BYVAP® Steam Desuperheater
TYPE MNB

Description

The BYVAP steam desuperheater type MNB is designed for accurate and cost effective steam temperature control. The MNB is a complete temperature control valve and cools the superheated steam by introducing water into the steam flow via a high efficiency multi nozzle design.

Characteristics:

Accuracy: +/- 1,5%

Body material : 1.7383 / A182 F22 cl3
1.0352 / A105
Seat material : stellite
TMS: 570°C
PMS: 150 bar
ΔPMax : 120 bar
PN250 / Class1500
Steam flange DN80
Water flange: DN25/DN40
Water turndown ratio up to 16:1
Minimum temperature above saturation 5°C

Design code : ANSI B16.34 class 1500/2500

Features :

Excellent spraying by high quality vortex nozzles, greatly reducing the risk of water accumulation in the pipe, and large turndown ratio.

How to order

MNB Material…, PN/Class …, Kv…, Water flange PN/Class

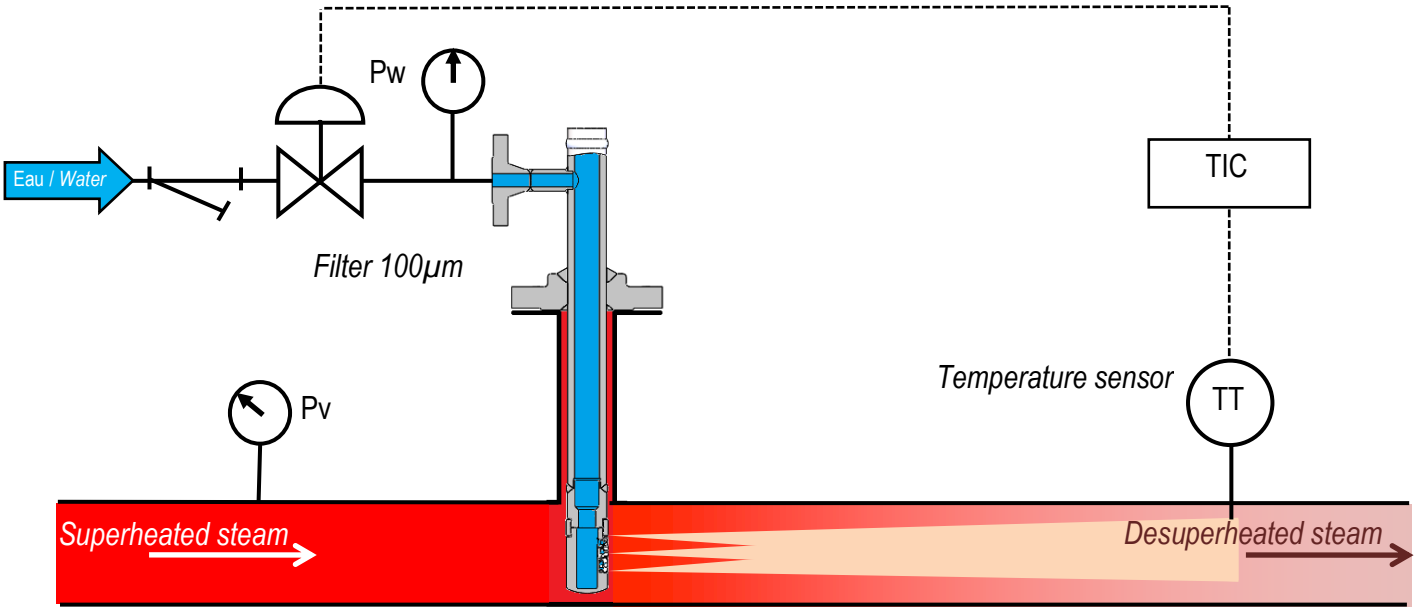
European Pressure Equipment Directive 2014/68/UE :

This desupperheater complies with directive 2014 /68 /UE

Sart von Rohr
25 Rue de la Chapelle
BP 2 – F 68620 Bitschwiller-lès-Thann

Tel. 33/ (0)3 89 37 79 50
Fax 33/ (0)3 89 37 79 51
E-mail : sartventes@sart-von-rohr.fr

Schematic Diagram

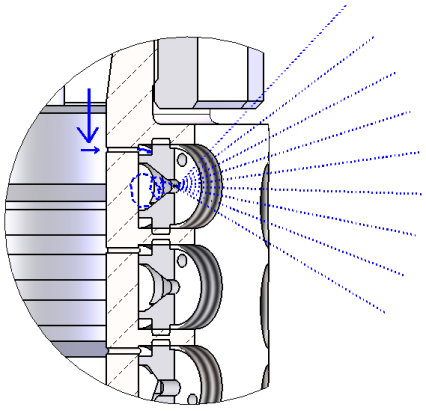


Operation

The desuperheater type MNB has a very simple and reliable operation. It is supplied complete, adjusted and operational.

MNB provides a very good atomization of desuperheating water from only 3.5 bar above the steam pressure at the temperature control. A 100 micron or finer strainer must be installed on the superheating water and its pressure drop must be taken into account. The MNB is designed:

- Without gaskets or springs,
- Can be installed vertically or horizontally
- With high specification Vortex nozzles welded in position,
- With a high resistance staZinless steel spray head
- Up to Class 1500 according to flanges



