INTERNATIONAL STANDARD

ISO 18674-4

First edition
2020-06

Geotechnical investigation and testing — Geotechnical monitoring by field instrumentation —

Part 4: Measurement of pore water pressure: Piezometers

Reconnaissance et essais géotechniques — Surveillance géotechnique par instrumentation in situ —

Partie 4: Mesure de la pression interstitielle: Piézomètres

Reference number
ISO 18674-4:2020(E)

© ISO 2020



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, 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
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Symbols and abbreviated terms ... **7**

5 Instruments ... **7**
5.1 General ... 7
5.2 Open piezometer systems ... 9
5.2.1 General ... 9
5.2.2 Types of open piezometer systems ... 10
5.3 Closed piezometer systems ... 13
5.3.1 General ... 13
5.3.2 Types of closed piezometer systems ... 16
5.4 Absolute versus relative measurements and atmospheric compensation ... 17
5.5 Requirements for filters ... 19
5.5.1 Filters in open piezometer systems ... 19
5.5.2 Filters in closed piezometer systems ... 19
5.6 Measuring range and accuracy ... 20

6 Installation and measuring procedure ... **20**
6.1 Installation ... 20
6.1.1 General ... 20
6.1.2 Installation of open piezometer systems ... 21
6.1.3 Installation of closed piezometer systems ... 23
6.1.4 Checks before, during and after installation ... 24
6.1.5 Maintenance ... 25
6.2 Carrying out the measurement ... 25
6.2.1 Instrumentation check and calibration ... 25
6.2.2 Measurement ... 26

7 Data processing and evaluation ... **26**

8 Reporting ... **26**
8.1 Installation report ... 26
8.2 Monitoring report ... 26

Annex A (normative) **Measuring and evaluation procedure** ... **27**

Annex B (informative) **Geo-engineering applications** ... **34**

Annex C (informative) **Protection of piezometers at the ground level** ... **36**

Annex D (informative) **Response time for pore water pressure measurements** ... **39**

Annex E (normative) **Fully grouted piezometer installation** ... **42**

Annex F (normative) **Measuring negative pore water pressure (soil suction)** ... **44**

Annex G (informative) **Measuring examples** ... **45**

Bibliography ... **57**

© ISO 2020 – 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 182, *Geotechnics,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 341, *Geotechnical Investigation and Testing,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 18674 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.

© ISO 2020 – All rights reserved

Geotechnical investigation and testing — Geotechnical monitoring by field instrumentation —

Part 4:
Measurement of pore water pressure: Piezometers

IMPORTANT — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

1 Scope

This document specifies the measurement of pore water pressures and piezometric levels in saturated ground by means of piezometers installed for geotechnical monitoring. General rules of performance monitoring of the ground, of structures interacting with the ground, of geotechnical fills and of geotechnical works are presented in ISO 18674-1.

If applied in conjunction with ISO 18674-5, the procedures described in this document allow the determination of effective stresses acting in the ground.

This document is applicable to:

— monitoring of water pressures acting on and in geotechnical structures (e.g. quay walls, dikes, excavation walls, foundations, dams, tunnels, slopes, embankments, etc.);

— monitoring of consolidation processes of soil and fill (e.g. beneath foundations and in embankments);

— evaluating stability and serviceability of geotechnical structures;

— checking geotechnical designs in connection with the Observational Design procedure.

NOTE This document fulfils the requirements for the performance monitoring of the ground, of structures interacting with the ground and of geotechnical works by the means of piezometers, installed as part of the geotechnical investigation and testing in accordance with References [4] and [5] This document relates to measuring devices, which are installed in the ground. For pore water pressure measurements carried out in connection with cone penetration tests, see ISO 22476-1.

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 18674-1:2015, *Geotechnical investigation and testing — Geotechnical monitoring by field instrumentation — Part 1: General rules*

ISO 22475-1, *Geotechnical investigation and testing — Sampling by drilling and excavation methods and groundwater measurements — Part 1: Technical principles for execution*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18674-1 and the following apply.

© ISO 2020 – All rights reserved