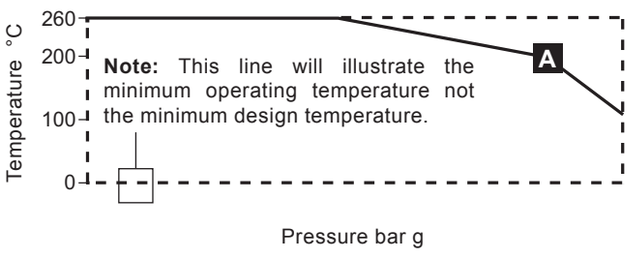
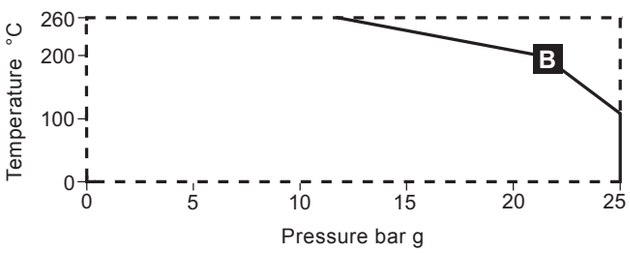
TI-GCM-02
CM Issue 7

Pressure / Temperature Limits

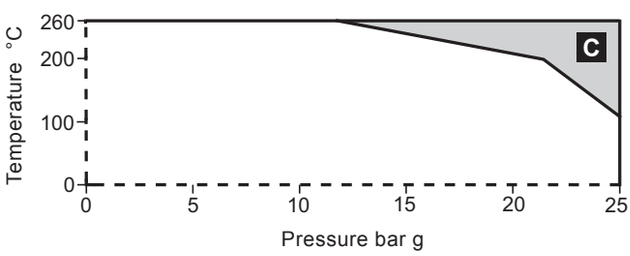
Technical Information sheets (TIs) for products in pressurised systems contain a 'Pressure / temperature limits' diagram. This diagram indicates the envelope of the product(s) at the full range of pressures and temperatures. The construction of the 'Pressure / temperature limits' diagram is shown below. **Note:** A table 'Definition of technical terms' and a typical example (no specific product) is displayed overleaf.



A Is the maximum allowable temperature (TMA) the body of the product can be raised to permanently, at a given pressure.

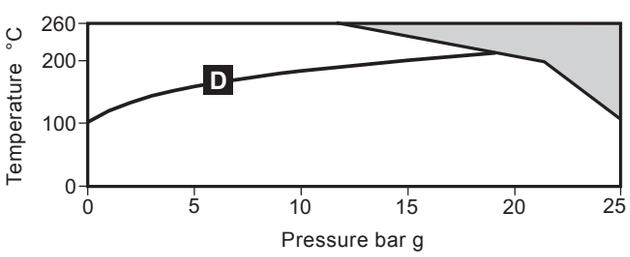


B Is the maximum allowable pressure (PMA) which can be tolerated within the body of the product at a given temperature. It is a function of the PN rating and body design / material.



C Is a prohibited area and the product must not be used in this region and will be worded:

The product **must not** be used in this region.



D The steam saturation curve is added (where relevant) to enable users to easily find the specific operating points, e.g. 10 bar g saturated steam @ 185°C, 10 bar g steam with 20°C superheat or 10 bar g / 250°C steam.

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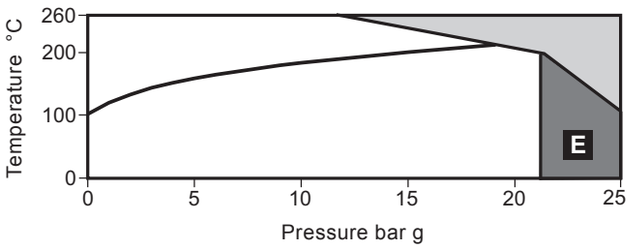
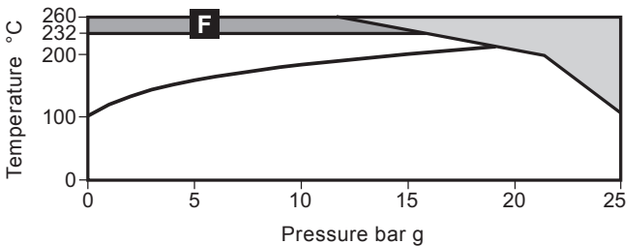
General information

