

# STANDARD METHOD OF MEASUREMENT FOR THERMAL INSULATION

DECEMBER, 1973

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# INTRODUCTION

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*It is my pleasure as the President of the Thermal Insulation Contractors Association to introduce this document which is designed to facilitate the basis of calculation of measurement for future projects between ourselves and our clients.*

*The document has been prepared by professional advisers and a working party of the clients themselves and now has the full approval of the Governing Council of T.I.C.A.*

*We have therefore taken all possible steps to ensure that the document should be acceptable to clients and we shall now ask all our members to use it as the basis for their calculations and we invite clients and clients' professional advisers or agents to quote this document in their tender details.*

*Additional copies are available from the Thermal Insulation Contractors Association, Alderman House, 37 Soho Square,, London, W.1. price 50p each including postage, and we trust that the widest possible application of the document by clients, specifiers and the thermal insulation contracting industry will result and that it will be to our mutual benefit.*

*D. E. WEST  
President - Thermal Insulation Contractors Association  
December 1973  
Alderman House,  
37 Soho Square,  
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## ACKNOWLEDGEMENTS

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*With acknowledgement to*

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*S. J. Tipton.*

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## ACKNOWLEDGEMENTS

This development is  
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S. J. Janner

## PR 1 CONTRACT DOCUMENTS

the Contract Document shall fully describe and accurately represent the works and services to be executed, and the following shall be stated:

- i) the form and type of contract
- ii) the edition of the Conditions of Contract and schedule of clause headings
- iii) appendix and schedule of alterations
- iv) programme of work
- v) that the Works shall be measured in accordance with the Standard Method of Measurement.

## PR 2 NAMES OF PARTIES

the names and addresses of the Employer and his representatives shall be stated.

## PR 3 DESCRIPTION OF SITE

the following details shall be stated:

- i) the location of the site shall be so described stating the means of access
- ii) areas for the use of the Contractor shall be so described
- iii) arrangements for visiting the site and inspection of drawings, models and other information
- iv) where stage by stage possession of the site is to be given to the Contractor.

## PR 4 PLANT, TOOLS AND TACKLE

the Contractor shall provide all plant, tools, tackle and consumables for the complete execution of the Works.

any plant, tools, tackle or consumables to be supplied by the Employer shall be listed.

## PR 5 SCAFFOLDING

scaffolding for the works shall comply with the relevant statutory regulations for the time being in force.

the responsibility for the provision of scaffolding shall be defined.

## PR 6 GENERAL REQUIREMENTS

general requirements covering but not limited to the following, shall be given:

- i) safety, health and welfare
- ii) notices and fees including rates and taxes to local authorities, public undertakings and other bodies
- iii) site management, staff and establishment
- iv) use and maintenance of public and private roads
- v) drawings and sketches
- vi) bye-laws and other statutory regulations.

## PR 7 SPECIAL RESTRICTIONS AND OBLIGATIONS

any obligation or restriction that may be imposed on the Contractor whether in the way that the works are to be carried out or restrictions on site personnel shall be given as an item stating all relevant particulars.

where site agreement is in operation this shall be stated and copies issued by the Employer.

## PR 8 WORKS REGULATIONS

works regulations which may affect the whole, parts or any part of the works such as arising from the Petroleum Act, safety requirements, fire hazards and such like, shall be fully described and given separately.

**PR 9 INSPECTION**

work failing to pass inspection shall be remedied at the Contractor's own expense to the complete satisfaction of the Employer.

**PR 10 PROVISION OF SERVICES**

all temporary services for the Works such as water, lighting and power, compressed air, shall be given as items and fully described.

where these services are to be supplied free of cost to the Contractor the source and location of the point of supply shall be given.

