

TECHNICAL SPECIFICATION

FLANGED STEEL PRESSURE RELIEF VALVES (AMENDMENTS/SUPPLEMENTS TO API 526)

MESC SPE 77/135

February 2020

MESC SPECIFICATION DOCUMENT



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PART I INTRODUCTION

1.1 SCOPE

This MESC SPE specifies requirements for relief valves to API 526, including thermal expansion relief valves.

This specification shall apply in addition to the applicable MESC Buying Description, purchase order or requisition sheet.

The requirements for maintenance and operation of relief valves are outside the scope of this MESC SPE.

This specification is written as amendments and supplements to API 526:2009 with Errata 2009 and 2012, which are covered in Part II of this MESC SPE. The clause numbering of API 526:2009 with Errata 2009 and 2012 has been retained and any amendments are identified as 'Add', 'Modify to read' or 'Delete'. Any clauses of API 609:2009 with Errata 2009 and 2012 that are not amended or supplemented by this MESC SPE, shall apply as written.

1.2 DISTRIBUTION, INTENDED USE AND REGULATORY CONSIDERATIONS

Unless otherwise authorised by Shell GSI, the distribution of this MESC SPE is confined to Shell companies and, where necessary, to Contractors and Manufacturers/Suppliers nominated by them.

This MESC SPE is intended for use in oil refineries, chemical plants, gas plants, exploration and production facilities and, where applicable, supply/distribution installations.

If national and/or local regulations exist in which some of the requirements may be more stringent than in this MESC SPE the Contractor shall determine by careful scrutiny which of the requirements are the more stringent and which combination of requirements will be acceptable with regards to safety, environmental, economic and legal aspects. In all cases the Contractor shall inform the Principal of any deviation from the requirements of this MESC SPE which is considered to be necessary in order to comply with national and/or local regulations. The Principal may then negotiate with the Authorities concerned, the objective being to obtain agreement to follow this MESC SPE as closely as possible.

1.3 DEFINITIONS

The **Contractor** is the party that carries out all or part of the design, engineering, procurement, construction, commissioning or management of a project, or operation or maintenance of a facility. The Principal may undertake all or part of the duties of the Contractor.

The **Manufacturer/Supplier** is the party that manufactures or supplies equipment and services to perform the duties specified by the Contractor.

The **Principal** is the party that initiates the project and ultimately pays for its design and construction. The Principal will generally specify the technical requirements. The Principal may also include an agent or consultant authorised to act for, and on behalf of, the Principal.

The word **shall** indicates a requirement.

The word **should** indicates a recommendation.

1.4 CHANGES SINCE PREVIOUS EDITION

The previous edition of this MESC SPE was dated **February 2017. The change is to make reference to the ASME BPVC VIII Div. 1 for ASME/ASTM (S)A216 grade WCB or WCC materials to establish impact testing exemptions.**

1.5 COMMENTS ON THIS MESC SPE

Comments on this MESC SPE may be sent to the MESC SPE Administrator at MESC@shell.com <mailto:standards@shell.com>.

PART II AMENDMENTS/SUPPLEMENTS TO API 526:2009 WITH ERRATA 2009 AND 2012**4 RESPONSIBILITY**

4.2 *Add:* The Manufacturer is responsible for:

- verifying the capacity of the requested relief device and confirm that the relief device will perform as premised in requisitioning;
- completing those portions of the relief device data sheets that are the responsibility of the Manufacturer;

The Manufacturer is responsible for supplying relief devices with material grades for components as specified on the requisition.

Supplied capacities of the selected relief devices shall be those established and guaranteed by the relief device Manufacturer for the applicable service conditions and be equal to or greater than the required capacities.

If a PRV is provided with accessories from another source, but supplied as part of the PRV requisition, the PRV Manufacturer remains fully responsible for the overall valve assembly (valve complete with accessories).

5 CONFLICTING REQUIREMENTS

5 *Add:* The Manufacturer is responsible for informing the Contractor of any irregularities found in the relevant requisition

6 ORIFICE AREAS AND DESIGNATIONS

6 *Add:* Pressure relief valves (PRVs) shall be selected from the standard sizes listed in API Std 526 unless otherwise approved by the Principal.

Thermal expansion relief valves (TERVs) are not required to be selected from the standard sizes listed in API Std 526.

7 DESIGN**7.1 General**

7.1 *Add:* Conventional PRVs where constant superimposed back pressure is greater than 3% of set pressure shall have their cold differential test pressure (CDTP) adjusted accordingly. The CDTP may also include temperature corrections. The PRV Manufacturer is fully responsible for the definition of the CDTP; the temperature correction table must be obtained from the valve manufacturer.

The blowdown pressure (reseating pressure) shall be above the maximum operating pressure. The Manufacturer shall advise the Contractor if the blowdown pressure is set too close to the set pressure, whereby the PRV might open and close rapidly, causing damage to the valve.

For PRVs on gas / vapour service that have an adjustment for blowdown, the blowdown shall be 5% to 10% below the valve set pressure. Valves that have a fixed blowdown design for gas / vapour may have a longer blowdown. The blowdown for liquid service valves shall also be limited to 5% to 10% below the valve set pressure. The Manufacturer shall advise the Contractor if the application requires more 10%, for feedback into the process design.

7.2 Determination of Orifice Area

7.2 *Add:* Capacities established and guaranteed by the relief device Manufacturer for the applicable service conditions shall be used for selecting the relief device.

With the exception of TERVs, direct spring-loaded relief valves shall be full nozzle type.

