CAVE A' VIN

Architectural, Clinical & MEP Engineering Guide: Custom-Cut Wellness Saunas

DESIGNERS • BUILDERS • CLIENTS

Premium Partners: Helo / Finnleo • World Sauna (Bathing Brands)

Standard: 100% Architectural Custom-Cut Built-In Installations Only

Craftsmanship & Science Standard: Cave a' Vin exclusively specifies and builds architectural **Custom-Cut Saunas** utilizing components from **Helo** (Finnish sauna heritage spanning over 100 years, sister company to Finnleo) and **World Sauna** (by Bathing Brands). We do *not* assemble pre-fabricated modular "flat-pack IKEA-style" boxes. Every sauna is custom-framed to fit room boundaries, insulated on site, vapor-sealed with high-temp radiant foil, and finished in architectural-grade timber.

1. MODALITY COMPARISON: TRADITIONAL FINNISH DRY HEAT VS. FAR-INFRARED (IR)

Evaluation Factor	Traditional Finnish Sauna (Rock Heater)	Far-Infrared (IR) Sauna (Wall Emitters)
Thermodynamic Operating Range	**150°F to 185°F (UL standard max 194°F / 90°C at ceiling).** High ambient convective air + radiant heat from hot rock mass and timber walls.	**120°F to 140°F.** Lower ambient air temp; relies on direct radiant wave absorption rather than high room air temperature.
Wavelength & Absorption Method	Indirect heating: electric elements super-heat stones, stones heat air via convection, enveloping the bather in deep atmospheric warmth.	Direct resonant penetration: Carbon/ceramic emitters tuned to the **"Vital Range" (7 to 14 microns; optimal 8.4 to 9.4 microns)**, matching the body's natural emission frequency.
Humidity Control & Ladle Steam (Löyly)	**User-Controlled Humidity:** Extremely dry (10% RH or lower) until water is ladled over stones to create soothing steam bursts and nasal relief. Accommodates essential oils.	**Ambient Room Humidity Only:** Completely dry. Water cannot be thrown; moisture damages electrical emitter faceplates.
Pre-Heat Time & Duty Cycle	**30 to 40 Minutes:** Heats both air and rock mass. Once at temperature, elements cycle **~50% of the time** while rocks hold and radiate stable heat.	**0 to 15 Minutes:** Can enter immediately or after short warm-up. Emitters **must stay on almost continuously** since there is no rock mass to store heat.
Bathing Duration & Social Dynamics	**10 to 15 Min Intervals ("Innings"):** Classic Finnish ritual (heat → cold plunge/shower → relax). Spacious for 2 to 6+ people, ideal for intimate socializing.	**20 to 30 Min Continuous Sessions:** Gentler air temp allows longer single sessions. Typically smaller rooms (1–2 bathers); quiet private retreat with light/audio.
Energy Efficiency & Power Requirements	Typically **4.5 kW to 10.5+ kW (240V / 30A–60A dedicated circuit)**. Costs approx. $0.37 first hr / $0.25 subsequent hrs due to element cycling.	Typically **1.5 kW to 1.7 kW (120V / 15A or 240V / 20A)** for standard 2-person. Costs approx. $0.10 to $0.18 per session.
Commercial Applicability	**Fully Approved for Commercial Duty:** Heavy-duty elements engineered for continuous operation in spas, athletic clubs, and hospitality suites.	**STRICTLY PROHIBITED FOR COMMERCIAL USE:** Emitters burn out if left on continuously by patrons; cannot withstand back-to-back commercial cycles.

2. CLINICAL & PHYSIOLOGICAL EVIDENCE: WHOLE-BODY HEAT STRESS (UNIVERSITY OF IOWA STUDY)

Cardiovascular, Endocrine & Cellular Mechanisms (Journal of Athletic Training)

Peer-reviewed clinical research demonstrates that 30 minutes of whole-body passive heat stress (73°C / 163.4°F with low humidity) replicates key physiological adaptations of moderate physical exercise:

- **Cardiovascular Conditioning without Joint Impact:** Heart rate increases linearly to ~131 BPM (66% of age-predicted maximum—equivalent to moderate exercise). Peripheral vasodilation drops systolic blood pressure by 16 mmHg and diastolic by 5 mmHg. Because blood pressure does not spike as it does in heavy exercise, heat bathing offers safe cardiovascular exercise-mimicry for aging adults or recovering athletes.
- **Cellular Repair Chaperones (HSP72):** Plasma concentrations of protective **Heat Shock Protein 72 (HSP72) increase by 48.7%**. HSP72 serves as a molecular chaperone that prevents cellular protein aggregation, repairs damaged tissues, and enhances systemic immune defense.
- **Hormonal & Neurotransmitter Modulation:** Plasma **norepinephrine increases by 58%** (driving healthy sympathetic stimulation and homeostatic vascular control), while **prolactin spikes by 285%** (nearly 4-fold), reflecting active central dopaminergic and serotonergic pathway modulation.
- **Adjunct to Physical Rehabilitation:** Safe passive heating induces profound physiological adaptations, making it an invaluable clinical therapy for individuals with osteoarthritis, obesity, orthopedic trauma, or spinal cord injuries who cannot sustain high-impact aerobic training.

3. WOOD SPECIES SELECTION: AESTHETIC & THERMAL CHARACTERISTICS

HELO SPECIFICATION

Western Red Cedar (Dynamic & Aromatic)

- **Grain & Color Variation:** Highly variegated timber sweeping naturally from dark chocolate brown to deep red, rich orange, and pale blonde/white.
- **Character & Aroma:** Distinctive rustic look with vibrant visual contrast. Famous natural cedar scent; rich natural oils provide maximum rot and moisture resistance.

HELO & WORLD SAUNA OPTIONS

Hemlock & Aspen (Clean & Uniform)

- **Canadian Hemlock (Helo):** Uniform grain with a calm, contemporary architectural look. Primarily pale white-to-yellow in tone with subtle light-reddish undertones. Low resin and splinter-free.

- **Nordic Aspen (World Sauna):** Crisp, bright blonde/white wood with ultra-clean graining. Free of knots and resin, hypoallergenic, and stays cool to the touch—ideal for modern minimalist suites.

4. SPATIAL ARCHITECTURE: CEILING HEIGHT, BENCHING & GLASS LIMITS

MANDATORY MAXIMUM HEIGHT

Strict 7'-0" (84") Maximum Ceiling Height

- **Thermodynamic Law:** Hot air stratifies at the ceiling. **All saunas must have a finished ceiling height of exactly 7'-0" (84" max) above finished floor.**
- **Performance Failure:** Taller ceilings trap heat in wasted overhead space where no one sits, leaving bathers on benches cold and overworking the heating elements.

CRUCIAL DESIGN RULE

Mandatory Two-Tiered Benching

- **Lower Bench:** Fixed at **18" above finished floor (AFF)** (step & warm rest tier).
- **Upper Bench:** Fixed at **36" AFF (18" above lower bench)** (primary heat zone).
- **Layout Reality:** Single wraparound benches shown on architectural plans fail thermodynamically. Stepped two-tier benches must be planned around heater clearances.

THERMAL INTEGRITY

Maximum 20% to 25% Glass Wall Limit

- **Glass Thermal Bleed:** Saunas rely on radiant timber mass. Glass acts as an uninsulated thermal heat sink.
- **Warranty Void Threshold: No more than 20% to 25% of total sauna wall surface may be glass.** Exceeding this limit prevents the room from reaching setpoint and **voids the manufacturer's performance and temperature warranty**.
- **Heater Sizing:** Any specified glass requires sizing up heater capacity to compensate for radiant losses.

5. LIFE-SAFETY, DOORS & BUILDING CODE COMPLIANCE (FLORIDA BUILDING CODE)

FLORIDA CODE MANDATES

Exterior Wall & Impact Restrictions

- **No Exterior Doors Allowed:** In Florida, exterior doors must comply with Florida Building Code hurricane wind and missile impact ratings. Sauna doors cannot meet impact standards. **All saunas must open exclusively into an interior conditioned space.**
- **Swing Direction: All sauna doors must swing outward.** Doors must never swing inward, ensuring an incapacitated bather can push or fall against the door to exit.

COMMERCIAL SPECS

Commercial Doors & Panic Controls

- **Wood Door w/ Kick Plate:** While residential saunas commonly use full frameless glass doors, commercial saunas require a **solid wood door with a kick plate** (can include a glass vision panel) so patrons can kick the door open hands-free.
- **Emergency Panic Button:** Per Florida Building Code and commercial standards, an emergency panic/kill-switch button connected to an alarm must be installed inside the room.

