

FLUIDRA



OLYMPIC SWIMMING POOLS

How to design a
World Aquatics-certified
Olympic Swimming Pool

OLYMPIC SWIMMING POOLS

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INTRODUCTION

Competitive aquatic disciplines are closely related to the name '**World Aquatics**' (formerly known as FINA). Their objectives are to promote and encourage the development of water sports throughout the world and the participation of athletes at all levels and in every possible way, regardless of age, gender, or race. To do so, they must uniformly develop the necessary rules and regulations and organize World Championships and other competitions in Swimming, Open Water, Diving, Water Polo, Artistic Swimming, High Diving, and Masters, to which these rules and regulations are strictly applied.

Regulations have been developed by the **World Aquatics Bureau** to provide the best possible environment for competitions and training in newly constructed facilities. These are the **WORLD AQUATICS COMPETITION REGULATIONS**.

This e-book explains how to apply the **World Aquatics Competition Regulations** when designing an Olympic swimming pool and presents the subsequent steps to follow in order to successfully pass the certification process.

02

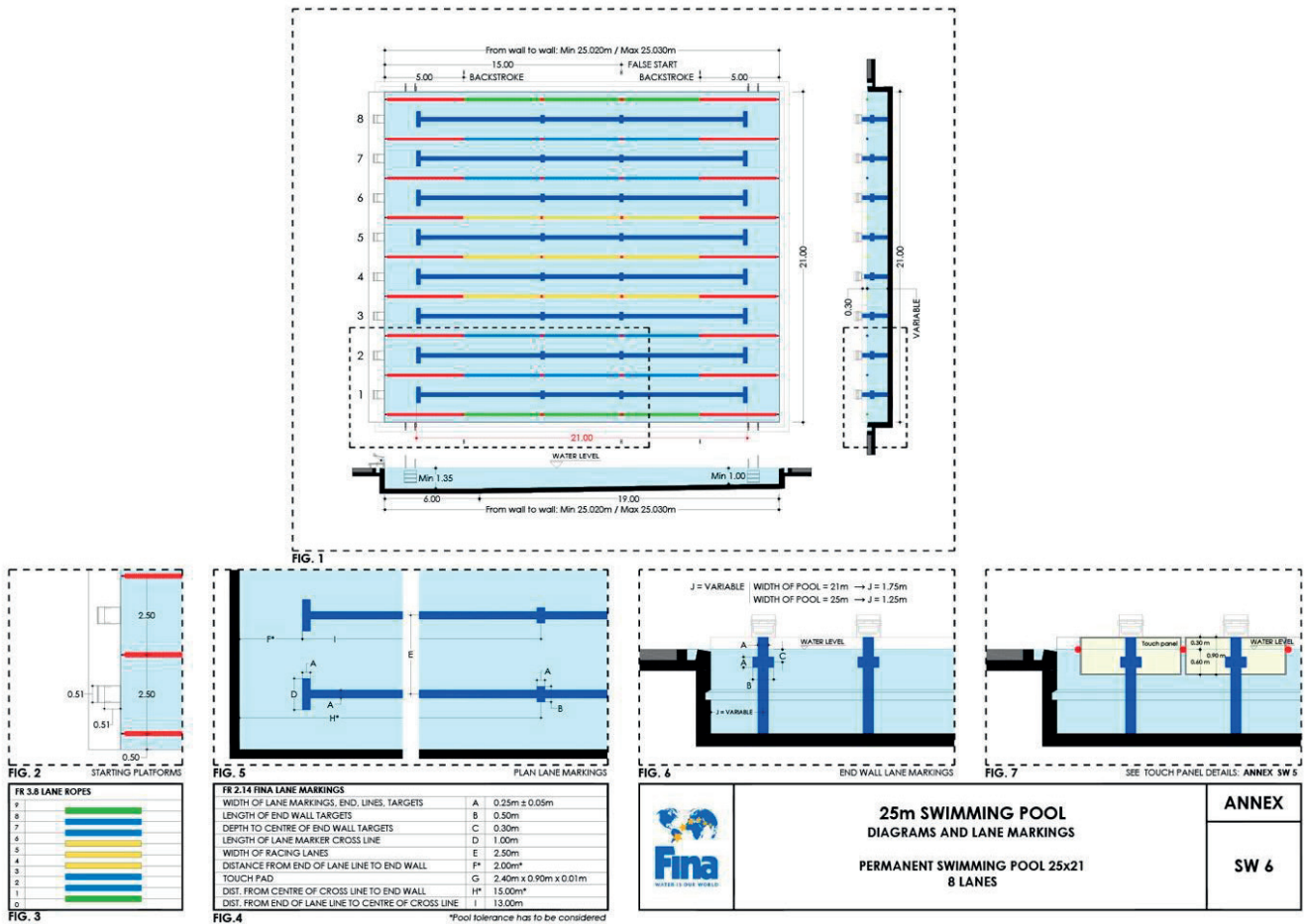
**ABOUT THE WORLD
AQUATICS COMPETITION
REGULATIONS**

