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**Working manual:
System for measurement and
recording for industrial
insulation cladding**

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Working manual: System for measurement and recording for industrial insulation cladding

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1. Scope and purpose

This manual is applicable for insulations of pipes, fittings, vessels and tanks in industrial installations. It creates a system of measurement for sheet-metal preparation and assembly.

The measuring system created in this document provides for recording all data required in a form equally as suitable for calculation, for sheet-metal preparation and assembly, and for accounting and documentation.

This measuring system dispenses with the possibility to devise symbols and tables for each and every conceivable case.

Complicated constructions and special cases can be recorded separately in the drawing spaced provided, or in the measuring sheet for special fittings.

2. Principles

The measuring system created in this manual comprises the recording of data in tabular form as well as the drawing rules. The main effort was applied to the tabular documentation. To meet this objective, measuring sheets have been designed for pipes, removable boxes, vessels and tanks.

Additionally, in the drawing space of the measuring sheet for pipes the opportunity is given to lay down the pipe system in isometric projection and – using symbols – the components listed in the tables. Special fittings can also be sketched in the drawing space in the measuring sheets.

The recording in tabular form is also the basis for the computerised data handling.

All measurements are to be given in mm.

3. Drawing rules

Plotting is carried out in the drawing spaces of the measuring sheets for pipes and removable boxes. However, it is principally restricted to the drawing of pipes and fittings. Plotting of removable boxes is needed only in special cases.

3.1 Plotting of pipe systems in isometric projection

3.1.1 Co-ordinates

The direction of pipes is plotted in isometric projection in accordance with Figure 1. A scale drawing of the lengths of the pipes is not necessary.

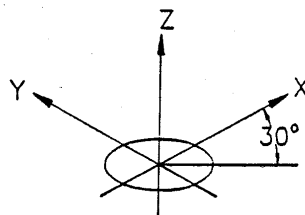


Figure 1

The co-ordinates X, Y, Z represent the three main axes; the planes defined by them are called the principal planes. If pipes run outside these principal directions, the planes must be hatched as shown in Figure 2 according to the following rules: The planes of the side and front perspective (Y,Z; X,Z) are hatched vertically and the plane of the horizontal perspective (X,Y) is hatched at an angle of 30°.

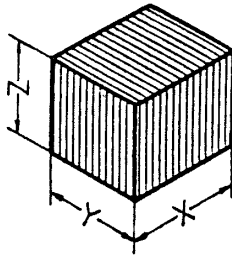


Figure 2

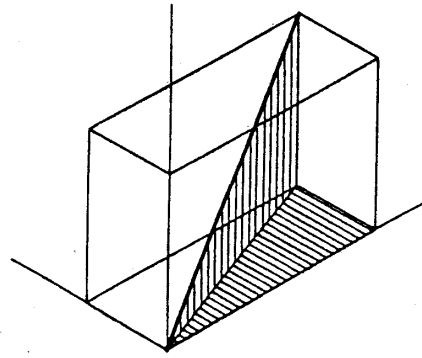


Figure 3

Figure 3 shows an example of a pipe running at angles to all three principal planes.

The definition of the angles for principal directions in relation to the direction of assembly is shown in Figure 4. For horizontal pipes, 0° always lies on top and the following angles run clockwise **looking in the direction of assembly** (marked with a double arrow-head). For vertical pipes (Z-axis), 0° is always in the Z,X-plane, the following angles run clockwise **looking against the Z-axis**.

These angles are used if in an isometric drawing the position for a fitting or the position of a seam are to be shown (see chapter 3.1.4).

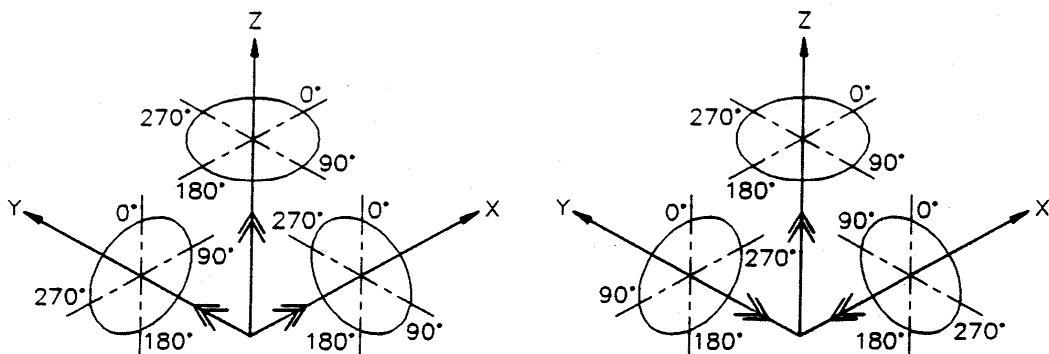


Figure 4

Figure 5 shows an example for the use of angles at a given piping system.

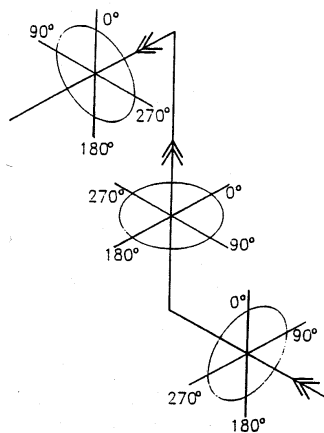


Figure 5

3.1.2 Symbols

Pipes and fittings are plotted using the symbols given in the Annex.

3.1.3 Direction of assembly

The direction of assembly and its changes can be specified using the symbols 1 and 2.

3.1.4 Longitudinal seams and cut-outs

It is possible to define the position of longitudinal seams and cut-outs. This is done using angles between 0° and 360° using the system shown in Figure 4 with the symbol 8 for the longitudinal seam and the symbols 10 or 11 for the cut-outs.

For the standard positions 0° , 90° etc., only the s symbol without the angle is used.

It must be noted that when defining fitting positions in the tables, the angle as defined in chapter 4.1 must be used.

Examples for the position of longitudinal seams and cut-outs on pipes are shown in Figure 6. These displays are symbols and are, therefore, not in an isometric projection.

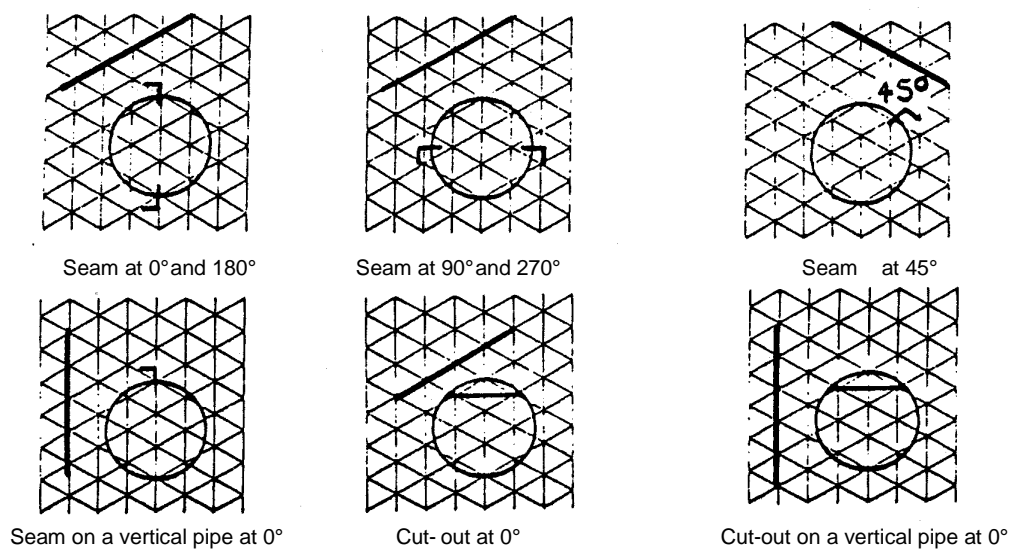


Figure 6

3.1.5 Pipe lengths between formed pieces and fittings

In the drawing space, the actual distances are being recorded, whilst in the table the measurements for fabrication are listed.

