BS ISO 10579:2010

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Geometrical product specifications (GPS) — Dimensioning and tolerancing — Non-rigid parts

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Spécification géométrique des produits (GPS) — Cotation et tolérancement — Pièces non rigides

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Foreword

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

ISO 10579 was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This second edition cancels and replaces the first edition (ISO 10579:1993), which has been technically revised.

Introduction

This International Standard is a geometrical product specification (GPS) standard and is to be regarded as a global GPS standard (see ISO/TR 14638)[4]. It influences chain links 1, 2 and 3 of the chain of standards on form of line independent of datum, form of line dependent on datum, form of surface independent of datum, form of surface dependent on datum, orientation, location, circular run-out and total run-out in the general GPS matrix.

For more detailed information on the relation of this standard to other standards and the GPS matrix model, see Annex B.

Certain parts, when removed from their manufacturing environment, may deform significantly from their defined limits owing to their weight, flexibility or the release of internal stresses resulting from the manufacturing processes.

These parts are defined as “non-rigid parts” and the deformation is acceptable provided that the parts may be brought within the indicated tolerance by applying reasonable force to facilitate inspection and assembly.

Depending on the design function and the part's interface with its mating components, instead of, or in addition to, assessing the part conventionally (in its free state condition), it may be necessary to assess the part when subject to restraint that is no greater than those accepted in the assembled condition.

Parts in this category include both those of inherently rigid material (such as thin metal parts) and those of inherently flexible material (such as rubber, plastics, etc.).

INTERNATIONAL STANDARD ISO 10579:2010(E)

Geometrical product specifications (GPS) — Dimensioning and tolerancing — Non-rigid parts

1 Scope

This International Standard gives rules for dimensioning and tolerancing non-rigid parts where restraining of features is required during verification of dimensions and tolerances specified on a drawing.

2 Normative references

The following referenced documents are indispensable for the application 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 1101:2004, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Tolerances of form, orientation, location and run-out*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
non-rigid part
part which deforms to an extent that in the free state is beyond the dimensional and/or geometrical tolerances on the drawing

3.2
free state
condition of a part subjected only to the force of gravity

4 Basic principles

The distortion of a non-rigid part must not exceed that which allows the part to be brought within specified tolerances for verification and positioning at assembly, or assembled, by applying pressure or forces not exceeding those which can be expected under normal assembly conditions. It is impossible to avoid the effect of natural forces such as gravity, but the extent of distortion may depend upon the orientation of the part and condition of the part in the free state. If it is necessary to indicate the tolerance in the free state, the conditions under which the tolerance is to be achieved (i.e. the direction of gravity, conditions in which it is to be supported, etc.) may have to be indicated in a note, as shown in Annex A. For non-rigid parts, identified on the drawing by the added statement “ISO 10579-NR”, the restrained condition applies unless the dimensions and tolerances are qualified by the symbol Ⓕ, see Clause 5.

5 Indications on drawings

Drawings of non-rigid parts shall include the following indications as appropriate (see also Annex A):

a) in or near the title block, the indication “ISO 10579-NR”;

b) in a note, the conditions under which the part shall be restrained to meet the drawing requirements;

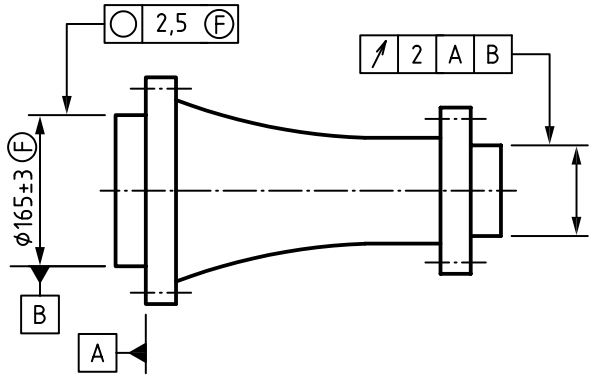
c) geometrical tolerances allowed in the free state, with the modifying symbol Ⓕ included in the tolerance frame in accordance with ISO 1101;

