

## RT 91-11260

# SAUNA VENTILATION, HEATING, LIGHTING AND ELECTRICAL INSTALLATIONS

English Translation

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# 1 OBJECTIVES

## Ventilation purposes:

- Maintain pleasant indoor air quality during sauna use
- Dry sauna spaces after use
- Prevent decay of structures and equipment

Ventilation also ensures combustion air supply for wood-fired heaters.

## Sauna Indoor Climate Targets:

- Air temperature at bather's head height: 70–100°C
- Air humidity: 40–70 g water vapor per kg of air
- Radiant heat from heater evenly distributed from all directions

## Washing Room Targets:

- Air temperature: 22–25°C
- Relative humidity: maximum 60%
- Floor surface temperature: minimum 23°C

## Changing Room Targets:

- Air temperature: 22–25°C
- Relative humidity: maximum 60%
- Floor surface temperature: minimum 21°C

## Floor Surface Temperature Recommendations:

Floor Covering	Surface Temperature (°C)
Stone, concrete	27–30
Linoleum, PVC	25–29
Wood, cork	23–28
Textile	21–28

## 2 SAUNA VENTILATION

Apartment and building saunas are typically connected to the building's ventilation system. Building saunas, public saunas, and corporate saunas are recommended to have their own dedicated ventilation system to ensure adequate oxygen supply.

### 2.1 Mechanical Supply and Exhaust System

Fresh air is heated before entering via supply duct, and is led to the lower part of the sauna near the heater via an adjustable supply vent. This system is easy to regulate. Exhaust removes air through the wall or ceiling. In mechanical systems, supply and exhaust are balanced for energy efficiency, controlled airflow, and comfortable conditions.

#### **Sauna with Electric Heater:**

The supply vent is placed minimum 500 mm above the heater, on the wall or ceiling, but NOT directly above the heater (to avoid cold draft on bathers and cold air flowing to the floor). The exhaust vent is recommended at bench seating level on the opposite side. It can also be at the ceiling, fitted with an easily closable exhaust valve. The vent is normally open during heating and use, and closed during rest periods.

#### **Sauna with Wood-Fired Heater (Continuous):**

The exhaust vent is CLOSED during heating and sauna use to maintain chimney draft and ensure combustion air supply to the fire. The supply vent is placed at floor level near the heater and opened during use.

### 2.2 Gravity Ventilation

Gravity ventilation (painovoimainen) is suitable for wood-fired stove saunas without mechanical ventilation requirements. Air enters via an adjustable supply vent near the heater base (outside air via window gaps or dedicated vent). The driving force is the temperature and pressure difference between inside and outside.

#### **Ventilation Area Requirements:**

Supply vent: minimum total area 300 cm<sup>2</sup>

Supply vent: 25 cm<sup>2</sup>/person (minimum 75 cm<sup>2</sup>)

Exhaust vent: 30 cm<sup>2</sup>/person (minimum 150 cm<sup>2</sup>)

If exhaust goes to a vertical pipe above the roof, the adjustable supply vent opening should be approximately 25 cm<sup>2</sup>/person (minimum 75 cm<sup>2</sup>) and the exhaust vent should be minimum 30 cm<sup>2</sup>/person (minimum 150 cm<sup>2</sup>).

If washing is done in the sauna, it is good to have an openable window to reduce the temperature needed at the washing location.

### 2.3 Mechanical Exhaust Only

Fresh air enters through a supply vent minimum 500 mm above the heater on the wall or ceiling. Exhaust is provided via a separate duct. The exhaust vent below benches can be omitted if air can exit via the gap under the door to the washing room.

### 2.4 Circulation Sauna

The circulation sauna (kiertoilmasauna) is for accessible saunas. Instead of conventional high benches, it uses chairs or seats at standard height. A ducted fan draws warm air from the ceiling and blows it to floor level at the wall base.