Recommandations

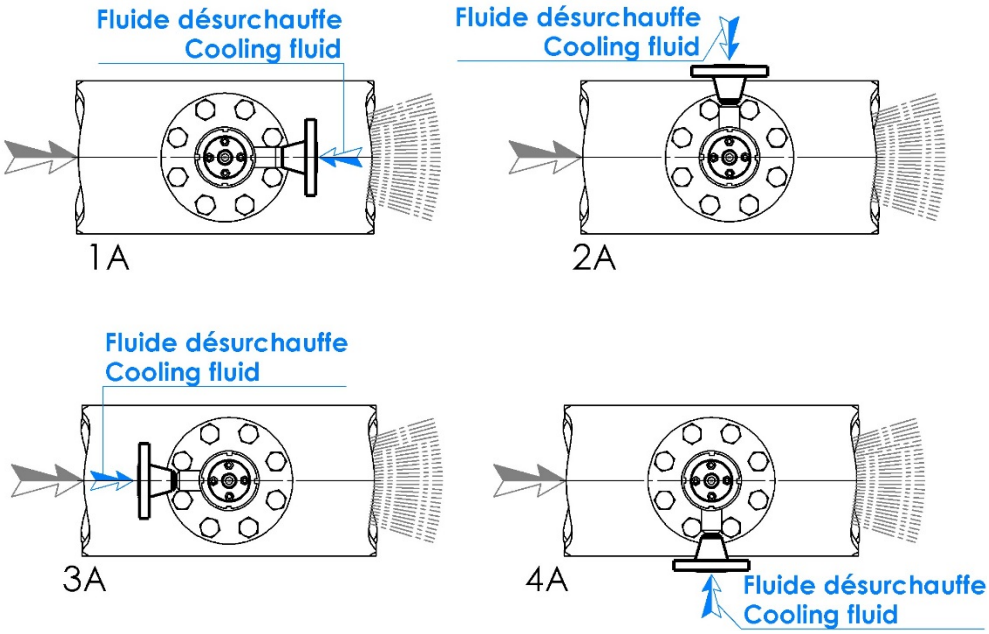
Filtrer
The installation of a 100µm filter in the desuperheating water line is recommended to prote

Straight length
The first elements that can impair the desuperheating, must not be located less than 6xD upstream and 5m downstream

Pressure difference
The difference of pressure between water of desuperheating and steam must be between 3,5bar and 120bar.

Speed
Minimal speed of steam must not be below 12m/s.

Water inlet flange top view



Standard capacity:

Kv	Cv	Tube Mini	Kv	Cv	Tube Mini	Kv	Cv	Tube Mini
0,39	0,451	150	**1,357**	1,569	150	**3,348**	3,871	200
0,48	0,555	200	**1,371**	1,584	150	**3,574**	4,131	200
0,5	0,578	150	**1,45**	1,676	200	**4,009**	4,634	200
0,505	0,584	150	**1,579**	1,825	150	**4,061**	4,695	200
0,52	0,601	150	**1,775**	2,052	150	**4,086**	4,723	200
0,55	0,636	150	**1,801**	2,081	200	**4,208**	4,865	250
0,6	0,693	150	**1,88**	2,173	200	**4,515**	5,219	200
0,68	0,786	150	**1,929**	2,23	200	**4,601**	5,319	200
0,76	0,878	150	**2,032**	2,349	200	**4,83**	5,583	250
0,779	0,901	200	**2,136**	2,469	200	**4,938**	5,709	200
0,809	0,936	150	**2,38**	2,751	200	**5,838**	6,749	200
0,915	1,058	150	**2,458**	2,841	200	**6,704**	7,75	200
1,019	1,178	150	**2,585**	2,988	200	**8,604**	9,946	400
1,162	1,343	150	**2,688**	3,108	200	**10,281**	11,884	400
1,256	1,452	200	**2,7**	3,121	200	**11,734**	13,564	400
1,291	1,493	200	**3,133**	3,622	200	/	/	/

Flow calculation :

To select a Sprayhead to install on the desuperheater two calculations have to be done:
- A calculation to define the water flow based on the process data.
- A calculation to define the Kv

The water flow Q_w is first calculated from process data using the following formula:

$$Q_w = Q_v \frac{H_{ve} - H_{vs}}{H_{vs} - H_w}$$

Q_v = Steam flow (m^3/h)
Q_w = Water flow (m^3/h)
H_{ve} = Upstream Steam enthalpy
H_{vs} = Downstream Steam enthalpy
H_w = Water enthalpy

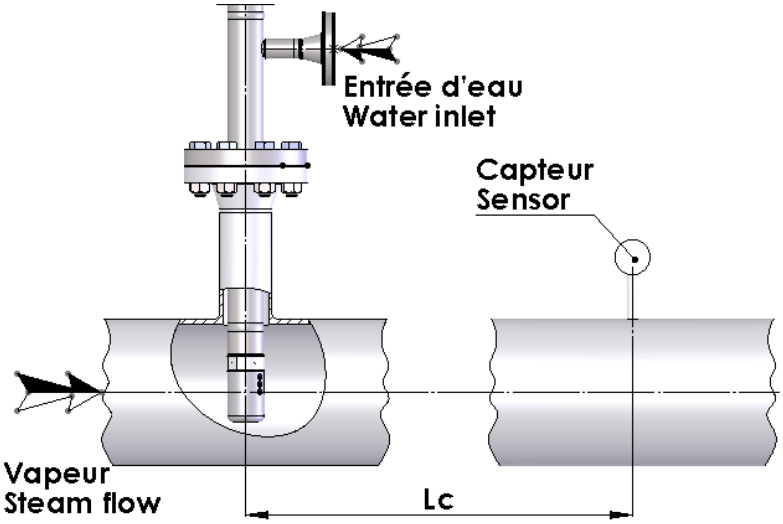
A simplified Kv calculation can be done using the following formula:

