

Innovative Flooring Systems



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Epoxy and Polyurethane floorings have become common in most of the industries as they offer great advantages in terms of seamlessness, cleanability, aesthetics, and chemical resistance and so on. But they still do not find favour in many of the commercial applications as well as exterior areas due to various issues of scratch resistance, UV resistance etc. But with the advent of new-age raw materials in polymers, additives, fillers and pigments as well as awareness towards environmental protection and green buildings had led to a plethora of new floorings and concepts and we will take a peek at them.

SuDS compliant Flooring systems

(Based on technical information provided by Ronacrete Limited, Essex, UK. References are also drawn from www.defra.co.uk, www.netregs.org.uk, www.susdrain.org)

What is SuDS?

Sustainable Drainage Systems (SuDS) is designed to reduce the potential impact of new and existing developments with respect to surface water drainage discharges. The idea behind SuDS is to try to replicate natural systems that use cost effective solutions with low environmental impact to drain away dirty and surface water run-off through collection, storage, and cleaning before allowing it to be released slowly back into the environment, such as into water courses. This is to counter the effects of conventional drainage systems that often allow for flooding, pollution of the environment – with the resultant harm to wildlife – and contamination of groundwater sources used to provide

drinking water. The paradigm of SuDS solutions should be that of a system that is easy to manage, requiring little or no energy input (except from environmental sources such as sunlight, etc.), resilient to use, and being environmentally as well as aesthetically attractive.

(Information sourced from Wikipedia.)



In short, a city like Mumbai goes through a nightmarish seasons of flooding year after year due to long spells of rain and funnily a season of water shortage may be after about 6 to 7 months. Thus all the water that pours in the land goes straight to drains and sewers and onto the sea. All the concrete buildings, concrete roads and concrete pathways add to the woes of the common man as well as scores of city-planners and administrators. SuDS compliant walkways, drive-ways, pool surrounds, access roads, hard landscaping areas etc can be a boon to these people by improving the ground water situation significantly that would mitigate the problems of country-wide metro cities.

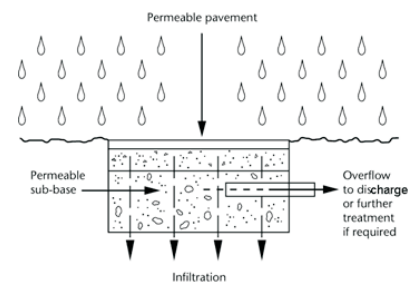
How does SuDS work?

SuDS is an approach to managing rainwater falling on roofs, floors and other surfaces through a sequence of actions. The key objectives are to manage the flow rate and volume of surface runoff

to reduce the risk of flooding and water pollution. SuDS also reduce pressure on the sewerage network and can improve biodiversity and local amenity

Sustainable drainage is a departure from the traditional approach to draining sites. There are some key principles that influence the planning and design process enabling SuDS to mimic natural drainage by:

- Storing runoff and releasing it slowly (attenuation)
- Allowing water to soak into the ground (infiltration)
- Slowly transporting (conveying) water on the surface
- Filtering out pollutants
- Allowing sediments to settle out by controlling the flow of the water

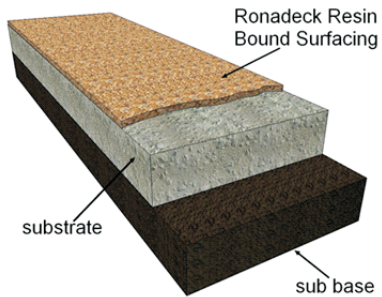


In this scenario, the first line of responsibility lies on the type of out-door flooring surrounding the residential, commercial and other buildings. Typically concrete, tiles or paver blocks are being used to provide this flooring surface. Though paver blocks do allow some water to drain through joints, other surfaces directly conduct the water to the drain pipes.

Alternately, the new genre of floorings offer an ideal path for rain water directly towards the surface underneath after filtering the unwanted pollutants, at the

same time offering a strong surface for pedestrian and light vehicular traffic.

