

### APPLICATION

- for installation of resistance or thermoelectric temperature sensors to thermowell, i.e. sensors, which have no own thermowell, in cases
  - o When is static or dynamic pressure or aggressive environment in the place of measurement;
  - o where stem of the sensor is unsatisfactory with the conditions of the place of measurement;
  - o when the temperature sensor needs to be replaced during the operation so that the space, in which the measurement takes place, remained closed.
- into the environment, where the mechanical resistance is required pursuant to EN 60068-2-6 (class AH2 pursuant to HD 60364-5-51) and seismic ability of electrical equipment of safety system of nuclear power plants pursuant to IEC 980 (MDE level SL-2).
- into the environment, where chemical resistance is required is possible to deliver thermowells with chemically resistant coating pursuant to table 1
- into the environment with abrasive mediums is possible to deliver thermowells with abrasion surface protection pursuant to table 1
- thermowells is possible to deliver in design in degree of purity for oxygen (O<sub>2</sub>), this armature is delivered perfectly degreased and provided with hanged blue label

### DESCRIPTION

**Cylindrical thermowells** are weldments of fixing screw joints with internal and external thread (for thermowell for screwing) or with a cylindrical surface (for welding thermowell), reduced or unreduced tubes and bottoms.

**Conical thermowells** for high speeds and parameters of measured liquid are made of one piece of material and are provided with the fixing screw joint with internal and external thread, in which follows conical part of the thermowell with the relevant bore.

**Fast response thermowells** are formed by screw joint with internal thread for fixing of the temperature sensor and cylindrical surface for welding. Thermowells are made of one piece of material to which is welded shaped bottom with protective cover.

**Conical thermowells, shape 4 pursuant to DIN 43772** have no external thread and are designed for welding into the piping, into weld-on piece on the piping or into special flanges.

**Conical thermowells, shape 6 and 7 pursuant to DIN 43772** have an external fixing thread.

**Screw-in thermowells with the sealing screw** are weldments of fixing screw joints with external thread to screwing into thermowell. For fixing of sensor to the thermowell serves sealing screw.

### TECHNICAL DATA

**Technical requirements** for thermowell are based on ČSN 02 7201, design of thermowells is based on ČSN 02 7202. Design of thermowells pursuant to DIN is based on the standard DIN 43772, design of thermowells with the sealing screw EN 1434-2.

### OPERATION CONDITIONS

The environment defined by the group of parameters and their degree of severity IE 36 pursuant to EN 60721-3-3 and the following operation conditions:

#### Relative ambient humidity:

10 to 100 % with condensation, with upper limit of water content 29 g H<sub>2</sub>O/kg of dry air

#### Atmospheric pressure:

70 to 106 kPa

#### Maximum operation temperature

is given by the material and design of the thermowell – refer to tables of design of thermowells

#### Nominal pressure

PN 160, PN 40

pursuant to ČSN 13 0010

for cylindrical thermowells and

thermowells with the sealing

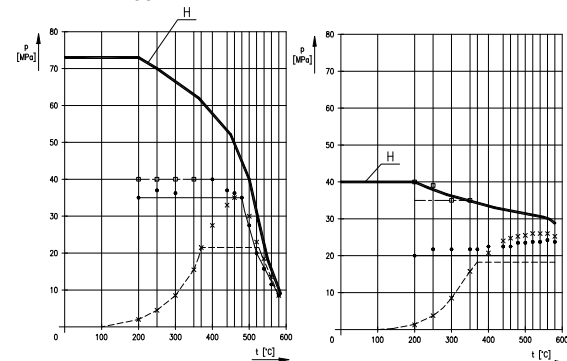
screw

PN 250

for conical thermowells, fast response thermowells and thermowells pursuant to DIN 43772

is specified in tables of design of thermowells

**Diagram 1 - stress (p, t) diagram of thermowells 1700 immersion 160 m**



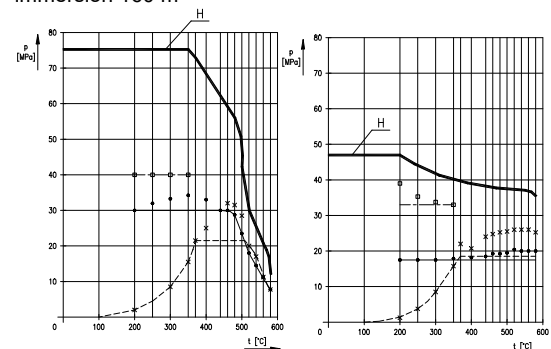
material 15 128

material 1.4541

H limit of pressure

— AIR 80 m/s •  
 - - - STEAM 80 m/s x  
 - · - WATER 10 m/s □

**Diagram 2 - stress (p, t) diagram of thermowells 1800 immersion 160 m**



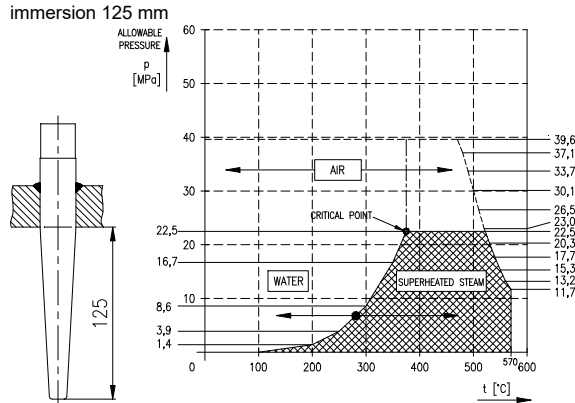
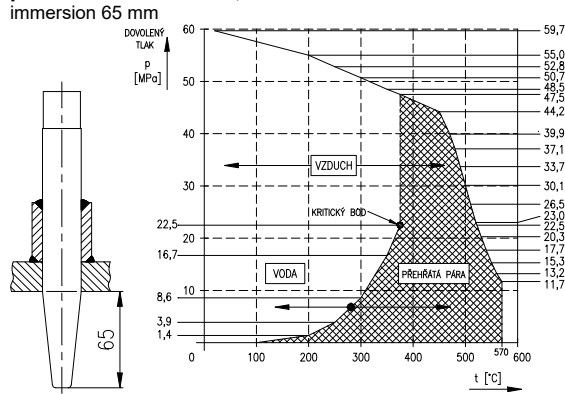
material 15 128

material 1.4541

H limit of pressure

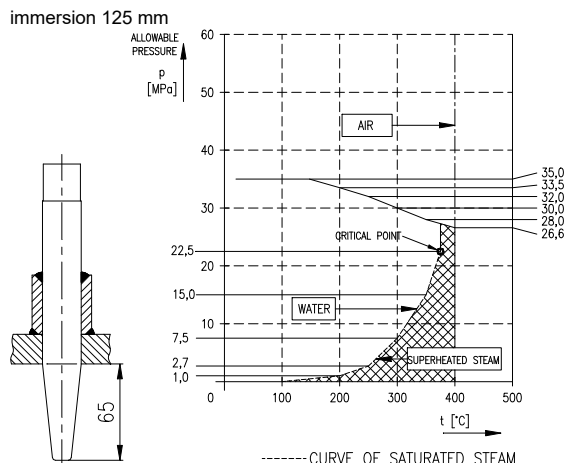
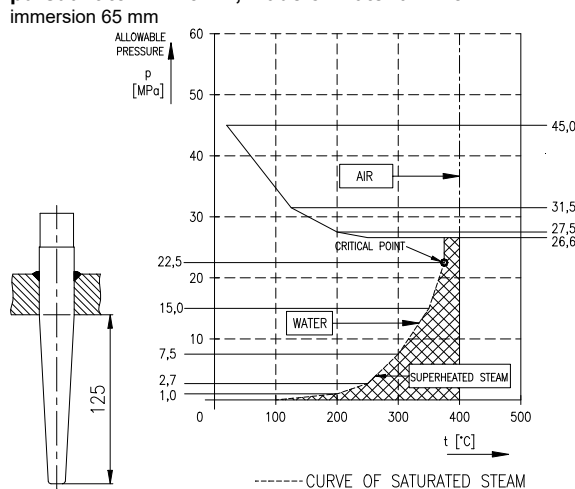
— AIR 80 m/s •  
 - - - STEAM 80 m/s x  
 - · - WATER 10 m/s □

**Diagram 3 - stress (p, t) diagram of thermowells, shape 4 pursuant to DIN 43772, made of material 1.7380**



Maximum allowed speed of flow of air and superheated steam: 60 m/s  
 Allowed pressure of water at speeds of flow up to 5 m/s: 45 MPa

**Diagram 4 - stress (p, t) diagram of thermowells, shape 4 pursuant to DIN 43772, made of material 1.4571**



Maximum allowed speed of flow of air and superheated steam: 60 m/s  
 Allowed pressure of water at speeds of flow up to 5 m/s: 45 MPa

**Maximum speed of flow**

Screw-in and welding cylindrical thermowells (type 10x0, 11x0, 12x0 and 13x0):

Nominal length L [mm]	100	160	250	400	630
Water steam and air [m/s]	50	25	8	2.5	1
Water [m/s]	5	3	3	1.5	0.2

Conical thermowells for high speeds of flow (type 1500 L = 160 mm):  
 max. 80 m/s (water steam)

Conical thermowells for high parameters of operation liquids (type 1700 and 1800 L = 160 mm):  
 max. 80 m/s (water steam, air)  
 max. 10 m/s (water)

**Fast response thermowells (type 1900):**

Depth of immersion (place of fixing) [mm]	100	150	200
Water steam and air [m/s]	80	60	40
Water [m/s]	10	7	5

**Thermowells pursuant to DIN, shape 4 (4F)**

Nominal length L [mm]	110	140	200	260
Installation length L1 [mm]	65	65	65	125
Water steam and air [m/s]	60	60	60	30
Water [m/s]	5	5	5	5

Allowed pressure of water at speeds of flow up to 5 m/s is 45 MPa.

