RT 91-11258 / SIT 97-610121

SAUNA STRUCTURES AND BENCHES

Guidelines for Design and Construction

April 2017

Translated from Finnish

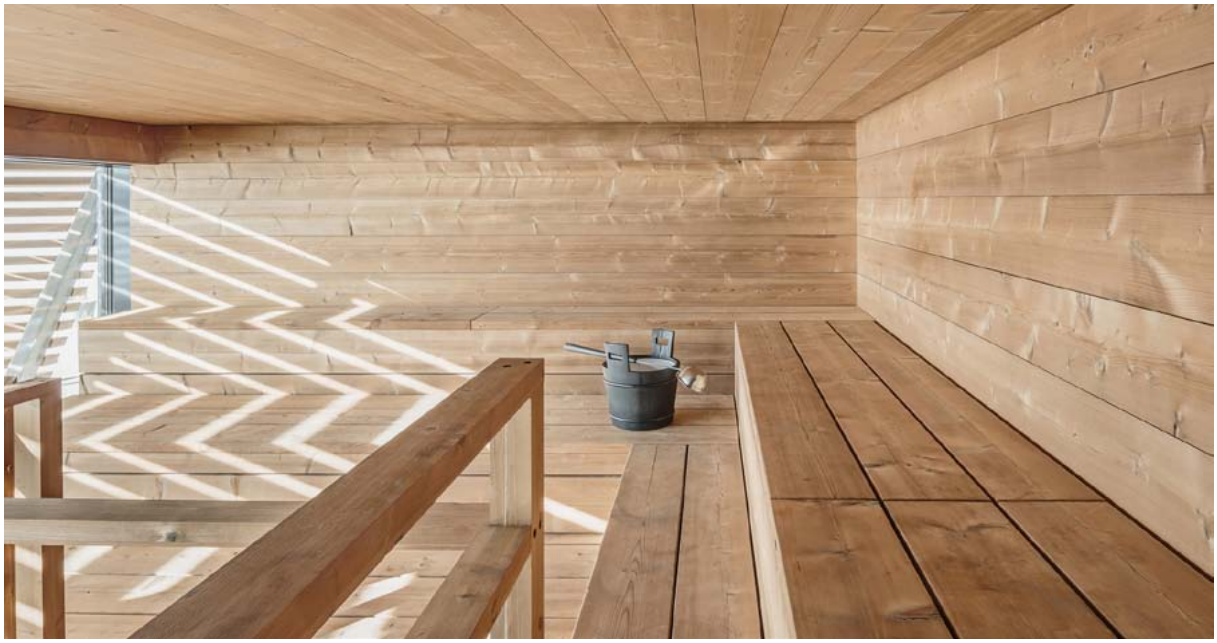

Figure 1. Sauna interior with benches and wood cladding

TABLE OF CONTENTS

1 STRUCTURES

In general, saunas should use moisture-resistant materials for the frame structure. For example, clay brick is recommended for partition walls. Panel walls need to be replaced every few years, so walls not directly adjacent to the sauna typically use ceramic tiling as the surface finish material.

1.1 Thermal Insulation

Building regulations Section D3 "Energy Efficiency of Buildings" contains regulations and guidelines that also apply to saunas. Holiday and recreational buildings designed for year-round use with a heating system have envelope heat loss requirements specified in D3. Wall and ceiling thermal storage capacity can be affected by material and structural design. If the sauna walls and ceiling are stone structures, the interior finish is additional insulation, typically mineral wool. Sauna and washing room insulated floors can be equipped with underfloor heating using hydronic or electric heating connected to the floor's concrete surface. The floor should be pleasant to walk on and dry quickly. Holiday home sauna floors can be built from wood with no insulation. Mineral wool-type insulation is used in walls and ceilings.

