Instructions to Voters/Comments on API 520 Part I Ballot "Definition of Trim"

BALLOT FOR ACTION ITEM AI 2023-07

1. Your comments should be limited to the **red-line portions of the ballot only.**
2. This ballot addresses 520 Action Item 2023-07.
3. If you are voting negative, please indicate which of your comment or comments are the reason for your negative vote. API's Balloting system will categorize all of your comments as Negative.

Thanks to Gaurav Arora and his work group for their efforts.

Phil Henry
API 520 Task Force Chair

3 Terms, Definitions, Acronyms, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following definitions apply. Many of the terms and definitions are taken from ASME PTC 25.

3.1.1
accumulation
The pressure increase over the MAWP of the vessel, expressed in pressure units or as a percentage of MAWP or design pressure. Maximum allowable accumulations are established by applicable codes for emergency operating and fire contingencies.

3.1.2
actual orifice area/actual discharge area
The cross-sectional area (based on the measured diameter) within the pressure-relief device flow path that limits the fluid flow through the pressure-relief device.

NOTE The value is normally measured and recorded as part of the certification test by an independent organization following the procedures specified in the device's code of construction.

3.1.3
backpressure
The pressure that exists at the outlet of a pressure-relief device as a result of the pressure in the discharge system. Backpressure is the sum of the superimposed and built-up backpressures.

3.1.4
balanced pressure-relief valve
A spring-loaded pressure-relief valve that incorporates a bellows or other means for minimizing the effect of backpressure on the operational characteristics of the valve.

3.1.5
blowdown
The difference between the set pressure and the closing pressure of a pressure-relief valve, expressed as a percentage of the set pressure or in pressure units.

3.1.6
bore area/nozzle area/nozzle throat area/throat area
The minimum cross-sectional flow area of a nozzle in a pressure-relief valve.

3.1.7
built-up backpressure
The increase in pressure at the outlet of a pressure-relief device that develops as a result of flow after the pressure-relief device opens.

3.1.8
burst pressure
The value of the upstream static pressure minus the value of the downstream static pressure just prior to when the disk bursts. When the downstream pressure is atmospheric, the burst pressure is the upstream static gauge pressure.

3.1.9
burst pressure tolerance
The variation around the marked burst pressure at the specified disk temperature in which a rupture disk shall burst.

3.1.10
capacity/relieving capacity
The flow rate of a fluid through a pressure-relief device or a pressure-relief system under a given set of conditions and fluid properties.

3.1.11
certified capacity/certified relieving capacity
The capacity of a pressure-relief device determined using the certification test fluid (commonly air, steam, or water), at the certification test overpressure, with the certified coefficient of discharge, and with the actual orifice area, all in accordance with the applicable code of construction.

NOTE 1 It does not include any derating factors based on the physical installation such as a rupture disk upstream of a pressure-relief valve or backpressure on a balanced bellows valve. This capacity is provided by the pressure- relief device vendor and is stamped on the pressure-relief device nameplate.

NOTE 2 The certification overpressure for ASME *BPVC*, Section VIII valves is typically the greater of 10 % or 3 psi.

3.1.12
certified coefficient of discharge
The published value for the ratio of the measured relieving capacity to the theoretical relieving capacity of an ideal nozzle, multiplied by a capacity derating factor if required by the code of construction.

NOTE This value is determined by an independent organization following the capacity certification requirements in the device's code of construction.

3.1.13
chatter
The opening and closing of a pressure-relief valve at a very high frequency (on the order of the natural frequency of the valve's spring mass system).

3.1.14
closing pressure
The value of decreasing inlet static pressure at which the valve disc reestablishes contact with the seat or at which lift becomes zero as determined by seeing, feeling, or hearing.

3.1.15
cold differential test pressure
CDTP
The pressure at which a pressure-relief valve is adjusted to open on the test stand. The CDTP includes corrections for the service conditions of backpressure or temperature or both.

3.1.16
conventional pressure-relief valve
A spring-loaded pressure-relief valve whose operational characteristics are directly affected by changes in the backpressure.

3.1.17
curtain area
The area of the cylindrical or conical discharge opening between the seating surfaces above the nozzle seat created by the lift of the disc.

3.1.18
cycling
The relatively low frequency (a few cycles per second to a few seconds per cycle) opening and closing of a pressure-relief valve.

3.1.19
design pressure
Pressure, together with the design temperature, used to determine the minimum permissible thickness or physical characteristic of each vessel component as determined by the design rules of the pressure design code.