**Vibrations**

Cylindrical thermowells (10x0 – 13x0)

Nominal length L [mm]	160	250	(400)	(630)
Frequency range [Hz]	10 to 500			
Drift amplitude sa [mm]	0.2	0.15	0.15	0.075
Acceleration amplitude sa [m.s <sup>-2</sup> ]	30	20	20	10

Thermowells for welding, shape 4 (4F) and screwing shape 7 pursuant to DIN

Nominal length L [mm]	110	140	200	260
Frequency range [Hz]	10 to 500			
Drift amplitude sa [mm]	0.5	0.35	0.2	0.15
Acceleration amplitude aa [m.s <sup>-2</sup> ]	70	50	30	20

If the measured substance flows, the thermowell is stressed by dynamic effects of the flowing substance. Stressing of the thermowell by dynamic effects of the flowing measured substance depends on the speed of flow, physical properties of the measured substance and immersion length of the thermowell. Therefore, it is necessary to check in individual cases whether selected thermowell is suitable with respect to stress caused by dynamic effects of the measured substance, refer to stress (p,t) diagrams.

For long-term reliable operation of conical thermometer thermowells (1700, 1800 of nominal length L = 160 mm) for high parameters of operating liquids it is necessary to secure the level of kinematical excitation in the place of fixing of the thermowell into piping does not exceed the values pursuant to the following table:

Material of thermowell	Frequency of place fixing of thermowell [Hz]							
	0.6 f <sub>j</sub>	0.7 f <sub>j</sub>	0.8 f <sub>j</sub>	0.9 f <sub>j</sub>	f <sub>j</sub>	1.1 f <sub>j</sub>	1.2 f <sub>j</sub>	1.3 f <sub>j</sub>
Drift amplitude sa [µm]								
15 128	121	71	38	16	1.36	12	21	28
1.4541	208	122	66	28	2.35	20	36	48

for thermowell 1700

material 15 128:  $f_j [Hz] \approx -0.4576 \times t [°C] + 287.1$

material 1.4541:  $f_j [Hz] \approx -0.4126 \times t [°C] + 2175.2$

for thermowell 1800

material 15 128:  $f_j [Hz] \approx -0.4927 \times t [°C] + 2469.3$

material 1.4541:  $f_j [Hz] \approx -0.4585 \times t [°C] + 2420.2$

where f<sub>j</sub> - own frequency of thermowell

t - temperature of operation medium

**Limit values** of parameters of the operation liquid for speed of flow of water steam and air 80 m/s and water 10 m/s are marked in the stress (p, t) diagrams (refer to diagrams 1 to 4). Reliable operation of thermowells is guaranteed in the area below the lines indicating limit values of safety parameters or in the applicable crosshatched fields for thermowells pursuant to DIN (refer to diagrams 3 and 4).

For speeds of flow of water steam and air 40 m/s and 60 m/s, the pressure value displayed in the relevant diagram shall be multiplied with coefficient S pursuant to the following tables. However, the obtained values may not exceed the level H (refer to diagrams 1 and 2).

#### Limit values for thermowells 1700 L = 160 mm

Operation liquid		Water steam			
Speed of flow of operation liquid in [m/s]		40	60	40	60
Material of thermowell 1700		15 128		1.4541	
Coefficient S for temperature of operation liquid	to 370°C	1.00	1.00	1.00	1.00
	370°C to 580°C	1.05	1.03	1.16	1.06
Operation liquid		Air			
Speed of flow of operation liquid in [m/s]		40	60	40	60
Material of thermowell 1700		15 128		1.4541	
Coefficient S for temperature of operation liquid	to 370°C	1.37	1.25	1.36	1.19
	370°C to 580°C	1.12	1.07	1.19	1.11

#### Limit values for thermowells 1800 L = 160 mm

Operation liquid		Water steam			
Speed of flow of operation liquid in [m/s]		40	60	40	60
Material of thermowell 1800		15 128		1.4541	
Coefficient S for temperature of operation liquid	to 370°C	1.00	1.00	1.00	1.00
	370°C to 580°C	1.10	1.07	1.17	1.11
Operation liquid		Air			
Speed of flow of operation liquid in [m/s]		40	60	40	60
Material of thermowell 1800		15 128		1.4541	
Coefficient S for temperature of operation liquid	to 370°C	1.54	1.36	1.51	1.32
	370°C to 580°C	1.20	1.12	1.32	1.20

For thermowells pursuant to DIN, shape 4 (4F), the stress diagrams depends on the installation length (immersion) of the thermowell pursuant to (refer to diagrams 3 and 4).

## DESIGNATION

**Data on the fixing screw joint in the upper part of the thermowell** (except of thermowells 991 101 xxx and 991 102 xxx):

- mark of the manufacturer
- serial number
- nominal pressure PN
- material or immersion part of thermowell
- maximum operation temperature
- control mark about performed pressure test

**Other data pursuant to design of thermowell:**

for thermowells, shape 4 (4F) pursuant to DIN 43772

- identification of standard - shape of thermowell - internal bore
- internal thread – total length of thermowell – length of conical part of thermowell

for thermowell, shape 6 and 7 pursuant to DIN 43772

- identification of standard - shape of thermowell - internal bore
- external fixing thread of thermowell
- internal thread for sensor
- nominal length of thermowell

**Data on the fixing screw joint in the upper part of the thermowells 991 101 xxx and 991 102 xxx:**

- standard EN 1434
- nominal pressure PN
- material of thermowell
- control mark about performed pressure test

**Data on the certificate of product quality and completeness**

- trademark of the manufacturer
- ordering number of the product
- time code (serial number)

## DELIVERY

Unless agreed otherwise with the customer, every delivery includes:

- delivery note
- products pursuant to the purchase order
- suitable sealing ring pursuant to the size of thread is delivered with each screw-in thermowell (except for thermowell, shape 7 pursuant to DIN 43772)
- suitable weld-on piece ordered independently from the catalogue of accessories, type 991
- Accompanying technical documentation in Czech:
  - o certificate of product quality and completeness, which also serves as the warranty certificate
  - o product manual

If it is established in the purchase contract or agreed otherwise, the following documentation can be also delivered with the product:

- copy of the Inspection Certificate 3.1 pursuant to EN 10204 for material of thermowell with the heat number
- declaration of Conformity with order 2.1 pursuant to EN 10204
- Test report about the seismic and the vibration qualification
- pressure test report
- supplier's declaration of conformity pursuant to EN ISO/IEC 17050-1

## PACKING

Thermowells are delivered in a package ensuring resistance to the impact of thermal effects and mechanical effects pursuant to controlled packing regulations. They are packed into a PE bag together with the Certificate of Quality.

## TRANSPORT

The products may be transported on conditions corresponding to the set of combinations of classes IE 23 pursuant to EN 60721-3-2, but must not be exposed to direct rain (i.e. by airplanes, trucks, flatbeds and trailers, railway wagons with specially designed shock absorbers and ships, in premises that are unventilated and unprotected against atmospheric conditions).

## STORAGE

The products may be stored on conditions corresponding to the set of combinations of classes IE 12 pursuant to EN 60721-3-1, but with the ambient temperature from -30 to 45 °C (i.e. in places where the temperature and humidity are not regulated, with danger incidence condensation, dripping water and the formation of ice, without a special threat of an attack with biological agents, with vibrations of small significance and not situated close to sources of dust and sand).

## REALIBILITY

Indicators of reliability in prescribed operation conditions and conditions of the environment during transport and storage:

- mean time of operation between failures 96 000 hours
- useful life 10 years

## THERMOWELL ORDERING

The purchase order shall specify:

- name
- ordering number of thermowell + code of surface treatments pursuant to table 1
- length of abrasion surface protection on thermowell from the bottom of thermowell
- requirement to other documentation pursuant to Article DELIVERY
- other (special) requirements to product
- number of pieces

## NIPPLE ORDERING

The purchase order shall specify:

- name
- ordering number of nipple
- number of pieces

TABLE 1 – SURFACE TREATMENTS OF THERMOWELLS

SURFACE TYPE		MAXIMAL MEDIUM TEMPERATURE [°C] **)	ORDERING CODE ****)
Chemically resistant cover *) (standard on the immersion parts including the sealing flat)	EFTE „Hyflon“	130	/PU1
	E-CTFe „Halar“	170	/PU2
	PFA	260	/PU3
	PTFE (certificate can be delivered for use in the food industry)	260	/PU4
Abrasion resistant cover (length of cover from the bottom of thermowell acc. to customer requirements)	sprey cover	Al <sub>2</sub> O <sub>3</sub>	800
		Al <sub>2</sub> O <sub>3</sub> TiO <sub>2</sub>	800 - 1200
		Cr <sub>2</sub> O <sub>3</sub>	1200
		WC-Co	550
	weld cover **)	COLMONOY 6	650
		STELLITE SF 6	650 (short term 1100)

**! WARNING**

- \*) Chemically resistant cover for welding thermowells is not suitable.
- \*\*) Only for for monolithic thick-walled can be used weld cover, don't use for cylindrical thermowells pursuant to ČSN 02 7202 pursuant to table 2 and for screw-in thermowells with the sealing screw pursuant to table 14 and 17.
- \*\*\*) Maximal medium temperature resistance is dependent on the type of thermowell cover and on material, from which is thermowell made.
- \*\*\*\*) Specify ordering code behind the slash after thermowells ordering number, to abrasion resistant cover with required lengths from the bottom of thermowell.  
EXAMPLE: 991 DIN 407 274/PU5, (length of cover 100 mm)

TABLE 2 - OVERVIEW OF DESIGNS AND ORDERING OF CYLINDRICAL THERMOWELLS PURSUANT TO ČSN 02 7202

SPECIFICATION						ORDERING NUMBER					
						991	xx	x	x	X	x
Cylindrical thermowell, figure 1 to 5	PN 160	screw-in external thread M27 × 2	unreduced	bore Ø [mm]	9		10		0		
			reduced		9/6.2		11		0		
		welding type, external Ø 27 mm	unreduced		9		12				
			reduced		9/6.2		13				
Thread of sensors	M20 × 1.5							0			
	G 1/2							G			
Flange	without flange								0		
	with flange *) only welding thermowell								F		
Material of immersion part of thermowell	15 128	surface treatment	screw-in thermowell	zinc coated	maximum operation temperature [°C]	550					2
			welding thermowell				conservation by fat				
	brushed, polished							3			
	pursuant to material							4			
	other *)							9			
Nominal length L [mm]	100	L1 [mm]	101	L2 [mm]	79						1
	160		161		139					2	
	250		251		229					3	
	400		401		379					4	
	630		631		610					5	
	other (max. 3000) *)										9

- \*) only as a special requirement after an agreement with the manufacturer
- \*\*) thermowells of these materials are suitable for contact with food

