

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

## **Instructions to Voters/Comments on API 520 Part II Ballot – “ASME Code References in Part II”**

- Your comments should be limited to the **red-lines portions of the ballot only.**
- This ballot covers the API 520 TF action item 2024-06.
- 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.
- Don’t worry about formatting issues, particularly with the equations since these are a mess. These will be fixed during final editing.

Thanks to Ken Kuptiz and his work group for their efforts.

Phil Henry  
TF520 Chairman

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

# **Sizing, Selection, and Installation of Pressure-relieving Devices**

## **Part II—Installation**

API STANDARD 520, PART II  
SEVENTH EDITION, OCTOBER 2020

BALLOT DRAFT



American  
Petroleum  
Institute

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

## Contents

	Page
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative References .....</b>	<b>1</b>
<b>3 Terms and Definitions .....</b>	<b>1</b>
<b>4 PRD Location .....</b>	<b>1</b>
4.1 General .....	1
4.2 Proximity to Protected Equipment .....	1
4.3 Pressure Fluctuations .....	1
4.4 Vibration .....	3
4.5 Operating Environment .....	3
4.6 Free-draining .....	3
4.7 Maintainability .....	3
<b>5 Inlet Piping Requirements .....</b>	<b>3</b>
5.1 General .....	3
5.2 Inlet Piping Diameter Requirements .....	4
5.3 Layout .....	4
5.4 Isolation Valves in Inlet Piping .....	6
5.5 Process Laterals Connected to Inlet Piping of PRVs .....	7
5.6 PRV Inlet Line Length and Pressure Loss .....	7
5.7 Inlet Stresses that Originate from Static Loads in the Discharge Piping .....	8
5.8 Inlet Stresses that Originate from Discharge Reaction Forces .....	8
<b>6 Discharge Piping .....</b>	<b>11</b>
6.1 General .....	11
6.2 Safe Disposal of Relieving Fluids .....	12
6.3 Backpressure Limitations and Sizing of Pipe .....	12
6.4 Considerations for Pilot-Operated PRVs .....	12
6.5 Stresses in Discharge Piping During Release .....	13
6.6 Isolation Valves in the Discharge Piping .....	13
6.7 Rupture Disks Installed at the Outlet of a PRV .....	13
<b>7 PRV Stability .....</b>	<b>13</b>
7.1 General .....	13
7.2 Potential Causes of PRV Instability .....	14
7.3 PRV Inlet Pressure Drop Limitations .....	16
<b>8 PRD Isolation (Stop) Valves .....</b>	<b>25</b>
8.1 General .....	25
8.2 Application .....	25
8.3 Isolation Valve Requirements .....	25
8.4 Examples of Isolation Valve Installations .....	32
8.5 Administrative Controls Related to Isolation Valves .....	33
<b>9 Rupture Disk Installations .....</b>	<b>35</b>
9.1 Rupture Disk Devices in Combination with PRVs .....	35
9.2 Rupture Disks In Series .....	37
<b>10 Bonnet or Pilot Vent Piping .....</b>	<b>37</b>

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

<b>10.1 General</b> .....	<b>37</b>
<b>10.2 Conventional Valves</b> .....	<b>37</b>

## Contents

	Page
<b>10.3 Balanced Bellows Valves</b> .....	<b>37</b>
<b>10.4 Balanced Piston Valves</b> .....	<b>42</b>
<b>10.5 Pilot-Operated Valves</b> .....	<b>42</b>
<b>11 Drain Piping</b> .....	<b>43</b>
<b>11.1 Installation Conditions that Require Drain Piping</b> .....	<b>43</b>
<b>11.2 Safe Practice for Installation of Drain Piping</b> .....	<b>43</b>
<b>12 Pre-installation Handling and Inspection</b> .....	<b>43</b>
<b>12.1 General</b> .....	<b>43</b>
<b>12.2 Storage and Handling of PRDs</b> .....	<b>43</b>
<b>12.3 Inspection and Cleaning of Systems Before Installation</b> .....	<b>44</b>
<b>13 Pressure-relief Device Installation and Maintenance</b> .....	<b>44</b>
<b>13.1 Mounting Position</b> .....	<b>44</b>
<b>13.2 Care in Installation</b> .....	<b>44</b>
<b>13.3 PRVs</b> .....	<b>44</b>
<b>13.4 Rupture Disk Devices</b> .....	<b>44</b>
<b>13.5 Pin-actuated Devices</b> .....	<b>45</b>
<b>13.6 Proper Gasketing and Bolting for Service Requirements</b> .....	<b>45</b>
<b>13.7 Inspection and Maintenance</b> .....	<b>45</b>
<b>13.8 Test or Lifting Levers</b> .....	<b>45</b>
<b>13.9 Heat Tracing and Insulation</b> .....	<b>45</b>
<b>Annex A (informative) Rupture Disk Installation Guidelines</b> .....	<b>46</b>
<b>Annex B (informative) Installation and Maintenance of Pin-actuated Non-reclosing PRDs</b> .....	<b>52</b>
<b>Annex C (informative) PRV Acoustic Interaction</b> .....	<b>54</b>
<b>Bibliography</b> .....	<b>57</b>
<b>Figures</b>	
<b>1 Typical Installation Avoiding Unstable Flow Patterns at PRV Inlet</b> .....	<b>2</b>
<b>2 Typical Pressure-relief Valve Installation: Atmospheric (Open) Discharge</b> .....	<b>4</b>
<b>3 Typical Pressure-relief Valve Installation: Closed System Discharge</b> .....	<b>5</b>
<b>4a Typical Rupture Disk Device Installation: Atmospheric (Open) Discharge</b> .....	<b>6</b>
<b>4b Typical Rupture Disk Device Installation: Atmospheric (Open) Discharge</b> .....	<b>6</b>
<b>5 Avoiding Process Laterals Connected to Pressure-relief Valve Inlet Piping</b> .....	<b>7</b>
<b>6 Typical Pressure-relief Valve Installation with Vent Pipe</b> .....	<b>9</b>
<b>7 Typical Pressure-relief Valve Mounted on Process Line</b> .....	<b>21</b>
<b>8 Typical Pressure-relief Valve Mounted on Long Inlet Pipe</b> .....	<b>22</b>
<b>9 Typical Pilot-Operated Pressure-relief Valve Installation</b> .....	<b>24</b>
<b>10 Typical PRD Installation with an Isolation Valve</b> .....	<b>28</b>
<b>11 Typical PRD Installation for 100 % Spare Relieving Capacity</b> .....	<b>29</b>
<b>12 Alternate PRD Installation for 100 % Spare Relieving Capacity</b> .....	<b>30</b>
<b>13 Three-Way Changeover Valve—Shuttle Type</b> .....	<b>31</b>
<b>14 Three-Way Changeover Valve—Rotor Type</b> .....	<b>31</b>

