IS 15872 (2009): Application of Coir Geotextiles (Coir Woven Bhoovastra) For Rain Water Erosion Control in Roads, Railway Embankments and Hill Slopes - Guidelines [TXD 30: Geotextiles and Industrial Fabrics]

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भारतीय मानक

सड़कों, रेलवे के तटबंध और पहाड़ों के ढ़लानों का वर्षा जल से होने वाले अपरदन के नियंत्रण हेतु नारियल जटा के भू-वस्त्रादि (नारियल जटा से बने *भूवस्त्र*) के अनुप्रयोग के मार्गनिर्देश

Indian Standard

APPLICATION OF COIR GEOTEXTILES (COIR WOVEN *BHOOVASTRA*) FOR RAIN WATER EROSION CONTROL IN ROADS, RAILWAY EMBANKMENTS AND HILL SLOPES — GUIDELINES

ICS 59.080.30

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

March 2009

Price Group 2

Geosynthetics Sectional Committee, TXD 30

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Geosynthetics Sectional Committee had been approved by the Textile Division Council.

The use of natural fibre geotextiles has been recognized in erosion control in embankment construction for roads and railways, dam engineering, canals, etc and in road pavements. Their increasing importance is due to their versatility based on their specific properties.

For applications, it is desired that the geotextiles maintain integrity during the course of its life and do not tear, split and deteriorate under constructional or post-constructional stresses.

From the view point of applications of natural fibre geotextiles, guidelines for application in water erosion control need to be established.

Woven coir *bhoovastra* is a natural coir matting. This woven coir *bhoovastra* can be used for rainwater erosion control in road and railway embankments and hill slopes. Exposed soil surface road and railway embankments and hill slopes by impact of rain drops and surface wind which cause surface run off particles. These particles carry seeds and soil nutrients. Natural growth of vegetation on slope will protect the surface soil. By the application of woven coir *bhoovastra* reducing the effects of raindrops and controlling surface soil particles. Woven coir *bhoovastra* forms mulch and fosters quick vegetative growth. The selection of woven coir *bhoovastra* is basically depend on type of soil to be protected ensured primarily from rain water erosion is geo-technically stable. The selection of woven coir *bhoovastra* basically depends upon the slope and the extreme rain fall in a limited time span.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard.

Indian Standard

APPLICATION OF COIR GEOTEXTILES (COIR WOVEN *BHOOVASTRA*) FOR RAIN WATER EROSION CONTROL IN ROADS, RAILWAY EMBANKMENTS AND HILL SLOPES — GUIDELINES

1 SCOPE

This standard prescribes the code for the guidelines of woven coir *bhoovastra* suitable for application in slopes of road and railway embankments and also in hill slopes including the selection of woven coir *bhoovastra* and installation methods.

2 MATERIALS

2.1 Coir Woven *Bhoovastra*

Open structure coir woven *bhoovastra* made out of coir threads in which each warp thread gets interlaced alternatively over and under by successive weft thread.

3 MECHANISM OF SOIL EROSION

Exposed soil surface road and railway embankments and hill slopes by impact of rain drops and surface wind which cause surface run off particles. These impacts detach the soil particles and carried away by the surface run off. These particles carry seeds and soil nutrients. Nat ıral growth of vegetation on slope is thus hindered.

4 ROLE OF COIR WOVEN *BHOOVASTRA* IN SURFACE EROSION CONTROL

Coir woven *bhoovastra* are permeable coir fabrics made from natural coir fibre. Coir woven *bhoovastra* control soil erosion by acting as a ground cover. As a ground cover, it reduces the flow velocity of run off water by forming check dams with help of net structured strands of coir woven *bhoovastra* in firm contact with soil, which absorb the impact of water flow and resist washing down keeping the soil intact.

5 SELECTION OF COIR WOVEN *BHOOVASTRA*

The choices of coir woven *bhoovastra* basically depend on the type of soil to be protected. It requires to be ensured primarily that the slope to be protected from rainwater erosion is geo-technically stable. It also required considering the extreme rainfall in a limited time span at that location as the intensity of rainfall is more important than the average annual rain fall. It is recommended that the choice of coir woven *bhoovastra* shall be 400/700 where intensity of rainfall is severe irrespective of type soil and slope is <1:1.

6 INSTALLATION METHOD

6.1 The stages of laying of woven coir woven *bhoovastra* on slopes for rain water erosion control are as under.

6.1.1 The slope shall be made free from undulations, soil slurry, mud and sharp projections and compacted with additional earth where necessary.

6.1.2 Anchoring trenches shall be excavated at the top and toe of the slope along the slope downward, caring to see that it touches the soil surface at all points.

