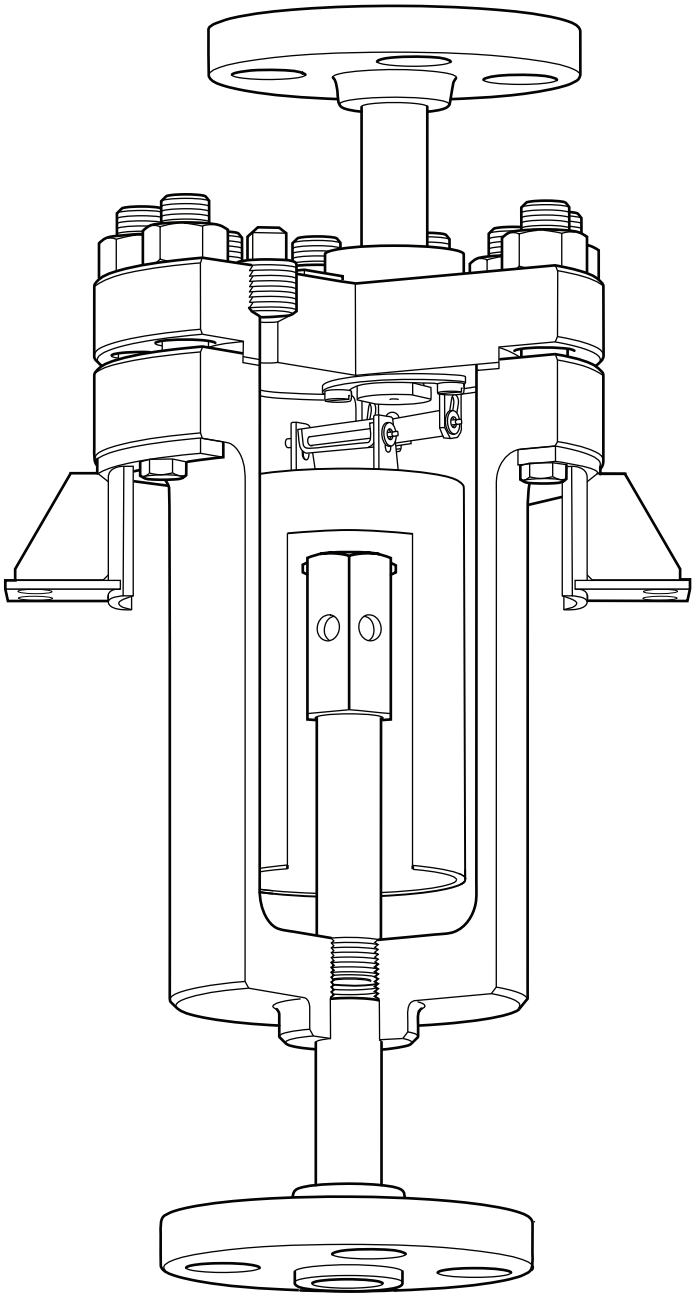
IBV Series C-LF2
Carbon Steel
Inverted Bucket Vertical Steam Trap

Description

The IBV series C-LF2 inverted bucket steam trap is manufactured using carbon steel (A350 LF2) for the body and cover; with internal components being made of stainless steel. It is suitable for use with saturated and superheated steam and in high pressure and high temperature applications. The IBV is fully automatic and has been designed in such a way that there is minimal friction from mechanism movement; valve closure is immediate, without any steam loss and the discharge action is positive with no equivocal phases. The standard version will be supplied with bolted support brackets.

On the cover of the IBV there in a ⅜" hole, threaded and plugged, to eliminate any water discharge after being hydraulically tested before leaving the factory. This hole can be reopened on site for the customer to perform periodic hydro testing.



Standards

This steam trap is designed following the ASME VIII Mechanical Design Code and complies with the requirements of the Pressure Equipment Directive and carries the CE mark when so required.

Certification

The product is available with material certification to EN 10204 3.1.

Note: All certification/inspection requirements must be stated at the time of order placement.

Optional extras

On request the IBV steam trap can be equipped with the following:

An **inbuilt stainless steel check valve**
Please note that this option is only available for units that have a ΔP maximum differential pressure of 40 bar (580 psi) and above - See the IBV product nomenclature and selection guide for clarification.

A **Stellite plug and seat**.

Available types

Series C	**Carbon steel** body and cover	**See** TI-P067-10
Series C-LF2	**Carbon steel** body and cover with a material specification of **A350 LF2** for low temperature applications down to -46 °C (-51 °F)	
Series Z	**Alloy steel** body and cover	**See** TI-P067-15

Sizes and pipe connections

Please note that all standard flanges (as noted below) will be slip-on type. Weld-neck type flanges can be supplied to special order and must be specified at the time of order placement.

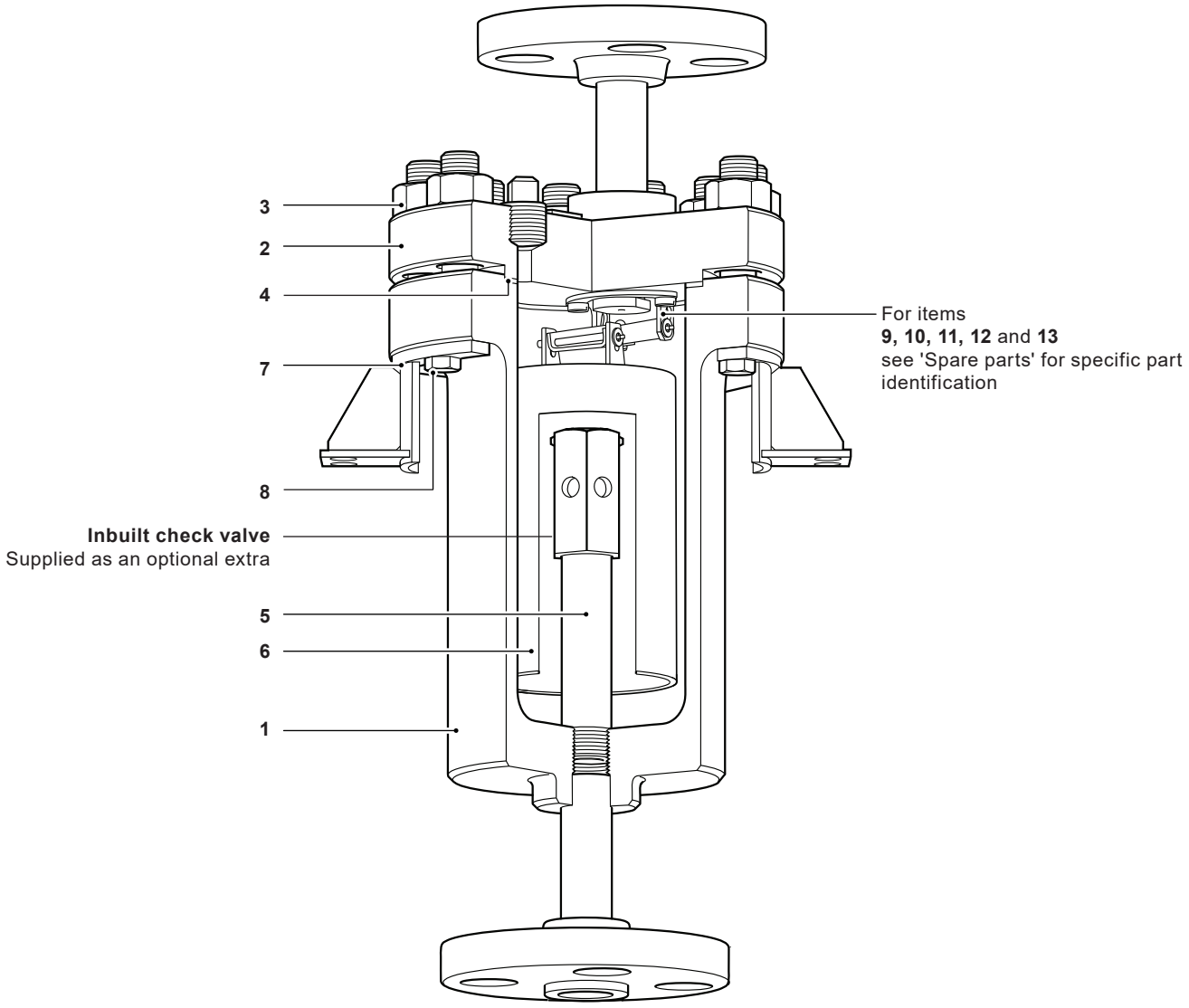
½", ¾", 1", 1½", 2" and 3"
Screwed BSP or NPT
Socket weld, according to ASME B 16.11