**PR 11 TEMPORARY WORKS**

items shall be given of any temporary works to be provided either by the Contractor or Employer such as:

- i) temporary foundations, roads, tracks, hard-standings, crossings and the like  
where special hard-standings are necessary for lifting equipment this shall be stated
- ii) temporary sheds, offices, mess rooms, sanitary accommodation and other buildings for the use of the Contractor
- iii) temporary offices for the use of the Employer's representative(s) particulars of accommodation requirements shall be given
- iv) temporary telephone facilities shall be described and included as an item  
the cost of calls shall be included with the item
- v) temporary screens, hoardings, fencing, guard rails, gantries and the like shall be fully described and included as an item
- vi) the dismantling, demolition and clearing away of temporary works and making good the site shall be included with each item of temporary works.

**PR 12 PROTECTION AND CLEANING**

- i) protecting the Works from damage, inclement weather, dust or any other factors, including work carried out under clean conditions, shall be given as an item
- ii) removing rubbish, surplus materials and debris, and cleaning the Works throughout the period of the Contract and on completion, shall be given as an item.

**PR 13 INSURANCE**

- i) the Contractor's liability for risk of injury to persons and property and of damage to the Works, new or existing, shall be given as an item
- ii) where the Employer requires the Contractor to effect insurance in respect of the Contractor's liability for any such risk, the relevant particulars shall be given  
consequential loss shall be given as an item, if included in the Conditions of Contract
- iii) where the Employer intends to relieve the Contractor of liability for any such risk the relevant particulars shall be given
- iv) where the cost of insuring any liability of the Employer is required to be included in the Contract Sum such cost shall be given as a 'provisional sum' in the Contract Document at the time of enquiry.

**PR 14 ATTENDANCE ON OTHER CONTRACTORS**

- i) general attendance on Nominated Sub-Contractors shall be given as an item in each case and shall include the use of standing scaffolding and hoists, providing space for accommodation, storage of plant and materials, temporary lighting and water, and clearing away rubbish
- ii) special attendance on Nominated Sub-Contractors shall be given as an item in each case giving particulars of unloading, hoisting, placing in position, providing power, special scaffolding, and like items
- iii) where attendance is required on other Contractors employed directly by the Employer, full details shall be given.

**PR 15 COMMISSIONING THE WORKS**

requirements for commissioning the works shall be fully described.

## GR 1 DESCRIPTION OF THE WORKS

the Works shall be fully and adequately described.  
overall linear measurement of pipework and schedule of vessels and equipment shall be given.  
where this is not available and the Contractor is required to extract the information from drawings, this shall be stated.  
working heights or depths shall be stated relative to defined levels.  
the Contract Period dates shall be stated. particulars shall be given where the Works are required to be executed or completed in any specific order, sections or phases.

## GR 2 EXISTING WORKS

new work affected by the proximity of or carried out in existing plants shall be so described.  
details shall be given of procedures and restrictions required by the Employer to be observed by the Contractor before or during occupation of the existing works and on leaving the site including the issue of various statutory and other certificates of authorisation and requirement.

## GR 3 SPECIFICATIONS AND DRAWINGS

specifications and drawings required and applicable at the time of enquiry shall be listed and provided.  
in the absence of a detailed specification reference must be made to British Standards.

## GR 4 QUANTITIES

the total quantities shall be calculated to the first place of decimals.  
where the application of this clause would cause an entire item to be eliminated, such items shall be enumerated stating the size or weight as appropriate.  
the order of stating the dimensions shall be consistent and in the sequence of length, width and height, where ambiguity could arise the dimensions shall be specifically identified.

## GR 5 DESCRIPTIONS

unless otherwise specifically stated in the Contract Documents, the following shall be deemed to be included with all items:—  
i) labour and all costs in connection therewith  
ii) consumables  
iii) use of plant  
iv) temporary works  
v) establishment and overhead charges and profit  
in addition where materials are to be supplied by the Contractor, the following shall be included:—  
i) materials and all costs in connection therewith  
ii) allowance for waste of materials.

