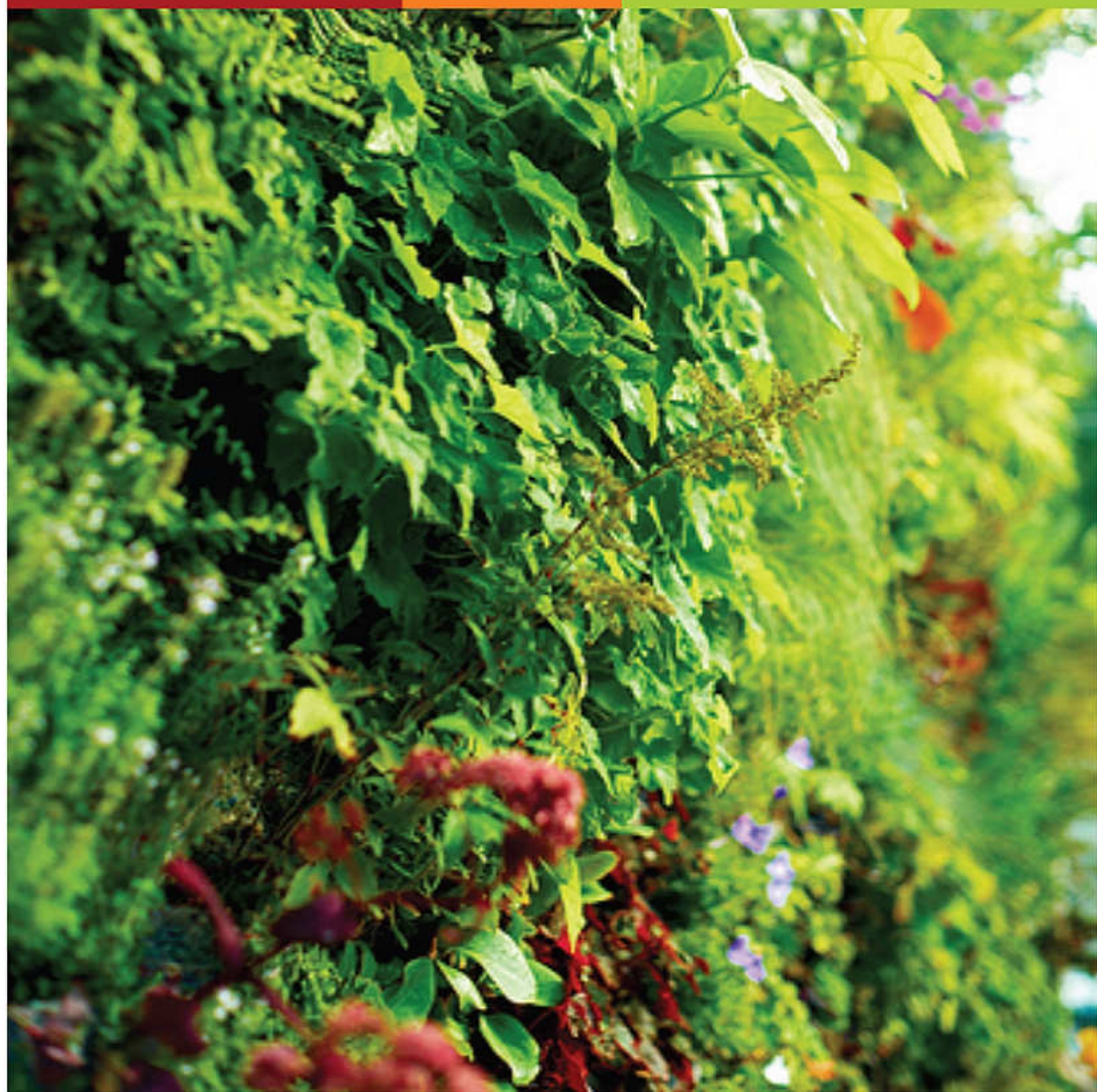


InnoGreen

VERTICAL GREEN WALL SYSTEM





Vertical Greening

Vertical greening is a special form of landscape architecture that make use of plants growing onto the walls in order to enhance green coverage, air quality and improve living environment. But most important of all, vertical greening can substantially reduce CO₂ emission.