NOTE: The design pressure is selected by the user to provide a suitable margin above the most severe pressure expected during normal operation at a coincident temperature, and it is typically specified by the Purchaser. The design pressure is equal to or less than the MAWP (the design pressure can be used as the MAWP in cases where the MAWP has not been established).

3.1.20
dual certified pressure-relief valves
Pressure-relief valves that are both vapor flow certified and liquid flow certified where dual certification is achieved without making any modifications or adjustments to the relief device when switching fluids during the flow testing.

3.1.21
effective coefficient of discharge
The value for the ratio of the estimated relieving capacity to the theoretical relieving capacity of an ideal nozzle.

NOTE API 520 provides effective coefficients of discharge.

3.1.22
effective discharge area/effective orifice area
A nominal cross-sectional area within the pressure-relief device flow path that limits the fluid flow through the pressure-relief device.

NOTE API 526 provides effective orifice areas for a range of valve sizes in terms of letter designations, “D” through “T” that allow calculations to be performed per the preliminary sizing equations.

3.1.23
flutter
The abnormal, rapid reciprocating motion of the moveable parts of a pressure-relief valve, during which the disk does not contact the seat or the upper stop.

3.1.24
huddling chamber
An annular chamber located downstream of the seat of a pressure-relief valve for the purpose of assisting the valve to achieve lift.

3.1.25
inlet size
The nominal pipe size (NPS) of the device at the inlet connection, unless otherwise designated.

3.1.26
leak test pressure
The specified inlet static pressure at which a seat leak test is performed.

3.1.27
lift
The actual travel of the disc from the closed position when a valve is relieving.

3.1.28
lot of rupture disks
Disks manufactured at the same time and of the same size, material, thickness, type, heat, and manufacturing process, including heat treatment.

3.1.29
manufacturing design range
The pressure range within which the marked burst pressure will fall.

NOTE: Manufacturing design ranges are usually catalogued by the manufacturer as a percentage of the specified burst pressure.

3.1.30
marked burst pressure/rated burst pressure
The burst pressure established by tests for the specified temperature and marked on the disk tag by the manufacturer.

NOTE: The marked burst pressure is applied to all of the rupture disks of the same lot.

3.1.31
maximum allowable working pressure
MAWP
The maximum gauge pressure permissible at the top of a completed vessel in its normal operating position at the designated coincident temperature specified for that pressure.

NOTE: The pressure is the least of the values for the internal or external pressure as determined by the vessel design rules for each element of the vessel using actual nominal thickness, exclusive of additional metal thickness allowed for corrosion and loadings other than pressure. The MAWP is normally greater than the design pressure but can be equal to the design pressure when the design rules are used only to calculate the minimum thickness for each element and calculations are not made to determine the value of the MAWP.

3.1.32
maximum operating pressure
The maximum pressure expected during normal system operation.

3.1.33
minimum net flow area
The calculated net area after a complete burst of a rupture disk with appropriate allowance for any structural members that reduce the net flow area through the rupture disk device.

3.1.34
modulating pressure-relief valve
A pressure-relief valve that opens and flows in proportion to the inlet pressure for some or all parts of the valve's operating range from set pressure to overpressure at full lift.

3.1.35
nonfragmenting rupture disk
A rupture disk designed and manufactured to be installed upstream of other piping components. Nonfragmenting rupture disks do not impair the function of pressure-relief valves when the disk ruptures.

3.1.36
nonreclosing pressure-relief device
A pressure-relief device that remains open after operation.

3.1.37
normal cubic meters per minute, Nm^3/min
SI unit for volumetric flow rate of gas at a temperature of 0 °C and an absolute pressure of 101.3 kPa, expressed in cubic meters per minute.

3.1.38
opening pressure
The value of increasing inlet static pressure at which there is a measurable lift of the disc or at which discharge of the fluid becomes continuous, as determined by seeing, feeling, or hearing.

3.1.39
operating ratio of a pressure-relief valve
The ratio of maximum system operating pressure to the set pressure.

3.1.40
operating ratio of a rupture disk
The ratio of the maximum system operating pressure to a pressure associated with a rupture disk (see Figure 27 and Figure 29). For marked burst pressures above 40 psi, the operating ratio is the ratio of maximum system operating pressure to the disk marked burst pressure. For marked burst pressures between 15 psi and 40 psi, the operating ratio is the ratio of maximum system operating pressure to the marked burst pressure minus 2 psi. For marked burst pressures less than 15 psi, the operating ratio should be determined by consulting the manufacturer.