## GR 6 ORDERING OF MATERIALS

a bill of quantities shall not be used for the ordering and purchasing of materials or services.

## GR 7 WELDED JOINTS

where welded joints are required to be un-lagged until after testing pipework, the work involved shall be the subject of a variation order unless otherwise stated in the specification at the time of tendering.

## GR 8 DAYWORK

where it is agreed between the Engineer and the Contractor that the work cannot be measured in accordance with the Standard Method of Measurement, it shall be carried out on an agreed 'Daywork' basis.

## TH 1 GENERAL

- TH 1a unit of measurement  
the unit of measurement shall be as follows:—
- i) metre
  - ii) number
- TH 1b measurement  
insulation shall be measured from Contract information such as marked up isometrics, general arrangements, models, or where agreed, as installed.  
the measurement of insulation to pipework shall be on square to the centre line over all in-line fittings such as bends, branches, elbows, reducers and tees, but excluding items of in-line equipment such as bellows units, flow-meters and valves, consequently no adjustment shall be made to the measured pipe lengths for enumerated items of in-line fittings. (see sketches)  
insulation to equipment, machinery and ducting shall be measured on the outside surface of the insulation.
- TH 1c scope of work  
the scope of work shall be given such as:—
- i) supply and fix
  - ii) supply only
  - iii) fix only
- TH 1d classification of insulation  
insulation shall be classified and given separately according to type of service, material to be insulated, composition and type of insulant and specified finish such as:—
- a) insulants
    - i) calcium silicate
    - ii) mineral wool
    - iii) magnesia
    - iv) polyurethane
    - v) cork
    - vi) glass fibre
    - vii) polystyrene
    - viii) foamed glass
  - b) finishes
    - i) cement
    - ii) bitumen or mastic
    - iii) bitumen felt
    - iv) metal cladding
    - v) tape wrapping
    - vi) plastic cladding
- work divisions  
the work shall be grouped and the items adequately described as follows:—
- i) pipework
  - ii) ducting
  - iii) equipment and machinery
  - iv) filling voids
- TH 1e location of insulation
- each classification of insulation shall be described according to location as follows:—
- a) pipework and ducting
    - i) trenches, pipe tracks and generally at ground level

DE 4

- ii) pipe bridges
- iii) plant structures
- iv) isolated plant items and special locations
- b) equipment and machinery shall be fully described according to type and location as follows:—
  - i) generally at ground level
  - ii) plant structures
  - iii) special locations

**TH 1f** work groups  
the work shall be grouped and the items adequately described and arranged under appropriate headings as follows:—

- i) work operations
- ii) ancillary works

**TH 1g** thickness and temperature  
nominal thickness of insulation shall be given.  
working temperatures shall be stated.

**TH 1h** tube sizes  
the outside diameter of tubes shall be given.

**TH 1j** pipe line equipment  
nominal size and outside diameter of adjacent pipework shall be given.

**TH 1k** pipe treatments  
treatment to pipework, ducting or equipment and machinery such as painting, cleaning or wrapping prior to application of insulation shall be given separately and included under ancillary works.

**TH 1l** weather protection  
where temporary weatherproof structures are required for the execution of the work these shall be fully described and the responsibility for its provision shall be defined.

## **TH 2 MATERIALS**

**TH 2a** free issue materials  
where materials are to be supplied as free issue to the Contractor this shall be stated together with details of:—

- i) specifications
- ii) points of delivery and collection, and responsibilities for handling

**TH 2b** materials fixed by others  
where materials are to be supplied by the Contractor for fixing by others this shall be stated together with details of:—

- i) specifications
- ii) requirements for waste or spare materials
- iii) points of delivery
- iv) responsibilities for carriage and charges for packaging and like charges
- v) test certificates

**TH 2c** materials by Contractor  
where materials are to be supplied and fixed by the Contractor this shall be stated together with details of:—

- i) specifications
- ii) selected suppliers or manufacturers
- iii) test certificates

**TH 2d** measurement of materials  
materials shall be measured nett in accordance with the



units of measurement applied to Work Operations—  
sub-section TH 3.

