

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-6°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
10.0	2.9*	3.4*	3.8*	4.2*
12.0	4.2*	4.8*	5.4*	5.9*
15.0	6.1*	7.2*	8.1*	9.0*
22.0	11.3*	13.6	15.5	17.5
28.0	15.1	18.4	21.1	23.9
35.0	20.9	25.8	30.0	34.3
42.0	27.0	33.7	39.4	45.4
54.0	36.5	46.1	54.5	63.3
67.0	44.5	56.6	67.5	79.0
76.1	57.1	73.0	87.5	102.9
108.0	85.9	111.6	135.2	160.7

### MDPE Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
20.0	6.8*	8.2*	9.3*	10.4*
25.0	10.4*	12.6	14.4	16.3
32.0	13.7	16.8	19.5	22.2
40.0	18.9	23.6	27.6	31.6
50.0	24.9	31.3	36.9	42.8
63.0	32.4	41.1	48.9	57.2
75.0	46.9	60.1	71.9	84.6
90.0	60.8	78.4	94.4	111.6
110.0	79.6	103.3	125.3	149.0
125.0	86.2	112.4	136.8	163.3

\*Where the indicated protection from freezing provided by AF/Armaflex Class O is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a  $-6^{\circ}\text{C}$  ambient temperature and an initial water temperature of  $7^{\circ}\text{C}$  Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
Total Freezing Time (Hours)				
17.2	5.2*	6.2*	6.9*	7.8*
26.9	10.5*	12.8	14.7	16.6
33.7	13.9	17.2	20.0	22.8
42.4	19.2	23.9	28.1	32.3
48.3	26.4	33.0	38.9	45.0
60.3	34.5	43.7	51.9	60.5
76.1	47.7	61.0	73.1	85.9
88.9	62.4	80.4	96.8	114.4
114.3	78.8	102.5	124.4	148.2

\*Where the indicated protection from freezing provided by AF/Armaflex Class O is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-10°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
10.0	1.8*	2.1*	2.4*	2.6*
12.0	2.6*	2.9*	3.3*	3.7*
15.0	3.8*	4.4*	5.0*	5.6*
22.0	6.9*	8.4*	9.5*	10.7*
28.0	9.3*	11.3*	13.0	14.8
35.0	12.8	15.9	18.4	21.1
42.0	16.6	20.7	24.2	27.9
54.0	22.4	28.3	33.5	38.9
67.0	27.3	34.8	41.5	48.6
76.1	34.9	44.8	53.7	63.1
108.0	52.7	68.4	82.9	98.7

### MDPE Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
20.0	4.2*	5.0*	5.7*	6.4*
25.0	6.4*	7.7*	8.9*	10.0*
32.0	8.4*	10.3*	12.0	13.6
40.0	11.6*	14.5	16.9	19.4
50.0	15.3	19.3	22.7	26.3
63.0	19.9	25.3	30.1	35.1
75.0	28.8	36.9	44.2	51.9
90.0	37.3	48.1	57.9	68.5
110.0	48.8	63.4	76.9	91.5
125.0	52.9	69.0	84.0	100.3

\*Where the indicated protection from freezing provided by AF/Armaflex Class O is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-10°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

Pipe O.D (mm)	AF/Armaflex Class O Thickness			
	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
<b>17.2</b>	<b>3.2*</b>	<b>3.8*</b>	<b>4.3*</b>	<b>4.8*</b>
<b>26.9</b>	<b>6.5*</b>	<b>7.9*</b>	<b>9.1*</b>	<b>10.3*</b>
<b>33.7</b>	<b>8.7*</b>	<b>10.7*</b>	12.4	14.1
<b>42.4</b>	<b>11.9*</b>	14.8	17.4	19.9
<b>48.3</b>	16.2	20.4	24.0	27.8
<b>60.3</b>	21.2	26.9	32.0	37.3
<b>76.1</b>	29.3	37.6	45.0	52.9
<b>88.9</b>	38.3	49.4	59.5	70.3
<b>108.0</b>	41.4	53.4	64.7	76.9
<b>114.3</b>	48.5	63.0	76.6	91.2