1.2 Vapor Barrier

Figure 2. Vapor barrier and aluminum foil installation

Sauna surroundings are protected from water and moisture damage. The structures are protected with a vapor barrier made of aluminum-coated paper, with the reflective surface facing INTO the sauna room. Aluminum sheet (0.7 mm) is possible in public saunas. Closed-cell polyurethane board with aluminum facing is a typical choice for apartment and residential saunas. The vapor barrier is installed on the warm side of wall and ceiling insulation. The number of vapor barrier seams should be minimized and penetrations must be avoided. Penetrations must be carefully sealed. Joints are overlapped at least 150 mm and sealed with heat-resistant aluminum tape and pressed between two wooden strips. Where the frame is located, the vapor barrier is attached with a wooden strip to the frame. Corners, ceiling-wall junctions, and openings around windows, doors, and other penetrations are sealed with extra 200 mm wide strips. The vapor barrier is pressed between the frame and interior cladding. **CRITICAL: The vapor barrier must NOT be penetrated by electrical cables, pipes, or other services.** For stone wall and wood floor junctions, the vapor barrier is connected airtightly to the wall's insulation inner surface. Door and window frame joints are sealed with caulk or sealing tape. Simply pressing the vapor barrier between the frame and interior cladding does not guarantee sufficient airtightness. For timber-framed exterior walls, an external wind barrier board is needed. The wind barrier is designed so that moisture that has entered can evaporate away. The wind barrier must be vapor-permeable.

1.3 Waterproofing

Sauna room floors are waterproofed with brush-applied waterproofing, membrane waterproofing, or floor coating system. For summer saunas, frost-resistant waterproofing is used. Current single-component waterproofing products are not frost-resistant. Sauna and washing room floors always require waterproofing.

1.4 Walls

Sauna walls can be log (timber), solid wood, frame (post-and-beam), or masonry construction. Other spaces connected to the sauna require added insulation and surface finishes as per sauna usage requirements. A separate sauna building's external wall is typically timber frame or log construction. Log is excellent for standalone saunas—both as traditional building material and for its technical properties. Log walls store heat and change temperature slowly. They require significant thermal energy to heat up. The wall absorbs moisture from the sauna steam (löyly) and retains the scent of wood for a long time. Untreated thin boards and similar structures are only suitable for warm-season use. On-site log frame assembly is presented in guideline RT 82-11168. Behind the heater, fire-resistant backing is always required using fire-rated materials. These include fire-rated tile, clinker brick, and fire-resistant board cladding. If the sauna partition wall is frame construction with 100 mm frame, insulation thickness is 75 mm with an air gap between insulation and the wet area board.

1.5 Sub-floors, Intermediate Floors, and Upper Floors

Cast-in-place concrete floors are sloped toward drains. Concrete element floors are finished with surface concrete. **Sauna floor minimum slopes:** Wood plank floor: 1:30 • Tiled floor: 1:100. All floors must slope to the floor drain. The washing room floor drain should be cleaned before washing the floor. If the washing room belongs to the home laundry area, appliances like washing machines can be placed in the washing room provided they don't disturb sauna users.