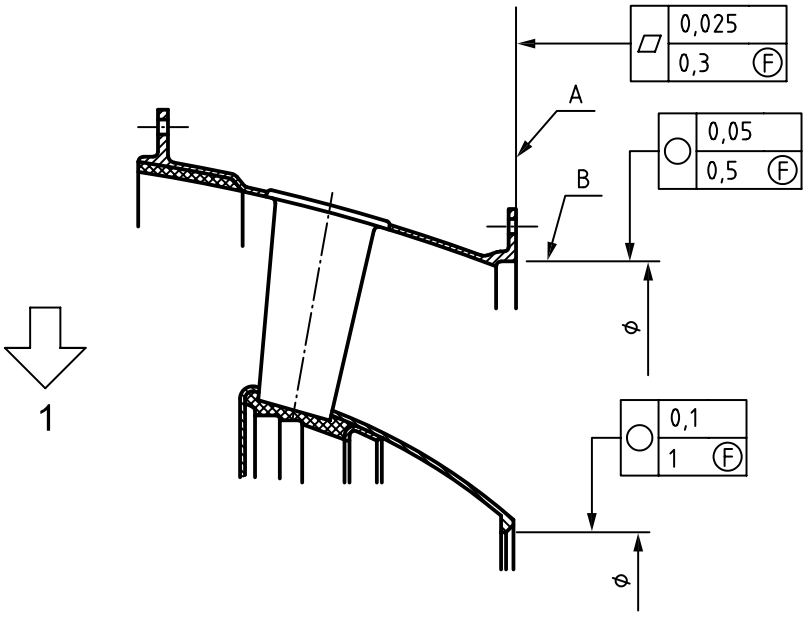
d) dimensional tolerances allowed in the free state, with the modifying symbol Ⓕ after the dimensional tolerance;

e) the conditions under which the geometrical tolerance under free state is achieved, such as direction of gravity, orientation of the part, etc.

Annex A
(informative)

Examples of indication and interpretation

Indication on the drawing	Interpretation
 **ISO 10579-NR** Restrained condition: The surface indicated as datum A is mounted (with 64 bolts M6 tightened to a torque of 9 N·m to 15 N·m) and the feature indicated as datum B is restrained at the corresponding mating size.	The geometrical and dimensional tolerance, followed by the symbol Ⓕ, shall be ensured in the free state. Other tolerances apply under the conditions indicated in the note.

Indication on the drawing	Interpretation
 **ISO 10579-NR** **Key** 1 direction of gravity Restrained condition: The surface indicated as surface A is mounted (with 120 bolts M20 tightened to a torque of 18 N·m to 20 N·m) and the feature indicated as surface B is restrained at the corresponding mating size.	The geometrical tolerance, followed by the symbol Ⓕ, shall be ensured in the free state. Other tolerances apply under the conditions indicated in the note.

Annex B
(informative)

Relation to the GPS matrix model

B.1 General

For full details about the GPS matrix model, see ISO/TR 14638[4].

B.2 Information about this standard and its use

This International Standard gives rules for dimensioning and tolerancing non-rigid parts where restraining of features is required during verification of dimensions and tolerances specified on a drawing.

B.3 Position in the GPS matrix model

This International Standard is a geometrical product specification (GPS) standard and is to be regarded as a global GPS standard (see ISO/TR 14638). It influences chain links 1, 2 and 3 of the chain of standards on form of line independent of datum, form of line dependent on datum, form of surface independent of datum, form of surface dependent on datum, orientation, location, circular run-out and total run-out in the general GPS matrix, as graphically illustrated in Figure B.1.

	Global GPS standards						
	General GPS standards						
	Chain link number	**1**	**2**	**3**	**4**	**5**	**6**
	Size						
	Distance						
	Radius						
	Angle						
Fundamental GPS standards	Form of line independent of datum	**X**	**X**	**X**			
	Form of line dependent on datum	**X**	**X**	**X**			
	Form of surface independent of datum	**X**	**X**	**X**			
	Form of surface dependent on datum	**X**	**X**	**X**			
	Orientation	**X**	**X**	**X**			
	Location	**X**	**X**	**X**			
	Circular run-out	**X**	**X**	**X**			
	Total run-out	**X**	**X**	**X**			
	Datums						
	Roughness profile						
	Waviness profile						
	Primary profile						
	Surface imperfections						
	Edges						

Figure B.1 — Position in the GPS matrix model

B.4 Related standards

The related standards are those of the chains of standards indicated in Figure B.1.

Bibliography

[1] ISO 2692:2006, *Geometrical product specifications (GPS) — Geometrical tolerancing — Maximum material requirement (MMR), least material requirement (LMR) and reciprocity requirement (RPR)*

[2] ISO 5458:1998, *Geometrical Product Specifications (GPS) — Geometrical tolerancing — Positional tolerancing*

[3] ISO 5459:1981, *Geometrical product specifications (GPS) — Geometrical tolerancing — Datums and datum-systems*

[4] ISO/TR 14638, *Geometrical product specification (GPS) — Masterplan*

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