



GENERAL SPECIFICATION FOR METHOD OF MEASURING COMPLETED INSULATION INSTALLATIONS

January 2001

THE THERMAL INSULATION ASSOCIATION OF SOUTHERN AFRICA
administered by





ASSOCIATION OF ARCHITECTURAL ALUMINIUM MANUFACTURERS OF SOUTH AFRICA

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The Thermal Insulation Association of Southern Africa (TIASA), currently under the aegis of AAAMSA, promotes that part of the Industry which specializes in the insulation of ceilings, walls, floors, piping and vessels with thermal insulation.

Membership constitutes manufacturers and suppliers of insulation materials, consultants for thermal insulation as well as contractors who sell and install insulation materials.

This specification refers to the measuring of completed insulation installation for industrial applications and will enable Architects, Engineers, Quantity Surveyors, Developers and other Specifiers, to quantify their insulation requirements.

Having the installation done by contractors who are members of TIASA will ensure that the installation meets with the specified performance standards.

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1. SYSTEM OF MEASUREMENT

METHOD OF MEASURING COMPLETED INSULATION

1.1 METHOD A

Applicable where contractor has quoted unit rate per linear metre of straight pipe and per each for pipefitting.

1.1.1 STRAIGHT PIPE

Shall be measured from origin to terminus point or junction, along the centerline of pipe. Measurements shall be through valves, flanges and fittings, but only if the valves, flanges and fittings are insulated. Elbows or bends shall be measured through to the intersection of the centre lines of the pipe. Reducers shall be counted as one fitting of the larger size involved, and omitted from the count of the smaller size. Tees shall be counted as one fitting, and if an unequal tee, shall be counted as a fitting of the smaller size. Quantities shall be to the nearest whole number (0.51 and larger to the whole number above).

1.1.2 FITTINGS-VALVES

Shall be counted per each. (Flanges on flanged valves shall be counted separately).

1.1.3 FLANGES

Shall be counted per pair of flanges. (Including flanges on valves and connections to vessels and equipment).

1.2 METHOD B

Applicable where the contract has quoted unit rate per square metre of completed insulation. Areas of completed insulation will be measured as defined in attached schedule. Should there be any items not detailed, the client and the contractor are to agree a system of measurement in advance.

Notes:

- All external insulation is measured over the outer surface area of the completed insulation.
- All internal insulation is measured over the surface area, which has been insulated.
- The method establishes actual areas of insulation, and makes no extra over allowance for difficulty of work as regards formwork or height. Should the contractor wish to charge an increased rate for difficult work he should specify to which items the quoted increased rate will apply.
- Quantities shall be calculated to the nearest whole number (0.51 and larger to the whole number above).

1.3 GENERAL

- Cutouts under 1,0m² are not deducted.
- End cap areas are measured to establish the actual surface area of insulation.
- Cut outs in such areas are treated as follows:
 - a) If gross area of end cap is less than 1,0m² cutouts are not deducted.
 - b) If gross area of end cap is 1,0m² or greater, deduct cutouts, but subject to rule above.
 - c) Pockets, niches, flattening shall be measured as if the cladding remains symmetrical.



5.3 SYSTEM OF MEASUREMENT

METHOD OF MEASURING COMPLETED INSULATION

5.3.1 METHOD A

Applicable where contractor has quoted unit rate per linear metre of straight pipe and per each for pipefitting.

5.3.1.1 STRAIGHT PIPE

Shall be measured from origin to terminus point or junction, along the centerline of pipe. Measurements shall be through valves, flanges and fittings, but only if the valves, flanges and fittings are insulated. Elbows or bends shall be measured through to the intersection of the centre lines of the pipe. Reducers shall be counted as one fitting of the larger size involved, and omitted from the count of the smaller size. Tees shall be counted as one fitting, and if an unequal tee, shall be counted as a fitting of the smaller size. Quantities shall be to the nearest whole number (0.51 and larger to the whole number above).