½", ¾", 1", 1½", 2" and 3"
Flanged ASME B 16.5 ASME Class 150, 300, 600 and 900 (1500 available to special request Series C only)

DN15, DN20, DN25, DN40, DN50 and DN80
Flanged EN 1092 PN16, PN25, PN40, PN63 and PN100

Note: that the flanged **ASME Class 1500** units are **limited to a body rating of ASME** Class 900.

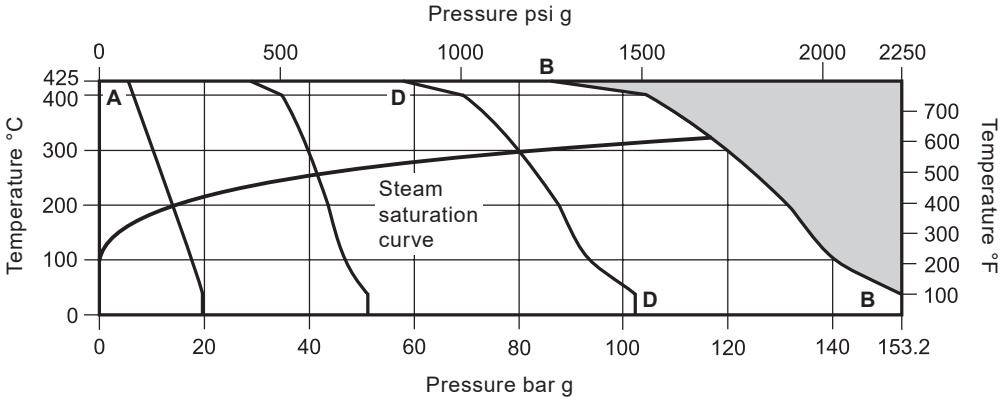
Materials



No.	Part	Material	
1	Body	Carbon steel	PED ASTM A350 LF2 CL. 1
2	Cover	Carbon steel	ASTM A350 LF2
3	Stud bolts		ASTM A193 Gr. B8 CL.2
	Nuts		ASTM A194 Gr. 8
	NACE Version	(External only)	
		Stud bolts	ASTM A479XM-19
		Nuts	ASTM A194 Gr. 8M
4	Cover gasket	Reinforced graphite	
5	Channelling pipe	Stainless steel	A333 Gr. 6

No.	Part	Material	
6	Bucket	Stainless steel	AISI 316
7	Bracket	Carbon steel	A516 Gr. 70
8	Bracket screw	Stainless steel	AISI 316
9	Lever pin	Stainless steel	AISI 316
10	Split pin	Stainless steel	AISI 316
11	Valve seat	Stainless steel	400 series
12	Valve head	Stainless steel	400 series
13	Valve lever	Stainless steel	AISI 316

Pressure/temperature limits (ISO 6552) - Screwed, Socket weld and Flanged ASME

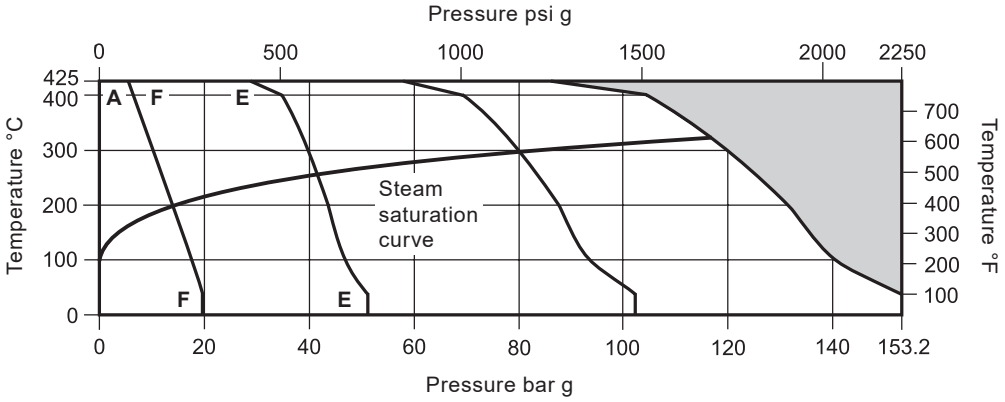


The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

* **Please note** that the PMO (PS) is limited to the maximum ΔP of the selected IBV.

