

## Comparison between Waterproofing Sheets Membrane and Polyurea Waterproofing Coating Methods

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### Abstract:

This research aims to compare between Waterproofing Sheets Membrane and Polyurea Waterproofing Coating Methods, and know the waterproofing methods applying time, cost, weight, materials durability, and the waterproofing methods materials fire resistance properties. The research used qualitative analysis techniques to compare the two waterproofing methods objectively, Through lab testing, researchers found that: the polyurea waterproofing coating method usually takes between 1 to 2 working days to apply while the traditional sheet membrane waterproofing method takes between 5 to 7 working days applying time, and the polyurea waterproofing coating method can be more expensive than the traditional waterproofing sheet membranes method. Applying polyurea requires specialized equipment and trained personnel for proper handling and application, Both methods' materials weight are considered relatively light but the polyurea coating method materials are lighter, the polyurea waterproofing coating system lasts up to 30 years. Rather than the traditional system which durability is up to 20 years, the polyurea waterproofing coating system is considered a good fire resistance system rather than traditional sheet membrane system. It is recommended to clean and clear the surface before the commence of the waterproofing process. and the surface needs to be tested for at least 3 full days to confirm that the waterproofing system was applied successfully and without missing any openings.

**Keywords:** Waterproofing, Sheets, Membrane, Polyurea Waterproofing, Coating Methods

## 1. Introduction

The main waterproofing methods used in the construction field in the Arabic gulf area are the sheet membrane waterproofing method and the polyurea waterproofing coating method. sheet membrane waterproofing method is the oldest and most classic waterproofing type, in which is a pre-fabricated, continuous sheet material specifically designed to form a barrier against water intrusion. It's essentially a large, flat sheet that acts like a water-proof blanket for the building element. They come in large rolls and are unfurled and laid flat on the surface that needs protection. Made from various waterproof materials like PVC, EPDM, or TPO, that are Installed directly on the substrate (the underlying surface) using adhesives, torches (for some types), or mechanical fasteners. For the purpose of creating a watertight seal to prevent water leakage and damage to the underlying structure. Waterproofing sheet membranes are widely used in construction projects for various applications like protecting foundations, basements, and underground structures, shielding roofs from leaks and water infiltration, waterproofing bathrooms, plazas, balconies, and other areas exposed to moisture, preventing water migration through walls and potential structural issues and creating a watertight container and stopping leaks (company, 20221).

The other method is the and polyurea waterproofing coating methods. Polyurea offers a robust waterproofing solution applied through a specialized spray method. The polyurea coating method considered as a modern method and the materials used are two-component polyurea system: This usually consists of an isocyanate component and an amine-resin blend component. In addition to plural-component spray equipment that includes heated tanks, hoses, and a spray gun for precise application. The coating process starts by surface preparation, the substrate (surface to be waterproofed) is thoroughly cleaned and prepared. This may involve removing dirt, debris, and any existing coatings that could affect adhesion. Afterwards, the polyurea components are loaded into separate heated tanks within the spray equipment. The system heats the materials to the appropriate temperature (typically around 140°F to 160°F) for optimal reaction and application. After that, the heated components are then proportioned and mixed at a precise ratio (usually 1:1) within the equipment and sprayed onto the prepared surface using a specialized spray gun. The polyurea reacts rapidly upon contact, curing within seconds to minutes, creating a seamless and monolithic membrane. Next, the applied coating is inspected for proper thickness, uniformity, and pinholes. Additional coats may be required if necessary. Last but not least, the polyurea cures

completely within a short time frame, allowing for faster project completion compared to traditional methods (Magazine., 2014).

### **1.1. Research aims**

This research aims to:

- Compare between Waterproofing Sheets Membrane and Polyurea Waterproofing Coating Methods applying to the time, the cost, the weight, and materials durability, and the waterproofing methods materials fire resistance properties.

### **1.2. Study methods:**

The researcher used the comparative analytical approach based on the results from laboratory tests and previous studies on the research topic.

### **1.3. The study framework**

The study farmwork will demonstrate the function and aids of using the sheet membrane waterproofing method and the polyurea waterproofing coating method and compere between the methods in various aspects supported by lab tests and practical filed experiments

The study farmwork can be summarized in the following bullet points:

- 1- The waterproofing methods applying time.
- 2- The waterproofing methods applying cost.
- 3- The waterproofing methods materials weigh.
- 4- The waterproofing methods materials durability.
- 5- The waterproofing methods materials fire resistance properties.

