

SECTION 07 55 65

INTENSIVE GREEN ROOF

(ZinCo "Roof Garden" with Floradrain FD 60 neo - intensive)

PART 1 GENERAL

1.1 SUMMARY

- A. This sample specification serves as a guideline to the specifier. It shall be adapted to each project by either choosing from several suggestions or by adjusting the text to project specific and site conditions, such as type of roof construction, roof slope, insulation, water proofing, local climate, design goals, and other.
- B. This specification is prepared in accordance with the CSI format and shall be included as separate section under DIVISION 7 – Thermal and moisture protection.

1.2 SECTION INCLUDES

- A. Intensive green roof system including the following:
 - 1. Vegetation layer according to project specific plant list.
 - 2. Growing media / mineral aggregate.
 - 3. Filter layer.
 - 4. Inspection chambers.
 - 5. Drainage layer.
 - 6. Protection layer / separation layer.
 - 7. Root barrier.
 - 8. Related products.

1.3 RELATED SECTIONS

- A. Division 07 Section "Waterproofing" for waterproofing systems under vegetated roof system.
- B. Division 07 Section "Roofing" for roofing systems under vegetated roof system.
- C. Section 07 Section "Sheet Metal Flashing and Trim" for coordination with flashing.

1.4 DEFINITIONS

- A. Green roof: Multi-layered exterior system of growing media and plant materials for installation over membrane roofing and waterproofing systems.
- B. Intensive green roof: Well-maintained garden on utilized flat roof. Intensive green roofs are heavy in weight with deep growing media levels. The plant selection includes perennials, shrubs, trees and / or lawn. Other landscape options like pavement, pergolas and ponds also may be included. Maintenance varies depending on plant choice and design.
- C. System build-up "Roof Garden" with Floradrain FD 60 neo - intensive: An attractive intensive green roof landscape according to the landscape architect's design, with deeper growing media levels.

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1.5 SUBMITTALS

- A. Submit in accordance with Division 01 Section "Submittal Procedures".
- B. Product data: Submit manufacturer's current published data including component materials, dimensions, standard details, and installation instructions.
- C. Shop drawings: Include the following:
 - 1. Details of green roofing system, plantings, and paving.
 - 2. Relationship to substrate, perimeter, and penetrating items.
 - 3. Location of roof drains and slopes.
 - 4. Average weight of green roof system.
- D. Range samples: Full size sample of each planting selection in trays minimum 1 x 1 ft. by full thickness.
- E. Closeout submittals: Maintenance instructions and warranties.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer qualifications: Minimum ten years' experience producing green roof systems of the size with the production facilities capable of meeting the project schedule.
 - 2. Installer qualifications: Minimum 2 years' experience with green roof systems and acceptable to the manufacturer, with adequate equipment and skilled workers.
- B. Pre-installation meeting: Convene on project site min. one week before beginning work to:
 - 1. Verify project requirements and site logistics.
 - 2. Coordinate between trades.
 - 3. Assess integrity of the roofing system and building structure.
 - 4. Review manufacturer's installation instructions and warranty requirements.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Coordinate delivery schedule to minimize on-site storage. Verify roofing installation system is tested and accepted prior to delivery. Do not overload roof.
- B. Store materials in a dry area, out of direct sunlight, protected from freezing, staining, contamination, or damage.
- C. Water plants and expose plant materials to daylight. Unpack trays for even daylight distribution.

1.8 WARRANTY

- A. Manufacturer's warranty: Provide manufacturer's 5-year limited warranty against deficiencies in materials or fabrication.
- B. Installer's warranty: Provide installer's 2-year growing warranty which provides periodic inspections and maintenance service to ensure vegetation is properly installed, is becoming established, and is of sufficient density over the roof area.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design: "Roof Garden" with Floradrain FD 60 neo - intensive Intensive Green Roof System by
ZinCo USA, Inc.
401 VFW Drive
Rockland, MA 02370
Telephone: 866-766-3155
Website: www.zinco-usa.com

2.2 COMPONENTS

(Note to specifier: select applying components for standard roof / inverted roof.)