3.1.6 Distance between elbows and taps

The distances are taken from the axis of the pipe, as shown in Figure 7.

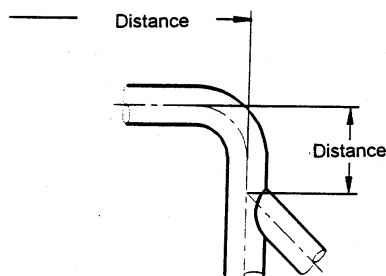


Figure 7

3.1.7 Distance between fittings

The distances from flanges and flanged fittings are taken from the middle of the flange, for welded fittings from the weld seam (Figure 8). The distance s must also be given.

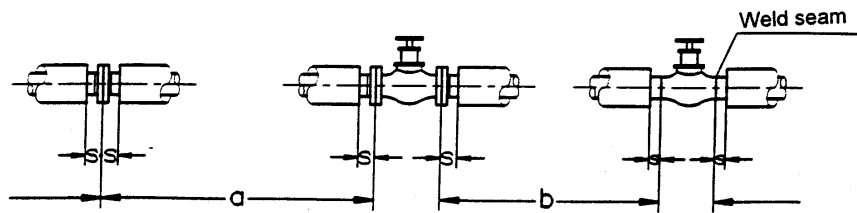


Figure 8

4. Display in tabular form

The measured data are being recorded on the sheets.

Measuring sheet for pipes
Measuring sheet for removable boxes
Measuring sheet for vessels and tanks

The measurements for fabrication must always include the swages (see Figure 9).

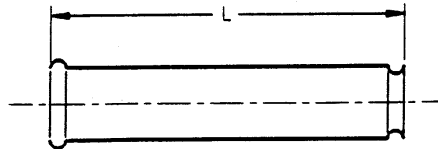


Figure 9

Additional information, e. g. for accounting, special pieces, additional longitudinal or circumferential seams, must be entered under "additional notes".

The measuring sheets for pipes and removable boxes are explained on their respective instruction sheets.

4.1 Measuring sheet for pipes

The dimensions of formed pieces are listed in the table. The identification of formed pieces is entered in column 2 **Identification** using the following abbreviations:

P	straight piping
E1 – E4	elbows
T1 – T4	taps
A1 – A4	cut-outs
RE	reducer
WA	water deflector
K	end cap
S	extremity
KA	removable box

In addition to the abbreviation K for end cap and S for extremity, the number of components must be given, e. g. K1 for a one-piece end cap, S2 for an extremity of two pieces.

For identification of the desired swages, four squares showing standard swages have been provided at the bottom left-hand corner.

In squares 3 and 4 enter the distance X between the swage and the end of the piece also. In square 5 special forms can be defined, if necessary. In square 6 enter the overlap of the longitudinal seam.

The identifying numbers of the swages for individual pieces are put in the columns 6 and 10 of the table.

For the formed pieces mentioned, all data must be put into the columns. Columns not needed for individual formed pieces have been crossed out in the instructions below.

4.1.1 Straight piping

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount
						X		X		X	X	X		

Column 2: Identification

P

Column 3: Pipe diameter

Outer diameter of the pipe without insulation

Column 4: Insulation thickness

Nominal thickness of fitted insulation layer s

Column 5: D

Diameter of the casing

This consists of the pipe diameter plus twice the insulation thickness. For insulation systems with an air space, twice the air space thickness must also be added. Fabrication tolerances, i. e. for radiused and bevelled legs, must be taken into consideration.

Columns 6 and 10: Swages

Insert the number of the desired swages from squares 1 to 5 of the swage squares. In column 6 the left swage, in column 10 the right swage as you look on the longitudinal seam.

Column 8: Length

Fabrication dimension of an element of casing. For standard lengths equal to coil-width is to be inserted. Width of coil to be given under "Remarks".

Column 14: Pre-fabrication

The developed circumference of the casing, to include additions for overlappings at seams and for the swages. If the swage is known, entry by measuring crew on the site, if not, entry in pre-fabrication shop.

4.1.2 Elbow

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount

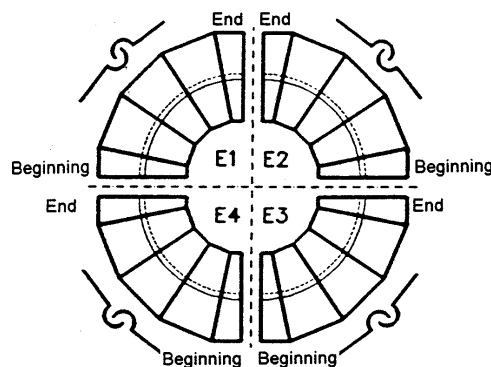


Figure 10

Column 10: Identification**E1 – E4**

Four types of elbows exist which are to be identified according to Figure 10 as E1 to E4. The type required is put into column 1 "Identification".

The four types of elbows have:

- circumferential and longitudinal seams positioned to ensure that water is kept out,
- the longitudinal seam at the front (standard pattern).

Note: If, for instance, a standing elbow type E2 is selected instead of type E1, the implication is that the longitudinal seam is at the back.

Columns 3 to 5:

See chapter 4.1.1

Columns 6 and 10: Swages

Select according to the squares 1 to 5 in the space for swage identification; the swage for the beginning in column 6, the swage for the end in column 10.

The beginnings and ends of the four types of elbows are shown in Figure 10.

Columns 7 and 9: Elongation of the start piece LA and of the end piece LE

The definition of LA and LE is shown in Figure 11. The difference between elbow and long radius bend must be noted.

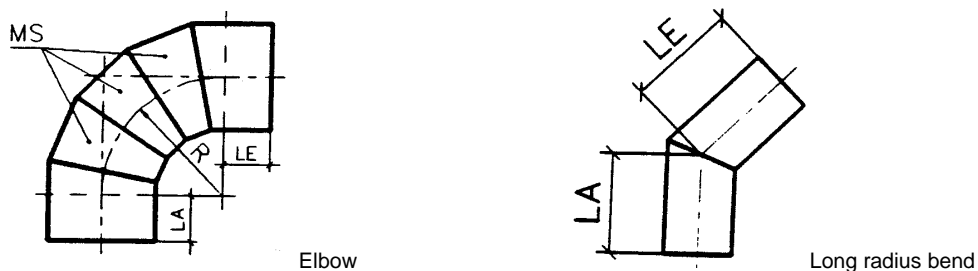


Figure 11

Column 8: Number of segments MS

Ms is the number of segments not counting the start and end pieces.

For a long radius bend is to be inserted.

Column 11: Radius

The radius of the elbow is the radius of curvature of the axis of the pipe.

For a long radius bend is to be inserted.

Column 12: Angle

The angle of the elbow W is the angle of change of direction of the straight-running pipe ($0^\circ < W < 180^\circ$).