Vertical greening

Vertical planting is certainly an alternative to roof greenery in a city composed of tower blocks which have high wall to roof ratio, and consequently large potential surface area for greening. The popularity of vertical greenery is growing because of its smaller footprint, aesthetic value and heat island mitigation impact. Moreover, facade walls, unlike rooftops, usually have no insulation layer against solar heat.

Vertical greening refers to vegetation that grows directly onto a building's facade or vegetation that is grown on a separate structural system that can be freestanding and adjacent or attached to the wall. Green facade typically feature woody or herbaceous climbers either planted into the ground or in planter boxes in order to cover buildings with vegetation.

Living wall system involves planter boxes or other structures to anchor plants that can be developed into modular systems attached to walls to facilitate plant growth without relying on rooting space at ground level.

Vertical greening can conserve air-conditioning energy, mitigate the urban heat island, increase longevity of building walls, reduce noise, decrease air pollution, sequester carbon, increase urban biodiversity by providing habitat for wildlife, and provide a more aesthetically pleasing environment to work and live. It can also establish in indoor environment.

Benefits of Green Wall

Current research has shown that incorporating living walls into building design has several benefits.

Building Energy Benefits

Green wall technology can lower heat absorption of the wall and therefore lower indoor temperature. The shading effect of vertical greening systems reduces the energy used for cooling by approximately 23%. In addition, vertical greenery systems can reduce air-conditioning load by shading walls and windows from incoming solar energy as a 5.5°C reduction in the temperature immediately outside of a building can reduce the amount of energy needed for air-conditioning by 50% to 70%.

Carbon Dioxide Reduction

Green surfaces can play reduce CO₂. Research showed that the reduction in CO₂ emissions of the green wall included a 15 % reduction in CO₂ generated for cooling buildings and another 2% via CO₂ uptake by the greenery.

Estimated that 1.1 km² of flat surface were greened, 3,640,263 kg CO₂ emitted per year could be avoided in electricity and natural gas consumption combined.



Benefits of Green Wall



Reduction of Urban Heat Island

Vegetation can alleviate urban heat island directly by shading heat-absorbing surfaces and through evapotranspiration cooling. Previous study showed that the humid climates of Hong Kong could achieve substantial benefits of a maximum temperature decrease of 8.4°C with vertical greenery systems in an urban canyon. In Singapore, the study of 8 different vertical greenery systems showed that differences in surface temperatures between surfaces with and without vegetation could be as high as 11°C.

Air Pollution Reduction

There has been many published on the ability of plants to clean the air, but little is specific to vertical greening. Vegetation removes pollutants in several ways.

Vegetation is able to collect PM₁₀ particles. The total amount of particles (upper side and underside) for the road is about 1.47×10^{10} particles per m² leaf area and is 8.72×10^9 particles per m² leaf area for the woodland.

Vegetation is not only restricted to particle adherence, it is also efficient in taking up other air polluting substances then particulate matter such as CO₂, NO_x and SO₂. Air pollutants can be removed at a rate of 85 kg ha⁻¹yr⁻¹ with ozone accounting for 52% of the total followed by NO₂ (27%), PM₁₀ (14%), and SO₂ (7%).

Noise reduction

Vegetation in combination with the growing substrate will absorb sound waves to a greater degree than a hard surface. Relative to a non-greened surface the reduction is most pronounced at frequencies in the range from 500 to 1000 Hz with a maximum reduction of 10 dB. Increasing substrate depth improved noise reduction up to a depth of 15-20 cm. Green surface with deeper substrate layers provided no further benefit.