$$Kv = \frac{Q_w}{\sqrt{P_w - P_v}}$$

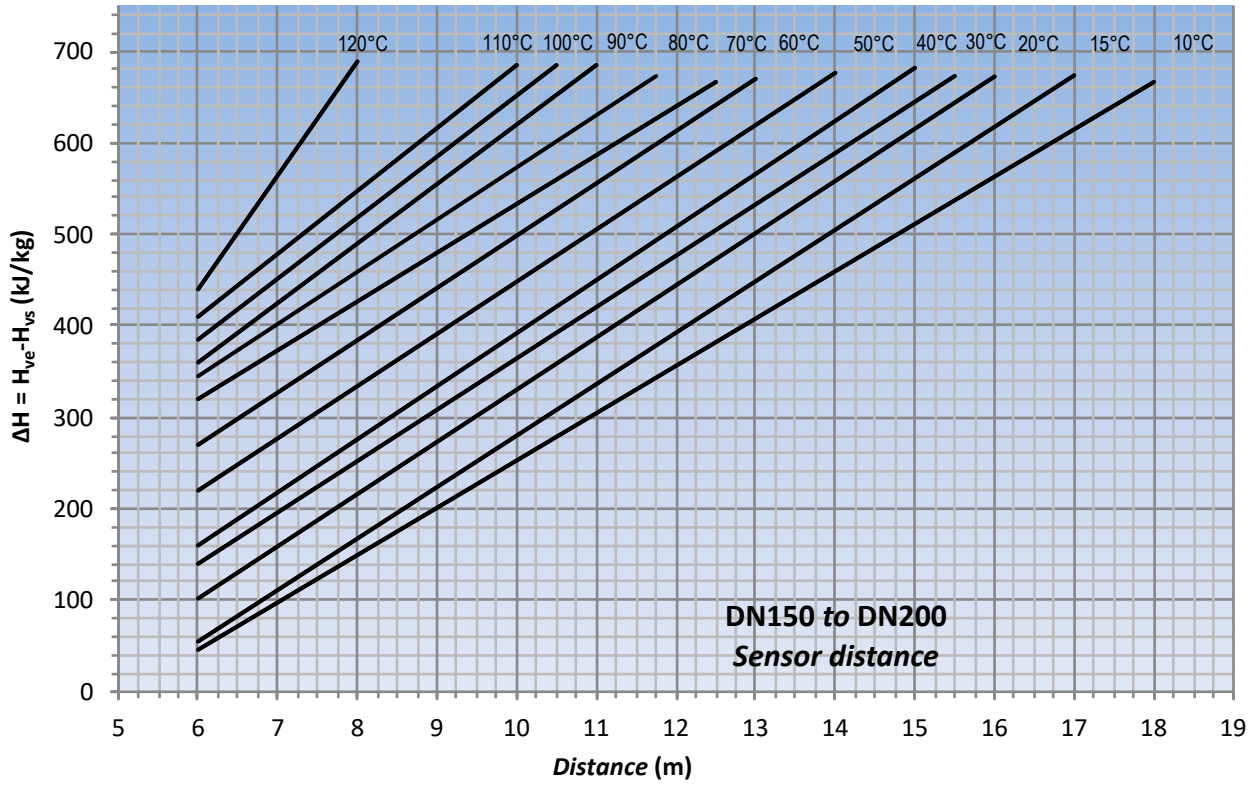
Q_w = Water flow (m^3/h)
P_v = Steam pressure (bar)
P_w = Water pressure (bar)

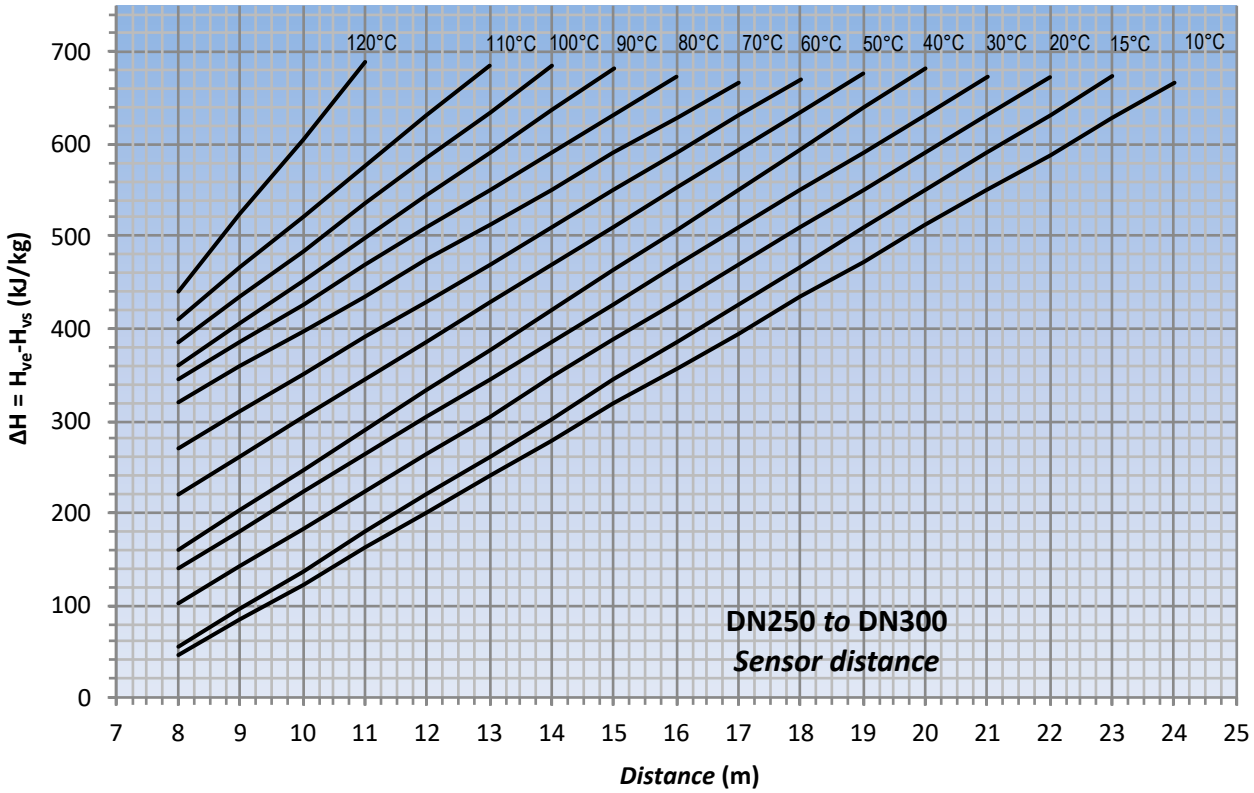
Sensor Distance

The temperature sensor is positioned as a function of the enthalpy difference and depending on the proximity of the temperature to be controlled to the saturation temperature. The graphs below indicate the position of the temperature sensor.



