(9) Certification Mark with the UD Designator placed under the Mark, as shown in Figure UG-129.2. A marking method other than the stamp issued by the Society may be used, provided it is acceptable to the ASME Designated Organization.

(10) year built, or alternatively, a coding may be marked on the device such that the device Manufacturer can identify the year the device was tested.

(11) The pin shall be marked according to one of the following methods:

- (a) for pin devices using a replaceable pin to control set pressure, the pin shall be marked with its lot number, pin temperature \(^{57}\) °F \(^{\circ}\) (°C) and the information required by (1), (4), (6), (10), or

NOTE: When the pin size or configuration does not permit the use of an attached metal tag, a metal tag may be attached using a nonmetallic connector with an adhesive that complies with Mandatory Appendix 18 of this Division.

- (b) for pin devices that are single use and permanently assembled, the marking requirements of (8)(a), (b)(-b), and (a) shall be applied to the device, or

- (c) for pin devices that have a replaceable pin within the sealed body per UG-138, the pin shall be marked with its lot number.

- (g) Spring-Loaded Nonrecessed Pressure Relief Devices. Spring-loaded nonrecessing pressure relief devices shall be marked in accordance with (a) above except that the Certification Mark is to be applied only when the capacity has been established and certified in accordance with UG-127(c)(3) and all other requirements of UG-130 have been met.

(b) For units other than those included above, see U-4.

UG-130 Certification Mark

Each pressure relief device \(^{58}\) to which the Certification Mark with the appropriate Designator (see Figures UG-129.1 and UG-129.2) will be applied shall have been fabricated or assembled by a Manufacturer or Assembler holding a valid Certificate of Authorization (UG-117) and capacity certified in accordance with the requirements of this Division. A Certified Individual (CI) shall provide oversight as required by UG-117(a). Each use of the Certification Mark with the appropriate Designator shall also be documented on a Certificate of Conformance Form UV-1 or UD-1, as appropriate.

UG-131 Certification of Capacity of Pressure Relief Devices

(a) Before the Certification Mark is applied to any pressure relief device, the device Manufacturers shall have the capacity of their devices certified in accordance with the provisions of these paragraphs except where noted.

(1) For pressure relief valves and pin devices to be certified for capacity, (b) through (m) apply.

(2) For rupture disks or pin devices to be certified for capacity, (b) through (j) apply.

(3) For rupture disks to be certified for flow resistance, (n) through (u) apply.

(4) For pin devices to be certified for flow resistance, (k) through (p) and (r) through (u) shall apply.

(b) See below.

(1) Capacity certification tests for pressure relief devices for compressible fluids shall be conducted on dry saturated steam, air, or gas. When dry saturated steam is used, the limits for test purposes shall be 98% minimum quality and 20°F \((10\degree\text{C})\) maximum superheat. Correction from within these limits may be made to the dry saturated condition. Pressure relief devices for steam service may be rated as above, but at least one device of each series shall be tested on steam to demonstrate the steam capacity and performance.

(2) Capacity certification tests for pressure relief devices for incompressible fluids shall be conducted on water at a temperature between 40°F \((5\degree\text{C})\) and 125°F \((50\degree\text{C})\).

(c) See below.

(1) Capacity certification tests shall be conducted at a pressure which does not exceed the pressure for which the pressure relief device is set to operate by more than 10% or 3 psi \((20\text{ kPa})\), whichever is greater, except as provided in (2) below. For pressure relief valves minimum pressure for capacity certification tests shall be at least 3 psi \((20\text{ kPa})\) above set pressure. The reseating pressure shall be noted and recorded.

(2) Capacity certification tests of pressure relief devices for use in accordance with UG-125(c)(3) may be conducted at a pressure not to exceed 120% of the stamped set pressure of the device.

(3) See below.

- (a) Pressure relief valves for compressible fluids having an adjustable blowdown construction shall be adjusted prior to testing so that the blowdown does not exceed 5% of the set pressure or 3 psi \((20\text{ kPa})\), whichever is greater.

- (b) The blowdown of pressure relief valves for incompressible fluids and pressure relief valves for compressible fluids having nonadjustable blowdown shall be noted and recorded.

(4) Capacity certification of pilot-operated pressure relief devices may be based on tests without the pilot devices installed, provided prior to capacity tests it has been demonstrated by test to the satisfaction of the Authorized Observer that the pilot device will cause the main device to open fully at a pressure which does not exceed the set pressure by more than 10% or 3 psi \((20\text{ kPa})\), whichever is greater, and that the pilot device in combination with the main device will meet all the requirements of this Division.