Example:

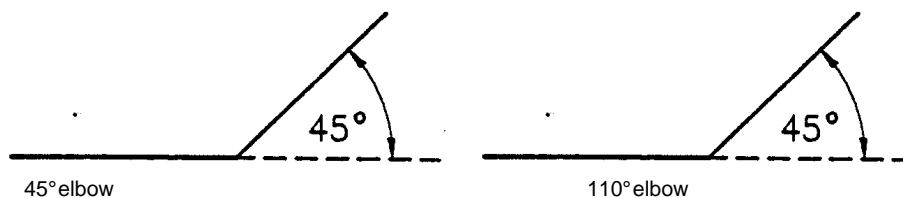


Figure 12

Column 13: Position of seam

For standard type, the seam is at the front side on the centre line. In this case, "0" is to be inserted.

Deviations from the standard type are identified by giving an appropriate angle:

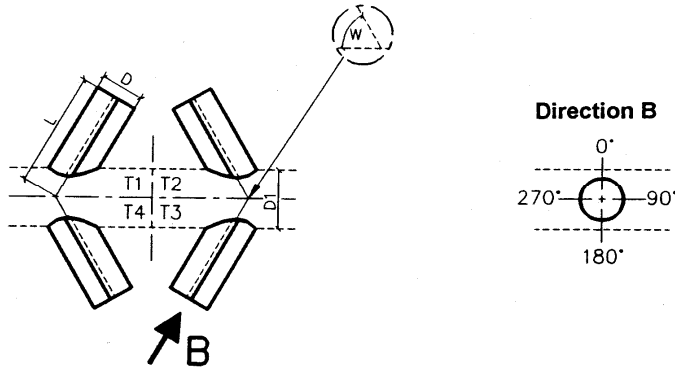
0° to 260° : clockwise looking into the elbow from its start.

Column 14: Pre-fabrication

See chapter 4.1.1

4.1.3 Taps

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount
					X			X		X				

**Figure 13****Column 2: Identification****T1 – T4**

Four types of taps are to be identified as T1 to T4 as shown in Figure 13. The type selected is entered in column 2 "Identification".

For the types of taps have:

- the longitudinal overlap positioned so that water is kept out,
- the longitudinal overlap at the front.

For types at right angles, T1 to T4 is entered according to the desired seam overlap.

Columns 3 to 5

See chapter 4.1.1. The dimensions of the tap are to be entered.

Column 7: D1

Diameter of the casing of the running pipe insulation.

Column 8: L

Length of the tap as shown in Figure 13 (note deviation from Figure 9)

Column 10: Swage

Information regarding the swage at the end of the tap. The number of the swage selected is entered according to the squares 1 to 5 from the swage identification block.

Column 12: Angle

Angle of the tap: angle between the tap and the running pipe ($0^\circ < W \leq 90^\circ$)

Column 13: Position of seam

The standard position is at 0° . This is at the front side at the centre line as shown in Figure 13. In this case, "0" is entered.

Deviations from the standard position are indicated using an angle:

0! to 360° clockwise looking into the tap (direction B, Figure 13).

Column 14: Pre-fabrication

See chapter 4.1.1

4.1.4 Double elbow

Double elbows following each other in a pipe system in so short a distance that they are measured as one piece for practical reasons must be sketched in the drawing space.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount
1.1								×	×					
1.2	ZT	×	×	×	×	×		×	×	×			×	
1.3		×	×	×	×	×								

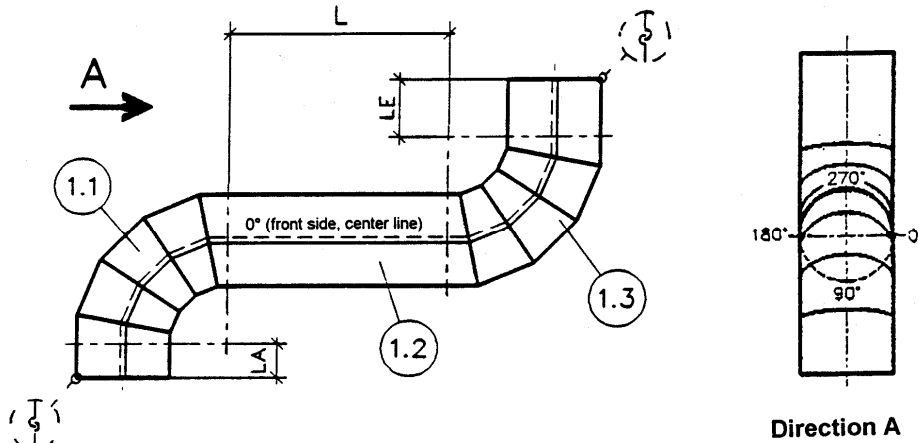


Figure 14

Column 1: Position

For each part of the combination one line is to be used. First line for the first part in direction of assembly. Each line is marked with a double digit, e. g. 1.1, 1.2, 1.3.

Column 2: Identification

E1 – E4

ZT for middle section

Columns 3 to 15

See chapter 4.1.2 for elbows;
see chapter 4.1.1 for straight parts ZT.

Peculiarities (explained using example positions 1.1 – 1.3)

Position 1.1 (commencing elbow)

Columns 9 and 10: no entries

Position 1.2 (middle section)

Columns 3 to 7: no entries

Column 8: Length of the middle section ZT

As shown in Figure 14 (note deviation from Figure 9)

Columns 9 to 11: no entries

Column 12: Angle mounting position

Insert the angle of the mounting position (direction of departure) of the departing elbow. The position of zero is defined by the centre line on the front side of the commencing elbow.

Column 13: Position of seam

Insert the position of the seam of the middle section ZT. Position of 0! as in column 12.

Position 1.3 (departing elbow)

Columns 3 to 7: no entries

4.1.5 Cut-out

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount
													X	

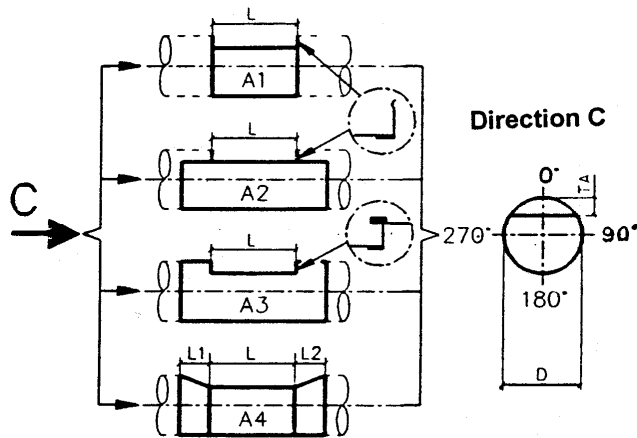


Figure 15

Column 2: Identification

A1 – A4

The different types of cut-outs A1 to A4 as shown in Figure 15 are entered.

Columns 3 to 5

See chapter 4.1.1

Columns 6 and 10: Swage

Enter the number of the swage according to the swage identification block for those swages which are needed at the connection to the cylindrical part. For cut-outs of type A4, the swage on the side of L1 is entered in column 6, the swage on the side of L2 in column 10.

Column 7: L1

Length of the first transition piece for cut-outs of type A4

Column 8: L

Length of the cut-out as shown in Figure 15

Column 9: L2

Length of the second transition piece in the direction of assembly for cut-outs of the type A4

Column 11: TA

Depth of the cut-out as shown in Figure 15

Column 12: Mounting position

For vertical pipes, the position is indicated using the space-oriented system of co-ordinates as given in Figure 4.

For vertical pipes, "S" is inserted.

Figure 16 shows as an example the mounting position of a horizontal cut-out, at an angle of 60°.