FIGURE 1 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS 10x0

Nominal length [mm]	Weight [kg]	Ordering number
100	0.29	991 10x0 x1
160	0.34	991 10x0 x2
250	0.40	991 10x0 x3
400	0.51	991 10x0 x4
630	0.67	991 10x0 x5

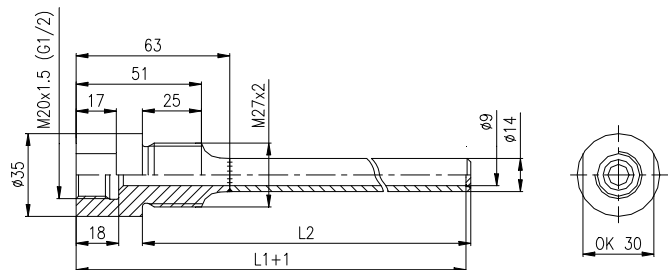


FIGURE 2 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS 11x0

Nominal length [mm]	Weight [kg]	Ordering number
100	0.29	991 11x0 x1
160	0.34	991 11x0 x2
250	0.40	991 11x0 x3
400	0.51	991 11x0 x4
630	0.67	991 11x0 x5

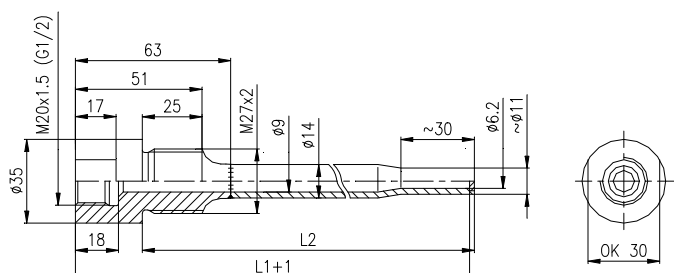


FIGURE 3 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS 12x0

Nominal length [mm]	Weight[kg]	Ordering number
100	0.28	991 12x0 x1
160	0.33	991 12x0 x2
250	0.39	991 12x0 x3
400	0.50	991 12x0 x4
630	0.66	991 12x0 x5

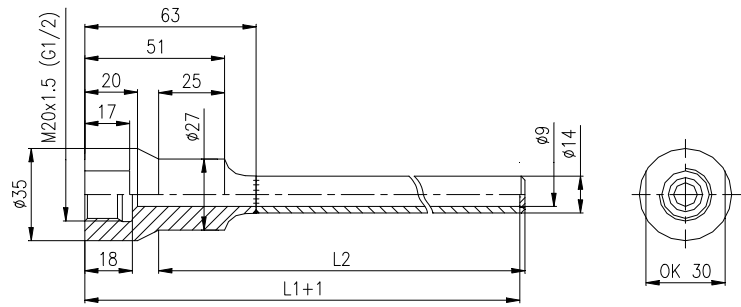


FIGURE 4 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS 13x0

Nominal length [mm]	Weight	Ordering number
100	0.28	991 13x0 x1
160	0.33	991 13x0 x2
250	0.39	991 13x0 x3
400	0.50	991 13x0 x4
630	0.66	991 13x0 x5

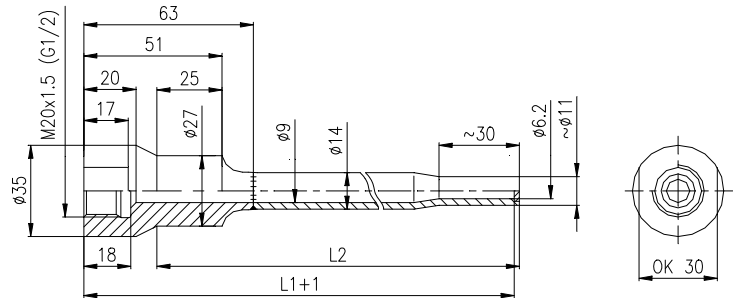


FIGURE 5 - DIMENSIONAL DRAWING OF WELDING THERMOWELLS WITH FLANGE

Welding thermowell with flange only as a special requirement after an agreement with the manufacturer

Ordering number: 991 12xF xx  
991 13xF xx

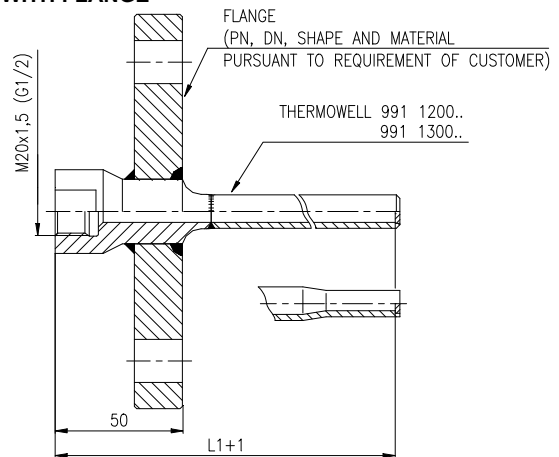


TABLE 3 - OVERVIEW OF DESIGNS AND ORDERING OF CONICAL THERMOWELLS PURSUANT TO ČSN 02 7202

SPECIFICATION					ORDERING NUMBER				
					991	xx	x	x	x
Conical thermowell, figure 6 to 8	PN 250	screw-in external thread M33 x 2	for high speeds of flow, unreduced	bore Ø 9 mm		15			
			for high parameters of the operating liquid, reduced	bore Ø 9/ Ø 6.2 mm		17			
			for high parameters of operating liquid; reduced	bore Ø 9/ Ø 7/ Ø 3.2 mm material: 15 128 or 1.4541 only L = 160		18			
Thread of sensor	M20 x 1.5					00			
Material of immersion part of thermowell	1.0577 15 128 1.4541 *** 1.4571 *** 1.4903 *** other *)	surface treatment	zinc coated	maximum operation temperature [°C]	400				1
					550				2
			brushed, polished		550 (650) **				3
					500				4
					620				5
pursuant to material				9					
Nominal length L [mm]	160 250 400 other *) max. 1200 for thermowells with codes 1500 and 1700 max. 500 for thermowells with codes 1800	L1 [mm]	L2 [mm]	L3 [mm]	161	135	131		2
					251	225	221		3
					401	375	371		4
									9

\*) only as a special requirement after an agreement with the manufacturer  
 \*\*) maximum working temperature 650 °C only for thermowells with codes 1700 and 1800  
 \*\*\*) thermowells of these materials are suitable for contact with food

FIGURE 6 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS 1500

Nominal length [mm]	Weight	Ordering number
160	0.91	991 1500 x2
250	1.43	991 1500 x3
400	2.22	991 1500 x4

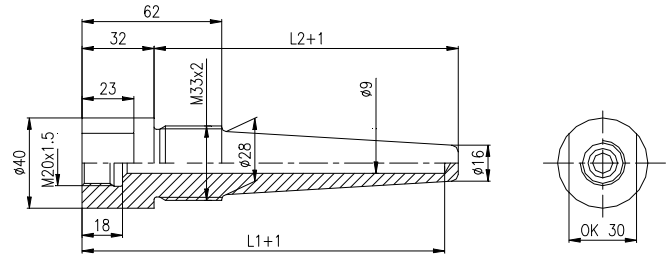


FIGURE 7 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS 1700

Nominal length [mm]	Weight	Ordering number
160	0.9	991 1700 x2
250	1.43	991 1700 x3
400	2.22	991 1700 x4

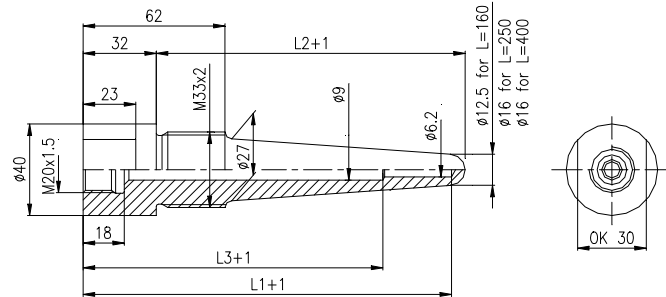
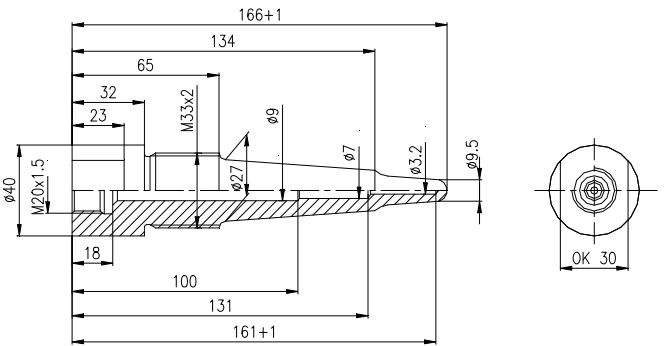


FIGURE 8 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS 1800

Nominal length [mm]	Weight	Ordering number
160	0.8	991 1800 x2



EXAMPLES ORDERS:

Standard design:

Cylindrical thermowell screw-in, unreduced  
991 1000 33  
20 pcs

For special requirement:

Cylindrical of welding thermowell, unreduced  
991 1200 99  
material 1.5415, nominal length L = 500 mm  
10 pcs

TABLE 4 - OVERVIEW OF SEALING RINGS, TYPE 991, SUPPLIED FOR SCREW-IN THERMOWELLS PURSUANT TO ČSN 02 7202

EXTERNAL FIXING THREAD OF THERMOWELL	SEALING RING			
	DIMENSION [mm] Ød × ØD × t	MATERIAL	NUMBER	ORDERING NUMBER
M27 × 2	27 × 32 × 1.5	copper	1 pcs	991 TK 27
M33 × 2	33 × 39 × 2			991 TK 33

The sealing ring is supplied to each sensor by default. The sealing ring can also be ordered separately using ordering number.