1.6 Drawings and Diagrams of Structures

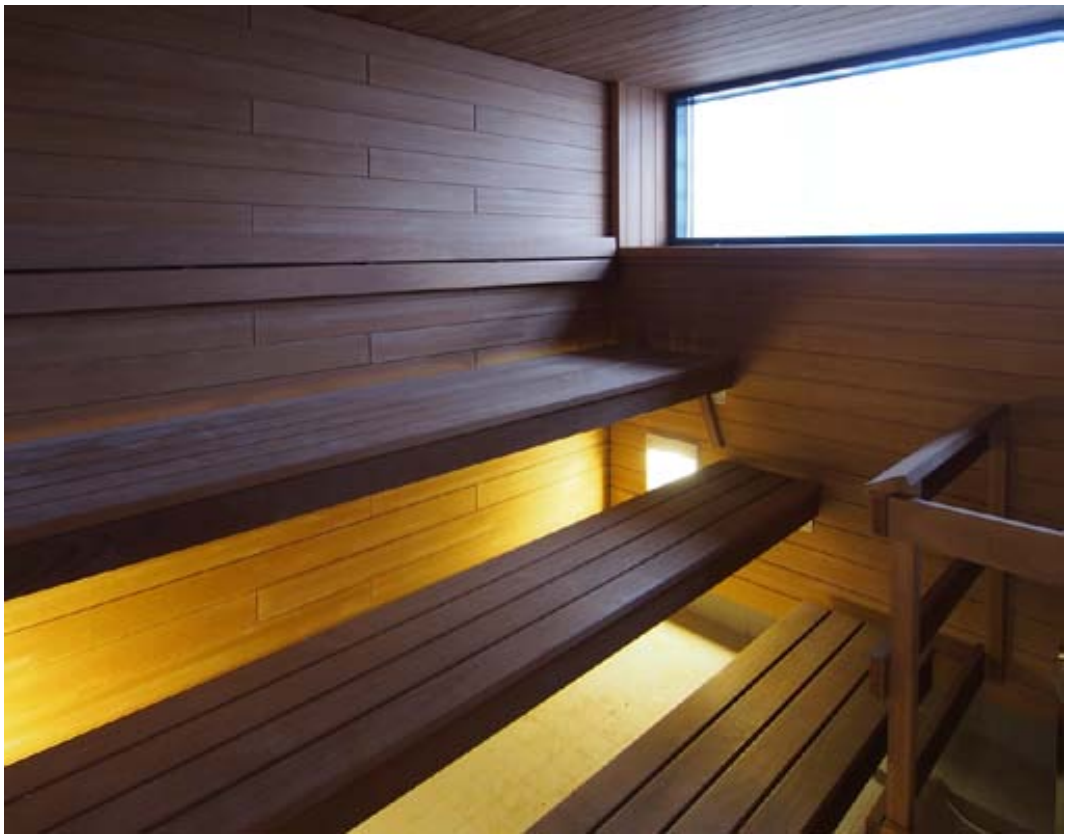

Figure 3. Yard/summer sauna upper floor structure (layers 1-6)

Figure 4. Year-round yard sauna upper floor (layers 1-7)

Example: Yard sauna or summer sauna upper floor 1. Ventilation space 2. 100 mm thermal insulation, wood fiber insulation 3. 100 mm wood frame 50 × 100 mm at 600 mm centers + wood fiber insulation 100 mm 4. Air gap, joint sealing and taping 5. 19 mm battens 19 × 100 mm at 300 mm centers 6. ≥15 mm ceiling panel, per building specifications

Example: Year-round yard sauna upper floor 1. Ventilation space 2. 50 mm wind barrier insulation, mineral wool per building specifications 3. 100 mm thermal insulation, mineral wool per building specifications 4. 100 mm wood frame 50 × 100 mm at 600 mm centers + thermal insulation 100 mm, mineral wool 5. Aluminum vapor barrier, joint sealing and taping with aluminum tape 6. 19 mm battens 19 × 100 mm at 300 mm centers 7. ≥15 mm ceiling panel per building specifications