7.3 Valve Selection

- 7.3 *Add:* Outlet flange ratings for PRVs that relieve to a flare system or atmosphere shall be in accordance with API 526. For PRVs that relieve to a pressurised system, the outlet flange shall be selected according to the maximum back pressure and temperature it is subjected to.

The standard TERV size for piping systems shall be (25 mm x 25 mm) or (20 mm x 25 mm) [(1"x1") or (¾"x1")], flanged, with a minimum orifice area of 0.71 cm² (0.110 in²).

7.4 **Dimensions**

7.4 *Add:* **Flanges**

Lateral alignment (offset of the aligned flange centrelines):

For valves ≤ DN 50 (≤ NPS 2")	maximum misalignment = 1.5 mm (0.059 inch),
For valves > DN 50 (> NPS 2")	maximum misalignment = 2 mm (0.079 inch).

Angular alignment of the flange faces (relative to perpendicular planes):

For valves with flanges DN < 650 (< NPS 26" to ASME B16.5	maximum misalignment = 2.5 mm/m (0.03 inch/ft).
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The surface finish of the nut bearing area at the back face of spring loaded and pilot operated valves shall be parallel to the flange face within 1°.

7.5 **Lifting Levers**

- 7.5 *Add:* Where the application of ASME Section VIII, Division 1 Code Case 2203 is permitted by local regulations, a lifting device shall not be provided. If local regulations do not permit application of Code Case 2203, then a lifting device shall be provided only for the fluids specified in the relevant pressure vessel design Code. Typically design codes only require lifting devices on PRVs in air, hot water (that may exceed 60°C or 140°F), or steam service.

7.6 **Special Construction Features**

- 7.6 *Add:* API Std 526 relief valves shall have their inlet and outlet flanges form an integral part of the body. Alternatively, full-penetration butt-welded welding-neck flanges may be applied, with weld examination in accordance with MESC SPE 77/302 (see 9.1). Slip-on welded flanges shall not be used on a PRV.

The body-to-bonnet connection of thermal expansion relief valves (TERVs) shall not be screwed; the body and bonnet are preferably to be of one piece.

By exception, TERVs in utility water service may have threaded end connections specified. TERVs having threaded inlet connections shall not have a threaded inlet bushing that may unscrew from the body during installation or maintenance of the device.

By exception, pilot operated relief valve tubing connections are allowed to be threaded, provided the following conditions are met:

- A thread sealant/lubricant shall be used on the pipe threads of all connections to ensure the threads are vapour tight.
Some examples of products include "Loctite PST 567" and Jet-Lube TFW with temperature limits up to 200 °C (400 °F) and 260 °C (500 °F), respectively.
- If the temperature exceeds 260 °C (500 °F), a high temperature nickel-based lubricant, such as Nickel-EZE, shall be used.

- c. Thread lubricants containing molybdenum disulfide shall not be used.
- d. Alternatively, PTFE tape may be used when the following conditions are met:
 - a. Nickel impregnated, full density PTFE sealing tape shall be used,
 - b. The supplier provides satisfactory proof to the Principal that the QC and training are adequate to properly apply PTFE tape without issue, and
 - c. The following pressure and temperature limitations of PTFE tape shall not be exceeded for the specific application:
 - i. Fitting temperature -100°C (-150 °F): 400 barg (5800 psig)
 - ii. Fitting temperature 150°C (300 °F): 300 barg (4350 psig)
 - iii. Fitting temperature 200°C (390 °F): 200 barg (2900 psig)
 - iv. Fitting temperature 300°C (570 °F): 140 barg (2000 psig) provided that this does not exceed tape manufacturer approved limit and that the PTFE tape is specified to MIL-T-27730A (ASG) (NOTICE 2), or MIL-A-A-58092 VALID NOTICE 1.

When applied, spiral wound gaskets utilized for the body/bonnet connection shall be fully confined or provided with outer and inner guide rings. Spiral wound gaskets shall conform to MESC SPE 85/103. Covered serrated metal gaskets shall conform to MESC SPE 85/100. Gaskets shall also conform to MESC SPE 85/300. Graphite quality shall conform to MESC SPE 85/203.

Diaphragm-style pilot-operated PRVs shall not be used on process equipment other than low pressure storage facilities, unless specified by the Principal.

Pilot tube and fittings shall be 10 mm (3/8") O.D. minimum. Fitting shall be double ferrule compression type. Flared tube fittings shall not be used.

- For valves in CS, LTCS, austenitic SS and NiAluBr that are not exposed to temperatures exceeding 60 °C (140 °F), 316 SS fittings in accordance with SPE 76/039 and 316SS tubing shall be used in accordance with SPE 74/051.
- For valves in other materials or for valves exposed to atmospheric temperatures exceeding 60 °C (140 °F), 316 SS fittings in accordance with SPE 76/039 shall be used in combination with Alloy 825 tubing in accordance with MESC SPE 74/052.

Direct spring-loaded PRVs, marked for steam service and discharging to atmosphere shall be of the exposed-spring type if operating above 250°C (480°F). PRVs which are installed on processing equipment and are not marked for steam service but include a steam relief scenario shall not have an exposed spring design.

Test rods (gags) shall only be provided with the approval of the Principal.

The Manufacturer shall ensure that the valve is capable of being lifted (e.g. provided with lifting points, if necessary).

Seal welding of threads shall comply with all requirements in ASME B31.3 and shall consist of 2 passes with rotating starts and stops.

Seal welds shall have a minimum welding dimension Cx in Figure 328.5.2C of ASME B31.3 and the seal weld shall meet all the welding qualification requirements in ASME B31.3 for an equally sized socket weld.

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MATERIAL

8.1

General