INTERNATIONAL STANDARD

ISO 6601

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Plastics — Friction and wear by sliding — Identification of test parameters

Plastiques — Frottement et usure par glissement — Identification des paramètres d'essai

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6601 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical properties*.

This second edition cancels and replaces the first edition (ISO 6601:1987), which has been technically revised.

Introduction

The resistance to movement of two surfaces against each other (sliding friction) consumes energy, causes wear and generates heat. In some applications, friction is a nuisance; others require a given level of friction (for example: brakes, shoe soles, etc.). It is important to be able to characterize the friction with certain parameters which are identified in this International Standard.

Plastics — Friction and wear by sliding — Identification of test parameters

1 Scope

This International Standard identifies the parameters associated with the friction and wear of plastics and the conditions that test methods should address to determine these characteristics.

It is intended to provide a basis for further International Standards dealing with methods of test and the specifications of materials.

2 General

The sliding friction behaviour of one material against another can be defined by such terms as the coefficient of friction, rate of wear, resistance to seizure or the "pv-limit" factor[1].

These terms are dependent on various parameters which may be classified into three groups:

a) intrinsic parameters relating to the materials involved, such as their nature, physico-chemical state, surface condition and finish;

b) external parameters relating to the sliding conditions, such as applied load, sliding velocity, characteristics of the motion, mode of contact (see Figure 1), ambient conditions (temperature, humidity) and interstitial matter (lubricant, wear debris);

c) parameters depending on both the nature of the materials involved and the sliding conditions, particularly the surface temperature of the rubbing surfaces.

3 Analysis of friction and wear tests

3.1 General

Friction and wear processes can be described by systematic analysis of the parameters given in 3.2 to 3.5.

3.2 Technical function of tribological systems

For example: transmission of motion, restriction of motion, transmission of force.

1) The pv-limit factor is the product of the bearing pressure p based upon projected area and the surface velocity v and is usually presented graphically as p vs. v on log-log paper.

3.3 Variables involved in the friction and wear process

a) type of motion (sliding, rolling, impact, flow or any combination thereof);

b) variation with time (continuous, oscillatory, intermittent);

c) normal load, F_n;

d) surface velocity, v;

e) temperature, T;

f) test duration, t.

3.4 Structure of tribological systems

3.4.1 Elements

a) body;

b) counter-body;

c) interfacial medium;

d) surrounding medium.

3.4.2 Properties of the elements

a) bulk properties (chemical composition, physical characteristics, mechanical properties, hardness);

b) surface properties (roughness and physico-chemical characteristics).

3.4.3 Interactions between the elements

a) mode of contact (see Figure 1);

b) type of friction (dry friction, boundary lubrication, mixed lubrication, hydrodynamic lubrication, gas lubrication);

c) wear mechanisms, which are often classified into

   1) adhesive wear by tearing of adhered parts from sliding surfaces,

   2) abrasive wear (abrasion) by hard particles present on sliding surfaces,

   3) degradative wear by a hostile environment,

   4) surface fatigue wear by a process of rolling over a track, and

   5) surface wearing asperities creating ploughed surface protuberances (material deposited alongside the furrow).

The modes of contact shown in Figure 1 may also be classified as follows:

a) conformal: radii of curvature of the two solids in the same direction;

   EXAMPLE 1 Cylinder-Cylinder (internal)

   EXAMPLE 2 Plane-Cylinder

b) non-conformal (counterformal): radii of curvature of the two solids in opposite directions.

