



## **R1 32 73 01 Tata Steel Technical Directive**

Manual thermal insulation according to CINI.  
Overview insulation and sealing materials for  
aboveground piping systems

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## 1. GENERAL

To counteract unnecessary or unwanted dissipation of heat or cold to the environment, or out of safety considerations, piping and installation components are insulated.

Usually this insulation layer consists of air trapped in tiny chambers.

In a few cases, an insulation layer of trapped inert gas will be used.

This will result in a very thin insulation system. When incorrect choices are made, the application of a layer of insulation may result into a host of problems. These can have, in the long run a significant impact on production, safety and the environment. This Directive is a tool for constructors and other users to facilitate their selection and to avoid possible errors.

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## 2. WORKING WITH THE CINI-DIRECTIVE

### 2.1. Introduction

The standardization committee has decided to make use of the knowledge of the CINI committee regarding the thermal insulation of cold and heat system components and pipes. The CINI commission is a foundation that comes forth from a consultation on corrosion and especially insulation problems, conducted by insulation and materials experts from a number of large internationally operating Dutch industries.

The CINI Committee publishes a manual with selection tables that lead rapidly to an insulation system.

Besides extensive material descriptions of the necessary materials for insulating, it shows, with the aid of images many examples of finishing details to pipelines and machine parts. (All section references in this document relate to this CINI manual.)

### 2.2. Insulation Choice considerations

Before a choice can be made to what kind of insulation is necessary/desirable some questions need to be answered first by the constructor, concerning the conditions to be satisfied by the insulation.

Some examples:

- Is it a cold or heat insulation
- Is it necessary/desirable that the boiler or pipe wall is regularly inspected?
- How are the forces between the walls, pipes and mountings passed through.
- Should the insulation jacket be suitable to be walked on or are there other chemical or mechanical (wind) loads.
- The choice of the insulating material must not conflict with the regulations concerning asbestos and fibrous materials in the Tata Steel regulations, Safety, Environment and Energy.
- The thickness of the insulating material of choice is a balance of, economy, efficiency and performance of the various details.
- The need for the preservation of the piping under the insulation in particular, depends on the temperature conditions of the system, and the various materials of which the system is constructed.
- Whether there is any need for tracing or any other external temperature medium to be included within the insulation.

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### 2.3. Selection table according to CINI

In the CINI manual, indicated in Section 0 a number of selection tables are listed that could provide the desired insulation method and the best assembly method for a temperature range of +20 to +430 degrees for both pipelines as for equipment.

The same selection tables are there also for cold insulation from +20 to -40 degrees.

The insulation thicknesses referred to in the manual are of minimum thicknesses which do not take into account the frequently (pretty much standard) used supports for piping at Tata Steel, where it is possible that these mounts stand out of the insulation.

Chapter 3.1.1 includes a preferred table of insulation thickness which in many cases do meet up to this standard.

### 2.4. Choice of jacketing material:

With the aid of the selection tables in the CINI manual you can choose your insulation. It also gives direction to the material that will be used to jacket the insulation.

Chapter 3 is devoted entirely to this subject.

Here, too it is generally indicated which materials are used.

In the old standard, some choices were already made, to make it easier for the constructor.

Chapter 3.1.2 will return to this with a number of preferred choices.

### 2.5. Assembly:

In chapter 4 of the CINI manual there are a large number of assembly details given for thermal insulation for a wide range of situations.

In Chapter 5 of the CINI manual the assembly details for cold insulation are indicated.

The descriptions and sketches are such that further explanation is unnecessary.

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### 3. POINTS OF ATTENTION FOR THE APPLICATION OF THE CINI DIRECTIVE AT TATA STEEL IJMUIDEN

#### 3.1. Choice of insulation material (thermal insulation)

For thermal insulation at Tata Steel, mineral wools, glass wool or rock wool are especially selected.

For processing the insulation refer to Chapter 1 Section 3.

Depending on the demand for the piping to be traced, and whether it is steam or electrical tracing, the dimensions of the jacketing must be adjusted accordingly.

For detailed sketches of the various forms of tracing see Chapter 4 Section 4.1.04

#### 3.2. Selection table insulation thickness. (thermal insulation)

Here in a distinction is made between the temperature range +50 to +120 degrees (see Table 1) and for the temperature ranges +120 to +535 degrees (see Table 2).