A schematic drawing of the flooring system is given below



This flooring system is a resin bound aggregate surface using a specially formulated UV resistant, non-yellowing resin and hardener system mixed with natural recycled aggregates in order to provide a highly porous, but decorative, strong and functional flooring surface.



The open matrix structure allows water to drain through into the substrate, feed any surrounding trees and plants and avoid any change of or damage to the natural water table. This open matrix construction is in line with the requirements of Sustainable Drainage Systems (SuDS), designed to reduce the potential of flooding on new and existing urban developments.

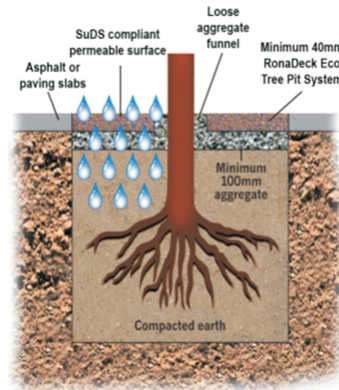
Technical data:

Mix Ratio	7.5kg resin : 106.25kg aggregate (typical)
Yield	4.675m ² @ 15mm
Pot Life	15-20 minutes
Anti-slip Aggregate (optional)	0.1kg per m ²
Permeability	→850 litres water /m ² /min
Foot Traffic	After 4 hours cure @ 20°C

The major application area of this flooring system are : Decorative natural aggregate surfacing, Footpaths,

walkways, corridors, cycle paths, Playgrounds, pool and pond surrounds, Driveways, car park bays, Showrooms, offices, reception areas, art galleries, Patios, conservatories, gardens, gazebos.

This concept is being used in tree-pit system wherein the porous tree-pits offer ease of maintenance, decoration and allow the tree to feed through the resin bound gravel system



Polymer-Epoxy Hybrid coatings

Epoxy coatings, for over 30 years are being used in variety of industries successfully. Though epoxies offer excellent properties of adhesion, strength, chemical resistance etc, suffers from few disadvantages such as non-UV resistance, susceptible to moisture, rigidity of film, typically having solvents that affect environment and long curing time. Thus epoxy coatings cannot be used in:

- Exterior areas subjected to exposure to sunlight
- Where high impact resistance is required

- Where quick turn-around 3 to 4 hrs is a pre-requisite
- Where water usage is continuous such as food-processing plants, abattoirs, dairies etc

Though solvents are being eliminated or reduced in most of the formulations, zero VOC can only be obtained by using water-borne systems. Typical water-borne epoxies do not offer the same level of performance in terms of abrasion resistance, durability, strength etc and this led to the emergence of new-age technologies of polymer- epoxy hybrid floorings.

Advantages of polymer- epoxy hybrid coatings:

- Easy use and cleaning
- Long pot life
- Fast drying
- Early hardness establishment
- Good water resistance and also can be used on floors having higher moisture content
- Good chemical resistance
- Significantly improved UV resistance compared to conventional epoxy dispersion

Various applications include:

- Exterior sports floors for tennis courts, basketball courts etc
- Exterior drive-ways, parking bays, walk ways
- Exterior loading bays
- Warehouses, logistic centres
- Food processing plants, dairies



Staircase Safety Systems (SSS):

Why does a staircase need SSS?

Staircase in a high-rise tower is the most important, but most-neglected part of the building. Most people do not need to use the staircase in normal times, but in case of unlikely fire, the staircase becomes the most important life-saving conduit to transport the people to safety.



Hence there are guidelines that were drawn for construction as well as maintenance of staircases in high-rises so that they are absolutely safe in times of dire need.

