



*NSF International Standard /
American National Standard*

NSF/ANSI 358-1 - 2012

**Polyethylene Pipe and Fittings for
Water-Based Ground-Source
"Geothermal" Heat Pump Systems**



NSF International, an independent, not-for-profit, non-governmental organization, is dedicated to being the leading global provider of public health and safety-based risk management solutions while serving the interests of all stakeholders.

*This Standard is subject to revision.
Contact NSF to confirm this revision is current.*

Users of this Standard may request clarifications and interpretations, or propose revisions by contacting:

Chair, Joint Committee on Plastics
c/o NSF International
789 North Dixboro Road, P.O. Box 130140
Ann Arbor, Michigan 48113-0140 USA
Phone: (734) 769-8010 Telex: 753215 NSF INTL
FAX: (734) 769-0109
E-mail: info@nsf.org
Web: <http://www.nsf.org>

NSF/ANSI 358-1 – 2012

NSF International Standard/
American National Standard
for Plastics –

**Polyethylene Pipe and Fittings for
Water-Based Ground-Source
“Geothermal” Heat Pump Systems**

Standard Developer

NSF International

NSF International Board of Directors

Designated as an ANSI Standard

July 11, 2012

American National Standards Institute

Prepared by
The NSF Joint Committee on Plastics

Recommended for Adoption by
The NSF Council of Public Health Consultants

Adopted by NSF International

July 2012

Published by

NSF International
PO Box 130140, Ann Arbor, Michigan 48113-0140, USA

For ordering copies or for making inquiries with regard to this Standard, please reference the designation "NSF/ANSI 358-1 - 2012."

Copyright 2012 NSF International

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 NSF International.

Printed in the United States of America.

Disclaimers¹

NSF, in performing its functions in accordance with its objectives, does not assume or undertake to discharge any responsibility of the manufacturer or any other party. The opinions and findings of NSF represent its professional judgment. NSF shall not be responsible to anyone for the use of or reliance upon this Standard by anyone. NSF shall not incur any obligation or liability for damages, including consequential damages, arising out of or in connection with the use, interpretation of, or reliance upon this Standard.

NSF Standards provide basic criteria to promote sanitation and protection of the public health. Provisions for mechanical and electrical safety have not been included in this Standard because governmental agencies or other national standards-setting organizations provide safety requirements.

Participation in NSF Standards development activities by regulatory agency representatives (federal, local, state) shall not constitute their agency's endorsement of NSF or any of its Standards.

Preference is given to the use of performance criteria measurable by examination or testing in NSF Standards development when such performance criteria may reasonably be used in lieu of design, materials, or construction criteria.

The illustrations, if provided, are intended to assist in understanding their adjacent standard requirements. However, the illustrations may not include **all** requirements for a specific product or unit, nor do they show the only method of fabricating such arrangements. Such partial drawings shall not be used to justify improper or incomplete design and construction.

Unless otherwise referenced, the annexes are not considered an integral part of NSF Standards. The annexes are provided as general guidelines to the manufacturer, regulatory agency, user, or certifying organization.

¹ The information contained in this Disclaimer is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Disclaimer may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

This page is intentionally left blank.

Contents

1	General.....	1
1.1	Purpose.....	1
1.2	Scope.....	1
2	Normative References.....	1
3	Definitions.....	2
4	Material Requirements.....	4
4.1	Plastic Materials.....	4
4.2	Materials.....	4
4.3	Long-term strength of plastic pipe.....	4
4.4	Hydrostatic design.....	4
5	General Requirements.....	4
5.1	Polyethylene Pipe.....	4
5.2	Polyethylene Fittings.....	5
5.3	Chemical Resistance.....	5
6	Marking Requirements.....	6
6.1	Pipe Marking.....	6
6.2	Fitting Marking.....	6
6.3	Manufacturers Instructions.....	6
7	Quality Assurance.....	6
7.1	General.....	6
7.2	Start-up and qualification of molds.....	7
7.3	Calibration.....	7
7.4	Quality assurance records.....	7
7.5	Production code identification.....	7
7.6	Number of test specimens.....	8

This page is intentionally left blank.

Foreword²

Geothermal technology has been used in North America for decades and is experiencing tremendous interest. In 2009, the NSF Joint Committee on Plastics and RV Plumbing Components proposed to develop this Standard after a need was identified in the industry. Plastic piping system components are used in the construction of earth energy systems yet there is no North American standard addressing all relevant aspects of earth energy systems. It is the intent of this Standard to assist in a more consistent approval and mainstream code adoption of the geothermal piping systems technology.

This standard will be separated into four separate documents based on material types. NSF/ANSI 358-1 addresses products in polyethylene systems.

This Standard was developed by the NSF Joint Committee on Plastics using the consensus process described by the American National Standards Institute.

Suggestions for improvement of this Standard are welcome. Comments should be sent to Chair, Joint Committee on Plastics at standards@nsf.org or, c/o NSF International, Standards Department, P.O. Box 130140, Ann Arbor, Michigan, 48113-0140, USA.

² The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. Therefore, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

This page is intentionally left blank.

NSF International Standard
for Plastics –

Polyethylene Pipe and Fittings for Water-Based Ground-Source “Geothermal” Heat Pump Systems

1 General

1.1 Purpose

This Standard establishes the minimum physical and performance requirements for plastic piping system components. These criteria were established for the protection of property, public health and the environment.

1.2 Scope

The physical and performance requirements in this Standard apply to plastic piping system components as well as non-plastic components of the ground loop heat exchanger including but not limited to pipes and fittings used in water-based ground-source heat pump systems. This Standard is intended for ground loop heat exchangers with a maximum temperature and pressure of 140 °F (60°C) at 100 psi. Water-based ground-source heat pump systems commonly include the use of anti-freeze, heat transfer fluids or other chemical additives. This Standard does not cover refrigerant based ground loop heat exchangers such as direct expansion (DX) systems. This Standard does not cover hydronic heating or cooling systems within buildings.

2 Normative references

The following documents contain provisions that, through reference, constitute provisions of this NSF Standard. At the time this Standard was balloted, the editions listed below were valid. All documents are subject to revision, and parties are encouraged to investigate the possibility of applying the recent editions of the documents indicated below.

ASTM D2290-08 Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe by Split Disk Method³

ASTM F1588-96(2011) Standard Test Method for Constant Tensile Load Joint Test (CTLJT)³

ASTM D2683-10 Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing³

ASTM D2737-12e1 Standard Specification for Polyethylene (PE) Plastic Tubing³

ASTM D2837-11 Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products³

³ American Society for Testing Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 <www.astm.org>.