

GEOMEMBRANE

INSTALLATION AND LAYING OF HDPE LINER

The HDPE liner sheet shall be brought to site by trailer/ truck or by any suitable transport without damaging HDPE liner sheet. HDPE liner sheet shall be stored in such a way that they are protected from puncture, dirt, grease, moisture and heat. In case any material gets damaged, it shall be segregated and stored separately for replacement. All the HDPE liner sheets shall be stored on a prepared smooth surface. The HDPE Liner works shall be executed at site by the supplier of HDPE liner only.

QUALITY ASSURANCE: AS PER CLIENT SPECIFICATION TECHNICAL PROPERTIES.

Results of all the tests shall be furnished to the EIC for his review. EIC or his authorized representative reserve the right to inspect the testing facilities and witness the tests as and when desired.

EIC or his authorized representative reserve the right to retest some or all the parameters of HDPE liner at client identified 3rd party testing laboratory anytime during the execution of contract. Sample shall be selected from site randomly, jointly by main client and contractor. Cost of all testing shall be borne by the contractor.

In case the sample does not meet the requirement of Technical Specifications, then EIC reserves the rights to reject the HDPE liner lot from which the sample is selected.

Precautions to be taken for HDPE liner laying:

1. The bed for HDPE liner shall be for
 - i) Bed bottom shall be 300 mm thick sand cushion (free from shingle, salts, sharp objects, organic matter, sods, lumps or any other foreign substances). Sand cushion shall be laid over 300 mm thick impervious soil by blending soil/ earth with bentonite in order to achieve the required imperviousness of permeability not more than 1×10^{-7} cm/sec.
 - ii) Bed slope shall be 300 mm thick impervious soil by blending soil/ earth with bentonite in order to achieve the required imperviousness of permeability not more than 1×10^{-7} cm/sec. All subgrade surface where lining shall be placed should be smooth, free of all foreign and organic matter, sharp objects. Standing water or excess moisture shall not be allowed.
2. After the bed preparation, HDPE liner roll shall be unrolled one at a time. The liner shall be adequately loaded with the sand bags and shall be immediately welded with the adjacent liner roll.
3. Once the welding of previous liner rolls is completed then only the next roll shall be unrolled.
4. The loading of HDPE liner shall be continuous at the edges and in a dense grid of 1m x 1m at over the liner area.
5. Liner shall not be left open without adequate loading and it shall be pressed properly (in order to take out air pockets which causes undulation) before welding.
6. Anchoring of HDPE liner at dyke embankment side slope shall be done as per the construction drawing.
7. On bed slope, 75 thick PCC (M20 grade and having cement of PPC grade) with macro synthetic polypropylene fibre of min. length of 5 cm also be placed over HDPE liner to get finished surface.
8. On bed bottom, 300 mm thick earth/ soil cover (free from shingle, salts, sharp objects, organic matter, sods, lumps or any other foreign substances) shall be provided.
9. The welding of HDPE liner rolls shall be carried out simultaneously. Large number of rolls should not be left un-welded to avoid tearing off of liner.

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Vacuum Box Testing (VBT)

VBT shall be carried out by contractor as per the procedure outlined here under. A vacuum box assembly consisting of a rigid housing with a transparent window and having a soft rubber gasket attached to bottom, porthole or valve assembly and a vacuum gauge shall be used. A soapy solution in plastic bucket with a mop shall be made available. The excess sheet overlap, if any, shall be properly trimmed away. Then a strip or HDPE liner of length 300 mm shall be wetted by the length of box with the soapy solution. The box shall be place over the wetted area and compressed. Create a vacuum of 0.2 kg/sq.cm to 0.35 kg/sq.cm. Care shall be taken to ensure that a leak proof seal is created. Vacuum shall be maintained for sufficient time. For a period of approximately 15 seconds, examine the HDPE liner through the viewing window for presence of any animated soap bubbles. In case no animated bubbles appears after 15 seconds, close the vacuum valve and open the bleed valve. There after move the box over the next area adjoining the tested area with a minimum 75 mm overlap. Repeat the process as described above. In case animated soap bubbles appear all such areas shall be marked, repaired and then retested successfully.

In locations where seams cannot be non-destructively tested, the seam shall be spark tested according to the manufacturer's recommendations and directions of the EIC.

Air Pressure testing (APT)

APT shall be applicable for all double fusion seams, only. Contractor shall furnish all required equipment. An air pump equipped with pressure gauge capable of generating and sustaining a pressure between 1.7 kg/sq.cm and 2.1 kg/sq.cm. The pressure gauge shall be equipped with a sharp hollow needle.

The contractor shall seal one end of the seam to be tested. Then insert needle or any other approved pressure feed device through the sealed end of the channel created by the double wedge fusion weld. Then energize the air pump to verify the unobstructed passage of air through the channel. Seal the other end of the channel. Then energize the air pump to about 2.1 kg/sq.cm. Close the valve and allow 2 minutes for the injected air to come to equilibrium in the channel and keep the pressure approximately for 5 minutes. In case loss of pressure exceeds 0.28 kg/sq.cm or even pressure does not stabilize, then locate faulty area. The area to be repaired and then retested successfully. In case the test is successful, the air channel should be deflated.

Destructive seam testing shall be carried out as per the recommendations of the manufacturer. One destructive test shall be carried out for every 150 meter length of seam or as directed by the EIC. Holes in the HDPE liner resulting from obtaining the seam samples shall be immediately patched and vacuum tested. The sample shall be 300 mm wide and 1.0 meter long with the seam centered lengthwise. The sample shall be cut into three equal length pieces. One piece to be given to the Engineer and the other shall be with bidder for testing. Contractor shall test ten 25 mm wide specimens, five specimens for shear strength and give for peel strength. To be acceptable, four out of five specimens must pass.

The EIC may send seam samples, at his own discretion, to a laboratory for testing.

In case the sample fails the destructive test, then the contractor shall cap strip, then seam between the failed locations. If the test fails, then process is repeated. Over the length of seam failure, the Bidder shall either cut out the old seam, then reposition the panel and re-seam or add a cap strip.

QUALITY ASSURANCE: AS PER CLIENT SPECIFICATION TECHNICAL PROPERTIES.

Non- Woven Geotextile 250 GSM or any GSM as per client specification

This specification covers the technical requirements for the manufacturing and installation of the non-woven geotextile as indicated in the drawings released for construction, Schedule of Quantities or as directed by the Engineer. All work will be performed in accordance with the procedures provided in this specification.

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Installation of geotextile

1. The geotextile shall be handled in such a manner as to ensure that it is not damaged in any way.
2. The geotextile shall be rolled down the slope in such a manner as to continuously keep the geotextile in tension by self-weight. The geotextile shall be securely anchored in a trench where applicable, or by other approved or specified methods.
3. The presence of wind, all geotextile shall be weight by sandbags or approved equivalent. Such anchors shall be installed during placement and shall remain in place until replaced with cover material.
4. The contractor shall take necessary precautions to prevent damage to adjacent or underlying material during placement of the geotextile. Any damage to such material occur due to the fault of the contractor, the contractor shall repair the damaged material at his own cost and to the satisfaction of the engineer.

