



SLOVENSKI STANDARD
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Železniška vozila na splošno - Metod za določanje ekvivalentne koničnosti

Railway applications - Method for determining the equivalent conicity

Bahnanwendungen - Methode zur Bestimmung der äquivalenten Konizität

Applications ferroviaires - Méthode de détermination de la conicité équivalente

Ta slovenski standard je istoveten z: EN 15302:2008

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Railway applications - Method for determining the equivalent conicity

Applications ferroviaires - Méthode de détermination de la conicité équivalente

Bahnanwendungen - Verfahren zur Bestimmung der äquivalenten Konizität

This European Standard was approved by CEN on 7 February 2008.

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Contents

Page

Foreword.....	9
Introduction	10
1 Scope	13
2 Normative references	13
3 Symbols	14
4 Principle of determining the equivalent conicity.....	15
4.1 Integration of the equation of the wheelset movement of a conical profile	15
4.2 Determining the wavelength of a conical profile.....	16
4.3 Definition of equivalent conicity for nonlinear profiles	17
5 Description of the reference procedure	17
5.1 General principles.....	17
5.2 Determining the wheel and rail profiles	18
5.2.1 Principles of measurement.....	18
5.2.2 Accuracy of the measuring system	18
5.3 Determining the rolling radius difference function Δr	18
5.4 Determining the equivalent conicity.....	19
6 Benchmark calculation	19
6.1 Overview	19
6.2 Validation of evaluation method	19
Annex A (informative) Example of presentation of Δr function and conicity	21
Annex B (informative) Example of method for determining the equivalent conicity by integration of the nonlinear differential equation	22
B.1 Principle.....	22
B.2 Steps of the procedure.....	25
B.3 Special cases	26
Annex C (informative) Example of method for determining the equivalent conicity by linear regression of the Δr function	28
C.1 Principles.....	28
C.2 Steps of the procedure.....	28
C.3 Particularities	28
Annex D (normative) Reference profiles.....	29
D.1 Wheel A.....	29
D.1.1 Drawing.....	29
D.1.2 Analytic definition.....	29
D.1.3 Cartesian coordinates	30
D.2 Wheel B.....	31
D.2.1 Drawing.....	31
D.2.2 Analytic definition.....	31
D.2.3 Cartesian coordinates	32
D.3 Wheel H.....	33
D.3.1 Drawing.....	33
D.3.2 Analytic definition.....	33
D.3.3 Cartesian coordinates	34
D.4 Wheel I	35
D.4.1 Drawing.....	35
D.4.2 Analytic definition.....	35

