



You can save money by building your Indoor Aquatic Center with Aluminum

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Any facility that is indoor and aquatic has to be built properly. The repercussions of poor construction can be structural building failure (there are several reported cases buildings collapsing), corrosion and constant maintenance. The space needs to be safe and healthy for guests and staff.

Waterparks have additional concerns due to the extreme volume of splashing and moisture in the air, but regardless all indoor aquatic centers have to carefully consider the building envelope before they build, so the long term costs of continued maintenance don't break the bank.

Traditionally aquatic centers are built in large span steel structures with concrete or metal and more recently glass infills/walls. Times have changed. If you are planning to build an indoor pool or aquatic center of any kind. Here is what you need to know:

Primary Building Envelope Key Issues/Concerns:

- 1. Indoor pools are moist, damp, warm environments, with poor air quality, large volumes of people and if there are slides, splash pads and spas; there is extensive splashing and spray.*
- 2. Air in a natatorium often contains nearly 3x the moisture per unit volume as a typical, non-humidified building. Waterparks are worse.*
- 3. Chlorine remains the primary disinfectant used to sanitize pools. Chloramines are gases that form as a disinfectant by-product of chlorination and hover above the water surface impacting guests and staff. Chloramines are toxic. They cause corrosion, irritate skin and eyes and are a known respiratory health hazard to swimmers, lifeguards and other pool occupants.¹*
- 4. Indoor pools are guided by the guidelines set out by ASHRAE 62.1. CDC Report says typical ASHRAE 6.1 standards are not enough in a large voluminous space where water is splashed and spread differently than in a more typical pool.²*
- 5. Natatorium investigation reports almost always cite "improper design/construction of the vapor retarder" as a primary cause of moisture problems³*
- 6. Exterior environmental/climate related corrosion is also a factor, specifically in coastal locations.*
- 7. Several structural failures over pools have led to the sudden collapse of ceilings, along with deaths and injuries. The cause was chloride-induced stress corrosion cracking (SCC).⁴*

So what should you do to prevent some of these issues?

Build with Aluminum.

Aluminum Building:

Retractable Aluminum Building Per OpenAire:

Polycarbonate Roof, Glass Walls, Aluminum Structure

1. Material

- Light weight
- High strength
- Widely Recycled
- Easily formed, highly conductive, highly reflective, non-toxic, durable
- Aluminum is a key component in LEED-certified green buildings

2. Corrosion/Rust

- Corrosion Resistant
- No rust
- Does not need finish to be corrosion resistant⁵

3. Painted finish

- Baked on - never needs repainting
- Can reflect up to 95% solar energy⁶

4. Hardware

- 316 stainless steel hardware

5. Retractable Roof

- Indoor & Outdoor environment
- Natural ventilation
 - Meets intent of energy code: less use of energy
 - Large volumes of fresh air
 - Exhaust chloramines
 - Reduces odor
 - Eliminates irritation to skin and eyes for staff & Guests
 - Reduced Staff downtime/turnover (sick leave) due to environment
- Direct sunshine/Daylight:
 - Less reliance on electrical lighting during daylight
 - Can reduce up to 1/3 electrical lighting costs⁷

Steel Building:

Fixed Steel Building per Pre-Engineered Structure:

Steel Roof, Steel Walls, Steel Structure

1. Material

- Denser Heavier (typical 2.5x denser than aluminum)⁹
- High Strength
- Widely Recycled

2. Corrosion/Rust

- Highly corrosive
- Will Rust
- Susceptible to SCC Failure
- Required to be painted or treated

3. Painted Finish

- Needs repainting every 5 to 10 years if proper finish is applied
- Standard Red Oxide finish will require repainting more frequently

4. Hardware

- Depends on Supplier.

5. Fixed Roof

- No Fresh Air
- Requires 24hr x365 day Mechanical ventilation system
- Odds a primary case transmitted COVID-19 in a closed environment is 18.7 time greater compared to an open-air environment¹⁰
- Requires Electrical Lighting all opening hours
- Marketability - eliminated in summer

6. Windows (Type TBD)

- Adds daylight in small areas
- Manual operation - only some accessible

7. Opaque Building Envelope

- Metal walls require paint and regular maintenance
- Corrosion can cause Cleanliness concerns

8. Maintenance

- Regular painting of steel material

- Daylight increases retail revenue⁸
- Marketability: "The FIRST & ONLY Retractable Roof Waterpark in Atlantic City"

6. Motorized Pivot Windows

- Enhances natural ventilation
- Replenishes building with natural air flow
- Ease of use/operation (may be programmed) for staff

7. Glazed Building envelope

- 1" multi-wall translucent polycarbonate roof
- Minimal opaque tilt up wall material on north street adjacent elevation
- 1 ¼" large missile hurricane glass
- Light bright space (all daylight hours)
- Easy to clean and no maintenance required

8. Maintenance

- No maintenance aside from standard day to day cleaning, upkeep
- Any required service covered by 15 year warranty
- COVID-19 disinfection, sanitization & PPE protocols per local guidelines

9. Building Operating Costs

- Saves 20% to 27% energy y.o.y compared to traditional aquatic facility
- Turn off dehumidification when roof is open
- No air conditioning
- No lights during daylight hours (except emergency by code)
- Solar gain in winter offsets some heating requirement

