DETAILED SYSTEM SPECIFICATIONS

2.1 General

This section covers the waterproofing for Roof, Green Roof and Podium slab by means of a minimum 1.5 mm thick **KRUBBER® Roof-X or equivalent,** prefabricated composite elastomeric terpolymer waterproofing membrane installed continuously on RCC slab of Terrace, podium, planters, sunken portions, LMR top, Staircase hall top, canopies etc.

The waterproofing shall be such that these superstructures with waterproofing systems are watertight. In case of leakage, provision shall be made for these to be repaired.

The roof and podium sections along which the installation of a waterproofing system will be required, will be determined by the system provider.

2.2 Description

The purpose of the membrane waterproofing to superstructures is to prevent leakage of water into the building and to protect the interior of the building against the rainwater and deleterious chemical influences etc. Waterproofing shall be applied on RCC slab and vertical walls such as parapet, planter walls etc. The waterproofing membrane shall always be fully adhered and bonded to the substrate with Krubber adhesive.

2.2.1 Waterproofing membrane shall be minimum 1.5 mm thick **Krubber Roof-X or equivalent**, prefabricated composite elastomeric terpolymer waterproofing membrane, designed for watertightness, fully bonded grip and better resistance to wear and tear. Prefabricated composite membrane shall have elastomeric terpolymer core of minimum 1.2 mm thick engaged with geotextile fleece on one side.

The waterproofing membrane shall properly bond to prepared concrete substrate by Krubber Adhesive as recommended by the manufacturer. Geotextile fleece side shall always be on exposed side.

While the waterproofing and sealing function shall be provided by the elastomeric terpolymer core of composite membrane, the layer of inbuild geotextile fleece is required to protect the waterproofing membrane against damage from reinforcements, backfilling and other wear and tears on site.

2.2.2 For downtake rainwater pipes, metal post, openings, skylights etc., waterproofing membrane shall be flashed with Krubber Lapseal liquid waterproofing sealant.

2.2.3 Preparing substrate by filling structural grade fillers and injecting Grouts at honeycombs, cracks, crevices, around pipe sleeves etc.; using non-shrink cementitious material of approved make, including necessary breaking, cleaning, washing, grooving, priming, curing, etc. complete. All as per manufacturer's specifications and instructions/ recommendations.

2.3 Submissions

The following submissions shall be furnished for approval in accordance with the contract requirements:

2.3.1 Certificates of compliance attesting that the materials meet specifications.

2.3.2 Samples

2.3.3 Shop drawings

2.4 Quality Assurance

Manufacturer's representative shall be present at least during the first installation of waterproofing systems on site.

Execute all installation and testing under the direct supervision of an individual with recent continuous, acceptable experience in the installation of waterproofing membrane.

Provide all personnel involved in waterproofing system installation and testing with adequate training prior to beginning work.

Installation records are to be submitted to the Engineer for approval with all relevant data for all checks etc. These records shall form a part of the submission to obtain approval to proceed with the installation subsequent layers over waterproofing system.

2.5 Materials

2.5.1 Krubber Roof-X, composite elastomeric Terpolymer waterproofing membrane

The waterproofing membrane shall be minimum 1.5 mm thick Composite prefabricated elastomeric terpolymer waterproofing membrane. It shall be able to meet requirements listed below in **Table 2.**

Table 2: Composite prefabricated elastomeric terpolymer Waterproofing membrane characteristics

