



THERMAL INSULATION OF PIPELINES

From the engineering and economic aspects, it is often advisable or even essential to protect pipelines from heat losses and condensation. Low thermal conductivity, low permeability to water vapour, low water absorption, high dimensional stability, good mechanical strength and protection from fire hazards are the aspects which will constitute the ideal insulating material. INSOPIPE expanded polystyrene pipe section incorporates all these aspects well and is therefore particularly effective.

If at all INSOPIPE sections get mechanically damaged during fixing or installation, the damage will be localised and water will not spread to the remainder of the insulation as happens with most other materials. This great advantage is due to the fact that INSOPIPE sections have a completely closed cell structure.

INSOPIPE sections also do not support insect or pest life and are unaffected by fungi and bacteria, making it the ideal choice for pipes operating in areas such as food processing etc., where the highest degree of hygiene is required.

FIELDS OF APPLICATION

Pipes for cold water systems (to prevent condensation and to protect against freezing).

Ducts in ventilation and air conditioning systems (to suppress fluctuations in temperature).

Pipes for refrigerants (to prevent refrigeration losses and condensation) eg. refrigeration units in cold stores, chemical factories, textile and paper mills, ice factories, dairies and breweries.

Pipes for liquefied gases in the cryogenic range down to -180°C (to prevent frost build-up).

Heating, plumbing and ventilation systems operating at temperatures up to 80°C .

Other Insulated equipments.

ORDERING INSOPIPE SECTIONS

INSOPIPE expanded polystyrene pipe sections are available in 1.250 linear meter lengths (2 halves per length) and can be ordered in SD, HD, EHD, UHD, SHD Grades for virtually any pipe size. On special order these sections can be supplied with aluminium foil pre-stuck on the sections and tongue and groove joints for ease in application.

THICKNESS OF INSULATION

The thickness of insulation required to reduce heat losses or gains to a tolerable level depends mainly on the differences between ambient temperature and the temperature of the pipe, the relative humidity and the pipe diameter and must be calculated for each individual application. The minimum thicknesses of INSOPIPE required to prevent condensation of water on pipelines at temperatures below ambient temperature are given in Annexure I.

APPLICATION METHODS

Insulation of pipework operating between 20 °C — 80 °C general recommendations.

- Before applying insulation all pipes to be properly wire brushed to remove rust scale and dirt.
- Polystyrene sections to be applied to pipes in half round sections.
- The insulation shall be firmly secured to the piping with self-adhesive tape at 250mm centres, the tape being over-lapped onto itself a minimum distance of 50mm.
- The surface finish should be selected with the following view to : Serviceability, Resistance to damage, Resistance to corrosion, Ease of maintenance, Fire resistance.

Insulation of pipe work operating at below 20 °C, general recommendations :

- All pipes to be wire brushed to remove rust scale and dirt before applying insulation.
- Polystyrene section to be applied to pipes in half round sections.
- Where the insulation thickness is greater than 50mm the thickness shall be built up in multi layers with the joints staggered in successive layers.

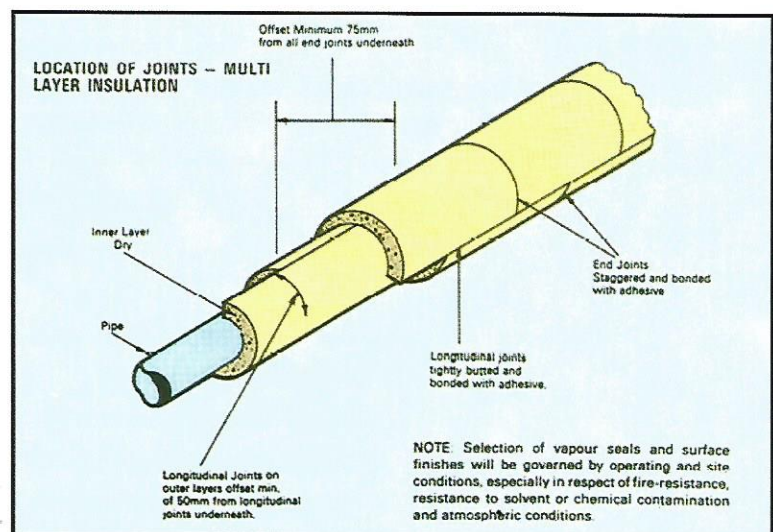
- The first layer of insulation should not be bonded to the piping with adhesive subsequent layers should be bonded to the previous layer with adhesive. Adhesive should be applied to be butt and longitudinal edges of all sections including those in the inner.

