified Fatigue Evaluation” in CAEPIPE Code Compliance Manual.
- New feature is added to input Nozzle Displacements in the Pipe Local Coordinate System (LCS).
- New feature is added to convert Anchor forces and moments from Global Coordinate System (GCS) to Local Coordinate System (LCS) of the connected element and vice versa.
- New load cases for "Cold Spring + Design" and "Cold Spring + Empty Weight" are included when Cold Spring (Cut Pipe) is input in the stress model.
- When Cold Spring is input in the model, descriptions for load combinations with Cold Spring are updated in Support Load Summary results.
- New feature is added to differentiate Lateral Limit Stops from other limit stops like it was done for Vertical Limit Stops acting as Resting Supports.
- New feature is added to include Bourdon Effect to Expansion Load Cases or Sustained Load Cases from inside of CAEPIPE instead of defining the Environmental Variable "BOURDONP". This can be performed through Layout Frame > Options > Analysis > Pressure.
- New feature is added to Show Resultant Force (FR) and Resultant Moment (MR) in Support Load Summary for Anchor, Generic Support and Nozzle, and compare them against the allowable values for Resultant Force and Resultant Moment input under “User Allowables”.
- New feature is added to compute the additional weight due to Snow and Ice as detailed in Chapter 7 and Chapter 10 respectively of ASCE/SEI 7-22. The parameters required for Snow & Ice can be input through "CAEPIPE Layout Frame > Loads > Snow & Ice..." or "CAEPIPE Layout Frame > Misc > Snow & Ice - ASCE/SEI 7-22".
- New module is added to evaluate "Remaining Strength of Corroded Pipeline" as per ASME B31G (2023). This module can be launched through CAEPIPE Main Frame > New > Remaining Strength Evaluation. Refer to section titled "Remaining Strength of Corroded Pipeline" in CAEPIPE Code Compliance Manual as well as in CAEPIPE Technical Reference Manual for further details.



- CAEPIPE can now import neutral files generated from CAESAR II versions up to and including Version 13.00 and Version 14.00.
- Improved rendering algorithm for Ball and Hinge Joints.
- Enhanced LCS plot in Graphics Screen to lowercase "x", "y" and "z" instead of upper case "X", "Y" and "Z".
- "Increase node numbers by" field in Generate command can accept up to 5 digit numbers.
- CAEPIPE SSTLM Version has a new optional feature to communicate with SST License Manager via UDP Port in addition to TCP Port. This can be performed by defining an Environmental variable "PORT_TYPE" with its values as "UDP" in Server and Client machines. Refer to SSTLM User's Manual for further details.
- MBF format is updated to be compatible with CAEPIPE Version 13.00. See Appendix A of CAEPIPE User's Manual for details.
- 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 13.00. These Manuals can be downloaded from the link www.sstusa.com/caepipe-docs.php.

Bug Fixes

- Bug Correction: For ASME B31.1 (2020 & 2022), ASME B31.8 (2022), ASME B31.9 (2020), ASME B31.12 IP (2019) and ASME B31.12 PL (2019), Stress Range Reduction Factor (f) at 7000 cycles is computed as 1.0212 (= 6/N^0.2). Since the computed f value should be less than or equal to 1.0 for the codes listed above, it is rounded to 1.0 internally.
- Bug Correction: When the Friction Force or Friction Torque is input for a Slip Joint, then non-linear iteration routine was not initialized properly.
- Bug Correction: For Piping Code = NONE, even though CAEPIPE versions 10.50 through 12.20 allowed the user to input specified displacements for Seismic, and similarly, CAEPIPE versions 12.00 through 12.20 allowed the user to input specified displacements for Wind, these specified displacements were not included in the CAEPIPE analysis. From version 13.00, a new feature is added to include these specified displacements in the analysis, the results of which are added "algebraically" to all other STATIC load case results.
- Bug Correction: If the model contained ONLY Generic Supports, the Specified displacements input at Generic Supports under Seismic 1, Seismic 2 and Seismic 3 load cases were not included in the analysis. This bug exists in CAEPIPE Versions 12.00 through 12.20.
- Bug Correction: SSTLM Version of CAEPIPE was altering the License information of a Borrowed License when the option Layout Window > Help > Renew / Repair Activation Key is selected.