		Body design conditions		ASME Class 900
A-B-B	Screwed and Socket weld ASME Class 900	PMA - Maximum allowable pressure	153.2 bar g @ 38 °C	2 222 psi g @ 100 °F
		TMA - Maximum allowable temperature	425 bar g @ 86.3 °C	800 °F @ 1 235 psi g
		Minimum allowable temperature	-46 °C	-50 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	116.3 bar g	1 687 psi g
		TMO (TS) - Maximum operating temperature for saturated steam service	323 °C @ 112.7 bar g	613 °F @ 1 635 psi g
		Designed for a maximum cold hydraulic test pressure of:	229.8 bar g	3 330 psi g
A-D-D	ASME Class 600	PMA - Maximum allowable pressure	102.1 bar g @ 38 °C	1 480 psi g @ 100 °F
		TMA - Maximum allowable temperature	425 °C @ 57.5 bar g	800 °F @ 825 psi g
		Minimum allowable temperature	-46 °C	-50 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	79.9 bar g	1 159 psi g
		TMO (TS) - Maximum operating temperature for saturated steam service	295 °C @ 75.1 bar g	564 °F @ 1 089 psi g
		Designed for a maximum cold hydraulic test pressure of:	153.1 bar g	2 220 psi g

Pressure/temperature limits (ISO 6552) - Screwed, Socket weld and Flanged ASME (continued)

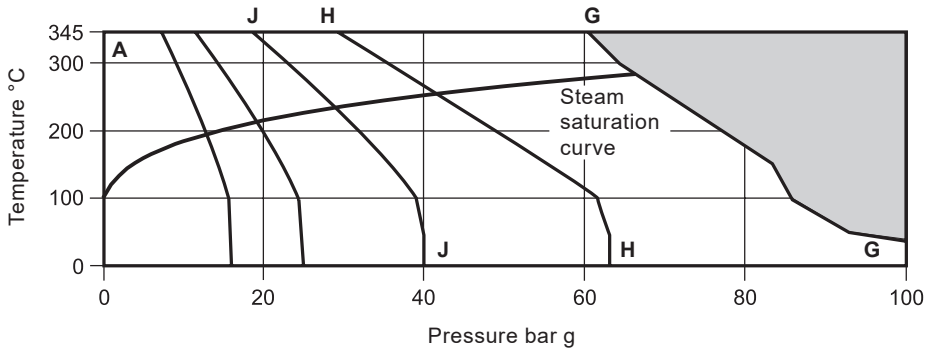


The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

* **Please note** that the PMO (PS) is limited to the maximum ΔP of the selected IBV.

A-E-E	**ASME Class 300**	PMA - Maximum allowable pressure	51.1 bar g @ 38 °C	741 psi g @ 100 °F
		TMA - Maximum allowable temperature	425 °C @ 28.8 bar g	800 °F @ 410 psi g
		Minimum allowable temperature	-46 °C	-50 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	41.7 bar g	605 psi g
		TMO (TS) - Maximum operating temperature for saturated steam service	254 °C @ 37.6 bar g	489 °F @ 545 psi g
		Designed for a maximum cold hydraulic test pressure of:	76.6 bar g	1 110 psi g
A-F-F	**ASME Class 150**	PMA - Maximum allowable pressure	19.6 bar g @ 38 °C	284 psi g @ 100 °F
		TMA - Maximum allowable temperature	425 °C @ 5.5 bar g	800 °F @ 80 psi g
		Minimum allowable temperature	-46 °C	-50 °F
		* PMO (PS) - Maximum operating pressure for saturated steam service	14 bar g	203 psi g
		TMO (TS) - Maximum operating temperature for saturated steam service	197 °C @ 8.4 bar g	387 °F @ 122 psi g
		Designed for a maximum cold hydraulic test pressure of:	29.4 bar g	427 psi g

Pressure/temperature limits (ISO 6552) - Screwed, Socket weld and Flanged EN1092-1

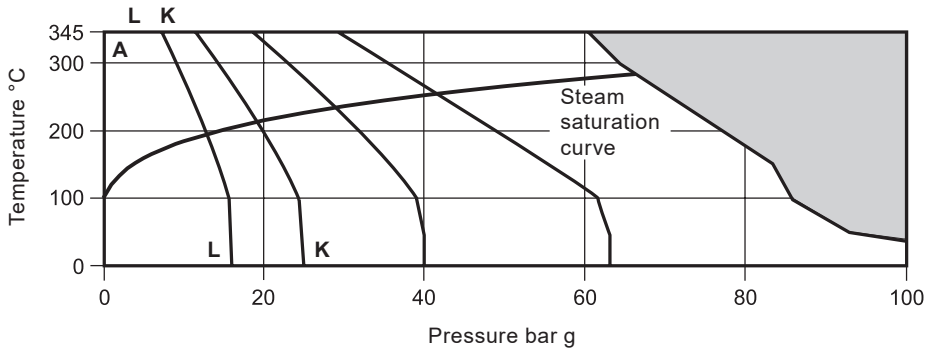


The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

* **Please note** that the PMO (PS) is limited to the maximum ΔP of the selected IBV.

		Body design conditions	PN100
A-G-G	**PN100**	PMA - Maximum allowable pressure	100 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 44.9 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	66 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	283 °C @ 60.4 bar g
		Designed for a maximum cold hydraulic test pressure of:	143 bar g
A-H-H	**PN63**	PMA - Maximum allowable pressure	63 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 28.3 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	44 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	257 °C @ 29.4 bar g
		Designed for a maximum cold hydraulic test pressure of:	90 bar g
A-J-J	**PN40**	PMA - Maximum allowable pressure	40 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 17.9 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	29 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	234 °C @ 18.6 bar g
		Designed for a maximum cold hydraulic test pressure of:	57.2 bar g

Pressure/temperature limits (ISO 6552) - Screwed, Socket weld and Flanged EN1092-1
(continued)



The product **must not** be used in this region or beyond the parameter of the PMA or TMA of the relative end connection.

* **Please note** that the PMO (PS) is limited to the maximum ΔP of the selected IBV.

A-K-K	**PN25**	PMA - Maximum allowable pressure	25 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 11.2 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	19 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	212 °C @ 11.6 bar g
		Designed for a maximum cold hydraulic test pressure of:	35.7 bar g
A-L-L	**PN16**	PMA - Maximum allowable pressure	16 bar g @ 50 °C
		TMA - Maximum allowable temperature	425 °C @ 7.1 bar g
		Minimum allowable temperature	-46 °C
		* PMO (PS) - Maximum operating pressure for saturated steam service	12 bar g
		TMO (TS) - Maximum operating temperature for saturated steam service	191 °C @ 7.4 bar g
		Designed for a maximum cold hydraulic test pressure of:	22.8 bar g

Capacities - DN15 (½")

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO (PS) of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

a) The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.

b) The effective differential pressure.

Working example:

Condensate discharge = 500 kg/h

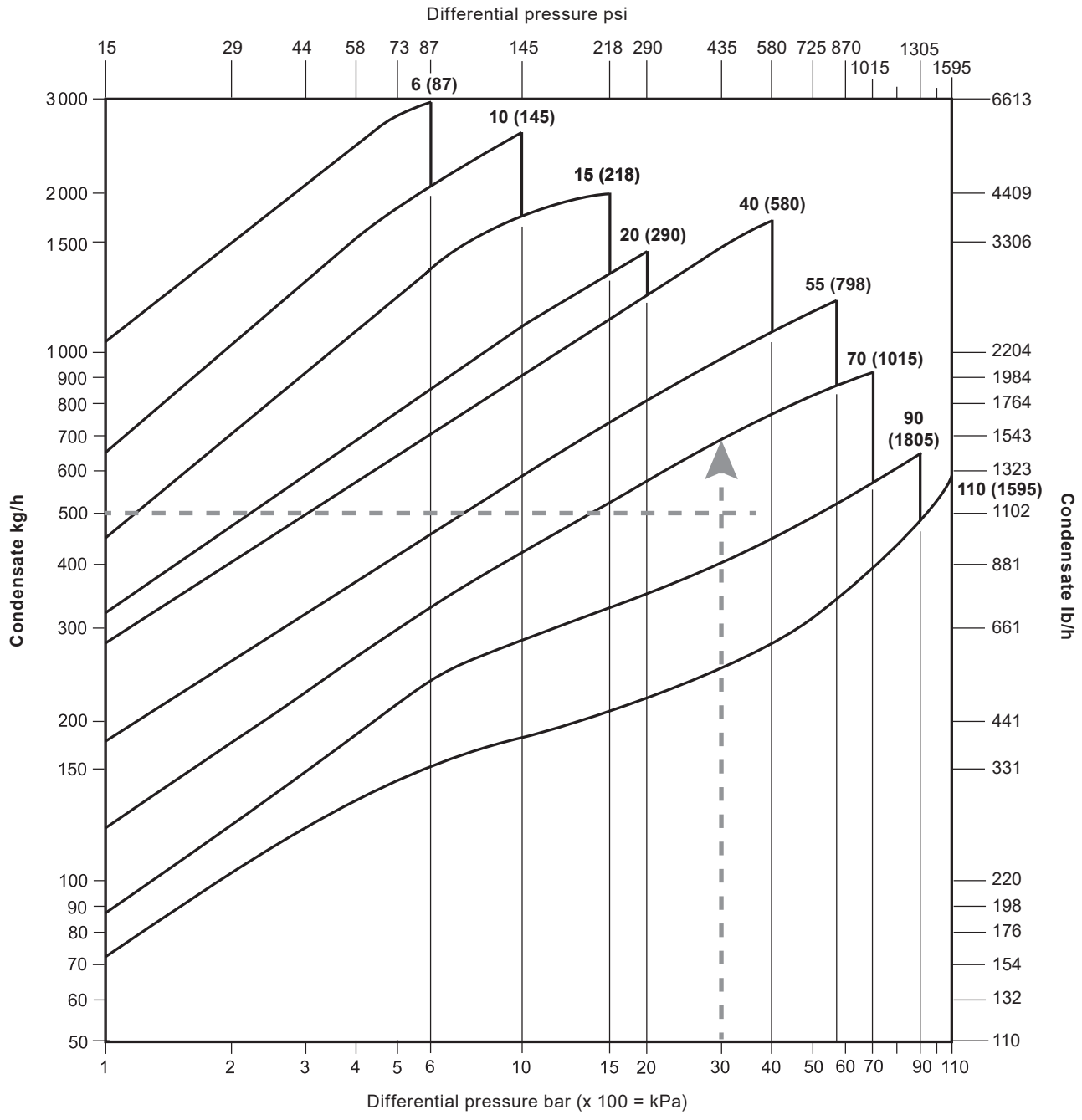
Effective differential pressure = 30 bar

Upstream pressure = 45 bar g

Backpressure = 15 bar g

The unit of choice would have a **ΔP max. differential pressure of 70 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 13.



Capacities - DN20 (¾")

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO (PS) of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

a) The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.

b) The effective differential pressure.

Working example:

Condensate discharge = 1050 kg/h

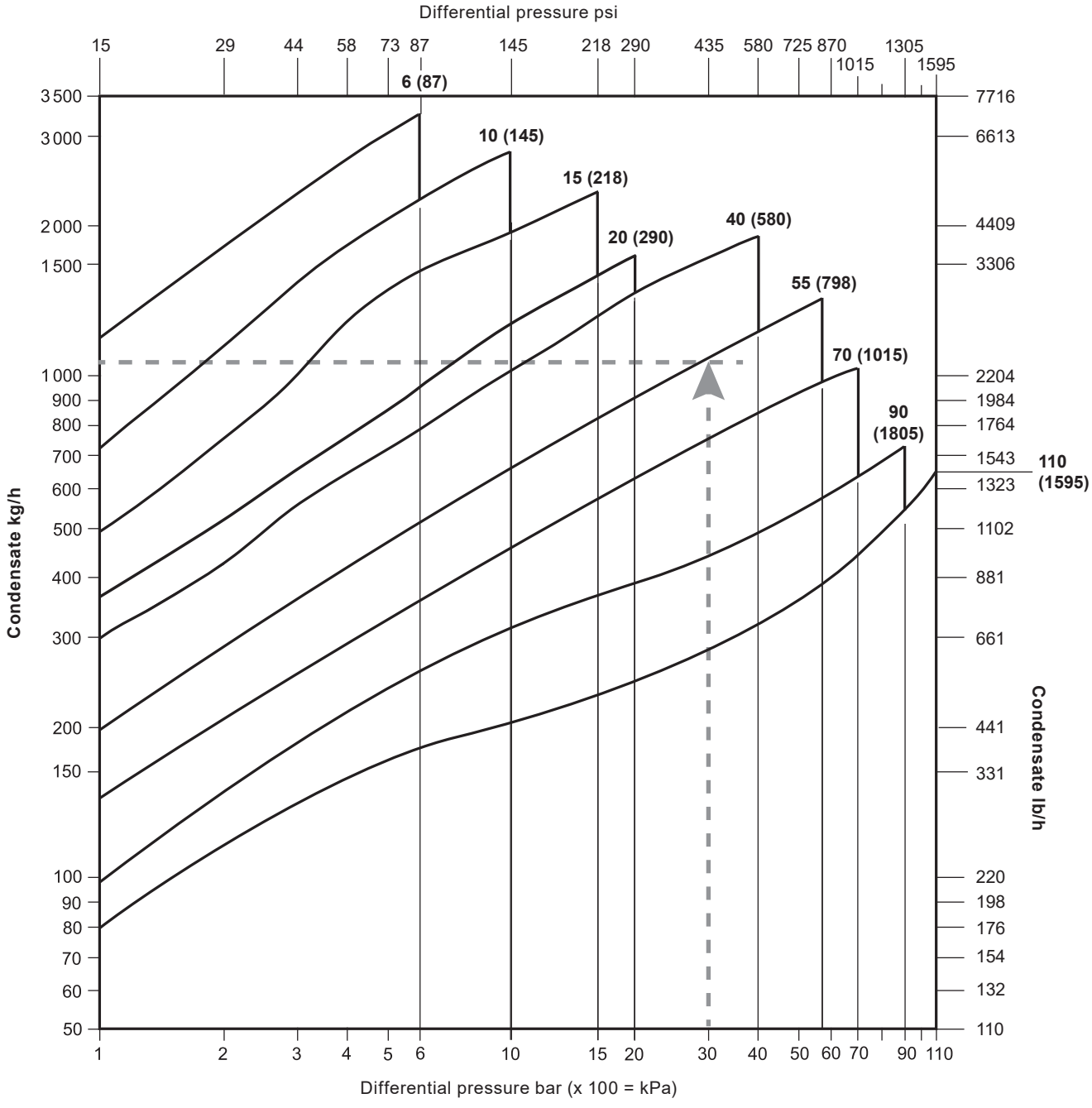
Effective differential pressure = 30 bar

Upstream pressure = 45 bar g

Backpressure = 15 bar g

The unit of choice would have a **ΔP max. differential pressure of 55 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 13.