1 - Calculate the total enthalpy difference between the inlet and outlet and draw a horizontal line to the superheat temperature to control.
2- From the point found, draw a vertical line down to find the distance


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
Distance (m)
DN150 to DN200
Sensor distance


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
7
8
9
10
11
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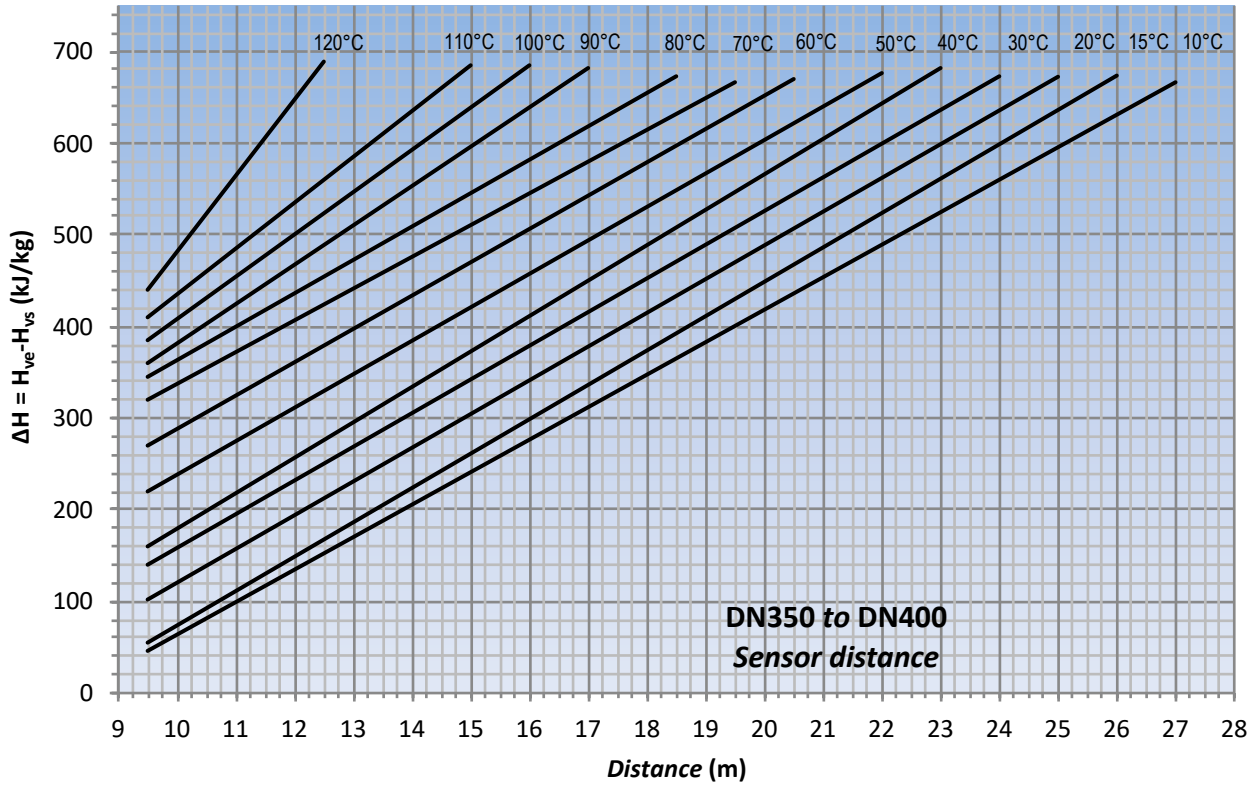
24
25
Distance (m)
DN250 to DN300
Sensor distance


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
9
10
11
12
13
14
15
16
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22
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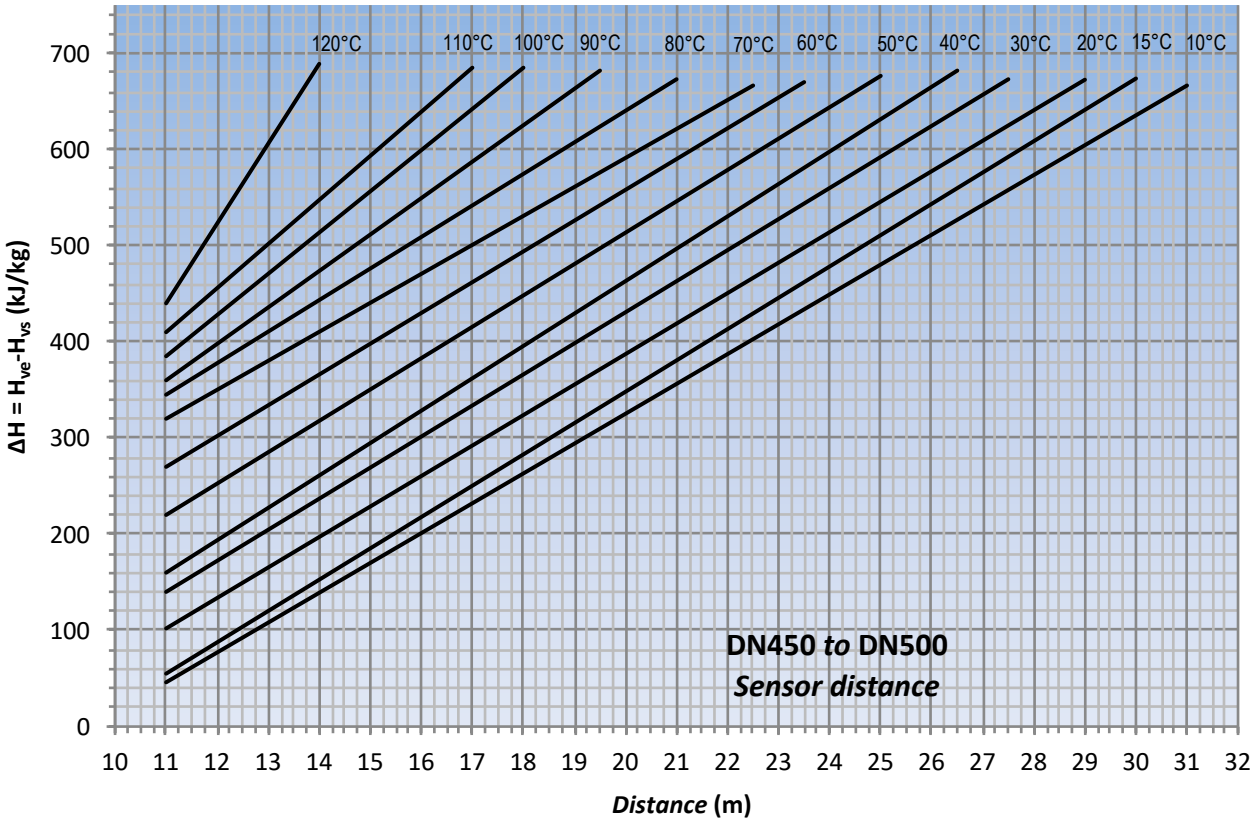
26
27
28
DN350 to DN400
Sensor distance
Distance (m)


