

# Flanged Steel Pressure-relief Valves

API STANDARD 526  
SEVENTH EDITION, SEPTEMBER 2017

ERRATA 1, SEPTEMBER 2018



AMERICAN PETROLEUM INSTITUTE

## Special Notes

API publications necessarily address problems of a general nature. With respect to particular circumstances, local, state, and federal laws and regulations should be reviewed.

Neither API nor any of API's employees, subcontractors, consultants, committees, or other assignees make any warranty or representation, either express or implied, with respect to the accuracy, completeness, or usefulness of the information contained herein, or assume any liability or responsibility for any use, or the results of such use, of any information or process disclosed in this publication. Neither API nor any of API's employees, subcontractors, consultants, or other assignees represent that use of this publication would not infringe upon privately owned rights.

API publications may be used by anyone desiring to do so. Every effort has been made by the Institute to ensure the accuracy and reliability of the data contained in them; however, the Institute makes no representation, warranty, or guarantee in connection with this publication and hereby expressly disclaims any liability or responsibility for loss or damage resulting from its use or for the violation of any authorities having jurisdiction with which this publication may conflict.

API publications are published to facilitate the broad availability of proven, sound engineering and operating practices. These publications are not intended to obviate the need for applying sound engineering judgment regarding when and where these publications should be utilized. The formulation and publication of API publications is not intended in any way to inhibit anyone from using any other practices.

Any manufacturer marking equipment or materials in conformance with the marking requirements of an API standard is solely responsible for complying with all the applicable requirements of that standard. API does not represent, warrant, or guarantee that such products do in fact conform to the applicable API standard.

Copyright © 2017 American Petroleum Institute. All rights reserved. No part of this work may be reproduced, translated, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher. Contact the Publisher, API Publishing Services, 1220 L Street, NW, Washington, DC 20005.

Date of Issue: September 2018

Affected Publication: API Standard 526, Flanged Steel Pressure-relief Valves, September 2017

## Errata 1

Table of Contents: Added the following line:

6 Spring-loaded Pressure-relief Valves "G" Orifice <sup>f</sup> (Effective Orifice Area = 0.503 in.<sup>2</sup>) ..... 10

Table of Contents: Changed "Effective Area" to "Effective Orifice Area" in the following lines:

8 Spring-loaded Pressure-relief Valves "J" Orifice <sup>f</sup> (Effective Orifice Area = 1.287 in.<sup>2</sup>) ..... 12  
 9 Spring-loaded Pressure-relief Valves "K" Orifice <sup>f</sup> (Effective Orifice Area = 1.838 in.<sup>2</sup>) ..... 13  
 10 Spring-loaded Pressure-relief Valves "L" Orifice <sup>f</sup> (Effective Orifice Area = 2.853 in.<sup>2</sup>) ..... 14  
 11 Spring-loaded Pressure-relief Valves "M" Orifice <sup>f</sup> (Effective Orifice Area = 3.60 in.<sup>2</sup>) ..... 15  
 12 Spring-loaded Pressure-relief Valves "N" Orifice <sup>f</sup> (Effective Orifice Area = 4.34 in.<sup>2</sup>) ..... 16  
 13 Spring-loaded Pressure-relief Valves "P" Orifice <sup>f</sup> (Effective Orifice Area = 6.38 in.<sup>2</sup>) ..... 17  
 14 Spring-loaded Pressure-relief Valves "Q" Orifice <sup>f</sup> (Effective Orifice Area = 11.05 in.<sup>2</sup>) ..... 18  
 15 Spring-loaded Pressure-relief Valves "R" Orifice <sup>f</sup> (Effective Orifice Area = 16.0 in.<sup>2</sup>) ..... 19  
 16 Spring-loaded Pressure-relief Valves "T" Orifice <sup>f</sup> (Effective Orifice Area = 26.0 in.<sup>2</sup>) ..... 20