D.4.3	Cartesian coordinates	36
D.5	Rail A.....	37
D.5.1	Drawing.....	37
D.5.2	Analytic definition	37
D.5.3	Cartesian coordinates.....	38
Annex E	(normative) Calculation results with reference profiles	39
E.1	Wheel A / Rail A	40
E.1.1	Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points	40
E.1.2	Representation of the curves of kinematic rolling movement of the wheelset on track	41
E.1.3	Numerical values for Δr function	42
E.1.4	Numerical values for $\tan \gamma_e$ function	43
E.2	Wheel B / Rail A	44
E.2.1	Diagram Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points	44
E.2.2	Representation of the curves of kinematic rolling movement of the wheelset on track	45
E.2.3	Numerical values for Δr function	46
E.2.4	Numerical values for $\tan \gamma_e$ function	47
E.3	Wheel H / Rail A	48
E.3.1	Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points	48
E.3.2	Representation of the curves of kinematic rolling movement of the wheelset on track	49
E.3.3	Numerical values for Δr function	50
E.3.4	Numerical values for $\tan \gamma_e$ function	51
E.4	Wheel I / Rail A.....	52
E.4.1	Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points	52
E.4.2	Representation of the curves of kinematic rolling movement of the wheelset on track	53
E.4.3	Numerical values for Δr function	54
E.4.4	Numerical values for $\tan \gamma_e$ function	55
E.5	Modified Wheel A (-2 mm on left wheel diameter) / Rail A	56
E.5.1	Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points	56
E.5.2	Representation of the curves of kinematic rolling movement of the wheelset on track	57
E.5.3	Numerical values for Δr function	58
E.5.4	Numerical values for $\tan \gamma_e$ function	59
E.6	Modified Wheel B (-2 mm on left wheel diameter) / Rail A	60
E.6.1	Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points	60
E.6.2	Representation of the curves of kinematic rolling movement of the wheelset on track	61
E.6.3	Numerical values for Δr function	62
E.6.4	Numerical values for $\tan \gamma_e$ function	63
E.7	Modified Wheel H (-2 mm on left wheel diameter) / Rail A	64
E.7.1	Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points	64
E.7.2	Representation of the curves of kinematic rolling movement of the wheelset on track	65
E.7.3	Numerical values for Δr function	66
E.7.4	Numerical values for $\tan \gamma_e$ function	67
E.8	Modified Wheel I (-2 mm on left wheel diameter) / Rail A.....	67
E.8.1	Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points	67
E.8.2	Representation of the curves of kinematic rolling movement of the wheelset on track	69
E.8.3	Numerical values for Δr function	70
E.8.4	Numerical values for $\tan \gamma_e$ function	71
E.9	(Right Wheel A – Left Wheel B) / Rail A.....	72
E.9.1	Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points	72
E.9.2	Representation of the curves of kinematic rolling movement of the wheelset on track	73
E.9.3	Numerical values for Δr function	74
E.9.4	Numerical values for $\tan \gamma_e$ function	75
Annex F	(normative) Tolerances on equivalent conicity	76
F.1	Wheel A / Rail A	77

F.1.1	Diagram.....	77
F.1.2	Numerical values	78
F.2	Wheel B / Rail A.....	80
F.2.1	Diagram.....	80
F.2.2	Numerical values	81
F.3	Wheel H / Rail A.....	83
F.3.1	Diagram.....	83
F.3.2	Numerical values	84
F.4	Wheel I / Rail A	86
F.4.1	Diagram.....	86
F.4.2	Numerical values	87
F.5	Modified Wheel A (-2 mm on left wheel diameter) / Rail A	89
F.5.1	Diagram.....	89
F.5.2	Numerical values	90
F.6	Modified Wheel B (-2 mm on left wheel diameter) / Rail A	92
F.6.1	Diagram.....	92
F.6.2	Numerical values	93
F.7	Modified Wheel H (-2 mm on left wheel diameter) / Rail A	95
F.7.1	Diagram.....	95
F.7.2	Numerical values	96
F.8	Modified Wheel I (-2 mm on left wheel diameter) / Rail A	98
F.8.1	Diagram.....	98
F.8.2	Numerical values	99
F.9	(Right Wheel A – Left Wheel B) / Rail A.....	101
F.9.1	Diagram.....	101
F.9.2	Numerical values	102
Annex G	(informative) Examples of calculation results with introduced errors.....	104
G.1	Wheel A / Rail A – Random error in mm	104
G.2	Wheel A / Rail A — Random error in mm	105
G.3	Wheel A / Rail A — Random error in mm	106
G.4	Wheel A / Rail A — Grid error in mm	107
G.5	Wheel A / Rail A — Grid error in mm	108
G.6	Wheel A / Rail A — Grid error in mm	109
G.7	Wheel H / Rail A — Random error in mm	110
Annex H	(informative) Guideline for application of errors	111
H.1	Grid error	111
H.2	Random error	113
Annex I	(informative) Guidelines for application	115
Annex ZA	(informative) Relationship between this European Standard and the Essential Requirements of EU Directive Council Directive 96/48/EC as amended by 2004/50/EC	117
Bibliography	119

Figures

Figure 1	— Benchmark process, Step 1	11
Figure 2	— Benchmark process, Step 2	11
Figure 3	— Benchmark process, Step 3	12
Figure 4	— Dimensions on the wheelset.....	15
Figure 5	— $y = f(x)$ function	16
Figure A.1	— $\Delta r = f(y)$ function and $\tan \gamma_e = f(y)$	21
Figure B.1	— Representation of dx, dy	22

