



ISO/TC 197
Hydrogen technologies

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Pressure Terminology and Corresponding Component Rating

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Basic Definitions

Maximum Allowable Working Pressure (MAWP) - maximum pressure permissible in a vessel or system during normal (fault free) operation at the temperature specified for the pressure.

- It is the least of the values found for maximum allowable working pressure for any of the essential parts of the vessel by the principles established in ASME Section VIII.
- The MAWP is shown on the vessel nameplate. The MAWP may be taken same as the design pressure, but for the most part the MAWP is based on the fabricated thickness minus the corrosion allowance. MAWP applies to pressure vessels only.
- MAP in Europe is equivalent to MAWP.

Safety **Pressure Relief Devices (PRDs)** must be set at or below MAWP to initiate fault management

Maximum Operating Pressure (MOP) - The highest pressure expected during normal (fault free) operation.

- This is usually 10-20% below the MAWP.

Nominal Working Pressure (NWP) – The settled pressure of a full container at 15C.

**Compressed Hydrogen
Storage System (CHSS)
On Vehicle**

Hydrogen Dispenser

H-Service

1.50 x NWP

Maximum Developed Pressure During Fault Management

1.38 x NWP

Not Applicable

*PSV Accuracy
and Full Lift*

Dispenser MAWP

*Individual
Component Ratings*

Highest PSV Setpoint

1.25 x NWP

Maximum Fill Pressure

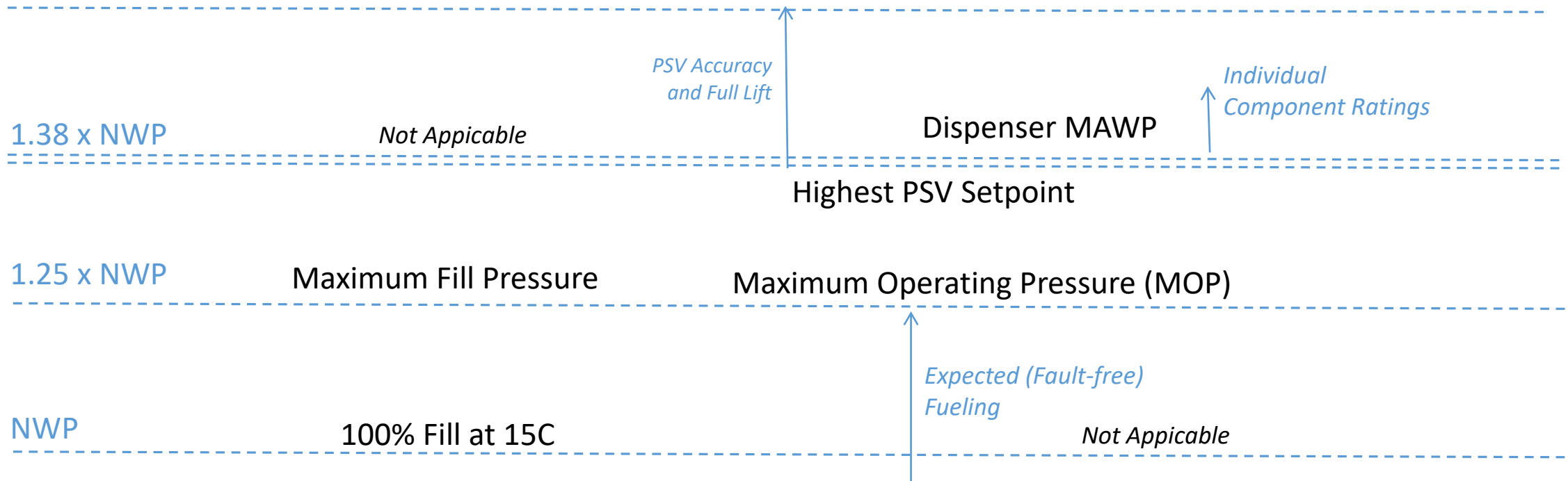
Maximum Operating Pressure (MOP)

NWP

100% Fill at 15C

*Expected (Fault-free)
Fueling*

Not Applicable



Rating of Dispenser Components

Ultimate Strength

- Typical state/regional norms
 - ANSI: typically 3 x MAWP but theoretically allows as low as 1.8xMAWP for high pressure systems in ANSI B31.3 with extensive analysis
 - Japan: 2.4 x MAWP?
 - China: 2.7 x MAWP or 2.4 x MAWP with special analysis
 - PED: $1/(1/3) = 3.0 \times \text{MAP} = 3.0 \times \text{MAWP}$ for austenitic steels
- Recommendation: Use a minimum (initial) burst pressure of at least 2.7 x MAWP – or, in order to accommodate the European requirement, do we need 3.0 x MAWP?
 - Using the H-service terminology, the burst pressure should be greater than $(2.7 \times 1.38) \times \text{NWP} = 3.73 \times \text{NWP}$ or $(3.0 \times 1.38) \times \text{NWP} = 4.14 \times \text{NWP}$ depending if we accommodate the European PED or not.
 - Is the current interpretation of the European PED correct or is there a flexibility within the PED for items to use a lower pressure to harmonize with other regions/states? This question may be particularly important to the nozzle but could apply to other components too! We need to resolve this!

Rating of Dispenser Components

Yield Strength

- Typical state/regional norms
 - ANSI: hydrotests are generally to 1.5 x MAWP but there alternatives where the test pressure can be lowered to as low as 1.1 x MAWP.
 - China: 1.25 x MAWP
 - PED: Test pressure = 1.43 x MAP = 1.43 x MAWP = (1.43 x 1.38) x NWP = 1.97 x NWP
- Recommendation: Conduct a proof test to at least 2 x NWP which is equivalent to $(2/1.38) \times NWP = 1.45 \times MAWP$ for the dispenser.