TABLE 5 - OVERVIEW OF DESIGN OF RECOMMENDED NIPPLES FOR SCREW-IN THERMOWELLS PURSUANT TO ČSN 02 7202

SPECIFICATION					ORDERING NUMBER						
					991	xxx	x	xxx	xx		
Shape	direct					NVP					
	oblique (chamfer 45°)					NVS					
Internal thread	M27 × 2				PN	160 (40)**					
	M33 × 2					250		4	M27		
Material	1.0308				maximum operation temperature [°C]	300 (only PN 40)			M27	13	
	1.0577					400			M33	15	
	15 128					550			M27	51	
	1.4541					550			M27	72	
	other *)					pursuant to material			M33		
						pursuant to material					99

\*) only as a special requirement after an agreement with the manufacturer

\*\*\*) nipple of a material 1.0308 only PN 40

PURCHASE ORDER EXAMPLE

Standard design:

Nipple  
NVP4 M27 72  
6 pcs

Special requirement:

Nipple  
NVP4 M27 99  
material 1.5415  
6 pcs



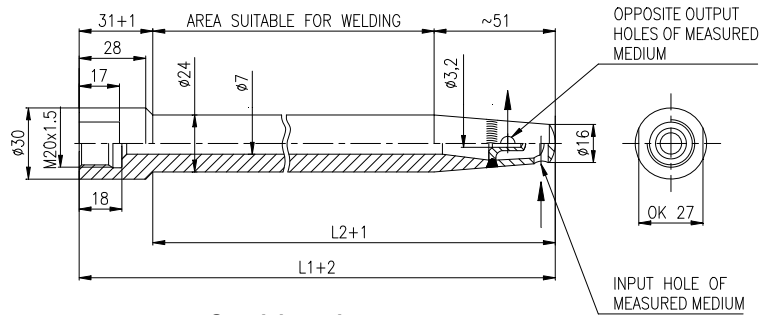
**TABLE 6 - OVERVIEW OF DESIGN AND ORDERING FAST RESPONSE THERMOWELLS PURSUANT TO DIN 43772, SHAPE 4 (4F)**

SPECIFICATION					ORDERING NUMBER				
					991	xxxx	x	x	
Fast response of welding thermowell, for high parameters operating of liquid and speed of flow pursuant to figure 9	PN 250	thread M20 × 1.5 bore Ø 7 / Ø 3.2 [mm]			1900				
Material of immersion part of thermowell	1.4541 **)	maximum operation temperature [°C]	550 °C				3		
	other *)		pursuant to material thermowell				9		
Nominal length L [mm]	160	L1 [mm]	L2 [mm]	175	144			2	
	250			265	234			3	
	400			415	384			4	
	other *)							9	

\*) only as a special requirement after an agreement with the manufacturer  
 \*\*) thermowells of this material are suitable for contact with food

**FIGURE 9 - DIMENSIONAL DRAWING OF FAST RESPONSE THERMOWELL**

Nominal length [mm]	Weight [kg]	Ordering number
160	0.6	991 1900 32
250	0.8	991 1900 33
400	1.3	991 1900 34



**EXAMPLES ORDERS :**

**Standard design:**

Fast response thermowell pursuant to ČSN  
 991 1900 33  
 10 pcs

**Special requirement:**

Fast response thermowell pursuant to ČSN  
 991 1900 93  
 material of thermowell 1.7335  
 15 pcs

**TABLE 7 - OVERVIEW OF DESIGN AND ORDERING OF WELDING THERMOWELLS PURSUANT TO DIN 43772, SHAPE 4 (4F)**

SPECIFICATION					ORDERING NUMBER												
					991	DIN	4	x	x	x	x	x					
Conical thermowell pursuant to figure 10 to 15	welding	thermowell, shape 4 pursuant to DIN 43772		without flange	PN 250				4	0							
				with flange *) **)				4	F								
				internal bore [mm]		Ø 3.5						3					
				Ø 7							7						
				Ø 9 *)								9					
		internal thread	M14×1.5	external Ø of thermowell [mm]	18	internal bore [mm]	Ø 3.5										
			M18×1.5		24		Ø 7 or Ø 9 *)						3	1			
			M20×1.5	26										2			
			G 1/2												3		
			½ - 14 NPT													4	
													5				
Nominal length of thermowell L [mm]			110	L1 [mm]	65	L2 [mm]	105							1			
			140		65		135									2	
			170		133		165									3	
			200		65		195									4	
			200		125		195									5	
			260		125		255									6	
			410		275		405									7	
			other *)		max. 1200		for thermowells with bore		Ø 7 and Ø 9								9
			max. 500		Ø 3.5												
Material of thermowell			1.7335	surface treatment	conservation by fat - by oil		550							1			
			1.7380		-		580								2		
			1.4541 ***)		-		580								3		
			1.4571 ***)		-		400								4		
			1.5415 (16Mo3) *)		conservation by fat - by oil		530								5		
			1.4903 *) ***)		-		620								6		
			A105, C22.8 or 1.0460 (P250GH) *)		conservation by fat - by oil		425								7		
			1.4404 *) ***)		-		550								8		
			other *)		pursuant to material		pursuant to material								9		

\*) for special requirement after an agreement with the manufacturer  
 \*\*) design of flange (shape, PN, DN and material) pursuant to the requirement of the customer  
 \*\*\*) thermowells of these materials are suitable for contact with food

FIGURE 10 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS, SHAPE 4 PURSUANT TO DIN 43772, THREAD M14

L [mm]	Weight [kg]	Ordering number
110	≈ 0.14	991 DIN 403 11x
140	≈ 0.20	991 DIN 403 12x
170	≈ 0.20	991 DIN 403 13x
200	≈ 0.31	991 DIN 403 14x
200	≈ 0.26	991 DIN 403 15x
260	≈ 0.38	991 DIN 403 16x
410	≈ 0.54	991 DIN 403 17x

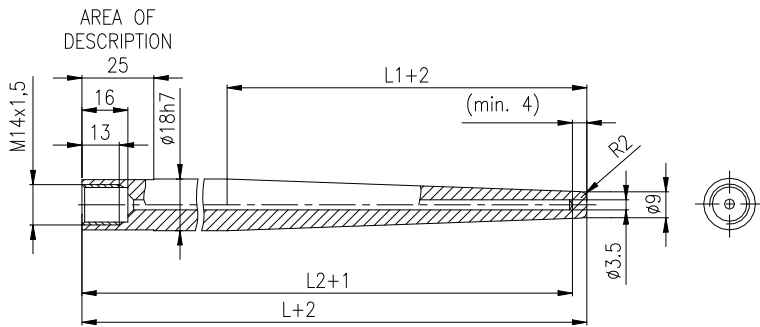


FIGURE 11 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS, SHAPE 4 PURSUANT TO DIN 43772, THREAD M18

L [mm]	Weight [kg]	Ordering number
110	≈ 0.24	991 DIN 407 21x
140	≈ 0.34	991 DIN 407 22x
170	≈ 0.34	991 DIN 407 23x
200	≈ 0.53	991 DIN 407 24x
200	≈ 0.46	991 DIN 407 25x
260	≈ 0.65	991 DIN 407 26x
410	≈ 0.92	991 DIN 407 27x

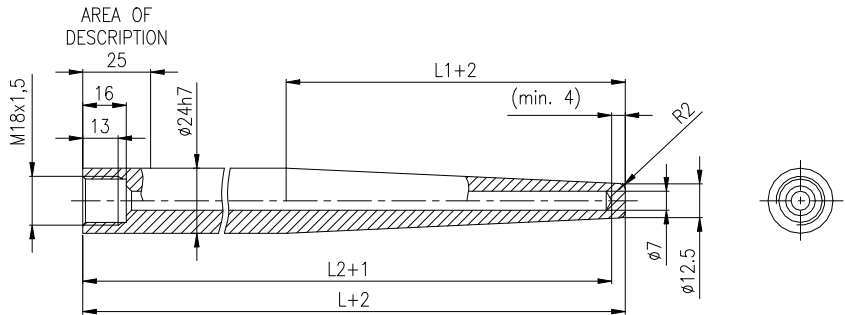


FIGURE 12 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS, SHAPE 4 PURSUANT TO DIN 43772, THREAD M20

L [mm]	Weight[k g]	Ordering number
110	≈ 0.27	991 DIN 407 31x
140	≈ 0.39	991 DIN 407 32x
170	≈ 0.38	991 DIN 407 33x
200	≈ 0.66	991 DIN 407 34x
200	≈ 0.51	991 DIN 407 35x
260	≈ 0.74	991 DIN 407 36x
410	≈ 1.09	991 DIN 407 37x

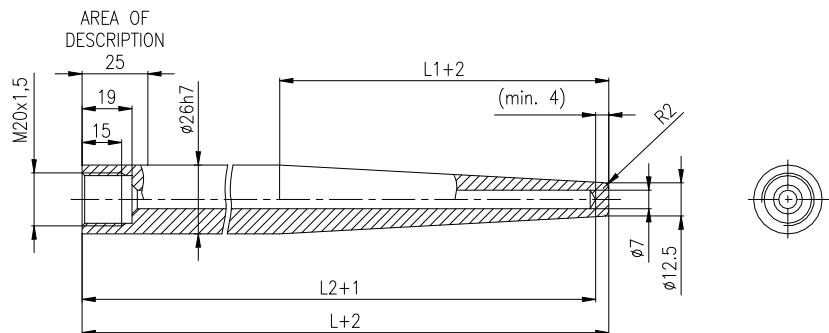


FIGURE 13 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS, SHAPE 4 PURSUANT TO DIN 43772, THREAD G 1/2

L [mm]	Weight[k g]	Ordering number
110	≈ 0.27	991 DIN 407 31x
140	≈ 0.39	991 DIN 407 32x
170	≈ 0.38	991 DIN 407 33x
200	≈ 0.66	991 DIN 407 34x
200	≈ 0.51	991 DIN 407 35x
260	≈ 0.74	991 DIN 407 36x
410	≈ 1.09	991 DIN 407 37x

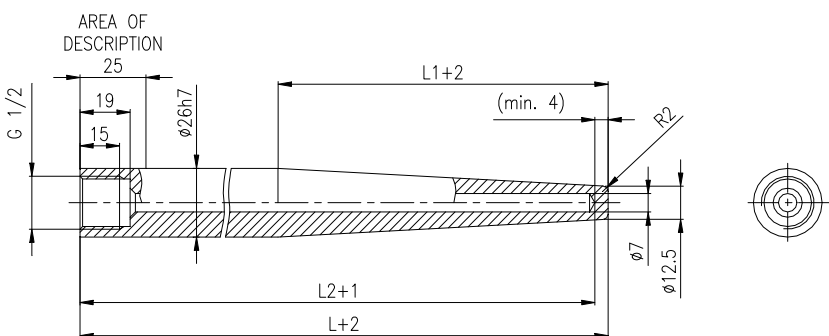


FIGURE 14 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS, SHAPE 4 PURSUANT TO DIN 43772, THREAD 1/2 - 14NPT