No.	Parameter	Test Method	Performance Spec as per ASTM Standard	Test Values
1	Thickness of Composite Terpolymer Membrane with Fleece on one side (mm)	ASTM D-412	-	1.5
2	Thicknesses of Terpolymer Membrane Core (mm)	ASTM D-412	1.2 (+15% / -10%)	1.2
3	Specific Gravity of Terpolymer Membrane Core (g/cm3)	ASTM D-297	1.23 (+/- 10%)	1.23
4	Tensile Strength (MPa) Terpolymer Membrane core	ASTM D-412	9 (Min)	9.8
5	Elongation ultimate (%) Terpolymer Membrane core	ASTM D-412	300 (Min)	410
6	Tensile Set (%) Terpolymer Membrane core	ASTM D-412	10 (Max)	8
7	Tear Resistance (kN/m) Terpolymer Membrane core	ASTM D-624	26.27 (Min)	29
8	Brittleness Point (°C) Terpolymer Membrane core	ASTM D-2137	(-45) Max	-48
9	Ozone Resistance Terpolymer Membrane core, No Cracks	ASTM D-1149	Pass	Pass
10	Heat Aging of Terpolymer Membrane core	ASTM D-573		
	Tensile Strength (MPa)	ASTM D-412	8.30 (Min)	8.5
	Elongation Ultimate (%)	ASTM D-412	200 (Min)	285
	Tear Resistance (kN/m)	ASTM D-624	21.9 (Min)	22.5
	Liner Dimension Change Max (%)	ASTM D-1204	±1	+0.2
11	Water Absorption of Terpolymer Membrane core (Mass %)	ASTM D-471	+8, -2	+2
12	Weather Resistance of Terpolymer Membrane core Visual Inspection No Cracks or Crazing	ASTM G -155 ASTM G-151 ASTM D-518	Pass	Pass
13	Puncture Resistance (Kgs) of Terpolymer Membrane core	ASTM D-5602	32	34
14	Hardness (Shore A) of Terpolymer Membrane core	ASTM D-2240	60 (+/- 10)	62
15	Fleece Material	-	PP/PE	PP/PE

The above-mentioned material specification shall comply with the properties in ASTM D 4637 Standard spec for waterproofing membrane applications in roof.

2.5.2 Accessories

Fixing and sealing material, flashing, sealing flanges and preparation of corners and intersections, termination bars etc. shall be made as recommended by the manufacturer of the membrane.

2.6 Application

Prior to the application of the waterproofing, all surfaces to which it shall be applied, shall be inspected and approved by the Engineer.

The application shall follow the written Instructions of the manufacturer. Generally, procedures are as follows:

Pre-requisite

The RCC slab shall be free from stagnant water, debris, oil spills, mud, muck, slush etc.
The RCC slab shall be cured enough before starting the waterproofing works.
The sharp matters from the workplace shall be removed or barricaded.

Designated area shall be marked for waterproofing works and no other trades shall be permitted within that area.
The crane movements shall be planned to avoid any safety hazards.
Loading and unloading of material by other trades within the designated waterproofing workplace area shall not be permitted.
The site shall be lightened and dewatered enough to carry out the waterproofing works during execution.

Substrate Preparation

All pre-requisites shall be met with prior to installation of **Krubber Roof-X or equivalent**, prefabricated composite elastomeric terpolymer waterproofing membrane for RCC slab of roof and podium. Any defects in the substrate need to be corrected and the final surface has to be prepared to meet the requirement.

Grind the surface to remove all sharp edges Wash the area to clean all loose particles. Let the surface dry and be free from all kind of moisture, grease, oil etc. which won't allow the adhesion of membrane to the substrate. Any defects in the substrate need to be corrected and the final surface has to be prepared to meet the requirement.

PLACING & RESTING OF KRUBBER® Roof - X waterproofing membrane

Place the membrane roll as close as possible to its final position. It is easier to locate the roll in this position than to have to reposition the membrane sheets after they have been unrolled. Then all membranes shall be unrolled, unfolded and positioned without stretching. The sheets can be moved sideways over the substrate by floating and allowing air underneath. Prior to any attachment, cutting or splicing, each sheets shall be allowed to relax a minimum of 45 minutes.

OVERLAPS AND SEAMS of KRUBBER® Roof -X waterproofing membrane

Position adjoining sheets with an overlap of 50 to 75 mm as side laps as well as for end laps. Fold the first membrane back, evenly onto itself so as to expose the underside and the substrate. The sheet fold should lay smooth so as to minimize the formation of wrinkles during and after installation. Before applying adhesive, remove excess of dust or other foreign loose particles.