Figure B.2 — Representation of $ds, d\psi$	22
Figure B.3 — Representation of r_1, r_2, e	23
Figure B.4 — $\Delta r = f(y)$ characteristic with negative slope	26
Figure B.5 — Calculation of $\int \Delta r dy$ integral	26
Figure B.6 — Determination of y_{em} , calculation of $\int \Delta r dy$ and determination of \hat{y}	27
Figure B.7 — Determination of $y_{emin} = f(\hat{y})$ and $y_{emax} = f(\hat{y})$ functions	27
Figure B.8 — Determination of C constant	27
Figure D.1 — Wheel A	29
Figure D.2 — Wheel B	31
Figure D.3 — Wheel H	33
Figure D.4 — Wheel I	35
Figure D.5 — Rail A	37
Figure E.1a — Diagram of $\Delta r, \tan \gamma_a, \tan \gamma_e$ functions and representation of contact points — Wheel A / Rail A	40
Figure E.1b — Representation of the curves of kinematic rolling movement of the wheelset on track — Wheel A / Rail A	41
Figure E.2a — Diagram $\Delta r, \tan \gamma_a, \tan \gamma_e$ functions and representation of contact points — Wheel B / Rail A	44
Figure E.2b — Representation of the curves of kinematic rolling movement of the wheelset on track — Wheel B / Rail A	45
Figure E.3a — Diagram of $\Delta r, \tan \gamma_a, \tan \gamma_e$ functions and representation of contact points — Wheel H / Rail A	48
Figure E.3b — Representation of the curves of kinematic rolling movement of the wheelset on track — Wheel H / Rail A	49
Figure E.4a — Diagram of $\Delta r, \tan \gamma_a, \tan \gamma_e$ functions and representation of contact points — Wheel I / Rail A	52
Figure E.4b — Representation of the curves of kinematic rolling movement of the wheelset on track — Wheel I / Rail A	53
Figure E.5a — Diagram of $\Delta r, \tan \gamma_a, \tan \gamma_e$ functions and representation of contact points — Modified Wheel A / Rail A	56
Figure E.5b — Representation of the curves of kinematic rolling movement of the wheelset on track — Modified Wheel A / Rail A	57
Figure E.6a — Diagram of $\Delta r, \tan \gamma_a, \tan \gamma_e$ functions and representation of contact points — Modified Wheel B / Rail A	60
Figure E.6b — Representation of the curves of kinematic rolling movement of the wheelset on track — Modified Wheel B / Rail A	61
Figure E.7a — Diagram of $\Delta r, \tan \gamma_a, \tan \gamma_e$ functions and representation of contact points — Modified Wheel H / Rail A	64
Figure E.7b — Representation of the curves of kinematic rolling movement of the wheelset on track — Modified Wheel H / Rail A	65

Figure E.8a — Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points — Modified Wheel I / Rail A68

Figure E.8b — Representation of the curves of kinematic rolling movement of the wheelset on track — Modified Wheel I / Rail A69

Figure E.9a — Diagram of Δr , $\tan \gamma_a$, $\tan \gamma_e$ functions and representation of contact points — (Right Wheel A – Left Wheel B) / Rail A72

Figure E.9b — Representation of the curves of kinematic rolling movement of the wheelset on track — (Right Wheel A – Left Wheel B) / Rail A73

Figure F.1 — Diagram Wheel A / Rail A77

Figure F.2 — Diagram Wheel B / Rail A80

Figure F.3 — Diagram Wheel H / Rail A83

Figure F.4 — Diagram Wheel I / Rail A86

Figure F.5 — Diagram modified Wheel A / Rail A89

Figure F.6 — Diagram modified Wheel B / Rail A92

Figure F.7 — Diagram modified Wheel H / Rail A95

Figure F.8 — Diagram modified Wheel I / Rail A98

Figure F.9 — Diagram (Right Wheel A — Left Wheel B) / Rail A101

Figure G.1 — Wheel A / Rail A — Random error in mm104

Figure G.2 — Wheel A / Rail A — Random error in mm105

Figure G.3 — Wheel A / Rail A — Random error in mm106

Figure G.4 — Wheel A / Rail A — Grid error in mm107

Figure G.5 — Wheel A / Rail A — Grid error in mm108

Figure G.6 — Wheel A / Rail A — Grid error in mm109

Figure G.7 — Wheel H / Rail A — Random error in mm110

Figure H.1 — Transformation of the point $P(x, y)$ to grid with grid widths $\Delta y, \Delta z$ 111

