

Code Comparison of ASME Boiler and Pressure Vessel Codes, Pressure Piping and API Standard Practices: ©Compiled by Goutham Rathinam, Aweldl®, CWSIP 3.1 (TWI,UK)

| Code | Reference | Minimum Hydrostatic Testing Calculation | Maximum Permissible Test Pressure | Minimum Test Hold Time | Pressure Gages | Test Temperature Limits | Service |
|----------------------------|-----------------|---|---|------------------------|--|--|---|
| ASME BPVC Sec I | PG-99.1 | 1.5 x Maximum Allowable Working Pressure (MAWP) | No part of the boiler shall be subjected to a general membrane stress greater than 90% of its yield strength (0.2% offset) at test temperature. The primary membrane stress to which boiler components are subjected during hydrostatic test shall be taken into account when designing the components. | | | | Power Boiler:General |
| ASME BPVC Sec I | PG-99.2 | | | | | The metal temperature shall not exceed 120°F (50°C) during the close visual examination | Power Boiler:General |
| ASME BPVC Sec I | PG-99.3.1 | 1.5 x MAWP | | | | | Power Boiler:Super Heater |
| ASME BPVC Sec I | PG-99.3.1 | 1.25 x MAWP | | | | | Power Boiler:Other parts excluding Boiler external piping |
| ASME BPVC Sec I | PG-99.4.2 | | | | not less than 1½ times that Test Pressure | | Power Boiler:Other parts excluding Boiler external piping |
| ASME BPVC Sec I | PMB-21.1 | 3 x MAWP | | | | | Miniature boiler pressure vessel |
| ASME BPVC Sec I | PMB-21.2 | 1.5 x MAWP | | | | | Power Boiler external piping |
| ASME BPVC Sec I | A-22.9 | 1.5 x MAWP | | | | | Power Boiler:Duplicate parts |
| ASME BPVC Sec I | A-22.11.2 | | | | not less than 1½ times that Test Pressure | | Power Boiler:Duplicate parts |
| ASME BPVC Sec III Div I NB | NB-2330 (a) (2) | | | | | not greater than RT _{NDT} + 60°F (RT _{NDT} + 33°C) RT _{NDT} = Drop weight Impact | Nuclear:Class 1 Components |
| ASME BPVC Sec III Div I NB | NB-3226 (c) | | (1) For $P_m \leq 0.67S_y$ $P_m + P_b \leq 1.35 S_y$ (2) For $0.67S_y < P_m \leq 0.90S_y$ $P_m + P_b \leq (2.15 S_y - 1.2P_m)$ P_m - Primary membrane stress intensity; P_b - Bending stress intensity S_y - Yield Strength | | | | Nuclear:Class 1 Components |
| ASME BPVC Sec III Div I NB | NB-6221 (a) | 1.25 x Design Pressure | | | | | Nuclear:Class 1 Components |
| ASME BPVC Sec III Div I NB | NB-6223 | | | 10 mins | | | Nuclear:Class 1 Components |
| ASME BPVC Sec III Div I NB | NB-6412 | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Nuclear:Class 1 Components |
| ASME BPVC Sec III Div I NC | NC-3218 (b) | | (1) For $P_m \leq 0.67S_y$ $P_m + P_b \leq 1.35 S_y$ (2) For $0.67S_y < P_m \leq 0.90S_y$ $P_m + P_b \leq (2.15 S_y - 1.2P_m)$ P_m - Primary membrane stress intensity; P_b - Bending stress intensity S_y - Yield Strength | | | | Nuclear:Class 2 Components |
| ASME BPVC Sec III Div I NC | NC-6212 (b) | | | | | not lower than RT _{NDT} + 60°F (RT _{NDT} + 33°C) | Nuclear:Class 2 Components |
| ASME BPVC Sec III Div I NC | NC-6221 (a) | 1.25 x Design Pressure | | | | | Nuclear:Class 2 Components |
| ASME BPVC Sec III Div I NC | NC-6223 | | | 10 mins | | | Nuclear:Class 2 Components |
| ASME BPVC Sec III Div I NC | NC-6412 | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Nuclear:Class 2 Components |
| ASME BPVC Sec III Div I ND | ND-6212 (b) | | | | | not lower than RT _{NDT} + 60°F (RT _{NDT} + 33°C) RT _{NDT} = Drop weight Impact | Nuclear:Class 3 Components |