Table of Contents: Changed "Limits" to "Limits<sup>1</sup>" in the following lines:

B.1 Pressure-temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30 of This Standard ..... 36  
 B.2 Pressure-temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30 of This Standard ..... 36  
 B.3 Pressure-temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30 of This Standard ..... 37  
 B.4 Pressure-temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30 of This Standard ..... 37  
 B.5 Pressure-temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30 of This Standard ..... 38

Table 3: The boxed sections below reflect changes made to the table:

Temperature Range Inclusive 801 °F to 1000 °F													
Chrome Molybdenum Steel	1D2	300	150				510	215	290	230	4 1/8	4 1/2	
	1D2	600	150				1015	430	290	230	4 1/8	4 1/2	
	1 1/2D2	900	300				1525	650	(600)	500	4 1/8	5 1/2	
	1 1/2D2	1500	300				2540	1080	(600)	500	4 1/8	5 1/2	
	1 1/2D3	2500	300				4230	1800		500	5 1/2	7	
Temperature Range Inclusive -450 °F to 1000 °F													
Austenitic Stainless Steel	1D2	150	150	275	275	275	180	80	20	275	230	4 1/8	4 1/2
	1D2 <sup>c</sup>	300	150	(275)	(275)	(275)	(275)	(275)	(275)	275	230	4 1/8	4 1/2
	1D2	300	150	720	720	720	495	420	365	275	230	4 1/8	4 1/2
	1D2	600	300	1440	1440	1440	990	845	725	275	230	4 1/8	4 1/2
	1 1/2D2	900	300	2160	2160	2160	1485	1265	1090	(600)	500	4 1/8	5 1/2
	1 1/2D2	1500	300	3600	3600	3600	2480	2110	1820	(600)	500	4 1/8	5 1/2
	1 1/2D3	2500	300	(4000)	6000	6000	4130	3520	3030	720	500	5 1/2	7
Temperature Range Inclusive -20 °F to 300 °F <sup>e</sup>													
Alloy 20	1D2	150	150				230	180		230	230	4 1/8	4 1/2
	1D2 <sup>c</sup>	300	150				(230)	(180)		230	230	4 1/8	4 1/2
	1D2	300	150				600	465		230	230	4 1/8	4 1/2
	1D2	600	150				1200	930		230	230	4 1/8	4 1/2
	1 1/2D2	900	300				1800	1395		600	500	4 1/8	5 1/2
	1 1/2D2	1500	300				3000	2330		600	500	4 1/8	5 1/2
	1 1/2D3	2500	300				5000	3880		600	500	5 1/2	7

Table 7: The boxed section below reflects changes made to the table:

Temperature Range Inclusive -20 °F to 900 °F <sup>d</sup>													
Nickel/ Copper Alloy <sup>e</sup>	1 1/2H3	150	150			230	175	80	50	230	230	5 1/8	4 7/8
	1 1/2H3 <sup>e</sup>	300	150			(230)	(230)	(230)	(230)	230	230	5 1/8	4 7/8
	2H3	300	150			600	475	460	275	230	230	5 1/8	4 7/8
	2H3	600	150			1200	945	915	550	230	230	6 1/16	6 3/8
	2H3	900	150			1800	1420	1375	825	230	230	6 1/16	6 3/8

Table 8: The title was changed to the following:

**Table 8—Spring-loaded Pressure-relief Valves “J” Orifice <sup>f</sup>  
(Effective Orifice Area = 1.287 in.<sup>2</sup>)**

Table 9: The title was changed to the following:

**Table 9—Spring-loaded Pressure-relief Valves “K” Orifice <sup>f</sup>  
(Effective Orifice Area = 1.838 in.<sup>2</sup>)**

Table 9: The boxed section below reflects changes made to the table:

Temperature Range Inclusive -20 °F to 300 °F <sup>e</sup>													
Alloy 20 <sup>e</sup>	3K4	150	150			230	180			230	150	6 1/8	6 3/8
	3K4 <sup>e</sup>	300	150			(230)	(180)			230	150	6 1/8	6 3/8
	3K4	300	150			600	465			230	150	6 1/8	6 3/8
	3K4	600	150			1200	930			230	200	7 1/4	7 1/8
	3K6	900	150			1800	1395			230	200	7 13/16	8 1/2
	3K6	1500	300			(2220)	(2220)			600	200	7 3/4	8 1/2

Table 10: The title was changed to the following:

**Table 10—Spring-loaded Pressure-relief Valves “L” Orifice <sup>f</sup>  
(Effective Orifice Area = 2.853 in.<sup>2</sup>)**

Table 10: The boxed section below reflects changes made to the table:

Temperature Range Inclusive -450 °F to 1000 °F													
Austenitic Stainless Steel	3L4	150	150	275	275	275	180	80	20	275	100	6 1/8	6 1/2
	3L4 <sup>e</sup>	300	150	(275)	(275)	(275)	(275)	(275)	(275)	275	100	6 1/8	6 1/2
	4L6	300	150	(535)	720	720	495	420	365	275	170	7 1/16	7 1/8
	4L6	600	150	(535)	(1000)	(1000)	990	845	725	275	170	7 1/16	8
	4L6	900	150	(700)	(1500)	(1500)	1485	1265	1090	275	170	7 3/4	8 3/4

Table 11: The title was changed to the following:

**Table 11—Spring-loaded Pressure-relief Valves “M” Orifice <sup>f</sup>  
(Effective Orifice Area = 3.60 in.<sup>2</sup>)**

Table 12: The title was changed to the following:

**Table 12—Spring-loaded Pressure-relief Valves “N” Orifice <sup>f</sup>  
(Effective Orifice Area = 4.34 in.<sup>2</sup>)**

Table 12: The boxed section below reflects changes made to the table:

Temperature Range Inclusive -20 °F to 300 °F <sup>e</sup>													
Alloy 20 <sup>e</sup>	4N6	150	150			230	180			230	80	7 3/4	8 1/4
	4N6 <sup>c</sup>	300	150			(230)	(180)			230	80	7 3/4	8 1/4
	4N6	300	150			600	465			230	160	7 3/4	8 1/4
	4N6	600	150			(1000)	930			230	160	7 3/4	8 3/4
	4N6	900	150			(1000)	(1000)			230	160	7 3/4	8 3/4

Table 13: The title was changed to the following:

**Table 13—Spring-loaded Pressure-relief Valves “P” Orifice<sup>f</sup>**  
(Effective Orifice Area = 6.38 in.<sup>2</sup>)

Table 14: The title was changed to the following:

**Table 14—Spring-loaded Pressure-relief Valves “Q” Orifice<sup>f</sup>**  
(Effective Orifice Area = 11.05 in.<sup>2</sup>)

Table 15: The title was changed to the following:

**Table 15—Spring-loaded Pressure-relief Valves “R” Orifice<sup>f</sup>**  
(Effective Orifice Area = 16.07 in.<sup>2</sup>)

Table 15: The boxed sections below reflect changes made to the table:

Body/ Bonnet	Inlet by Orifice by Outlet	I N L E T	O U T L E T	Conventional and Balanced Bellows Valves						(psig)		(in.)		
				-450 °F to -76 °F	-75 °F to -20 °F	-20 °F to 0 °F	450 °F	800 °F	1000 °F	Flange Rating Limit <sup>a</sup>	Bellows Rating Limit <sup>a</sup>	I N L E T	O U T L E T	
										100 °F	100 °F			
Temperature Range Inclusive -20 °F to 900 °F <sup>d</sup>														
Nickel/ Copper Alloy <sup>a</sup>	6R8	150	150				(100)	(100)	80	50	(60)	60	9 7/16	9 1/2
	6R8 <sup>c</sup>	300	150				(100)	(100)	(100)	(100)	(60)	60	9 7/16	9 1/2
	6R10	300	150				(230)	(230)	(230)	(230)	(100)	100	9 7/16	10 1/2
	6R10	600	150				(300)	(300)	(300)	(300)	(100)	100	9 7/16	10 1/2