Product limitations



E Sometimes end connections or internal components may restrict the operating envelope of the product below the standard rating. **Care** must therefore be taken in selecting **appropriate end** connections. In this case the product should not be used in area 'e' and will be worded:

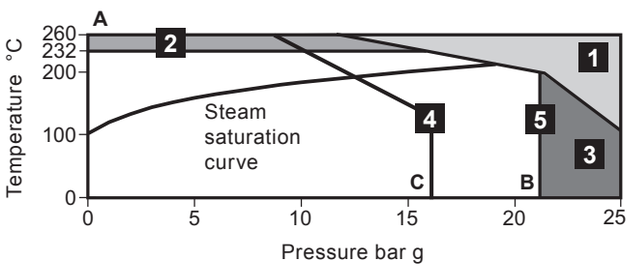
The product **should not** be used in this region because...(the actual reason will depend on the product being described).



F If a product should not be used above a certain temperature, or an ancillary product is required to operate above a certain limit then it will be tinted and worded appropriately. e.g.:

High temperature bolting required for use in this region (the actual reason will depend on the product being described).

An example of a finished diagram:



1 The product **must not** be used in this region.

2 High temperature bolting is required for use in this region.

3 The product should not be used in this region or beyond its operating range as damage to the internals may occur.

4 **A** - **C** Flanged end connections EN 1092 PN16.

5 **A** - **B** Flanged end connections EN 1092 PN25 or ANSI B 16.5 Class 300.

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Warning:

Care must also be taken concerning Differential pressure limits and these are tabulated in addition to the 'Product / temperature limits' diagram.

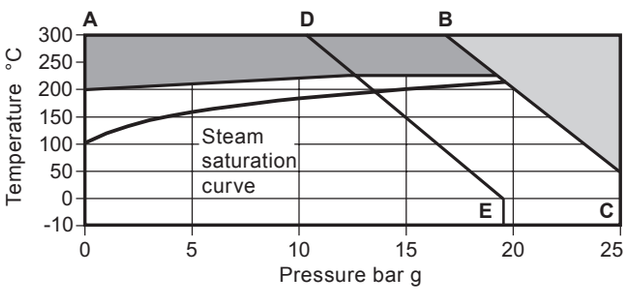
Definition of technical terms

PN	Nominal pressure	Permissible working pressure which is dependant on materials, design and working temperatures/pressures.
PMA	Maximum allowable pressure (bar)	That the shell of the product can withstand at a given temperature.
PMO	Maximum operating pressure (bar)	Which is given by the manufacturer. Sometimes restricted by the pressure limitations of internal mechanisms.
PO	Operating pressure (bar)	Measured at the product inlet.
POB	Operating backpressure	Measured at the outlet of the product.
PMOB	Maximum operating backpressure (bar)	Maximum permissible pressure at the trap outlet allowing correct operation.
ΔPMX	Maximum differential pressure (bar)	Maximum difference between operating pressure and operating backpressure.
ΔPMN	Minimum differential pressure (bar)	Minimum difference between operating pressure and operating backpressure.
TMA	Maximum allowable temperature (°C)	Maximum temperature to which the shell of the product can be raised permanently, at a given pressure.
TMO	Maximum operating temperature (°C)	Maximum temperature for which the operation of the product is guaranteed.
TO	Operating temperature (°C)	Temperature measured at the inlet of the product being tested.
Designed for a maximum cold hydraulic test pressure of __ bar g		This is a cold hydraulic test applied to the body only, with no internals fitted. **Note:** If, when the internals are fitted, the test pressure should be less, this figure should be clarified to the end user (see Typical pressure/temperature limits diagram below)

A standard layout for the Pressure / temperature limits information is shown opposite.

For further 'Pressure / temperature limits' diagram and table layouts, see TI-S24-41, pages 4 and 5.

Pressure / temperature limits



The product **must not** be used in this region.

The product should not be used in this region or beyond its operating range as damage to the internals may occur.

A-B-C Flanged PN25.

A-D-E Flanged ANSI 150.

Note: For hygienic / sanitary clamp ends the maximum pressure / temperature may be restricted by the gasket or sanitary clamp used. Please consult Spirax Sarco.

Body design conditions			PN25
PMA	Maximum allowable pressure		25 bar g @ 50 °C
TMA	Maximum allowable temperature		300 °C @ 17 bar g
Minimum allowable temperature			-196 °C
PMO	Maximum operating pressure for saturated steam service	PN25	19 bar g
		ANSI 150	13.5 bar g
TMO	Maximum operating temperature		222 °C @ 19 bar g
Minimum operating temperature			-10 °C

Note: For lower operating temperatures consult Spirax Sarco.