(d) See below.

(1) A capacity certification test is required on a set of three devices for each combination of size, design, and pressure setting. The stamped capacity rating for each combination of design, size, and test pressure shall not
conducted, and shall accurately model those features and internal flow configuration in the fully open position, and mechanical valve lift) shall be evaluated to ensure that production valves will achieve design lift and complete opening as modeled above.

\[
\begin{align*}
(U.S. Customary Units) \\
1.10p + 14.7 \\
1.03p + 14.7 \\
\text{(SI Units)} \\
1.10p + 100 \\
1.03p + 100 \\
\end{align*}
\]

where

\[p = \text{set pressure, psig (kPa gage)}\]

Such valves shall be marked in accordance with UG-129. This multiplier shall not be used as a divisor to transform test ratings from a higher to a lower flow.

For steam pressures above 1,500 psig (10.3 MPa gage), the above multiplier is not applicable. For pressure relief valves with relieving pressures between 1,500 psig (10.9 MPa gage) and 3,200 psig (22.1 MPa gage), the capacity shall be determined by using the equation for steam and the correction factor for high pressure steam in (e)(2) above with the permitted absolute relieving pressure (for Customary units, 1.10p + 14.7; for SI units, 1.10p + 101) and the coefficient \(K\) for that valve design.

(j) When changes are made in the design of a pressure relief device in such a manner as to affect the flow path, lift, or performance characteristics of the device, new tests in accordance with this Division shall be performed.

(k) If the design exceeds the laboratory pressure capability, (d)(2), (e), or (r) shall be followed with the exception that:

(1) the \textit{Valves shall be tested with their disks fixed at the minimum design lift to establish the rated capacity.}

(2) \textit{Pin devices shall be tested with their disks fixed at the minimum design lift or in the fully open position to establish rated capacity.}

(l) If the design exceeds the laboratory size or capacity capability, (e) or (r) shall be followed with the exception that flow models of three different sizes, each tested at three different pressures, shall be used in place of valves or pin devices required in (e)(1) or (r). Such flow models shall be sized consistent with the capabilities of the accepted test laboratory where the test will be conducted, and shall accurately model those features that affect flow capacity, such as orifice size, valve lift, and internal flow configuration. The test models need not be functional, pressure relief valves, but shall be geometrically similar to the final product.

(m) In the case of either (k) or (l), the valve or pin device design (i.e., parameters such as spring properties, seat geometry, internal flow configuration in the fully open position, and mechanical valve lift) shall be evaluated to ensure that production valves will achieve design lift and complete opening as modeled above.

(n) The certified flow resistance \(K_R\) of the nonreclosing pressure relief device used in UG-127(a)(2) or UG-127(b)(2) shall be either \(K_R = 2.4\), as or determined in accordance with (o) through (u) below.

(o) Flow resistance certification tests for nonreclosing pressure relief device for air or gas service \(K_{RL}\) shall be activated and flow tested with air or gas. Flow resistance certification tests for liquid service \(K_{RL}\) shall be activated with water and flow tested with air or gas. Nonreclosing pressure relief device for air or gas and liquid service \(K_{RL}\) may be certified with air or gas as above, but at least one device of the number required under (r) below for each size of each series shall be activated with water and flow tested with air or gas to demonstrate the liquid service flow resistance.

(p) Flow resistance certification tests shall be conducted at an inlet pressure which does not exceed 110% of the device set pressure.

(q) See below.

(1) The flow resistance for devices tested with non-pressure-containing items, such as seals, support rings, and vacuum supports, is applicable for the same device design without seals, support rings, or vacuum supports.

(2) A change in material for rupture disks and their non-pressure-containing disk items, such as seals, support rings, and vacuum supports, is not considered a design change and does not require retesting.

(3) Additional linings, coatings, or platings may be used for the same design of devices, provided:

(a) the certificate holder has performed a verification test with the additional linings, coatings, or platings and has documented that the addition of these materials does not affect the device opening configuration; and

(b) such verification tests shall be conducted with devices of the smallest size and minimum set pressure for which the certified flow resistance with additional materials is to be used.

(r) Flow resistance certification shall be determined by one of the following methods:

(1) \textit{One Size Method}

(a) For each nonreclosing pressure relief device design, three activation components from the same lot shall be individually activated and the device tested in accordance with (s) below. The set pressure shall be the minimum of the nonreclosing pressure relief device design of the size tested.