10. Warranty

- 15 year parts and labor warranty

11. Installation by OpenAire

- Welding and drilling pre arrival on site

12. Industry Expertise

1. 30 years , 1000+ projects
2. Waterparks/Aquatic Facilities around the globe

- Regular inspections for SCC failure
- Standard day to day cleaning, upkeep
- COVID-19 disinfection, sanitization & PPE protocols per local guidelines

9. Building Operating Costs

- Dehumidification required 24 hr day, 365 days year
- Electrical lighting required all operating hours (when open) and per code/safety (when closed) year round
- Air conditioning most likely required

10. Warranty

- Typical 1 year warranty

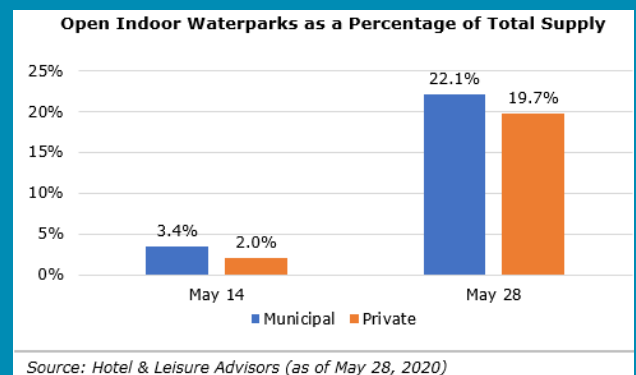
11. Installation by third party

- Typical drilling and cutting on site compromises finish and rust will quickly occur at those points

11. Industry Expertise

- Depends on Supplier

As of June 11, 2020 100% of OpenAire Indoor Waterparks in the US are open, have set an Opening Date (typically June 2020) or are awaiting state mandated opening dates to re-open to the public.





OpenAire has had the pleasure of building aquatic centers around the globe, challenging the stereotypes of traditional indoor natatoriums. Our aluminum retractable roof enclosures cover commercial pools from spas to retirement communities, to municipal parks and recreation facilities, YMCAs, Boys and Girls Clubs, to hotels, cruise ships and private Health Clubs. We also have an extensive portfolio of waterparks.

No matter what the sector is, the issues around corrosion for indoor pools are the same.

A small sample of our aquatic centers include:

- Scheu Family YMCA of Upland, California
- The Fit at Plunge Fitness Center, San Diego, California
- The Cove at Lakefront, Morrisville Aquatic & Fitness Center, North Carolina
- Saarland Therme Resort, Fitness, Spa, Rilchingen, Germany
- Grand Cascades Lodge - Crystal Springs Resort, New Jersey
- Heritage El Dorado Hills Retirement, El Dorado Hills, California
- The Granite Club: Private Members Club, Toronto, Ontario
- Ivybridge Leisure Center, Ivybridge, UK

For expanded portfolios of projects in all sectors, please reach out and contact us to see how we can support your future aquatic center dreams, or assist in modifying your existing facility to accommodate the future of improved daylight, hygiene, ventilation, and cleanliness.

Footnotes:

1. *Ventilation Requirements For Indoor Pools*, Gary Lochner, ASHRAE Journal ashrae.org JULY 2017, www.ashrae.org
2. *CDC Workplace Safety and Health; Investigation of Employee Symptoms at an Indoor Waterpark*, Lilia Chen MS, Health Hazard Evaluation Report HETA 2007-0163-3062, Great Wolf Lodge, Mason, Ohio, June 2008
3. *Avoiding Problems in Aquatics Facilities: Atypical design for atypical buildings*, Construction Specifier December 25, 2013, Jason S. Der Ananian, PE, and Sean M. O'Brien, PE, LEED AP, <https://www.constructionspecifier.com/avoiding-problems-in-aquatics-facilities-atypical-design-for-atypical-buildings/>
4. *A Corrosive Environment; Aquatics International Magazine*, September 01,2011, Dave Schwartz, P.E, https://www.aquaticsintl.com/facilities/maintenance/a-corrosive-environment_o
5. <https://www.wenzelmetal spinning.com/steel-vs-aluminum.html>
6. *Daylighting*, Gregg D. Ander, FAIA, Southern California Edison, Updated by U.S. Department of Energy Federal Energy Management Program (FEMP) Updated: 09-15-2016, <https://www.wbdg.org/resources/daylighting>
7. *The Benefits of Natural Light: Research supports daylighting's positive effect on building performance and human health*. Kevin Van Den Wymelenberg. architecturallighting.com; March 19, 2014.
8. <https://www.aluminum.org/aluminum-advantage/aluminum-101>
9. <https://www.wenzelmetal spinning.com/steel-vs-aluminum.html>
10. *Closed environments facilitate secondary transmission of coronavirus disease 2019 (COVID-19)* Hiroshi Nishiura, Hitoshi Oshitani, Tetsuro Kobayashi, Tomoya Saito, Tomimasa Sunagawa, Tamano Matsui, Takaji Wakita, MHLW COVID-19 Response Team, Motoi Suzuki, medRxiv 2020.02.28.20029272; doi: <https://doi.org/10.1101/2020.02.28.20029272>