\*Where the indicated protection from freezing provided by AF/Armaflex Class O is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-15°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
10.0	1.2*	1.4*	1.6*	1.8*
12.0	1.7*	2.0*	2.3*	2.5*
15.0	2.6*	3.0*	3.4*	3.8*
22.0	4.7*	5.7*	6.5*	7.3*
28.0	6.3*	7.7*	8.8*	10.0*
35.0	8.7*	10.8*	12.5	14.3
42.0	11.3*	14.0	16.4	18.9
54.0	15.2	19.2	22.7	26.4
67.0	18.6	23.6	28.2	33.0
76.1	23.7	30.4	36.5	42.9
108.0	35.8	46.4	56.3	67.0

### MDPE Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
20.0	2.8*	3.4*	3.9*	4.3*
25.0	4.3*	5.2*	6.0*	6.8*
32.0	5.7*	7.0*	8.1*	9.3*
40.0	7.9*	9.8*	11.5*	13.2
50.0	10.4*	13.1	15.4	17.9
63.0	13.5	17.2	20.4	23.9
75.0	19.6	25.0	30.0	35.2
90.0	25.3	32.6	39.3	46.5
110.0	33.1	42.9	52.2	62.1
125.0	35.9	46.8	57.0	68.0

\*Where the indicated protection from freezing provided by AF/Armaflex Class O is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-15°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
Total Freezing Time (Hours)				
17.2	2.2*	2.6*	3.0*	3.3*
26.9	4.4*	5.4*	6.2*	7.0*
33.7	5.9*	7.3*	8.5*	9.7*
42.4	8.1*	10.1*	11.8*	13.6
48.3	11.0*	13.9	16.3	18.9
60.3	14.5	18.3	21.8	25.4
76.1	19.9	25.5	30.6	36.0
88.9	26.0	33.6	40.4	47.8
108.0	28.0	36.3	44.1	52.4
114.3	32.9	42.8	52.0	61.9

\*Where the indicated protection from freezing provided by AF/Armaflex Class O is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-20°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
10.0	0.9*	1.1*	1.2*	1.3*
12.0	1.3*	1.5*	1.7*	1.9*
15.0	1.9*	2.3*	2.6*	2.9*
22.0	3.6*	4.3*	4.9*	5.5*
28.0	4.8*	5.8*	6.7*	7.6*
35.0	6.6*	8.2*	9.5*	10.9*
42.0	8.6*	10.7*	12.5	14.4
54.0	11.6*	14.6	17.3	20.1
67.0	14.1	18.0	21.4	25.1
76.1	18.0	23.1	27.7	32.6
108.0	27.2	35.3	42.8	50.9

### MDPE Pipe:

AF/Armaflex Class O Thickness				
Pipe O.D (mm)	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
20.0	2.2*	2.6*	3.0*	3.3*
25.0	3.3*	4.0*	4.6*	5.2*
32.0	4.3*	5.3*	6.2*	7.0*
40.0	6.0*	7.5*	8.7*	10.0*
50.0	7.9*	9.9*	11.7*	13.6
63.0	10.3*	13.0	15.5	18.2
75.0	14.8	19.0	22.8	26.8
90.0	19.2	24.8	29.9	35.3
110.0	25.1	32.7	39.6	47.2
125.0	27.2	35.5	43.3	51.7

\*Where the indicated protection from freezing provided by AF/Armaflex Class O is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-20°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

Pipe O.D (mm)	AF/Armaflex Class O Thickness			
	13mm	19mm	25mm	32mm
<b>Total Freezing Time (Hours)</b>				
17.2	1.7*	2.0*	2.3*	2.5*
26.9	3.4*	4.1*	4.7*	5.4*
33.7	4.5*	5.5*	6.4*	7.4*
42.4	6.2*	7.7*	9.0*	10.4*
48.3	8.4*	10.5*	12.4	14.4
60.3	11.0*	13.9	16.6	19.3
76.1	15.2	19.4	23.3	27.4
88.9	19.8	25.5	30.7	36.3
108.0	21.3	27.6	33.5	39.9
114.3	25.0	32.6	39.6	47.2

\*Where the indicated protection from freezing provided by AF/Armaflex Class O is less than the recommended 12 hours, Armacell recommends trace heating be used.