| ASME BPVC Sec III Div I ND | ND-6221 (a) | 1.25 x Design Pressure | | | | | Nuclear:Class 3 Components |
| ASME BPVC Sec III Div I ND | ND-6223 | | | 10 mins | | | Nuclear:Class 3 Components |
| ASME BPVC Sec III Div I ND | ND-6412 | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Nuclear:Class 3 Components |
| ASME BPVC Sec III Div I NE | NE-3226 (a) | | (1) For $P_m \leq 0.67S_y$ $P_m + P_b \leq 1.35 S_y$ (2) For $0.67S_y < P_m \leq 0.90S_y$ $P_m + P_b \leq (2.15 S_y - 1.2P_m)$ P_m - Primary membrane stress intensity; P_b - Bending stress intensity S_y - Yield Strength | | | | Nuclear:Class MC Components |

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| ASME BPVC Sec III Div I NE | NE-6212 (b) | | | | | not lower than $RT_{NDT} + 60^{\circ}F$ ($RT_{NDT} + 33^{\circ}C$) RT_{NDT} = Drop weight Impact | Nuclear:Class MC Components |
| ASME BPVC Sec III Div I NE | NE-6221 | 1.2 x Design Pressure | | | | | Nuclear:Class MC Components |
| ASME BPVC Sec III Div I NE | NE-6223 | | | 10 mins | | | Nuclear:Class MC Components |
| ASME BPVC Sec III Div I NE | NE-6412 | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Nuclear:Class MC Components |
| ASME BPVC Sec III Div I NH | NH-6212 | | | | | not lower than $RT_{NDT} + 60^{\circ}F$ ($RT_{NDT} + 33^{\circ}C$) RT_{NDT} = Drop weight Impact | Nuclear:Class 1 Components in Elevated Temperature Service |
| ASME BPVC Sec III Div I NH | NH-6215 | | | 10 mins | | | Nuclear:Class 1 Components in Elevated Temperature Service |
| ASME BPVC Sec III Div I NH | NH-6221 (a) | 1.25 x Design Pressure | | | | | Nuclear:Class 1 Components in Elevated Temperature Service |
| ASME BPVC Sec III Div I NH | NH-6400 | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Nuclear:Class 1 Components in Elevated Temperature Service |
| ASME BPVC Sec III Div III | WB-3225 (a) TO (d) | | (1) For $P_m \leq 0.67S_y$ $P_m + P_b \leq 1.35 S_y$ (2) For $0.67S_y < P_m \leq 0.90S_y$ $P_m + P_b \leq (2.15 S_y - 1.2P_m)$ P_m - Primary membrane stress intensity; P_b - Bending stress intensity S_y - Yield Strength | | | | Nuclear:Class TC Transportation Containments |
| ASME BPVC Sec III Div III | WB-6212 | | | | | not lower than $RT_{NDT} + 60^{\circ}F$ ($RT_{NDT} + 33^{\circ}C$) RT_{NDT} = Drop weight Impact | Nuclear:Class TC Transportation Containments |
| ASME BPVC Sec III Div III | WB-6221 (a) | 1.5 x Design Pressure | | | | | Nuclear:Class TC Transportation Containments |
| ASME BPVC Sec III Div III | WB-6223 | | | 10 mins | | | Nuclear:Class TC Transportation Containments |
| ASME BPVC Sec III Div III | WB-6412 (a) | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Nuclear:Class TC Transportation Containments |
| ASME BPVC Sec III Div III | WC-3218 (b) | | (1) For $P_m \leq 0.67S_y$ $P_m + P_b \leq 1.35 S_y$ (2) For $0.67S_y < P_m \leq 0.90S_y$ $P_m + P_b \leq (2.15 S_y - 1.2P_m)$ P_m - Primary membrane stress intensity; P_b - Bending stress intensity S_y - Yield Strength | | | | |
| ASME BPVC Sec III Div III | WC-6212 | | | | | not lower than $RT_{NDT} + 60^{\circ}F$ ($RT_{NDT} + 33^{\circ}C$) RT_{NDT} = Drop weight Impact | Nuclear:Class SC Storage Containments |
| ASME BPVC Sec III Div III | WC-6221 | 1.25 x Design Pressure | | | | | Nuclear:Class SC Storage Containments |
| ASME BPVC Sec III Div III | WC-6223 | | | 10 mins | | | Nuclear:Class SC Storage Containments |