The **World Aquatics Competition Regulations** is a 573-page document found in the rules section of the [World Aquatics](#) website. It is divided into 8 parts laying out the requirements that facilities must meet, whether for Olympic Games or World Championship standards or other competitions or training standards in the following disciplines: Swimming, Open Water, Diving, High Diving, Water Polo, Artistic Swimming and Masters.

The document also consists of useful annexes graphically presenting some of the most relevant geometrical requirements described in the rules, with the help of schematic figures and sketches.



**The WORLD AQUATICS
COMPETITION REGULATIONS
is a 573-page document found
in the rules section of the
World Aquatics website**



Set of figures from the Part 2: Swimming Rules annex of the **World Aquatics Competition Regulations** describing the configuration of a 25-meter swimming pool

The **World Aquatics Competition Regulations** do not dictate the materials to use in building Olympic swimming pools nor the products, manufacturers, or brands that must be involved in the process of equipping and commissioning them. They do describe the standards to be followed (mainly in geometrical terms and dimensional tolerance, distribution of elements, color of equipment...) when designing pools for different aquatic disciplines.

03

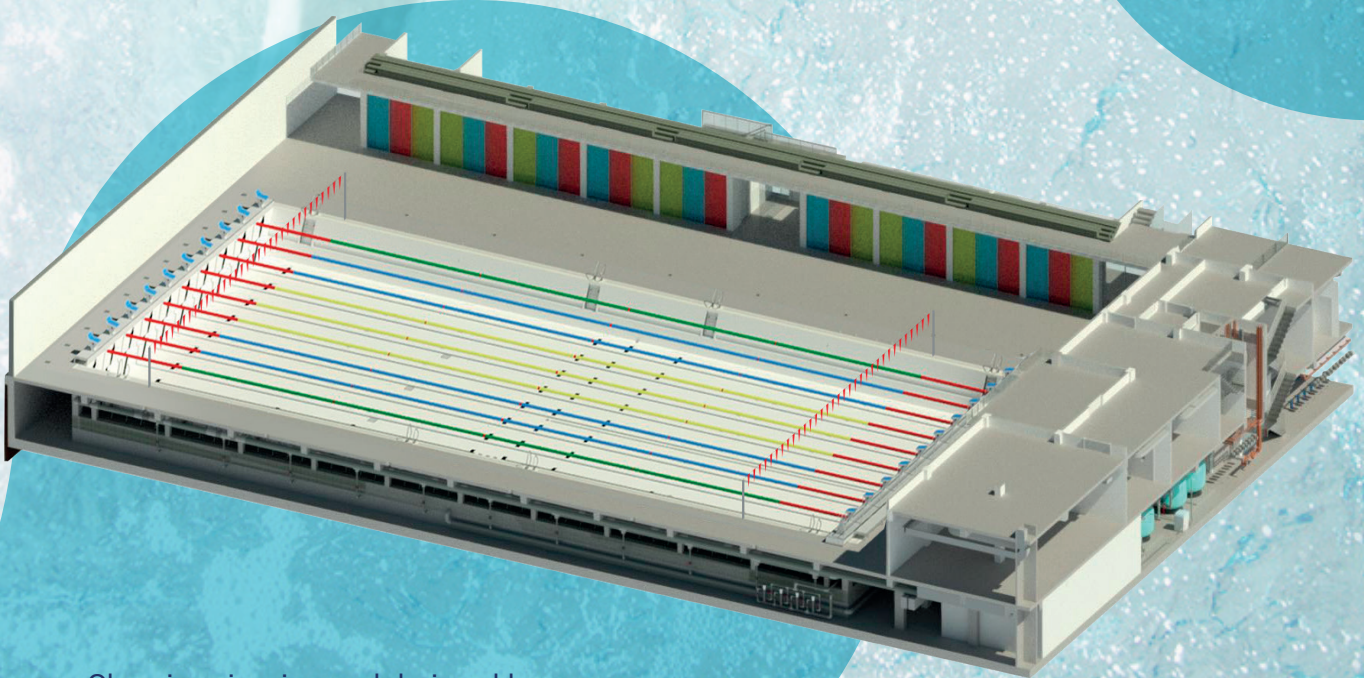
WHAT REQUIREMENTS MUST BE MET WHEN DESIGNING AN OLYMPIC SWIMMING POOL?