TH 2e special storage  
requirements for special storage and protection facilities  
shall be given separately.

### TH 3 WORK OPERATIONS

measurement of items in each classification of insulation  
indicated in clause TH 1c shall generally conform to the  
items in sub-section TH 3a-g inclusive.

all insulation shall be measured in accordance with  
items of measurement indicated in each of the following  
sub-sections.

items shall be deemed to include all cutting and fitting  
of insulation around hangers, supports, anchors, slippers  
and the like and the specified methods of jointing of  
insulants and finishes.

TH 3a pipework

a1 insulate tubing linear  
measure through all fittings  
joints (other than welded joints) measured separately  
curved pipework in loops only shall be given separately

a2 in addition measure number DE 5  
insulate bend  
state radius  
where the information is not available bends shall be  
grouped together as not exceeding 5 diameter radius  
or over 5 diameter radius

a3 in addition measure number DE 5  
insulate reducer  
state sizes DE 6

a4 in addition measure number DE 5  
insulate branch or tee  
in all finishes (except metal cladding) where branch  
size is two thirds or more of the size of parent pipe  
all branch sizes in metal cladding shall be measured  
joints (other than welded joints) measured separately

a5 insulate flanged joint number  
excluding joints on valves and in line items of equipment

a6 insulate proprietary joint number  
state type

a7 form expansion joint number  
fully describe state size

a8 insulate valve or similar in line item of equipment number  
including joints  
state type of valve or equipment  
removable covers shall be given separately and fully  
described

TH 3b trace pipework  
shall be measured in accordance with sub-section TH 3a  
complete  
state type of tracing, size, number of tracers and  
orientation on parent pipe  
spirally wound tracing shall be given separately

TH 3c jacketed pipework  
shall be measured in accordance with sub-section TH 3a  
complete  
state size of jacket tube and type of closure (special  
items shall be given separately and enumerated)

TH 3d circular ducting  
shall be measured in accordance with sub-section TH 3a  
complete as applicable

d1 transition pieces from circular to rectangular section number  
shall be fully described stating sizes

TH 3e	rectangular ducting	
e1	insulate rectangular ducting measure through all fittings state outside section sizes	superficial
e2	in addition measure bends (state radius), tapers, angles and the like	number DE 5
TH 3f	equipment and machinery state whether insulation is applied to flat, curved or domed surfaces no deductions shall be made for opening less than 0.5m <sup>2</sup> (labour finishing insulation around openings shall not therefore be measured) the following shall be given separately:—	
	i) curved surfaces not exceeding 1.5m diameter	
	ii) items not exceeding 6m <sup>2</sup>	
	iii) work in excess of 30m above ground grouped in 10m stages	
	iv) flanged, riveted or lapping plate structure	
	v) ends of items of equipment fully describe (see sketches)	
	vi) method of support and attachment/reinforcement and/or anchorage to be given	
	vii) where welding of studs, lugs, support rings, etc., are involved, the responsibility for this shall be defined	
f1	insulate equipment and machinery	superficial
f2	additional work to manholes, pockets, blanked off branches and the like shall be fully described removable items shall be given separately	number
f3	additional insulation to support rings, rib flanges and the like shall be fully described	superficial
f4	form expansion joints fully describe, state size	linear
f5	finish insulation around openings exceeding 0.5m <sup>2</sup>	linear
f6	fabricate metal cladding finish to domed ends, removable end covers and the like fully describe	superficial
f7	fabricate metal cladding finish around projections support rings and the like	superficial
f8	fabricate metal cladding finish to manhole covers, pipe collars and the like fully describe, state size	number
TH 3g	filling voids fully describe stating dimensions and density	linear/ superficial/ volume

## GENERAL

the clauses hereunder in this Section are provided to PR 1 (ii) define the phraseology used within the context of this Standard Method of Measurement and are not intended to invalidate any particular edition of a Conditions of Contract included in the Contract documents, but may be used in conjunction with or supplementary to them.