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

<b>15</b>	<b>Three-Way Changeover Valve—Ball Types</b> .....	<b>33</b>
<b>16</b>	<b>Typical Flare Header Block Valves</b> .....	<b>34</b>
<b>17</b>	<b>Typical Isolation Block Valves for Spare Compressor</b> .....	<b>35</b>
<b>18</b>	<b>Typical Rupture Disk Device in Combination With Relief Valve: Inlet Side Installation</b> .....	<b>36</b>

BALLOT DRAFT

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

## **Contents**

	Page
<b>19 Bonnet Vent for Bellows Valves with Vent Located at the PRV .....</b>	<b>39</b>
<b>20 Bonnet Vent for Bellows Valves Handling Vapor with Remote Vent Location .....</b>	<b>40</b>
<b>21 Bonnet Vent for Bellows Valves Handling Liquids Where a Leak Needs to Be Routed Away from the PRV .....</b>	<b>41</b>
<b>22 Bonnet Vent for Bellows Valves Handling Liquids or Flashing Liquid and Vapor with Remote Vent Location .....</b>	<b>42</b>
<b>A.1 Typical Configuration of Companion Flanges, Gaskets, and Rupture Disk Assembly .....</b>	<b>47</b>
<b>A.2 Proper Handling of a Rupture Disk .....</b>	<b>49</b>
<b>A.3 Improper Handling of a Rupture Disk .....</b>	<b>49</b>
<b>A.4 Proper Alignment of Rupture Disk Indicated by Tag Arrows .....</b>	<b>50</b>

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

## Sizing, Selection, and Installation of Pressure-relieving Devices Part II—Installation

### 6.7.1 Rupture Disks Installed at the Outlet of a PRV

A rupture disk device may be installed on the outlet of a PRV to protect the valve from downstream fluids. Consideration shall be given to the PRV design so that it will open at its proper pressure setting regardless of any backpressure that may accumulate between the valve and rupture disk. The pressure drop due to the rupture disk in the discharge piping should be included in the hydraulic calculations. See [8.3 UG-127](#) of the ASME [Boiler and Pressure Vessel Code BPVC](#), Section [XVIII](#) <sup>(8)</sup> for other requirements and considerations.

## 8 PRD Isolation (Stop) Valves

### 8.2 Application

If a PRD has a service history of leakage, plugging, or other severe problems that affect its performance, isolation and sparing of the PRD may be provided. The use of isolation valves and/or sparing permits the PRD to be inspected, maintained, or repaired without shutting down the process unit. However, there are potential hazards associated with the use of isolation valves. The ASME [Boiler and Pressure Vessel Code BPVC](#), Section VIII [7], [Nonmandatory](#) Appendix M, Section M-5-6 discusses proper application of these valves and the administrative controls that shall be in place when isolation block valves are used. Local jurisdictions may have other requirements.

*This document is not an API Standard; it is under consideration within an API technical committee but has not received all approvals required to become an API Standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of API committee activities except with the approval of the Chairman of the committee having jurisdiction and staff of the API Standards Dept. Copyright API. All rights reserved.*

## **Bibliography**

### **Informative References**

- [1] API Standard 510, *Pressure Vessel Inspection Code: In-Service Inspection, Rating, Repair and Alteration*
- [2] API Standard 526, *Flanged Steel Pressure-relief Valves*
- [3] API Standard 521, *Pressure-Relieving and Depressuring Systems*
- [4] API Recommended Practice 576, *Inspection of Pressure Relieving Devices*
- [5] ASME B31.1 <sup>1</sup>, *Power Piping*
- [6] ASME B31.3, *Process Piping*
- [7] ASME *Boiler and Pressure Vessel Code*, Section VIII, *Pressure Vessels*
- [8] [ASME \*Boiler and Pressure Vessel Code\*, Section XIII, \*Rules for Overpressure Protection\*](#)