 LINDE AG Process Engineering and Contracting Division	Specification for the Insulation of Oxygen-Bearing Plant Components Insulation Type OCS and OKS		LINDE STANDARD 151-07 Part 5
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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.

3 Definitions

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.

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

Insulation type	Description of the insulation
OCS	Condensation prevention insulation with simultaneous function as sound insulation
OKS	Condensation prevention insulation with simultaneous function as sound and thermal insulation (hot service)

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 and 6.3.2

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

See Linde Standard 151-07 Part 1, Section 7.2.1.

7.2.2 Jacketing

See Linde Standard 151-07 Part 1, Section 7.2.2.

7.3 Insulating Layer

7.3.1 Linde Standard 151-07 Part 1, Sections 7.3.1 and 7.3.2 apply analogously. In addition, the following shall be observed:

- In order to prevent damage to the vapour barrier, care shall be taken during installation of the mineral fibre mats that no pointed wire ends protrude from the insulating layer.
- In order to achieve a vapour-tight connection between the mineral fibre mats and the plant component, the insulating layer in the area of flange connections shall be made from foamglass mouldings. The length of the foamglass moulding is 300 mm. The foamglass moulding shall be attached to the plant component using sealing tapes. The joints shall also be closed with sealing tapes. The connection between the flange or valve insulating layer and the piping insulating layer shall be made analogously. The foamglass mouldings shall be secured in accordance with LS 151-07 Part 1, Section 7.3.3.
- In order to prevent wetting-through of the insulating layer, a vapour barrier of aluminium foil shall be applied to the mineral fibre mats. The longitudinal and circumferential joints shall be overlapped by at least 50 mm and sealed tight with self-adhesive aluminium foil. In the area of the flange connections, the vapour barrier shall be attached to the foamglass using a sealing tape.
- In order to prevent damage to the vapour barrier in the area of the foamglass supporting rings, a aluminium sheet strip of 100 x 0.6 mm shall be placed onto the supporting ring. The same applies analogously to the foamglass mouldings in the area of flange connections. The sheet metal 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 the insulating layer on equipment is performed by analogy with Linde Standard 151-07 Part 1, Sections 8.1.1 to 8.1.3, and is not illustrated in this part.

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 2: Minimum Thicknesses of Jacketing

Insulation thickness of 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 will not have a jacketing.
- In order to achieve structure-borne sound insulating properties of the jacketing, a second jacket is installed on straight pipe sections. The inner jacket does not have to be corrugated and sealed, but should lie flush with the surface of the outer jacket.
- 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 the 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 Sections 8.1.1 to 8.1.3.

8 Drawings and Sketches

8.1 Piping

8.1.1 Insulation of Horizontal Piping

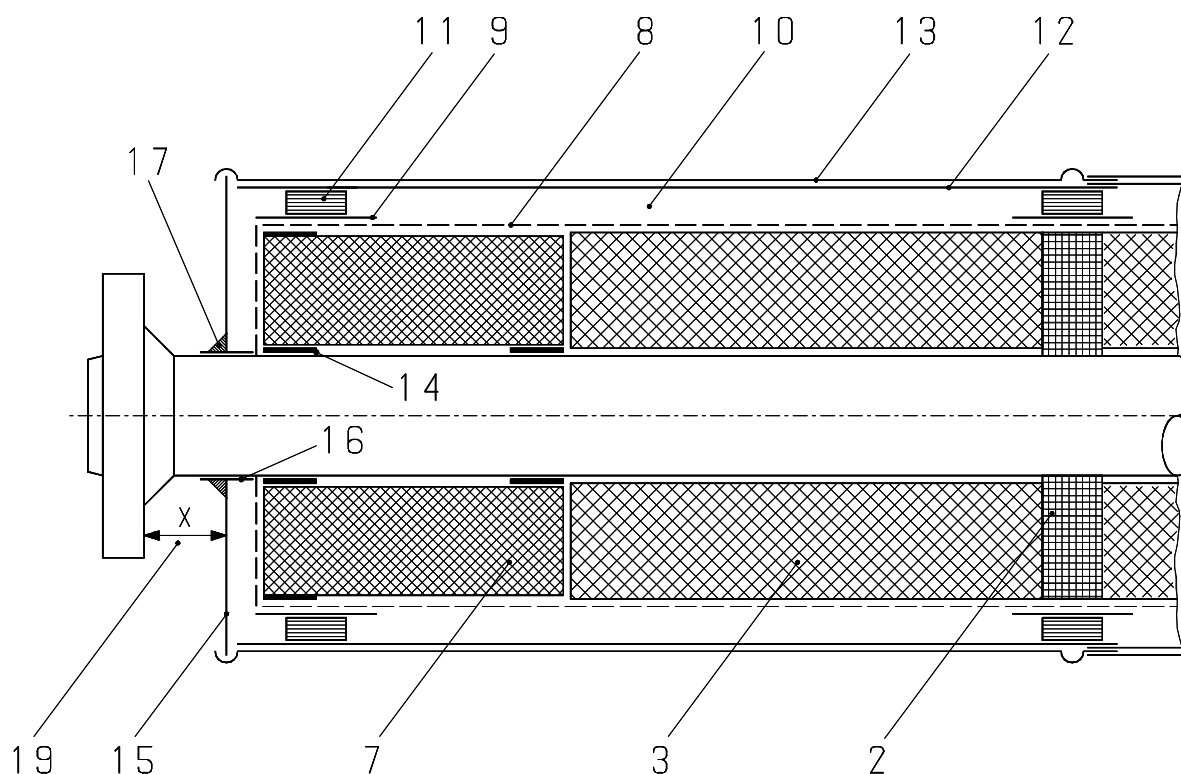


Figure 1

- 2 Jacketing of supporting structure
- 3 Mineral fibre mats
- 7 Foamglass
- 8 Vapour barrier
- 9 Protective sheet metal strips
- 10 Air gap
- 11 Corrugated profile strip
- 12 Inner jacket
- 13 Outer jacket
- 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

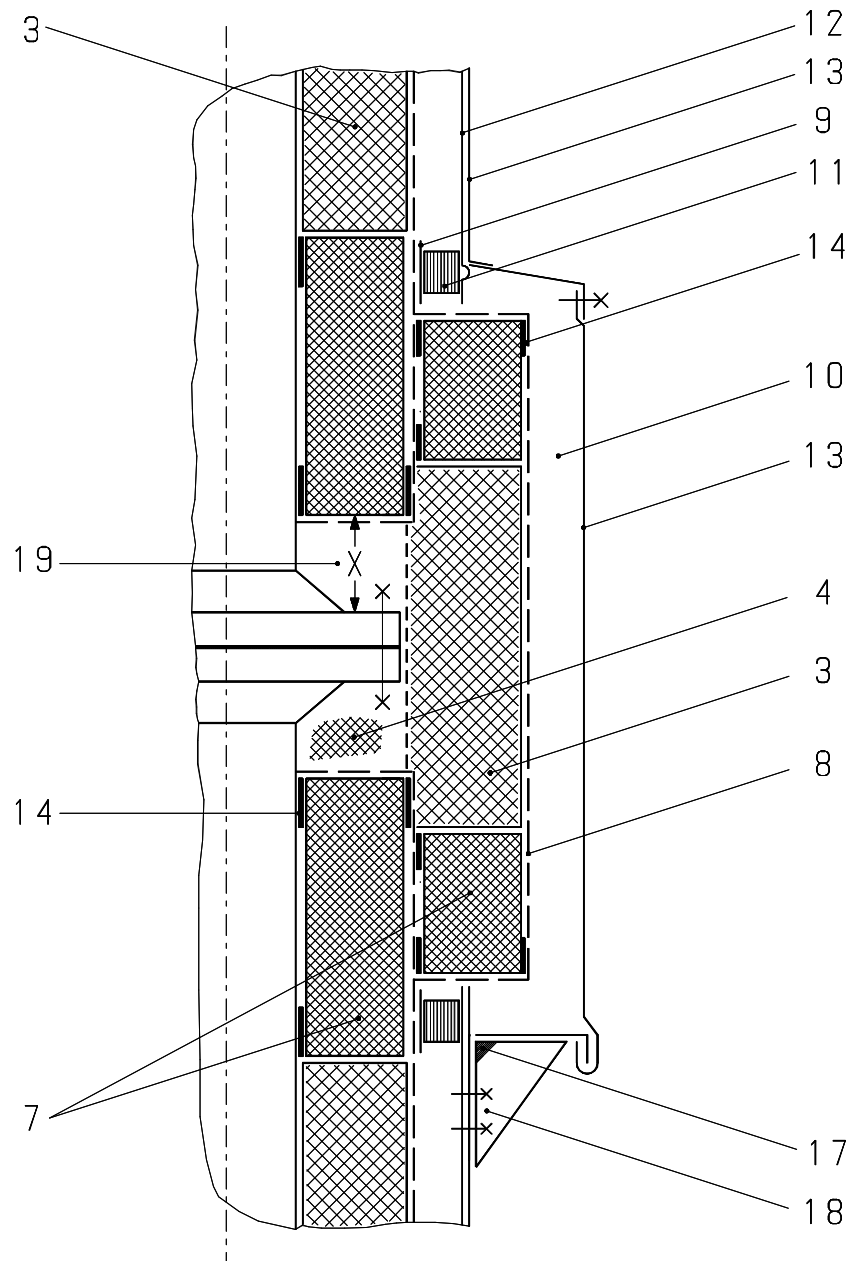


Figure 2

- 3 Mineral fibre mats
- 4 Loose mineral fibre wool
- 7 Foamglass
- 8 Vapour barrier
- 9 Protective sheet metal strips
- 10 Air gap
- 11 Corrugated profile strip
- 12 Inner jacket
- 13 Outer jacket
- 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

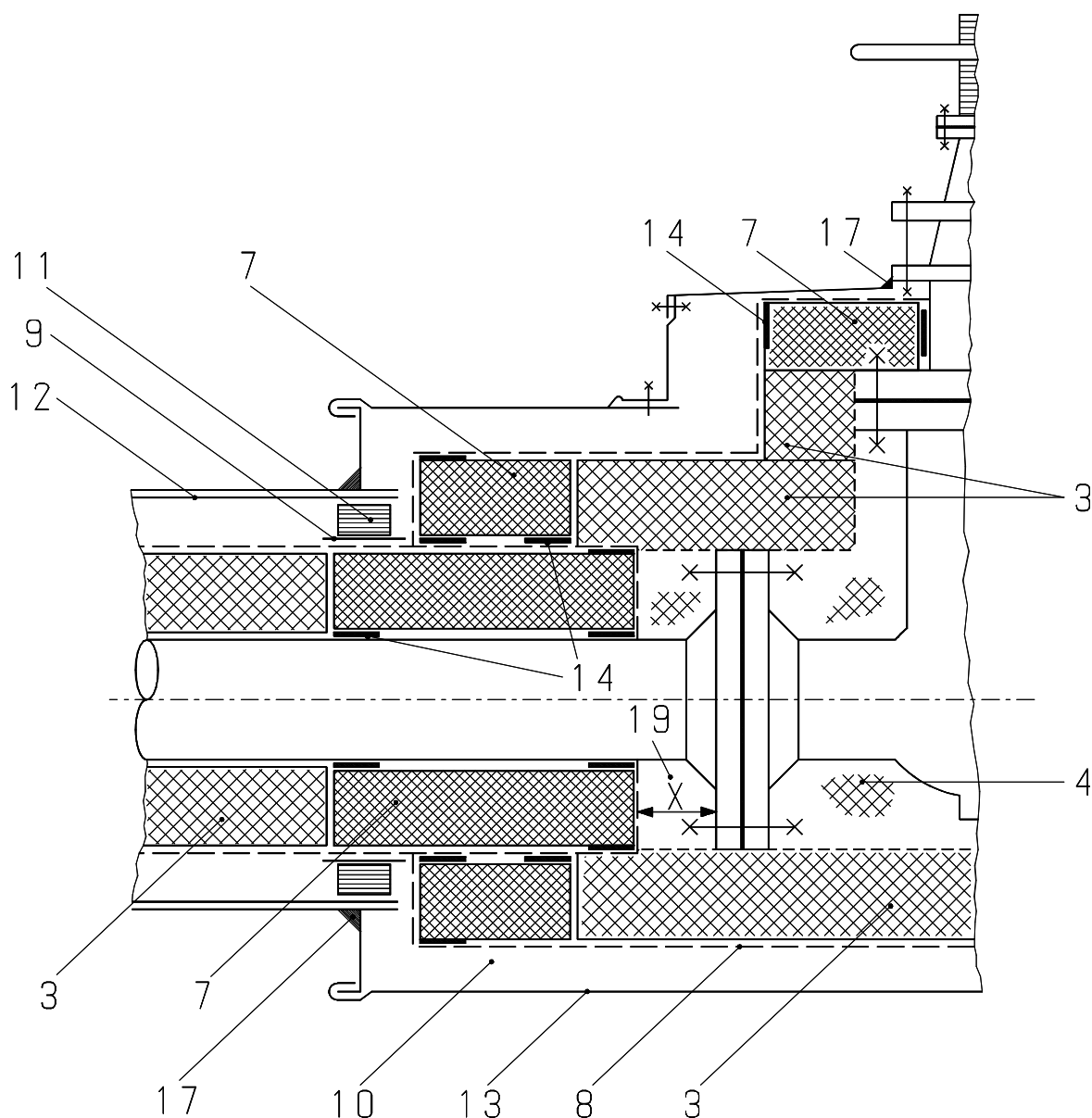


Figure 3

- 3 Mineral fibre mats
- 4 Loose mineral fibre wool
- 7 Foamglass
- 8 Vapour barrier
- 9 Protective sheet metal strips
- 10 Air gap
- 11 Corrugated profile strip
- 12 Inner jacket
- 13 Outer jacket
- 14 Sealing tape
- 17 Gun-grade sealing compound
- 19 $x = \text{Bolt length} + 20 \text{ mm}$