L [mm]	Weight [kg]	Ordering number
110	≈ 0.27	991 DIN 407 51x
140	≈ 0.39	991 DIN 407 52x
170	≈ 0.38	991 DIN 407 53x
200	≈ 0.66	991 DIN 407 54x
200	≈ 0.51	991 DIN 407 55x
260	≈ 0.74	991 DIN 407 56x
410	≈ 1.09	991 DIN 407 57x

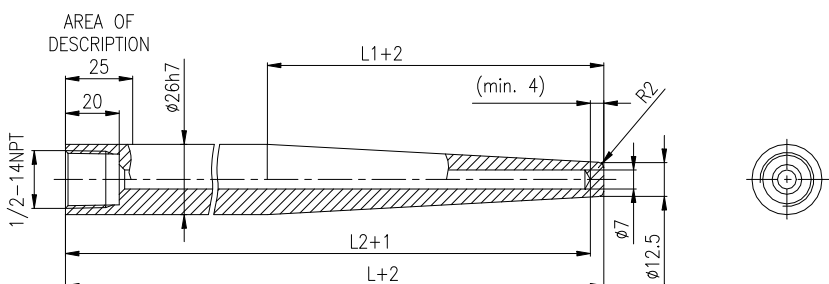
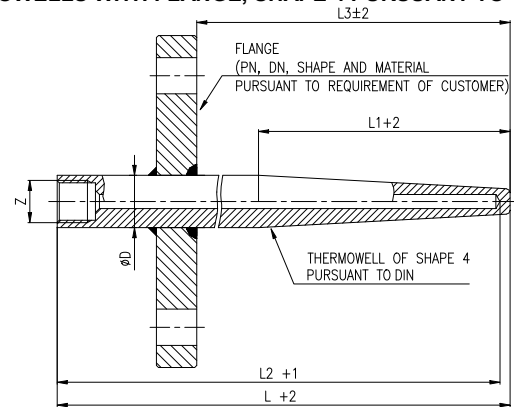




FIGURE 15 - DIMENSIONAL DRAWING, TABLE OF DESIGNS OF THERMOWELLS WITH FLANGE, SHAPE 4 PURSUANT TO DIN 43772

Thread Z ØD	L [mm]	L1 [mm]	L2 [mm]	L3 [mm]	Ordering number
M18x1.5 24h7	200	65	195	130	991 DIN 4F7 24x
	260	125	255	190	991 DIN 4F7 26x
	410	275	405	340	991 DIN 4F7 27x
M20x1.5 26h7	200	65	195	130	991 DIN 4F7 34x
	260	125	255	190	991 DIN 4F7 36x
	410	275	405	340	991 DIN 4F7 37x
G ½ 26h7	200	65	195	130	991 DIN 4F7 44x
	260	125	255	190	991 DIN 4F7 46x
	410	275	405	340	991 DIN 4F7 47x



Note:

- material of the flange may be different from material of the thermowell
- weight of the thermowell depends on weight of the flange

**EXAMPLES ORDERS**

**Standard design:**

Welding thermowell, shape 4 pursuant to DIN 43772  
991 DIN 407 214  
10 pcs

**Special requirement:**

Welding thermowell, shape 4 pursuant to DIN 43772  
991 DIN 407 211  
material of thermowell 1.4401  
15 pcs

TABLE 8 - OVERVIEW DESIGN OF RECOMMENDED NIPPLES FOR THERMOWELLS, SHAPE 4 PURSUANT TO DIN 43772

SPECIFICATION				ORDERING NUMBER					
				991	xxx	x	xxx	xx	
Nipple direct					NVD				
Nipple for welding thermowell, shape 4, pursuant to DIN 43772 (pursuant to figure 7)						4			
Nominal pressure	PN 250	internal bore	Ø 24				D24		
			Ø 26				D26		
			other Ø *)				999		
Material	15 128 1.4541 1.5415 *) 1.4903 *) A105, C22.8 or 1.0460 (P250GH) *) 1.4404 *) other *)	surface temperature [°C]	conservation by fat - by oil conservation by fat - by oil - conservation by fat - by oil - pursuant to material	maximum operation temperature [°C]	550				51
					550				72
					530				50
					620				71
					425				20
					550				73
					pursuant to material				99

\*) only as a special requirement after an agreement with the manufacturer

**PURCHASE ORDER EXAMPLE**

**Standard design:**

Nipple  
NVD4 D24 72  
6 pcs

**Special requirement:**

Nipple  
NVD4 999 99  
internal bore Ø 18, material 1.4571  
6 pcs

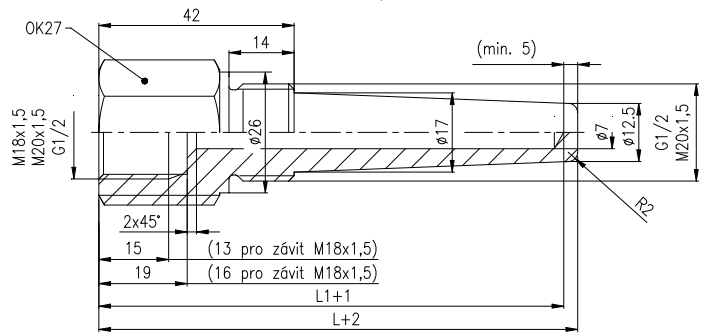
TABLE 8 - OVERVIEW OF DESIGN AND ORDERING OF SCREW-IN THERMOWELLS PURSUANT TO DIN 43772 SHAPE 6

SPECIFICATION				ORDERING NUMBER								
				991	DIN	6	x	x	x	x	x	
Conical thermowell pursuant to figure 16 to 18	screw-in	thermowell, shape 6 pursuant to DIN 43772	PN 250			6						
			external thread	G1/2				1				
				G1					2			
				M27x2					3			
				G3/4					4			
		M20x1.5						6				
		internal bore [mm]	Ø 7						7			
			Ø 9 *)						9			
		internal thread	M18x1.5							2		
			M20x1.5/							3		
G 1/2/								4				
Nominal length of thermowell L [mm]	L1 [mm]	110							1			
		140							2			
		170							3			
		200							4			
		260							6			
		410							7			
		other (maximum 1200) *)							9			
Material of thermowell	maximum operation temperature [°C]	1.4541 **)							3			
		1.4571 **)							4			
		other *)							9			

\*) for special requirement after an agreement with the manufacturer \*\*) thermowells of these materials are suitable for contact with food

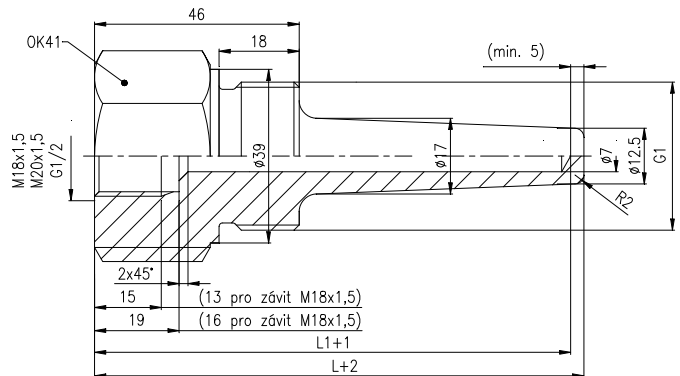
**FIGURE 16 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS, SHAPE 6 PURSUANT TO DIN 43772, EXTERNAL THREAD G1/2 AND M20x1.5**

L [mm]	Weight [kg]	Ordering number
110	≈ 0.21	991 DIN 6x7 x1x
140	≈ 0.25	991 DIN 6x7 x2x
170	≈ 0.32	991 DIN 6x7 x3x
200	≈ 0.37	991 DIN 6x7 x4x
260	≈ 0.48	991 DIN 6x7 x6x
410	≈ 0.76	991 DIN 6x7 x7x



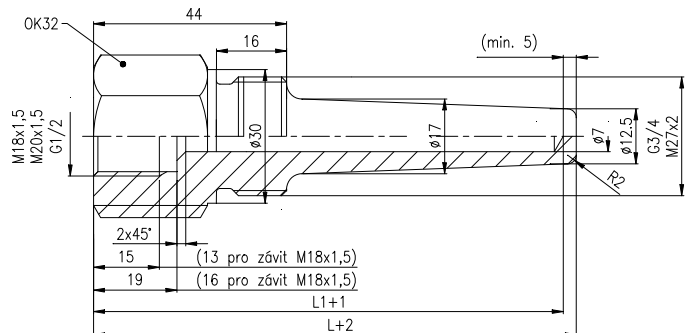
**FIGURE 17 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS, SHAPE 6 PURSUANT TO DIN 43772, EXTERNAL THREAD G1**

L [mm]	Weight [kg]	Ordering number
110	≈ 0.30	991 DIN 627 x1x
140	≈ 0.35	991 DIN 627 x2x
170	≈ 0.42	991 DIN 627 x3x
200	≈ 0.47	991 DIN 627 x4x
260	≈ 0.58	991 DIN 627 x6x
410	≈ 0.86	991 DIN 627 x7x



**FIGURE 18 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF THERMOWELLS, SHAPE 6 PURSUANT TO DIN 43772, EXTERNAL THREAD G3/4 AND M27x2**

L [mm]	Weight [kg]	Ordering number
110	≈ 0.30	991 DIN 6x7 x1x
140	≈ 0.35	991 DIN 6x7 x2x
170	≈ 0.42	991 DIN 6x7 x3x
200	≈ 0.47	991 DIN 6x7 x4x
260	≈ 0.58	991 DIN 6x7 x6x
410	≈ 0.86	991 DIN 6x7 x7x



**EXAMPLES ORDERS**

**Standard design:**

Screw-in thermowell, shape 6 pursuant to DIN 43772  
 991 DIN 617 214  
 10 pcs

**Special requirement:**

Screw-in thermowell, shape 6 pursuant to DIN 43772  
 991 DIN 627 219  
 material of thermowell 1.7335  
 15 pcs

**TABLE 10 - OVERVIEW OF SEALING RINGS, TYPE 991, SUPPLIED FOR SCREW-IN THERMOWELLS PURSUANT TO DIN 43772 SHAPE 6**

EXTERNAL FIXING THREAD OF THERMOWELL	SEALING RING			
	DIMENSION [mm] Ød × ØD × t	MATERIAL	NUMBER	ORDERING NUMBER
M20x1.5	21×27×1.5	copper	1 pcs	991 TK 21
G1/2				991 TK 27
M27x2	27×32×1.5			991 TK 33
G3/4				
G1	33×39×2			

The sealing ring is supplied to each sensor by default. The sealing ring can also be ordered separately using ordering number.