1.6 Drawings and Diagrams of Structures (continued)

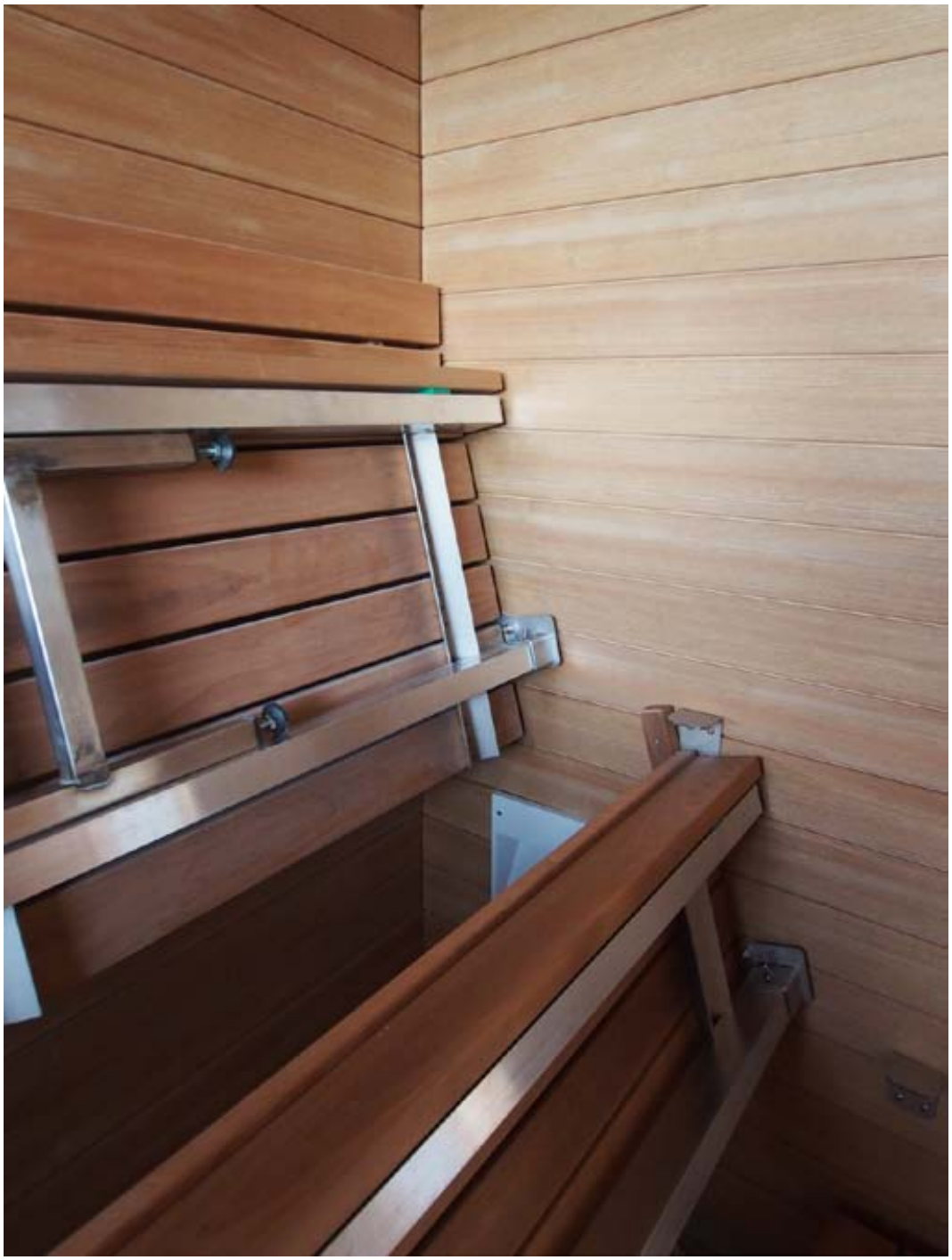

Figure 5. Yard/summer sauna subfloor with drainage

Figure 6. Swimming hall/spa sauna upper floor

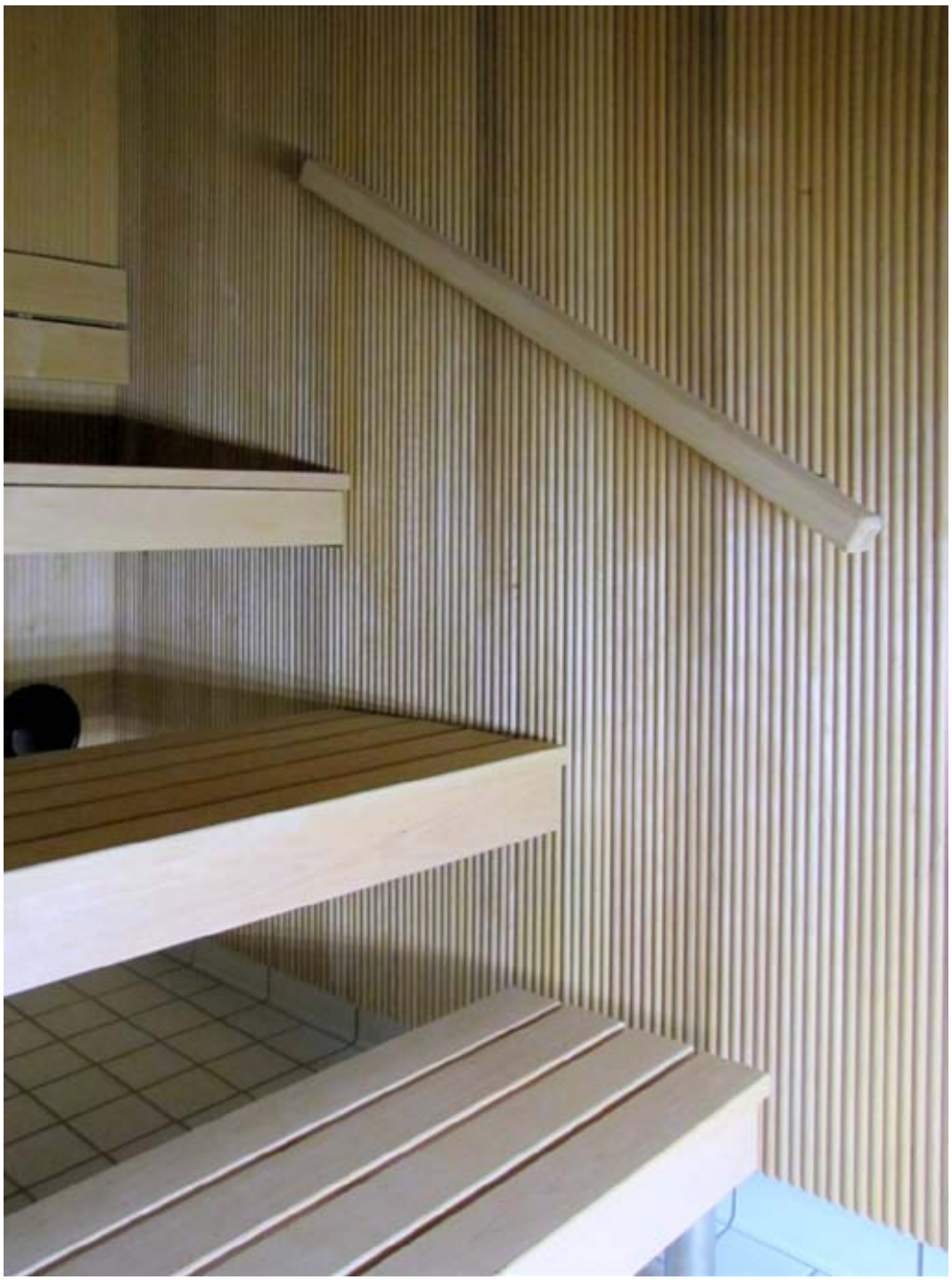

Figure 7. Yard sauna timber frame wall

Figure 8. Yard sauna timber frame wall with vapor barrier

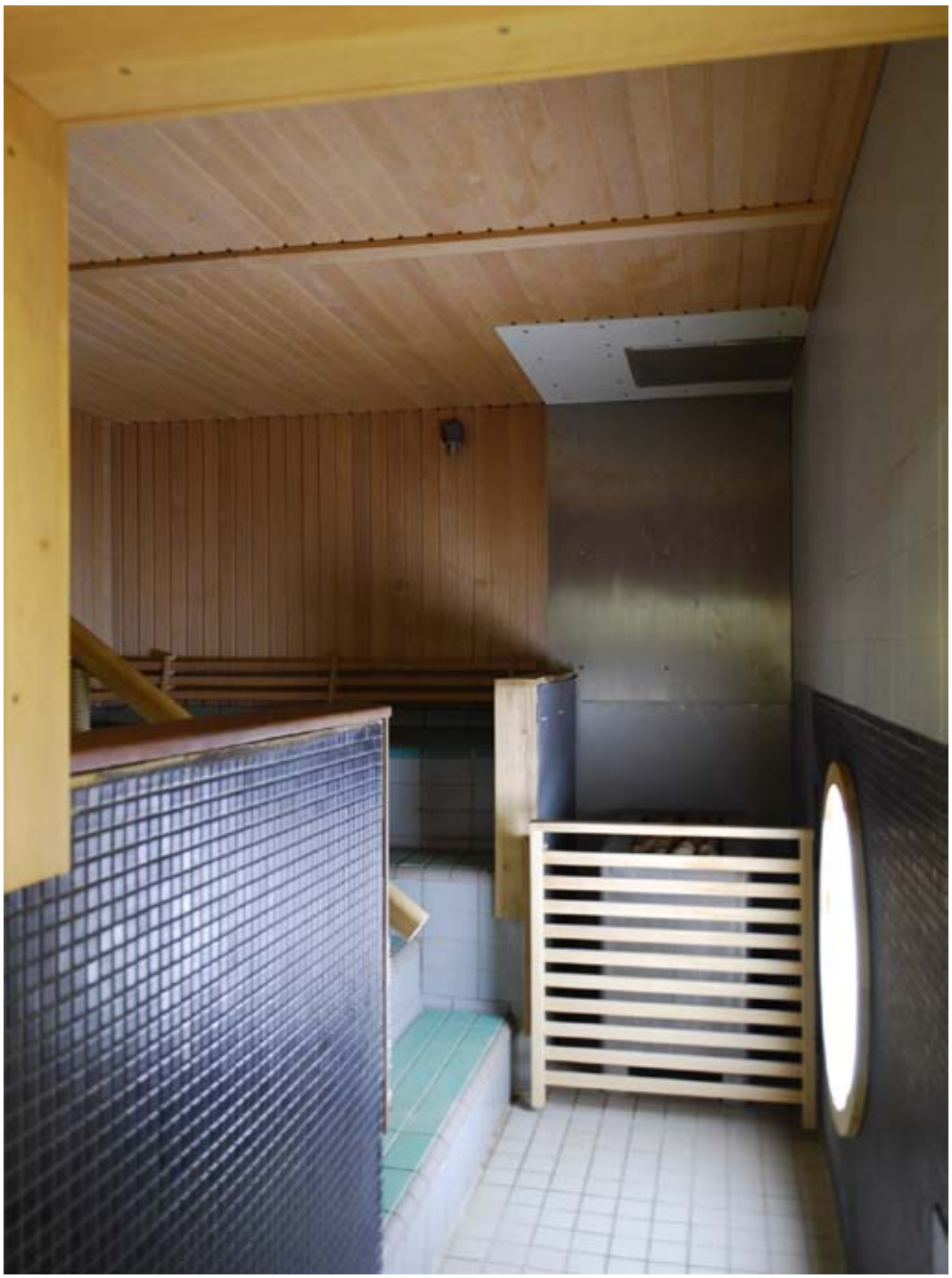

Figure 9 & 10. Swimming hall partition walls (multiple wall sections)

Example: Swimming hall or spa sauna upper floor 1. >300 mm ventilation space 2. 100 mm thermal insulation, mineral wool 3. Aluminum vapor barrier, joint sealing and taping with aluminum tape 4. 22-50 mm battens 22-50 × 100 mm 5. ≥15 mm panel

Example: Yard/summer sauna timber frame wall 1. 21 mm wood cladding per building specifications 2. 22 mm ventilation gap, mounting battens 22 mm at 600 mm centers 3. 12 mm wind barrier board, porous fiber board 4. 125-150 mm structural timber frame 50 × 150 mm at 600 mm centers + wood fiber insulation 150 mm 5. Air gap, joint sealing and taping 6. 19 mm vertical battens 7. 15 mm horizontal panel cladding per building specifications

Example: Year-round yard sauna timber frame wall Same as above but with aluminum vapor barrier added at layer 4/5 position. **NOTE: The sauna vapor barrier must NOT be penetrated by electrical cables, pipes, or any other services.**

1.7 Roof

Roof materials include bitumen shingle, formed metal roofing, ceramic tiles, concrete tiles, or fiber cement board. Saunas can also have a turf or green roof. Structurally, a turf roof consists of a bitumen membrane with a drainage layer and two layers of turf. Eaves drainage should be adequate. Turf roof structural weight must be accounted for in design.