The presence of green spaces such as garden and park can reduce the negative effects of rapid urbanization by creating a cooling effect, improving air quality and mitigating CO₂ emission (the major source of global warming).

InnoGreen Vertical Green Wall System is truly modular and demountable, with individual plant access and changeable.

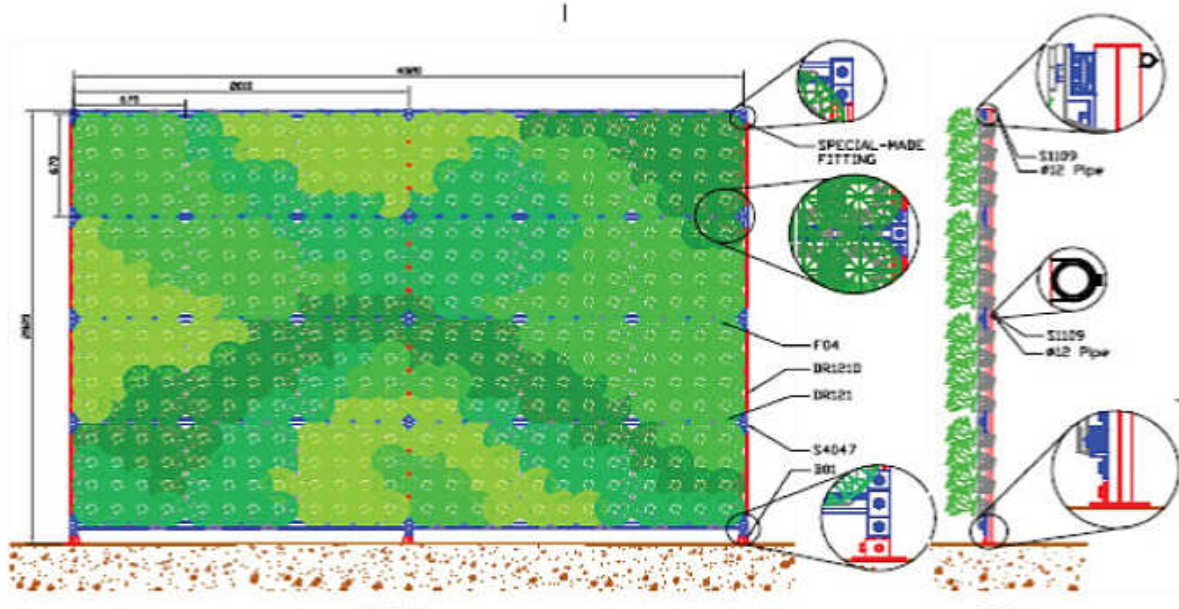
InnoGreen

Vertical Green Wall is flexible and can be installed by any professional. Its modularity maximizes the plantation area.

An efficient irrigation system, with water saving device and convenient access, can be installed on each module. The ease of plantation has been studied and makes the replacement of plants extremely simple.

InnoGreen Vertical Green Wall System comprising of

- DRSTRUT Support Metal Framing System
- Modular Panel
- Plant Cup
- Selective Plants
- Soilless Medium (optional)
- Medium Containing Bag
- Irrigation Drip System
- Waterproofing Backing (optional)
- LED Futures (optional)
- Drainage System (optional)



DRSTRUT Metal Framing System

Has created to give you the most complete and flexible support system available.