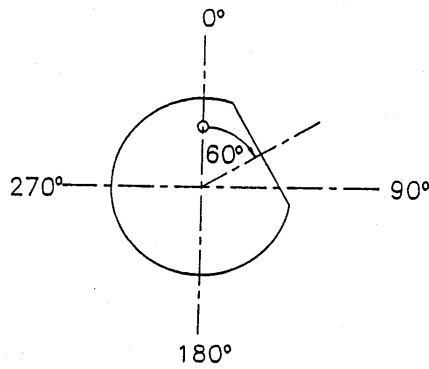


Figure 16

Column 13: Position of seam

The position of the seam is given as an angle respective of the pre-fabricated piece. The angle is between the cut-out and the seam. This angle is measured clockwise in direction "C" (Figure 15).

Figure 17 shows as example the seam at 80° from the cut-out at a mounting position angle of 30°!

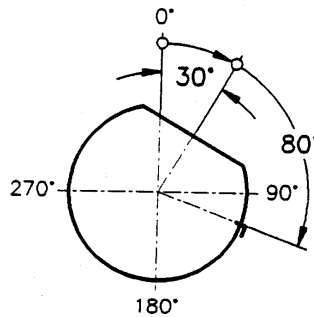


Figure 17

4.1.6 Reducer

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount
		X	X	X									X	

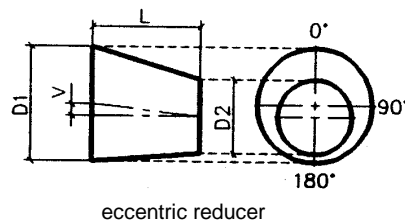
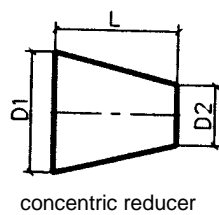


Figure 18

Column 2: Identification
RE

Columns 6 and 10: Swages

Enter the number of the swages according to the swage identification block: in column 6 the swage for the end with the bigger diameter, in column 10 the swage for the end with the smaller diameter.

Note: For vertical reducers, the identification of the swage also indicates which of the two ends is the upper and which the lower, respectively.

Column 7: D1

The larger diameter of the casing

See also description of column 5 in chapter 4.1.1

Column 8: L

Length of the reducer as shown in Figure 18

Column 9: D2

Smaller diameter of the casing

See also description of column 5 in chapter 4.1.1

Column 11: Offset

Distance V between the two pipe axes (see Figure 18)

For concentric reducers, is inserted

Column 12: Mounting position

Only for eccentric reducers; for concentric reducers, is inserted

For horizontal pipes, the position of the largest longitudinal line of the reducer is indicated using the space-oriented system of co-ordinates as given in Figure 4.

For vertical pipes, "S" is inserted.

Figure 19 shows an example for a mounting position of 40°.

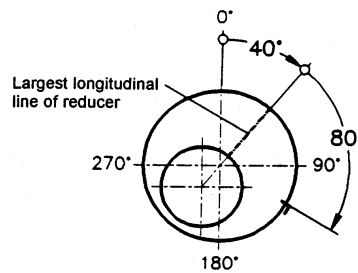


Figure 19

Column 13: Position of seam

Only for eccentric reducers; for concentric reducers, is inserted

The position of the seam is indicated using an angle between the largest longitudinal line of the reducer and the seam (Figure 20). The angle is measured clockwise looking from the larger diameter into the reducer.

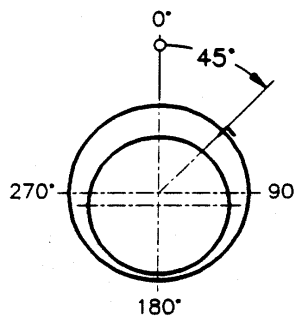


Figure 20

4.1.7 Water deflector (rain deflector; deflector)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount
		X	X	X						X	X	X	X	

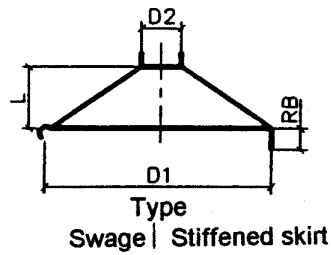


Figure 21

Column 2: Identification
WA
Columns 6 and 10: Swages

The number of the desired swages are inserted according to squares 1 to 5 of the swage identification block. If a stiffened skirt or an edge is wanted instead of the swage, the square number 5 is used to denote, for example:

$$RB = 15 \quad (15 \text{ mm stiffened skirt}) \quad \text{or}$$

$$SF = 18 \quad (18 \text{ mm edge})$$

Column 7: D1

Larger diameter of the water deflector

Column 8: L

Height of the water deflector

Column 9: D2

Smaller diameter of the water deflector

Note: The water deflector is edged onto the given diameter.

4.1.8 Extremity

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount
		X	X				X	X	X	X	X	X	X	

Column 2: Identification
S..

After S, the number of parts is entered, e. g.

S1, for a one-piece extremity,

S2, for a two-piece extremity

Column 5: D

Diameter of the casing according to chapter 4.1.1

Column 6: Swage

If the extremity is swaged, insert "1". Otherwise, .

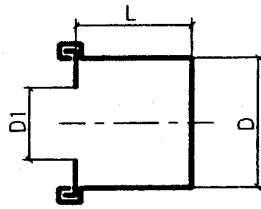
Column 7: D1

The diameter of the cut-out (inner diameter)

In case the extremity is without a cut-out, is to be inserted.

4.1.9 End cap

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount
		X	X		X			X	X	X	X	X	X	



Column 2: Identification

K..

After K, the number of parts of the cylindrical part is entered, e. g.
 K2, for a two-piece end cap,
 K3, for a three-piece end cap.

Column 5: D

Diameter of the casing according to chapter 4.1.1

Column 7: D1

The diameter of the cut-out (inner diameter)
 In case the extremity is without a cut-out, is to be inserted.

Column 8: L

Length of the end cap

4.1.10 Removable boxes

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Pre- fabrication	Amount
		X	X	X	X	X	X	X	X	X	X	X	X	

Column 2: Identification

KA

No further information is given since there is a special measuring sheet for removable boxes.

4.2 Measuring sheet for removable boxes

The shape of the removable boxes is given using the letters A to G, the joint line is given using the figures 1 to 7 according to Figure 23.

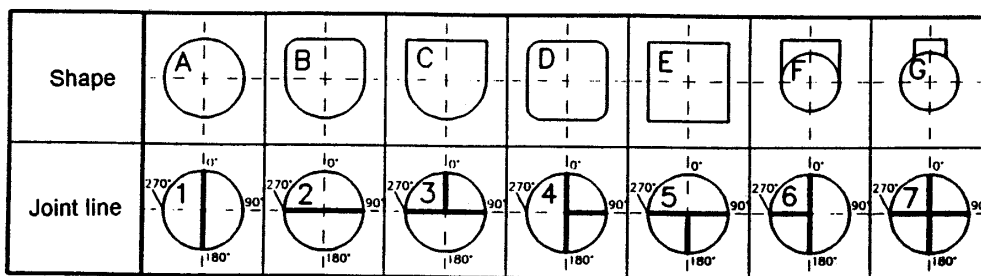


Figure 23

Example: Removable flange box with two longitudinal joints at top and bottom: A1

Column 3: Method

Enter information regarding the insulation of the removable box and its fastening

Type:

- 1... removable box without pins
- 2... removable box with pins, but without insulation and information regarding the insulation thickness
- 3... removable box with insulation and information regarding the insulation thickness

Fastening:

- S... fastening by screws
- BK... fastening by bands and toggle clips
- K... fastening by toggle clips

Example: Removable box with insulation and 100 mm thickness, fastening by bands and toggle clips = 3 BK 100

Column 4: Type of longitudinal seam

Tick the desired type of the longitudinal seam with or without edging.