Capacities - DN25 (1")

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO (PS) of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

a) The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.

b) The effective differential pressure.

Working example:

Condensate discharge = 2000 kg/h

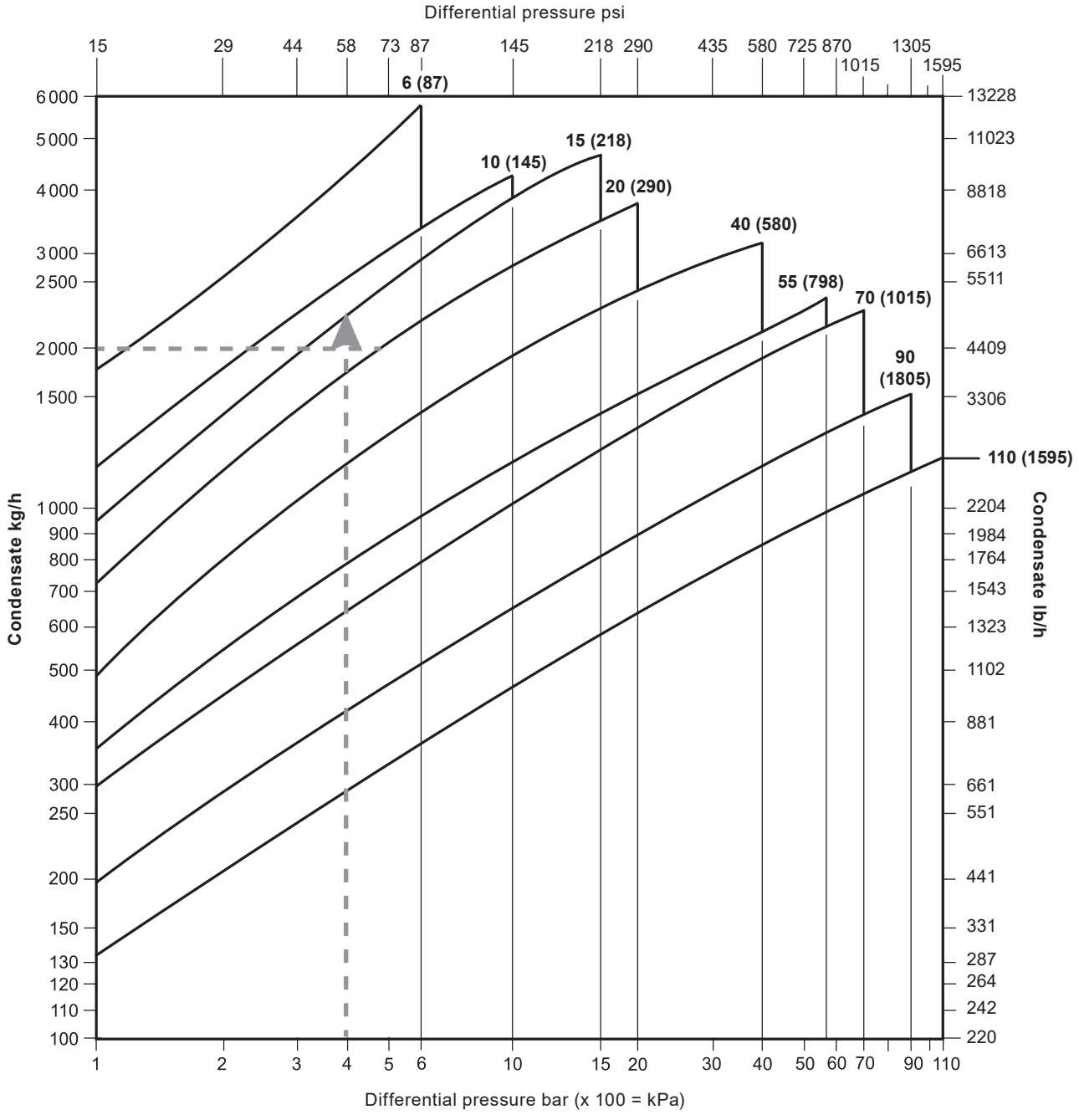
Effective differential pressure = 4 bar

Upstream pressure = 5 bar g

Backpressure = 1 bar g

The unit of choice would have a **ΔP max. differential pressure of 15 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 13.



Capacities - DN40 (1½")

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO (PS) of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

a) The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.

b) The effective differential pressure.

Working example:

Condensate discharge = 2000 kg/h

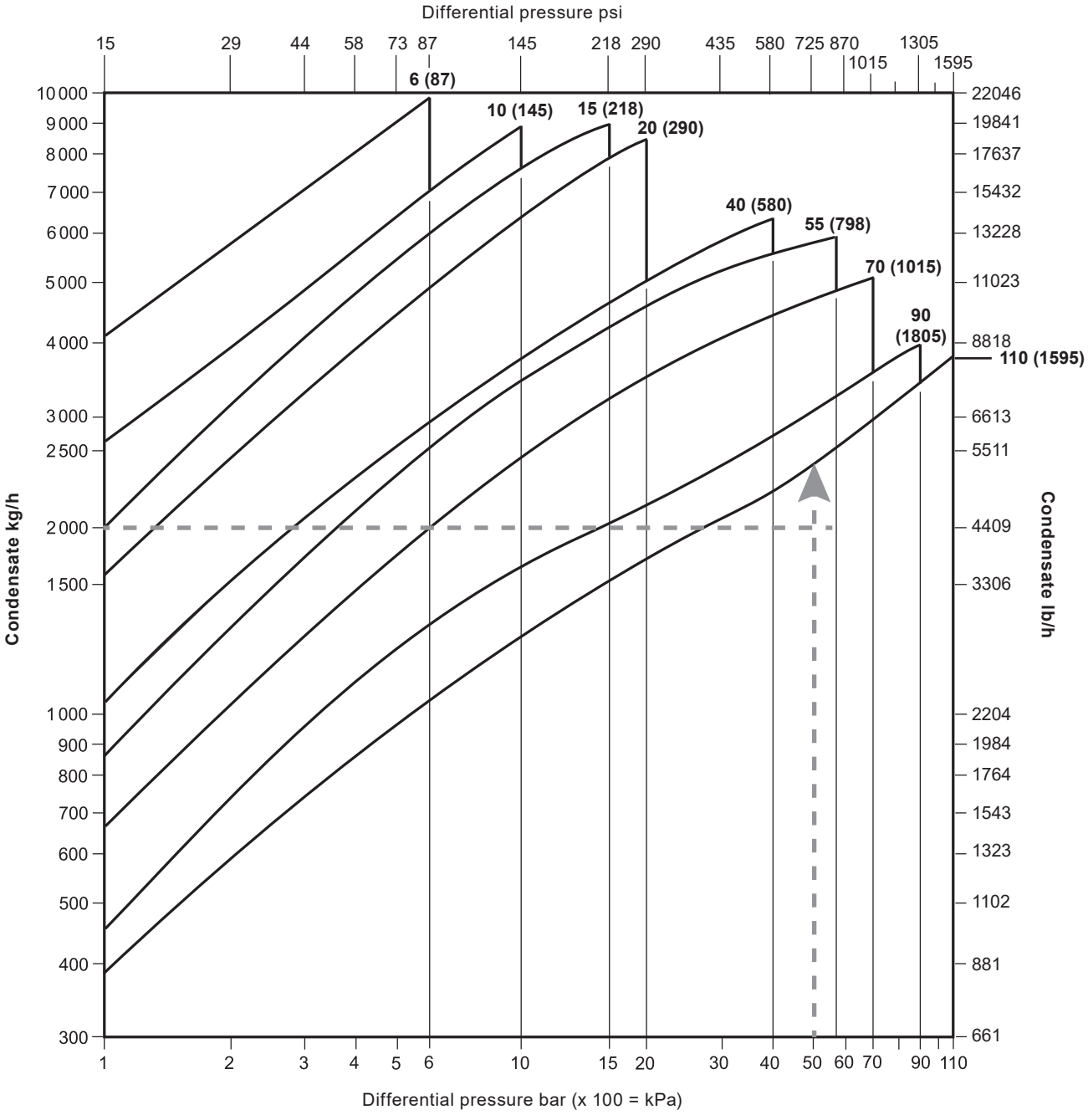
Effective differential pressure = 50 bar