3.1.41
outlet size
The NPS of the device at the discharge connection, unless otherwise designated.

3.1.42
overpressure
The pressure increase over the set pressure of the relieving device. Overpressure is expressed in pressure units or as a percentage of set pressure. Overpressure is the same as accumulation only when the relieving device is set to open at the MAWP of the vessel.

3.1.43
pilot-operated pressure-relief valve
A pressure-relief valve in which the major relieving device or main valve is combined with and controlled by a self-actuated auxiliary pressure-relief valve (pilot).

3.1.44
pin-actuated device
A nonreclosing pressure-relief device actuated by static pressure and designed to function by buckling or breaking a pin, which holds a piston or a plug, in place. Upon buckling or breaking of the pin, the piston or plug instantly moves to the full open position.

3.1.45
pressure-relief device
PRD
A general term for a device actuated by inlet static pressure and designed to open during emergency or abnormal conditions to prevent an internal fluid pressure or vacuum in excess of a specified design value (see section 4).

3.1.46
pressure-relief valve
PRV
A pressure-relief device designed to open and relieve excess pressure and to reclose and prevent the further flow of fluid after normal conditions have been restored.

3.1.47
rated capacity/rated relieving capacity
The capacity of the pressure-relief device determined using the properties of the actual fluid flowing through the pressure-relief device at the certification test overpressure. The overpressure is specified by the applicable code of construction. This capacity can be determined using the effective coefficient of discharge and effective orifice area, or the certified coefficient of discharge and actual orifice area (see 5.2).

NOTE 1 The certification test overpressure for ASME *BPVC*, Section VIII valves is typically the greater of 10 % or 3 psi.

NOTE 2 The rated capacity retains the code-required capacity derating.

3.1.48
relief valve
A spring-loaded pressure-relief valve actuated by the static pressure upstream of the valve. The valve opens normally in proportion to the pressure increase over the opening pressure. A relief valve is used primarily with incompressible fluids.

3.1.49
relieving conditions
The inlet pressure and temperature on a pressure-relief device during an overpressure condition. The relieving pressure is equal to the valve set pressure (or rupture disk burst pressure) plus the overpressure.

NOTE: The temperature of the flowing fluid at relieving conditions can be higher or lower than the operating temperature.

3.1.50
required capacity/required relieving capacity/required relief rate/required relief load
The fluid flow rate that is required to pass through the pressure-relief device for a particular overpressure scenario.

3.1.51
rupture disk
A pressure-containing, pressure- and temperature-sensitive element of a rupture disk device.

3.1.52
rupture disk device
A nonreclosing pressure-relief device actuated by static differential pressure between the inlet and outlet of the device and designed to function by the bursting of a rupture disk. A rupture disk device includes a rupture disk and a rupture disk holder.

3.1.53
rupture disk holder
The structure that encloses and clamps the rupture disk in position. Some disks are designed to be installed between standard flanges without holders.

3.1.54
safety relief valve
A spring-loaded pressure-relief valve that can be used as either a safety or relief valve depending on the application.

3.1.55
safety valve
A spring-loaded pressure-relief valve actuated by the static pressure upstream of the valve and characterized by rapid opening or pop action. A safety valve is normally used with compressible fluids.

3.1.56
set pressure
The inlet gauge pressure at which the pressure-relief device is set to open under service conditions.

3.1.57
simmer
The audible or visible escape of compressible fluid between the seat and disc of a pressure-relief valve that can occur at an inlet static pressure below the set pressure prior to opening.

3.1.58
specified burst pressure
The burst pressure specified by the user at a specified temperature. (see 4.3.6.2.1).

3.1.59
specified disk temperature
The temperature of the disk when the disk is expected to burst. The specified disk temperature is the temperature the manufacturer uses to establish the marked burst pressure.

NOTE: The specified disk temperature is rarely the design temperature of the vessel and sometimes is not the operating temperature or relief temperature, depending on the relief system configuration (see 4.3.1.5).

3.1.60
standard cubic feet per minute
SCFM
USC unit for volumetric flow rate of gas at a temperature of 60 °F and an absolute pressure of 14.7 psi, expressed in cubic feet per minute.

3.1.61
superimposed backpressure
The static pressure that exists at the outlet of a pressure-relief device at the time the device is required to operate. Superimposed backpressure is the result of pressure in the discharge system coming from other sources and can be either constant or variable.

3.1.62
trim
Collective reference to the internal components (nozzle, disc, disc holder, adjusting ring etc.) of a pressure-relief valve required to achieve desired valve performance characteristics.