Instructions to Voters/Comments on API 520 Part I Ballot – "Rupture Disk Kr Based on Schedule 40 Inlet Pipe"

1. Your comments should be limited to the **red-line portions of the ballot only.**
2. This ballot provides guidance to the reader on how to adjust the certified rupture disk resistance factor, Kr, when the installed inlet piping to the rupture disk is other than schedule 40 which is the standard used by the National Board during flow testing.
3. This ballot addresses 520 Action Item 2017-17.
4. 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 Brandon Nutter and his work group for their efforts.

Phil Henry

API 520 Task Force Chair

BALLOT FOR ACTION ITEM AI 2017-17

Sizing, Selection, and Installation of Pressure-relieving Devices

Part I—Sizing and Selection

API STANDARD 520, PART I

TENTH EDITION, OCTOBER 2020

American Petroleum Institute

4.3 Rupture Disk Devices

4.3.1 General

4.3.1.1 Rupture disk devices are nonreclosing PRDs used to protect vessels, piping, and other pressure-containing components from excessive pressure and/or vacuum. Rupture disks are used in single and multiple relief device installations. They are also used as redundant PRDs.

4.3.1.2 With no moving parts, rupture disks are simple, reliable, and faster acting than other PRDs. Rupture disks react quickly enough to relieve some types of pressure spikes. Because of their light weight, rupture disks can be made from high alloy and corrosion resistant materials that are not practical in PRVs.

4.3.1.3 Rupture disks can be specified for systems with vapor (gas) or liquid pressure-relief requirements. Also, rupture disk designs are available for highly viscous fluids. The use of rupture disk devices in liquid service should be carefully evaluated to ensure that the design of the disk is suitable for liquid service. The user should consult the manufacturer for information regarding liquid service applications.

4.3.1.4 Rupture disk devices often have different opening characteristics as a function of the fluid state against the disk at the time of bursting. To account for the resulting differences in the resistance to flow, certified Kr values are stated in terms of Krg (gas), Krl (liquid), or $Krgl$ (gas or liquid). In application, use the following guidelines.

- When the fluid initiating rupture (in contact with rupture disk) is compressible, rupture disks rated with Krg or $Krgl$ should be used.

- When the fluid initiating rupture (in contact with rupture disk) is incompressible, rupture disks rated with Krl or $Krgl$ should be used.

4.3.1.5 Certified Kr values are determined in flow testing rigs using Schedule 40 piping that is the same nominal size as the rupture disk device and published accordingly. When rupture disk devices are used on piping of a different size and/or schedule, the Kr velocity head loss used in calculations should be adjusted to the application pipe size using Equation (XX).

$$K_{r,app} = K_{r,cert}\frac{d_{app}^4}{d_{cert}^4} \qquad \text{(XX)}$$

where

d_{app} = is the inside diameter of the pipe system where the rupture disk will be installed, in in. (mm)

d_{cert} = is the inside diameter of Schedule 40 pipe of the same nonimal pipe size of the rupture disk device, in in. (mm)

$K_{r,app}$ = is the K_r velocity head loss for use in calculations based on the actual pipe diameter where the rupture disk will be installed, unitless

$K_{r,cert}$ is the certified K_r velocity head loss based on Schedule 40 pipe of the same nominal diameter as the rupture disk device, unitless

~~4.3.1.5~~4.3.1.6 The rupture disk is also a temperature-sensitive device. Burst pressures can vary significantly with the temperature of the rupture disk device. This temperature may be different from the normal fluid operating temperature. As the temperature at the disk increases, the burst pressure usually decreases. Since the effect of temperature depends on the rupture disk design and material, the manufacturer should be consulted for specific applications. For these reasons, the rupture disk shall be specified at the pressure and temperature the disk is expected to burst.

~~4.3.1.6~~4.3.1.7 Care should be taken during installation to avoid damaging the disk and to ensure that the disk and holder are properly oriented relative to the flow. A damaged or improperly oriented disk may burst considerably higher than its marked burst pressure, depending on the style of the disk. Contact the manufacturer for information about the effects of damage or improper orientation for a specific style of disk.

~~4.3.1.7~~4.3.1.8 Care should be taken to follow the manufacturer's bolt and tightening procedures during installation. Improper torque can also affect the disk's burst pressure.