 LINDE AG Process Engineering and Contracting Division	Specification for the Insulation of Oxygen-Bearing Plant Components Insulation Type OS..C.. and OS..K..		LINDE STANDARD 151-07 Part 7
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1 Scope

1.1 This standard shall apply to the condensation prevention insulation and combined condensation prevention, sound and thermal insulation (hot service) of oxygen-bearing plant components with an oxygen content of $\geq 70\%$ and an operating temperature of $\geq -10\text{ °C}$ to 100 °C .

2 Purpose

2.1 In supplement to Part 1, this part of the standard describes the design criteria for the application of a functionally effective condensation prevention insulation/sound insulation and a condensation prevention insulation with a simultaneous function as sound and thermal insulation (hot service) using mineral fibre mats. The method described here represents an alternative to the insulation using mineral fibre mats as per Linde Standard 151-07 Part 5.

3 Definitons

3.1 See Linde Standard 151-07 Part 1, Section 3

4 Reference Codes and Standards

4.1 LS 151-07 Part 1, Specification for the Insulation of Oxygen-Bearing Plant Components.

4.2 AGI Arbeitsblatt Q 137, Foamglass as an Insulating Material for Industrial Plants.

5 Identification of the Insulation Types

5.1 In the technical documents, the insulation systems are identified with insulation type and insulation thickness in mm.

The insulation types covered by this part of the standard are defined as follows:

Table 1: Insulation Types

InsulationType	Description of the insulation
OS..C.. ¹⁾	Condensation prevention insulation with simultaneous function as sound insulation (sound insulation under condensation prevention insulation)
OS..K.. ¹⁾	Condensation prevention insulation with simultaneous function as sound and thermal insulation (hot service) (sound insulation under condensation prevention insulation)
1) The insulation thickness for the sound and condensation prevention insulation shall be inserted behind the code letter.	

6 Materials

6.1 Delivery, Storage and Documentation

See Linde Standard 151-07 Part 1, Section 6.1

6.2 Supporting and Bearing Structures

See Linde Standard 151-07 Part 1, Section 6.2.1

6.3 Insulating Layer

See Linde Standard 151-07 Part 1, Section 6.3.1, 6.3.3 and 6.3.4.

6.4 Jacketing

See Linde Standard 151-07 Part 1, Section 6.4

6.5 Accessory Materials

Linde Standard 151-07 Part 1, Section 6.5 applies analogously.

7 Performance of the Insulation Work

7.1 General

See Linde Standard 151-07 Part 1, Section 7.1

7.2. Supporting and Bearing Structures

7.2.1 Insulating Layer

Linde Standard 151-07 Part 1, Section 7.2.1 applies analogously. The following deviation shall be observed:

- The supporting and bearing rings are arranged at intervals of 600 mm.

7.2.2 Jacketing

Linde Standard 151-07 Part 1, Section 7.2.2 applies analogously.

7.3 Insulating Layer

7.3.1 Sound insulating layer of ceramic fibre mats

The ceramic fibre mats shall be installed and secured without gaps between the foamglass supporting rings and fixed with galvanised binding wire in a distance of 150 mm. Gaps resulting from the installation work shall be carefully stuffed using loose ceramic fibre wool. The ceramic fibre mats must be so cut that the required insulation thicknesses exist at all points even after the installation.

The following insertion loss shall be maintained in relation to the insulation thickness and the nominal diameter:

Tabelle 2: Insertion Loss

Insulation thickness	Insertion loss in octave band 2 kHz	Nominal diameter
30 mm	10 dB	≥ DN 50
50 mm	20 dB	≥ DN 100
100 mm	30 dB	≥ DN 200

7.3.2 Condensation prevention insulating layer

Linde Standard 151-07 Teil 1, Section 7.3.3 applies analogously. In addition, the following shall be observed:

- A vapour barrier of aluminium foil shall be installed on the foamglass mouldings. The longitudinal and circumferential joints shall be overlapped by at least 50 mm and sealed with self-adhesive aluminium foil. In the area of the flange connections, the vapour barrier shall be attached to the foamglass with a sealing tape.
- In order to prevent damage to the vapour barrier in the area of the foamglass supporting rings, an aluminium sheet strip, size: 100 x 0,6 mm shall be placed onto the supporting ring. The sheet strip shall be overlapped by 30 mm and secured all around with a glassfibre-reinforced self-adhesive tape.
- The design of the insulating layer on piping and flanged plant components are shown in figures 1 to 3. The design of insulating layer on equipment is performed by analogy with Linde Standard 151-07 Part 1, Sections 8.1.1 to 8.1.3.

7.4 Jacketing

Linde Standard 151-07 Part 1, Section 7.4 applies analogously. In addition, the following shall be observed:

- The jacketing shall exhibit the following minimum thicknesses:

Table 3: Minimum Thicknesses

The insulation thickness for the sound insulation	Sheet metal thickness of the jacketing
≤ 30 mm	0,8 mm
> 30 mm	1,0 mm

- For weight reasons, a jacketing of aluminium sheet is not used. In exceptional cases, the approval for the use of aluminium sheet shall be obtained in writing from Linde Process Engineering and Contracting Division.
- Insulation end sections in the vicinity of insulated flange connections shall not have a jacketing.
- The jacketing is installed at a distance of 20 mm from the insulating layer. The supporting structure for the jacketing is made in accordance with Section 7.2.2. In order to ensure ventilation of the jacketing, 2 holes, 15 mm diameter, shall be provided per metre on the underside of the jacketing. The provision of the ventilation openings is limited here to horizontal sections of plant components. The ventilation openings shall be drilled before installation of the jacketing.
- The design of jacketing on piping and flanged plant components are shown in Figures 1 to 3. The design of the jacketing on equipment is performed by analogy with Linde Standard 151-07 Part 1, Section 8.1.1 to 8.1.3.

8 Drawing and Sketches

8.1 Piping

8.1.1 Insulation of Horizontal Piping

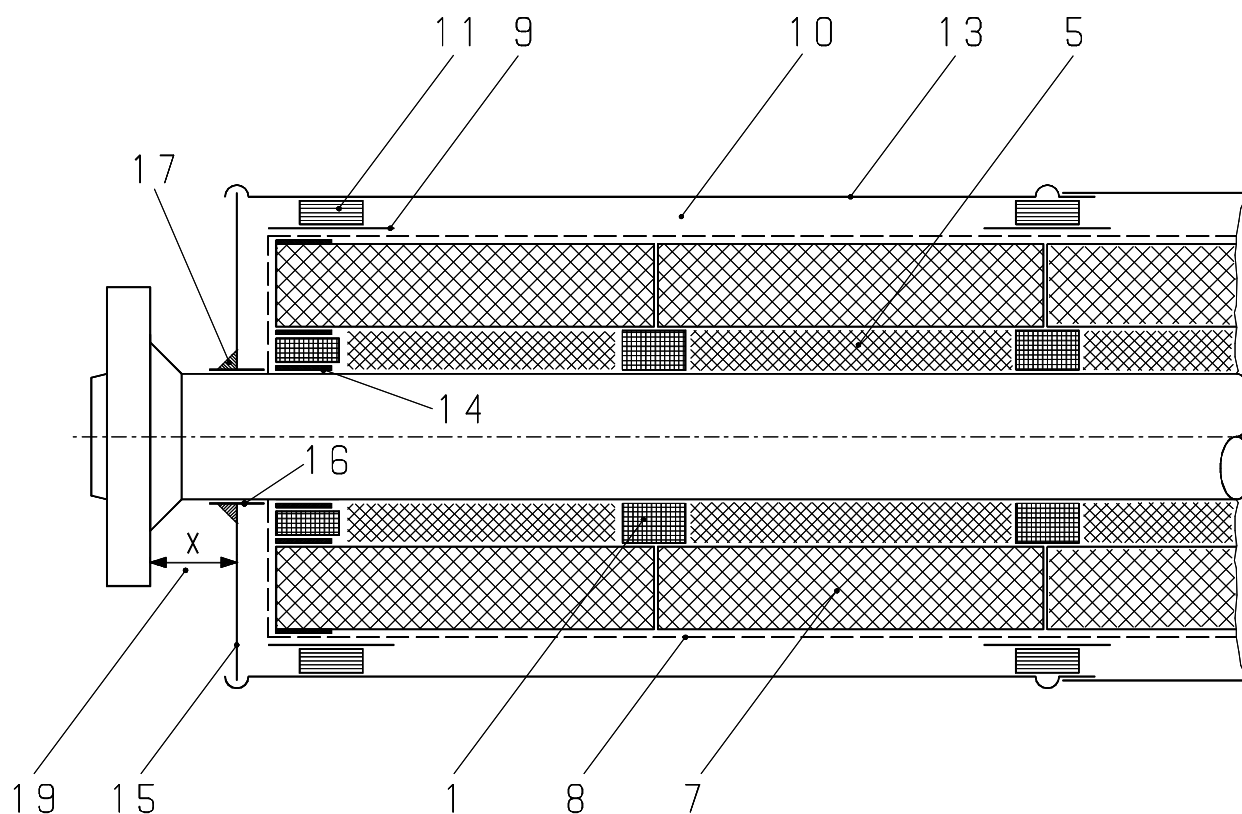


Figure 1

- 1 Insulating layer of supporting structure
- 5 Ceramic fibre mats
- 7 Foamglass mouldings
- 8 Vapour barrier
- 9 Protective sheet metal strips
- 10 Air gap
- 11 Corrugated profile strip
- 13 Jacketing
- 14 Sealing tape
- 15 Insulation end section
- 16 Glassfibre tape
- 17 Gun-grade sealing compound
- 19 $x = \text{Bolt length} + 20 \text{ mm}$

8.2 Flanged Plant Components

8.2.1 Insulation of Flanges

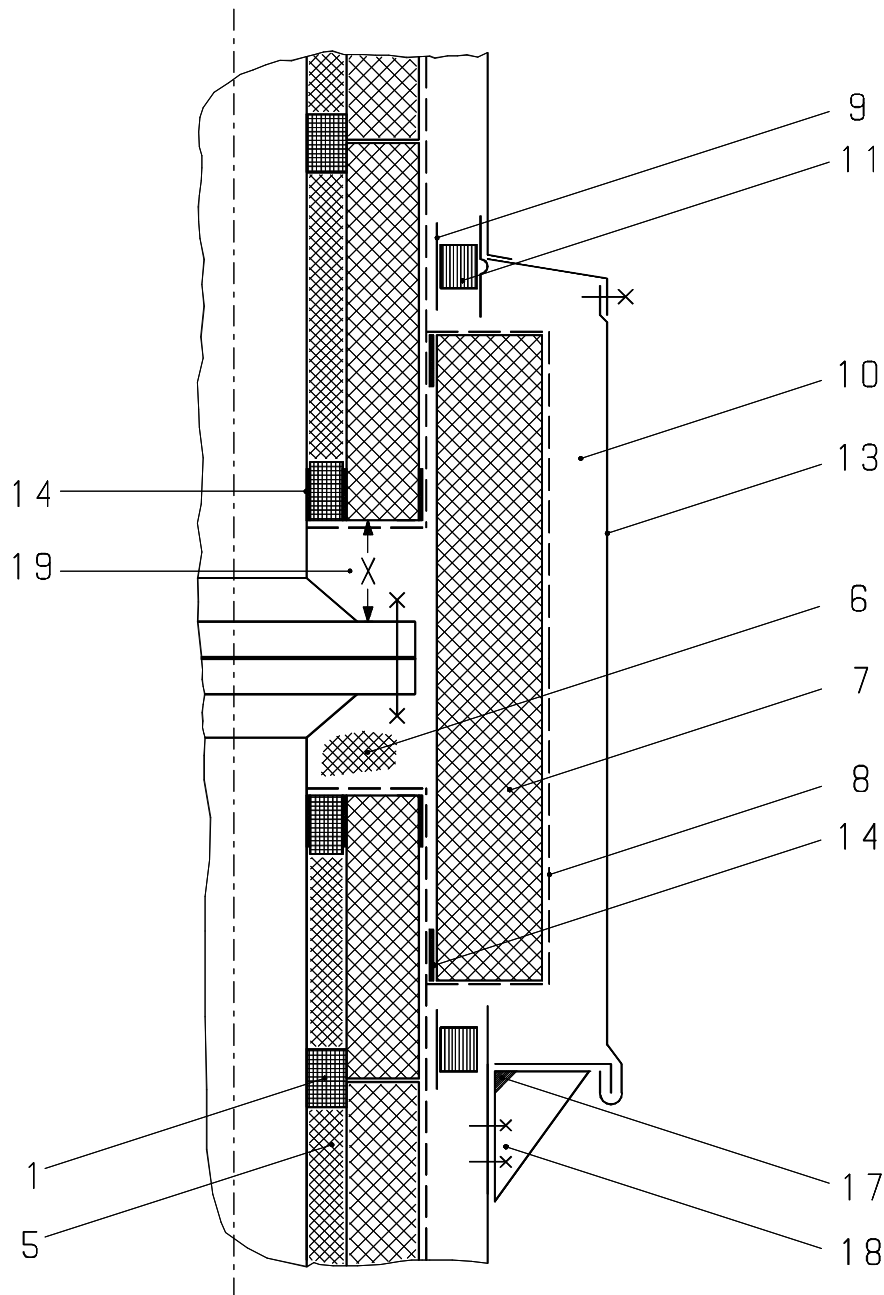


Figure 2

- 1 Insulating layer of supporting structure
- 5 Ceramic fibre mats
- 6 Loose ceramic fibre wool
- 7 Foamglass mouldings
- 8 Vapour barrier
- 9 Protective sheet metal strips
- 10 Air gap
- 11 Corrugated profile strip
- 13 Jacketing
- 14 Sealing tape
- 17 Gun-grade sealing compound
- 18 Cap support
- 19 $x = \text{Bolt length} + 20 \text{ mm}$

8.2.2 Insulation of Valves

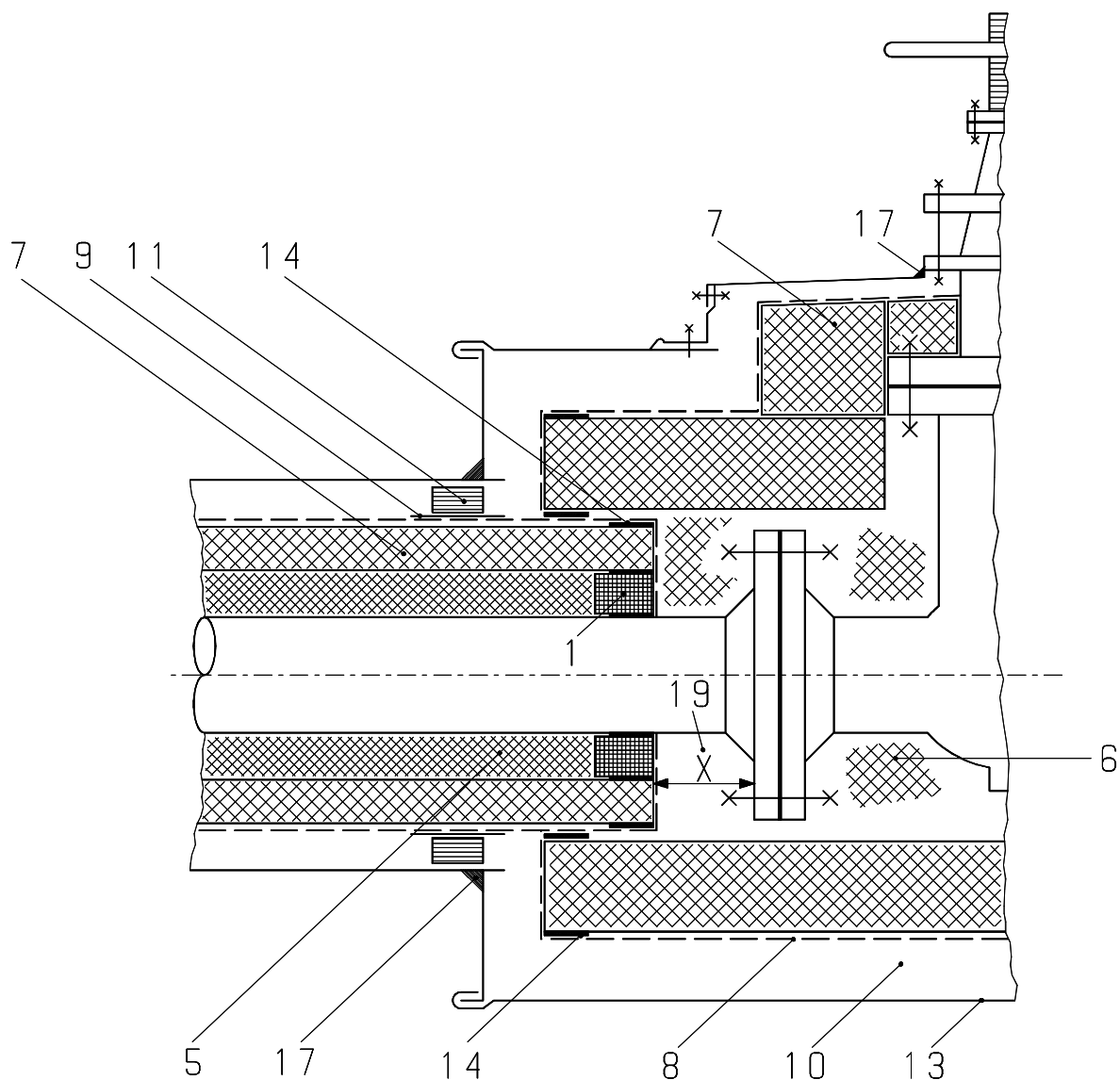


Figure 3

- 1 Insulating layer of supporting structure
- 5 Ceramic fibre mats
- 6 Loose ceramic fibre wool
- 7 Foamglass mouldings
- 8 Vapour barrier
- 9 Protective sheet metal strips
- 10 Air gap
- 11 Corrugated profile strip
- 13 Jacketing
- 14 Sealing tape
- 17 Gun-grade sealing compound
- 19 $x = \text{Bolt length} + 20 \text{ mm}$

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