Table 16: The title was changed to the following:

**Table 16—Spring-loaded Pressure-relief Valves “T” Orifice<sup>f</sup>**  
(Effective Orifice Area = 26.00 in.<sup>2</sup>)

Figure B.1: The title was changed to the following:

**Figure B.1—Pressure-temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30  
of This Standard**

*Figure B.2: The title was changed to the following:*

**Figure B.2—Pressure–temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30 of This Standard**

*Figure B.3: The title was changed to the following:*

**Figure B.3—Pressure–temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30 of This Standard**

*Figure B.4: The title was changed to the following:*

**Figure B.4—Pressure–temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30 of This Standard**

*Figure B.5: The title was changed to the following:*

**Figure B.5—Pressure–temperature Limits<sup>1</sup> to be Used with Table 3 to Table 30 of This Standard**

Currently in preview, click buy full version

## Foreword

Nothing contained in any API publication is to be construed as granting any right, by implication or otherwise, for the manufacture, sale, or use of any method, apparatus, or product covered by letters patent. Neither should anything contained in the publication be construed as insuring anyone against liability for infringement of letters patent.

The verbal forms used to express the provisions in this document are as follows.

Shall: As used in a standard, “shall” denotes a minimum requirement in order to conform to the standard.

Should: As used in a standard, “should” denotes a recommendation or that which is advised but not required in order to conform to the standard.

May: As used in a standard, “may” denotes a course of action permissible within the limits of a standard.

Can: As used in a standard, “can” denotes a statement of possibility or capability.

This document was produced under API standardization procedures that ensure appropriate notification and participation in the developmental process and is designated as an API standard. Questions concerning the interpretation of the content of this publication or comments and questions concerning the procedures under which this publication was developed should be directed in writing to the Director of Standards, American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005. Requests for permission to reproduce or translate all or any part of the material published herein should also be addressed to the director.

Generally, API standards are reviewed and revised, reaffirmed, or withdrawn at least every five years. A one-time extension of up to two years may be added to this review cycle. Status of the publication can be ascertained from the API Standards Department, telephone (202) 682-8000. A catalog of API publications and materials is published annually by API, 1220 L Street, NW, Washington, DC 20005.

Suggested revisions are invited and should be submitted to the Standards Department, API, 1220 L Street, NW, Washington, DC 20005, [standards@api.org](mailto:standards@api.org).

## Contents

	Page
1 Scope .....	1
2 Normative References .....	1
3 Terms and Definitions .....	1
4 Responsibility .....	2
5 Conflicting Requirements .....	2
6 Orifice Areas and Designations .....	2
7 Design .....	2
7.1 General .....	2
7.2 Determination of Orifice Area .....	2
7.3 Valve Selection .....	2
7.4 Dimensions .....	3
7.5 Lifting Levers .....	3
7.6 Special Construction Features .....	3
7.7 Restricted Lift Pressure-Relief Valves .....	3
8 Material .....	4
8.1 General .....	4
8.2 Spring-loaded Pressure-relief Valves .....	4
8.3 Pilot-operated Pressure-relief Valves .....	5
9 Inspection and Shop Tests .....	5
9.1 Inspection .....	5
9.2 Set Pressure Test .....	5
9.3 Seat Leakage Test .....	5
10 Identification and Preparation for Shipment .....	5
10.1 Identification .....	5
10.2 Preparation for Shipment .....	6
11 Pressure-temperature Tables .....	6
11.1 Materials .....	6
11.2 Temperature Ranges .....	6
11.3 Maximum Inlet Flange Pressure .....	6
11.4 Outlet Pressure Limit .....	6
Annex A (normative) Pressure-relief Valve Nameplate Nomenclature .....	35
Annex B (normative) Pressure-temperature Rating Charts .....	36
Annex C (normative) Bellows Pressure-temperature Requested Rating Factors .....	39
Annex D (informative) Valve Selection Examples .....	40
Annex E (informative) Valve Selection Example: Restricted Lift .....	43
Bibliography .....	44
<b>Tables</b>	
1 Standard Effective Orifice Areas and Letter Designations .....	3
2 Spring Materials .....	5
3 Spring-loaded Pressure-relief Valves “D” Orifice $f$ (Effective Orifice Area = 0.110 in. <sup>2</sup> ) .....	7

