ISO/PRF TR 18228-6:2023 (E)

ISO-/TC- 221

Secretariat:- BSI

Date: 2023-10-16

Design using geosynthetics— —

Part 6: Protection

WD/CD/DIS/FDIS stage

Warning for WDs and CDs

This document is not an ISO International Standard. It is distributed for review and comment. It is subject to change without notice and may not be referred to as an International Standard.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Design pour géosynthétiques —

Partie 6: Protection

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11

~~Fax: +41 22 749 09 47~~

~~Email~~E-mail: copyright@iso.org
Website: ~~www.iso.org~~www.iso.org

Published in Switzerland

Contents

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documentsdocument should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Field Code Changed

Attention is drawnISO draws attention to the possibility that some of the elementsimplementation of this document may beinvolve the subjectuse of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.htmlwww.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC *221*, *Geosynthetics*, Working group WG 6, *Design using geosynthetics*.

A list of all parts in the ISO/TR 18228 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Field Code Changed

Introduction

The ISO/TR 18228 series provides guidance for designs using geosynthetics for soils and below ground structures in contact with natural soils, fills and asphalt. The series contains 10 parts which cover designs using geosynthetics, including guidance for characterisation of the materials to be used and other factors affecting the design and performance of the systems which are particular to each part, with ISO/TR 18228-1 providing general guidance relevant to the subsequent parts of the series.

The series is generally written in a limit state format and guidelines are provided in terms of partial material factors and load factors for various applications and design lives, where appropriate.

This document includes information relating to the use of geosynthetics in a protective function.

Design using geosynthetics —

Part 6:
Protection

1 Scope

This document provides general considerations to support design guidance for the evaluation of geosynthetics to fulfil a protective function to any surface or material placed in contact with the protective element.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 10318-1, *Geosynthetics — Part 1: Terms and definitions*

ISO 10318-2, *Geosynthetics — Part 2: Symbols and pictograms*

3 Terms, definitions and symbols

2.1 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10318-1 and the symbols and pictograms in ISO 10318-2 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.2 Symbols

For the purposes of this document, the symbols and pictograms in ISO 10318-2 apply.

3 4 Concepts and fundamental principles

Geosynthetics for protection (protectors) are frequently incorporated with other geosynthetics and soil components in barrier systems. The objective of any barrier protector is to ensure that the stresses and strains encountered during the construction phase and operational life of a site pose no significant risk of damage to the barrier. The aim of the geosynthetic protection layer is to limit damage to the barrier caused by the drainage aggregate placed above the barrier (see Figure 1 and Figure 2).

Figure 1 and Figure 2). Designers would normally assess the potential for stresses and strains in the protector. This document covers the use of geosynthetics as a protection layer for barriers.

Figure 1 — Drainage aggregate in contact with protection geotextile

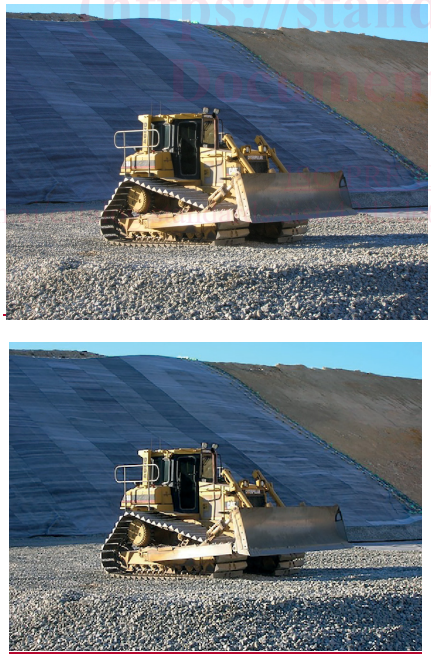

Figure 2 — Placement of drainage aggregate

The purpose of the protective layer is to:

— minimize the risk of barrier damage or puncture during construction i.e. placement of the aggregate drainage layer (dynamic loads) (static loads). The test methods described in Clause 4Clause 4 don't cover this aspect of the design. Test pads using the actual geotextile grade, drainage aggregate and placement equipment are normally performed in order to assess the minimum aggregate placement thickness. Figure 3Figure 3 shows barrier damage from a rounded river gravel due to trafficking with <150 mm cover; and

— minimize the localized strains in the barrier during the subsequent operation and life of the containment facility. Hence reducing the risk for future mechanical damage forming due to, for example, environmental stress cracking.

Figure 3 — Barrier damage due to construction traffic

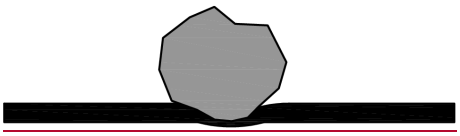

Figure 4 — Deformation without protection layer

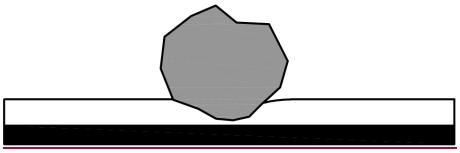

Figure 5 — Deformation with protection layer

A geosynthetic can provide some stress reduction (Figures 4(Figures 4 and 5)5) however, this layer alone would not normally be relied upon to reduce all stresses from the barrier. While strain minimization is desirable, designers would normally be aware that zero strain is unlikely to be achieved.

45 Design approaches for protection

Table 1Table 1 outlines some of the common issues designers would normally consider in selecting the most effective geosynthetic for protection.

Table 1 — Issues considered by designers

Environment	Issue
Physical	— The likely stresses and strains imposed during the construction period. — The likely stresses and strains imposed by settlement and movement. — The likely stresses and strains imposed by the materials placed in contact with the geosynthetic, particularly any drainage stone. — The duration of exposure to ultraviolet light. — The likely temperatures expected adjacent to the geosynthetic and whether these are likely to have a damaging effect upon the material properties in any way. — The interface friction angles between the materials around the geosynthetics and the geosynthetics themselves, particularly on slopes.
Chemical	— The likely interaction between the geosynthetic and the material around the geosynthetic. It is usual for there to be little or no interaction. — The polymeric structure of the geosynthetic itself and whether it will be prone to degradation which would affect its ability to protect the barrier. The polymeric structure would normally be such as to cover the predicted life of the geosynthetic and barrier. — The effects of mineral precipitation on the geosynthetics performance.
Biological	— The effects of microbial growth on the polymer of the geosynthetic. — The effects of microbial growth on the characteristics of the geosynthetic.

Split Cells

Split Cells