ΔPMX	Maximum differential pressure	XYZ14-14.5	4.5 bar
		XYZ14-10	10 bar
		XYZ14-14	14 bar

Designed for a maximum cold hydraulic test pressure of 37.5 bar g
Note: With internals fitted, test pressure must not exceed 25 bar g

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Product limitations

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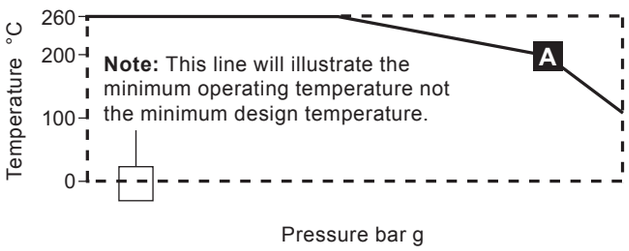
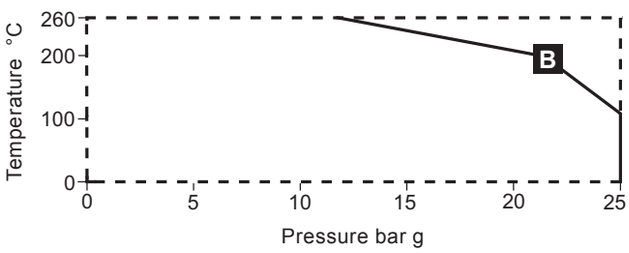
TI-S24-41
CH Issue 3

Pressure / Temperature Limits for Control Valves

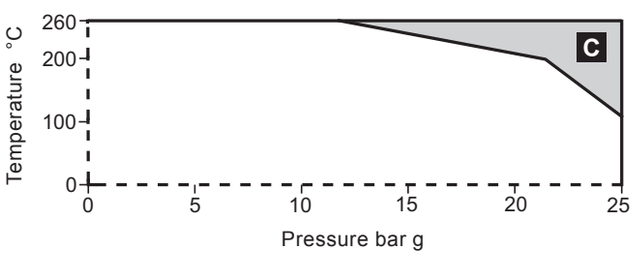
Control valve Technical Information sheets (TIs) for products in pressurised systems contain a 'Pressure / temperature limits' diagram. This diagram indicates the envelope of the product(s) at the full range of pressures and temperatures. The construction of the 'Pressure / temperature limits' diagram is shown below.
Note: A table 'Definition of technical terms used for control valves' and a typical example (no specific product) is displayed overleaf.



A Is the maximum design temperature the body of the product can be raised to permanently, at a given pressure.

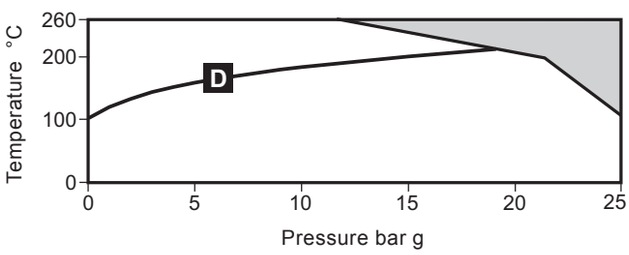


B Is the maximum design pressure that the combined body and end connections of the product can withstand at a given temperature. It is a function of the PN rating and body design / material.



C Is a prohibited area and the product **must not** be used in this region and will be worded:

The product **must not** be used in this region.



D The steam saturation curve is added (where relevant) to enable users to easily find the specific operating points, e.g. 10 bar g saturated steam @ 185 °C, 10 bar g steam with 20 °C superheat or 10 bar g / 250 °C steam.

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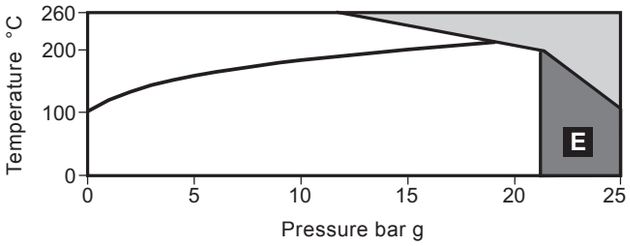
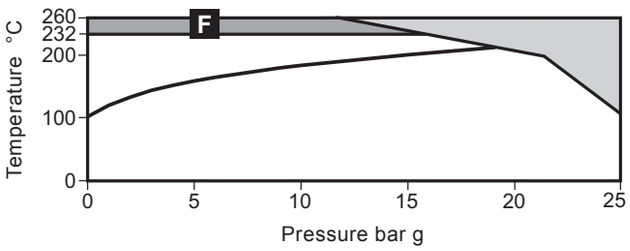
General information