Columns 5 to 10: Dimensions A, B, C, D1, D2, L

Dimensions according to Figure 24

The length L is measured overall

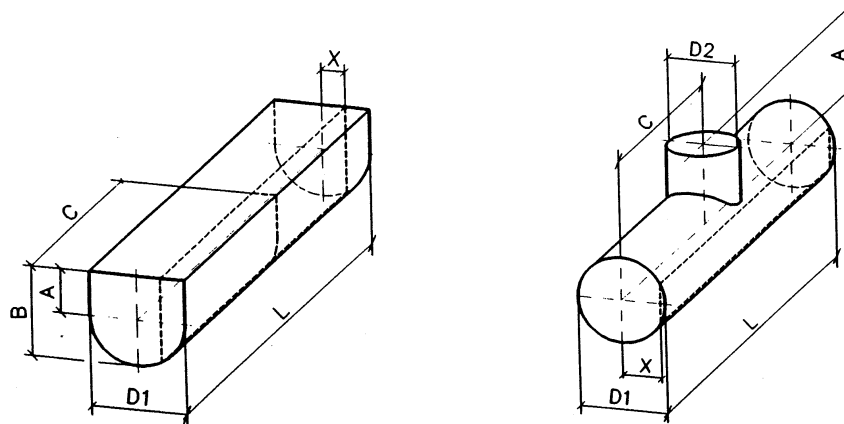


Figure 24

Column 11: Cut-out

The position of the cut-out is given as an angle relative to the removable box, using the co-ordinate system of Figure 23 for the joint lines 1 to 7 (example, see Figure 25)

Use the direction of the dimension "C" according to Figure 24

If there is no cut-out in the removable box, is to be inserted.

The dimension X is defined in Figure 24. Unlike cut-outs on pipes, it is the "remaining distance" and not the "reduced distance".

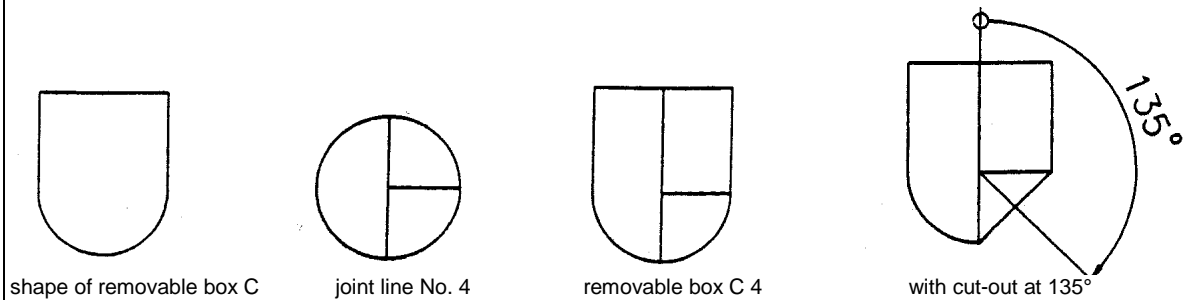


Figure 25

Figure 27 shows the example of a prefabricated box with the mounting position 180° and a position of the cut-out of 135°.

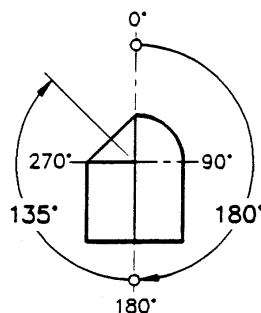


Figure 27

Column 13: Positioning, horizontal / vertical

Information whether it is a horizontal or a vertical prefabricated box. Tick the appropriate column.

Column 14: Rigidised cover

To be ticked if a rigidised cover is required for a vertical spindle box.

If no rigidised cover is required, insert | / |.

4.3 Measuring sheet for vessels and tanks

Dimensions and data for vessels and tanks are inserted in the measuring sheet for vessels and tanks. For each vessel, an individual sheet must be used. For the top and bottom ends, the DIN standards according to the explanation sheet should be inserted where appropriate.

The dimensions of the ends are given in the tables, e. g. vessel with two ends: 1st line: top of left end of vessel; 2nd line: bottom or right end of vessel.

For information regarding the cylindrical part, the squares "profile of the cylindrical part" and "position of longitudinal seams" are to be used.

Numbered swaged connections are given in the measuring sheet for vessels and tanks. The numbers of the desired swaged connections are to be inserted in columns 3, 14, 15 and 16.

Table

1	2	3		4	5	6	7	8	9	10	11	12	13		14	15	16	17
Pos.	Shape	Vessel End swages		Vessel diameter	Insulation thickness	D1	D2	R	r	H1	H2	H3	Number		Pre-fabrication seam	Assembly seam	End connection	Amount
		horizontal	vertical										segments	parts				

Column 2: Shape

Form of the ends:

E	flat end
T	cone end
K	dome end without knuckle radius
Z	dome end with knuckle radius

Column 3: Vessel horizontal / vertical

Information whether it is a horizontal or vertical vessel and information on the shape of end seam required (connection to the cylindrical part).

For a horizontal vessel, the desired number of the swage is inserted under "horizontal", for a vertical vessel under "vertical".

If no swage is desired, | / | must be inserted.

Column 4: Diameter of the vessel

Diameter of the vessel without insulation.

Column 5: Insulation thickness

The thickness of the insulation is inserted (see also column 4 in chapter 4.1.1).

Columns 6 to 12: Dimensions D 1, D 2, R, r, H 1, H 2, H 3

Dimensions of the insulation cladding

D 1	diameter of the cladding
D 2	diameter of the opening
R	the spherical radius for domed ends
r	the knuckle radius for domed ends
H 1	projected extension of the end
H 2	height of the dome
H 3	height to the opening

Column 13: Number of segments / prefabricated pieces

Enter the number of segments of the complete end and the number of pre-assembled pieces in which the end is to be delivered to the erection site.

Column 14: Prefabricated seam

Enter the required connection for those segments which are pre-assembled in the workshop, using the appropriate number from the swage squares.

Column 15: Assembly seam

Enter the required connection for the joining of the pre-assembled pieces on site, using the appropriate number from the swage squares.

Column 16: Top and bottom connection (flat end; for coned and domed ends, the connection from H 1 to H.2)

Connection between top / bottom and body.

Enter 9 for open lock-seam or 10 if stiffened skirt is to be used.

Square "Profile of cylindrical cladding"

Here, information regarding the cladding is given, such as the number of cylindrical pieces, overlap, connection, direction of assembly as shown in Figure 29.

For vertical vessels, the upper part is on the left-hand side of the diagram.

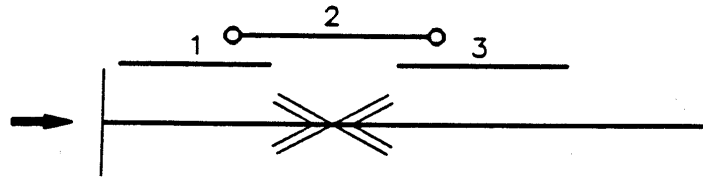


Figure 28

Square "Position of longitudinal seams"

The position of the longitudinal seams for the parts given in "profile of the cylindrical cladding" should be indicated. Examples for three parts of a vessel are given in Figure 29.