5.3.1.2 FITTINGS - VALVES

Shall be counted per each. (Flanges on flanged valves shall be counted separately).

5.3.1.3 FLANGES

Shall be counted per pair of flanges. (Including flanges on valves and connections to vessels and equipment).

5.3.2 METHOD B

Applicable where the contract has quoted unit rate per square metre of completed insulation. Areas of completed insulation will be measured as defined in attached schedule. Should there be any items not detailed, the client and the contractor are to agree a system of measurement in advance.

Notes:

- All external insulation is measured over the outer surface area of the completed insulation.
- All internal insulation is measured over the surface area, which has been insulated.
- The method establishes actual areas of insulation, and makes no extra over allowance for difficulty of work as regards formwork or height. Should the contractor wish to charge an increased rate for difficult work he should specify to which items the quoted increased rate will apply.
- Quantities shall be calculated to the nearest whole number (0.51 and larger to the whole number above).

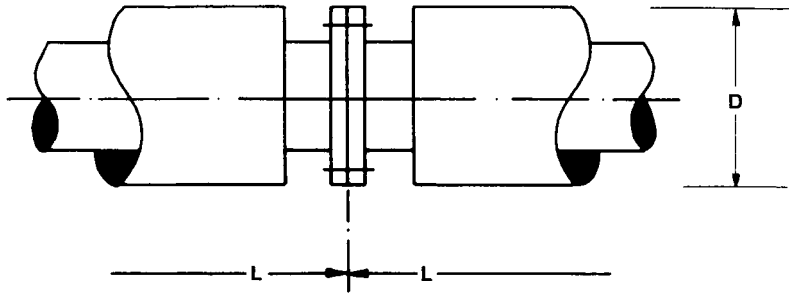


5.3.3 GENERAL

- Cut-outs under $1,0\text{m}^2$ are not deducted.
- End cap areas are measured to establish the actual surface area of insulation.
- Cut outs in such areas are treated as follows:
 - a) If gross area of end cap is less than $1,0\text{m}^2$ cut-outs are not deducted.
 - b) If gross area of end cap is $1,0\text{m}^2$ or greater, deduct cut-outs, but subject to rule (a) above.
 - c) Pockets, niches, flattening shall be measured as if the cladding remains symmetrical.

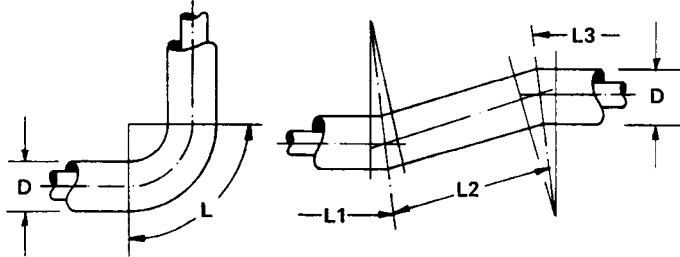


1) STRAIGHT PIPES AND TUBING



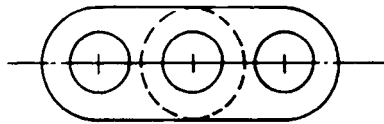
Area = Circ © x Length (L)
Measure through at flanges.
All other inserted items (valves,
strainers, tees, etc.) not measured through

