ISO 4156-3:2021 (E)

Straight cylindrical involute splines — Metric module, side fit — Part 3: Inspection

Contents

Foreword

Introduction

1 Scope

2 Normative references

3 Terms and definitions

4 Symbols and abbreviated terms

5 Reference conditions

6 Quality features

6.1 General
6.2 Size
6.2.1 Actual size
6.2.2 Effective size
6.3 Location
6.4 Form

7 Methods of inspection

7.1 Size
7.1.1 General methods
7.1.2 Choice of measuring instrument
7.1.3 Actual size
7.1.3.1 Dimensions over and between balls
7.1.3.2 Dimensions over and between pins
7.1.3.3 NO GO sector gauge
7.1.3.4 Span size over k teeth
7.1.3.5 Variable sector gauge
7.1.4 Effective size
7.1.4.1 GO composite gauge
7.1.4.2 Variable composite gauge
7.1.4.3 NO GO composite gauge
7.1.4.4 Inspection of diameter at tooth tip (Dii or Dee)
7.2 Location
7.2.1 General
7.2.2 Choice of the method of inspection of location
7.2.3 Effective axis using mating part
7.2.4 Actual pitch cylinder axis
7.2.5 Calculation with Fourier analysis
7.2.6 Spline clamping system
7.3 Form

8 Measurements with balls or pins

8.1 General
8.2 Selection of balls or pins
8.3 Use and marking of pins
8.4 Statistical actual tolerance limit LSTA
8.4.1 General
8.4.2 Acceptance of parts according to the statistical actual tolerance limit LSTA

8.4.3 Examples
8.5 Calculation of ball or pin diameter (DRe or DRi)
8.5.1 External spline
8.5.2 Internal spline
8.6 Calculation of dimensions for ball or pin inspection (part and gauge inspection)
8.6.1 Exact calculation
8.6.1.1 Measurement over two balls or pins — External splines (MRe)
8.6.1.2 Measurement between two pins — Internal splines (MRi)
8.6.2 Approximation factor
8.6.2.1 General
8.6.2.2 Calculation of the approximation factor Ke
8.6.2.3 Calculation of the approximation factor Ki

9 Measurement over k teeth — External splines (W)

9.1 Calculation of W
9.2 Choice of k

10 Gauges

10.1 Generalities
10.1.1 Conditions of use of gauges
10.1.1.1 GO gauge
10.1.1.2 NO GO sector gauge
10.1.1.3 NO GO composite gauge
10.1.2 Limiting dimensions of use for gauges
10.1.3 Handles of spline gauges
10.1.4 Number of teeth for sector NO GO gauges
10.2 Length of measuring part of gauges
10.2.1 Influence of the active spline length and of the length of engagement
10.2.2 GO or NO GO gauges
10.2.3 Master plug gauges
10.2.4 Spline gauges of pitch diameters D > 180 mm
10.3 Manufacturing tolerances for spline gauges
10.4 Values of deviation allowances of spline gauges
10.5 Inspection of gauges
10.5.1 Damage
10.5.2 Marking
10.5.3 Major diameter of plug gauges and minor diameter of ring gauges
10.5.4 Form diameter
10.5.5 Tooth thickness of plug gauges
10.5.6 Space width of ring gauges
10.5.7 Form deviations
10.5.8 Gauge wear inspection
10.5.9 Inspection certificates
10.6 Dimensions, designation and marking of gauges
10.6.1 Inspection of external splines
10.6.1.1 GO composite ring gauge
10.6.1.2 Tapered tooth master plug gauge for GO composite ring gauge
10.6.1.3 NO GO sector ring gauge
10.6.1.4 Tapered tooth master plug gauge for NO GO sector ring gauge
10.6.1.5 NO GO composite ring gauge
10.6.1.6 Tapered tooth master plug gauge for NO GO composite ring gauge
10.6.2 Inspection of internal splines
10.6.2.1 GO composite plug gauge
10.6.2.2 NO GO sector plug gauge
10.6.2.3 NO GO composite plug gauge
10.6.3 Inspection with plain gauges for internal and external splines
10.6.3.1 General
10.6.3.2 Inspection of minor diameter — Internal spline
10.6.3.3 Inspection of major diameter — External spline
10.6.4 Marking of gauges

11 Measurement of spline deviations

11.1 General
11.2 Total profile deviation Fα

11.3 Total pitch deviation Fp
11.4 Total helix deviation Fβ

Annex A (informative) Influences of eccentricity and pitch deviation as explained in ISO 4156:1981

Page count: 47