Upstream pressure = 75 bar g

Backpressure = 25 bar g

The unit of choice would have a **ΔP max. differential pressure of 110 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 13.



Capacities - DN50 (2")

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO (PS) of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

a) The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.

b) The effective differential pressure.

Working example:

Condensate discharge = 6000 kg/h

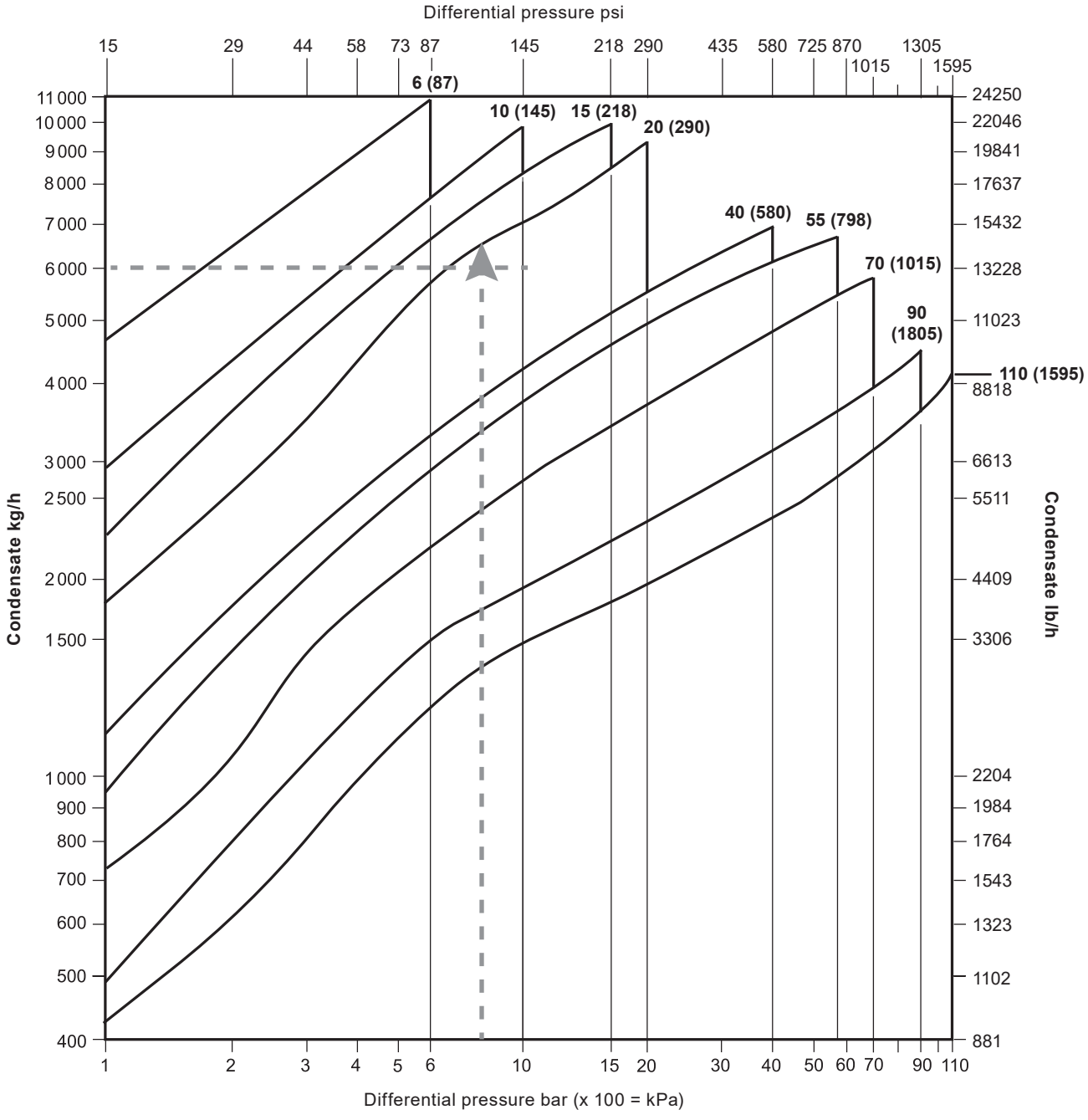
Effective differential pressure = 8 bar

Upstream pressure = 10 bar g

Backpressure = 2 bar g

The unit of choice would have a **ΔP max. differential pressure of 20 bar** which is greater than the upstream pressure.

For full product selection and nomenclature follow the guide on page 13.



Capacities - DN80 (3")

Note: IBV inverted bucket steam traps should be selected for use at the most appropriate working differential pressure and not on the basis of load.

Condensate discharge capacities (kg/h) - The discharge capacities in the table are referring to the operating temperature of the saturated steam and the PMO (PS) of the steam trap shall be the relevant ΔP maximum differential pressure of each specific model.

For optimum trap selection you need to know the following criteria:

a) The hourly amount of condensate to be discharged, inclusive of the safety factor: x 1.5 for continuous use, x 2 to x 3 for intermittent use.

b) The effective differential pressure.

