



EUCLID CHEMICAL

HOW IT WORKS

PERVIOUS CONCRETE

Portland Cement Pervious Concrete (PCPC) is composed of portland cement, coarse aggregate, water, and admixtures. The lack of fine aggregate causes the concrete to have a void structure, which allows liquids and air to be filtered and pass through the concrete into a sub-base or collection pond. Placing PC can be difficult due to different challenges when compared to normal concrete. That's why The Euclid Chemical Company has developed a system of chemical admixtures to help produce, place, and level this unique type of concrete with ease and while maintaining workability.



Pervious Concrete



Normal Concrete



Filtration



Normal vs. Pervious Drainage

THE DIFFERENCE

The appearance of the pervious concrete compared to the normal concrete is markedly different. Pervious concrete is usually free of fine aggregate, causing it to appear very coarse and lacking fluidity.

PRIMARY APPLICATIONS

Many times, pervious concrete roadways and parking lots can account for reducing or eliminating the need for traditional stormwater management systems such as retention ponds or connecting into a sewer, as well as being apart of a water retention structure. Sidewalks, Parking Lots, Residential Flatwork, Pavements and Drainage Systems can also benefit from having used pervious concrete.

FILTRATION

The ability of pervious concrete and the sub-base to filter harmful materials greatly reduces the effects of damaging chemicals, such as gas and oils, to the environment. Once the chemicals are trapped in the concrete and sub-base from filtration, naturally they breakdown into a harmless form. Also, pervious concrete reduces the amount of erosion being caused by runoff from conventional concrete structures. The EPA recognizes pervious concrete as a Best Management Practice (BMP), and building owners and designers are realizing more efficient use of land while acquiring LEED credits through the use of pervious concrete structures.

Routine maintenance should be apart of any pervious concrete pavement. This removes sediment particles before they get stuck in the pavement system. It can involve dry sweeping or vacuuming the surface. A more aggressive approach is to use pressure washers to move particles in the top portion and to flush them off of the pavement or through the pavement. For many cases where routine sweeping hasn't been done, this usually does the trick and restores good filtration to the concrete.

WHY WE SHOULD USE PERVIOUS CONCRETE

- Green Building alternative that is suitable for many applications
- Natural run-off allows rainwater to drain directly to a sub-base
- Reduced construction requirements for drainage structures
- Reduced pollution prevents environmental damage
- Protects streams and lakes which allows vegetation to thrive

HOW IT'S MADE

Pervious concrete is a design dependent mixture and should achieve a 15-25% void structure. Aggregate gradation is one of the key elements of a successful project. Aggregates must be clean and properly graded. Rounded gravel or limestone at 3/8" is typically used. Cement contents vary but generally fall in the range of 500 – 650 lb/yd³ (300-385 kg/m³). A 0.25 – 0.32 water/cement ratio is used. The Euclid Chemical Company recommends that admixtures be used to help aid in the production, placement, leveling, and curing of pervious concrete.

3 MAIN PROPERTIES TO USE ADMIXTURES FOR WHEN USING PERVIOUS CONCRETE

WORKABILITY

Highly efficient polycarboxylate based high and mid range water reducers make mixing and placing pervious concrete easy. Having extremely low W/C ratios, coupled with the very low workability that come with pervious concrete, can make placement a labor-intensive task. Euclid Chemical's new generation **Plastol** line of water reducers will allow the producer to maintain the W/C, and still provide a mixture that is easy to place and level in all climates.

RHEOLOGY MODIFYING

Eucon AWA-P20 and **Visctrol** can make pervious concrete more manageable. These admixtures give the cement paste more of a 'body', and lubricate the cement particles. **Eucon AWA-P20** and **Visctrol** also help keep the cement particles on the aggregate.

HYDRATION CONTROL

Pervious Concrete has a low water content and a high void structure. These factors allow ambient conditions to have more access to the cement paste and sometimes the cement particles tend to hydrate too fast to allow for time of placement. **Eucon Stasis** and **Eucon DS** will lessen this effect dramatically. These admixtures extend the working time of fresh pervious concrete even in the harshest of climates.

TYPICAL MIX DESIGN

MATERIAL	lb/yd ³	kg/m ³
Cement	600	356
Coarse Aggregate 3/8" Limestone	2600	1543
Water	160	95
W/CM Ratio	0.27	0.27

EUCLID CHEMICAL ADMIXTURES USED

ADMIXTURE	oz/cwt	ml/100kg
Plastol 6400	3.5	228
Eucon Stasis	4.0	261
Eucon AWA-P20	8.0	522

The Euclid Chemical Company has certified personnel, trained by NRMCA, for assistance in the design and placement of Pervious Concrete.

TYPICAL CONCRETE PROPERTIES

PLASTIC	lb/ft ³	kg/m ³
Density	125	2000
Air Void %	25	25

HARDENED	PSI	MPa
Compressive Strength		
7 Day	1610	11
28 Day	1970	13.6
Flexural Strength		
28 Day	505	3.5

ADDITIONAL REFERENCES

- ACI 522.1-13
- ASTM C1701
- ASTM C1688
- ASTM C1754
- ASTM C1747