To design an Olympic swimming pool according to the **World Aquatics Competition Regulations** (when the pool is not to be used for Olympic Games or World Championships) the requirements laid out in rules 16.1 must be met.

We will now review in detail the specific requirements for Olympic swimming pools.

3.1 Pool Length

According to section 16.1.1.1, the length of an Olympic pool must be **50.000** meters and when there are Automatic Officiating Equipment touch panels at the starting end or also at the turning end, the length must ensure the required distance between the two panels is **50.000** meters.



Olympic swimming pool designed by **FLUIDRA** following **World Aquatics Competition Regulations**.

3.2 Dimensional Tolerances

Section 16.1.2.1 defines the dimensional tolerances allowed for Olympic swimming pools, which are **+0.010, -0.000** meters when touch panels are used.

The same section states that the tolerances must be measured as follows:

For swimming pools with touch panels on both ends, the distance between walls must be: Minimum **50.020** meters / Maximum **50.030** meters.

Tolerances must be consistent between **0.300** meters above and **0.800** meters below the water surface.

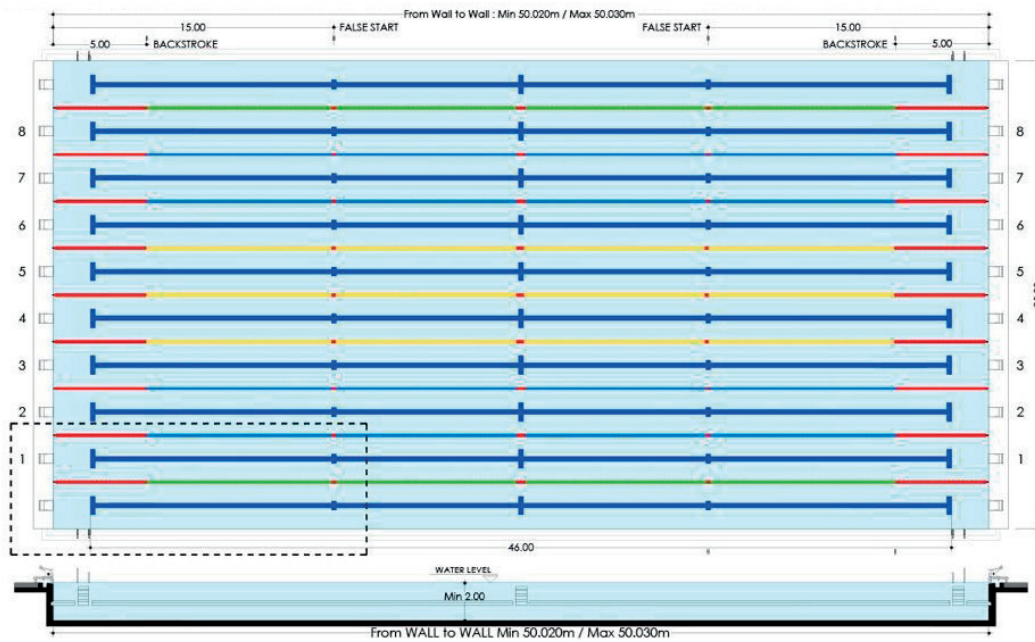


Figure 1 from ANNEX 2 Diagrams (Part 2: Swimming Rules) of the **World Aquatics Competition Regulations**

The **World Aquatics Competition Regulations** state that these measurements must be certified by a surveyor or other qualified official, appointed or approved by the Member of the Swimming Federation in the country where the pool is located.

Following **FLUIDRA**'s experience in engaging in **World Aquatics** certification processes for dozens of swimming pools, our recommendation is to use a construction system based on prefabricated modular steel panels with a regulation system (such as **SKYPOOL** technology) that allows the fine adjustment of the structure to ensure compliance with the tolerance requirements set out by **World Aquatics**.

3.3 Depth

Section 16.1.4 states that an Olympic swimming pool with starting blocks must have a minimum depth of **1.35** meters extending from the first meter to **6.0** meters from the end wall. For the rest of the pool, a minimum depth of **1.0** meters is required.

3.4 Walls

According to section 16.1.5, the end walls must be vertical, parallel, and form **90-degree** right angles with the swimming lanes and water surface. They must be made from a solid material with a non-slip finish extending **0.8** meters below the water surface to allow the swimmer to touch and push off safely when turning. The tolerance allowed in the verticality

of the walls shall be ± 0.3 degrees.