## DE 1 CONTRACT DEFINITIONS

the following words and expressions shall be interpreted in the manner shown except where the context otherwise requires:—

- i) the 'contract documents' mean: PR 1 and 2
  - a) Contractor's tender
  - b) Memorandum of Contract, letter of acceptance or official order
  - c) Technical Specification and Drawings
  - d) General Conditions of Contract
  - e) Special Conditions of Contract
  - f) Site Regulations
- ii) the 'Works' means the Plant to be provided and the works and services to be executed in accordance with the contract.
- iii) the 'Employer' means the person, firm or company named in the contract and includes the Employer's representatives or successors.
- iv) the 'Engineer' means the person, firm or company named in the contract for the purpose of either design and/or supervision of the works to be executed by the Contractor.
- v) the 'Contractor' means the person, firm or company whose tender has been accepted by the Employer and includes the Contractor's representatives, successors and permitted assigns.
- vi) the 'Site' means the area to be made available to the Contractor for the works other than merely for access.

## DE 2 NOMINATED SUB-CONTRACTOR

PR 14 (i) (ii)

a nominated sub-contractor means the person, firm or company designated by the Employer to carry out part or parts of the works as ordered and generally supervised by the principal Contractor in accordance with the terms and conditions of the main contract.

## DE 3 NOMINATED SUPPLIER

a nominated supplier means the person, firm or company designated by the Employer from whom the principal Contractor is required to obtain specified materials or services of the quality and workmanship previously approved by the Employer and in accordance with the terms and conditions of the main contract.

## DE 4 LOCATION

TH 1e

a location shall mean the area, place or position within which the pipework is contained:—

- i) trenches (open or supported)
  - open or timber and/or sheet supported trench excavations to receive single or multiple pipe lines below ground level.

- ii) pipe tracks  
prepared reservations generally at ground level or in open excavation to receive single or multiple pipe lines and associated equipment.
- iii) generally at ground level  
includes for erecting pipework on independent supports, blocks, plinths or similar.  
the height to underside of pipe shall not exceed 1m/3ft. above ground or defined level.
- iv) pipe bridges  
includes for pipework on or supported from single or multi-decked bridges generally of rigid construction erected above ground level to support single or multiple pipe lines and associated equipment.
- v) plant buildings and structures  
single or multi-storey clad buildings or open type framed structures to receive vessels and equipment with inter-connecting pipework.
- vi) isolated plant items and the like  
plant items such as distillation columns, stacks or similar requiring independent scaffolding to provide working platforms and access for the erection of pipework.
- vii) other locations  
locations not listed in (i) to (vi) above shall be given separately and fully described such as ducts, conduits or similar.