Working example:

Condensate discharge = 5000 kg/h

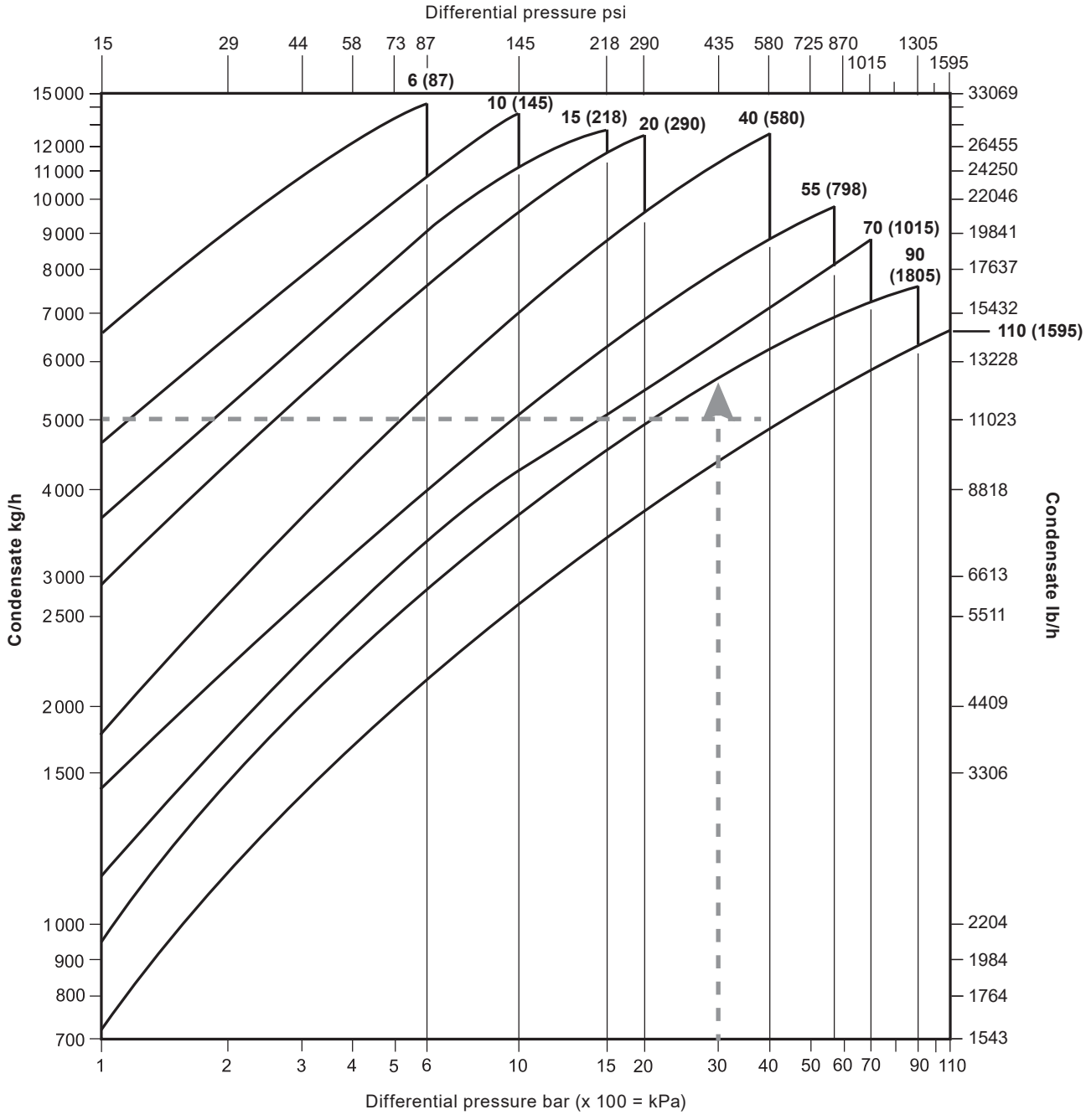
Effective differential pressure = 30 bar

Upstream pressure = 55 bar g

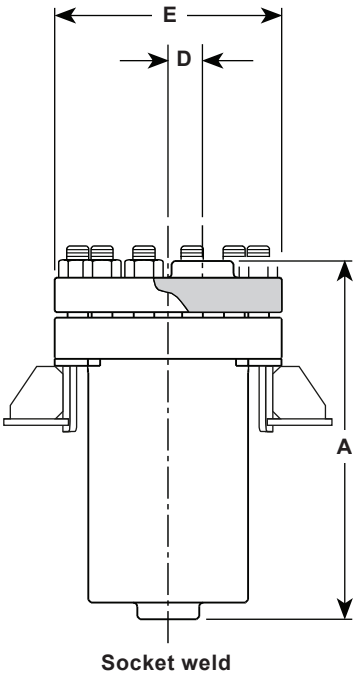
Backpressure = 25 bar g

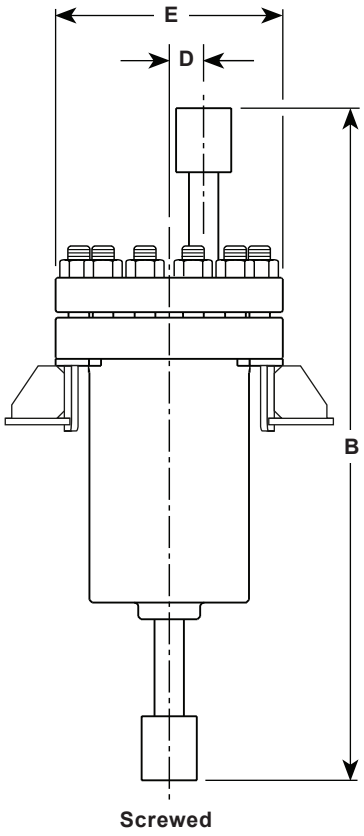
The unit of choice would have a **ΔP max. differential pressure of 90 bar** which is greater than the upstream pressure.

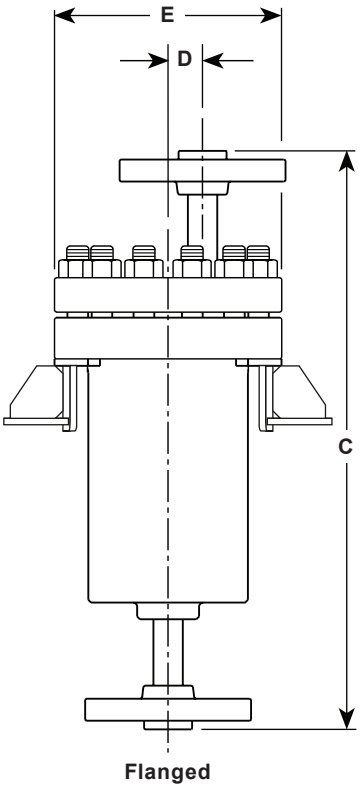
For full product selection and nomenclature follow the guide on page 13.