The use of ledges along pool walls is allowed, but they must not be located less than **1.2** meters below the water surface and can be between **0.1** and **0.15** meters wide. Both inward and protruding ledges are allowed, although ledges that do not protrude from the walls are recommended.

As for perimeter water collection, gutters may be installed on all four walls but any gutters on the end walls must allow for touch panels to be attached in the **0.3** meters above the water surface.

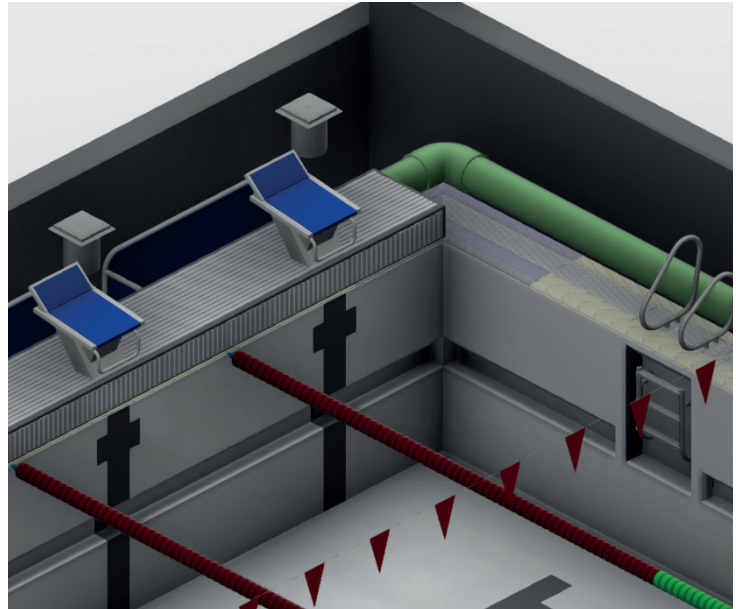
3.5 Lanes

According to section 16.1.6, **lanes** must be at least **2.5** meters wide, with two gaps of at least **0.1** meters on the outside of the first and last lanes.

3.6 Lane Ropes

Section 16.1.7 sets out the requirements that **lane ropes** must meet in Olympic swimming pools. Their main function is not only to separate swimming **lanes** but also reduce waves in the pool. A **lane rope** must have the necessary properties to limit waves moving from lane to lane or bouncing back.

In an **8-lane** pool, **lane ropes** should stretch the entire length of the course and components that do not contribute to wave reduction, such as the tension spring and take-up reel, should measure no more than **200** mm at each **lane rope** end.



FLUIDRA's Olympic swimming pool design with a ledge **1.2** meters below the water surface

