ICS 75.100 SLOVENSKÁ TECHNICKÁ NORMA August 2018

STN	**Ropa a príbuzné výrobky Určovanie vlastností kvapalín pri limitných tlakoch a vlastností proti opotrebovaniu Metóda štyroch guľôčok (európske podmienky) (ISO 20623: 2017)**	**STN EN ISO 20623** 65 6021

Petroleum and related products - Determination of the extreme-pressure and anti-wear properties of lubricants - Four-ball method (European conditions) (ISO 20623:2017)

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 07/18

Obsahuje: EN ISO 20623:2018, ISO 20623:2017

Oznámením tejto normy sa ruší
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EUROPEAN STANDARD

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EUROPÄISCHE NORM

EN ISO 20623

January 2018

ICS 75.100

Supersedes EN ISO 20623:2003

English Version

Petroleum and related products - Determination of the extreme-pressure and anti-wear properties of lubricants - Four-ball method (European conditions) (ISO 20623:2017)

Pétrole et produits connexes - Détermination des propriétés extrême pression et anti-usure des lubrifiants - Essai quatre billes (conditions Européennes) (ISO 20623:2017)

Mineralölerzeugnisse und verwandte Produkte - Bestimmung der EP-Eigenschaften und Verschleißkennwerte von Schmierstoffen - Verfahren mit dem Vierkugel-Apparat (Europäische Bedingungen) (ISO 20623:2017)

This European Standard was approved by CEN on 6 December 2017.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN ISO 20623:2018 E

EN ISO 20623:2018 (E)

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European foreword

This document (EN ISO 20623:2018) has been prepared by Technical Committee ISO/TC 28 "Petroleum and related products, fuels and lubricants from natural or synthetic sources" in collaboration with Technical Committee CEN/TC 19 “Gaseous and liquid fuels, lubricants and related products of petroleum, synthetic and biological origin” the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by July 2018, and conflicting national standards shall be withdrawn at the latest by July 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 20623:2003.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 20623:2017 has been approved by CEN as EN ISO 20623:2018 without any modification.

INTERNATIONAL STANDARD

ISO 20623

Second edition
2017-12

Petroleum and related products — Determination of the extreme-pressure and anti-wear properties of lubricants — Four-ball method (European conditions)

Pétrole et produits connexes — Détermination des propriétés extrême pression et anti-usure des lubrifiants — Essai quatre billes (conditions Européennes)

Reference number
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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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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 28, *Petroleum and related products, fuels and lubricants from natural or synthetic sources*.

This second edition cancels and replaces the first edition (ISO 20623:2003), which has been technically revised.

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

— this document has been extended to all types of liquid lubricants and greases, whereas previously it applied only to fire-resistant hydraulic fluids;

— the procedures have been technically revised but the essentials remain the same;

— the test balls have been better specified (see Annex A) and calculations for the wear test have been included;

— the calibration procedure of the friction recorder springs has been deleted and reference is now made to the manufacturer's instructions.

Introduction

The four-ball machine is widespread and commonly used to assess the anti-wear properties of all types of liquid lubricants, lubricating greases and other consistent lubricants.

An electrical motor, the rotational speed of which depends on the frequency of the current, actuates the four-ball machine. So, depending on the country where the machines are used, the results obtained cannot be compared.

ASTM has standardized several procedures with these methods, based on the use of the four-ball machine:

— ASTM D2266;

— ASTM D4172;

— ASTM D2596;

— ASTM D2783.

The Energy Institute has standardized IP 239.

DIN has standardized DIN 51350, divided into five parts:

— Part 1: General working principles;

— Part 2: Determination of the welding load of liquid lubricants;

— Part 3: Determination of the wearing characteristics of liquid lubricants;

— Part 4: Determination of the welding load of consistent lubricants;

— Part 5: Determination of the wearing characteristics of consistent lubricants.

DIN, ASTM and Energy Institute test methods stipulate different rotational speeds.

Table 1 summarizes the test conditions for the above standards.

Table 1 — Test conditions of the various four-ball standards

Standard	Lubricant	Type of test	Load (N)	Duration	Rotational speed r/min	Temperature °C
ASTM D2266	Grease	Wear	392	60 min	1 200	75
ASTM D4172	Oil	Wear	147 (A) 392 (B)	60 min	1 200	75 75
ASTM D2596	Grease	Extreme pressure	59 to 7 848	10 s	1 770	19 to 35
ASTM D2783	Oil	Extreme pressure	59 to 7 848	10 s	1 760	18 to 35
IP 239	Grease — oil	Extreme pressure + wear	60 to 7 940	Wear: 60 min EP: 10 s or 60 s	1 450	Not specified
DIN 51350-2	Oil	Weld load	2 000 to 12 000	60 s	1 450	18 to 40

Table 1 *(continued)*

Standard	Lubricant	Type of test	Load (N)	Duration	Rotational speed r/min	Temperature °C
DIN 51350-3	Oil	Wear	150 (A) 300 (B)	60 min	1 450	18 to 40
DIN 51350-4	Consistent lubricant	Weld load	2 000 to 12 000	60 s	1 450	18 to 40
DIN 51350-5	Consistent lubricant	Wear	150 (C) 300 (D) 1 000 (E)	60 min 60 min 60 s	1 450	18 to 40

The lubricants' properties defined by the various test methods are also different. They are defined in Table 2.

Table 2 — Lubricant properties evaluation by the different methods

Standard	Lubricant property
ASTM D2262	MWSD (mm) under 392 N load
ASTM D4172	MWSD (mm) under 147 N of 392 N
ASTM D2596	WL (N), LWI (N), LNSL (last non-seizure load) (N)
ASTM D2783	WL (N), LWI (N)
IP 239	WL (N), LWI (10 s or 60 s), ISL (N), MWSD (mm) (10 s, 60 s or 60 min)
DIN 51350-2	WL (N)
DIN 51350-3	MWSD (150 N or 300 N, 60 min)
DIN 51350-4	WL (N)
DIN 51350-5	MWSD (150 N, 300 N or 1 000 N)

The purpose of this document is to propose a single standard to evaluate the extreme-pressure and the anti-wear properties of all types of lubricants, with the 4-ball machine, based on a single rotational speed of 1 450 r/min.

The operating procedures take into account all the features present on the machines available on the market.

The lubricants' properties involved are as follows:

a) initial seizure load (ISL);

b) weld load (WL);

c) wear-load curve;

d) Load-Wear Index (LWI);

e) anti-wear characteristics short duration (MWSD) (10 s or 60 s) and long duration (60 min).

INTERNATIONAL STANDARD **ISO 20623:2017(E)**

Petroleum and related products — Determination of the extreme-pressure and anti-wear properties of lubricants — Four-ball method (European conditions)

WARNING — The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of users of this document to take appropriate measures to ensure the safety and health of personnel prior to the application of this document, and to determine the applicability of any other restrictions.

1 Scope

This document specifies procedures for the measurement of the extreme pressure (EP) and anti-wear properties of liquid lubricants (categories C, D, F, G, H, M, P of ISO 6743-99), lubricating greases (ISO 6743-9, category X) and other consistent lubricants. The test conditions are not intended to simulate particular service conditions, but to provide information over a range of standard conditions for the purpose of research, development, quality control and fluid ranking. The output is used in lubricant specifications.

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 3290-1, *Rolling bearings — Balls — Part 1: Steel balls*

ISO 3170, *Petroleum liquids — Manual sampling*

ASTM D4057, *Standard Practice for Manual Sampling of Petroleum and Petroleum Products*

