

1/29/09

As a result of discussions at the Austin TX meeting, the following item is being submitted for a letter ballot of the Sub-Committee on Pressure Relief Devices.

NB07-1206, Part 1, Valve Loading

This proposal adds wording to assure that discharge piping does not apply excessive loading to the pressure relief device. Wording from 2.9.5.1 (boilers) was adapted and added to 4.5.6 a) (pressure vessels) and 5.3.6 g) (piping)

See attached proposal. Page 31 with 2.9.5.1 included for information only.

between a pressure relief valve and the pressure vessel, the reduction in capacity due to installation of the non-reclosing device shall be determined in accordance with the code of construction by use of a National Board certified Combination Capacity Factor (CCF). For rupture disks, if a certified combination capacity factor is not available, the capacity of the pressure relief valve shall be multiplied by 0.9 and this value used as the capacity of the combination installation.

- f) The owner shall document the basis for selection of the pressure relief devices used, including capacity, and have such calculations available for review by the Jurisdiction.

#### 4.5.5 SET PRESSURE

- a) When a single pressure relief device is used, the set pressure marked on the device shall not exceed the maximum allowable working pressure.
- b) When more than one pressure relief device is provided to obtain the required capacity, only one pressure relief device set pressure needs to be at the maximum allowable working pressure. The set pressures of the additional pressure relief devices shall be such that the pressure cannot exceed the overpressure permitted by the code of construction.

#### 4.5.6 INSTALLATION AND DISCHARGE PIPING REQUIREMENTS

- a) The opening through all pipe and fittings between a pressure vessel and its pressure relief device shall have at least the area of the pressure relief device inlet. The characteristics of this upstream system shall be such that the pressure drop will not reduce the relieving capacity below that required or adversely affect the proper operation of the pressure relief device.

- b) A non-reclosing device installed between a pressure vessel and a pressure relief valve shall meet the requirements of 4.5.6(a).
- c) The opening in the pressure vessel wall shall be designed to provide unobstructed flow between the vessel and its pressure relief device.
- d) When two or more required pressure relief devices are placed on one connection, the inlet cross-sectional area of this connection shall be sized either to avoid restricting flow to the pressure relief devices or made at least equal to the combined inlet areas of the pressure relief devices connected to it. The flow characteristics of the upstream system shall satisfy the requirements of 4.5.6(a).
- e) There shall be no intervening stop valves between the vessel and its pressure relief device(s), or between the pressure relief device(s) and the point of discharge except under the following conditions:
- 1) When these stop valves are so constructed or positively controlled that the closing of the maximum number of block valves at one time will not reduce the pressure relieving capacity below the required relieving capacity; or,
  - 2) Upon specific acceptance of the Jurisdiction, when necessary for the continuous operation of processing equipment of such a complex nature that shutdown of any part is not feasible, a full area stop valve between a pressure vessel and its pressure relief device should be provided for inspection and repair purposes only. This stop valve shall be arranged so that it can

Add to 4.5.6 a)

When a discharge pipe is used, the size shall be such that any pressure that may exist or develop will not reduce the pressure relief device capacity, and it shall be as short and straight as possible and arranged to avoid undue stress on the pressure relief device.