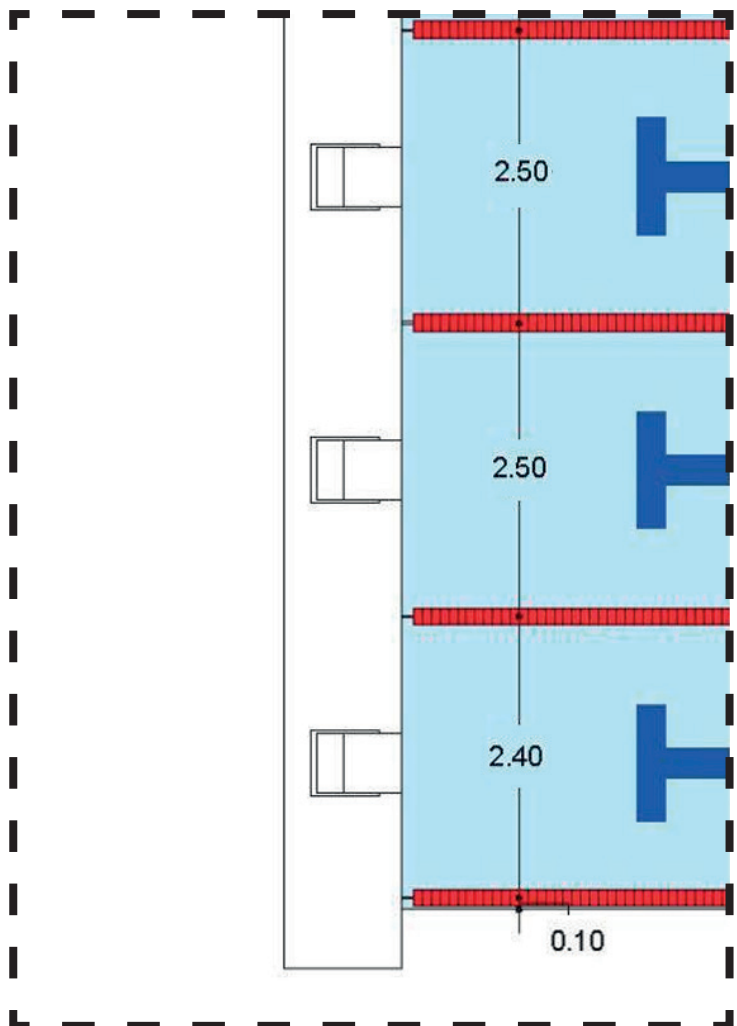


Figure 2 of the ANNEX 2 (Part 2: Swimming Rules) of the **World Aquatics Competition Regulations** with lane widths



World Aquatics-certified Olympic swimming pool built by **FLUIDRA**. The main functions of the **lane ropes** are not only to separate swimming **lanes** but also reduce waves in the pool

Lane ropes shall extend the full length of the course and components not contributing to its wave reduction function, such as tension spring and take-up reel, shall measure less than **200 mm each end of rope**.

The lane rope must be fixed to anchor brackets embedded in the end walls at each end. If the anchor is positioned on the pool deck, a rigid extender must be in place. The installed lane rope should stay inside the water of the swimming pool. The anchor with extender must not stretch into the pool more than **10 mm**. The length of the **lane rope** shall not be influenced by the anchor by more than **±10 mm** at each rope end.

The anchor shall be attached in a way that wave-reducing components on each end wall should be 50% below the water surface. Anchors must be installed to support **20 kN**. Wave-reducing components will be included along the length of each **lane rope**, with a minimum diameter of **0.10** meters. Discs and floats must be designed in such a way that the floats themselves do not affect **lane-rope** length. Floats should be an integral component between two discs. The length of the **lane rope** should have negative buoyancy so that a minimum of one-half to a maximum of two-thirds of the height of the wave-reducing components should be below the water surface.

A tool is required to lock the position of the take-up reel of the **lane rope** and prevent unauthorized tampering. A tension spring must be installed on the **lane rope** to absorb sudden high-point loads, as well as a cable that can support **12 kN** tension.

In **8-lane** Olympic swimming pools, the following colors should be used for the **lane ropes**:

- **Two (2) GREEN lane ropes** for **lanes 1 and 8**
- **Four (4) BLUE lane ropes** for **lanes 2, 3, 6, and 7**
- **Three (3) YELLOW lane ropes** for **lanes 4 and 5**

The part of the **lane rope** that stretches a distance of **5.0** meters from each end of the pool must be **RED**.

There must be no more than one **lane rope** between each lane and its tension value must be between **1** and **1.2** kN.

At the **15-meter** mark, the components must be of a different color from the surrounding components. Similarly, in **50-meter** pools the components must be different when marking **25** meters.











16.1.7 LANE ROPES	
9	
8	
7	
6	
5	
4	
3	
2	
1	
0	

Figure 3 from the ANNEX 1 (Part 2: Swimming Rules) of the **World Aquatics Competition Regulations** about lane rope colors.

3.7 Starting Platforms

According to section 16.1.8, **starting platforms** must be rigid with no spring. They must be positioned between **0.5** and **0.75** meters in height above the water surface, measure at least **0.5 x 0.5** meters in surface area, and be coated in a non-slip material.

In this section, other geometric requirements that **starting platforms** must adhere to are outlined relating to their maximum slope, grips, and handgrips.

As seen in section **3.3**, in swimming pools with **starting platforms**, there must be a minimum depth of **1.35** meters in the area extending from the first meter to at least **6.0** meters from the starting wall.

Starting platform surfaces should be at least 0.5 x 0.5 meters in area and coated in a non-slip material



3.8 Numbering, Turn Indicators, and Other Accessories

Section 16.1.9 deals with the numbering of the swim lanes and states that each **starting platform** must be clearly numbered on all four sides in a clearly visible manner. Lane number **0** is recommended to be on the right-hand side when looking at the course from the starting end, except in **50 m** events where the opposite end can be used to start. In touch panels, the numbering may be on top.

Section 16.1.10 deals with backstroke turn indicators, where flagged ropes shall be hung along the length of the pool, **1.8** meters above the water surface and **5.0** meters from each end wall. Distinctive markers must be placed at each end of the pool, on each **lane rope** if possible, **15.0** meters from either end wall.

According to section 16.1.12, **False Start Ropes** can be hung no less than **1.2** meters from the water level with poles attached **15.0** meters from the starting end. The poles will be attached using a quick-release system and the rope must effectively cover all **lanes** when triggered.