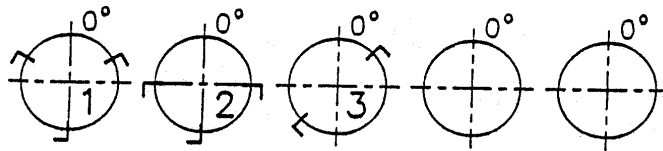
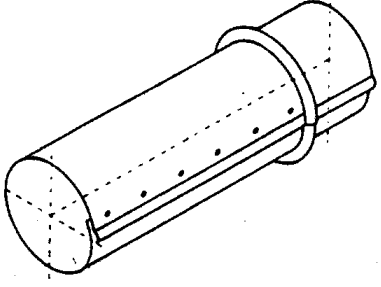
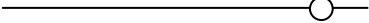
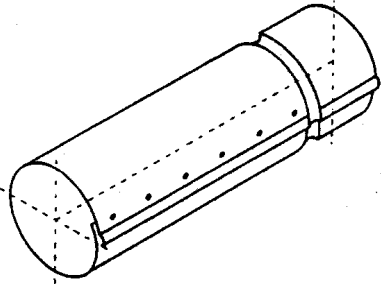
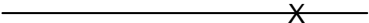
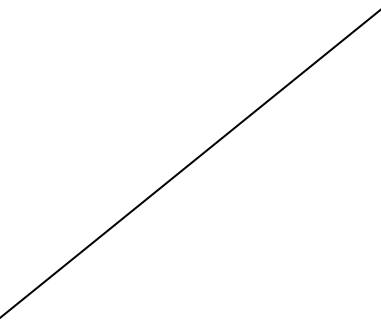
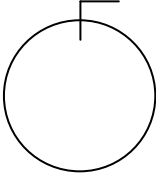
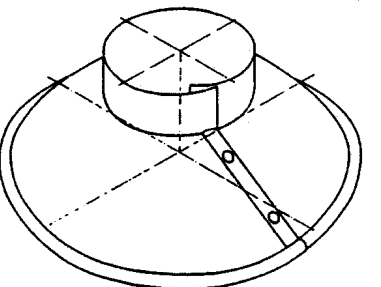
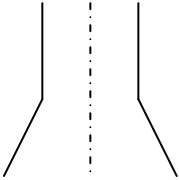
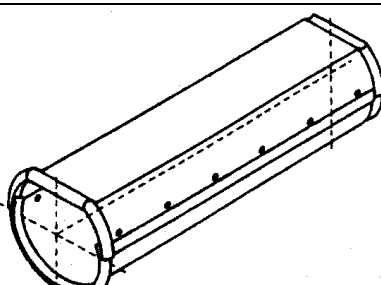
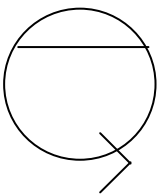


Figure 29

4.4 Measuring sheet for special fittings

For special fittings, e. g. Y-pieces, tap-elbows, flattened elbows, transition pieces, the measuring sheet for special fittings is to be used.

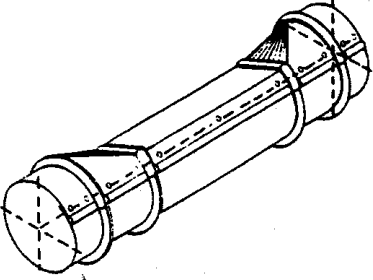
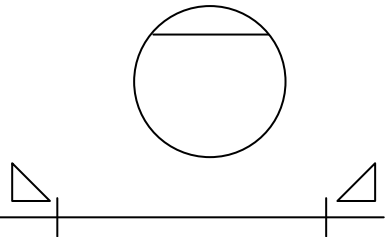
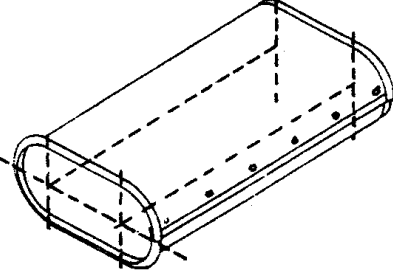

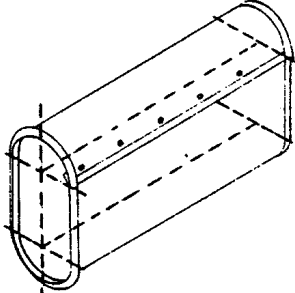

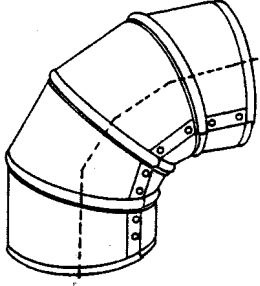

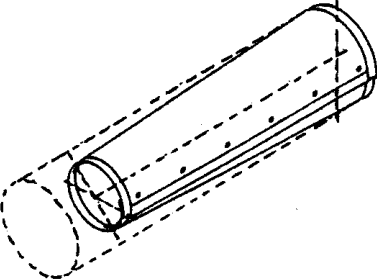
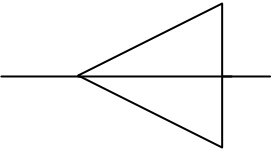
SYMBOLS			
No.	Drawing	Symbol	Explanation
1			Direction of assembly
2			Change in direction of assembly
3			Pipe without circumferential swage
4			Pipe with male swage at one end
5			Pipe with female swage at one end
Note: If a piece is without a longitudinal swage, this must be stated.			

SYMBOLS			II
No.	Drawing	Symbol	Explanation
6			Pipe with inset male swage
7			Pipe with inset female swage
8			Position of longitudinal seam, also indicating the direction of overlap ¹⁾
9			Water deflector
10			Pipe with cut-out and swaged longitudinal seam

¹⁾ Where needed, including the angle dimension.

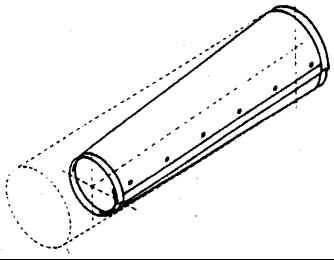
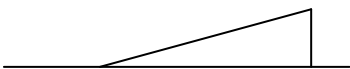
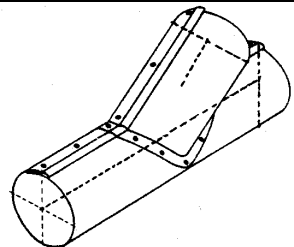

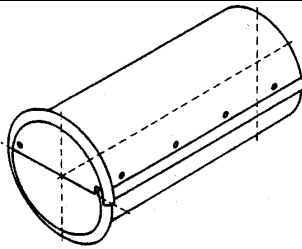
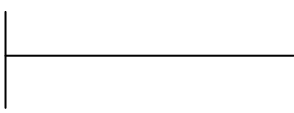
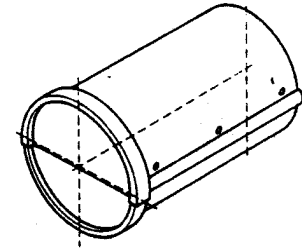
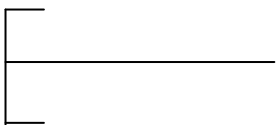
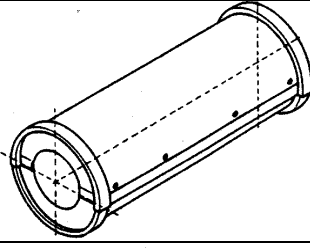
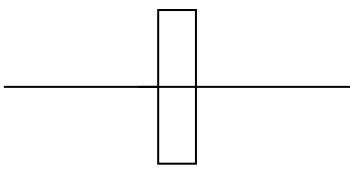
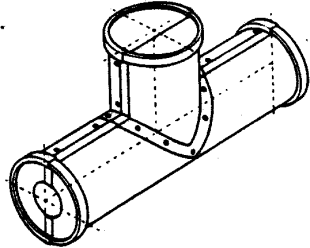

SYMBOLS


III

No.	Drawing	Symbol	Explanation
11			Reduction with two triangles ¹⁾ (Type A 4)
12			Pipe cluster Pipes lying alongside each other
13			Pipe cluster Pipes on top of each other
14			Elbow ²⁾
15			Concentric reducer

¹⁾ If needed, including angle dimension.