6.1.3 The selected coir woven *bhoovastra* shall be unrolled across the top trench and along the slope downward, caring to see that it touches the soil surface at all points.

6.1.4 Overlaps shall be minimum 150 mm at sides and ends (*see* Fig. 1). The coir woven *bhoovastra* at the higher level on the slope shall be placed over level. Side overlaps of a coir woven *bhoovastra* piece shall be placed over its next piece on one side and under the next piece on the other.

6.1.5 The coir woven *bhoovastra* shall be fixed in position by steel staples of 220 mm lengths (usually of 11 gauge diameter) or by spilt bamboo pegs. Stapling shall be done normally at an interval of 500-750 mm both in longitudinal and transverse directions. Special care shall be taken to staple the coir woven *bhoovastra* within the anchoring trenches (300 mm depth and 150 mm width) both at the bottom and at the sides.

6.1.6 The anchoring trenches shall be filled up with brick-bats/soil for preventing displacement of the coir woven *bhoovastra*. Care shall be taken that the overlaps are not displaced during installation.

6.1.7 Care shall be taken to ensure that the coir woven *Bhoovastra* is not damaged due to puncture, tear and other operational stresses.

6.1.8 Seeds of vegetation (grass, legumes, etc. of appropriate variety) shall than be spread (Annex A for

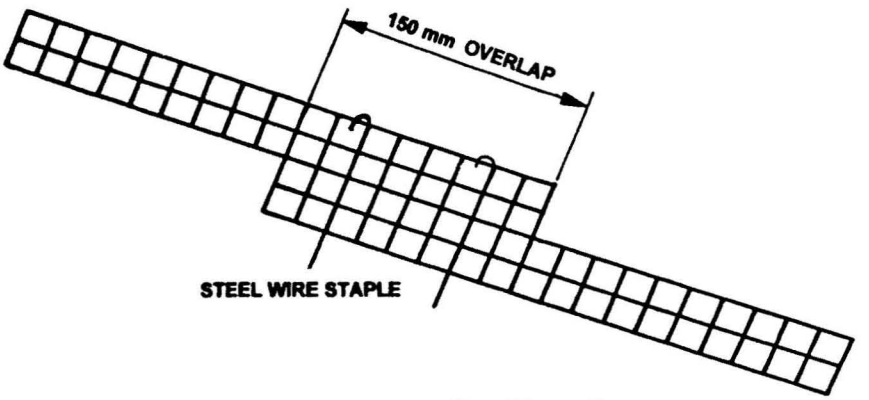

FIG. 1 OVERLAPPING OF COIR WOVEN *BHOOVASTRA*

guidance in selecting the species of vegetation). If seeds are not available, saplings of the appropriate plant species may be planned at suitable intervals through the opening of the coir woven *bhoovastra*.

6.1.9 In special circumstances, a second dose of seeds may be spread with dibbling of locally available grass.

6.1.10 Installation shall be completed preferably before the monsoon to take advantage of the rains for quick germination of seeds.

7 MONITORING

7.1 Close monitoring shall be done for at least one season cycle.

7.2 The treated area shall be kept out of bounds for cattle and other grazing animals till the time of maturity of vegetation.

7.3 The damage and displacement of coir woven *bhoovastra* shall be noted for corrective action. Torn portions of the coir woven *bhoovastra* shall be covered with new pieces of coir woven *bhoovastra* of identical specification duly stapled at all sides.

7.4 Watering/maintenance of identical specifications duly stapled at all sides.

7.5 Advice shall be sought from specialist to find out cause of unsatisfactory growth of vegetation. Withered plants shall be replaced. Species of vegetation needs to be selected carefully considering the local soil and climatic conditions.

ANNEX A

(*Clause* 6.1.8)

GUIDANCE IN SELECTING THE SPECIES OF VEGETATION

Name of the Species	*Suited for*
Avicennia officinalis	Shrub suitable for marshy places
Rhizophora mucrunata	Shrub suitable for marshy places
Cyperus mxaltatus	Grass suitable for highway slopes
Acrostichum mureum	Shrub suitable for dam sites
Adiantum spices	Shrub suitable for dam sites
Cyanodon dactylon	For light sandy soils
Cenehurs ciliaries	For most types of soil
Eragrostis curuvla	For protecting terraces and channels
Dianthum annulatum	For light soil
Pennisetum pedicellatum	For sandy loam soil
Both rochola glabra	For red semi-arid soil
Stylosanthis gracilis	For light soils with low moisture
Stylosamthis gusineusis	For light and medium soil with low moisture
Pucraria hirsute	Cover crop suited to alluvial soil and for hills in humid climate
Pennisetum purpureum	For hill slopes
Peuraria hirsta	Cover crop suited to alluvial soil

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