   EXAMPLE 3 Sphere-Cylinder

   EXAMPLE 4 Cylinder-Cylinder (external)

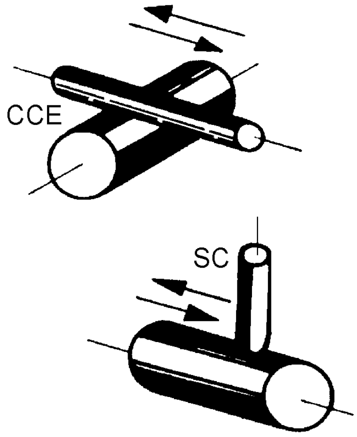
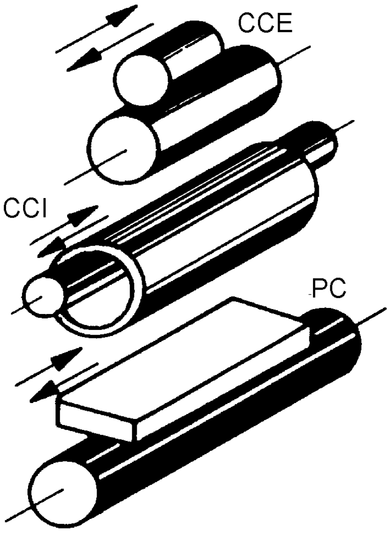
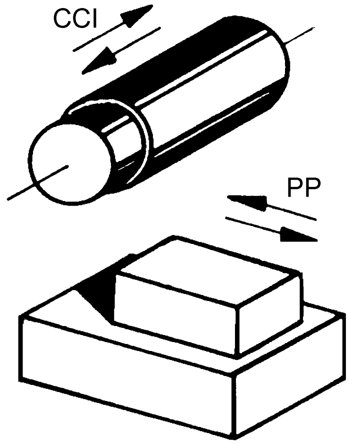
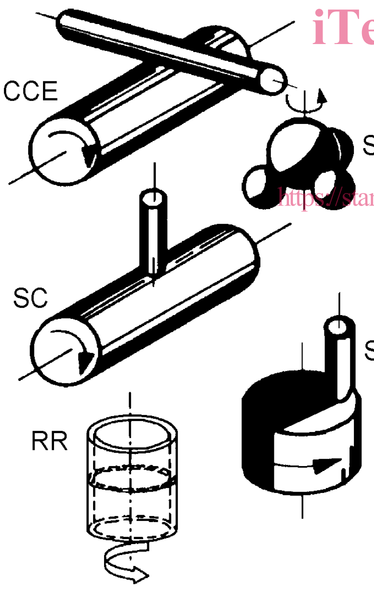
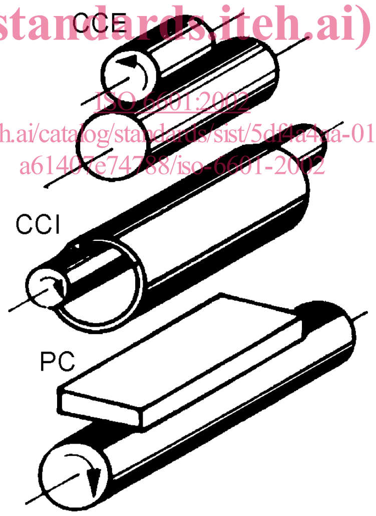
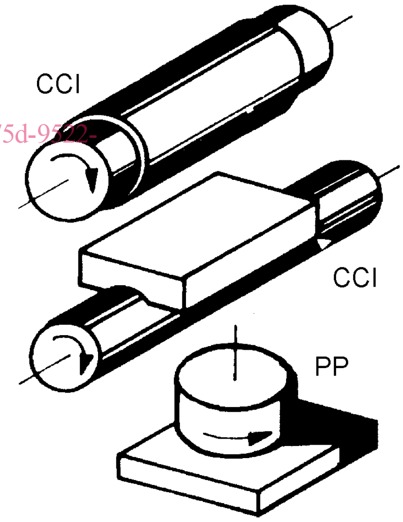
Point contact	Linear contact	Contact of apparent surfaces
Reciprocal movement		
		
Continuous movement		
		
CEE Cylinder-Cylinder (external) SC Sphere-Cylinder SP Sphere-Plane SS Sphere-Sphere RR Ring-Ring	CCE Cylinder-Cylinder (external) CCI Cylinder-Cylinder (internal) PC Plane-Cylinder	CCI Cylinder-Cylinder (internal) PP Plane-Plane

Figure 1 — Contact modes most frequently used in tribometers