| ASME BPVC Sec III Div III | WC-6412 (a) | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Nuclear:Class SC Storage Containments |
| ASME BPVC Sec III Div V | ASME BPVC Sec III Div I NB-3226 (c) | | (1) For $P_m \leq 0.67S_y$ $P_m + P_b \leq 1.35 S_y$ (2) For $0.67S_y < P_m \leq 0.90S_y$ $P_m + P_b \leq (2.15 S_y - 1.2P_m)$ P_m - Primary membrane stress intensity; P_b - Bending stress intensity S_y - Yield Strength | | | | Nuclear:High Temperature Reactors |
| ASME BPVC Sec III Div V | HBB-6212 | | | | | not lower than $RT_{NDT} + 60^{\circ}F$ ($RT_{NDT} + 33^{\circ}C$) RT_{NDT} = Drop weight Impact | Nuclear:High Temperature Reactors |
| ASME BPVC Sec III Div V | HBB-6215 | | | 10 mins | | | Nuclear:High Temperature Reactors |

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|----------------------------|----------------------------|--|-----------------------------------|------------------------|---|--|-----------------------------------|
| ASME BPVC Sec III Div V | HBB-6221 (a) | 1.25 x Design Pressure | | | | | Nuclear:High Temperature Reactors |
| ASME BPVC Sec III Div V | HBB-6400 | | | | not less than 1½ times nor more than 4 times theTest Pressure | | Nuclear:High Temperature Reactors |
| ASME BPVC Sec IV | HG-504 | 1.5 x MAWP | | | | | Heating Boiler:General |
| ASME BPVC Sec IV | HG-505 | | | | not less than 1½ times nor more than 4 times theTest Pressure | | Heating Boiler:General |
| ASME BPVC Sec IV | HG-510 (2) | | | 5 mins | | | Heating Boiler:General |
| ASME BPVC Sec IV | HG-510 (4) (c) Shop | 1.5 x MAWP | 10 psi (70 kPa) | | | | Heating Boiler:General |
| ASME BPVC Sec IV | HG-510 (4) (c) Assembled | 2.5 x MAWP or 60 psi (0.400 MPa) | | | | | Heating Boiler:General |
| ASME BPVC Sec IV | HC-402.1 (b) | | | | not less than 1½ times nor more than 4 times theTest Pressure | | Heating Boiler:Cast Iron |
| ASME BPVC Sec IV | HC-410.2 Shop | 2.5 x MAWP or 60 psi (0.400 MPa) | | | | | Heating Boiler:Cast Iron |
| ASME BPVC Sec IV | HC-410.2 Assembled | 1.5 x MAWP | | | | | Heating Boiler:Cast Iron |
| ASME BPVC Sec IV | HC-410.3 | | 10 psi (70 kPa) | | | | Heating Boiler:Cast Iron |
| ASME BPVC Sec IV | HA-406.1 (b) Shop | 2.5 x MAWP or 60 psi (0.400 MPa) | | | | | Heating Boiler:Cast Aluminium |
| ASME BPVC Sec IV | HA-406.1 (C) Assembled | | | | | | Heating Boiler:Cast Aluminium |
| ASME BPVC Sec IV | HA-406.2 | | 10 psi (70 kPa) | | | | Heating Boiler:Cast Aluminium |
| ASME BPVC Sec IV | HLW-502.2 (b) | | | | not less than 1½ times nor more than 4 times theTest Pressure | | Potable-Water Heaters |
| ASME BPVC Sec IV | HLW-505.1 | 1.5 x MAWP | | | | | Potable-Water Heaters |
| ASME BPVC Sec IV | HLW-505.2 | | 10 psi (70 kPa) | | | | Potable-Water Heaters |
| ASME BPVC Sec VII | 105.8 | Test Pressure never exceed 1.5 x MAWP and typically is 1.25 x MAWP or lower | | | | ASME Sec I, PG-99 requires that pressure test water temperature be a min. of 70°F (20°C) and a | Care of Power Boilers |
| ASME BPVC Sec VIII Div I | UG-99 (b) | 1.5 x MAWP x LSR ⁴ | | | | | Pressure Vessel |
| ASME BPVC Sec VIII Div I | UG-99 (h) | | | | | The metal temperature during a hydrostatic test shall be maintained at least 17°C (30°F) above the minimum design metal temperature of the vessel, but | Pressure Vessel |
| ASME BPVC Sec VIII Div I | UG-102 (b) | | | | not less than 1½ times nor more than 4 times theTest Pressure | | Pressure Vessel |