Figure H.2 — Grid transformation with grid widths of 0,5 mm112

Figure H.3 — Variation of the grid origin112

Figure H.4 — 50 variants of grid origins113

Figure H.5 — Random error of measuring points114

Tables

Table D.1 — Wheel profile: R-UIC 519-A — Right wheel30

Table D.2 — Wheel profile: R-UIC 519-B — Right wheel32

Table D.3 — Wheel profile: R-UIC 519-H — Right wheel34

Table D.4 — Wheel profile: R-UIC 519-I — Right wheel36

Table D.5 — Rail profile: S-UIC 519-A — Right rail38

Table E.1a — Contact geometry wheel / rail: $\Delta r = f(y)$ — Wheel profile: R-UIC 519-A — Rail Profile: S-UIC 519-A42

Table E.1b — Contact geometry wheel / rail: Conicity — Wheel profile: R-UIC 519-A — Rail profile: S-UIC 519-A43

Table E.2a — Contact geometry wheel / rail: $\Delta r = f(y)$ — Wheel profile: R-UIC 519-B — Rail profile: S-UIC 519-A	46
Table E.2b — Contact geometry wheel / rail: Conicity — Wheel profile: R-UIC 519-B — Rail profile: S-UIC 519-A	47
Table E.3a — Contact geometry wheel / rail: $\Delta r = f(y)$ — Wheel profile: R-UIC 519-H — Rail profile: S-UIC 519-A	50
Table E.3b — Contact geometry wheel / rail: Conicity — Wheel profile: R-UIC 519-H — Rail profile: S-UIC 519-A	51
Table E.4a — Contact geometry wheel / rail: $\Delta r = f(y)$ — Wheel profile: R-UIC 519-I — Rail profile: S-UIC 519-A	54
Table E.4b — Contact geometry wheel / rail: Conicity — Wheel profile: R-UIC 519-I — Rail profile: S-UIC 519-A	55
Table E.5a — Contact geometry wheel / rail: $\Delta r = f(y)$ — Diameter difference of 2 mm — Wheel profile: R-UIC 519-A — Rail profile: S-UIC 519-A	58
Table E.5b — Contact geometry wheel / rail: Conicity — Diameter difference of 2 mm — Wheel profile: R-UIC 519-A — Rail profile: S-UIC 519-A	59
Table E.6a — Contact geometry wheel / rail: $\Delta r = f(y)$ — Diameter difference of 2 mm — Wheel profile: R-UIC 519-B — Rail profile: S-UIC 519-A	62
Table E.6b — Contact geometry wheel / rail: Conicity — Diameter difference of 2 mm — Wheel profile: R-UIC 519-B — Rail profile: S-UIC 519-A	63
Table E.7a — Contact geometry wheel / rail: $\Delta r = f(y)$ — Diameter difference of 2 mm — Wheel profile: R-UIC 519-H — Rail profile: S-UIC 519-A	66
Table E.7b — Contact geometry wheel / rail: Conicity — Diameter difference of 2 mm — Wheel profile: R-UIC 519-H — Rail profile: S-UIC 519-A	67
Table E.8a — Contact geometry wheel / rail: $\Delta r = f(y)$ — Diameter difference of 2 mm — Wheel profile: R-UIC 519-I — Rail profile: S-UIC 519-A	70
Table E.8b — Contact geometry wheel / rail: Conicity — Diameter difference of 2 mm — Wheel profile: R-UIC 519-I — Rail profile: S-UIC 519-A	71
Table E.9a — Contact geometry wheel / rail: $\Delta r = f(y)$ — Wheel profile: right wheel R-UIC519-A / left wheel R-UIC 519-B — Rail profile: S-UIC 519-A	74
Table E.9b — Contact geometry wheel / rail: Conicity — Wheel profile: right wheel R-UIC 519-A / left wheel R-UIC 519-B — Rail profile: S-UIC 519-A	75
Table F.1 — Benchmark calculations: Tolerances — Wheel profile: R-UIC 519-A — Rail profile: S-UIC 519-A	78
Table F.2 — Benchmark calculations: Tolerances — Wheel profile: R-UIC 519-B — Rail profile: S-UIC 519-A	81
Table F.3 — Benchmark calculations: Tolerances — Wheel profile: R-UIC 519-H — Rail profile: S-UIC 519-A	84
Table F.4 — Benchmark calculations: Tolerances — Wheel profile: R-UIC 519-I — Rail profile: S-UIC 519-A	87
Table F.5 — Benchmark calculations: Tolerances — Wheel profile: R-UIC 519-A — Diameter difference of 2 mm — Rail profile: S-UIC 519-A	90
Table F.6 — Benchmark calculations: Tolerances — Wheel profile: R-UIC 519-B — Diameter difference of 2 mm — Rail profile: S-UIC 519-A	93
Table F.7 — Benchmark calculations: Tolerances — Wheel profile: R-UIC 519-H — Diameter difference of 2 mm — Rail profile: S-UIC 519-A	96