## Insulation Thicknesses to Prevent Pipe Freezing

Given a  $-6^{\circ}\text{C}$  ambient temperature and an initial water temperature of  $7^{\circ}\text{C}$  Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when HT Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
10.0	2.7*	3.1*	3.4*
12.0	3.8*	4.4*	4.9*
15.0	5.6*	6.5*	7.4*
22.0	10.3*	12.3	14.0*
28.0	13.8	16.7	19.1
35.0	19.1	23.4	27.2
42.0	24.7	30.6	35.7
54.0	33.4	41.9	49.4
67.0	40.7	51.5	61.2
76.1	52.3	66.4	79.3
108.0	78.8	101.6	122.6

### MDPE Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
20.0	6.2*	7.4*	8.4*
25.0	9.5*	11.4*	13.0
32.0	12.5	15.2	17.6
40.0	17.4	21.4	24.9
50.0	22.8	28.5	33.5
63.0	29.7	37.4	44.4
75.0	43.1	54.7	65.2
90.0	55.7	71.3	85.6
110.0	73.0	94.1	113.6
125.0	79.1	102.4	124.1

\*Where the indicated protection from freezing provided by HT Armaflex is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a  $-6^{\circ}\text{C}$  ambient temperature and an initial water temperature of  $7^{\circ}\text{C}$  Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when HT Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
17.2	4.7*	5.6*	6.3*
26.9	9.6*	11.6*	13.3
33.7	12.8	15.7	18.1
42.4	17.6	21.7	25.4
48.3	24.1	30.0	35.3
60.3	31.6	39.7	47.0
76.1	43.7	55.5	66.3
88.9	57.2	73.1	87.7
108.0	61.2	78.9	95.2
114.3	72.3	93.3	112.8

\*Where the indicated protection from freezing provided by HT Armaflex is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-10°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when HT Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
10.0	1.7*	1.9*	2.1*
12.0	2.3*	2.7*	3.0*
15.0	3.4*	4.0*	4.5*
22.0	6.3*	7.6*	8.6*
28.0	8.4*	10.2*	11.8*
35.0	11.7*	14.4	16.7
42.0	15.2	18.8	21.9
54.0	20.5	25.7	30.3
67.0	25.0	31.6	37.6
76.1	32.0	40.8	48.6
108.0	48.3	62.3	75.2

### MDPE Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
20.0	3.8*	4.5*	5.2*
25.0	5.8*	7.0*	8.0*
32.0	7.7*	9.4*	10.8*
40.0	10.6*	13.1	15.3
50.0	14.0	17.5	20.6
63.0	18.2	23.0	27.2
75.0	26.4	33.5	40.0
90.0	34.2	43.7	52.5
110.0	44.7	57.7	69.7
125.0	48.5	62.8	76.1

\*Where the indicated protection from freezing provided by HT Armaflex is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-10°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when HT Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
17.2	2.9*	3.5*	3.9*
26.9	5.9*	7.2*	8.2*
33.7	7.9*	9.7*	11.2*
42.4	10.9*	13.4	15.7
48.3	14.9	18.5	21.7
60.3	19.4	24.5	29.0
76.1	26.9	34.2	40.8
88.9	35.1	44.9	53.9
108.0	37.7	48.6	58.6
114.3	44.4	57.4	69.4

\*Where the indicated protection from freezing provided by HT Armaflex is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-15°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when HT Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
10.0	1.1*	1.3*	1.4*
12.0	1.6*	1.8*	2.0*
15.0	2.3*	2.7*	3.1*
22.0	4.3*	5.1*	5.9*
28.0	5.7*	6.9*	7.0*
35.0	8.0*	9.8*	11.3*
42.0	10.3*	12.7	14.9
54.0	13.9	17.4	20.6
67.0	17.0	21.5	25.5
76.1	21.7	27.6	33.0
108.0	32.7	42.2	51.0

### MDPE Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
20.0	2.6*	3.1*	3.5*
25.0	3.9*	4.8*	5.4*
32.0	5.2*	6.4*	7.3*
40.0	7.2*	8.9*	10.4*
50.0	9.5*	11.9*	14.0
63.0	12.4	15.6	18.5
75.0	17.9	22.7	27.1
90.0	23.1	29.6	35.6
110.0	30.3	39.1	47.2
125.0	32.8	42.6	51.6

\*Where the indicated protection from freezing provided by HT Armaflex is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-15°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when HT Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