2) BENDS/ELBOWS



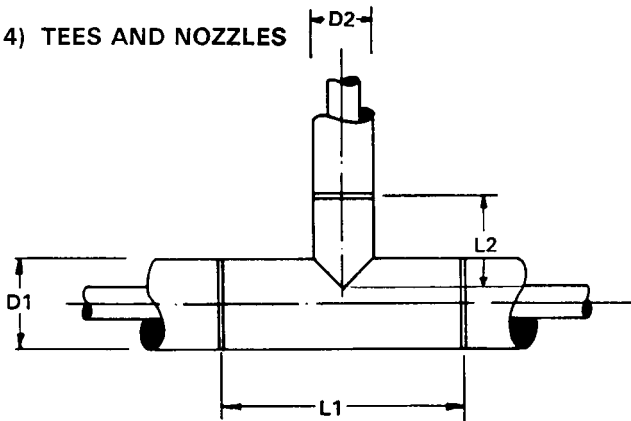
Area = C x L
Length measure on outside

3) TUBE BUNDLES



Tubes to be measured separately

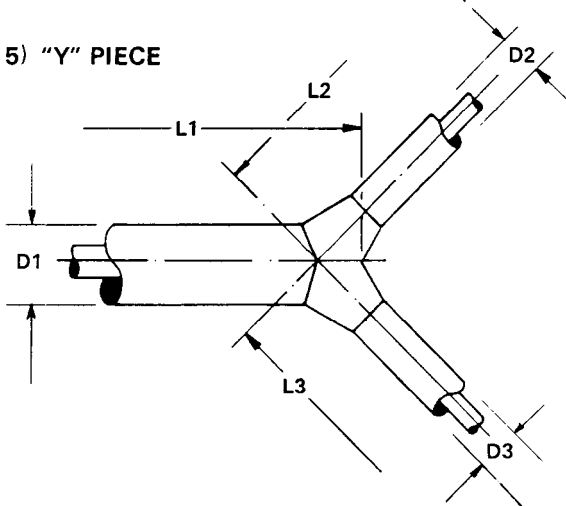
4) TEES AND NOZZLES



Area = (L1 x C1) + (L2 x C2)

where L1 = 2D1
L2 = D2

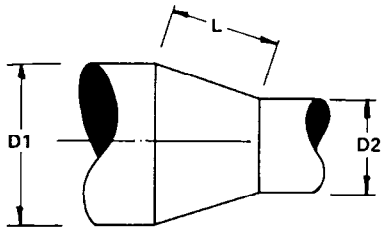
5) "Y" PIECE



Area = (C1xL1) + (C2xL2) + (C3xL3)



6) CONES AND REDUCERS



Area – $Cm \times L$

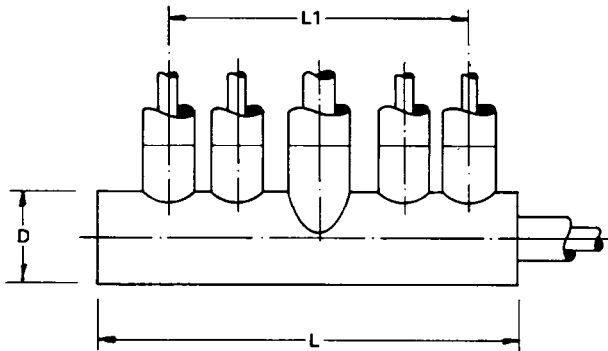
Mean Circumference

$$Cm = \frac{C1 + C2}{2}$$

7) SQUARE AND RECTANGULAR DUCTING

Rules 1 – 6 above apply substituting perimeter for circumference and half the perimeter for diameter.

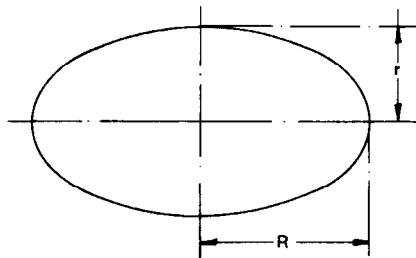
8) HEADERS



Area = $C \times L + \text{Ends}$
where $L = L1 + 2D$

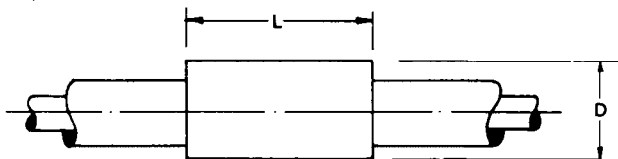
Tees/nozzles to be measured separately as per Paragraph (4)