Table F.8 — Benchmark calculations: Tolerances — Wheel profile: R-UIC 519-I — Diameter difference of 2 mm — Rail profile: S-UIC 519-A.....	99
Table F.9 — Benchmark calculations: Tolerances — Wheel profile: right wheel R-UIC 519-A / left wheel R-UIC 519-B — Rail profile: S-UIC 519-A.....	102
Table I.1 — Combinations of profiles and their applications	116
Table ZA.1 — Correspondence between this European Standard and Directives: Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system Directive 2004/50/EC of the European parliament and of the Council of 29 April 2004 amending Council Directive 96/48/EC	118

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Foreword

This document (EN 15302:2008) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2008, and conflicting national standards shall be withdrawn at the latest by September 2008.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 96/48 of 23 July 1996 as amended by 2004/50/EC.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

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

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Introduction

This European Standard is based on the UIC Code 519 OR submitted to CEN by the International Union of Railways (UIC) and which has been revised by CEN/TC 256/WG 10 "Vehicle/Track Interaction".

The contact geometry is fundamental to explain the dynamic running behaviour of a railway vehicle. Among the parameters by which the dynamic behaviour of a rail vehicle is characterised, the conicity plays an essential role since it allows the satisfactory appreciation of the wheel-rail contact on tangent track and on very large-radius curves (when operated with low cant deficiencies). A wheelset with conical profiles describes a waveform while running on a track. Klingel's theory states that the wavelength depends on the cone angle of the wheel profile and the distance between contact patches.

For practical wheel profiles with changing cone angles along the profile it is possible to evaluate the wavelength of the wheelsets movement by integration of the function of rolling radius difference depending on the lateral movement of the wheelset on the track. Equivalent conicity is evaluated by comparison of this wavelength with the one evaluated according to Klingel's theory.

It is necessary to have a clear procedure for the evaluation of equivalent conicity, which is used in European and national standards and documents (legal and technical).

The results need to be consistent. However it is possible to use different evaluation procedures to those given in this European Standard, provided that the procedure used leads to the determination of an equivalent conicity in accordance with the calculation results using reference profiles specified in Annex E.

To confirm whether an alternative evaluation procedure can achieve the results specified in this European Standard, three aspects of the process need to be evaluated in a benchmark process given in this European Standard and outlined below in Steps 1, 2 and 3.

In Step 1, tables of reference profiles in Annex D are applied to the interpolation and calculation algorithm which allows the location of the contact points in order to calculate the rolling radius difference as a function of the lateral position of the wheelset. Starting from this function the equivalent conicity is calculated as a function of the amplitude of the oscillation. A comparison of the achieved results with the reference results in Annex E and a defined field of allowed tolerances in Annex F determine the acceptance or rejection of the assessed evaluation procedure (see Figure 1).