- A. Vegetation layer:
Species, sizes, and qualities according to project specific plant list. Delivery and appropriate planting in the growing media, incl. suitable watering regime after installation.
- B. Growing media:
Engineered growing media purpose made for intensive green roofs.
1. Zincoblend I, typical for intensive roofs, or Zincoblend T, typical for turf areas. Average depth according to the requirements of selected species and according to drawings, min. 10 in. (approx. 250 mm). Delivery and installation on the filter layer or on the mineral aggregate Zincoblend M.
 2. Zincoblend M, engineered mineral aggregate as sub-substrate.
(Note to specifier: please select for growing media levels exceeding approx. 14.0 in. (approx. 350 mm).)
In case of growing media levels exceeding approx. 14.0 in. (approx. 350 mm); a pure mineral aggregate as sub-substrate is recommended. Also suitable as infill of drainage elements and for the installation of vegetation free zones. Delivery and installation on the filter layer.
 3. Zincoblend M, engineered mineral aggregate for infill of drainage element in vegetated zones: especially suitable as infill of drainage elements and also for the installation of vegetation free zones. Delivery and installation into the drainage layer.
- C. Filter layer:
ZinCo Filter Sheet SF made of non-rotting thermally strengthened polypropylene. UV-stabilized, chemically and biologically neutral. Color: black. Thickness: approx. 0.04 in. (approx. 1.14 mm). Weight approx. 0.02 lbs./sq. ft. (approx. 109 g/m²). Water flow rate according to ASTM D4491: approx. 160 gpm/sq. ft. (approx. 6519 l/min/m²). Apparent opening size according to ASTM D4751: approx. 70 US Sieve (approx. 0.212 mm). Delivery and installation on the drainage layer.
- D. Inspection chamber:
(Note to specifier: please select according to project requirements.)
1. ZinCo Inspection Chamber KS 10, made of plastic-coated aluminum with lateral slots for water passage. Detachable cover made of galvanized, plastic-coated steel with two finger-holes. Color: old silver-antique. Height: approx. 3.9 in. (approx. 100 mm) (H). Outer dimension of the Chamber (at transportation): approx. 11.8 x 11.8 in. (approx. 300 x 300 mm) (O). Dimension including flange (extended, including chamber): approx. 11.8 x 20.9 in. (approx. 300 x 530 mm) (F). Aperture dimension: approx. 9.4 x 9.4 in. (approx. 240 x 240 mm) (A). Slot width: approx. 0.1 in. (approx. 3 mm). Weight: approx. 6.2 lbs. (approx. 2.8 kg). Delivery and installation on the drainage elements above the roof outlets to ensure accessibility of the outlets at any time.