3.9 Water Conditions and Lighting

Section 16.1.13 sets out the general conditions to be met by the water in Olympic swimming pools. Specifically, the temperature must be between **25°C** and **28°C** and the level must remain constant throughout the competition, without noticeable movement.

Section 16.1.13.2 also recommends that, in order to maintain the water level, preserving water transparency and taking into account the health regulations in force in most countries, water inlets and outlets should be regulated between **220** to **250 m³/h** for **50.00-meter** pools.

Each **starting platform** must be clearly numbered on all four sides, in a clearly visible manner



Water inflow and outflow in daily use must comply with the health regulations of each country. At standard turnover rates, water distribution should not generate any noticeable currents or turbulence. Section 16.1.13.2 presents a method to ensure this turbulence is not being produced.

Section 16.1.13.3 limits water salinity to less than **3** gr/liter of salt for pools that wish to register World Records and Junior World Records.

Finally, section 16.1.14 states that the intensity of the lighting over **starting platforms** and turning ends must be no less than 600 lux.

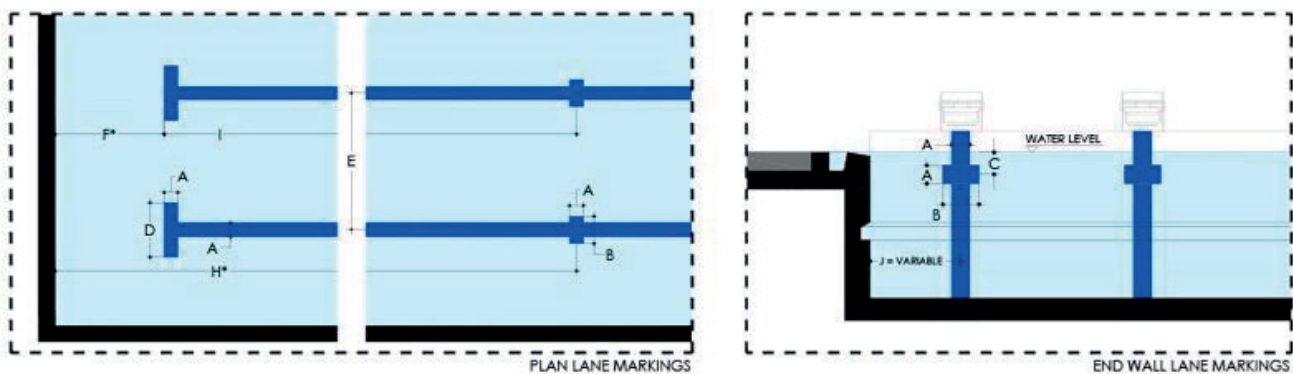
3.10 Lane Markings

In accordance with section 16.1.15, **lane markings** must be dark in color and positioned on the pool floor in the middle of each lane. Their minimum width should be **0.2** meters and the maximum **0.3** meters. They must be **46.0** meters long for **50**-meter-long pools.

Lane lines must end **2.0** meters from the end wall, with a **1.0**-meter-long cross line the same width as the lane line.

Target lines the same width as the lane lines should be positioned on the end walls or touch panels, in the middle of each lane.

They will extend continuously from deck edge to pool bottom up to a maximum of **3** meters. A **0.5**-meter-long cross line will be positioned below the water surface at **0.3** meters, measured from the mid-point of the cross line.



Lane Markings		
Width of lane markings, end, lines targets	A	0.25m ± 0.05m
Length of end wall targets	B	0.50m
Depth to centre of end wall targets	C	0.30m
Length of lane marker cross line	D	1.00m
Width of racing lanes	E	2.50m
Distance from end of lane line to end wall	F*	2.00m*
Distance from centre of cross line to end wall	G	15.00m*
Distance from end of lane line to centre of cross line	H	13.00m
Distance from centre of cross line to end wall	I	25.00m*
* Pool tolerance has to be considered		

Diagrams from the Annex 10 (Part 2: Swimming Rules) of the **World Aquatics Competition Regulations**

3.11 Bulkheads

In accordance with section 16.1.16, when a **bulkhead** is used as an end wall, it must stretch the entire pool width and present a solid smooth vertical surface that is both stable and non-slip in order to install touch panels stretching at least **0.8 m** below and **0.3 m** above the water surface. There must be no precarious gaps above or below the water line that a swimmer's hands, feet, toes, or fingers could go through. **Bulkheads** must be designed to allow officials to move freely along the pool length without creating any noticeable current or turbulence inside the water.