1.8 Windows and Hatches

Sauna windows are similar in construction to other building windows. Holiday home saunas typically have casement-type openable windows. The openable window inner frame must have a seal to prevent vapor barrier penetration between panes. Other saunas typically use triple-glazed windows (MSE, SE, or SEK type). If the window is fixed, it can be triple-insulated glass (MEK) with a ventilation hatch connected to the ventilation network.

1.9 Doors

Sauna doors are chosen for wet-area conditions. These include panel doors, mirror doors, and glass doors. The sauna panel door is paneled on both sides and moisture-resistant. The door typically does not have separate thermal insulation. Glass can be used in the door for light and spatial effect. Frame construction with two or three glass panels. In a three-pane glass door, the lowest glass is typically tempered safety glass. A fully glass door is made from tempered safety glass. Door size should have contrast markings at 900-1500 mm height for visibility and collision prevention.

2 SAUNA CLADDINGS

Wood grade must be: • Low-resin • Low-knot (few knots) • Porous. Low-resin spruce and alder suit all sauna surfaces well. Pine is problematic due to high resin content.

2.1 Wall Claddings

The best wall cladding is planed tongue-and-groove boards. The board joint pattern must be chosen so it doesn't pinch, and must meet fire rating Class EM (per fire requirements for 1.5 m travel distance, minimum 2 expansion joints per 6 m without any single piece exceeding minimum width specifications). Board joints are overlapped at least 150 mm and seated with adhesive on the frame on the outer side and fastened with 33 mm joists. Panel thickness recommended minimum 15 mm. Wider panels are better for heat storage. The cost of maintenance and repair is reduced by choosing quality cladding. Sauna surfaces should be oiled. Surface treatment is applied to the surface with hot oil to allow good penetration. **Wood species suitable for wall and ceiling claddings:** • Spruce • Alder • Aspen • Heat-treated pine • Heat-treated aspen

2.2 Ceiling Claddings

The same board as walls is used for ceiling. Joints must overlap sufficiently so no visible gaps form at bench level due to drying and shrinkage. The sauna ceiling does not need fire protection unless there is insufficient clearance between the heater and ceiling, per RT 91-11259.

2.3 Floor Coverings

Concrete floors are typically covered with ceramic tiles. Anti-slip surface with rating R10 is recommended. Floor tile guidance is provided in RT 34-10341 and RT 34-10997.

2.4 Surface Protection of Sauna

Sauna structures and details are designed to withstand reasonable moisture exposure. Good post-use ventilation and natural drying help preserve wood surfaces. Frequently used saunas accumulate dirt over time, requiring surface treatment. Oil-based sauna finishes provide protection against moisture in high-traffic saunas. The primary option for improving cleanliness is to wash sauna wood surfaces or to apply treatment with sauna-specific products. Treatment products should be non-toxic. Freshly treated surfaces should be allowed to dry. Surfaces in constant contact should be treated according to manufacturer instructions per MaalausRYL 2012. In metal-railed saunas, stainless steel is recommended. Galvanized handrails can rust. Skin contact surfaces should not be treated with products that become hot and irritating.

2.5 Washing Room Claddings

Washing room wall claddings can be wood panels, ceramic tiles, or other wet-area surfaces including stone tiles. If walls and ceiling are stone, good sound dampening results. Washing room floors can be tiled like the sauna floor.

2.6 Surface Protection

See section 2.4 for detailed surface protection guidance.