Table 1 from +50 to +120 degrees Celsius

Nominal throughput	External Pipe-diameter	Medium temperature							
		< 50	60	70	80	90	100	110	120
		insulation thickness to be attained after assembly							
15	21,3	30	30	30	30	40	40	40	40
20	26,9	30	30	30	30	40	40	40	40
25	33,7	30	30	30	30	40	40	40	40
32	42,2	30	30	30	30	40	40	40	40
50	60,3	30	30	30	30	40	40	40	40
65	76,1	30	30	30	30	40	40	40	40
80	88,9	40	40	40	40	60	60	60	60
100	114,3	40	40	40	40	60	60	60	60
150	168,3	40	40	40	40	60	60	60	60
200	219,1	40	50	50	50	60	60	60	70
250	273,0	40	50	50	50	60	60	70	70
300	323,9	50	50	50	60	60	60	70	80
350	355,6	50	50	50	60	60	60	80	80
400	406,4	50	50	50	60	70	70	80	80

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Table 2 from +120 to +535 degrees Celsius

Nominal throughput	External Pipe-diameter	Medium temperature in degrees Celsius										
		120	150	180	200	250	300	350	400	475	500	535
		insulation thickness to be attained after assembly										
15	21,3	40	40	40	40	50	50	60	70	80	90	100
20	26,9	40	40	40	50	60	60	70	80	90	100	100
25	33,7	40	40	50	50	60	70	80	90	100	100	120
32	42,2	40	40	50	50	60	80	90	100	110	120	130
40	48,3	40	50	50	60	70	80	100	110	120	130	140
50	60,3	40	50	60	60	70	90	100	110	130	140	150
65	76,1	40	50	60	70	80	90	110	120	140	150	150
80	88,9	60	60	70	70	80	100	120	130	150	160	160
100	114,3	60	60	70	80	90	110	130	140	160	170	170
150	168,3	60	70	80	90	110	130	150	170	200	210	210
200	219,1	70	80	90	100	120	140	160	180	210	220	220
250	273,0	80	90	100	110	130	150	170	190	220	230	230
300	323,9	80	90	100	110	130	150	170	190	220	230	230
350	355,6	80	90	100	110	130	160	180	200	230	240	240
400	406,4	80	100	110	120	140	160	180	210	240	250	250

### 3.3. Choice of jacketing material

As jacketing material aluminium plating is predominantly used.

The minimum thickness of this plate is 0.8 mm for insulated diameters up to 200 mm.

For larger diameters, plate thickness of 1 mm is chosen.

Other jacketing materials are:

- Aluminized steel
- Aluzinc steel
- Hot Dipped Galvanized steel sheet
- Stainless steel sheet
- Isogenepak (PVC) (especially for cold insulation)

For the various choices and material descriptions of the materials listed here, refer to Chapter 3 of the CINI manual.

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### 3.4. Moisture condensation under the insulation

#### 3.4.1. Carbon steel piping:

Only in those cases where the temperature of the pipe to be insulated will **always** remain above 120 degrees Celsius, the use of a preservative can be omitted.

In all other cases, preservation is necessary. The preservative must be in accordance with the conditions. For the preservative directive see R3 10 56 01

#### 3.4.2. Stainless steel piping:

For austenitic stainless steel piping follows that in temperature ranges from +55 to +120 degrees centigrade, under the influence of chlorides, rapid corrosion will occur beneath the insulation.

These chlorides are always present in the insulating material, or they could end up within the insulation through the air, rainwater and leakage of the jacket.

Even during the assembly of the insulating layer a lot of moisture can enter. It is advisable to be alert to this and observe the weather conditions. (Work in dry weather only, wear gloves, cover up during rain etc).

To protect austenitic stainless steel it is recommended to protect the piping with a zinc-free paint system or by a layer of aluminium foil.

The advantage is, that this enables the foil and the insulation to be applied in one working cycle, and the aluminium offers cathodic protection, comparable to the zinc in a paint system on carbon steel.

### 3.5. Vapour-proof insulation for cold pipes

- Condensation occurs mainly at low media temperatures
- Corrosion of the pipes under the insulation may occur due to weather conditions (incorrectly installed insulation or water seeping in). In these cases, preservation of the steel pipe is therefore unavoidable.

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## 4. REFERENCES

This document refers to the CINI manual insulation for industry.  
The CINI manual is also electronically available on the intranet (ProjectNet) only accessible to PTC (Dutch URL) (\Producten en Diensten\Isolatietechniek(CINI handboek)\ )

Tata Steel Standards:

S1 76 81 01            Marking of pipelines. (ID)  
S1 91 73 01            Application of safety colours.

Technical Directive:

R3 10 56 01            Implementation and testing of paintwork in new and existing steel structures

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## 5. DECLARATION

This Directive replaces the old Corus standard 00.32.73.001 and 00.32.73.002.

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