- Care should be taken to ensure that no over application of the adhesive occurs, and that it is evenly spread over the appropriate surfaces of insulation.

- Each adhesive tape at 250mm centres, the tape being overlapped onto itself a minimum distance at 50mm.

- Contraction joints should be provided at 12 metre intervals on all straight run piping operating at — 20 °C or below.

- Polystyrene sections should be vapour sealed with a compatible material, which should be applied strictly to the manufactures instructions.



ANNEXTURE - I

Thickness (in mm) of INSOPIPE lagging required to prevent condensation on pipes

Relative humidity %		90			80			70			60		
Ambient temperature		10	20	40	10	20	40	10	20	40	10	20	40
Pipe dia (mm)	Pipe Temp (C)	Thickness (mm)			Thickness (mm)			Thickness (mm)			Thickness (mm)		
25/33.7	-20	65	60	100	35	45	55	20	30	40	15	15	25
	0	25	45	75	15	25	45	15	15	25	15	15	20
	+10	-	25	60	-	15	30	-	15	20	-	-	15
50/75	-20	75	90	120	40	50	60	25	30	45	15	20	30
	0	30	50	85	15	25	60	15	15	30	15	15	25
	+10	-	30	70	-	15	35	-	15	20	-	15	15
100/108	-20	85	100	140	45	55	70	25	35	50	15	25	35
	0	35	55	100	15	25	55	15	15	35	15	15	15
	+10	-	35	80	-	15	40	-	15	25	-	15	15
200/216	-20	100	115	150	50	60	80	30	40	55	15	25	35
	0	35	60	110	25	30	60	15	20	35	15	15	20
	+10	-	35	90	-	15	40	-	15	30	-	15	15
400/419	-20	110	130	180	55	70	90	30	45	60	20	30	40
	0	40	70	125	25	30	70	15	20	40	15	15	30
	+10	-	40	100	-	20	45	-	15	30	-	15	20

PHYSICAL FORM OF INSOPIPE & TECHNICAL DATA AS PER EPPMA / BRITISH STANDARDS

Sr. No	Description	Units	Grade				
			SD	HD	EHD	UHD	SHD
1.	Foamed Density	Kg/M ³	12-15	18-20	24-25	28-30	32-35
2.	Thermal Conductivity at 10 ⁰ C	W/mk	0.038	0.035	0.033	0.032	0.030
3.	Compressive Strength at 10% Deflection Minimum	Kpa	70	110	150	190	235
4.	Water Vapour permeability at 38 ⁰ C & 90% r.h.	ng/Pasm	6.9	5.0	4.2	4.2	3.9
5.	Heat Stability at 80 ⁰ C	Max. %	0.5	0.5	0.5	0.5	1.0
6.	Water Absorption 7 days (DIN 53428)	% by Vol.	3%	2.3%	2.2%	2%	2%
7.	Min. Cross Breaking Strength	KPa	140	170	205	275	350

SIZES OF STEEL PIPES COMMONLY USED IN THE ENGINEERING AND PROCESS INDUSTRIES (ABSTRACTED FROM BS 3600)

NOMINAL SIZE		ID OF INSULATION	COMMON THICKNESS
MM	INCHES	MM	MM
15	0.50	25	25,50
20	0.75	30	25,50
25	1.00	36	25,50
32	1.25	44	25,50
40	1.50	50	25,50
50	2	62	25,50
65	2.5	78	50,75
80	3	91	50,75
100	4	116	50,75
125	5	142	50,75
150	6	170	50,75
200	8	220	50,75
250	10	275	50,75
300	12	326	50,75
350	14	358	50,75
400	16	409	50,75
450	18	460	50,75
500	20	511	50,75
600	24	613	50,75

SIZES OF COPPER PIPES COMMONLY USED IN THE ENGINEERING AND PROCESS INDUSTRIES (ABSTRACTED FROM BS 2871 : PART 1)

NOMINAL SIZE	ID OF INSULATION	COMMON THICKNESS
MM	MM	MM
12	14	25,50
15	17	25,50
22	24	25,50
28	30	25,50
35	37	25,50
42	44	25,50
54	56	25,50
76.1	78	25,50
108	110	25,50



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