Product limitations



E Sometimes end connections or internal components may restrict the operating envelope of the product below the standard rating. **Care must** therefore be taken in selecting **appropriate end connections**. In this case the product should not be used in area 'e' and will be worded:

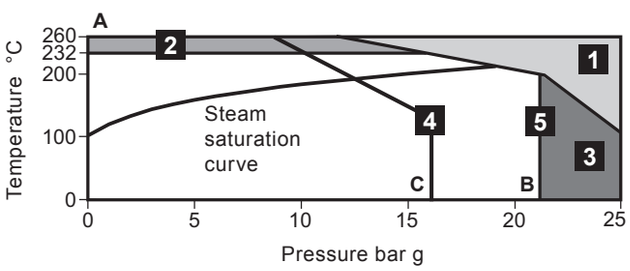
The product **should not** be used in this region because...(the actual reason will depend on the product being described).



F If a product should not be used above a certain temperature, or an ancillary product is required to operate above a certain limit then it will be tinted and worded appropriately. e.g.:

High temperature bolting required for use in this region (the actual reason will depend on the product being described).

An example of a finished diagram:



1		The product **must not** be used in this region.
2		High temperature bolting is required for use in this region.
3		The product should not be used in this region or beyond its operating range as damage to the internals may occur.
4	**A** - **C**	Flanged end connections EN 1092 PN16.
5	**A** - **B**	Flanged end connections EN 1092 PN25 or ANSI B 16.5 Class 300.

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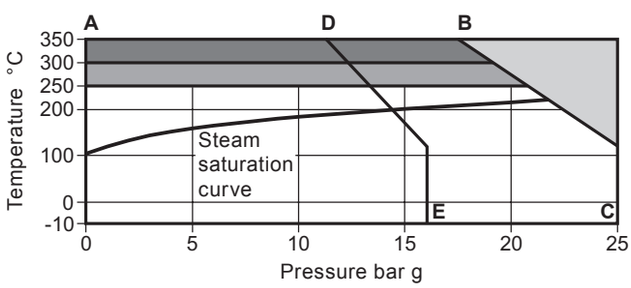
Definition of technical terms used for control valves

Body	This is a combination of the product body and end connections and is the term used to describe the pressure containing envelope of the product.
Nominal pressure (PN)	The PN is the nominal working pressure / temperature (which is dependant on materials, design and working temperatures/pressures) that can be tolerated by the body of the product.
Maximum design pressure	This is the maximum allowable pressure that the body of the product can withstand at a given temperature.
Maximum operating pressure	This is provided by the manufacturer when it is less than the maximum design pressure. For example the maximum design pressure may be reduced to the pressure limitation of the lowest rated option chosen.
Maximum differential pressure	This is dependant upon the chosen actuator up to the maximum design pressure of the product.
Maximum design temperature	This is the maximum allowable temperature to which the body of the product can be raised permanently, at a given pressure.
Maximum operating temperature	This is the maximum temperature for correct operation of the product. This is determined by the lowest rated option chosen.
Minimum design temperature	This is the minimum documented temperature the body of the product can withstand.
Minimum operating temperature	This is the minimum temperature for correct operation of the product.
Designed for a maximum cold hydraulic test pressure of __ bar g or psi g	This is a cold hydraulic test applied to the body as supplied. **Note:** When Spirax Sarco have tested the product in an alternative form than that supplied, a lower pressure will be given (see Typical pressure/temperature limits diagram below).

A standard layout for the Pressure / temperature limits information is shown opposite.

For further layouts, depending on space available in the TI or IMI, are shown on pages 4 and 5.

Pressure / temperature limits



The product **must not** be used in this region.

High temperature packing is required for use in this region.

The product should not be used in this region or beyond its operating range as damage to the internals may occur.

A-B-C Flanged PN25.

A-D-E Flanged PN16.

Note: As standard the XYZ series two port control valves are supplied with PTFE stem seal and metal-to-metal seats.

Body design conditions		PN25
Maximum design pressure		25 bar g @ 120 °C
Maximum design temperature		350 °C @ 17.5 bar g
Minimum design temperature		-20 °C
Maximum operating temperature	As standard	250 °C @ 22 bar g
	With high temperature packing	300 °C @ 20 bar g
	With high temperature bolting and packing	350 °C @ 18 bar g
Minimum operating temperature		-10 °C

Note: For lower operating temperatures consult Spirax Sarco.

