TECHNICAL REPORT

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Plastics pipes and fittings for industrial applications — Collection of data on combined chemical-resistance

Tubes et raccords en matières plastiques pour applications industrielles — Collecte de données sur la résistance chimique combinée

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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).

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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 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 3, *Plastics pipes and fittings for industrial applications*.

This second edition cancels and replaces the first edition (ISO/TR 10358:1993), which has been technically revised.

The main changes compared to the previous edition are as follows:

— Due to the rare use of PE-LD inside industrial applications and the comparability of its chemical behaviour to PE-HD, the reference to PE only has been indicated.

— Considering the ever more frequent use in industrial fields, the following materials have been introduced:

  — ECTFE

  — PA-U

  — PFA

  — PPS

  — PSU

  — PTFE

— Due to the different behaviours of the materials considered in this document, they have been gathered in two separate tables with different temperature ranges.

— A column with CAS (Chemical Abstracts Service) number, where available, has been introduced for the listed substances.

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.

Introduction

The tables in this document provide a preliminary informative collection of the chemical resistance of thermoplastic materials used to manufacture piping components which are not subjected to pressure or other stresses. They take into account the working conditions used, in particular the temperatures and concentrations of the chemical fluids to which a material may be exposed. To evaluate the behaviour of the different materials against the chemicals, data coming from published literature and industry experience were considered. To obtain numerical values for changes in mass or for mechanical properties, tests can be carried out in accordance with ISO 175, ISO 4433 (all parts) and ISO 22088 (all parts).

Careful consideration is paid by the end user when the fluid being transported is a combination of two or more chemicals. The resulting combination can have the potential to negatively affect the material from which the pipeline is made[12].

Careful consideration is paid by the end user to composite structures. The following data, collected from literature, only address the effect on an individual material. Aspects for composite structure such as layers, reinforcements and/or fillers that are added above a negligible amount, are outside of the scope of this document[12].

Plastics pipes and fittings for industrial applications — Collection of data on combined chemical-resistance

1 Scope

This document collects available data on combined chemical resistance of thermoplastic materials typically used to manufacture piping components for industrial applications, against fluids over a range of temperatures.

The base thermoplastic materials covered by this classification are:

Polyethylene	PE

NOTE 1 The PE considered in this document corresponds to PE-HD, with a minimum density value of 0,935 g/cm^3 (e.g.: PE63, PE80, PE100, PE100-RC, PE-RT).

Polypropylene	PP (PP-R and PP-RCT, PP-H, PP-B)
Polyvinyl chloride, unplasticized	PVC-U
Polyvinyl chloride, chlorinated	PVC-C
Polybutylene	PB
Acrylonitrile/butadiene/styrene	ABS
Polyvinylidene fluoride	PVDF

NOTE 2 This document considers homopolymer PVDF.

Cross-linked polyethylene	PE-X (PE-Xa, PE-Xb, PE-Xc)
Ethylene chloro trifluoro ethylene	ECTFE
Polyamide, unplasticized	PA-U (PA-U11, PA-U12)

NOTE 3 This document focuses on PA-U11 and PA-U12 only, as these long chained PA-U are standardized according to ISO 16486-1; short chained (e.g. PA 66) and plasticized PAs are not used for monolithic plastic piping components.

Polysulfone	PSU
Perfluoralkoxy	PFA

NOTE 4 Temperatures higher than 200°C can be applied after an evaluation with the raw material manufacturer.

Polytetrafluoroethylene	PTFE

NOTE 5 Temperatures higher than 200°C can be applied after an evaluation with the raw material manufacturer.