**TABLE 11 - OVERVIEW OF DESIGNS OF RECOMMENDED NIPPLE FOR SCREW-IN THERMOWELLS DIN 43772 SHAPE 6**

SPECIFICATION						ORDERING NUMBER						
						991	xxx	x	xxx	xx		
Shape	direct						NVP					
	oblique (chamfer 45°)						NVS					
Internal thread	M20×1.5		PN	40	height of nipple [mm]			1	M20			
	G½							2				
	M27×2			160 (40) **)			1	G12				
	G¾						2					
	G1											
		250			4	M27						
					5	G01						
Material	1.0308	surface treatment	conservation by fat - by oil	maximum operation temperature [°C]	300 (only PN 40)				M20	13		
								G12				
								M27				
								G34				
	1.0577						400				G01	15
	15 128						550				M27	51
											G34	
	1.4541					-	550				M20	72
											G12	
											M27	
							G34					
other *)		pursuant to material		pursuant to material			G01		99			

\*) only as a special requirement after an agreement with the manufacturer

\*\*)) weld-on piece of a material 1.0308 only PN40

**PURCHASE ORDER EXAMPLE**

**Standard design:**  
Nipple  
NVP4 M27 72  
6 pcs

**Special requirement:**

Nipple  
NVP4 M27 99  
material 1.5415  
6 pcs

**TABLE 12 - OVERVIEW OF DESIGN AND ORDERING OF SCREW-IN THERMOWELLS PURSUANT TO DIN 43772 SHAPE 7**

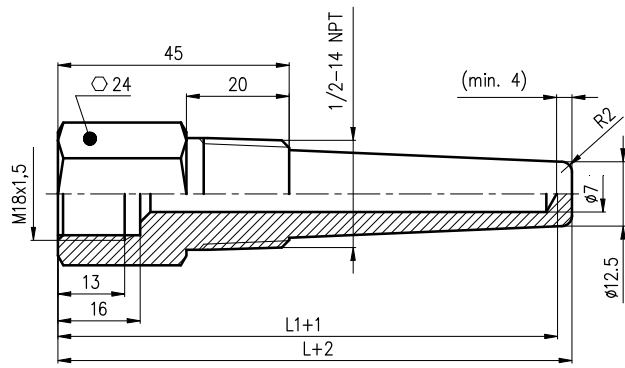
SPECIFICATION						ORDERING NUMBER					
						991	DIN	x	x	x	x
Conical thermowell pursuant to figure 19	PN 250	screw-in shape 7	bore [mm]	Ø 7			7				
				Ø 9 *)			9				
			external fixing thread	½ - 14 NPT				5			
				¾ - 14 NPT				7			
				1- 11,5 NPT				8			
			other *)				9				
internal thread for sensor	M18 × 1.5					2					
	½ - 14 NPT					5					
	other *)					9					
Nominal length of thermowell L [mm]	110	L1 [mm]	105						1		
	140		135						2		
	170		165						3		
	200		195						4		
	260 *)		255						6		
	410 *)		405						7		
	other (max. 1200) *)								9		
Material of thermowell	1.7335 *)	surface treatment	conservation by fat - by oil	maximum operation temperature [°C]	550					1	
	1.7380 *)				580					2	
	1.4541 **)				580					3	
	1.4571 **)		400						4		
	1.5415 (16Mo3) *)		conservation by fat - by oil		530					5	
	1.4903 *) **)				-	620				6	
	A105, C22.8 or 1.0460 (P250GH) *)				conservation by fat - by oil	425				7	
	1.4404 *) **)		-		550					8	
	Other *)		pursuant to material		pursuant to material						9

\*) only as a special requirement after an agreement with the manufacturer

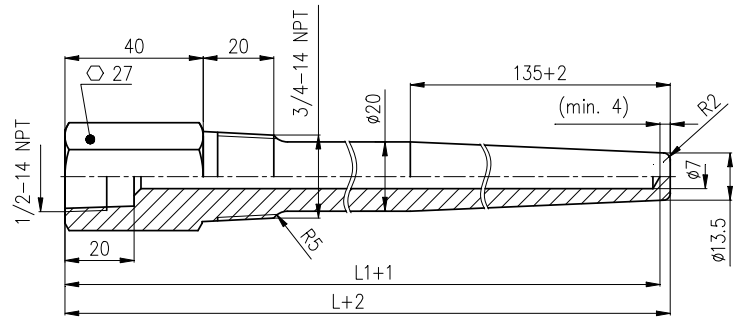
\*\*)) thermowells of these materials are suitable for contact with food

FIGURE 19 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF SCREW-IN THERMOWELLS, SHAPE 7 PURSUANT TO DIN 43772

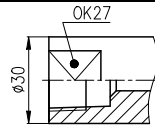
L [mm]	Weight [kg]	Ordering number
110	≈ 0,19	991 DIN K75 21x
140	≈ 0,25	991 DIN K75 22x
170	≈ 0,30	991 DIN K75 23x
200	≈ 0,35	991 DIN K75 24x
260	≈ 0,43	991 DIN K75 26x
410	≈ 0,65	991 DIN K75 27x



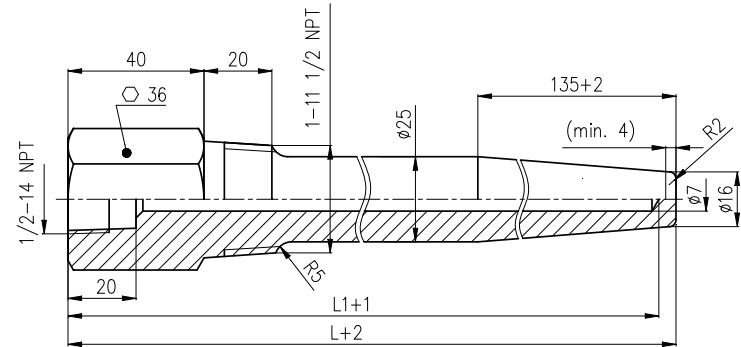
L [mm]	Weight [kg]	Ordering number
110	≈ 0,29	991 DIN K77 51x
140	≈ 0,32	991 DIN K77 52x
170	≈ 0,38	991 DIN K77 53x
200	≈ 0,44	991 DIN K77 54x
260	≈ 0,50	991 DIN K77 56x
410	≈ 0,75	991 DIN K77 57x



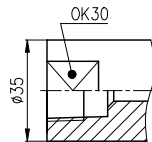
In case of unavailability material in hexagon will be thermowell supplied in this shape:



L [mm]	Weight [kg]	Ordering number
110	≈ 0,52	991 DIN K78 51x
140	≈ 0,60	991 DIN K78 52x
170	≈ 0,67	991 DIN K78 53x
200	≈ 0,75	991 DIN K78 54x
260	≈ 0,90	991 DIN K78 56x
410	≈ 1,27	991 DIN K78 57x



In case of unavailability material in hexagon will be thermowell supplied in this shape:



**EXAMPLES ORDERS:**

**Standard design:**

Screw-in thermowell, shape 7 pursuant to DIN 43772  
991 DIN K75 214  
10 pcs

**For special requirement:**

Screw-in thermowell, shape 7 pursuant to DIN 43772  
991 DIN K75 293  
nominal length L = 260 mm, material of thermowell 1.4404  
1 pcs

TABLE 13 - OVERVIEW OF DESIGNS OF RECOMMENDED NIPPLE FOR SCREW-IN THERMOWELLS DIN 43772 SHAPE 7

SPECIFIKACE					OBJEDNACÍ ČÍSLO				
					991	xxx	x	xxx	xx
Shape	direct					NVP			
	oblique (chamfer 45°)					NVS			
Internal thread	3/4 - 14 NPT *)				PN	160 (40) **)		4	N34
Material	1.0308	surface treatment	conservation by fat - by oil	maximum operation temperature [°C]	300 (only PN 40)				13
	15 128				550			51	
	1.4541				550			72	
	other *)				pursuant to material			99	

\*) only as a special requirement after an agreement with the manufacturer

\*\*\*) nipple material 1.0308 only PN40

**PURCHASE ORDER EXAMPLE**

**Standard design:**

Nipple  
NVP4 N34 72  
6 pcs

**Special requirement:**

Nipple  
NVP4 N34 99  
material 1.5415  
6 pcs

**TABLE 14 - OVERVIEW OF DESIGN AND ORDERING OF SCREW-IN THERMOWELLS WITH SEALING SCREW**

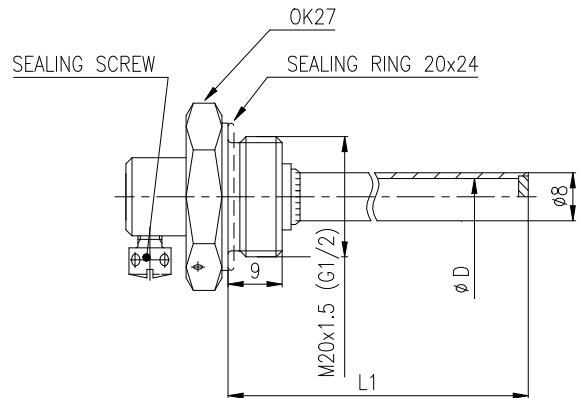
SPECIFICATION					ORDERING NUMBER				
					991	xxx	x	x	x
Cylindrical thermowell screw-in, unreduced, PN 40 pursuant to figure 20	thread	M20×1.5				101			
		G1/2				102			
	bore D [mm]	Ø 6.1 + 0.1					0		
	material	1.4541 **)	maximum operation temperature [°C]	550				3	
		other *)					9		
	nominal length L1 [mm]	50							6
		100							1
160								2	
other *)								9	

\*) only as a special requirement after an agreement with the manufacturer

\*\*\*) thermowells of this material are suitable for contact with food

**FIGURE 20 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF SCREW-IN THERMOWELLS WITH SEALING SCREW**

L1 [mm]	Weight [g]	Ordering number
50	≈ 63	991 10x0 36
100	≈ 70	991 10x0 31
160	≈ 78	991 10x0 32



**EXAMPLES ORDERS Standard design:**

Screw-in thermowell  
991 1010 31  
10 pcs

**For special requirement:**

Screw-in thermowell  
991 1020 39  
nominal length L1 = 250 mm  
5 pcs

**TABLE 15 - OVERVIEW OF SEALING RINGS, TYPE 991, SUPPLIED FOR SCREW-IN THERMOWELLS WITH SEALING SCREW**

EXTERNAL FIXING THREAD OF THERMOWELL	SEALING RING			
	DIMENSION [mm] Ød × ØD × t	MATERIAL	NUMBER	ORDERING NUMBER
M20×1.5	20×24×2	copper thermally insulating insert	1 pcs	991 TK 20
G1/2				

The sealing ring is supplied to each sensor by default. The sealing ring can also be ordered separately using ordering number.