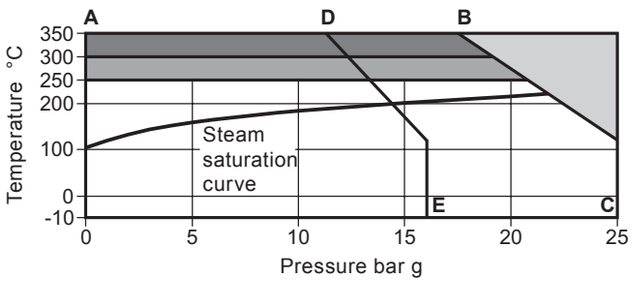
Maximum differential pressure	See relevant actuator TI

Designed for a maximum cold hydraulic test pressure of 37.5 bar g
Note: As supplied the test pressure must not exceed 25 bar g

7 General information
Product limitations

If the chart is on a full single page, this layout is used

Pressure / temperature limits



The product **must not** be used in this region.

High temperature packing is required for use in this region.

The product should not be used in this region or beyond its operating range as damage to the internals may occur.

A-B-C Flanged PN25.

A-D-E Flanged PN16.

Note: As standard the XYZ series two port control valves are supplied with PTFE stem seal and metal-to-metal seats.

Body design conditions		PN25
Maximum design pressure		25 bar g @ 120 °C
Maximum design temperature		350 °C @ 17.5 bar g
Minimum design temperature		-20 °C
Maximum operating temperature	As standard	250 °C @ 22 bar g
	With high temperature packing	300 °C @ 20 bar g
	With high temperature bolting and packing	350 °C @ 18 bar g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C
Maximum differential pressure		See relevant actuator TI
Designed for a maximum cold hydraulic test pressure of: **Note:** As supplied the test pressure must not exceed 25 bar g		37.5 bar g

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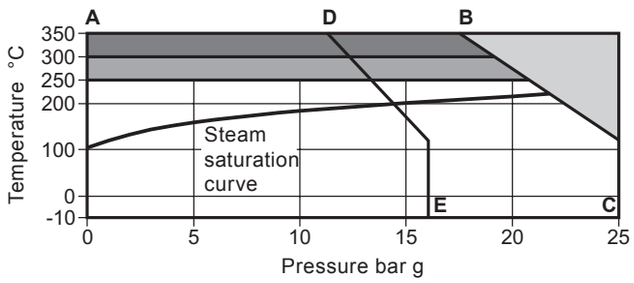
If the chart is on a single page, with limited space, this layout is used

Pressure / temperature limits



The product **must not** be used in this region.

High temperature packing is required for use in this region.

The product should not be used in this region or beyond its operating range as damage to the internals may occur.

A-B-C Flanged PN25.

A-D-E Flanged PN16.

Note: As standard the XYZ series two port control valves are supplied with PTFE stem seal and metal-to-metal seats.

Body design conditions		PN25
Maximum design pressure		25 bar g @ 120 °C
Maximum design temperature		350 °C @ 17.5 bar g
Minimum design temperature		-20 °C
Maximum operating temperature	As standard	250 °C @ 22 bar g
	With high temperature packing	300 °C @ 20 bar g
	With high temperature bolting and packing	350 °C @ 18 bar g
Minimum operating temperature **Note:** For lower operating temperatures consult Spirax Sarco.		-10 °C
Maximum differential pressure		See relevant actuator TI
Designed for a maximum cold hydraulic test pressure of **Note:** As supplied the test pressure must not exceed 25 bar g		37.5 bar g

7 General information
Product limitations

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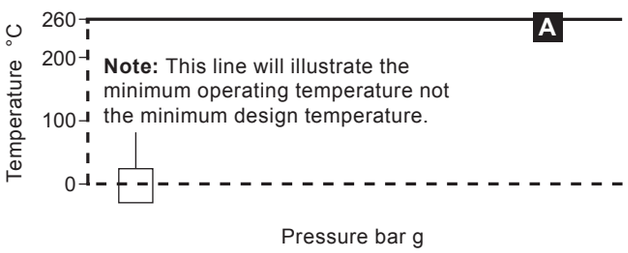
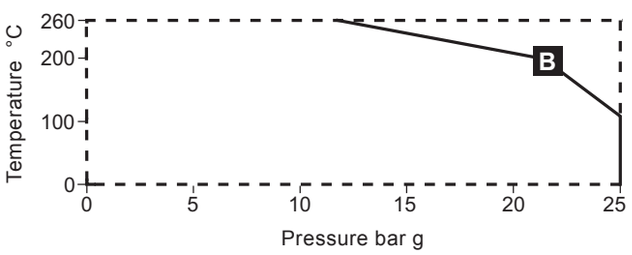
TI-S13-50
CH Issue 3