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
10
11
12
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16
17
18
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25
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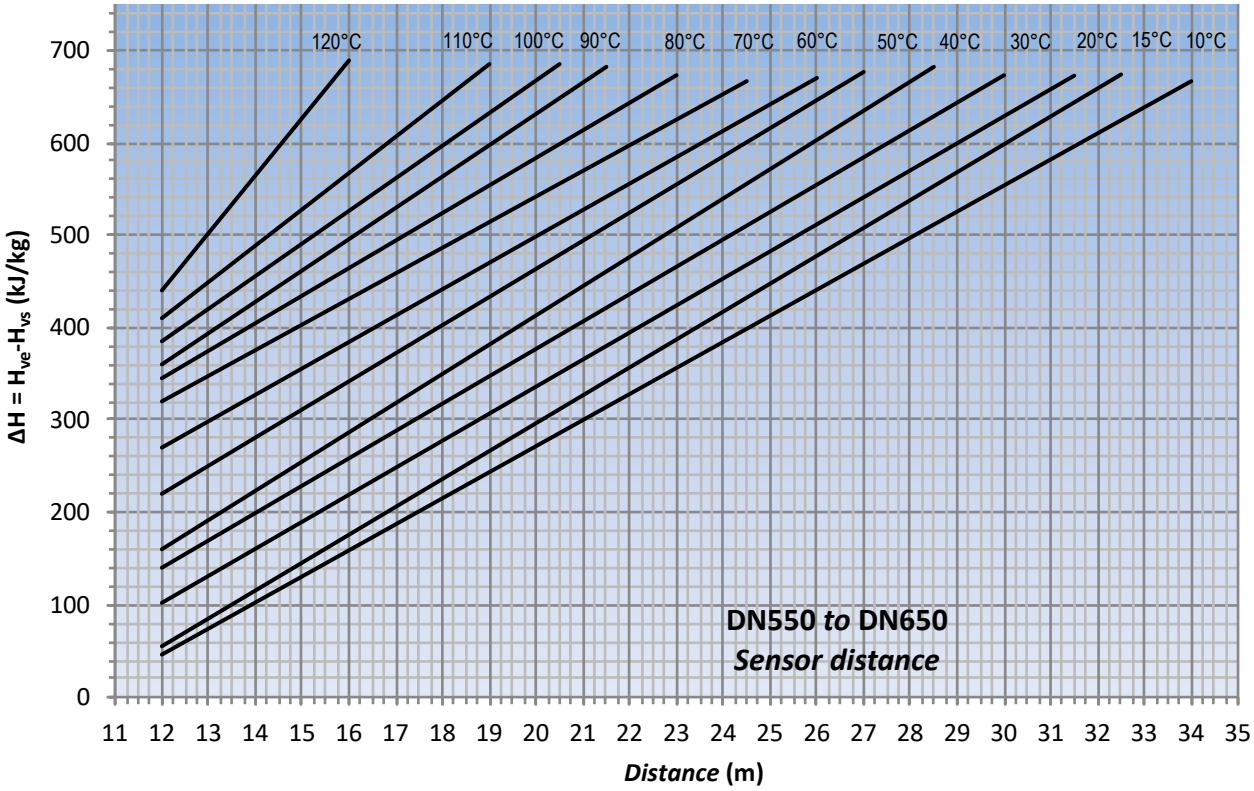
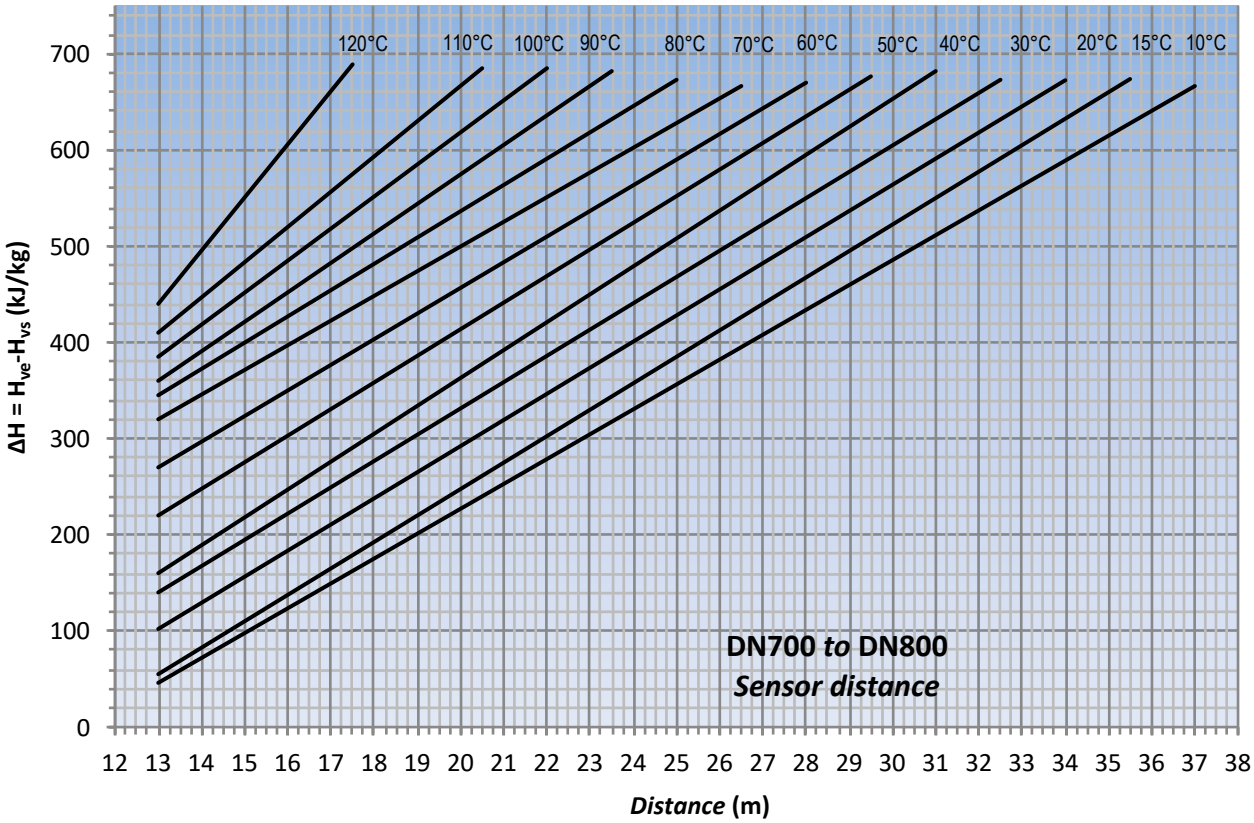
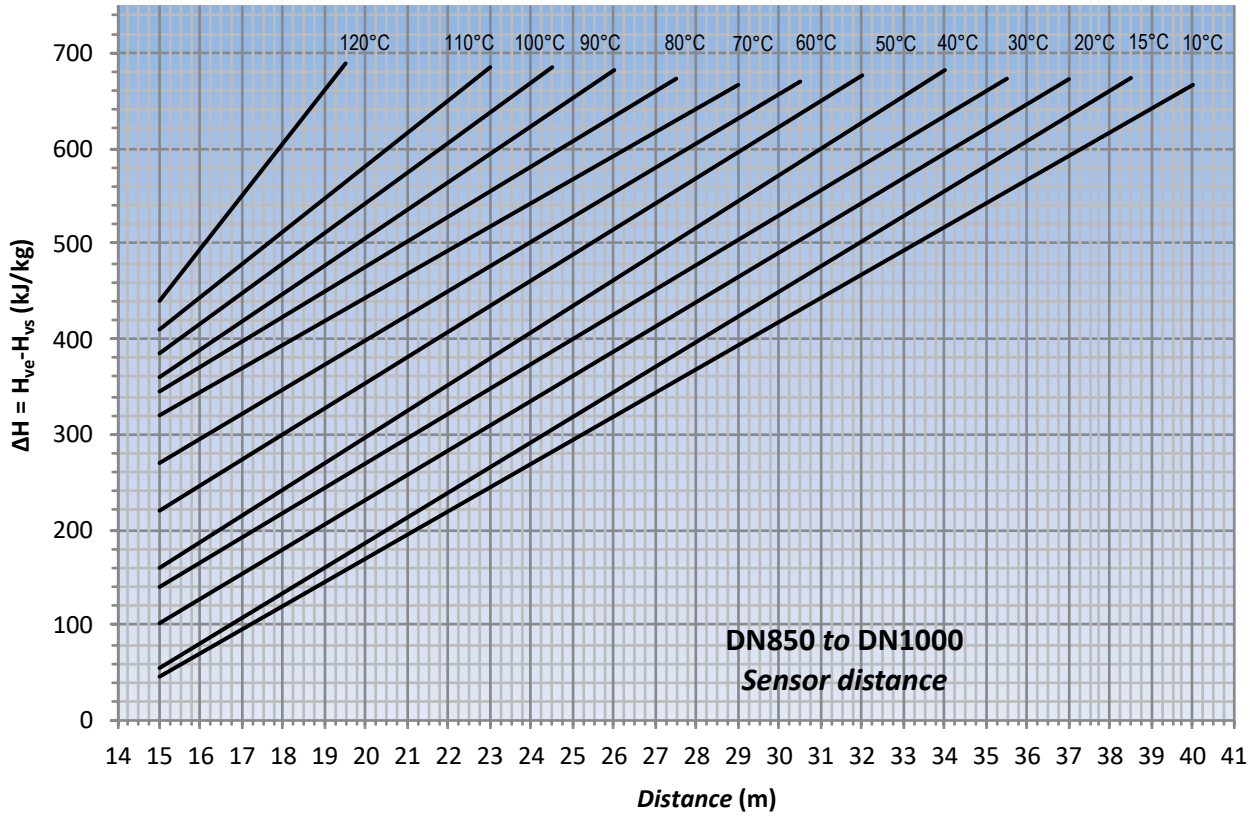
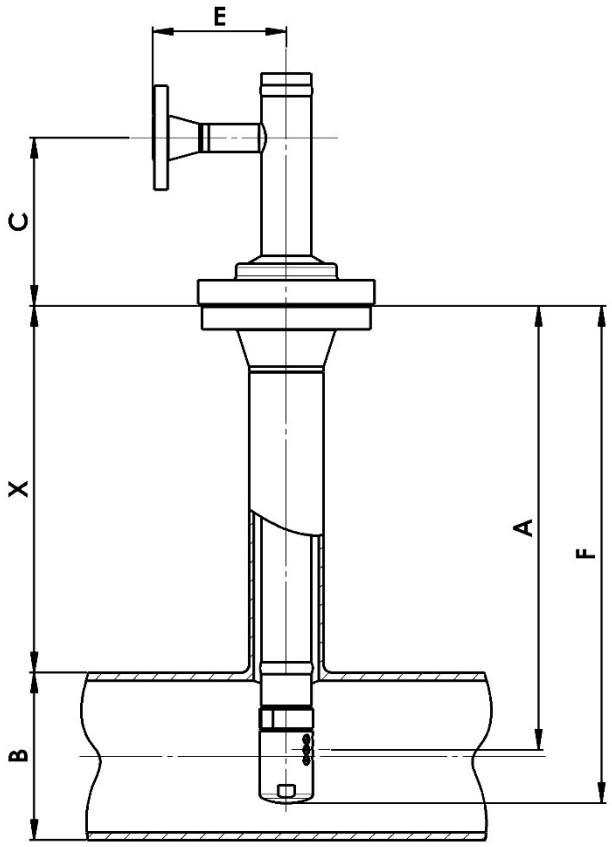
29
30
31
32
DN450 to DN500
Sensor distance
Distance (m)