²⁾ The term "elbow" is also used for "radial protractor" and "long-radius bend".

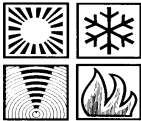
SYMBOLS		IV	
No.	Drawing	Symbol	Explanation
16			Eccentric reducer
17			Tap
18			Extremity
19			End cap
20			Removable box for flanges
21			Removable box for fittings

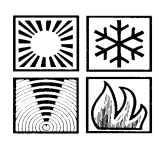
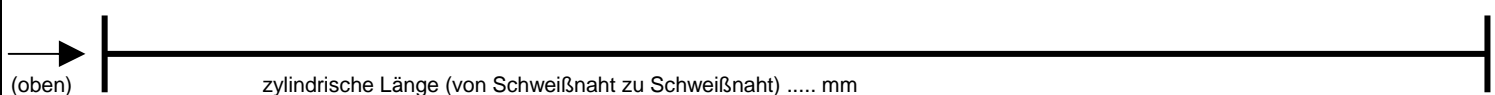
Measuring sheet for pipes			Auftrags-Nr.:			Datum:						Bundesfachabteilung Wärme-, Kälte-, Schall- und Brandschutz beim Hauptverband der Deutschen Bauindustrie e.V.					
			Baustelle:			Zeichnungs-Nr.:									Blatt-Nr.:		
			Aufmaßnehmer:			Rohrleitungs-Nr.:									Liefertermin:		

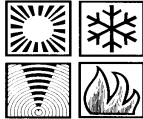
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15					
Pos.	Bezeichnung	Rohrleitungsdurchmesser	Isolierschichtdicke	D	Sicke	LA D1 L1	MS L	LE D2 L2	Sicke	Radius TA Versatz	Winkel Einbaulage	Nahtlage	Zuschnitt	Stück					
FOR MISSING TRANSLATION, SEE PAGE 8.																			
Blechwerkstoff:						Kontrolle Werkstatt:						Bemerkungen:							
Blechdicke:						Kontrolle Baustelle:													
1	2	3	4	5	6	Überlappung Längsnaht mm													

Entries required in the measuring sheet for pipes															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Prefabrication	Amount
Straight piping	P														
Elbows	E 1 – E 4														
Tap	T 1 – T 4														
Double elbow	.1														
	.2	ZT													
	.3														
Cut-out	A1 – A 4														
Reducer	RE														
Water deflector (rain deflector; deflector)	WA														
Extremity	S.														
End cap	K.														
Removable box	KA														

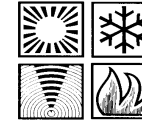
Entries required in the measuring sheet for pipes															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Pos.	Identification	Pipe diameter	Insulation thickness	D	Swage	LA D1 L1	MS L	LE D2 L2	Swage	Radius TA offset	Angle mounting position	Position of seam	Prefabrication	Amount
Straight piping	P						X		X		X	X	X		
Elbows	E 1 – E 4														
Tap	T 1 – T 4					X			X		X				
Double elbow	.1								X	X					
	.2	ZT	X	X	X	X	X		X	X	X			X	
	.3		X	X	X	X	X								
Cut-out	A1 – A 4													X	
Reducer	RE		X	X	X									X	
Water deflector (rain deflector; deflector)	WA		X	X	X						X	X	X	X	
Extremity	S.		X	X				X	X	X	X	X	X	X	
End cap	K.		X	X		X			X	X	X	X	X	X	
Removable box	KA		X	X	X	X	X	X	X	X	X	X	X	X	

Measuring sheet for removable boxes															Auftrags-Nr.:			Datum:					Bundesfachabteilung Wärme-, Kälte-, Schall- und Brandschutz beim Hauptverband der Deutschen Bauindustrie e.V.				
Baustelle:															Zeichnungs-Nr.:			Blatt-Nr.:									
Aufmaßnehmer:															Rohrleitungs-Nr.:			Liefertermin:									
1	2	3	4		5	6	7	8	9	10	11		12		13	14	15	Bemerkungen:									
Pos.	Bezeichnung	Ausführung	Längennahtausführung		A	B	C	D1	D2	L	Abflachung		Einbaulage (Spindel)		Anordnung	Riffelbord	Stück										
									bei Grad	x	li.	st.															
																							FOR MISSING TRANSLATION, SEE PAGE 22.				
Blechwerkstoff:										Kontrolle Werkstatt:							Bemerkungen:										
Blechdicke:										Kontrolle Baustelle:																	

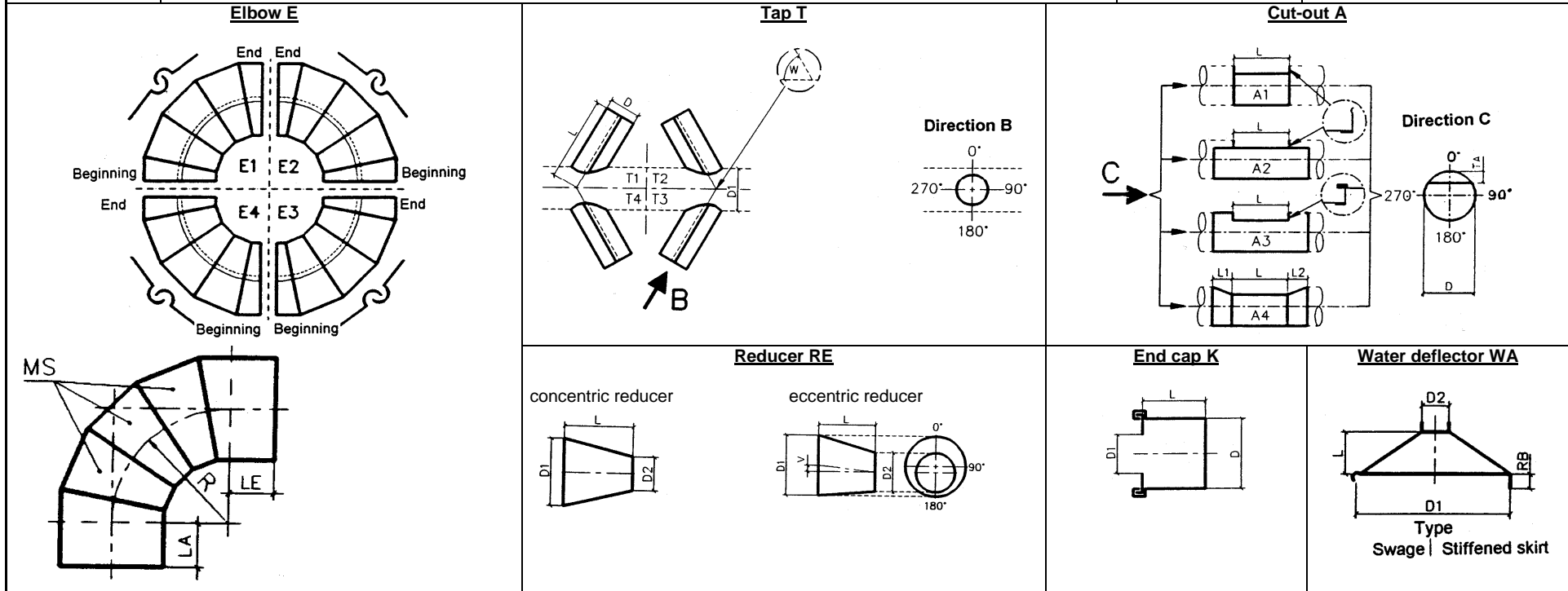
Measuring sheet for vessels and tanks										Auftrags-Nr.:			Datum:						Bundesfachabteilung Wärme-, Kälte-, Schall- und Brandschutz beim Hauptverband der Deutschen Bauindustrie e.V.				
Baustelle:					Zeichnungs-Nr.:					Blatt-Nr.:													
Aufmaßnehmer:					Rohrleitungs-Nr.:					Liefertermin:													
1	2	3		4	5	6	7	8	9	10	11	12	13		14	15	16	17					
Pos.	Form	Behältersicke		Behälterdurchmesser r	Isolierschichtdicke	D1	D2	R	r	H1	H2	H3	Anzahl		Werkstatt-naht	Baustellen-naht	Stirnseitenverbindung	Stück					
		li.	st.										Seg- mente	Bau- teile									
Längsschnitt zylindrische Ummantelung										Rundnahtüberlappung mm													
																							
