

SUMMARY

IS 16654: 2017 Geosynthetics - Polypropylene multifilament woven geobags for coastal and waterways protection – Specification

Geobags are widely employed in safeguarding riverbanks, beaches, and offshore breakwaters to protect coastal and waterway areas. These geosynthetic products, manufactured from polyester or polypropylene, have gained global recognition for their effectiveness in shielding riverbanks and hydraulic structures from severe scouring and erosion.

Moreover, Geobags have found practical applications as revetments, breakwaters, and other structural erosion protection measures, ensuring stability and preventing soil and coastal erosion.

Notably, this technology has minimal impacts on fish resources and even supports fishing activities, fostering the growth of the algal community.

The popularity of Geobag technology spans worldwide due to its user-friendly installation, cost-effectiveness, technical efficiency, and eco-friendliness when compared to conventional erosion protection methods involving cement concrete blocks, gravel, hard rock, and similar materials.

This standard specifies requirements for three types of geobags made from needle punched non-woven fabric of polypropylene (PP), used for coastal and waterways protection applications such as revetments; river training; construction of groynes and artificial reefs; etc, in order to minimize soil erosion and control floods.

- i) Type I Geobags having 300 GSM
- ii) Type II Geobags having 400 GSM
- iii) Type III Geobags having 600 GSM

Requirements

Geobags shall be made from needle punched nonwoven fabric (Types 1 to 3) manufactured from ultra violet stabilized polypropylene and constituent fibre shall be identified by the microscopic and confirmatory tests as specified in IS 667; depending upon the end use requirements and shall conform to the requirements as specified in Table 1. The geobags shall be inert to commonly encountered chemicals, resistant to rot and mildew and shall have no tear or defects which adversely affect or alter its physical properties.

All property values except apparent opening size in these specifications represent minimum average bag values (MABV). Average of test results from any sampled bag in a lot shall meet or exceed the minimum values specified in this standard. In case of apparent opening size, the MABV shall represent the maximum average bag value.

Polymers used in the manufacture of geobags, shall consist of long chain synthetic polymers, composed of at least 95 percent by weight of virgin polypropylene or polyester. In any case recycled polyester shall not be permitted in view of its inherent non-uniformity and substandard quality as compared to virgin polyester fibre. The isophthalic acid content of the virgin polyester fiber shall be zero when tested by the method prescribed in Annex C. Polypropylene fiber generally used is virgin only as it is not recycled.

Geobags shall be dimensionally stable and able to retain their geometry under manufacture, transport and installation.

Prefabrication of Geobags: Geobags shall be prefabricated using UV stabilized polyester/polypropylene thread. The geobags shall have seam with double line chain stitches along the edges on two sides with a stitch density of 20 ± 2 stitches/dm. Number of stitches shall be chosen in such a way that seam strength is achieved at least 80 percent of fabric strength. If seam is intact then the strength of fabric broken shall be at least 80 percent of its original strength. The sewing shall be done at a minimum distance of 10 mm from edges by using a ring spun polyester/polypropylene thread, as the case may be, of linear density 1 500 - 2 500 Denier (167 – 278 Tex) for bags up to 400 g/m² and of 2 500 - 3 500 Denier (278 - 389 Tex) for bags greater than 400 g/m². The distance between the two rows of stitches shall be 5 to 10 mm. Stitch lines on both sides of the bags shall continue beyond the bag's open mouth and end in a loose loop of thread of length 25 to 50 mm. The stitching shall be uniform without any loose thread or knot.

Significance of the requirements:

- a) Mechanical strength is crucial for its ability to retain soil or other fill materials, especially in high-stress environments such as riverbanks or steep slopes.
- b) Abrasion Resistance: Geobags used in riverbanks, coastal areas, and offshore breakwaters are subjected to constant water flow and sediment movement, leading to abrasion. Higher abrasion resistance ensures that the geobag can withstand these erosive forces.
- c) Water permeability: Geobags are often used for erosion control, and their permeability affects water flow and drainage. An appropriate permeability level is necessary to prevent water accumulation and potential damage to the geobag or surrounding structures.
- d) UV resistance: Geobags are often exposed to sunlight, and prolonged UV exposure can cause degradation of the material. UV resistance is an important parameter to ensure that the geobag retains its strength and integrity over time.