Pipe O.D (mm)	HT Armaflex Thickness		
	13mm	19mm	25mm
<b>Total Freezing Time (Hours)</b>			
<b>17.2</b>	<b>2.0*</b>	<b>2.4*</b>	<b>2.7*</b>
<b>26.9</b>	<b>4.0*</b>	<b>4.9*</b>	<b>5.6</b>
<b>33.7</b>	<b>5.4*</b>	<b>6.6*</b>	<b>7.6*</b>
<b>42.4</b>	<b>7.4*</b>	<b>9.2*</b>	<b>10.7*</b>
<b>48.3</b>	<b>10.1*</b>	12.6	14.8
<b>60.3</b>	13.2	16.6	19.7
<b>76.1</b>	18.2	23.2	27.7
<b>88.9</b>	23.8	30.5	36.6
<b>108.0</b>	25.6	33.0	39.9
<b>114.3</b>	30.2	39.0	47.1

\*Where the indicated protection from freezing provided by HT Armaflex is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-20°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when HT Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
10.0	0.9*	1.0*	1.1*
12.0	1.2*	1.4*	1.6*
15.0	1.8*	2.1*	2.3*
22.0	3.3*	3.9*	4.4*
28.0	4.4*	5.3*	6.1*
35.0	6.0*	7.4*	8.6*
42.0	7.8*	9.7*	11.3*
54.0	10.6*	13.2	15.6
67.0	12.9	16.3	19.4
76.1	16.5	21.0	25.1
108.0	24.8	32.0	38.7

### MDPE Pipe:

HT Armaflex Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
20.0	2.0*	2.3*	2.7*
25.0	3.0*	3.6*	4.1*
32.0	4.0*	4.8*	5.6*
40.0	5.5*	6.8*	7.9*
50.0	7.2*	9.0*	10.6*
63.0	9.4*	11.8*	14.0
75.0	13.6	17.3	20.6
90.0	17.6	22.5	27.0
110.0	23.0	29.7	35.9
125.0	24.9	32.3	39.2

\*Where the indicated protection from freezing provided by HT Armaflex is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-20°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when HT Armaflex is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

Pipe O.D (mm)	HT Armaflex Thickness		
	13mm	19mm	25mm
<b>Total Freezing Time (Hours)</b>			
<b>17.2</b>	1.5*	1.8*	2.0*
<b>26.9</b>	3.1*	3.7*	4.3*
<b>33.7</b>	4.1*	5.0*	5.8*
<b>42.4</b>	5.6*	7.0*	8.1*
<b>48.3</b>	7.7*	9.6*	11.2*
<b>60.3</b>	10.0*	12.7	15.0
<b>76.1</b>	13.9	17.6	21.1
<b>88.9</b>	18.1	23.2	27.8
<b>108.0</b>	19.5	25.1	30.3
<b>114.3</b>	22.9	29.6	35.8

\*Where the indicated protection from freezing provided by HT Armaflex is less than the recommended 12 hours, Armacell recommends trace heating be used.



## Insulation Thicknesses to Prevent Pipe Freezing

Given a  $-6^{\circ}\text{C}$  ambient temperature and an initial water temperature of  $7^{\circ}\text{C}$  Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Tubolit is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
<b>Total Freezing Time (Hours)</b>			
10.0	2.9*	3.3*	3.7*
12.0	4.1*	4.7*	5.3*
15.0	6.0*	7.0*	7.9*
22.0	11.0*	13.3	15.1
28.0	14.7	17.9	20.6
35.0	20.4	25.2	29.2
42.0	26.4	32.8	38.4
54.0	35.7	44.9	53.1
67.0	43.5	55.2	65.8
76.1	55.8	71.2	85.3

### MDPE Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
<b>Total Freezing Time (Hours)</b>			
20.0	6.6*	7.9*	9.0*
25.0	10.1*	12.3	14.1
32.0	13.4	16.4	19.0
40.0	18.5	23.0	26.8
50.0	24.4	30.6	36.0
63.0	31.7	40.1	47.7
75.0	45.9	58.6	70.2

\*Where the indicated protection from freezing provided by Tubolit is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a  $-6^{\circ}\text{C}$  ambient temperature and an initial water temperature of  $7^{\circ}\text{C}$  Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Tubolit is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
17.2	5.1*	6.0*	6.8*
26.9	10.3*	12.5	14.3
33.7	13.7	16.8	19.5
42.4	18.8	23.3	27.3
48.3	25.8	32.2	37.9
60.3	33.7	42.6	50.6
76.1	46.6	59.5	71.3