#### Design Requirements:

- Design airflow: 10 dm<sup>3</sup>/s/m<sup>2</sup> (liters per second per square meter)

- Fan must withstand sauna humidity and temperature

- Speed control and ducting with adequate sound dampening required

- Air blown at wall base at maximum 1.0 m/s velocity

- Benches can be replaced with chairs or bench seats with armrests

*Figure 1. Circulation sauna with accessible seating.*

## 3 WASHING AND CHANGING ROOM VENTILATION

### 3.1 Mechanical Supply and Exhaust

Washing room supply air is heated outdoor air or transferred from the changing room. Supply ducts must not pass through windows (to avoid condensation). Exhaust is directed to the exhaust duct or plenum and then to the outside. WC toilets are connected to the washing room exhaust system.

### 3.2 Mechanical Exhaust Only

Supply air comes from outside or indirectly through the changing room. Exhaust is directed to the outside.

### 3.3 Gravity Ventilation

Supply vent at floor level: approximately 25 cm<sup>2</sup>/person (minimum 100 cm<sup>2</sup>)

Exhaust at ceiling level: approximately 50 cm<sup>2</sup>/person (minimum 200 cm<sup>2</sup>)

## 4 HEATING

Outside the sauna season, sauna rooms are kept warm with radiators, electric heaters, or underfloor heating. The sauna heater itself can also maintain room temperature during non-use periods.

### 4.1 Hydronic Underfloor Heating

Hydronic underfloor heating is suitable for saunas used year-round. Pipes run minimum around the perimeter year-round with no freezing risk. This is a recommended heating method as it also helps keep the sauna and washing room floor dry. Pipes are placed near the floor close to walls, following a layout that responds quickly to temperature changes.

#### Installation Requirements:

Heating cable or element placed in concrete under tiles

Installation follows manufacturer instructions

Heating element minimum 300 mm from walls

30 mA RCD protection required

Cannot be placed under the sauna heater

### 4.2 Electric Heating

Electric heating elements must have drip-proof enclosures and be fed from a circuit with maximum 30 mA RCD protection. The heater is placed at bench level and below, with the supply pipe or conduit routed at floor level.

## 5 LIGHTING

### 5.1 General

Lighting should be dim and atmospheric overall, but safe for movement. Electrical lighting design considers placement, fixture type, selection, and intensity.

Fixtures are positioned so the upper sauna and bench area is dim, while stairs, walkways, and platforms are adequately lit. Consider how lamp replacement affects bench access.

Suitable lighting can be achieved with fiber optic or LED strips illuminating wall and ceiling surfaces indirectly. Sauna lighting can be adjusted with a dimmer to suit preference.



Figure 2. Sauna with indirect fiber optic and accent lighting.

### 5.2 Lighting Installation Requirements (per SFS 6000-7-703)

#### Installation Requirements:

Sauna and washing room lighting circuit: 30 mA RCD required

No light fixtures within 0.5 m horizontally of heater outer edge (vertical limit to ceiling)

#### Below 1 m from Floor:

Minimum IP24 rating required

If used for water spraying: minimum IPX5

#### Above 1 m from Floor:

Standard enclosure ratings apply

Must withstand minimum 125°C ambient (T 125°C marking)

Cable insulation must withstand 170°C

## 6 ELECTRICAL INSTALLATIONS

Sauna electrical design follows regulations per SFS 600-1 and SFS 6000 standards.

### 6.1 Hot Water Heater Installation

The water heater (varaaja) is placed primarily in utility spaces. If placed in the sauna or washing room, the feeding circuit must have 30 mA RCD protection. In the sauna, electrical equipment on the floor must meet heat resistance requirements. Manufacturer instructions for clearances must be followed.

#### Installation Requirements:

Water heater control panels and connections require minimum 800 mm clear working space in front

Water heater enclosure must meet minimum IP24 requirements

Since water heater is cleaned with water spray, enclosure must be minimum IPX5



*Figure 3. Water heater installation in sauna space.*