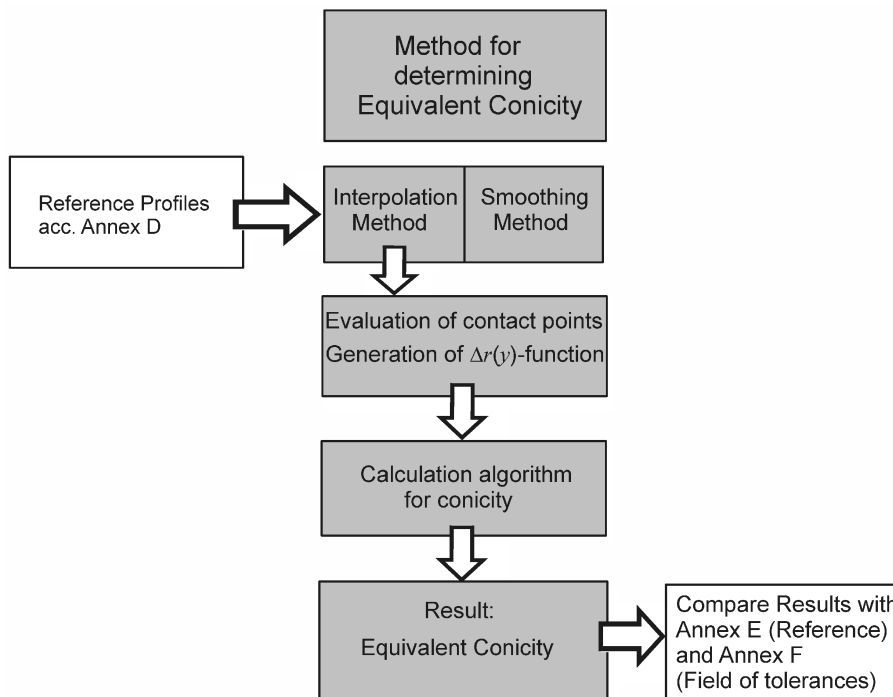


Figure 1 — Benchmark process, Step 1

In Step 2, random errors given in Annex G are added to the reference profiles in Annex D and are applied to the smoothing and interpolation algorithm. A comparison of the achieved results with the reference results including the field of tolerances in Annex F allows the assessment of the evaluation procedure (see Figure 2).