**TABLE 16 - ACCESSORIES - OVERVIEW OF DESIGN AND ORDERING OF NIPPLES FOR THERMOWELLS WITH SEALING SCREW - TYPE 991**

SPECIFICATION							ORDERING NUMBER				
							991	xxx	x	xxx	xx
Nipple for screw-in thermowells with sealing screw	shape	direct						NVP			
		oblique (chamfer 45°)						NVS			
	PN	40							3		
	internal thread Z	M20×1.5								M20	
		G 1/2								G12	
	material	1.0308	surface treatment	conservation by fat - by oil	maximum operation temperature [°C]	300					13
		1.4541		-		550					72
other *)		pursuant to material		pursuant to material						99	

\*) as a special requirement after an agreement with the manufacturer

**PURCHASE ORDER EXAMPLE**

**Standard design:**

Nipple  
NVP3 M20 72  
6 pcs

**Special requirement:**

Nipple  
NVP3 M20 99  
material 1.5415  
6 pcs

**TABLE 17 - OVERVIEW OF DESIGN AND ORDERING OF SCREW-IN THERMOWELLS WITH SEALING SCREW (pursuant to EN 1434-2)**

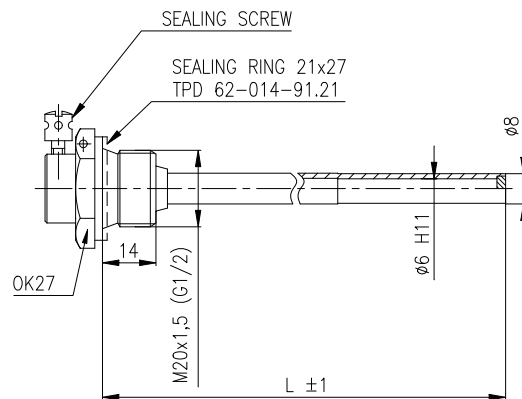
SPECIFICATION					ORDERING NUMBER				
					991	xxx	x	x	x
Cylindrical thermowell screw-in, unreduced, PN 40 with sealing screw (pursuant to EN 1434-2) pursuant to figure 21	thread	M20×1.5				101			
		G1/2				102			
	bore [mm]	Ø6 H11					1		
	material	1.4541 **)	maximum operation temperature [°C]	550				3	
		other *)					9		
	nominal length L [mm]	85							1
		120							2
		210							3
		50							6
		100							7
other *)							9		

\*) only as a special requirement after an agreement with the manufacturer

\*\*)) thermowells of these materials are suitable for contact with food

**FIGURE 21 - DIMENSIONAL DRAWING, TABLE OF DESIGNS AND WEIGHTS OF SCREW-IN THERMOWELLS WITH SEALING SCREW (pursuant to EN 1434-2)**

L1 [mm]	Weight [g]	Ordering number
85	86	991 10x1 31
120	91	991 10x1 32
210	105	991 10x1 33
50	63	991 10x1 36
100	70	991 10x1 37



**EXAMPLES ORDERS:**

**Standard design:**

Cylindrical thermowell screw-in, unreduced, PN 40 with sealing screw  
991 1011 31  
10 pcs

**For special requirement:**

Cylindrical thermowell screw-in, unreduced, PN 40 with sealing screw  
991 1021 39  
nominal length L = 250 mm  
5 pcs

**TABLE 18 - OVERVIEW OF SEALING RINGS, TYPE 991, SUPPLIED FOR SCREW-IN THERMOWELLS WITH SEALING SCREW (pursuant to EN 1434-2)**

EXTERNAL FIXING THREAD OF THERMOWELL	SEALING RING			
	DIMENSION [mm] Ød × ØD × t	MATERIAL	NUMBER	ORDERING NUMBER
M20×1.5 G1/2	21×27×2	copper thermally insulating insert	1 pcs	991 TK 21

The sealing ring is supplied to each sensor by default. The sealing ring can also be ordered separately using ordering number.

**TABLE 19 - OVERVIEW OF DESIGN AND ORDERING OF NIPPLES FOR THERMOWELLS WITH SEALING SCREW PURSUANT TO EN 1434-2, TYPE 991**

SPECIFICATION						ORDERING NUMBER					
						991	xxx	x	xxx	xx	
Nipple for thermowells with sealing screw pursuant to EN 1434-2	shape	direct					NVP				
		oblique (chamfer 45°)					NVS				
	PN	40						1			
	internal thread Z	M20×1.5							M20		
		G 1/2							G12		
	material	surface treatment	1.0308	conservation by fat - by oil	maximum operation temperature [°C]	300				13	
			1.4541				-	550			72
			other *)				pursuant to material	pursuant to material			99

\*) as a special requirement after an agreement with the manufacturer

**PURCHASE ORDER EXAMPLE**

**Standard design:**

Nipple  
NVP1 M20 72  
6 pcs

**Special requirement:**

Nipple  
NVP1 M20 99  
material 1.5415  
6 pcs



TABLE 20 - OVERVIEW OF DESIGN AND ORDERING OF THERMOWELLS PURSUANT TO SHELL \*)

SPECIFIKACE						OBJEDNACÍ ČÍSLO					
						991	SHELL	x	x	x	
Thermowell pursuant to figure 22	Flange	DN	25	max. [LbS]	900			1			
			40		1500			2			
			50		2500			3			
			other		other			9			
Nominal length of thermowell L [mm]	230								1		
	255								2		
	305								3		
	355								4		
	405								5		
	455								6		
	other								9		
Material of thermowell	surface treatment	1.7335	conservation by fat - by oil	maximum operation temperature [°C]	550					1	
		1.7380			580					2	
		1.4541			-	580					3
		1.4571			-	400					4
		1.5415 (16Mo3)			conservation by fat - by oil	530					5
		1.4903			-	620					6
		A105, C22.8 or 1.0460 (P250GH)			conservation by fat - by oil	425					7
		1.4404			-	550					8
		other			pursuant to material	pursuant to material					

\*) as a special requirement after an agreement with the manufacturer

**PURCHASE ORDER EXAMPLE**

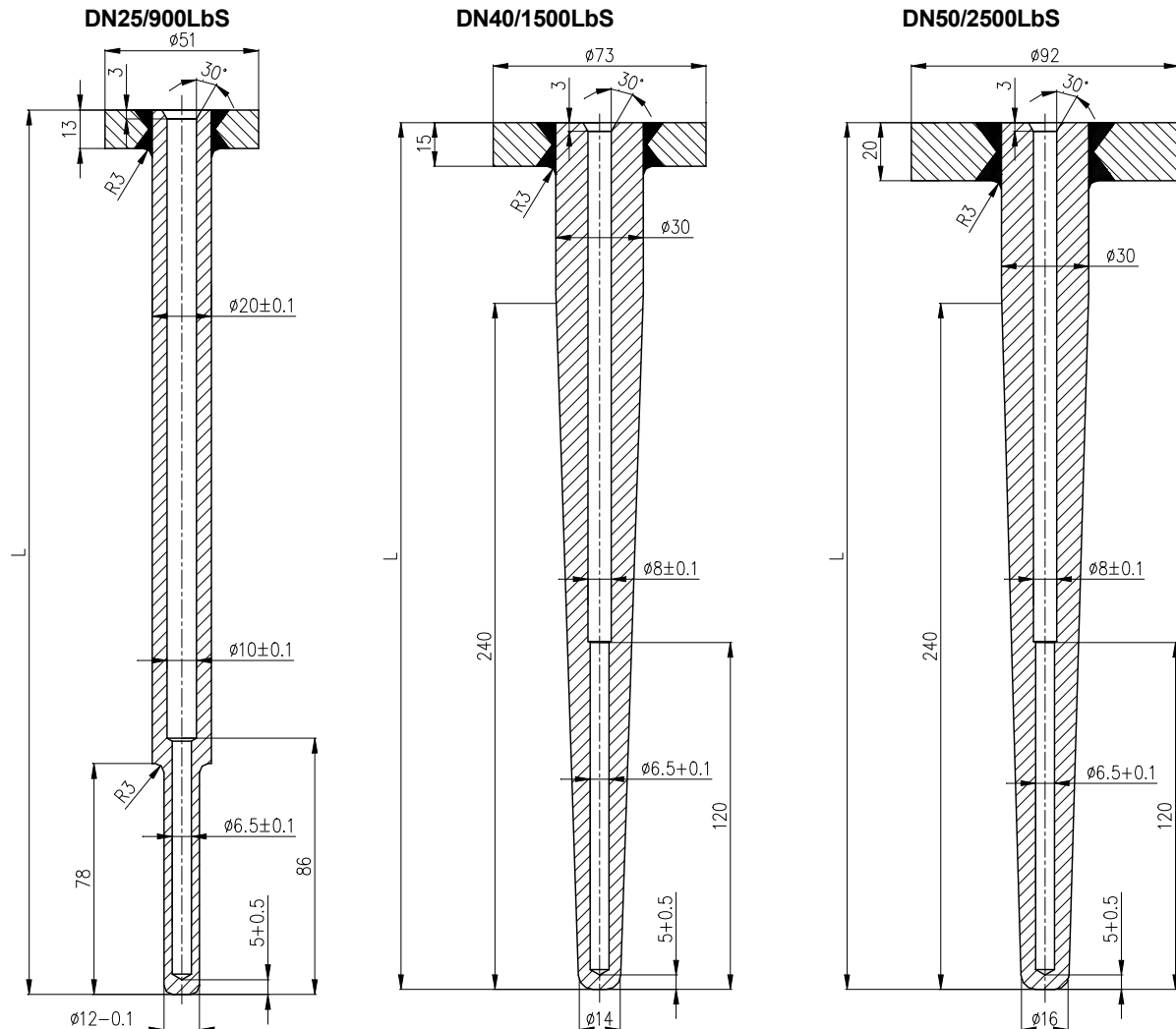
**Standard design:**

Thermowells pursuant to SHELL DN/900LbS  
 991 SHELL 111  
 10 pcs

**Special requirement:**

Thermowells pursuant to SHELL DN/900LbS  
 991 SHELL 298  
 nominal length L = 250 mm  
 5 pcs

FIGURE 22 - DIMENSIONAL DRAWING OF THERMOWELLS PURSUANT TO SHELL



## INSTALLATION AND CONNECTION

Screw the **thermowells for screw-in** into direct or oblique nipples welded on the piping or technological equipment and seal them by suitable sealing rings (sealing ring is not used for thermowells shape 7 pursuant to DIN) or sealing weld. For thermowells with sealing screw serves for fixing sealing screw. Examples of recommendations for the installation of direct and oblique nipples are provided in figure 22.

