# ISO 14978:2018 (E)

## Geometrical product specifications (GPS) — General concepts and requirements for GPS measuring equipment

# Contents


Foreword

Introduction

1 Scope

2 Normative references

3 Terms and definitions

3.1 ISO/IEC Guide 99:2007 terms
3.2 Synonym terms to ISO/IEC Guide 99:2007 terms
3.3 ISO/IEC Guide 98-4:2012 terms
3.4 ISO 14253-5:2015 terms
3.5 Terms related to GPS measuring equipment

4 Abbreviations

5 Design characteristics

5.1 General
5.1.1 Importance of design characteristics
5.1.2 Standards for measuring equipment
5.1.3 Measuring equipment — Commerce
5.1.4 Measuring equipment — Internal use in a company
5.2 Design characteristics for indicating measuring instruments
5.3 Design characteristics for material measures

6 Metrological characteristics

6.1 General
6.1.1 Importance of metrological characteristics
6.1.2 Standards for measuring equipment
6.1.3 Identification, definition and choice of metrological characteristics
6.1.4 Calibration and verification of measuring equipment
6.1.5 Calibration and verification methods
6.1.5.1 General
6.1.5.2 Definition of indication and error of indication
6.1.5.3 Rated operating conditions
6.1.5.3.1 General
6.1.5.3.2 Temperature
6.1.5.3.3 Reasonably skilled user
6.1.5.4 Number of test points in verification testing
6.1.6 Measuring equipment — Commerce
6.1.7 Measuring equipment — Internal use in a company
6.2 Indicating measuring instruments
6.2.1 General
6.2.2 Scale interval — Resolution
6.2.2.1 General
6.2.2.2 Scale interval
6.2.2.3 Resolution of reading
6.2.3 Digital step
6.2.4 Error of indication
6.2.4.1 General
6.2.4.2 Error of indication of length
6.2.4.3 Error of indication of form

6.2.4.4 Error of indication of orientation
6.2.4.5 Repeatability
6.2.4.6 Hysteresis
6.2.5 Temperature-related metrological characteristics
6.2.6 Characteristics related to measuring force
6.2.7 Geometry of contact element
6.2.8 Auxiliary equipment
6.3 Material measures
6.3.1 General
6.3.2 Scale interval — Resolution of reading
6.3.2.1 General
6.3.2.2 Scale interval
6.3.2.3 Resolution of reading
6.3.3 Form of feature characteristics
6.3.4 Orientation of feature characteristics
6.3.5 Temperature-related metrological characteristics
6.3.6 Geometrical stability
6.3.7 Other possible metrological characteristics

7 Specification and presentation of metrological characteristics

7.1 General
7.2 Specification of metrological characteristics
7.2.1 General
7.2.2 Constant value MPE function
7.2.3 Proportional value MPE function
7.2.4 Proportional and maximum value MPE function
7.3 Presentation of characteristic curves
7.3.1 General
7.3.2 Presentation of characteristic curves – Reference point

8 Calibration of metrological characteristics

8.1 Manufacturer and supplier of measuring equipment
8.2 User of measuring equipment
8.3 Measurement uncertainty

9 Marking

10 GPS standards for specific measuring equipment

Annex A (normative) General minimum requirements and guidance for clauses in GPS standards for specific measuring equipment

Annex B (informative) Data sheet for measuring equipment requirements

B.1 Explanation
B.2 Contents of a data sheet

Annex C (normative) Common design characteristics

C.1 General
C.2 Protection for field use
C.3 Measuring elements
C.4 Zero adjustment
C.5 Locking mechanisms
C.6 Types of indicating devices
C.6.1 General
C.6.2 Vernier scale
C.6.2.1 General
C.6.2.2 Main scale and vernier scale
C.6.2.3 Design of vernier scale
C.6.2.4 Scale surfaces
C.6.3 Circular scale
C.6.4 Digital indicating devices with mechanical digital display
C.6.5 Digital indicating devices with electronic digital display
C.6.5.1 General
C.6.5.2 Interface

C.6.5.3 Error messages
C.6.5.4 Battery life
C.6.5.5 Additional functions

Annex D (informative) Test uncertainty

D.1 General
D.2 Generally included — Reference standard
D.3 Generally not included
D.4 Rated operating condition — Interval
D.5 Rated operating condition — Exact value
D.6 User influences
D.7 User-provided quantity values

Annex E (informative) Relation to the GPS matrix model

E.1 General
E.2 Information about this document and its use
E.3 Position in the GPS matrix model
E.4 Related standards

Page count: 43