3 BENCHES

3.1 Bench Support and Frame

Figure 11. Bench support and frame options (a, b, c)

Support options:
Wall-mounted: For small saunas, for easy cleaning. Wall structure must support the load during construction phase.
Floor-mounted: For large and public saunas with fixed base structure, using wood or steel frame with ceramic tile

covering at base.
Combination: Corner and L-shaped benches may need partial floor support.
For easy cleaning, benches are designed to be liftable or removable. If benches are fixed, ensure the underside can also be washed. Step platforms can be removable if well supported on the floor.

3.2 Bench Platforms

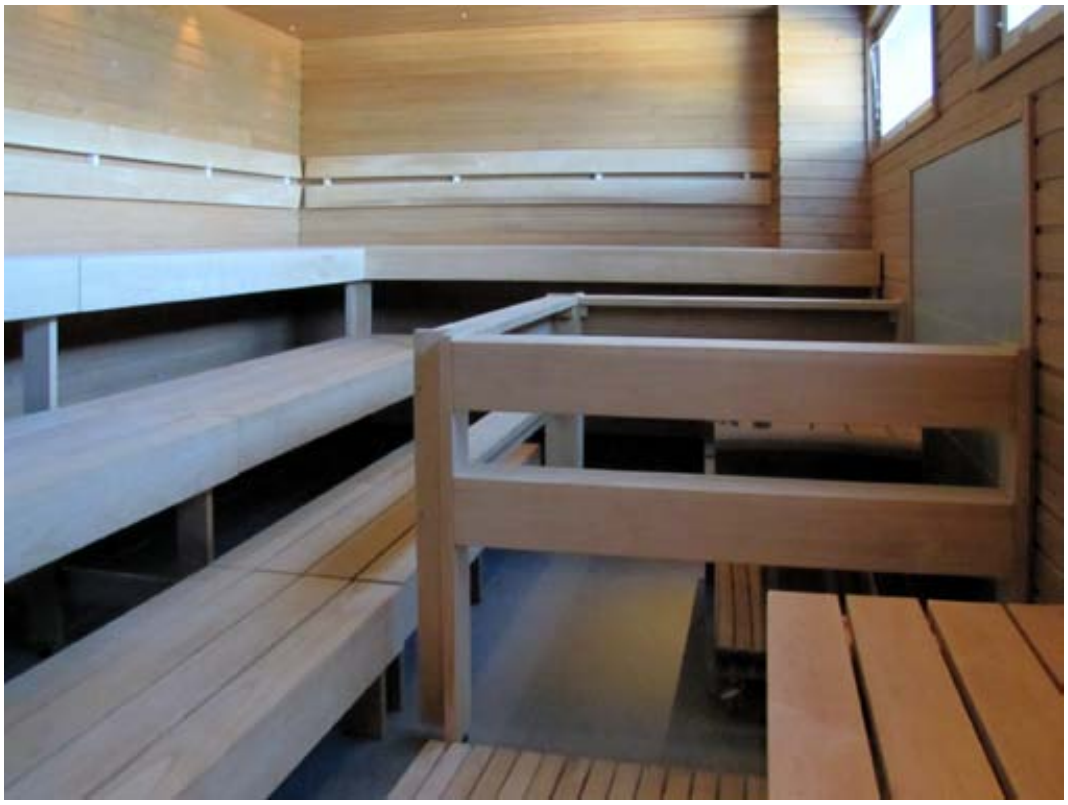

Figure 12. Liftable bench platforms with built-in lighting

Bench slat specifications: • Minimum thickness: 19 mm • Spacing between slats: sufficient for drainage and air circulation • Material: same species as wall cladding, premium grade (clear or select, knots <5 mm)

Figure 13. Wooden bench frame construction (isometric view)

3.3 Rails and Handrails

Handrail specification: • Diameter: 40 mm round wood • Distance from wall: minimum 45 mm. Handrails should ideally continue from the changing room through the washing room to the sauna. They are important for children, those with limited mobility, poor balance, and elderly users.

3.4 Backrests

Backrests are optional comfort features attached to the wall behind the upper bench.