Thermowells		Recommended tightening torque [Nm]	
Screw-in	cylindrical, (codes 10×0, 11×0)	100	
	conical (codes 1500, 1700, 1800)	300	
	shape 6 pursuant to DIN 43772	M20×1.5, G1/2	70
		M27×2, G3/4	150
		G1	300
	shape 7 pursuant to DIN 43772	1/2-14 NPT	70
		3/4-14 NPT	90
		1-11 1/2 NPT	100
with sealing screw	70		

Screw-in thermowells shall be secured after installation against release e.g. by a safety weld which is executed in two places of circuit by fillet weld.

The installation of the **welding thermowells** is carried out by welding the cylindrical part of the fastening screw joint into hole in the wall of the piping or technological equipment.

The installation of the **fast response thermowells** is carried out by welding the cylindrical part of the thermowell (marked in dimensional sketch) into bore in the wall of the piping or technological equipment or into the flange ensured by customer.

Install the thermowell fundamentally in vertical position. Before welding is necessary positioning of the thermowell so as has been located inlet hole in bottom part of thermowell ca. in 1/3 of diameter piping and oriented against direction flow of measured medium (refer to figure 23).

The right position of inlet hole is set using the arrow, which is in the same position as inlet hole and is marked under the logo of the manufacturer in upper section of thermowell.

If carried out temperature control by injecting water, place the thermowell to the distance 20 to 30 diameters D, but minimum 6 diameters D of direct length from place of injection water. If there are placed orifice plates, nozzles and venturi nozzles in the piping, must be this equipments placed to the distance minimum 20 diameters D of direct length behind thermowell and 5 to 8 diameters D before thermowell. The required of minimum direct lengths states EN ISO 5167-1, Table 1.

**For thermowells of shape 4 pursuant to DIN 43772** the welding shall be realized pursuant to figure 24.

The right choice of the nipple and its location significantly influences metrological properties of the sensor and its service life.

With respect to maintaining metrological properties and the longest possible service life, it is not recommended to install the sensors in places with high turbulence of the medium flow (unless it is vitally required), which is caused e.g. a rapid transition from a small diameter of the piping to a larger one (when failing to comply with the required shape and dimensions of diffuser behind the flow meter).

Recommended distance of the temperature sensor from the installation flange of the flow meter is min. 1 m.

## COMMISSIONING

Thermowells do not require any operation and maintenance.

## SPARE PARTS

Thermowells do not require any delivery of spare parts.

## WARRANTY

The warranty period is 24 months from the receiving of the product by the customer, unless established otherwise in the purchase contract or other document.

Rejection of defects shall be enforced in writing at the manufacturer within the warranty period. The rejecting side shall identify the product name, ordering and serial number, date of issue and number of the delivery note, clear description of the occurring defect and the subject of the claim. If the rejecting side is invited to send the device for repair, it shall do so in the original package of the manufacturer and/or in another package ensuring safe transport.

The warranty shall not apply to defects caused by unauthorized intervention into the device, its forced mechanical damage or failure to comply with operation conditions of the product and the product manual.

## REPAIRS

Thermowells do not require any repair.

## DISABLING AND LIQUIDATION

The product and its package do not include any parts that could impact the environment.

The products that are withdrawn from operation, including their packages, may be disposed of to sorted or unsorted waste pursuant to the type of waste.

The package of the sensor and metal parts of the product shall be recycled.

**TABLE 21 - APPLICATIONS THERMOWELLS FOR SENSORS OF TEMPERATURE ZPA NOVÁ PAKA a.s.**

Type of thermowell	Type number of resistance or thermoelectric sensor of temperature
991 1000 xx to 991 1700 xx	241, 243, 341, 112 60*, 112 61*, 112 61/P*, 112 68*, 112 68/P*, 112 81, 113 13*, 113 13/P*, 113 68*, 113 68/P*
991 10G0 xx to 991 13G0 xx	241, 243, 341, 343
991 1800 xx	241, 243, 341, 343, 113 15
991 1900 xx	241, 243, 341, 343, 113 15
991 DIN 4×3 xxx	331, 333
991 DIN 4×7 xxx	203*, 231, 233, 303*, 331, 333
991 DIN 4×7 5xx	235, 236, 335, 336
991 DIN 6×7 xxx	203*, 231, 233, 303*, 331, 333
991 DIN K75 xxx	203*, 231, 233, 303*, 331, 333
991 1010 xx and 991 1020 xx	201*, 213, 112 20*
991 1011 xx and 991 1021 xx	202

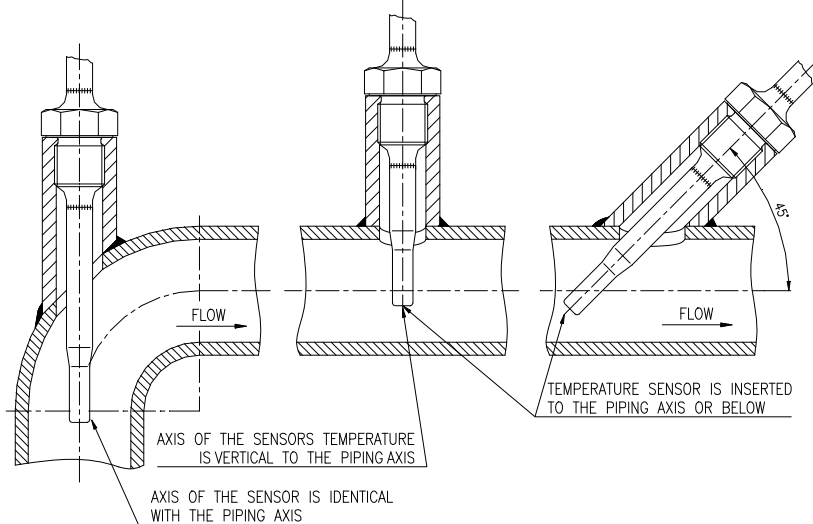
\* - production of these types of temperature sensors was finished

**FIGURE 23 - EXAMPLES OF RECOMMENDATIONS FOR THE INSTALLATION OF DIRECT AND OBLIQUE NIPPLES PURSUANT TO EN 1434-2**

for  $\leq$  DN 50

DN 65 to DN 250

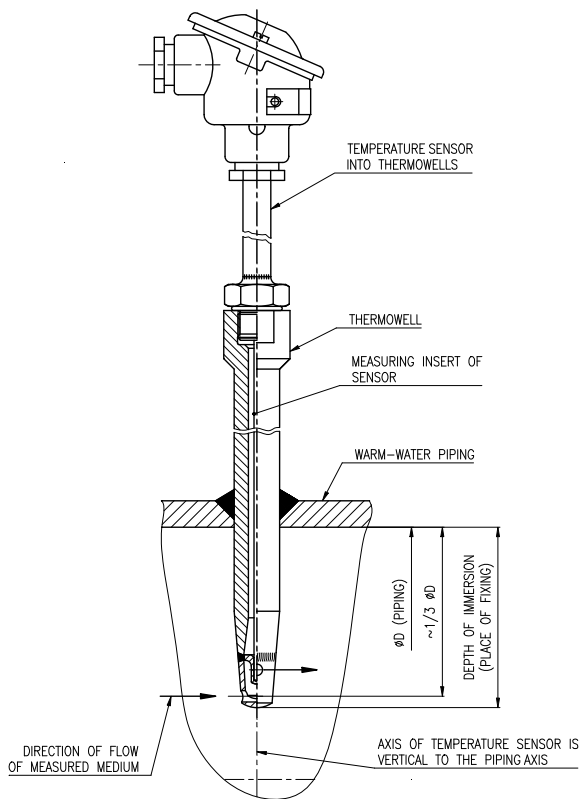
$\leq$  DN 50



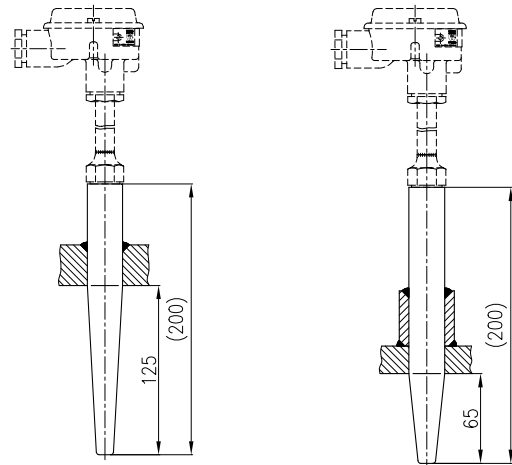
**! WARNING**

- When using the sensor with an oblique nipple, locate the sensor with thermowell at an oblique against the direction of flow
- The sensor may not touch the opposite side of the piping
- It is also advantageous to use the temperature sensors in the piping elbow. In such a case, locate the sensor with the thermowell against the direction of flow so that the measured medium flows around evenly

**FIGURE 24 - INSTALLATION OF FAST RESPONSE THERMOWELLS**



**FIGURE 25 - EXAMPLES WELDING OF THERMOWELLS AND WELD-ON PIECES PURSUANT TO DIN 43772**



for the installation of resistance and thermoelectric temperature sensors with external fixing thread, with a conical thermowell for welding, shape 4