04

WHAT IS THE WORLD AQUATICS CERTIFICATION PROCESS FOR A SWIMMING POOL?

The protocol to follow in order to achieve **WORLD AQUATICS** certification of an Olympic swimming pool is as follows:

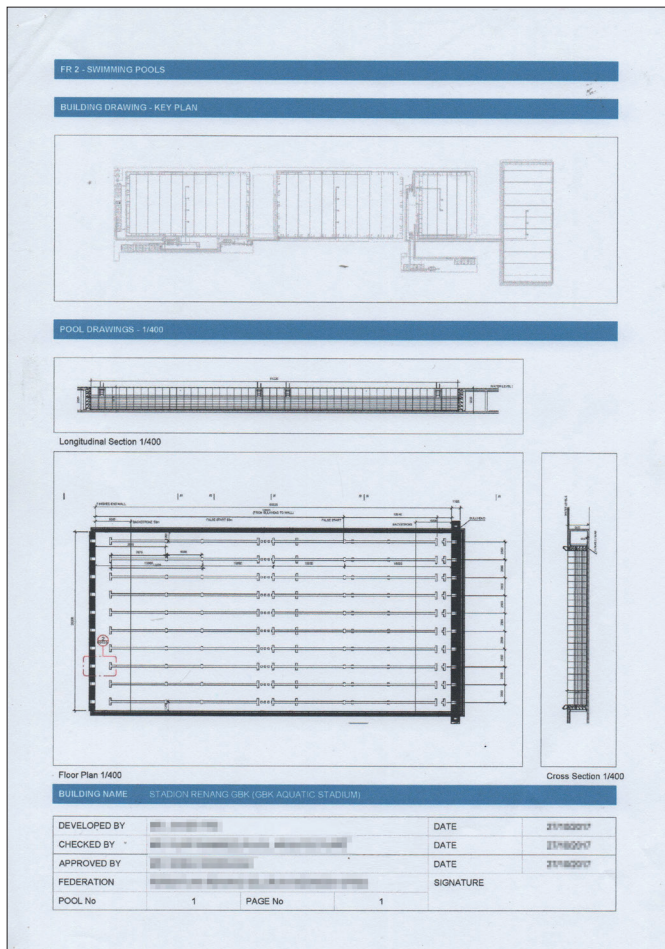
4.1. Preliminary Control

The preliminary control must be carried out in the design stage, when compliance with all the requirements set out in the **World Aquatics Competition Regulations** will be verified.

4.2. Implementing World Aquatics Certification

Once the pool construction is complete, the certification process can begin. For this, the following steps must be followed:

1. The Principal Contractor shall propose to the National Federation the name of the surveyor, the equipment intended to be used, and the specialist technician who will proceed to verify the measurements given by the surveyor and their compliance with the conditions set forth in the Certificate.
2. The National Federation must approve the designation of people and equipment proposed by the Principal Contractor.
3. The Principal Contractor will confirm the dates when the surveyor will verify the measurements and invite the specialist technician to attend the process.
4. The surveyor will check the necessary measurements in the presence of the specialist technician.
5. The surveyor will complete and sign the Certification form.
6. The specialist technician will verify the resulting document and sign it once it has been correctly completed.



Example of page 2 of the **World Aquatics** (at that time still called World Aquatics Competition Regulations). Olympic pool-certificate guide. Olympic pool built by **FLUIDRA** for the 2018 Asian Games in Jakarta, Indonesia.



Example of **World Aquatics certification** (at that time still called FINA) for an Olympic pool built by **FLUIDRA**