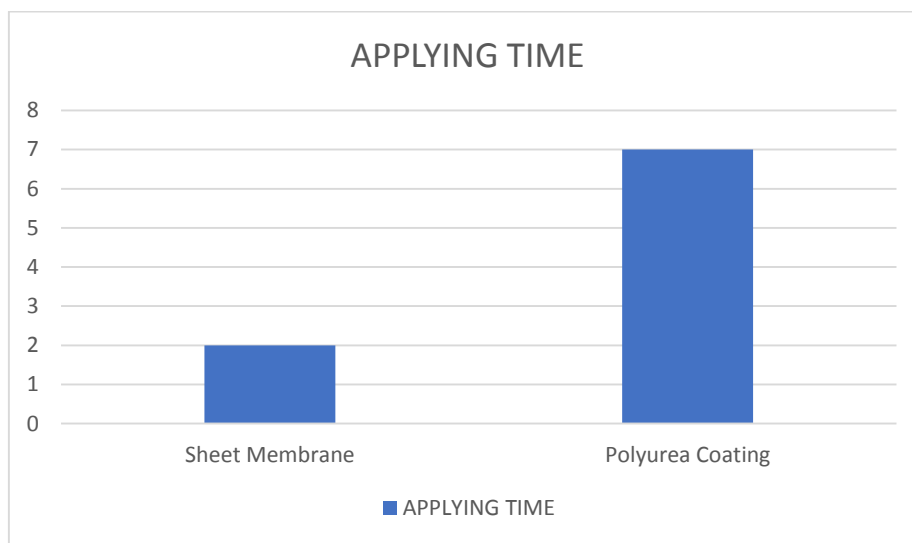
## **2. The waterproofing methods applying time.**

The polyurea waterproofing coating method usually takes between 1 to 2 working days to apply while the traditional sheet membrane waterproofing method takes between 5 to 7 working days applying time.

The following table demonstrate the applying time for 100m<sup>2</sup> roof surface waterproofing using the sheet membrane method and in comparison, with polyurea method.

**Table (1)** methods applying time requirements.

Water proofing system	Time required to Apply(days)
Sheet Membrane (1)	2
Polyurea Coating (2)	7



**Chart (1):** Waterproofing method applying time comparison.

### 3. The waterproofing methods applying cost

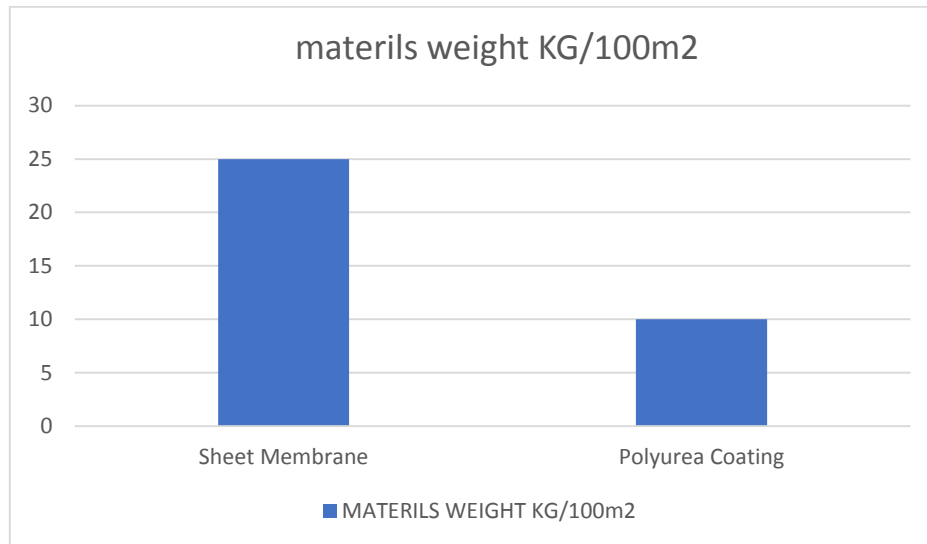
The polyurea waterproofing coating method can be more expensive than the traditional waterproofing sheet membranes method. Applying polyurea requires specialized equipment and trained personnel for proper handling and application. This can translate to higher upfront costs compared to the traditional method. The comparison excludes the protective foam 30cm layer.

### 4. The waterproofing methods materials weight

the polyurea waterproofing coating materials weight is around 10 kg per 100 m<sup>2</sup> square surface. However, the traditional sheet membrane materials layers wrights around 25 kg per 100 m<sup>2</sup> square meters. Both methods materials weight considered relatively light but the polyurea coating method materials is the lighter, the comparison excludes the protective foam 30cm layer.

**Table (2)** methods materials weight per 100 square meter surface.

Water proofing system	Weight KG/100m <sup>2</sup>
Sheet Membrane (1)	25
Polyurea Coating (2)	10



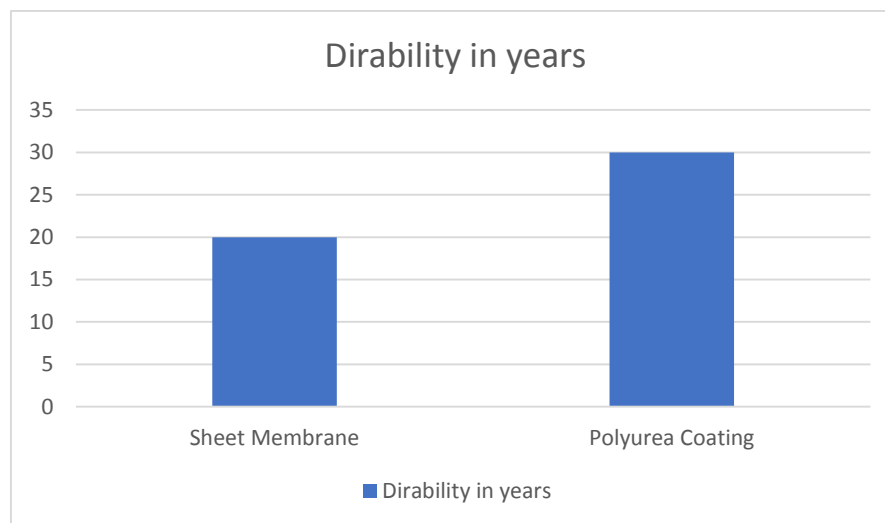
**Chart (2):** Materials Weight KG/100m<sup>2</sup>