2. ZinCo Extension Piece KSA 8. (*Optional item for deeper growing media level*). Height approx. 3.1 in (approx. 80 mm). For elevation of KS 10 in segments of approx. 3.1 in. (approx. 80 mm).
 3. ZinCo Extension Piece KSA 20. (*Optional item for deeper growing media level*). Height approx. 7.9 in (approx. 200 mm). For elevation of KS 10 in segments of approx. 7.9 in. (approx. 200 mm).
- E. Drainage layer:
ZinCo Drainage Element Floradrain FD 60 neo. Drainage and water retention element made of thermoformed recycled polyolefin, with water retaining troughs and openings for ventilation and evaporation as well as a multidirectional drainage channel system on the underside. Color: black. Height approx. 2.4 in. (approx. 60 mm). Weight: approx. 0.45 lbs./sq. ft. (approx. 2.2 kg/m²). Max. compressive strength (at 10% compression): without filling approx. 2.8 psi (approx. 19 kN/m²), with filling approx. 5.8 psi (approx. 40 kN/m²). Water retention capacity (with filling): approx. 0.32 gal/sq. ft. (approx. 13 l/m²). In-plane water flow rate with roof slope 1 %: approx. 5.3 gpm/ft. (approx. 1.1 l/(s-m)); with roof slope 2 %: approx. 7.7 gpm/ft. (approx. 1.6 l/(s-m)); for roof slope 3 %: approx. 9.7 gpm/ft. (approx. 2.0 l/(s-m)).
Delivery and installation on the protection layer / separation layer.
- F. Protection layer / separation layer:
Note to specifier: select applying components for standard roof / inverted roof.)
1. For standard roof:
ZinCo Protection Mat ISM 50. Recycled synthetic fiber mat made of polyester/polypropylene, bottom sided fiber impregnation using acrylic compounds. Highly resistant to mechanical stress; geotextile strength class 5. For use as protection layer and as water and nutrient retention. Reduction of impact noise. Color: grey mottled. Thickness: approx. 0.2 in. (approx. 6mm). Weight: approx. 0.2 lbs./sq. ft. (approx. 850 g/m²). Water retention capacity: approx. 0.1 gal/sq. ft. (approx. 4 l/m²). Compatible with bitumen and polystyrene. Delivery and installation on the root barrier or root resistant waterproofing.
 2. For inverted roof:
ZinCo Separation Membrane TGV 21 made of thermally bound, water repellent polypropylene. Non-rotting. Color: black. Thickness approx. 0.02 in. (approx. 0.55 mm); Weight approx. 0.02 lbs./sq. ft. (approx. 80 g/m²). Compatible with bitumen and polystyrene, resistant to acids and alkalizes, biologically and chemically neutral, air and vapor permeable. Vapor opening size $s_d \leq 0.03$ ft. ($s_d \leq 0.01$ m). Delivery and installation on the thermal insulation.
- G. Root barrier:
(Note to specifier: please select, if non root resistant waterproofing is used.)
ZinCo Root Barrier WSB 100-PO. Root proof, hot air weldable sheet made of flexible polyolefin (FPO), with polyester weft inserted reinforcement. Resistant to bitumen and for short periods of time to oil. Superb weather proofness (UV- and IR-Radiation). Thickness: approx. 0.04 in. (approx. 1.1 mm). Weight: approx. 0.23 lbs./sq. ft. (approx. 1.1 kg/m²). Hot air weldable, excellent cold flexibility. Root resistance tested according to FLL-Test method of 2002. Delivery and installation on the waterproofing.
- H. Related products
(Note to specifier: please select, if required.)
1. Provide gravel for non-vegetated areas, including roof edges, flashing, and roof penetrations: smooth, washed, clean, well rounded gravel.
 2. Provide aluminum or stainless steel L-shaped profile between gravel and growing media.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of conditions:
 - 1. Confirm work by others is installed per the project requirements. Do not cover work by others prior to inspection or acceptance.
 - 2. Inspect seams, penetrations and details. Identify defects in writing to the Architect.
- B. Do not proceed until unacceptable conditions are corrected.

3.2 INSTALLATION

(Note to specifier: select applying components for standard roof / inverted roof.)

- A. General:

Install green roof system in strict accordance with manufacturer's instructions and in proper relationship with adjacent materials and the following.

 - 1. Root barrier: **(Note to specifier: please select, if required.)**

Install the Root Barrier WSB 100-PO above the non root resistant waterproofing, the seams are to be hot air welded, root proof and waterproof with an overlap of min. 2.0 in. The root barrier shall be taken above the growing media along edges and at roof penetrations. Cut the root barrier in situ at roof penetrations. Consider an allowance for overlap and wastage of approx. 3–5 %.
 - 2. Protection layer / separation layer:
 - a. For standard roof:

Install the Protection Mat ISM 50 above a root resistant waterproofing or root barrier with an overlap of 4.0 in. (approx. 100 mm). The protection mat shall be taken above the growing media along edges and at roof penetrations. Cut the protection mat in situ at roof penetrations. Consider an allowance for overlap and wastage of approx. 10–15 %.
 - b. For inverted roof:

Install the Separation Membrane TGV 21 above the thermal insulation with an overlap of approx. 4.0 in (approx. 100 mm). Cut the slip sheet in situ at roof penetrations. Consider an allowance for overlap and wastage of approx. 10–15 %.
 - 3. Drainage layer:

Install the Drainage Element Floradrain FD 60 neo continuously over the entire roof area on the protection or separation layer with the evaporation holes facing upwards. Connect the FD 60 neo elements at the connecting fold all along their edges, in a way, that the larger fold covers the smaller one, regarding the errors indicating the installation instruction. In vegetated areas fill with mineral aggregate Zincoblend M. In paved areas fill with structure stable and drainable loose stone material, such as coarse sand or fine gravel (grain size < 0.3 in.). Cut the drainage element in situ at roof penetrations. Cover immediately after installation to protect from UV-radiation.
 - 4. Inspection chamber:

Cut holes into all layers of the build-up in the size of the drain. Then install the Inspection Chamber KS 10, and if needed Extension Pieces KSA 8 and/or KSA 20, on top of the drainage layer above the drain. Install the Filter Sheet SF by rolling it over the inspection chamber and cutting it, ensuring that all slots of the inspection chamber remain uncovered, but the flanges remain covered. Surround with a gravel strip.
 - 5. Filter layer:

Install the Filter Sheet SF with an overlap of approx. 8 in. (approx. 200 mm) above the

drainage element. The filter sheet shall be taken above the growing media along edges and at roof penetrations. Cut the filter sheet in situ at roof penetrations. Consider an allowance for overlap and wastage of approx. 15–25 %.

6. Growing media:
 - a. Mineral aggregate Zincoblend M as sub-substrate:
(Note to specifier: please select, if required.)
For greater growing media depths install Zincoblend M in the required depth. Check the depth in several places to ensure a continuous thickness. A tolerance of 0.5 in. (13 mm) is acceptable. Consider a settlement factor of 1.05.
 - b. Zincoblend I or Zincoblend T:
Install the Growing Media Zincoblend I or Zincoblend T for the “Roof Garden” Green Roof System on the Filter Sheet SF or on the mineral aggregate Zincoblend M. Install the growing media equally in the necessary depth. Check the depth in several places to ensure a continuous thickness. A tolerance of 0.5 in. (13 mm) is acceptable. Consider a settlement factor of 1.2.
7. Vegetation layer:
Apply plants at recommended application rate and according to the project specific plant list and drawings. Water and fertilize as required by the specific plant lists and local climate.
8. Related products:
(Note to specifier: please select, if required.):
 - a. Install gravel in non-vegetated areas, including roof edges, flashing, and roof penetrations: smooth, washed, clean, well rounded gravel.
 - b. Install aluminum or stainless steel L-shaped profile between gravel and growing media.

3.3 CLEANING

- A. Remove all debris from the project site in accordance with the owner’s construction waste management requirements.

3.4 PROTECTION

- A. Protect green roof planting and components from dirt and damage caused by subsequent construction activities.

3.5 MAINTENANCE

- A. Initial irrigation: Immediately after installation ensure the plants have sufficient water to root successfully. Subsequent irrigation regime depends on weather, location, and project specific plant material.
- B. Initial fertilization: An initial fertilization with a slow release fertilizer is recommended. Fertilization regime depends on weather, location, project specific plant list.
- C. Monitor the first two growing seasons carefully. Replace dead plants to ensure full-vegetation coverage and prevent weed growth. Remove coarse or unwanted plants and tree seedlings.
- D. General maintenance: includes but is not limited to the removal of unwanted plants and the seedlings of trees, keeping the vegetation zone free from unwanted plants, visual inspection and cleaning of the outlets, and fertilization of the vegetation with a slow release fertilizer, replacing plant material that dies, plant specific irrigation.

END OF SECTION

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