

NORSOK STANDARD

XXXX
HEATING, VENTILATION AND AIR-CONDITIONING

Rev. 1, December 1994

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1 FOREWORD

This standard has been developed by the NORSOK Standardisation Work Group for the widest possible national and international application.

Annex A is normative.

2 SCOPE

This standard identifies the basic requirements for the design of heating, ventilation and air conditioning systems.

3 NORMATIVE REFERENCES

Arbeidstilsynet	Best.nr. 391	Arbeidslokaler og personalrom
Arbeidstilsynet	Best.nr. 420	Luftforurensing ved buesveising
Arbeidstilsynet	Best.nr. 444	Klima og luftkvalitet på arbeidplassen
Norsk Standard	NS 3421	Description of Technical Installations
NorskByggforsk- ningsinstitutt	NBI	Retningslinjer for testing og oppstart av ventilasjonsanlegg
Air Moving and Conditioning Assosiation Inc.	AMCA 201	Fan Application Manual

EUROVENT Eurovent 4/5 Method of Testing Air Filters used in general ventilation.

4 DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

All terms and phrases within the scope of this standard shall be regarded as defined in the regulations and international codes and standards referred to in this document.

Arbeidstilsynet Directorate of Labour Inspection

4.2 Abbreviations

L.E.L Lower Explosion Limit

CCR Central Control Room

5 TECHNICAL REQUIREMENTS

5.1 General

The design shall take into account both normal and emergency operation requirements.

The ventilation systems shall be designed to:

- Maintain acceptable working and living environment for personnel and non-destructive conditions for equipment.
- Prevent formation of any combustible mixture and maintain an atmosphere where the gas/air mixture is kept below L.E.L. during normal operation.
- Prevent entry of hydrocarbons into closed non-hazardous areas.
- Prevent smokespreading and keep enclosed escapeways free of smoke in case of fire.

5.2 Natural Ventilation

Minimum requirements for natural ventilation shall be that a local gas leakage rate of 0,05 kg/sec. in hazardous areas shall correspond to less than 20% L.E.L. for the total area volume. The requirement shall be met for 95% of the year.

Ventilation openings shall be optimised with respect to sizes, shapes and positions and give the necessary level of weather protection to improve the working environment.

Potential stagnant zones shall be evaluated

5.3 Mechanical Ventilation

There shall be separate systems, or groups of systems, for the following areas:

- Non-hazardous areas
 - Hazardous areas
- Areas with contaminated air (separate extract).

For practical reasons systems may also be separated for the following areas:

- Living Quarters
- Areas to be in operation during emergency situations.
- Auxiliary systems for naturally ventilated areas
- Derrick and drilling substructure
- Substructure.

The minimum ventilation air volumes shall be documented.

5.4 Fire/Smoke Ventilation

In a fire situation, the ventilation to an area shall continue until the temperature sensor on the fire damper is activated, or the area is manually shut-down.

The above actions shall close fire dampers in both supply and exhaust ducts to avoid excessive over/under pressure in the room.

Mechanically ventilated enclosed escapeways shall have overpressure against neighbouring areas.

When fire extinguishing gases or inert gases are used for fire fighting in a room, the fire dampers shall be controlled by the Fire & Gas system.

5.5 Emergency/shut-down Operation

All systems shall in normal operation be powered from the main power system. Systems to be in operation during emergency situations shall also be powered from the emergency power system.

The system shall ensure that all vital equipment in operation during a shut-down, will have the necessary cooling.

All systems serving areas where area classification depends on ventilation or where operational aspects require extensive ventilation availability, shall have back-up capacity.

For HVAC systems with back-up fans, these fans shall start automatically on failure of duty fans.

All systems shall in normal operation be powered from the main power system. Systems to be in operation during emergency situations shall also be powered from the emergency power system.

The system shall ensure that all vital equipment in operation during a shut-down will have the necessary cooling.

5.6 Heating/Cooling

Pre-heating/Cooling

All air supplied by the mechanical ventilation systems shall be preheated to maintain a minimum of 5 °C in non occupied areas. For occupied areas the minimum temperature shall be suitable for the actual areas/rooms (ref. publication no 444 issued by Arbeidstilsynet).

Water condensate on cooling coils and droplet eliminators shall be properly drained. Water condensate shall not be transferred into the ductwork. The design shall be based on the extreme ambient conditions regarding temperature and humidity.

In areas with high cooling or heating loads, local placed recirculation units for heating or cooling should be used instead of increased ventilation air volumes.

Heating

Heating of ventilation air can be based on the main heating medium system. This can be used directly or via separate low pressure/low temperature water systems.

The type of reheating shall correspond to the ventilation principle chosen.

5.7 Room Air Distribution

Displacement ventilation is recommended and the final design shall comply with normal comfort standard for the relevant rooms and applications.