\*Where the indicated protection from freezing provided by Tubolit is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-10°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Tubolit is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
10.0	1.8*	2.1*	2.3*
12.0	2.5*	2.9*	3.3*
15.0	3.7*	4.3*	4.9*
22.0	6.8*	8.1*	9.3*
28.0	9.0*	11.0*	12.7
35.0	12.5	15.5	18.0
42.0	16.2	20.1	23.6
54.0	21.9	27.6	32.6
67.0	26.7	33.9	40.5
76.1	34.2	43.7	52.3

### MDPE Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
20.0	4.1*	4.9*	5.6*
25.0	6.2*	7.5*	8.6*
32.0	8.2*	10.1*	11.7*
40.0	11.4*	14.1	16.5
50.0	15.0	18.8	22.1
63.0	19.4	24.7	29.3
75.0	28.2	36.0	43.1

\*Where the indicated protection from freezing provided by Tubolit is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-10°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Tubolit is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
17.2	3.1*	3.7*	4.2*
26.9	6.3*	7.7*	8.9*
33.7	8.5*	10.4*	12.1
42.4	11.6	14.4	16.9
48.3	15.9	20.0	23.4
60.3	20.8	26.3	31.2
76.1	28.7	36.6	43.9

\*Where the indicated protection from freezing provided by Tubolit is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-15°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Tubolit is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
10.0	1.2*	1.4*	1.6*
12.0	1.7*	2.0*	2.2*
15.0	2.5*	2.9*	3.3*
22.0	4.6*	5.5*	6.3*
28.0	6.1*	7.5*	8.6*
35.0	8.5*	10.5*	12.2
42.0	11.0	13.7	16.0
54.0	14.9	18.7	22.1
67.0	18.1	23.0	27.5
76.1	23.2	29.7	35.5

### MDPE Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
20.0	2.8*	3.3*	3.8*
25.0	4.2*	5.1*	5.9*
32.0	5.6*	6.8*	7.9*
40.0	7.7*	9.6*	11.2*
50.0	10.2*	12.7	15.0
63.0	13.2	16.7	19.9
75.0	19.1	24.4	29.2

\*Where the indicated protection from freezing provided by Tubolit is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-15°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Tubolit is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
17.2	2.1*	2.5*	2.9*
26.9	4.3*	5.3*	6.0*
33.7	5.8*	7.1*	8.2*
42.4	7.9*	9.8*	11.5*
48.3	10.8*	13.5	15.9
60.3	14.1	17.9	21.2
76.1	19.5	24.9	29.8

\*Where the indicated protection from freezing provided by Tubolit is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-20°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Tubolit is used. Local water supply regulations recommend providing at least 12 hours protection.

### Copper Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
10.0	0.9*	1.1*	1.2*
12.0	1.3*	1.5*	1.7*
15.0	1.9*	2.2*	2.5*
22.0	3.5*	4.2*	4.8*
28.0	4.7*	5.7*	6.5*
35.0	6.5*	8.0*	9.3
42.0	8.3	10.4	12.2
54.0	11.3	14.2	16.8
67.0	13.8	17.5	20.9
76.1	17.6	22.5	27.0

### MDPE Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
20.0	2.1*	2.5*	2.9*
25.0	3.2*	3.9*	4.5*
32.0	4.2*	5.2*	6.0*
40.0	5.9*	7.3*	8.5*
50.0	7.7*	9.7*	11.4*
63.0	10.0*	12.7	15.1
75.0	14.5	18.5	22.2

\*Where the indicated protection from freezing provided by Tubolit is less than the recommended 12 hours, Armacell recommends trace heating be used.

## Insulation Thicknesses to Prevent Pipe Freezing

Given a **-20°C** ambient temperature and an initial water temperature of 7°C Armacell has calculated (in accordance with BS EN ISO 12241) the following freezing times of pipework when Tubolit is used. Local water supply regulations recommend providing at least 12 hours protection.

### Steel Pipe:

Tubolit Thickness			
Pipe O.D (mm)	13mm	19mm	25mm
Total Freezing Time (Hours)			
17.2	1.6*	1.9*	2.2*
26.9	3.3*	4.0*	4.6*
33.7	4.4*	5.4*	6.3*
42.4	6.0*	7.5*	8.8*
48.3	8.2*	10.3*	12.1
60.3	10.7	13.6	16.2
76.1	14.8	18.9	22.7

\*Where the indicated protection from freezing provided by Tubolit is less than the recommended 12 hours, Armacell recommends trace heating be used.