# Contents

Page

4	Spring-loaded Pressure-relief Valves “E” Orifice <sup>f</sup> (Effective Orifice Area = 0.196 in. <sup>2</sup> )	8
5	Spring-loaded Pressure-relief Valves “F” Orifice <sup>f</sup> (Effective Orifice Area = 0.307 in. <sup>2</sup> )	9
6	Spring-loaded Pressure-relief Valves “G” Orifice <sup>f</sup> (Effective Orifice Area = 0.503 in. <sup>2</sup> )	10
7	Spring-loaded Pressure-relief Valves “H” Orifice <sup>f</sup> (Effective Orifice Area = 0.785 in. <sup>2</sup> )	11
8	Spring-loaded Pressure-relief Valves “J” Orifice <sup>f</sup> (Effective Orifice Area = 1.287 in. <sup>2</sup> )	12
9	Spring-loaded Pressure-relief Valves “K” Orifice <sup>f</sup> (Effective Orifice Area = 1.838 in. <sup>2</sup> )	13
10	Spring-loaded Pressure-relief Valves “L” Orifice <sup>f</sup> (Effective Orifice Area = 2.853 in. <sup>2</sup> )	14
11	Spring-loaded Pressure-relief Valves “M” Orifice <sup>f</sup> (Effective Orifice Area = 3.60 in. <sup>2</sup> )	15
12	Spring-loaded Pressure-relief Valves “N” Orifice <sup>f</sup> (Effective Orifice Area = 4.34 in. <sup>2</sup> )	16
13	Spring-loaded Pressure-relief Valves “P” Orifice <sup>f</sup> (Effective Orifice Area = 6.38 in. <sup>2</sup> )	17
14	Spring-loaded Pressure-relief Valves “Q” Orifice <sup>f</sup> (Effective Orifice Area = 11.05 in. <sup>2</sup> )	18
15	Spring-loaded Pressure-relief Valves “R” Orifice <sup>f</sup> (Effective Orifice Area = 16.00 in. <sup>2</sup> )	19
16	Spring-loaded Pressure-relief Valves “T” Orifice <sup>f</sup> (Effective Orifice Area = 26.00 in. <sup>2</sup> )	20
17	Pilot-operated Pressure-relief Valves “D” Orifice <sup>d</sup> (Effective Orifice Area = 0.196 in. <sup>2</sup> )	21
18	Pilot-operated Pressure-relief Valves “E” Orifice <sup>d</sup> (Effective Orifice Area = 0.307 in. <sup>2</sup> )	22
19	Pilot-operated Pressure-relief Valves “F” Orifice <sup>d</sup> (Effective Orifice Area = 0.503 in. <sup>2</sup> )	23
20	Pilot-operated Pressure-relief Valves “G” Orifice <sup>d</sup> (Effective Orifice Area = 0.785 in. <sup>2</sup> )	24
21	Pilot-operated Pressure-relief Valves “H” Orifice <sup>d</sup> (Effective Orifice Area = 1.287 in. <sup>2</sup> )	25
22	Pilot-operated Pressure-relief Valves “J” Orifice <sup>d</sup> (Effective Orifice Area = 1.838 in. <sup>2</sup> )	26
23	Pilot-operated Pressure-relief Valves “K” Orifice <sup>d</sup> (Effective Orifice Area = 2.853 in. <sup>2</sup> )	27
24	Pilot-operated Pressure-relief Valves “L” Orifice <sup>d</sup> (Effective Orifice Area = 3.60 in. <sup>2</sup> )	28
25	Pilot-operated Pressure-relief Valves “M” Orifice <sup>d</sup> (Effective Orifice Area = 4.34 in. <sup>2</sup> )	29
26	Pilot-operated Pressure-relief Valves “N” Orifice <sup>d</sup> (Effective Orifice Area = 6.38 in. <sup>2</sup> )	30
27	Pilot-operated Pressure-relief Valves “P” Orifice <sup>d</sup> (Effective Orifice Area = 11.05 in. <sup>2</sup> )	31
28	Pilot-operated Pressure-relief Valves “Q” Orifice <sup>d</sup> (Effective Orifice Area = 16.00 in. <sup>2</sup> )	32
29	Pilot-operated Pressure-relief Valves “R” Orifice <sup>d</sup> (Effective Orifice Area = 26.00 in. <sup>2</sup> )	33
30	Pilot-operated Pressure-relief Valves “T” Orifice <sup>d</sup> (Effective Orifice Area = 26.00 in. <sup>2</sup> )	34
A.1	PRV Nameplate Nomenclature Table	35