| ASME BPVC Sec VIII Div I | UCI-99 (a) | for MAWP> 30 psi (200 kPa) 2 x MAWP for MAWP< 30 psi (200 kPa) 2.5 x MAWP | 60 psi (400 kPa) | | | | Pressure Vessel |
| ASME BPVC Sec VIII Div I | UCD-99 (a) | 2 x MAWP | | | | | Pressure Vessel |
| ASME BPVC Sec VIII Div I | ULT-99 | 1.4 x Design Pressure | | 15 mins | | 150°F (65°C) | Pressure Vessel |
| ASME BPVC Sec VIII Div II | 8.1.3.1 | 1.43 x MAWP | | | | | Pressure Vessel |
| ASME BPVC Sec VIII Div II | 8.1.4 (b) | | | | not less than 1½ times nor more than 4 times theTest Pressure | | Pressure Vessel |
| ASME BPVC Sec VIII Div II | 8.2.1 (a) | 1.43 x MAWP (Class 1) | | | | | Pressure Vessel |
| ASME BPVC Sec VIII Div II | 8.2.1 (a) | 1.25 x MAWP X LSR (Class 2) | | | | | Pressure Vessel |
| ASME BPVC Sec VIII Div II | 8.2.4 | | | | | The metal temperature during a hydrostatic test shall be maintained at least 17°C (30°F) above the minimum design metal temperature of the vessel, but | Pressure Vessel |
| ASME BPVC Sec VIII Div III | KT-311 | 1.25 x MAWP | | | | | Pressure Vessel |
| ASME BPVC Sec VIII Div III | KT-320 | | | | | T _{cy} + 17°C (30°F); T _{cy} = 10°F (5.6°C) Impact Test Metal Temperature | Pressure Vessel |

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|----------------------------|-------------------------|---|---|------------------------|--|--|---|
| ASME BPVC Sec VIII Div III | KT-410 | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Pressure Vessel |
| ASME BPVC Sec XI | IWA-5264 | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Inservice inspection of Nuclear Power Plant |
| ASME BPVC Sec XI | Table IWB-5230-1 | Test Temperature, °F (°C) | Test Pressure | | | | Inservice inspection of Nuclear Power Plant |
| | | 100 (40) or less | 1.10P _o | | | | |
| | | 200 (95) | 1.08P _o | | | | |
| | | 300 (150) | 1.06P _o | | | | |
| | | 400 (200) | 1.04P _o | | | | |
| | | 500 (260) or greater | 1.02P _o | | | | |
| | | P _o is the reactor pressure corresponding to | | | | | |
| ASME BPVC Sec XI | IWC-5230 | 1.10 x System Pressure | | | | for systems with Design Temperature of 200°F (95°C) or | Inservice inspection of Nuclear Power Plant |
| ASME BPVC Sec XI | IWC-5230 | 1.25 x System Pressure | | | | for systems with Design Temperature above 200°F (95°C) | Inservice inspection of Nuclear Power Plant |
| ASME BPVC Sec XI | IWD-5230 | 1.10 x System Pressure | | | | for systems with Design Temperature of 200°F (95°C) or | Inservice inspection of Nuclear Power Plant |
| ASME BPVC Sec XI | IWD-5230 | 1.25 x System Pressure | | | | for systems with Design Temperature above 200°F (95°C) | Inservice inspection of Nuclear Power Plant |
| ASME BPVC Sec XII | TT-210 (a) (1) | 1.3 x MAWP | | | | | Transport Tanks |
| ASME BPVC Sec XII | TT-210 (a) (3) | | | | | metal temperature during hydrostatic test be maintained at least 17°C (30°F) above the minimum design metal and to | Transport Tanks |
| ASME BPVC Sec XII | TT-240 | | | | not less than 1½ times nor more than 4 times the Test Pressure | | Transport Tanks |
| ASME BPVC Sec XII | TP-410.3 (5) (b) | | | 10 mins | | | Transport Tanks |
| ASME B31.1 | 137.4.3 | 1.5 x Design Pressure | | 10 mins | | | Pressure Piping |