05

CONCLUSIONS

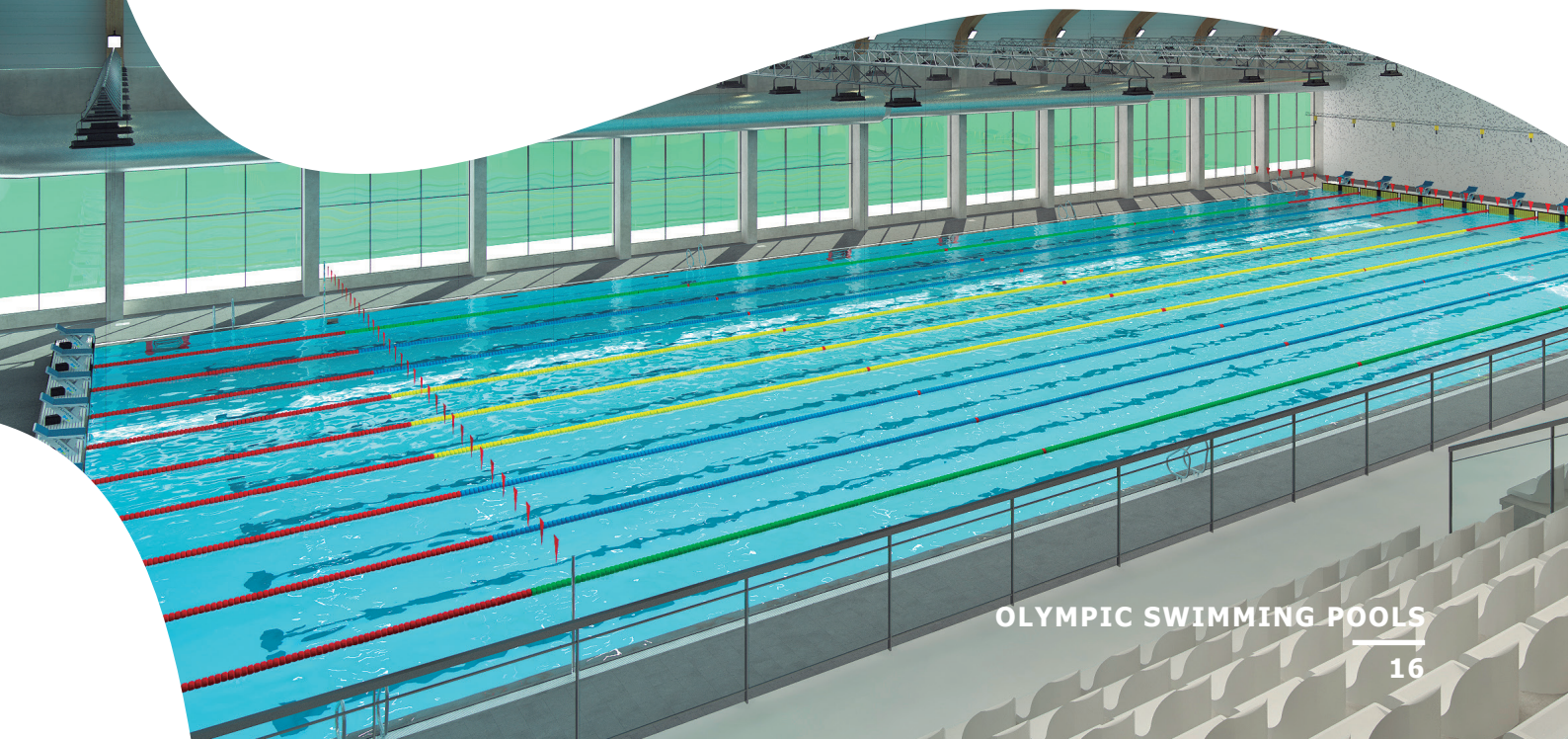
The design process of an Olympic swimming pool to be certified by **World Aquatics** must comply with the requirements set out in section 16.1 (Part 2: Swimming Rules) of the **World Aquatics Competition Regulations**.

We have seen that these rules describe the requirements that must be applied to the design of an Olympic swimming pool in terms of length, depth, tolerances, walls, **lanes, lane ropes, platforms, numbering, accessories, water conditions, lighting, and lane markings**.

It is important to highlight that, as seen in sections 2 and 3 of the **World Aquatics Competition Regulations**, the use of specific materials is not required to build an Olympic swimming pool nor any specific manufacturers or brands that may be involved in the process of equipping and commissioning the pool. Therefore, any company with solvency and good technical preparation can obtain certification if it complies scrupulously with the requirements of the standard.

Once construction of the pool is complete, the certification process may be initiated through the Contractor that built the pool, with the collaboration of a surveyor authorized by the National Federation where the pool is located, as well as a specialist technician. The surveyor shall take measurements and complete the Certification form and the technician shall validate the information and sign the document.

The entire process can be carried out swiftly and safely with the collaboration of a company with experience in the design and construction of **World Aquatics**-certified Olympic swimming pools.



Bibliography:

World Aquatics (WA), [World Aquatics Competition Regulations](https://www.worldaquatics.com/rules/competition-regulations), on 21 February 2023, **<https://www.worldaquatics.com/rules/competition-regulations>**

"This information contains general recommendations that must be taken into consideration on a case-by-case basis. This information is not an instruction manual and cannot be considered as such for any purpose. Any implementation or installation to be made must be made by a professional and under the appropriate guidelines. In this regard, each user is responsible for the application it makes of the information contained herein. Fluidra will not be responsible for its use. Consequently, under no circumstances will Fluidra be liable or responsible for any claim, damages or loss that may arise as a consequence of the use of this information".



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