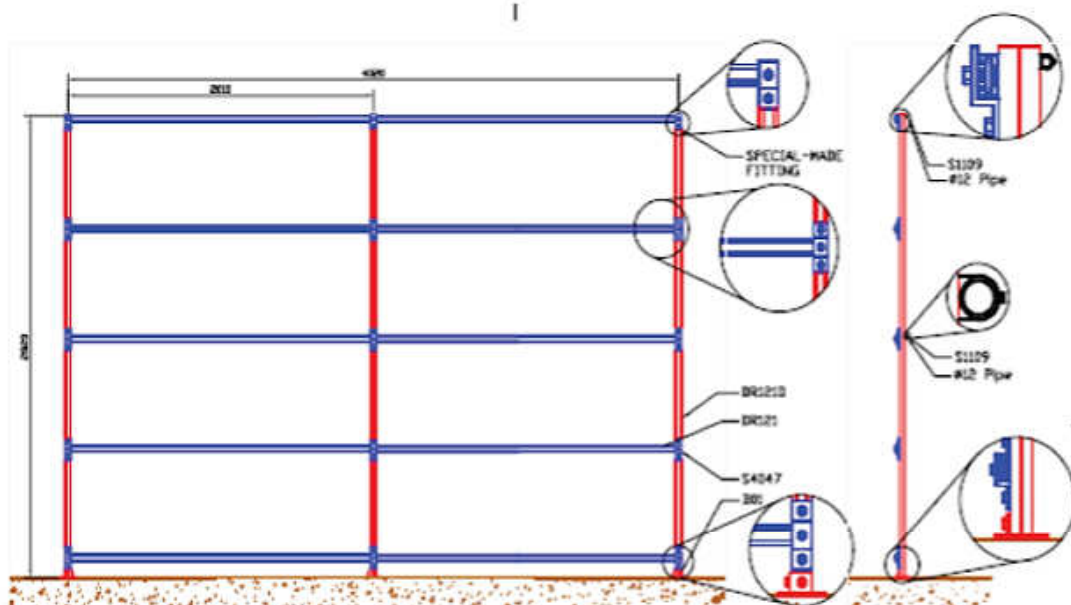


DRSTRUT do not need drilling and welding, contributed by the user-friendly design, so that noise and air pollution can be avoided.

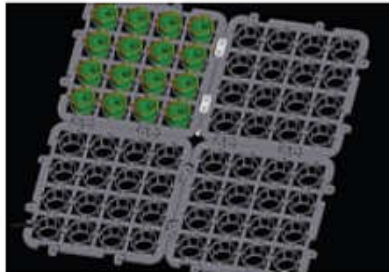


DRSTRUT Metal Framing System Standard:

- Channel Width: 41mm
- Channel Thickness: 1.5 - 2.5mm
- Channel Height: 21 – 124mm
- Fitting Thickness: 6mm unless stated
- Fitting Width: 40mm unless stated
- Channel and Brackets conform to BS6946:1988
- Standard Finish: Hot-Dip Galvanized to BS-EN1461
- Other finishes available to order, such as Stainless Steel Grade 304, 316, Pre-galvanized
- Minimum Safety Factor of 2.5



Modular Panel, offer flexible, lightweight, low maintenance and effective system complete with drainage and irrigation properties are professionally designed and installed by specialists.



Module Specifications

Size: 670mm High x 670mm Wide x 150mm Deep

Unplanted Weight approx. 1.1 Kg per module

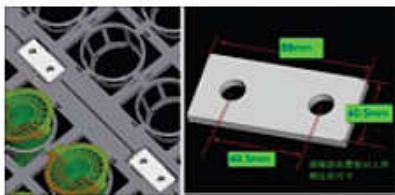
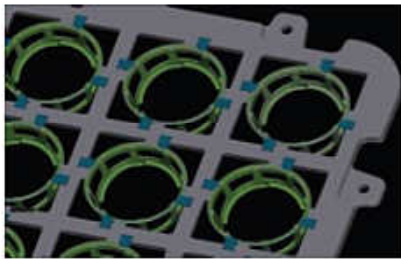
Material: Polypropylene PP

