
International Standard



4292

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Methods for the assessment of departure from roundness — Measurement by two- and three-point methods

Méthodes d'évaluation des écarts de circularité — Mesurage par les méthodes en deux et trois points

First edition — 1985-07-15

UDC 531.717

Ref. No. ISO 4292-1985 (E)

Descriptors: metrology, surface condition, roundness measurement, error analysis.

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4292 was prepared by Technical Committee ISO/TC 57, *Metrology and properties of surfaces*.

Methods for the assessment of departure from roundness — Measurement by two- and three-point methods

1 Scope and field of application

This International Standard specifies methods of numerical assessment of out-of-roundness determined by the combination of two- and three-point measurement:

- a) determination by means of two-point measurement (measurement of diameters);
- b) determination by means of three-point measurement, summit (symmetrical or asymmetrical setting);
- c) determination by means of three-point measurement, rider (symmetrical setting).

Any statement regarding an out-of-round section is incomplete unless the extent and nature of the departures from roundness are given. Methods for making such descriptions and evaluating them are specified in ISO 4291.

For routine or in-process inspection, the procedure specified in ISO 4291 may either be needlessly accurate or the items to be inspected may be too large to be accommodated.

The methods specified give faster and cheaper ways of assessing departures from roundness. This assessed value will deviate from the true value. The difference between the measured value and the true value can be estimated with the help of tables 2 to 8, assuming that the undulation numbers are known and of sinusoidal nature. For non-sinusoidal undulations, a theory for estimating such deviations is not yet available.

2 References

ISO 4291, *Methods for the assessment of departure from roundness — Measurement of variations in radius*.

ISO 6318, *Measurement of roundness — Terms, definitions and parameters of roundness*.

3 Definitions

For the purpose of this International Standard, the definitions given in ISO 6318 and the following apply.

3.1 two-point measurement: Measurement between coaxial anvils, one fixed and one moving in the direction of measurement.

See figures 1 and 2.

3.2 three-point measurement: Measurement between anvils, two fixed and one moving in the direction of measurement.

See figures 3 to 8.

3.2.1 summit method: A three-point measurement in which the two fixed anvils are situated on one side and the measuring anvil is situated on the other side of the workpiece axis in the plane of measurement.

See figures 3, 4, 6 and 7.

3.2.2 rider method: A three-point measurement in which the two fixed anvils are situated on the same side as the measuring anvil in the plane of measurement.

See figures 5 and 8.

3.3 symmetrical (three-point) setting: A setting at which the direction of measurement coincides with the bisector angle between fixed anvils.

See figures 3, 5, 6 and 8.

3.4 asymmetrical (three-point) setting: A setting at which the direction of measurement constitutes an angle with the bisector angle between fixed anvils.

See figures 4 and 7.

4 Measurement

In order to cover all possible form deviations and numbers of undulations, a complete measurement should always consist of one two-point measurement and two three-point measurements at different angles between fixed anvils. In this International Standard, several alternatives are given when choosing angles between fixed anvils (see table 1). The measurement procedures may, under certain preconditions, be amplified. See tables 2 to 4.