(b) The certified flow resistance \(K_R\) determined in (s) below shall apply only to the nonreclosing pressure relief device design of the size tested.

(c) When additional activation components of the same design are constructed at a later date, the test results on the original components may be included as applicable in the three size method described in (2) below.

(2) \textit{Three Size Method}

(a) This method of flow resistance certification may be used for a nonreclosing pressure relief device design of three or more sizes. The set pressure shall be the minimum of the activation component for each of the sizes submitted for test.
have a documented program for the application, calibration, and maintenance of gages and instruments used during these tests.

(2) Pressure Testing

(a) The pressure-containing parts of each rupture disk holder are subject to pressure testing.

(b) A rupture disk holder part is exempt from pressure testing if

(1) the stress that would be applied under hydrostatic test conditions does not exceed 50% of the allowable stress and the part is not cast or welded, or

(2) the part is downstream of the rupture disk when the outlet of the rupture disk device is not designed to contain pressure, or

(3) the part is fully contained within the holder.

(c) A rupture disk holder part requiring pressure testing shall be tested either

(1) hydrostatically at a minimum 1.5 times the design pressure of the part, or

(2) pneumatically at a minimum 1.25 times the design pressure of the part. Pneumatic testing can be hazardous; it is therefore recommended that special precautions be taken when conducting a pneumatic test.

(d) Pressure testing may be done in the part or assembled condition.

(e) Pressure testing shall be conducted after all machining and welding operations have been completed.

(f) Parts subject to pressure testing shall not exhibit a sign of leakage.

(3) Each lot of rupture disks shall be tested in accordance with one of the following methods. All tests of disks for a given lot shall be made in a holder of the same form and pressure area dimensions as that being used in service. Sample rupture disks, selected from each lot of rupture disks, shall be made from the same material and of the same size as those to be used in service. Test results shall be applicable only to rupture disks used in disk holders supplied by the rupture disk Manufacturer.

(a) At least two sample rupture disks from each lot of rupture disks shall be burst at the specified disk temperature. The marked burst pressure shall be determined so that the sample rupture disk burst pressure are within the burst pressure tolerance specified by UG-127(a)(1).

(b) At least four sample rupture disks, but not less than 5% from each lot of rupture disks, shall be burst at four different temperatures distributed over the applicable temperature range for which the disks will be used. This data shall be used to establish a smooth curve of burst pressure versus temperature for the lot of disks. The burst pressure for each data point shall not deviate from the curve more than the burst pressure tolerance specified in UG-127(a)(1).

The value for the marked burst pressure shall be derived from the curve for a specified temperature.

(c) For prebulged solid metal disks or graphite disks only, at least four sample rupture disks using one size of disk from each lot of material shall be burst at four different temperatures, distributed over the applicable temperature range for which this material will be used. These data shall be used to establish a smooth curve of percent change of burst pressure versus temperature for the lot of material. The acceptance criteria of smooth curve shall be as in (b) above.

At least two disks from each lot of disks, made from this lot of material and of the same size as those to be used, shall be burst at the ambient temperature to establish the room temperature rating of the lot of disks. The percent change shall be used to establish the marked burst pressure at the specified disk temperature for the lot of disks.

(e) Design Requirements. At the time of the inspection in accordance with (e)(3) above, a representative from an ASME Designated Organization has the authority to review the design for conformity with the requirements of (a) and (b) and to reject or require modification of designs that do not conform, prior to capacity testing.

(f) Welding and Other Requirements. All welding, brazing, heat treatment, and nondestructive examination used in the construction of rupture disk holders and pressure parts shall be performed in accordance with the applicable requirements of this Division.

UG-138  MINIMUM REQUIREMENTS FOR PIN DEVICES

(a) Mechanical Requirements

(1) The design shall incorporate guiding arrangements necessary to ensure consistent operation and tightness.

(2) The seat of a pin device shall be fastened to the body of the pin device in such a way that there is no possibility of the seat moving from its required position.

(3) In the design of the pin device, consideration shall be given to minimize the effects of deposits.

(4) Pin devices having threaded inlet or outlet connections shall be provided with wrenching surfaces to allow for normal installation without damaging operating parts.

