PD ISO/TS 20432:2022



BSI Standards Publication

Guidelines for the determination of the long-term strength of geosynthetics for soil reinforcement

bsi.

National foreword

This Published Document is the UK implementation of ISO/TS 20432:2022. It supersedes PD ISO/TR 20432:2007, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/553, Geosynthetics.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

© The British Standards Institution 2023
Published by BSI Standards Limited 2023

ISBN 978 0 539 06590 9

ICS 59.080.70

Compliance with a Published Document cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 January 2023.

Amendments/corrigenda issued since publication

Date	Text affected

PD ISO/TS 20432:2022

TECHNICAL SPECIFICATION

ISO/TS 20432

First edition
2022-12-19

Guidelines for the determination of the long-term strength of geosynthetics for soil reinforcement

Lignes directrices pour la détermination de la résistance à long terme des géosynthétiques pour le renforcement du sol

Reference number
ISO/TS 20432:2022(E)

© ISO 2022



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

© ISO 2022 – All rights reserved

Contents

Page

Foreword ..... **v**

1 Scope **1**

2 Normative references **1**

3 Terms, definitions, abbreviated terms and symbols **1**
3.1 Terms and definitions 1
3.2 Abbreviated terms 2
3.3 Symbols 2

4 Design procedure **4**
4.1 General 4
4.2 Design lifetime 4
4.3 Causes of degradation 4
4.4 Design temperature 5

5 Determination of long-term creep strain **5**
5.1 General 5
5.2 Extrapolation 6
5.3 Time-temperature superposition methods 6
5.4 Isochronous curves 7
5.5 Weathering, chemical and biological effects 7

6 Determination of long-term strength **8**
6.1 Tensile strength 8
6.2 Reduction factors 8
6.3 Modes of degradation 8

7 Creep rupture **9**
7.1 General 9
7.2 Measurement of creep rupture: conventional method 10
7.3 Curve fitting (conventional method) 11
7.4 Curve fitting for time-temperature block shifting of rupture curves 13
7.5 Strain shifting and the stepped isothermal method 14
7.6 Extrapolation and definition of reduction factor or lifetime 15
7.7 Residual strength 16
7.8 Reporting of results 16
7.9 Procedure in the absence of sufficient data 16

8 Installation damage **17**
8.1 General 17
8.2 Data recommended 17
8.3 Calculation of reduction factor 18
8.4 Procedure in the absence of direct data 18
8.4.1 General 18
8.4.2 Interpolation from measurements with different soils 18
8.4.3 Interpolation between products of the same product line 19
8.4.4 Laboratory damage tests 19

9 Weathering, chemical and biological degradation **19**
9.1 General 19
9.2 Data recommended for assessment 20
9.3 Weathering 20
9.4 Chemical degradation 21
9.4.1 Causes of chemical degradation 21
9.4.2 Evidence from service experience 21
9.4.3 Accelerated chemical degradation tests 22
9.4.4 Oxidation of polyolefins 26
9.4.5 Hydrolysis of polyesters 27

© ISO 2022 – All rights reserved

9.4.6 Procedure in the absence of sufficient data 29
9.5 Biological degradation 29
10 Determination of long-term strength 29
10.1 Factor of safety f_S 29
10.2 Design for residual strength 30
11 Reporting 30
Bibliography 31

© ISO 2022 – All rights reserved

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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. 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.html.

This document was prepared by Technical Committee ISO/TC 221, *Geosynthetics.*

This first edition of ISO/TS 20432 cancels and replaces ISO/TR 20432:2007, which has been technically revised. It also incorporates the Technical Corrigendum ISO/TR 20432:2007/Cor 1:2008.

The main changes are as follows:

— Subclause 7.4 has been modified to further detail and clarify the fitting of linear regression curves to time-temperature block shifted creep-rupture test results.

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.

© ISO 2022 – All rights reserved

TECHNICAL SPECIFICATION **ISO/TS 20432:2022**

Guidelines for the determination of the long-term strength of geosynthetics for soil reinforcement

1 Scope

This document provides guidelines for the determination of the long-term strength of geosynthetics for soil reinforcement.

This document describes a method of deriving reduction factors for geosynthetic soil-reinforcement materials to account for creep and creep rupture, installation damage and weathering, and chemical and biological degradation. It is intended to provide a link between the test data and the codes for construction with reinforced soil.

The geosynthetics covered in this document include those whose primary purpose is reinforcement, such as geogrids, woven geotextiles and strips, where the reinforcing component is made from polyester (polyethylene terephthalate), polypropylene, high density polyethylene, polyvinyl alcohol, aramids and polyamides 6 and 6,6. This document does not cover the strength of joints or welds between geosynthetics, nor whether these might be more or less durable than the basic material. Nor does it apply to geomembranes, for example, in landfills. It does not cover the effects of dynamic loading. It does not consider any change in mechanical properties due to soil temperatures below 0 °C, nor the effect of frozen soil. The document does not cover uncertainty in the design of the reinforced soil structure, nor the human or economic consequences of failure.

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*

3 Terms, definitions, abbreviated terms and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10318-1 and the following 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 https://www.electropedia.org/

3.1.1
long-term strength
load which, if applied continuously to the geosynthetic during the service lifetime, is predicted to lead to rupture at the end of that lifetime

3.1.2
reduction factor
factor (≥ 1) by which the tensile strength is divided to take into account particular service conditions in order to derive the long-term strength

Note 1 to entry: In Europe, the term 'partial factor' is used.

© ISO 2022 – All rights reserved