## Figures

B.1	Pressure–temperature Limits <sup>1</sup> to be Used with Table 3 to Table 30 of This Standard	36
B.2	Pressure–temperature Limits <sup>1</sup> to be Used with Table 3 to Table 30 of This Standard	36
B.3	Pressure–temperature Limits <sup>1</sup> to be Used with Table 3 to Table 30 of This Standard	37
B.4	Pressure–temperature Limits <sup>1</sup> to be Used with Table 3 to Table 30 of This Standard	37
B.5	Pressure–temperature Limits <sup>1</sup> to be Used with Table 3 to Table 30 of This Standard	38
C.1	Bellows Pressure-temperature Rating Factor	39
D.1	Bellows Pressure-temperature Rating Factor for Example 2	41
D.2	Pressure–temperature Limits <sup>1</sup> for Example 3	42

# Flanged Steel Pressure-relief Valves

## 1 Scope

This standard is a purchase specification for flanged steel pressure-relief valves. Basic requirements are given for direct spring-loaded pressure-relief valves and pilot-operated pressure-relief valves as follows:

- orifice designation and area;
- valve size and pressure rating, inlet and outlet;
- materials;
- pressure-temperature limits;
- center-to-face dimensions, inlet and outlet.

Nameplate nomenclature and requirements for stamping are detailed in Annex A.

## 2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Recommended Practice 520 (all parts), *Sizing, Selection, and Installation of Pressure-relieving Devices in Refineries*

API Standard 527, *Seat Tightness of Pressure Relief Valves*

ASME B16.5, *Pipe Flanges and Flanged Fittings*

ASME B16.34, *Valves-Flanged, Threaded and Welding End*

ASME Boiler and Pressure Vessel Code (BPVC), *Section VIII: Pressure Vessels, Division 1 and Division 2*

ASME BPVC, *Section II: Materials*

ASME SA-216, *Carbon-Steel Castings Suitable for Fusion Welding for High-Temperature Service*

ASME SA-217, *Ferritic, Martensitic Stainless Steel and Alloy Steel Castings for Pressure-Containing Parts, Suitable for High-Temperature Service*

ASME SA-351, *Specification for Castings, Austenitic, Austenitic-Ferritic (Duplex), for Pressure-Containing Parts*

ASME SA-494, *Specification for Castings, Nickel and Nickel Alloy*

## 3 Terms and Definitions

Pressure-relief valve terminology is defined in API 520, Part I.