Color: Black

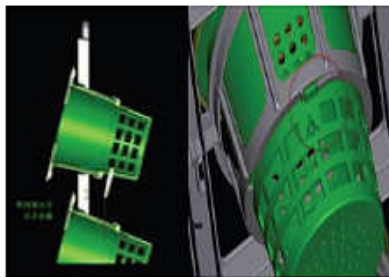
Others: UV Resistance

Plant Cup: 16nos. per module

Plant Cup Size: 100mm dia. x 120mm depth

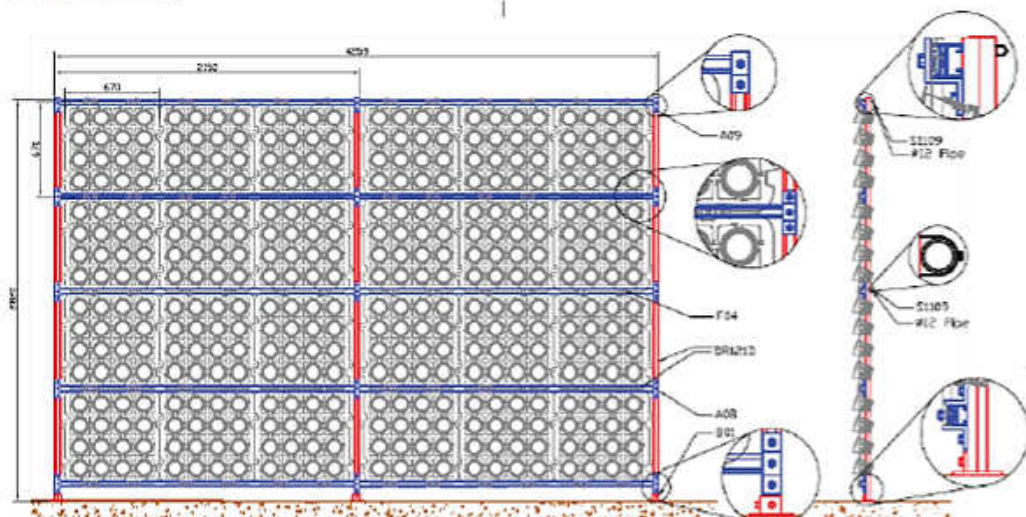


DRSTRUT Fittings are designed to be compatible with the InnoGreen Vertical Green Wall System.



Module install vertically with designed angle, to prevent falling and offer prefect irrigate dipping.

Special safety lock system designed to prevent loosing of, careless installation and robbery.



Automatic Irrigation System

Careful designed drip irrigation system is installed on the top of the module panel. With the aid of gravity the remainder of the system is irrigated with water dripping vertically from plant to plant.

Automatic Timer will be used to control watering automatically.

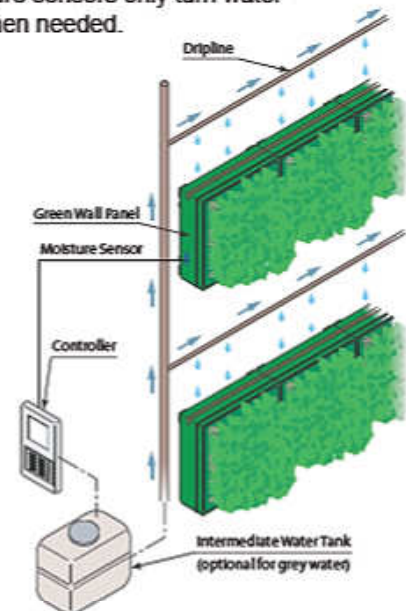


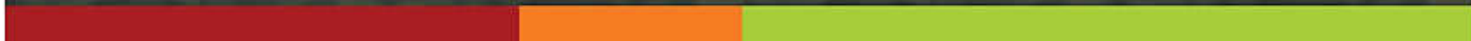
The watering system works in a closed circuit including;

- Control Unit
- Real-time Monitoring System
- Circuiting Pipe Works
- Drip Heads
- Filtering System (optional)
- Surface Pump (optional)
- Fertilizer Injector
- Watering Collection Tank (optional)
- Humidity Sensors (Optional)

Vertical Drip Irrigation System

- Can use reclaimed water.
- Can recapture water from drainage and recirculate into the system.
- Moisture sensors only turn water on when needed.





B.S.N. Fastener Limited
the professional fastener

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