9) OVAL ENDS



Area = $R \times r \times \pi$

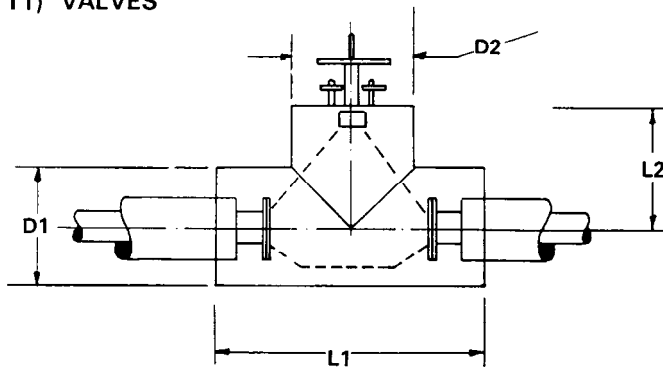
10) FLANGES



Area = $C \times L + \text{Ends}$

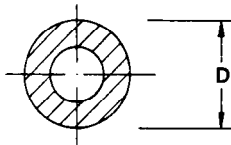


11) VALVES

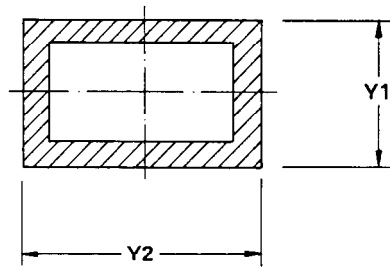


Area = $(L1 \times C1) + (L2 \times C2) + \text{Ends}$

12) INTERNAL INSULATION

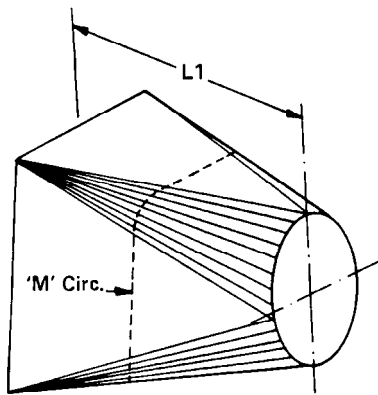


Area = $D \times \pi \times L$



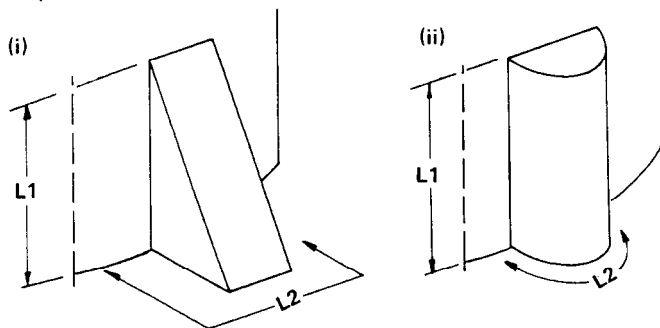
Area = $2(Y1 + Y2) \times L$

13) TRANSITION PIECE



Area = Circumference at "M" $\times L1$

14) SUPPORT COVERS