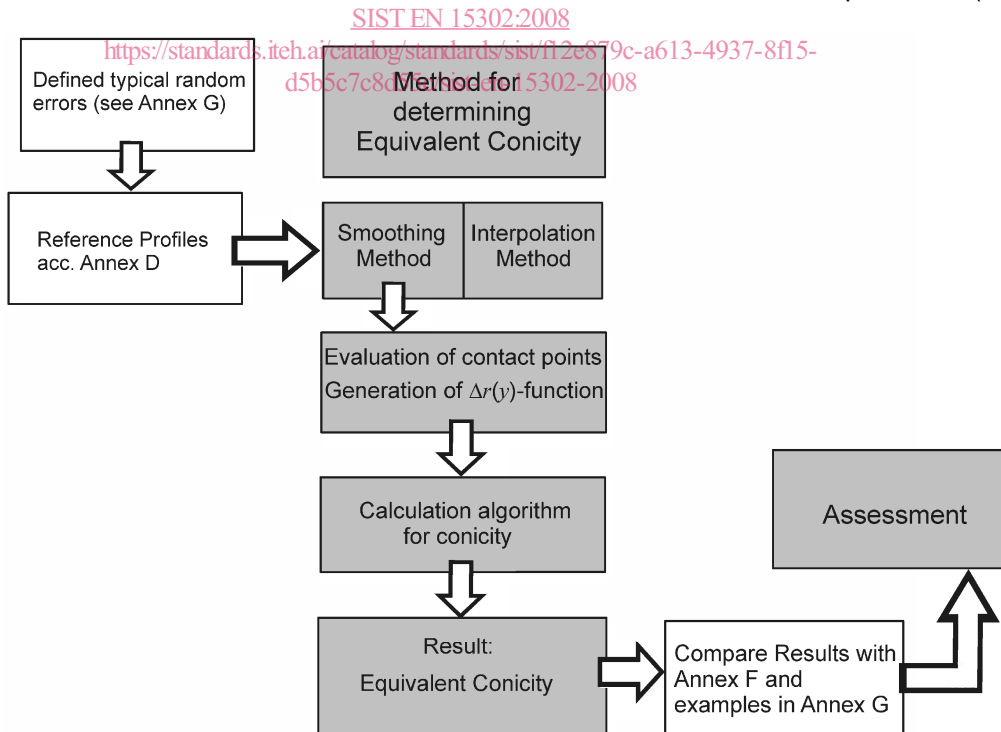
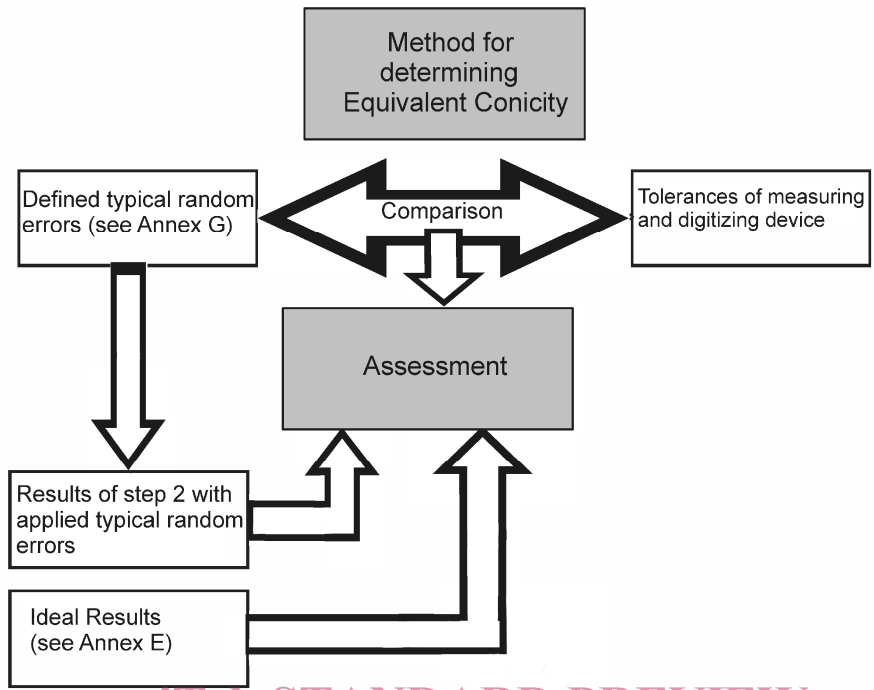


Figure 2 — Benchmark process, Step 2

In Step 3, the tolerances of the measuring system used are compared with the random errors applied in Step 2 in order to assess their influence on the results.



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Figure 3 – Benchmark process, Step 3

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1 Scope

This European Standard establishes an evaluation procedure for determining equivalent conicity. A benchmark calculation is specified to achieve comparable results on a consistent basis for the equivalent conicity, which may be calculated by different methods not given in this European Standard. This European Standard also proposes possible calculation methods. Informative examples of the use of the Klingel formula (see Annex B) and linear regression of the Δr -function (see Annex C) are included in this European Standard.

This European Standard includes reference profiles, profile combinations, tolerances and reference results with tolerance limits, which allow the user to assess the acceptability of a measuring and calculation system including random- and grid- errors of the measuring system. It sets down the principles of calculation that need to be followed but does not impose any particular numerical calculation method.

This European Standard does not define limits for the equivalent conicity and gives no tolerances for the rail profile and the wheel profile to achieve acceptable results for the conicity.

For purposes outside the scope of this European Standard (e.g. simulation of vehicle behaviour) it can be useful or necessary to use more sophisticated theories. These methods are not within the scope of this European Standard.

For the application of this European Standard some general recommendations are given in Annex I.

2 Normative references

The following referenced document is 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.

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