(5) Means shall be provided in the design for sealing all critical parts to ensure that these parts are original and unmodified. Seals shall be installed in a manner to prevent changing or modifying parts without breaking the seal. If the pin is replaceable, this component is not required to be sealed if it is marked in accordance with UG-129(f)(11)(a). Seals shall be installed by the Manufacturer. For pin devices larger than NPS \( \frac{1}{2} \) (DN15), the seal shall serve as a means of identifying the device Manufacturer.
(6) If the design of the pin device is such that liquid can collect on the discharge side, except as permitted in (7) below, the device shall be equipped with a drain at the lowest point where liquid can collect (for installation, see UG-135).

(7) Devices that cannot be equipped with a drain as required in (6) above because of design or application may be used provided

- (a) the devices are used only on gas service where there is neither liquid discharged from the device nor liquid formed by condensation on the discharge side of the device
- (b) the devices are provided with a cover or discharge piping per UG-135(f) to prevent liquid or other contaminant from entering the discharge side of the device
- (c) the device is marked FOR GAS SERVICE ONLY in addition to the other required marking

(8) Pins shall be manufactured by the device Manufacturer.

(b) Material Selections

(1) Cast iron seats and disks are not permitted.

(2) Adjacent sliding and sealing surfaces shall both be of a corrosion-resistant material suitable for use with the fluid to be contained.

(3) Materials used in bodies and pressure-containing members, excluding proprietary pin material, shall be listed in Section II and this Division. Bodies and pressure-containing members, excluding proprietary pin material, shall meet all applicable requirements of Subsection C.

(4) Materials used in all other parts required for the pressure-relieving or pressure-retaining function shall be

- (a) listed in Section II; or
- (b) listed in ASTM specifications; or
- (c) controlled by the Manufacturer of the pin device by a specification ensuring control of chemical and physical properties and quality at least equivalent to ASTM specifications.

(5) Materials used for pins shall be controlled by the Manufacturer of the device by a specification ensuring the control of material properties.

(c) Inspection of Manufacturing of Pin Devices

(1) A Manufacturer shall demonstrate to the satisfaction of a representative from an ASME Designated Organization that his manufacturing, production, and testing facilities and quality control procedures will ensure close agreement between the performance of random production samples and the performance of those devices submitted for Certification.

(2) Manufacturing, assembly, inspection, and test operations including capacity are subject to inspections at any time by a representative from an ASME Designated Organization.

(3) A Manufacturer may be granted permission to apply the Certification Mark with the UD Designator to production pin devices certified in accordance with UG-131 provided the following tests are successfully completed.

This permission shall expire on the sixth anniversary of the date it is initially granted. The permission may be extended for 6-yr periods if the following tests are successfully repeated within the 6-month period before expiration.

- (a) Two production sample pin devices of a size and capacity within the capability of an ASME-accepted laboratory shall be selected by a representative of an ASME Designated Organization.
- (b) Operational and capacity tests shall be conducted in the presence of a representative from an ASME Designated Organization at an ASME-accepted laboratory. The pin device Manufacturer shall be notified of the time of the test and may have representatives present to witness the test.
- (c) Should any pin device fail to meet or exceed performance requirements (set pressure and certified capacity or flow resistance) of UG-127, the test shall be repeated at the rate of two replacement devices, selected and tested in accordance with (a) and (b) above for each device that failed.
- (d) Should any of the replacement devices fail to meet the capacity or performance requirements of this Division, the Manufacturer shall determine the cause of failure and take corrective action to guard against future occurrence. This cause of failure and corrective action shall be documented and submitted to the ASME Designated Organization within 60 days of the failure or be cause for revocation of the authorization to use the Certification Mark on that particular type of device. Upon acceptance of the submitted corrective action by the ASME Designated Organization, the requirements of (3) above shall apply.

(4) For valves-pin devices that exceed the laboratory testing cap-abilities and for which lift at rated overpressure can be measured or complete opening can be verified, the alternative method described below shall be used in lieu of the test requirements of (3)(a) through (3)(c).

- (a) Two production valves-pin devices that are representative of the design shall be tested per ASME PTC 25, Part III to demonstrate to the satisfaction of the representative of the ASME Designated Organization that
- (1) the measured set pressure is consistent with the stamped set pressure within the tolerances required by UG-134(f)
- (2) the valve-pin device will achieve complete opening or the minimum lift required to meet its certified capacity
- (3) the valve will operate without chatter or flutter, the pin device will operate in a stable manner

If only one valve-pin device of the design will be produced within the 6-yr period within which the permission is granted, only that valve-pin device need be tested as stated above.

- (b) The testing shall be performed at a facility that is mutually agreeable to the manufacturer, the representative of an ASME Designated Organization, and the
facility owner. The facility shall be capable of demonstrating the characteristics stated in (-a)(-1) through (-a)(-3).