**DE 5 IN ADDITION MEASURE**

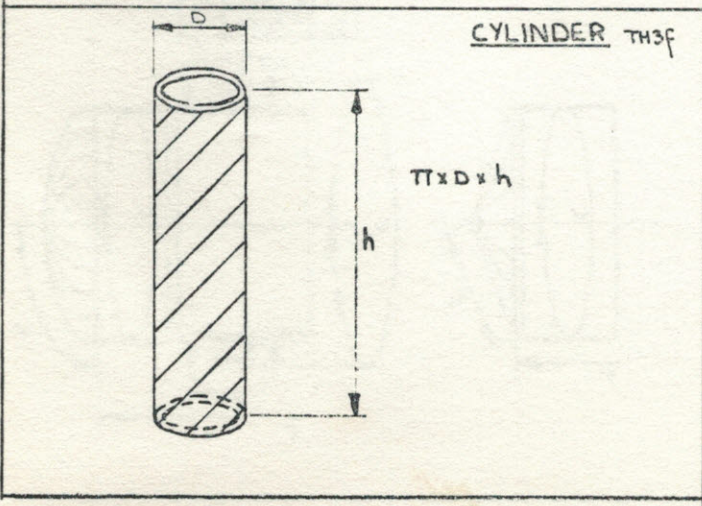
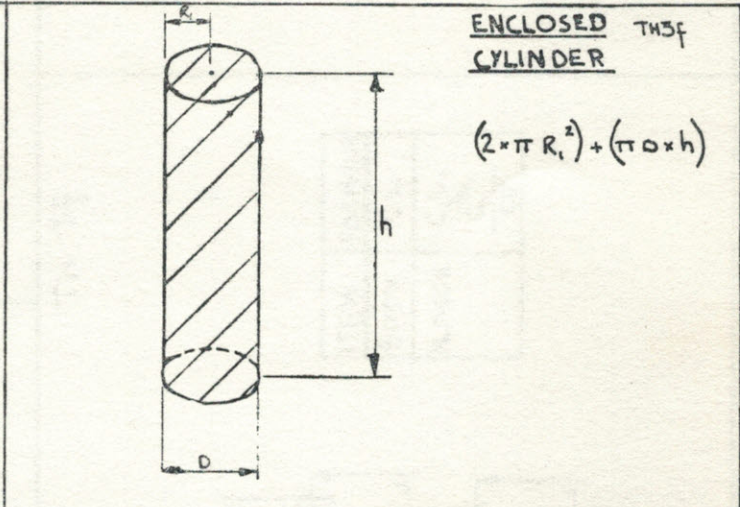
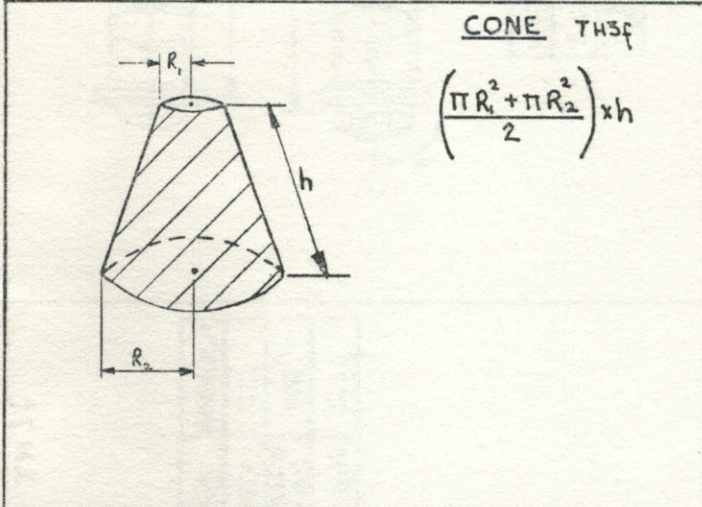
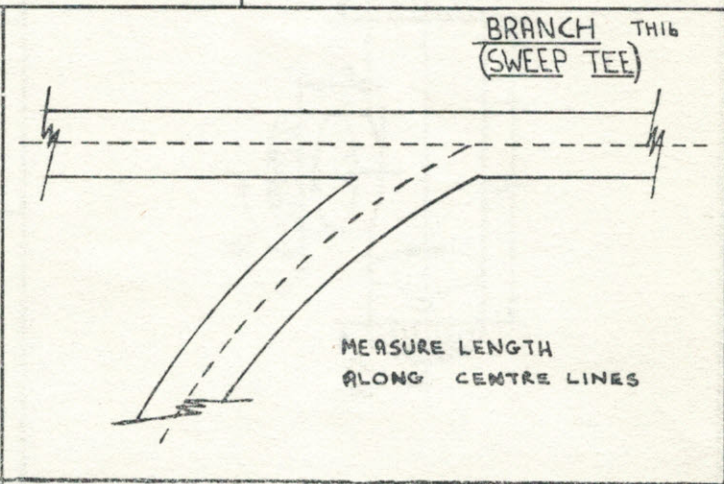