(oben) zylindrische Länge (von Schweißnaht zu Schweißnaht) mm																							
Lage der Längsnähte										Überlappung mm													
Blechwerkstoff:				Blechdicke:			Kontrolle Werkstatt:		Kontrolle Baustelle:			Bemerkungen:											
1	2	3	4	5	6	7	8	9	10	11													

Instructions for Measuring Sheet for Pipes							Bundesfachabteilung Wärme-, Kälte-, Schall- und Brandschutz beim Hauptverband der Deutschen Bauindustrie e.V.
Blechwerkstoff:				Kontrolle Werkstatt:		Bemerkungen:	
Blechdicke:				Kontrolle Baustelle:			
1	2	3	4	5	6 Überlappung Längsnaht mm		

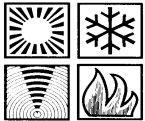
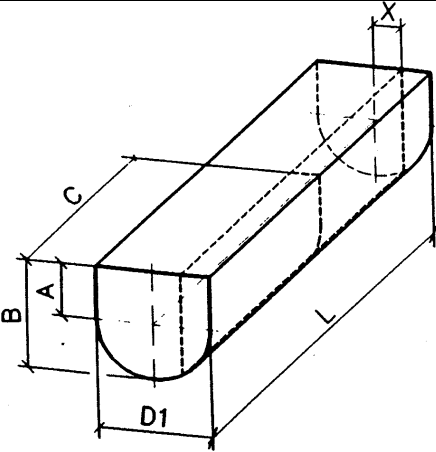
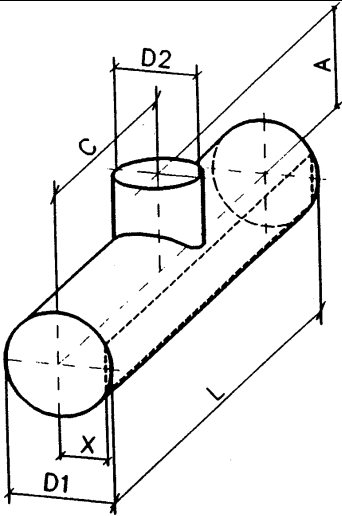
Instructions for measuring sheet for pipes




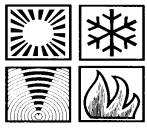
Bundesfachabteilung
Wärme-, Kälte-, Schall-
und Brandschutz
im Hauptverband der
Deutschen Bauindustrie e.V.



	Cut-out (A1 – A4)		Elbow (E1 – E4)	MS	Number of middle pieces	RE	Reducer		Tap (T1 – T 4)
D	Diameter of the casing	L	length	P	straight piping	K2	End cap Number indicates two-piece end cap	V	Offset in eccentric reducer
D1	larger diameter	L1	Length of the connecting piece	R	Radius of the elbow	S1	Extremity Number indicates extremity in one piece	W	Angle
D2	smaller diameter	L2	Length of the connecting piece	RB	Stiffened skirt	TA	Depth of the cut-out	WA	Water deflector

		Instructions for measuring sheet for removable boxes		 Bundesfachabteilung Wärme-, Kälte-, Schall- und Brandschutz im Hauptverband der Deutschen Bauindustrie e.V.	
Form	Partition	1 = 2 = 3 =	S = K = BK =		
		1 = Removable box without pins 2 = Removable box with pins, but without insulation and information regarding the insulation thickness 3 = Information regarding the insulation thickness Example: Removable box with insulation of 100 mm thickness, fastening by bands and toggle clips = 3 BK 100	S = Fastening by screws K = Fastening by toggle clips BK = Fastening by bands and toggle clips	Cut outs Example: removable box A2 flat side at 90° Mounting position Example: upper spindle at 0° To indicate the mounting position, the angle at which the spindle is lying is to be indicated.	
					

		Explanations to measuring sheet for vessels and tanks						Bundesfachabteilung Wärme-, Kälte-, Schall- und Brandschutz im Hauptverband der Deutschen Bauindustrie e.V.
Flat end				Cone end				
Dome end without knuckle radius				Dome end with knuckle radius				
E	Flat end							Domed ends according DIN 28011 (Klöpferform) and 28013 (Korbboogenform)
T	Cone end	H1	Projected extension of the end					
K	Dome end without knuckle radius	H2	Height of the dome	R	Spherical radius	D1	Diameter of the cladding	
Z	Dome end with knuckle radius	H3	Height to the opening	r	Knuckle radius	D2	Diameter of the opening	

Measuring sheet for pipes										Auftrags-Nr.:			Datum:			Bundesfachabteilung Wärme-, Kälte-, Schall- und Brandschutz beim Hauptverband der Deutschen Bauindustrie e.V.
Baustelle:					Zeichnungs-Nr.:					Blatt-Nr.:						
Aufmaßnehmer:					Rohrleitungs-Nr.:					Liefertermin:						

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Pos.	Bezeichnung	Rohrleitungs-durchmesser	Isolierschichtdicke	D	Stücke	LA D1 L1	MS L	LE D2 L2	Stücke	Radius TA Versatz	Winkel-einbau lage	Naht-lage	Zu-schnitt	Stück
1	RE				2	460	140	370	2	/	0	90		1
2	P	219	120	460	2		/		1				1495	1
3	T1	168	100	370		460	285	370	1		90	0	1210	1
4	P	219	120	460	1		715		1				1495	1
5	S2			460	1	225								5
6	A1	219	120	460	2		370		2	50	90	180		1
7	P	219	120	460	1		705		1				1495	1
8	KA													1
9	E4	219	120	460	1	235	4	420	2	300			1485	1
10	P	219	120	460	1		/		1				1495	1
11	KA													1
12	P	219	120	460	1		/		2				1495	1
13	E2	219	120	460	1	710	/	395	2	/	45	0	1485	1
14	P	219	120	460	2		/		1				1495	2
15	E2	219	120	460	1	500	4	235	1	300	90	0	1485	1
16	S2			370	1	172								1

Blechwerkstoff: Aluminium			Kontrolle Werkstatt:		Bemerkungen: Coil width: 1000 mm
Blehdicke: 1,0 mm			Kontrolle Baustelle:		
1	2	3	4	5	
		X = mm	X = mm		Überlappung Längsnaht 40 mm

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