(-c) In the event of failure of the tests, (3)(-d) shall apply.

(5) For valves-pin devices that exceed the laboratory testing capabilities and for which lift at rated overpressure cannot be measured or complete opening cannot be verified, the alternative method described below shall be used.

(-a) For initial certification, two functional models that are representative of the design shall be used, provided the test requirements of (3)(-a) through (3)(-d) are followed and the following additional tests are completed satisfactorily:

(-1) Two production valves-pin devices that are representative of the design shall be tested per ASME PTC 25, Part III to demonstrate to the satisfaction of the representative of the ASME Designated Organization that

(+a) the measured set pressure is consistent with the stamped set pressure within the tolerances required by UG-134(f)

(+b) seat tightness and a secondary pressure zone leakage test are demonstrated in accordance with (d)(3) and (d)(6)

If only one valve-pin device of the design will be produced within the 6-yr period within which the permission is granted, only that valve-pin device need be tested as stated above.

(-2) The testing shall be completed at a facility that is mutually agreeable to the manufacturer, the representative of an ASME Designated Organization, and the facility owner. The facility shall be capable of demonstrating the characteristics stated in (-1)(+a) and (-1)(+b).

(-3) In the event of failure of the tests, (3)(-d) shall apply.

(-b) For 6-yr renewal of capacity certification, (-a)(-1) through (-a)(-3) shall apply.

(d) Production Testing by Manufacturers

(1) Each device to which the Certification Mark is to be applied shall be subjected to the following tests by the Manufacturer. The Manufacturer shall have a documented program for the application, calibration, and maintenance of gages and instruments used during these tests.

(2) Pressure Testing

(-a) The pressure-containing parts of each pin device are subject to pressure testing.

(-b) A pin device part is exempt from pressure testing if

(-1) the stress that would be applied under hydrostatic test conditions does not exceed 50% of the allowable stress and the part is not cast or welded, or

(-2) the part is downstream of the pressure-containing element for a device designed for discharging directly to atmosphere, or

(-3) the part is downstream of the pressure-containing element and fully within the holder

(-c) A pin device part requiring pressure testing shall be tested either

(-1) hydrostatically at a minimum 1.5 times the design pressure of the part, or

(-2) pneumatically at a minimum 1.25 times the design pressure of the part. Pneumatic testing can be hazardous; it is therefore recommended that special precautions be taken when conducting a pneumatic test.

(-d) Pressure testing may be done in the part or assembled condition.

(-e) Pressure testing shall be conducted after all machining and welding operations have been completed.

(-f) Parts subjected to pressure testing shall not exhibit a sign of leakage.

(3) The secondary pressure zone exceeding NPS 1 (DN 25) inlet size, when such devices are designed for discharge to a closed system, shall be tested with air or other gas at a pressure of at least 30 psi (200 kPa). There shall be no visible signs of leakage.

(4) Set pressure qualification of a pin device shall be accomplished by completing set pressure testing in the device. At least two pins from the same lot shall be tested in the device. For single use permanently assembled pin devices having the same specification and configuration, to be supplied as a single lot, at least two completed devices shall be tested. The tests shall be conducted at the pin temperature or according to (5)(-d) below. The tests shall be within the tolerance defined in UG-127(b)(1).

(5) For all pin lot qualification testing:

(-a) Sample pins selected from each lot shall be made from the same material, heat and of the same critical dimension as those to be used in service.

(-b) Test results shall be applicable only to pins used in pin devices supplied by the device Manufacturer.

(-c) At least two pins or two single-use permanently assembled pin devices from the same lot shall be tested.

(-d) Tests shall be conducted at ambient temperature or the pin temperature (as agreed between device Manufacturer and user). The manufacturer shall establish a temperature range for which testing at ambient temperature is applicable. For qualification of a pin lot at a single pin temperature at least two pin tests shall be conducted at the specified pin temperature.

(-e) Pin testing shall be completed in the actual pin device(s) or using one or more of methods (-1) or (-2) below.

(-1) Lot qualification testing shall be done in a test pin device of the same form and pressure area dimensions as that in which the pins will be used. At least two set pressure tests shall be conducted at the pin temperature in accordance with (-d). The tests shall be within the tolerance defined in UG-127(b)(1).

(-2) The set pressure of a lot of pins for a pin device may be verified by a characterization test that determines the activation loading (force) under device opening conditions. The following characterization test conditions shall apply: