

# FSTA, ERFA

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Lattergas, N<sub>2</sub>O  
Central distribution

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JANUAR 2020

SVEND GRAM, NIRAS



FSTA

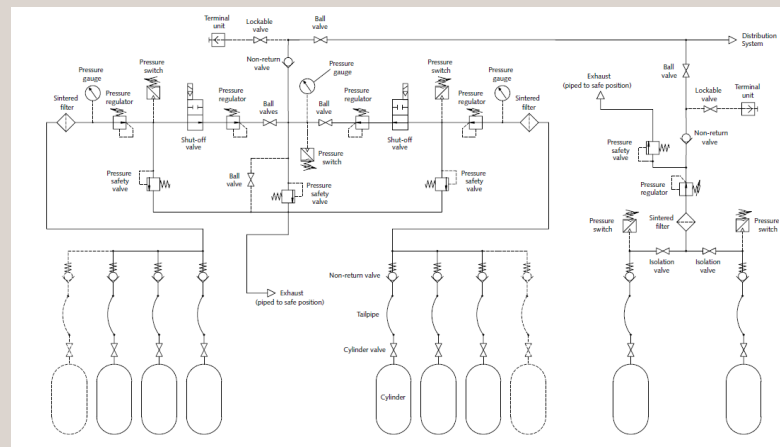
**NIRAS**

# Forsyningsanlæg

## Normgrundlag og flaskecentraler

Centralgasforsyning af lattergas til medicinsk brug på hospitaler er omfattet af DS/EN ISO 7396-1, og designkrav mv. er velbeskrevet heri.

Forsyningsanlægget skal være udført med min 3 forsyninger: primær, sekundær og reserve.



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INTERNATIONAL STANDARD  
ISO 7396-1:2016(E)

### Medical gas pipeline systems — Part 1: Pipeline systems for compressed medical gases and vacuum

#### 1 (\*) Scope

This part of ISO 7396 specifies requirements for design, installation, function, performance, testing, commissioning and documentation of pipeline systems used in healthcare facilities for the following:

- oxygen;
- nitrous oxide;
- medical air;
- carbon dioxide;
- oxygen/nitrous oxide mixture;
- helium.

#### 5.3 Supply systems with cylinders, cylinder bundles or high-pressure reservoir(s)

- 5.3.1 A supply system with cylinders, cylinder bundles or high-pressure reservoir(s) shall comprise:
- a primary source of supply which supplies the pipeline;
  - a secondary source of supply which shall automatically supply the pipeline when the primary source of supply becomes exhausted or fails;
  - a reserve source of supply (except for air or nitrogen for driving surgical tools).

Except for air and nitrogen for driving surgical tools, the supply system with cylinders, cylinder bundles or high-pressure reservoir(s) shall be such that the system design flow can be supplied with any two sources of supply out of service.

5.3.2 The primary and secondary sources of supply which alternately supply the pipeline shall each consist of one bank of cylinders, cylinder bundles or high-pressure reservoir(s). When an exhausted bank of cylinders, cylinder bundles or high-pressure reservoir(s) is replaced, it shall be possible to reset the automatic changeover. Each bank shall have its cylinders, cylinder bundles or high-pressure reservoir(s) connected to a manifold with its own pressure regulator. Except for air, vent valves shall be vented outside of the building.

5.3.3 Except for banks with only one cylinder, cylinder bundle or high-pressure reservoir, a non-return valve shall be installed at the manifold end of each flexible connection between the cylinder, cylinder bundles or high-pressure reservoir(s) and the manifold.

# Fordelingsanlæg

## Design og flow

Fordelingsanlægget skal designes og dimensioneres som øvrige komprimerede medicinske gasser med nødforsyningsenheder mv. i henhold til DS/EN ISO 7396-1.

Driftstryk bør være lavere end oxygen (- 1 bar), så Oxygen er dominerende over N<sub>2</sub>O.

**Table 12 Gas flow – flows required at terminal units**

Service	Location	Nominal pressure (kPa)	Design flow (L/min)	Typical flow required (L/min)	Test flow (L/min)
Oxygen	Operating rooms and rooms in which N <sub>2</sub> O is provided for anaesthetic purposes	400	100 <sup>(1)</sup>	20	100
		400	10		
Nitrous oxide	All other areas	400	15	6	40
				6	40

**Table 2 — Ranges of nominal distribution pressure**

Pressure in kilopascals

Compressed medical gases other than air or nitrogen for driving surgical tools	400 <sup>+100</sup> <sub>0</sub>
Air or nitrogen for driving surgical tools	800 <sup>+200</sup> <sub>-100</sub> <sup>a</sup>
Vacuum	<60 <sup>b</sup>

<sup>a</sup> Regional or national regulations/standards may require a different range.  
<sup>b</sup> Absolute pressure.

If gases are delivered at different nominal distribution pressures, nitrous oxide should be delivered at a nominal distribution pressure lower than that for oxygen and medical air in order to prevent flow of nitrous oxide into the oxygen or medical air pipeline when gas mixers or other equipment are used.

If gases are delivered at different nominal distribution pressures, medical air may be delivered at a nominal distribution pressure lower or higher from that for oxygen. A risk analysis should be conducted to determine appropriate pressure settings.

**Table 15 Nitrous oxide: design and diversified flows**

Department	Design flow for each terminal unit (L/min)	Diversified flow Q (L/min)
Accident & emergency: resuscitation room, per trolley space	10	
Operating	15	$Q = 10 + [(n-1)6/4]$
Maternity: operating suites	15	$Q = 15 + (nT-1)6$
Radiological: all anaesthetic and procedures rooms	15	$Q = 15 + (nS-1)6$
Critical care areas	15	$Q = 10 + [(n-1)6/4]$
Oral surgery/orthodontic: consulting rooms, type 1	10	$Q = 10 + [(n-1)6/4]$
Other departments	10	$Q = 10 + [(n-1)6/4]$
	15	No additional flow included
		No additional flow included

**Table 1 — Marking and colour coding**

Medical gas or mixture	Symbol	Colour coding <sup>a b</sup>
Oxygen	O <sub>2</sub>	White
Oxygen-enriched air	c	
Nitrous oxide	N <sub>2</sub> O	c

# Opmærksomhedspunkter

## Klimapåvirkning og arbejdsmiljø

Lattergas er en drivhusgas, der ifølge Energistyrelsen har en CO<sub>2</sub>-ækvivalent på 298. Dvs. 1 ton N<sub>2</sub>O svarer til 298 ton CO<sub>2</sub>. Unødvendigt forbrug fra utætheder mv. skal derfor minimeres.

Ved nye anlæg bør destruktion af brugt lattergas overvejes.

Der skal sikres bortledning af lattergas fra "behandlingsrum" af forbrugt gas => AGS-anlæg (DS/EN ISO 7396-2).

Test af gas-identitet kan udføres ved måling af ilt-procent hvis der ikke er øvrige medicinske gasser med 0% Oxygen indhold (fx CO<sub>2</sub>)

3.6 An anaesthetic gas scavenging (AGS) terminal unit should be provided whenever nitrous oxide and anaesthetic agents are available for anaesthetic procedures. In recovery areas, where nitrous oxide is not provided, there is no primary source of anaesthetic gas pollution; thus, no anaesthetic gas scavenging system (AGSS) is required. Guidance on operating departments requires such areas to be mechanically ventilated. Where nitrous oxide mixed with oxygen is provided for analgesic purposes, scavenging is not generally practicable and pollution should therefore be controlled by