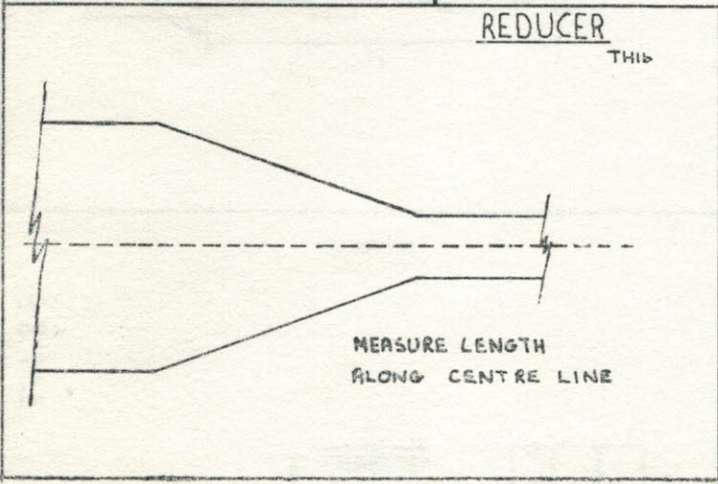
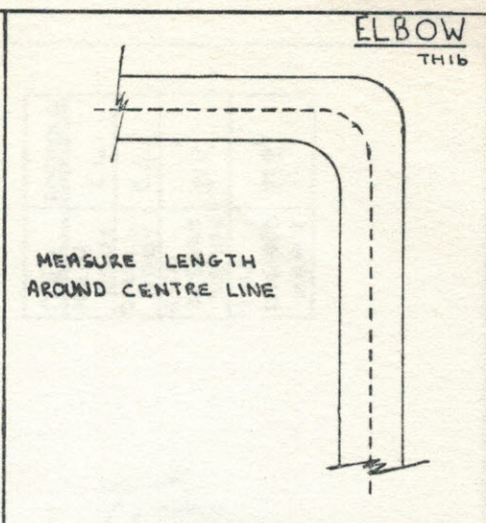
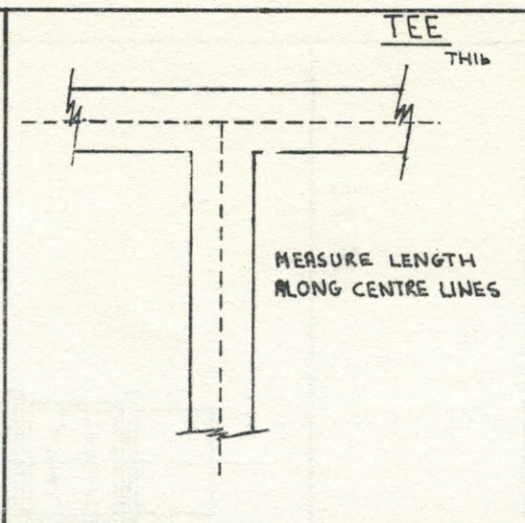
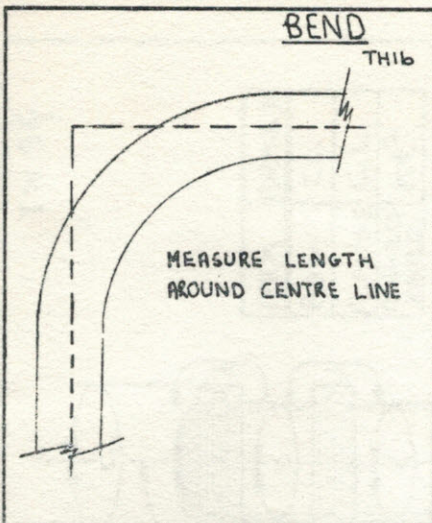
TH3a 2, 3 & 4  
TH3e 2