BONDING of KRUBBER® Roof -X waterproofing membrane

The plain side of waterproofing Membrane sheets are to be fully bonded and adhered to RCC surface of roof and podium with KRUBBER® Adhesive. Geotextile fleece side shall always be on exposed side.
All longitudinal overlap seams shall preferably in vertical plane and or along gradient. Stir the KRUBBER® Adhesive before and during application to achieve a uniform mix with no sediment at the bottom. Properly mixed adhesive is critical for desired performance and uniformity of the bond.

The KRUBBER® Adhesive must be roller applied in a thin even coat on both mating surfaces of prepared concrete substrate and membrane. Avoid globs or puddles of adhesive during application. An excess of adhesive will prolong the drying time and reduce production. When applying the adhesive manually, use solvent resistant rollers with short hairs to apply the adhesive evenly. Use a chalk to mark the overlap area that has to remain clean. See Detailing Section for more information.

Wait until the adhesive is tacky. Drying time will differ with various climatic conditions and coverage rate. Never use a hot air dryer to accelerate this process. Touch the surface with a clean, dry finger to check the adhesive for dryness.

Junction of slab and vertical wall

The membrane above slab shall be rolled over in upward direction on vertical walls such as parapet wall, fully bonded with Krubber Adhesive and terminate on wall with termination bar and sealant. All vertical terminations shall be minimum 300mm above FFL.

Sealing Pipe flanges, traps, rainwater outlets

All the pipes entry and exist shall be sealed with additional patch of Krubber Roof-X membrane with Krubber Lapseal liquid membrane sealant around the periphery of intrusions.

Laying slope making screed and hardscape finishing material

Lay slope making screed in cement concrete or light weight concrete to a minimum gradient of 1:100 towards drain outlet. Thickness of screed shall not be less than 40 mm at around drain outlets. Once slope making screed is installed, tiles or pavers can be laid as per good construction practice.

Laying Drain boards in planter areas

Fix dimple drain boards to facilitate drainage function in the planter floor and sides. The overlap between two adjacent drain boards shall be minimum 100 mm.

Backfilling

Only Soft soil shall be permitted for backfilling and soil compaction shall be done in layers. No boulders and rocks shall be permitted for backfilling as it will damage the waterproofing system.

Testing of Membrane

The installed membrane shall be tested and records of these tests shall be submitted by the Contractor to the Engineer. The purpose of test is to detect breaches during and after installation of waterproofing membrane before laying any subsequent layers.

a) Seam Test with probe tester

For seams between adjacent sheets of waterproofing membrane the testing for bonding and fish mouths shall be carried out by means of sharp probe tester. The probe tester shall be dragged at seam joint longitudinally and if any breach in seam is observed shall be sealed with Krubber Lapseal liquid waterproofing sealant.

b) Holiday Detection Test

Glide Holiday detection tool on to the membrane by passing minimum 50V current. The machine will beep in case of any breaches or pin holes in the membrane. Further it shall be patched with Krubber membrane or sealing by Krubber Lapseal liquid waterproofing sealant.

Protective Measures

Every care shall be taken not to damage the waterproofing membrane during or after installation. Any damages occurred shall be reported to the Engineer, repaired and tested before laying subsequent layers like final tiling or backfilling.

2.7 Measurement and Payment

The quantities of waterproofing membrane to be paid for shall be measured by the unit of square meters Installed. The finished waterproofed area shall be measured after the fixing and finishing of the waterproofing work and shall not include overlaps, folding, and any wastage etc.

The payment shall include all materials and work required to carry out the work in accordance to specifications and shown on the drawings or as instructed by the Engineer.

2.8 Warranty

Waterproofing system shall be warranted for good performance for the period of minimum 15 years for product and installation. In case, any third-party damage is observed during the warranty period, it should be recorded and informed to the waterproofing system provider for corrective actions.

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