Pressure / Temperature Limits for Safety Valves

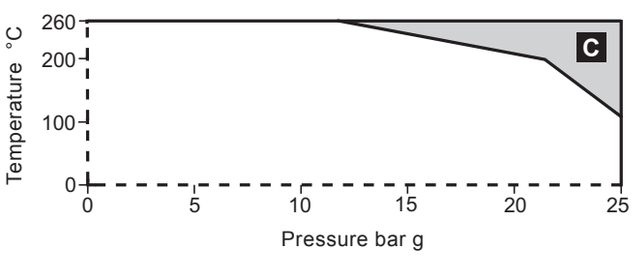
Safety valve Technical Information sheets (TIs) contain a 'Pressure / temperature limits' diagram. This diagram indicates the envelope of the product(s) at the full range of pressures and temperatures. Note: The construction of this diagram and a typical example (no specific product) is displayed below:



A Is the maximum design temperature the body of the product can be raised to permanently, at a given pressure.

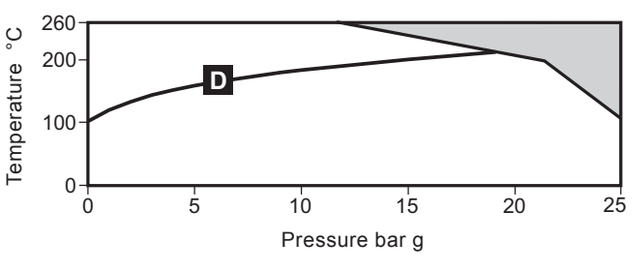


B Is the maximum design pressure that the combined body and end connections of the product can withstand at a given temperature. It is a function of the PN rating and body design / material.



C Is a prohibited area and the product **must not** be used in this region and will be worded:

The product **must not** be used in this region.



D The steam saturation curve is added (where relevant) to enable users to easily find the specific operating points, e.g. 10 bar g saturated steam @ 185 °C, 10 bar g steam with 20 °C superheat or 10 bar g / 250 °C steam.

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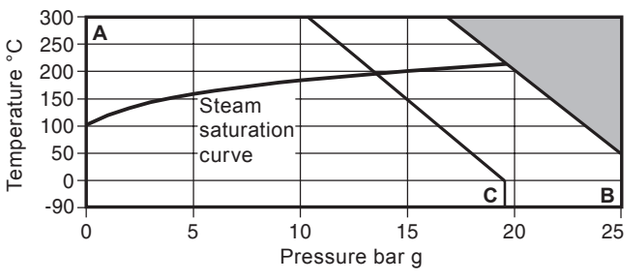
Typical 'Pressure / temperature limits' diagram and table for a safety valve:

Pressure / temperature limits
Please contact: Spirax Sarco, when so required, for relevant details regarding the maximum allowable limits that the body can withstand.



The product **must not** be used in this region.

A - B Flanged PN25.

A - C Flanged ANSI 150.

Note: For hygienic / sanitary clamp ends the maximum pressure / temperature may be restricted by the gasket or sanitary clamp used. Please consult Spirax Sarco.

Body design conditions			PN25
Set pressure range	Maximum	DN15 - DN32	18 bar g
		DN40 - DN50	14 bar g
	Minimum		0.3 bar g
Temperature	Metal seat	Minimum	-90 °C
		Maximum	+300 °C
	Nitrile seat	Minimum	-30 °C
		Maximum	+120 °C
	EPDM seat	Minimum	-50 °C
		Maximum	+150 °C
	Viton seat	Minimum	-20 °C
		Maximum	+200 °C
Performance data	Overpressure	Steam	5%
		Gas, liquid	10%
	Blowdown limits	Steam, gas, liquid	10%
	Derated coefficient of discharge values	Steam, gas	0.71
		Liquid	0.52

Designed for a maximum inlet cold hydraulic test pressure of 37.5 bar g
Note: If a test gag is fitted, test pressure must not exceed 25 bar g

For further 'Pressure / temperature limits' diagram and table layouts, see TI-S24-41, pages 4 and 5.