5.8 Filtration

If required, the air intake should be provided with prefilters with filter class EU3 (G89) according to EUROVENT 4/5 and equipped for mist and droplet collection.

For dust filtration, reference is made to publication no. 444 issued by Arbeidstilsynet.

Space for installation of temporary prefilters shall be provided where necessary to reduce intrusion of sand blast grit, diesel exhaust, etc., during hook-up and commissioning phases.

5.9 Ventilation Fans

Fans should be direct driven.

5.10 Monitoring/Control of HVAC Systems

Central monitoring and control

The HVAC system shall as a minimum have the following control/monitoring facilities:

- Auto/manual operation selecting facilities
- Start/stop of fans
- Fan and damper status/alarm
- Alarm for loss of pressurisation/flow
- Auto/stand-by selecting facilities for fans
- Facilities for change of setpoints for heaters, coolers, etc.

Field Instrumentation

The HVAC system shall as a minimum have the following field instruments:

- Monitoring of pressure-drop across filters.
- Temperature indicators in main supply ducts and temperature sensitive areas.

The system logic shall be equipped with manual reset.

Fire dampers

All firedampers shall be actuator operated with spring return (fail safe).

All firedampers shall be closed by direct activation of the temperature sensor.

Manual closing from CCR shall be implemented.

Limit switch for closed indication shall be provided on firedampers.

Monitoring of areas

For monitoring of pressurised areas reference is made to S-DP-001 "Design Principles: Technical Safety".

6 SYSTEM REQUIREMENTS

6.1 Living Quarters

The laundry room shall be provided with separate extracts with local filter sections to prevent the ductwork and equipment to be clogged.

The Kitchen shall have a separate extract system including hood. Boiling/frying equipment shall have an air curtain to improve the working environment for the kitchen personnel.

Vent outlets from steam ovens and washing machines shall have special connections for extract if these are not located below a hood.

6.2 Drilling Area

For extract from mudpits and shale shakers, precautions shall be taken to avoid clogging of ducts and contaminated condensate in the exhaust area.

The cooling of the cementing room shall be self-contained during emergency operation. In normal operation the room shall be connected to the general ventilation system.

6.3 Utility Areas

Emergency Generator and Firepump Rooms

The cooling of these rooms shall be self-contained during emergency operation. In normal operation the room shall be connected to the general ventilation system.

Battery Rooms

If enclosed maintenance-free batteries are used, no extra ventilation is required.

HVAC Rooms

In HVAC rooms where the differential pressure to the surroundings is over 150 Pa, air lock with air relief hatches in both doors shall be provided.

7 LAYOUT AND ARRANGEMENT

7.1 General

The main air-handling units should be located in designated HVAC rooms.

Ductwork shall be located to enable simple maintenance work.

7.2 Clearance and Accessibility

All equipment and ducting shall be arranged to provide required headroom and clearances for installations, operation, inspection, maintenance and dismantling with the minimum interference or removal of ducting and equipment. Accessible inspection and maintenance doors shall be installed in ductwork.

7.3 Air Intakes and Outlets

The air intakes shall where possible be located underneath the installation.

Systems for hazardous and non hazardous areas may have common air intake if means are provided to prevent the spreading of gas from hazardous to non hazardous areas. Consideration shall be taken to possible contamination sources such as:

- Ventilation extract outlets
- Turbine and diesel engine exhaust outlets
- Mud burning smoke
- Gas leakage from hazardous areas.

The air intakes shall be upstream the prevailing wind. The wind influence on the air intake must be studied and documented.

Outlets from hazardous areas should be located on platform high level.

7.4 Air Extract From Areas

In hazardous areas extract shall be arranged at both high and low level in order to take care of both lighter and heavier than air gases.

Spot extract shall be used wherever suitable to avoid spreading of dust, fumes, heat etc. and to reduce the amount of general ventilation.

7.5 Ducting

Circular ducts shall be used wherever possible.

Special attention shall be paid to ductwork connections to fan inlets and outlets in order to maximise the fan performance. See AMCA publication 201.

Flexible ducting shall be kept to a minimum and be used only for vibration damping or thermal expansion purposes.

Number of fire dampers shall be kept to a minimum.

Measuring stations shall be installed in all main ducts and ductbranches.

8 EQUIPMENT

Description and technical requirements of equipment is found in the relevant Data Sheets and Schedules in Annex A.

Annex A includes Data Sheets/Schedules for the following equipment:

- Fire and Gas Dampers
- Shut-off Dampers
- Pressure Control Dampers
- Balancing Dampers
- Sound Attenuators
- Supply Air Devices
- Extract Air Devices
- Electrical Heating Coils
- Filter/coalescer/separators
- Liquid Medium Coils
- Air Handling Units
- Fans
- Air Filters
- Measuring Stations

ANNEX A

HVAC DATA SHEET

(Normative)