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
Distance (m)
DN550 to DN650
Sensor distance


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
ΔH = Hve-Hvs (kJ/kg)
0
100
200
300
400
500
600
700
12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
Distance (m)
DN700 to DN800
Sensor distance


120°C
110°C
100°C
90°C
80°C
70°C
60°C
50°C
40°C
30°C
20°C
15°C
10°C
700
600
500
400
300
200
100
0
ΔH = Hve-Hvs (kJ/kg)
14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
Distance (m)
DN850 to DN1000
Sensor distance

Dimensions



C	200
E (ISO PN40 / PN64* / PN100* **FS)**	145
E (ISO PN150* / PN250* **FS)**	178
E (ANSI Class300/ Class600 / Class900* **RF)**	159
E (ANSI Class 1500 RF)	178
X	A-(B/2)
Maxi Mass (kg)	35

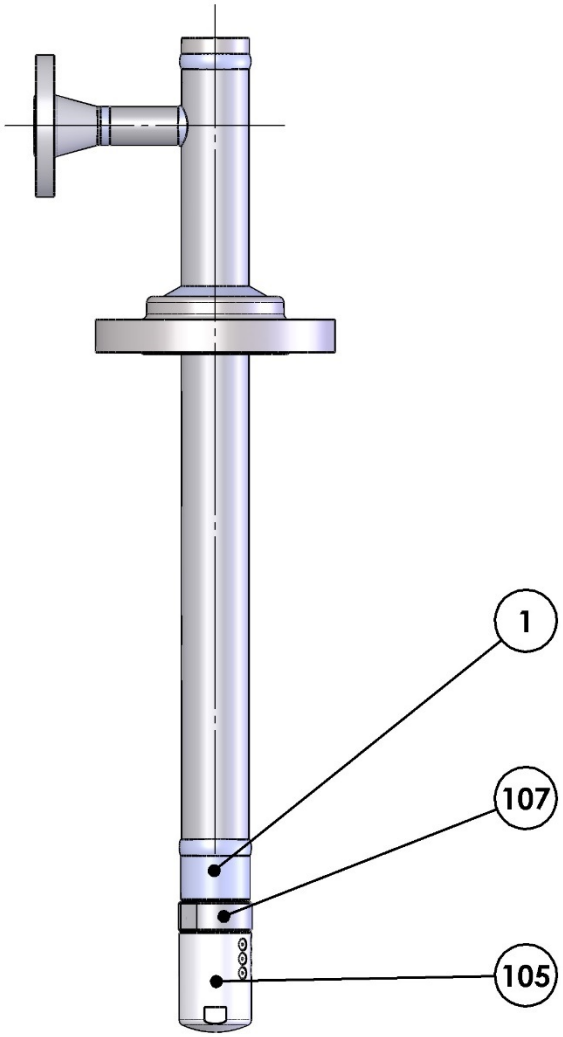
The variable dimension is X, in order to have the Sprayhead in the center of the pipe

Kv	**0,39**	**0,48**	**0,5**	**0,505**	**0,52**	**0,55**	**0,6**	**0,68**	**0,76**	**0,779**	**0,809**	**0,915**
F	436	467	436	436	436	436	436	436	436	467	436	436
A	373	391	375	374	373	375	375	379	377	391	377	381
Kv	**1,019**	**1,162**	**1,256**	**1,291**	**1,357**	**1,371**	**1,45**	**1,579**	**1,775**	**1,801**	**1,88**	**1,929**
F	436	436	467	467	436	436	467	436	436	467	467	467
A	379	378	384	384	379	380	387	382	382	389	384	384
Kv	**2,032**	**2,136**	**2,38**	**2,458**	**2,585**	**2,688**	**2,7**	**3,133**	**3,348**	**3,574**	**4,009**	**4,061**
F	467	467	467	467	467	467	467	467	467	467	467	467
A	384	386	385	391	387	389	392	390	386	391	392	396
Kv	**4,086**	**4,208**	**4,515**	**4,601**	**4,83**	**4,938**	**5,838**	**6,704**	**8,604**	**10,281**	**11,734**	/
F	467	480	467	467	480	467	467	467	495	547	547	/
A	391	397	392	394	400	393	394	394	408	421	434	/