in addition measure indicates additional labour and material (if any) overall in-line fittings measurement as described in TH 1b.

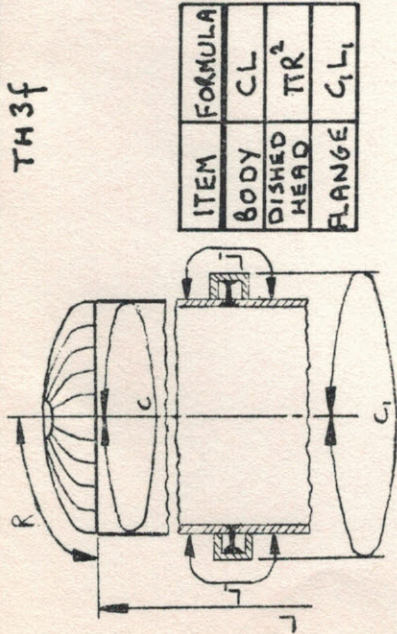
**DE 6 SIZE OF REDUCER**

TH3a 3

diameter of reducer, the largest diameter shall be applied to the length of the reducer.

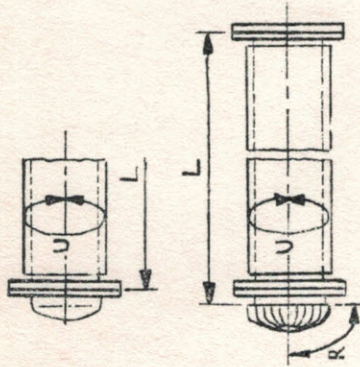


TH 3f



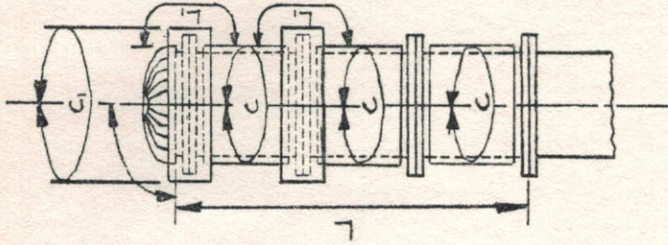
ITEM	FORMULA
BODY	CL
DISHED HEAD	$\pi R^2$
FLANGE	$C_1 L_1$

TH 3f



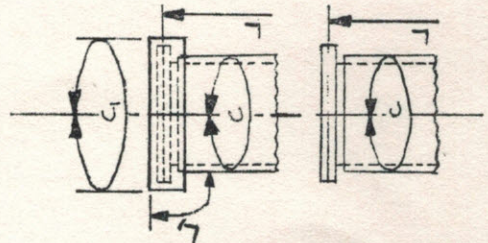
ITEM	FORMULA
BODY	CL
DISHED HEAD	$\pi R^2$

TH 3f



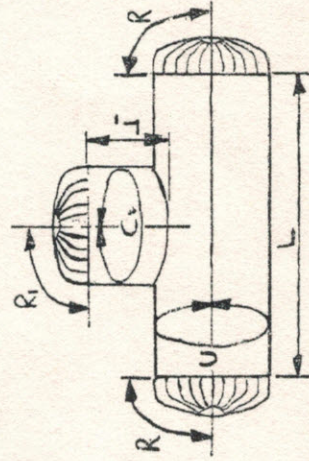
ITEM	FORMULA
BODY	CL
FLANGE	$C_1 L_1$
DISHED HEAD	$\pi R^2$

TH 3f



ITEM	FORMULA
BODY	CL
FLANGE	$\frac{C_1 L_1 + C_2 L_2}{4\pi R}$

TH 3f



ITEM	FORMULA
MAIN BODY	CL
SMALL BODY	$C_1 L_1$
END DISHED HEADS	$\pi R^2$
TOP DISHED HEAD	$\pi R^2$