- 1) When these stop valves are so constructed or positively controlled that the closing of the maximum number of block valves at one time will not reduce the pressure relieving capacity below the required relieving capacity; or,
- 2) Upon specific acceptance of the Jurisdiction, when necessary for the continuous operation of processing equipment of such a complex nature that shutdown of any part is not feasible, a full area stop valve between a piping system and its pressure relief device should be provided for inspection and repair purposes only. This stop valve shall be arranged so that it can be locked or sealed open and it shall not be closed except by an authorized person who shall remain stationed there during that period of operation while the valve remains closed. The valve shall be locked or sealed in the open position before the authorized person leaves the station.
- 3) A full area stop valve may be placed on the discharge side of a pressure relief device when its discharge is connected to a common header for pressure relief devices to prevent discharges from these other devices from flowing back to the first device during inspection and repair. This stop valve shall be arranged so that it can be locked or sealed open, and it shall not be closed except by an authorized person who shall remain stationed there during that period of operation while the valve remains closed. The valve shall be locked or sealed in the open position before the authorized person leaves the station. This valve shall only be used when a stop valve on the inlet side of the pressure relief device is first closed.
- 4) A piping system where the pressure originates from an outside source should have a stop valve between the system and the pressure relief device, and this valve need not be sealed open, provided it also closes off that vessel from the source of pressure.
- f) Pressure relief device discharges shall be arranged such that they are not a hazard to personnel or other equipment and when necessary, lead to a safe location for disposal of fluids being relieved.
- g) Discharge lines from pressure relief devices shall be designed to facilitate drainage or be fitted with drains to prevent liquid from collecting in the discharge side of a pressure relief device. The size of discharge lines shall be such that any pressure that may exist or develop will not reduce the relieving capacity of the pressure relief device, or adversely affect the operation of the pressure relief device.
- h) Pressure relief devices shall be installed so they are accessible for inspection, repair, or replacement.

#### 5.4 EXAMINATION, INSPECTION, AND TESTING

The owner shall ensure that all examinations, inspections, and tests required by the code of construction have been performed prior to operation.

Add to 5.3.6 g)

It shall be as short and straight as possible and arranged to avoid undue stress on the pressure relief device.

- (6 mm). If safety or safety relief valves are attached to a separate steam drum or dome, the opening between the boiler proper and the steam drum or dome shall be not less than 10 times the total area of the safety valve inlet.
- b) Every safety or safety relief valve shall be connected so as to stand in an upright position with spindle vertical.
- c) The opening or connection between the boiler and the safety or safety relief valve shall have at least the area of the valve inlet. No valve of any description should be placed between the safety or safety relief valves and the boiler, nor on the discharge pipe between the safety or safety relief valves and the atmosphere. When a discharge pipe is used, the cross-sectional area shall not be less than the full area of the valve outlet or of the total of the areas of the valve outlets, discharging thereinto and shall be as short and straight as possible and arranged to avoid undue stresses on the valve or valves.
- d) When two or more safety valves are used on a boiler, they should be mounted either separately or as twin valves made by placing individual valves on Y-bases, or duplex valves having two valves in the same body casing. Twin valves made by placing individual valves on Y-bases or duplex valves having two valves in the same body shall be of equal size.
- e) When two valves of different sizes are mounted singly, the relieving capacity of the smaller valve shall not be less than 50% of that of the larger valve.
- f) When a boiler is fitted with two or more safety relief valves on one connection, this connection to the boiler shall have a cross-sectional area not less than the combined areas of inlet connections of all the safety relief valves with which it connects.
- g) All safety or safety relief valves shall be piped to a safe point of discharge so located or piped as to be carried clear from running boards or platforms. Ample provision for gravity drain shall be made in the discharge pipe at or near each safety or safety relief valve, and where water or condensation may collect. Each valve shall have an open gravity drain through the casing below the level of the valve seat. For iron- and steel-bodied valves exceeding NPS 2 (DN 50), the drain hole shall be tapped not less than NPS 3/8 (DN 10).
- h) Discharge piping from safety relief valves on high temperature water boilers shall have adequate provisions for water drainage as well as steam venting.
- i) If a muffler is used on a safety or safety relief valve, it shall have sufficient outlet area to prevent back pressure from interfering with the proper operation and discharge capacity of the valve. The muffler plates or other devices shall be so constructed as to avoid a possibility of restriction of the steam passages due to deposits. Mufflers shall not be used on high temperature water boiler safety relief valves.

## 2.10 TESTING AND ACCEPTANCE

### 2.10.1 GENERAL

- a) Care shall be exercised during installation to prevent loose weld material, welding rods, small tools, and miscellaneous scrap metal from getting into the boiler. Where possible, an inspection of the interior of the boiler and its appurtenances shall be made for the presence of foreign debris prior to making the final closure.
- b) Safe operation should be verified by a person familiar with boiler system operations for all boilers and connected appurtenances and all pressure piping connecting them to the appurtenances and all piping up to and

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