INTERNATIONAL STANDARD

ISO 16134

First edition
2006-02-01

Earthquake- and subsidence-resistant design of ductile iron pipelines

Conception de canalisations en fonte ductile résistant aux tremblements de terre et aux affaissements

Reference number
ISO 16134:2006(E)

© ISO 2006

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parametres were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS

© ISO 2006

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

 © ISO 2006 – All rights reserved

Contents

Page

This document is a preview generated by EVS

© ISO 2006 – 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 16134 was prepared by Technical Committee ISO/TC 5, *Ferrous metal pipes and metallic fittings*, Subcommittee SC 2, *Cast iron pipes, fittings and their joints*.

This document is a preview generated by EVS

 © ISO 2006 – All rights reserved

Introduction

Buried pipelines are often subjected to damage by earthquakes. It is therefore necessary to take earthquake resistance into consideration, where applicable, in the design of the pipelines. In reclaimed ground and other areas where ground subsidence is expected, the pipeline design must also take the subsidence into consideration.

Even though ductile iron pipelines are generally considered to be earthquake-resistant, since their joints are flexible and expand/contract according to the seismic motion to minimize the stress on the pipe body, nevertheless there have been reports of the joints becoming disconnected by either a large quake motion or major ground deformation such as liquefaction.

This document is a preview generated by EVS

© ISO 2006 – All rights reserved

Earthquake- and subsidence-resistant design of ductile iron pipelines

This document is a preview generated by EVS

1 Scope

This International Standard specifies the design of earthquake- and subsidence-resistant ductile iron pipelines suitable for use in areas where seismic activity and land subsidence can be expected. It provides a means of determining and checking the resistance of buried pipelines and also gives example calculations. It is applicable to ductile iron pipes and fittings with joints that have expansion/contraction and deflection capabilities, used in pipelines buried underground.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
burying
placing of pipes underground in a condition where they touch the soil directly

2.2
response displacement method
earthquake-resistant calculation method in which the underground pipeline structure is affected by the ground displacement in its axial direction during an earthquake

2.3
liquefaction
phenomenon in which sandy ground rapidly loses its strength and rigidity due to repeated stress during an earthquake, and where the whole ground behaves just like a liquid

2.4
earthquake-resistant joint
joint having slip-out resistance as well as expansion/contraction and deflection capabilities

3 Earthquake-resistant design

3.1 Seismic hazards to buried pipelines

In general, there are several main causes of seismic hazards to buried pipelines:

a) ground displacement and ground strain caused by seismic ground shaking;

b) ground deformation such as a ground surface crack, ground subsidence and lateral spread induced by liquefaction;

c) relative displacement at the connecting part with the structure, etc.;

d) ground displacement and rupture along a fault zone.

Since ductile iron pipe has high tensile strength as well as the capacity for expansion/contraction and deflection from its joint part, giving it the ability to follow the ground movement during the earthquake, the

© ISO 2006 – All rights reserved