

OPC vs PPC | OPC and PPC Cement – 15 Important Difference

OPC vs PPC | Difference between OPC and PPC Cement

Hello friends,

In this article, we will see the differences between **OPC** and **PPC**.

So, Let's start,

The long form of **OPC** is ordinary Portland cement and the long form of **PPC** is Portland pozzolana cement.



OPC vs PPC

The ISI mark on the **Ordinary Portland cement** bag is black in colour whereas the ISI mark on the **Portland pozzolana cement** bag is red in colour.

1). Manufacturing process

The raw materials used to manufacture **OPC** are calcareous materials containing limestone which is 60 to 70%.

Argillaceous materials containing silica 17 to 25%,

Alumina 3 to 8% and oxides of iron 0.5 to 6%.

Gypsum, magnesia, sulphur trioxide, potash or soda point 0.5 to 1.3%.

All these materials are mixed in a fixed proportion and heated in kilns to form clinkers which are then grinding to the required fineness to obtain **ordinary Portland cement**.



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Whereas,

The raw materials used to manufacture **PPC** are **OPC** cement clinker 75 to 77%.

Gypsum 3 to 5% and pozzolanic materials 10 to 25% which can be fly ash, rice husk Ash, volcanic tuffs, clay and shale. All these materials are mixed and grinder to obtain the **Portland pozzolana cement**.

2). Grades



OPC vs PPC

As per the classification of the Bureau of Indian Standards, **OPC** is available in 33 grade 43 grade and 53 Grade.

Whereas

As per the Bureau of Indian Standards, **PPC** is available in 1 grade and its strength matches the strength of 33-grade **OPC** after curing.

3). IS Codes

IS code used for **OPC** 33 Grade Cement is IS 269. For 43 Grade Cement IS 8112 is used and for 53 Grade Cement IS 12269 is used.

Whereas

The IS code used for **PPC** is IS 1489 parts 1 and 2 1991.

4). Strength

In 3 days **OPC** achieves a compressive strength of 35N/mm².

In 7 days **OPC** achieves a compressive strength of 43.5N/mm².

In 28 days **OPC** achieves a compressive strength of 55N/mm².

Whereas

In 3 days **PPC** achieves a compressive strength of 29N/mm².

In 7 days **PPC** achieves a compressive strength of 39N/mm².

In 28 days **PPC** achieves a compressive strength of 56.5N/mm².

The initial strength of **ordinary Portland cement** is higher than **Portland pozzolana cement**.

whereas

The long-term strength of **Portland pozzolana cement** is higher than that of **ordinary Portland cement**. So it's pretty clear now if you need high strength at the initial stage then go for **OPC**.

5). Durability

The durability of concrete made using **OPC** cement is less than that of concrete made using **PPC** cement.

Whereas

The durability of concrete made using **PPC** is higher than **OPC** which means the structure made up of **PPC** will last longer.

6). Workability



OPC vs PPC

Workability means how easily it can flow on the surface.

Concrete made using **OPC** cement has lower workability.

Whereas

Concrete made using **PPC** cement has a higher workability.

7). Permeability

Permeability is the quality of any substance to measure how much liquid or water can pass through them.

Due to the absence of pozzolanic materials **ordinary Portland cement** is highly permeable to water.

on the other hand

Portland pozzolana cement is less permeable hence it is suitable for a structure such as Bridge Pier



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or a Foundation where the waterproof structure is recommended.



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8). Heat of Hydration

The heat of hydration is the heat generated when water and cement react.

In the case of **OPC**, Hydration Process takes less time to complete and it produces more heat than **PPC**. Please note if cement produces more heat in less time then it cannot be used for mass concreting. As it may generate cracks in structures.

Whereas,

In the case of **PPC**, the Hydration process takes a long time and produces less heat the hydration process, Hence it is ideal for mass concreting.

9). Setting Time

The initial setting time of your **OPC** and **PPC** is the same and it is 30 minutes and the final setting time of your **OPC** is 280 minutes which is 11.67 days its setting time is less and **PPC**. So it is recommended in projects where props are to be removed early.

on the other hand

The final setting time of **PPC** is 600 minutes which is 25 days **PPC** cement prolongs the setting time of concrete Hence, it helps in better finishing of concrete.

10). Fineness



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The fineness of **OPC** is at least $225\text{m}^2/\text{kg}$ which is lower than **PPC** hence it is easy to handle.

Whereas

The fineness of **PPC** is at least $300\text{m}^2/\text{kg}$ which is higher than **PPC** hence it is difficult to handle but it is not a major thing.

11). Resistance To Attack Against Chemicals



OPC vs PPC

In the case of **OPC**, Resistance to attack against sulphates, alkalis, chlorides and chemical is lower as compared to **PPC**.

whereas

PPC has more resistance towards the attack of sulphates, alkalis, chloride and Chemicals as compared to **OPC**.

12). Curing Time



OPC vs PPC

OPC required a minimum curing period of 7 days.

When **OPC** is exposed to hot and dry weather conditions the minimum curing period required shall not be less than 10 days

Whereas

PPC required a minimum curing period of 10 days.

When **PPC** is exposed to hot and dry weather conditions the minimum curing period required shall not be less than 14 days. Here you can see the curing period of **OPC** is less than **PPC**. Hence, the curing cost reduces and that's why **OPC** is recommended when the curing is cost prohibitive.

13). Environmental Impact



OPC vs PPC

During the manufacturing process of **OPC**, a large amount of CO₂ emits.

whereas

PPC contains 10 to 25% pozzoloanic materials. Hence, It emits less CO₂ manufacturing process. Here **PPC** is called environment friendly as it utilizes by-products of the thermal station which reduces environmental problems.

14). Cost



OPC vs PPC

The cost of your **OPC** is around 380/-bag which is slightly

more expensive than **PPC**.

Whereas,

In the case of **PPC**, the expensive clinker is replaced by pozzolanic material such as fly ash.

Hence, the price of **PPC** is slightly less than **OPC**. Generally, there is a price difference of Rs.5 to 10/- but this slightly lesser price creates a considerable difference in the overall cost of building and impact on the Environment.

15). Uses



OPC vs PPC

OPC is the most commonly used Cement in construction. A higher grade like grade 53 is not recommended to be used for plastering as it is known to develop shrinkage cracks due to its high strength. **OPC** is also not used in masonry as mortar strength in the initial period is not that critical.

OPC can be used for structural members like slabs, columns and beams. Ideal applications for ordinary **Portland cement** are commercial and industrial complexes, high-rise buildings, roads, bridges, flyovers, heavy different structures etc.

on the other hand

PPC can be used in all types of construction works like RCC

work in residential, commercial and industrial buildings, Marine works, and mass concrete work, like Dams, huge foundations, roads Runway, bridges & flyovers etc.

Specially **PPC** is used in plastering, masonry, tiling and waterproofing works. In these works, strength is not the major criterion.

Conclusion

Both **OPC** and **PPC** have commonly used cement in construction and both have their pros and cons.

Nowadays, **PPC** is used as a substitute for ordinary Portland cement. Since **PPC** contains pozzolanic materials, it helps to enhance the strength of concrete and also fulfils the green building criteria.

As a result of this, Nowadays, Most **OPC** manufacturers are shifting to **PPC**.

I hope this article will definitely help you to choose to make the correct choice between **OPC** and **PPC**.

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