| ASME B31.1 | 102.3.3 (B) | | circumferential (hoop) stress shall not exceed 90% of the yield strength (0.2% offset) at test temperature. In addition, the sum of longitudinal stresses due to test pressure and live and dead loads at the time of test, excluding occasional loads, shall not exceed 90% of the yield strength at test temperature. | | | | Pressure Piping |
| ASME B31.2 | 237.4 | 1.5 x MAWP | | | | | Pressure Piping |
| ASME B31.3 | A345.4.2 | 1.5 x Design Pressure | | | | | Pressure Piping |
| ASME B31.3 | K345.4.2 | 1.25 x Design Pressure | | | | | High Pressure Piping |
| ASME B31.4 | 437.4.1 | 1.25 x Design Pressure | | not less than 4 hrs | | | General Pipeline |
| ASME B31.4 | C437.4.1 | 1.1 x Design Pressure | | not less than 4 hrs | | | Slurry Pipeline |
| ASME B31.5 | 538.4.2 (f) | | | 10 min | | | Refrigerent Piping |
| ASME B31.5 | 538.6 (a) | 1.5 x Design Pressure | | | | | Refrigerent Piping |
| ASME B31.8 | 816 | 1.25 x MAWP (Class 1) | | 2 hrs | | | Line Pipe-Gas Transmission |
| ASME B31.8 | 816 | 1.5 x MAWP (Class 2,3,4) | | | | | Line Pipe-Gas Transmission |
| ASME B31.8 | 851.12.1 (d) In Service | 1.1 x Maximum Allowable Operating Pressure | | | | | Line Pipe-Gas Transmission |
| ASME B31.8 | 851.12.2 | | | ½ hr | | | Line Pipe-Gas Transmission |
| ASME B31.8 | A847.2 | 1.25 x Maximum Allowable Operating | | | | | Offshore Gas Transmission |
| ASME B31.8 | A847.4 (c) | | | 2 hrs | | | Offshore Gas Transmission |
| ASME B31.9 | 937.3.4 (a) | 1.5 x Design Pressure | | | | | Building Service Piping |
| ASME B31.9 | 937.3.5 | | | 10 min | | | Building Service Piping |
| ASME B31.11 | 1137.4.1 (2) | 1.1 x Design Pressure | | not less than 4 hrs | | | Slurry Transportation Piping |
| ASME B31.12 | GR-5.17.1 In Service | 1.5 x Maximum Allowable Operating Pressure | | | | | Industrial Pipeline |
| ASME B31.12 | GR-5.17.2 In Service | | | ½ hr | | | Industrial Pipeline |
| ASME B31.12 | IP-10.6.2 | 1.5 x Design Pressure | | | | | Industrial Piping |
| ASME B31.12 | PL-3.10.2 | 1.5 x Maximum Allowable Operating | | 2 hrs | | | Industrial Pipeline |
| API 1111 | 8.2.4.1 | 125 % x Maximum Operating Pressure | | | | | Offshore hydrocarbo Pipeline |
| API 510 | 5.8.3.1 | 1.3 x MAWP x (S _{test} temp/S _{design} temp) S _{test} temp = allowable stress at test | | | | | In service inspection of Pressure Vessel |

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|-------------|---------------------|---|-----------------------------------|------------------------|----------------|---|--|
| API 510 | 5.8.7.2 | | | | | To minimize the risk of brittle fracture during a pressure test, the metal temperature should be maintained at least 30 °F (17 °C) above the MDMT or MAT for vessels that are more than 2 in. (5 cm) thick and 10 °F (6 °C) | In service inspection of Pressure Vessel |
| API 572 | 9.7.2 | | | | | To minimize the risk of brittle fracture during a pressure test, the metal temperature should be maintained at least 30 °F (17 °C) above the MDMT or MAT for vessels that are more than 2 in. (5 cm) thick and 10 °F (6 °C) | In service inspection of Pressure Vessel |
| API 579-1 | 3.6.2.3 | | | | | TCV+ 17°C (30°F);TCV = 10°F (5.6°C) | General |
| API RP 574 | 10.4.2 | 1.5 x Design Pressure | | | | | Piping |
| API RP 1110 | 4.1.7-Spike Test | > 1.25 x Design Pressure | | > 5 mins < 1 hour | | | Pipeline |
| API RP 1110 | 4.1.7-Strength Test | > 1.25 x Design Pressure | | > 4 hours | | | Pipeline |
| API RP 1110 | 4.1.7-Leak Test | > 1.25 x Design Pressure | | ≥ 2 hours | | | Pipeline |