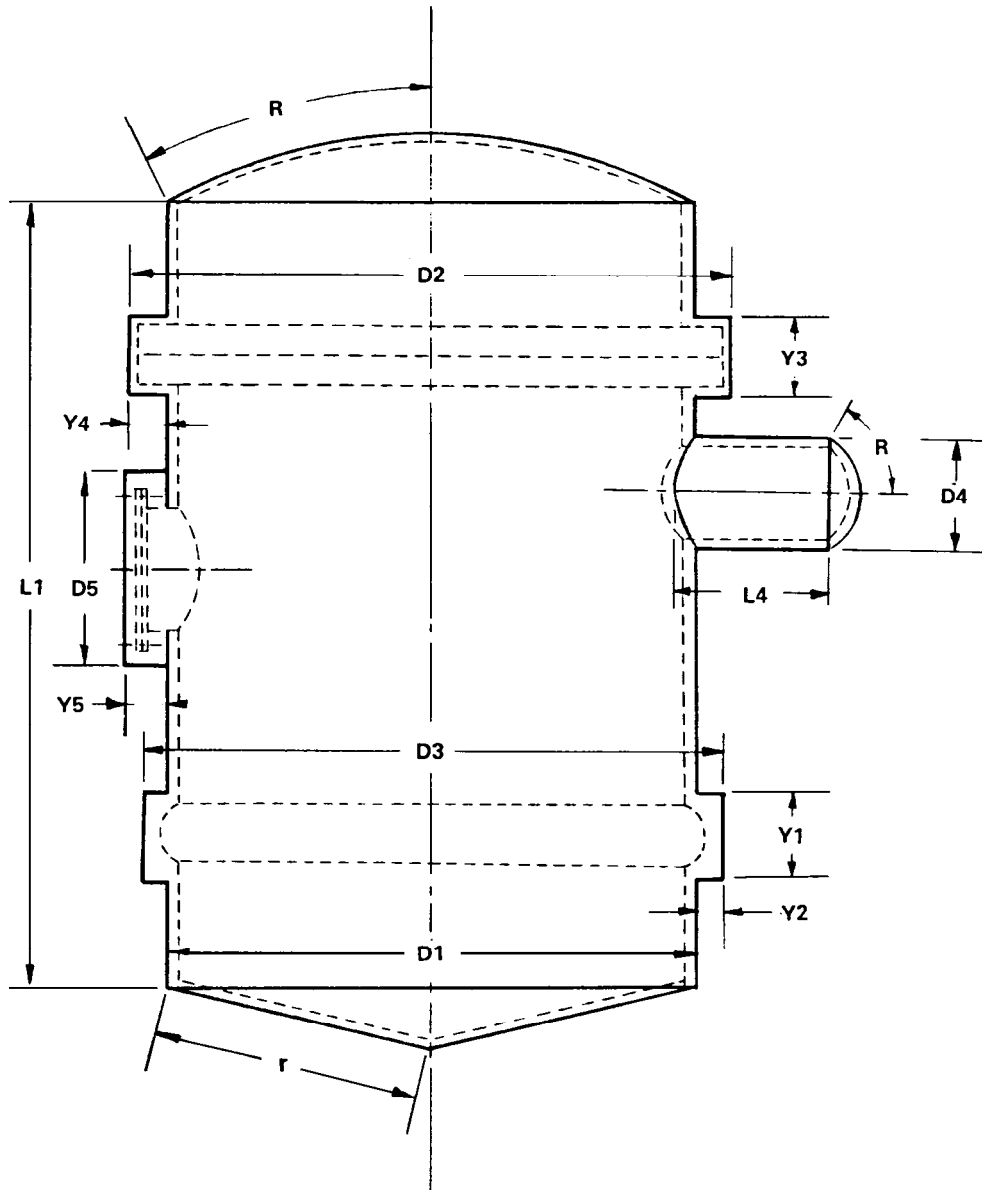


(i) Area = $L1 \times \frac{1}{2}L2$

(ii) Area = $(L1 \times L2) + \text{End/s}$



15) VESSELS



Areas of:

$$\text{Main body} = D1 \times L1 \times \pi$$

$$\text{Dished topes} = \pi R^2$$

$$\text{Cronical bottom} = D1 \times \pi \times \frac{r}{2}$$

$$\text{Box over expansion bellows} = (2Y2 + Y1) \times D3 \times \pi$$

$$\text{Box over flange / stiffener} = (2Y4 + Y3) \times D2 \times \pi$$

$$\text{Small body} = D4 \times \pi \times L4$$

$$\text{Manhole cover} = \left(\pi \times \frac{D5^2}{4} \right) + (\pi \times D5 \times Y5)$$