The National Building Code, which is a document containing standardized requirement for the design & construction of most types of building in the country specifies minimum guidelines for protection of life and property

GUIDELINES FOR FIRE PROTECTION AND MEANS OF EXIT REQUIREMENTS (INCLUDING HIGH RISE BUILDINGS)

Internal Staircases:-

- Shall be composed of non-combustible materials throughout.
- External wall of building shall constitute one of its sides.
- Shall not be arranged around a lift shaft.
- Minimum flight width=1000mm, Maximum flight width=2000mm.
- Minimum tread =250mm, Maximum riser=190mm, Minimum Head Room=2200mm. (varying slightly based on classification of buildings)

FIRE PROTECTION REQUIREMENTS FOR HIGH RISE BUILDINGS – 15M in Height or Above CONSTRUCTION:-

- All materials of construction in load bearing elements, stairways and corridors and facades shall be non-combustible.
- The interior finishes should not have a flame spreadability rating exceeding Class 1.
- The internal walls or staircase shall be of brick or RCC with minimum of 2H fire rating.

- The staircase shall be well ventilated.
- The roof of the shaft shall be one meter above the surrounding roof with fire resistance rating of 2h.
- The above is the minimum specifications for a staircase in India.

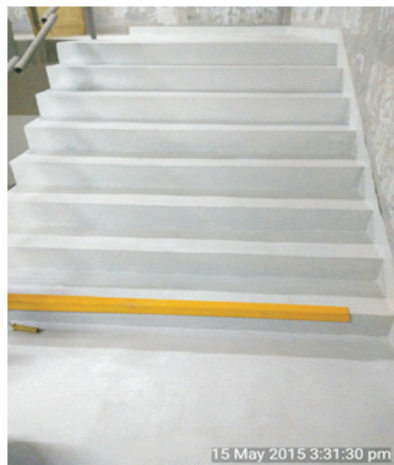


Image Courtesy: www.shilpaarchitects.in

However, in developed world, there are more stringent requirements for staircases and these changes and additions to the means of egress requirements have been introduced in the International Building Code for high-rise buildings.

One requirement was an additional stairway for buildings more than 420 feet in height (IBC Section 403.5.2). If a building exceeds 420 feet in height, then a third stairway would be required. This is to overcome the problem encountered at the WTC in 2001, when occupants were egressing down the stairs while firefighters were trying to work their way up the same stairs.

Stairways serving high-rise buildings are required to be constructed as smoke-



proof enclosures per IBC Section 403.5.4

Photoluminescent (Anti-slip Fire resistant Epoxy Coating) Anti Slip stair nosings Stair nosings with anti slip and photoluminescent strips serve as the built in core of the system. These nosings provide the benefits of both low level visual egress and slip prevention. Slips and falls are the second largest cause of accidental injuries in the United States. When quickly evacuating (Fire-retardant staircase nosing) a large number of people from a tight stairwell; slips and falls are known to be a major hazard and cause of injury. While tape, paint and

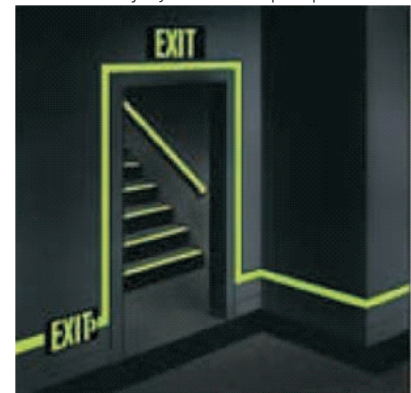


Image courtesy: www.safetystep.com

guidance treads will meet the new code they don't provide anti slip protection. Also high traffic stairwells subject tape, paint and guidance treads to abuse and more frequent replacement. Stair nosings with profiled grooves, anti-slip and photoluminescent inserts provide a more complete and durable solution.

Spatial guidance on steps, handrails, floor landings and wall and exit enclosures Imagine walking down an unfamiliar unmarked stairwell in total darkness or smoke. Photo luminescent anti slip stair nosings give fleeing occupants both visual and spatial guidance to allow them to swiftly and safely descend the stairs. Combine this with photoluminescent markings on handrails, floor landings and the perimeters of wall and exit enclosures and occupants are guided safely to the exit. This advance guidance system prevents many injuries due to tripping and falling and also provides fleeing occupants with an added feeling of confidence and control.

For further details:

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