*** On request**

All dimensions in mm

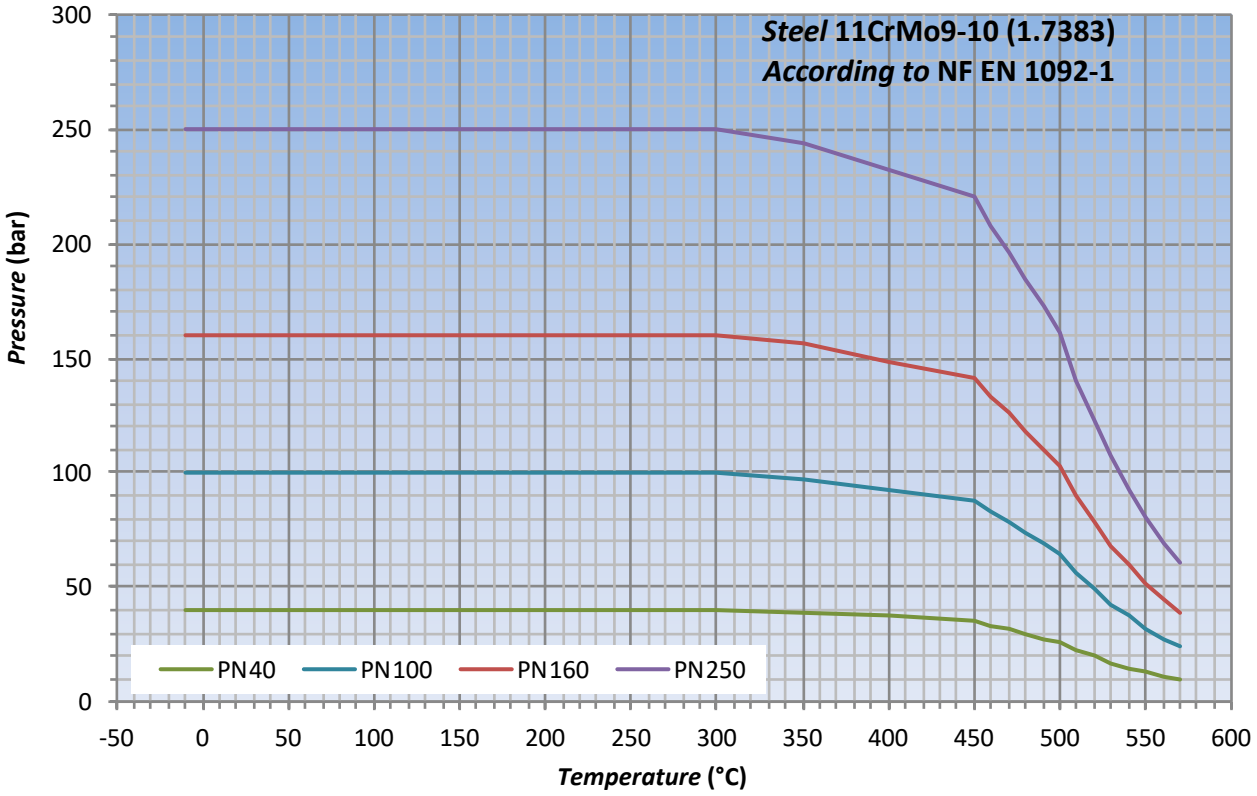
Part List

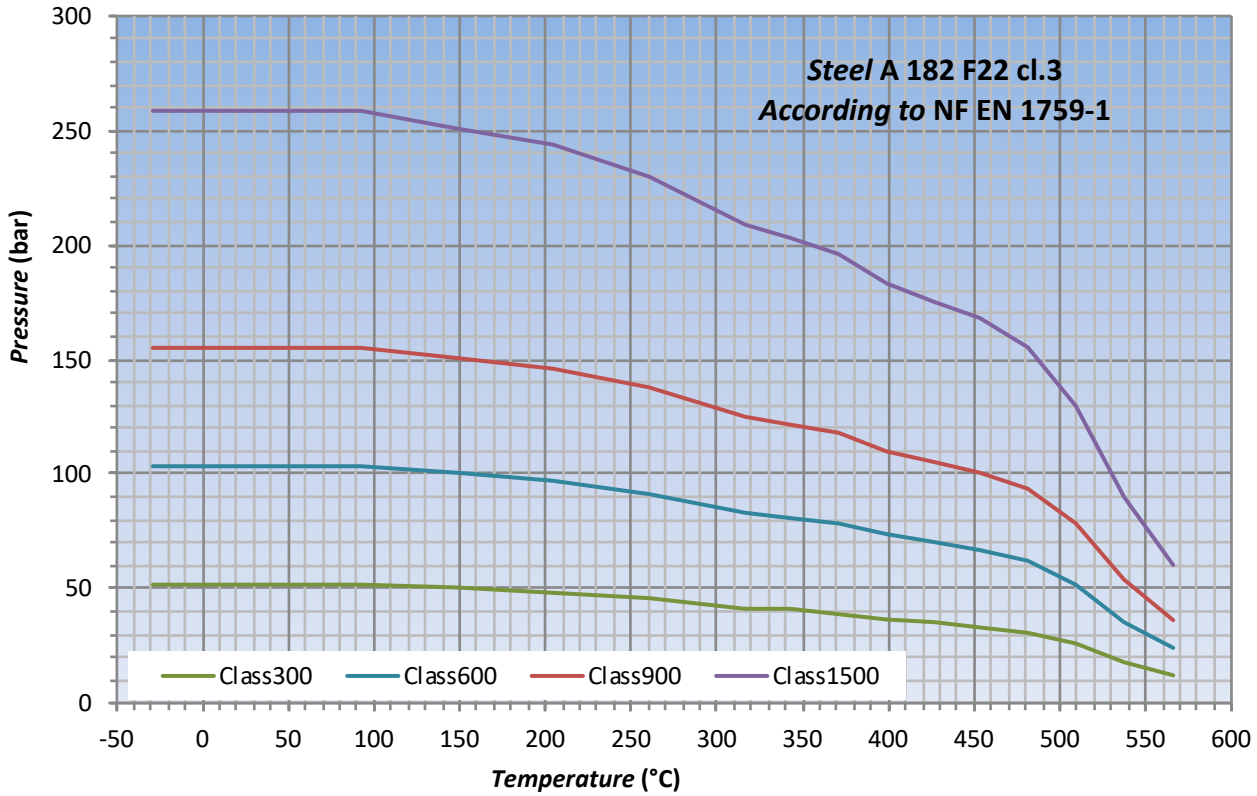


Rep./Item	Designation	Material
1	Corps / BodyServomoteur / Actuator	1.7383 / A182 F22 cl3 - 1.0352 / A105
105*	**Sprayhead**	AISI 410
107	Ecrou / Nut	AISI 410

*** Spare parts**

Pressure -Temperature Charts





Pressure -Temperature Charts