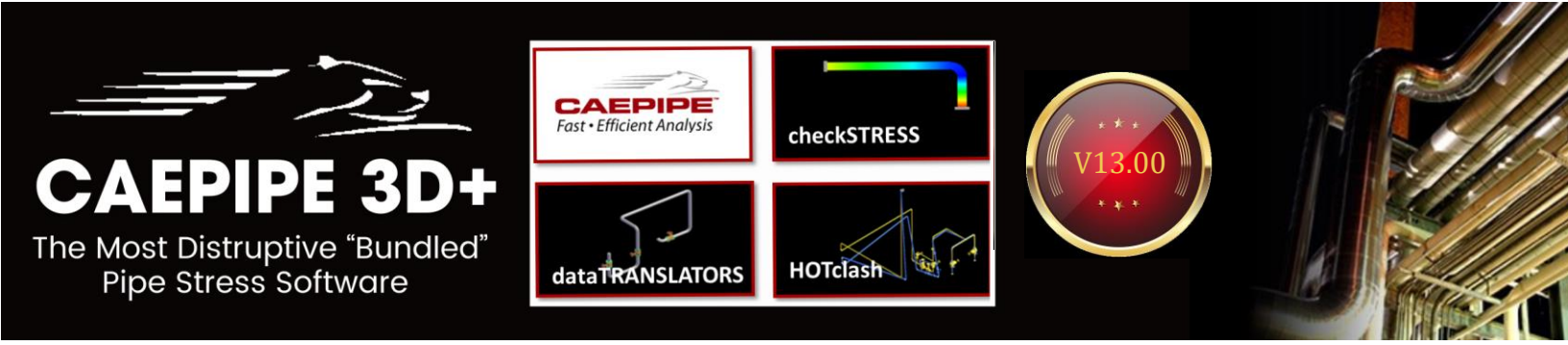


CAEPIPE Code Compliance Checks

Table given below lists the Piping Codes that are built into CAEPIPE Version 13.00 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 (2022) - Process Piping	Metallic	Yes	---
7	ASME B31.4 (2022) - Pipeline Transportation Systems for Liquids and Slurries	Metallic	Yes	Yes
8	ASME B31.5 (2022) - 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 (2022) - Thermoplastic Piping Systems	Nonmetallic	Yes	---
14	ASME NM.2 (2022) - 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	---

Sl. No.	Piping Code and Description	Metallic / Nonmetallic Piping	Above Ground	Buried Piping
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 2 (2023) - ASME Section III, Subsection NC - Class 2	Metallic	Yes	---
22	ASME Class 3 (2017) - ASME Section III, Subsection ND - Class 3	Metallic	Yes	---
23	ASME Class 3 (2021) - ASME Section III, Subsection ND - Class 3	Metallic	Yes	---
24	ASME Class 3 (2023) - ASME Section III, Subsection ND - Class 3	Metallic	Yes	---
25	ISO 14692-3 (2017) - Petroleum and Natural Gas Industries - Glass Reinforced Plastics (GRP/FRP) Piping	Nonmetallic	Yes	Yes
26	EN 13480-3 (2020) - Metallic industrial piping	Metallic	Yes	Yes
27	EN 13941-1 (2021) - District heating pipes	Metallic	---	Yes
28	BS 806 (1986) - Construction of Ferrous Piping Installations for and in Connection with Land Boilers (British)	Metallic	Yes	---
29	DNV-ST-F101 – Submarine pipeline systems	Metallic	Yes	---
30	IGEM (2012) - Institution of Gas Engineers and Managers (IGEM) IGE/TD/12 Edition 2 (UK)	Metallic	Yes	---
31	Norwegian (1983) - Process design	Metallic	Yes	---
32	Norwegian (1990) - Process design	Metallic	Yes	---



Sl. No.	Piping Code and Description	Metallic / Nonmetallic Piping	Above Ground	Buried Piping
33	RCC-M (1985) - Design and Construction Rules for Mechanical Components of PWR Nuclear Islands (French)	Metallic	Yes	---
34	RCC-M (2018) - Design and Construction Rules for Mechanical Components of PWR Nuclear Islands (French)	Metallic	Yes	---
35	RCC-M (2020) - Design and Construction Rules for Mechanical Components of PWR Nuclear Islands (French)	Metallic	Yes	---
36	RCC-M (2022) - Design and Construction Rules for Mechanical Components of PWR Nuclear Islands (French)	Metallic	Yes	---
37	CODETI (2013) - CODE DE CONSTRUCTION DES TUYAUTERIES INDUSTRIELLES (French)	Metallic	Yes	---
38	Stoomwezen (1989) - Dutch Power piping code	Metallic	Yes	---
39	Swedish (1978) – Swedish piping code	Metallic	Yes	---
40	Z183 (1990) - Oil Pipeline Systems (Canadian)	Metallic	Yes	---
41	Z184 (1992) - Gas Pipeline Systems (Canadian)	Metallic	Yes	---
42	Z662 (2019) - Oil & Gas Pipeline Systems (Canadian)	Metallic	Yes	Yes
43	NONE (for AWWA M11 applications, and for applications in aircraft, aerospace & defence industries)	Metallic	Yes	Yes

CAEPIPE 3D+ Demo: Download an evaluation version of CAEPIPE 3D+ from the link https://www.sstusa.com/caepipe3d-software-download.php.