Dimensions (approximate) in mm (in)







IBV size		A	B	C	D	E
DN15	½"	260 (10.2)	488 (19.2)	420 (16.5)	25 (1)	165 (6.5)
DN20	¾"					
DN25	1"	345 (13.6)	616 (24.3)	530 (20.9)	40 (1.6)	210 (8.3)
DN40	1½"	411 (16.2)	774 (30.5)	650 (25.6)	39 (1.5)	265 (10.4)
DN50	2"		782 (30.8)			
DN80	3"	532 (20.9)	1 026 (40.4)	850 (33.5)	36 (1.4)	305 (12)

Weights (approximate) in kg (lb)

IBV size		BSP + NPT	Socket weld	Flanged ASME Class:					Flanged EN 1092:				
				150	300	600	900	1500*	PN16	PN25	PN40	PN63	PN100
DN15	½"	20 (44)	18 (40)	20 (44)	20 (44)	20 (44)	22 (49)	22 (49)	20 (44)	20 (44)	20 (44)	20 (44)	22 (49)
DN20	¾"	26 (57)	24 (53)	26 (57)	28 (62)	28 (62)	30 (66)	30 (66)	28 (62)	28 (62)	28 (62)	28 (62)	30 (66)
DN25	1"	42 (93)	39 (86)	42 (93)	44 (97)	44 (97)	48 (106)	48 (106)	42 (93)	42 (93)	42 (93)	42 (93)	46 (101)
DN40	1½"	68 (150)	65 (143)	70 (154)	72 (159)	72 (159)	78 (172)	78 (172)	70 (154)	70 (154)	70 (154)	70 (154)	74 (163)
DN50	2"	68 (150)	65 (143)	72 (159)	74 (163)	76 (168)	88 (194)	88 (194)	72 (159)	72 (159)	72 (159)	74 (159)	78 (172)
DN80	3"	125 (276)	120 (265)	132 (291)	136 (300)	138 (304)	152 (335)	162 (357)	130 (287)	130 (287)	130 (287)	134 (295)	138 (304)

* on request

IBV product nomenclature and selection guide:

Please note that other units are available on request to suit the specifics of a particular process application.

Series		C-LF2 =	Carbon steel	C
PMO (PS) @ Saturated steam temperature for the body rating	**Carbon steel**	116 bar g =	ASME Class 900 body	116
ΔP maximum differential pressure		ΔP =	6, 10, 15, 20, 40, 55, 70, 90, 110 bar	110
Connections	**Size**	=	½", ¾", 1", 1½", 2", 3" **or** DN15, DN20, DN25, DN40, DN50, DN80	3"
	Screwed	=	BSP or NPT	ASME Class 300
	Socket weld	=	According to ASME B 16.11	
	Flanged	ASME =	ASME Class 150, 300, 600, 900, (*1500 available on request)	
		EN 1092 =	PN16, PN25, PN40, PN63, PN100	
Optional extras		Blank =	Standard	
		NACE =	NACE compliancy	
		CV =	Check valve **Please note** that this option is only available for units that have a ΔP maximum differential pressure of 40 bar and above - See above.	

IBV product selection example: IBV - C-LF2 - 116 - 110 - 3" - ASME Class 300 -

How to order

1 off Spirax Sarco IBV-C-LF2-116-110-3"-Flanged ASME Class 300 inverted bucket vertical steam trap having a carbon steel body and cover with stainless steel internals.

The following will be supplied, if specified, at the time of order placement:

1. A special name-plate when a U-STAMP has been specified.

Safety information, installation and maintenance

For full details see the Installation and Maintenance Instructions supplied with the product.

Installation note

The trap must be installed below the drain point with the body upright in a vertical position, the cover at the top and the inlet connection at the bottom; this orientation will ensure that the bucket mechanism will rise and fall vertically without any friction. It is recommended that a strainer is installed upstream of the IBV to protect it from contamination.
To permit safe inspection for cleaning or maintenance purpose it is again recommended that suitable shut-off valves are installed upstream and downstream of the IBV application.
It needs to be appreciated that there is blast discharge with this device, consequently the downstream accessories, if any, should be installed at a minimum distance of 1 m from the IBV.

Disposal

This product is recyclable. No ecological hazard is anticipated with the disposal of this product providing due care is taken.

Spare parts

The spare parts available are shown in heavy outline. Parts drawn in a grey line are not supplied as spares.

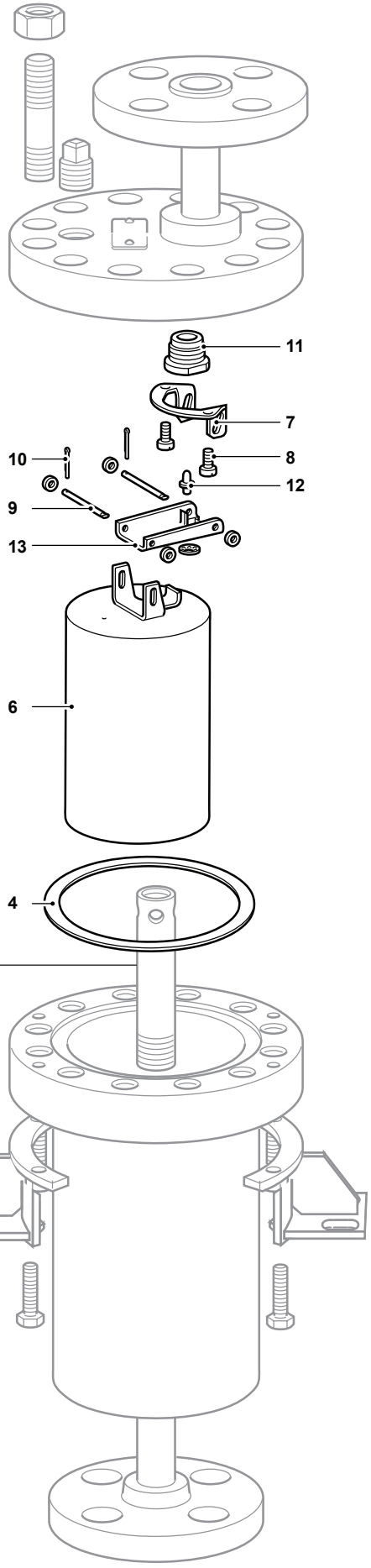
Available spares

Valve assembly		**4**, **7**, **8**, **9**, **10**, **11**, **12**, **13**
Bucket assembly		**4**, **6**, **9**, **10**
Cover gasket	(packet of 3)	**4**

How to order spares

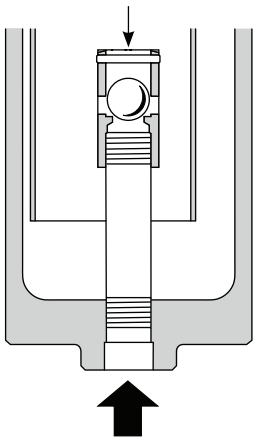
Always order spares by using the description given in the column headed 'Available spares' and state the type of trap, pressure rating and size and type of the connections.

Example:
1 - Valve assembly for a Spirax Sarco IBV - C-LF2 - 116 - 110 - 3" - Flanged ASME Class 300 inverted bucket vertical steam trap.



Optional extra

Inbuilt stainless steel check valve



Please note that this option is only available for units that have a DP maximum differential pressure of 40 bar (580 psi) and above -
See the IBV product nomenclature and selection guide on page 15 for clarification.