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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 21461.2-2023

Replacing GB/T 21461.2-2008

**Plastics - Ultra-high-molecular-weight polyethylene (PE-UHMW)
moulding and extrusion materials - Part 2: Preparation of test
specimens and determination of properties**

塑料 超高分子量聚乙烯 (PE-UHMW) 模塑和挤出材料 第2部分：试样制备和性能测定

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents" Drafting:

This document is Part 2 of GB/T 21461 "Plastic ultra-high molecular weight polyethylene (PE-UHMW) molding and extrusion materials":

GB/T 21461 has published the following parts:

---Part 1: Nomenclature system and classification basis;

---Part 2: Sample preparation and performance determination:

This document replaces GB/T 21461.2-2008 "Plastic ultra-high molecular weight polyethylene (PE-UHMW) molding and extrusion materials No: 2 Part: Sample Preparation and Performance Determination", compared with GB/T 21461.2-2008, in addition to structural adjustments and editorial changes, the main technical changes transformed as follows:

a) Changed the regulations on humidity conditions for specimen condition adjustment (see Chapter 5, Chapter 4 of the:2008 edition);

b) The regulations on the humidity conditions of the standard test environment have been changed, and the original humidity conditions requirements for filled samples have been retained:

The requirements for humidity conditions are deleted (see Chapter 6, Chapter 5 of the:2008 edition);

c) In the compression molding conditions of the test piece, the "average cooling rate" is changed to "cooling rate", and "inconsistent cooling rates will affect the degree of crystallinity of the specimen results in significant differences in the performance measurements, so a molding press that can achieve a linear cooling rate should be used" (see Footnotes in Table 1,:2008 version of Table 1);

d) Added two properties: "bending strength" and "glass transition temperature" (see Table 2);

e) The type and size of the electrical properties of the specimen have been changed (see Table 2, Table 2 of the:2008 edition);

f) Added the requirement for electrical properties that "the size of the sample should be larger than the size of the electrode on the instrument to prevent discharge along the surface" (see footer in Table 2

Note c)

g) Added three properties: "melt volume flow rate", "wear performance - wear rate" and "wear performance - wear index" (see Table 3);

h) Changed some contents of the tensile stress test instrument (see B:2, A:3 of the:2008 edition);

i) Changed the type of loading weight mass for the tensile stress specimen (see Table B:1, Table A:1 of the:2008 edition);

j) Changed the schematic diagram of the tensile stress measuring device (see Figure B:1, Figure A:1 of the:2008 version);

k) Changed some contents of the tensile stress test (see B:4:2, A:5:2 of the:2008 edition);

l) The unit of weight mass in the calculation formula of constant elongation stress has been changed from "gram (g)" to "kilogram (kg)" (see B:5,:2008 edition A:6);

m) Changed the schematic diagram of the double-notch sample preparation device and the double-notch sample (see Figure C:1, Figure B:1 of the:2008 version);

n) The preparation method of the double notch of the specimen has been changed (see C:4, B:5 of the:2008 edition):

This document is modified to adopt ISO 21304-2:2021 "Plastic ultra-high molecular weight

polyethylene (PE-UHMW) molding and extrusion materials" Part 2: Specimen preparation and performance determination:

Compared with ISO 21304-2:2021, there are many technical differences between this document and the clauses involved in the outer margins:

Straight single lines (|) are marked: A list of these technical differences and their causes is provided in Appendix A:

Compared with ISO 21304-2:2021, this document has made the following editorial changes:

- a) The symbol of double-notch impact strength of simply supported beams was changed from " α_{HN} " to " α_{HDN} ";
- b) Added instructions for preparing specimens by punching after compression molding (see note in 4.2);
- c) Added reference ISO 293:2023:

Please note that some content in this document may be subject to patents: The publisher of this document assumes no responsibility for identifying patents:

Introduction

The previous version of GB/T 21461.2 (this document) and the previous version of GB/T 21461.1 released at the same time as this document are adopted equally:

ISO 11542-2:1998 and ISO 11542-1:2001: In:2016, my country took the lead in revising ISO 11542-1:2001 and ISO 11542-2:

In:1998, the ISO/TC61/SC9 Thermoplastics Branch revised the material naming system rules and released a new material naming system:

Name format template: In order to facilitate the readers and users of the standard to become familiar with it and use it during the transition period, ISO stipulates that the standard Part 1 of the new template should be adopted:

New standard numbers are given when the standard is revised: Part 2 standards also appear with new standard numbers when they are revised: Therefore, the ISO standard is revised to ISO 21304-1:2019 and ISO 21304-2:2021 replace ISO 11542-1:2001 and ISO 11542-2:1998 respectively:

GB/T 21461 is intended to consist of two parts:

---Part 1: Nomenclature system and classification basics: The purpose is to establish a standard model suitable for ultra-high molecular weight polyethylene materials:

Nomenclature and classification principles of materials:

---Part 2: Sample preparation and performance determination: The purpose is to establish a sample preparation method suitable for ultra-high molecular weight polyethylene materials:

Methods and performance measurement items, methods and conditions:

This document is modified to adopt ISO 21304-2:2021, by stipulating unified sample preparation, condition adjustment, sample size and test strips to obtain reproducible and comparable test results:

The terms and definitions of "cooling rate/linear cooling rate" in this document are derived from ISO 293:2023, which was revised and published under the leadership of my country:

(See 3.2 and Table 1), compared with the "average cooling rate" in the previous version of this document, the cooling stage of the compression molded test piece has a significant impact on the control of the molding machine:

The requirements of the control system are more stringent:

This document newly adds the measurement of PE-UHMW materials using a triple cross-sectional area die (inner diameter 3:628mm) under the conditions of 230°C/21:6kg:

The melt volume flow rate (MVR) test item can quickly determine the fluidity of lower molecular weight PE-UHMW materials for some uses:

For constant elongation stress testing, this document only gives the minimum load up to 50g weight, but there is reason to believe that the use of smaller loads is essential for obtaining Take the modulus stress curve of some lower molecular weight PE-UHMW materials to study the molecular weight, molecular weight distribution and certain applicability of the material:

Relationships with performance (such as wear resistance) are useful:

Due to the ISO standard revision rules and the rapid development of PE-UHMW materials in my country, some aspects of the standard adoption standards will be revised during the revision process of this document:

Technical modifications have been made to the sub-clauses and contents, and comparative instructions have been given in appropriate ways:

Plastic ultra-high molecular weight polyethylene (PE-UHMW) Molded and extruded materials Part 2: Specimen preparation and Performance Measurement

1 Scope

This document specifies the specimen preparation methods and performance determination methods for ultra-high molecular weight polyethylene (PE-UHMW) molded and extruded materials:

test methods: This document also gives requirements for handling the test material as well