### 5. The waterproofing methods durability.

the polyurea waterproofing coating system last up to 30 years. On the other hand, the traditional sheet membrane system durability is up to 20 years, which gives the polyurea waterproofing system the advantages in the durability aspect.

**Table (3)** Systems durability in years.

Water proofing system	Durability in years
Sheet Membrane (3)	20
Polyurea Coating (3)	30



**Chart (3):** Waterproofing systems durability in years.

## 6. The waterproofing methods materials fire resistance properties.

The polyurea waterproofing coating system considered a good fire resistance system that can resist up to 30 minutes (whitechem, 2020). Unlike the traditional sheet membrane system that does not have a fire resistance ability.

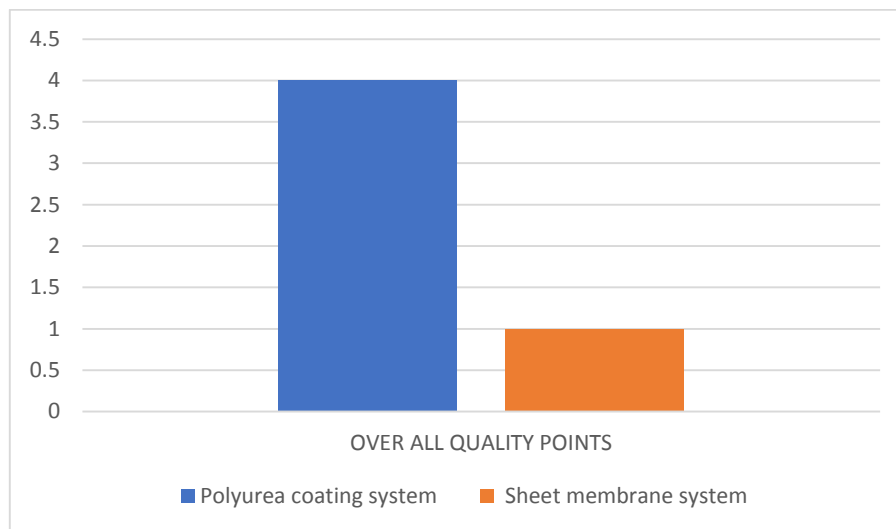
## 7. The study Results Discussing

The above results in table (1) shows that the polyurea waterproofing coating system are fast to apply that requires only 1-2 working days than the traditional sheet membrane system that requires up to 7 days applying time. In addition, the data in table (2) indicate that the polyurea waterproofing coating system is lighter than the traditional sheet membrane system by approximate 40%. Moreover, as shown in table (3) the polyurea waterproofing coating system has a better durability time span of 30 years than the sheet membrane system that last for up to 20 years only. Additionally, the polyurea coating system has fire resistance ability of a rate around 30 minutes unlike the sheet membrane system that does not has such function, on the other hand, the polyurea waterproofing coating system fix costs more than the sheet membrane system due to the requirement of a certain equipment set and special labour skills.

The study results for the Polyurea coating system superior quality comparison points can be summarized in the following table (4) and chart (4).

**Table (4)** Result Summary table.

System method	Polyurea coating system	Sheet membrane system
Building time	1	
Less cost		1
Lighter Surface Mass	1	
Durability	1	
Best fire resistance	1	
Overall quality points	4	1



**Chart (4):** Summary Chart overall quality points Compression Chart.

### 8. The study conclusion

The Polyurea coating system are the better modern era waterproofing system because of the system properties values that suppress the traditional sheet membrane system method starting with the Polyurea coating system fast fixing time, Furthermore, being a light weight waterproofing system that tolls less load on the buildings structure and less pressure on the building man power that results in more work activity per day. Moreover, the Polyurea coating system has fire resistance properties that can withstand active fire for up to 30 minutes. Additionally, the Polyurea coating system has a better life span than the sheet membrane system that can last up to 30 years. On the other hand, the Polyurea coating system applying cost is more than the sheet membrane method but that downside can be compensated with the stated advantages of the Polyurea coating system method.

## 9. The study Recommendations

It is recommended to clean and clear the surface that to be waterproofed before the commence of the waterproofing process. Additionally, the level of hydrostatic pressure the membrane will need to withstand should be Considered. For example, basements or buried structures require higher water resistance compared to a plaza deck. Moreover, the surface need to be tested for at least 3 full days to coniform that the waterproofing system was applied successfully and without missing any openings.

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