6. COMMERCIAL ACCESSIBILITY (OSHA & ADA STANDARDS)

Wheelchair Clearances & Transfer Bench

- **60" Turning Diameter:** Must provide an unobstructed **5-foot (60") turning circle** inside the hot room with the door closed.
- **Transfer Clearance:** Minimum **30" wide x 48" deep clear floor space** directly adjacent to the accessible lower bench.
- **Accessible Lower Bench:** Bench section adjacent to the transfer area must be a minimum of **42" long** at 17"–19" AFF.

MINIMUM COMMERCIAL FOOTPRINT

Minimum Room Size: 8'-0" x 8'-0"

Because the room must concurrently fit:

- 1. Commercial rock heater + safety guardrail.
- 2. Lower & upper two-tiered benches (~36"–48" total depth).
- 3. 60" turning radius + 30" transfer space.

An 8' x 8' exterior framed footprint is approximately the smallest achievable commercial dry heat sauna.

7. ELECTRICAL ROUGH-IN & SUBCONTRACTOR SCOPE BOUNDARY

Both Helo and World Sauna utilize a centralized external relay control topology. Coordinate all rough-in stub-outs before framing is closed:

Component	Rough-In Elevation & Placement	Electrician vs. Cave a' Vin Responsibilities
Control Box & Dedicated Circuit	Stub-out dedicated line at **approximately 20" above finished floor (AFF)**. Located in an adjacent dry utility space or *underneath the upper bench*.	**Electrician:** Pulls dedicated 240V home-run circuit from main panel to the 20" AFF stub-out location. Terminates to box terminals. **Cave a' Vin:** Furnishes and physically mounts the control box.
Heater Jumper Cable	Route through wall stud cavity via sealed chase conduit from Control Box (20" AFF) to heater base.	**Cave a' Vin:** Furnishes high-temp wire spec and provides internal wall chase to heater. **Electrician:** Pulls high-temp jumper wire through chase and hardwires both ends.
Digital Touchpad & Wi-Fi	Eye-level outside sauna door (approx. 48"–54" AFF) or in dry control station.	

Component	Rough-In Elevation & Placement	Electrician vs. Cave a' Vin Responsibilities
		Electrician: Roughs in low-voltage Cat5/Cat6 / control cable from wall keypad to Control Box. **Cave a' Vin:** Furnishes touchpad and Wi-Fi gateway module.
Sauna Lighting Circuit	Concealed under-bench warm LED strips or vapor-proof high-temp wall/corner sconces.	**Cave a' Vin:** Furnishes fixtures with sauna kit. **Electrician:** Connects lighting harness to switched relay terminal inside Control Box.

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WIRING TOPOLOGY:
[Main Electrical Panel] → (Dedicated 240V Circuit) → [CONTROL BOX @ 20" AFF] (Under bench or utility closet)
                                                    • → (High-Temp Jumper Wire) → [Sauna Rock Heater] (Hardwired by EC)
                                                    • → (Low-Voltage Control Cable) → [External Digital Touchpad & Wi-Fi]
                                                    • → (Switched Low-Voltage/120V) → [Integrated Bench / Accent Lighting]
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8. BUILDER FRAMING, THERMAL ENVELOPE & FLOORING SPECIFICATIONS

Framing & Thermal Insulation

- **Wall & Ceiling Framing:** Standard 2x4 stud framing (16" O.C.). **Ceiling height must be framed to finish at exactly 7'-0" (84" max) above finished floor.** Drop framing if structural ceiling is taller.
- **Insulation Material:** 3½" R-13 fiberglass or Rockwool batt in walls; R-19 to R-30 in ceiling. *Never use spray foam in sauna hot-rooms* (toxic off-gassing at 190°F).
- **Structural Backing:** Install solid 2x6 horizontal wood blocking for rock heater hanging brackets and bench wall cleats.

Flooring, Vapor Barrier & Venting

- **Tile Flooring & Removable Duckboard:** The floor must be fully waterproofed and tiled (with optional floor drain) for hygienic mopping. Cave a' Vin installs **removable wood duckboard** over the tile so it can be lifted for cleaning.
- **Foil Vapor Barrier:** Cave a' Vin installs high-temp radiant barrier foil over studs, sealed with foil tape (no plastic poly). 1x2 vertical furring creates a 3/4" convection air gap behind cladding.
- **Convection Venting:** Lower intake vent located 2"–4" AFF directly beneath heater; exhaust vent located high on opposite wall beneath upper bench.