

INTERNATIONAL STANDARD



**Household and similar electrical appliances – Test code for the determination
of airborne acoustical noise –
Part 3: Procedure for determining and verifying declared noise emission values**

Document Preview

IEC 60704-3:2019

<https://standards.iteh.ai/catalog/standards/iec/a7c6f157-577f-4d13-bc5f-9490ee7a21e3/iec-60704-3-2019>



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2019 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

[IEC 60704-3:2019](http://standards.iteh.ai/catalog/standards/iec/a7c6f157-577f-4d13-bc5f-9490ee7a21e3/iec-60704-3-2019)

<https://standards.iteh.ai/catalog/standards/iec/a7c6f157-577f-4d13-bc5f-9490ee7a21e3/iec-60704-3-2019>



IEC 60704-3

Edition 3.0 2019-05
REDLINE VERSION

INTERNATIONAL STANDARD



**Household and similar electrical appliances – Test code for the determination
of airborne acoustical noise –
Part 3: Procedure for determining and verifying declared noise emission values**

Document Preview

[IEC 60704-3:2019](#)

<https://standards.iteh.ai/catalog/standards/iec/a7c6f157-577f-4d13-bc5f-9490ee7a21e3/iec-60704-3-2019>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 17.140.20; 97.030

ISBN 978-2-8322-7027-1

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms, definitions and calculations.....	6
3.1 Terms and definitions.....	6
3.2 Calculations	12
4 General	13
4.1 Test method.....	13
4.2 Values and symbols	13
4.3 Reference standard deviation	14
5 Verification of declared noise emission values.....	14
5.1 Basis of the procedure	14
5.2 Verification procedure	14
6 Determination of noise emission values for declaration.....	15
6.1 Basis of the procedure	15
6.2 Determination procedure.....	15
6.3 Presentation of noise emission values	15
Annex A (normative) Noise emission of household appliances – Standard deviations	16
Annex B (informative) Verification of noise emission values – Examples.....	17
B.1 Example 1.....	17
B.2 Example 2.....	17
Annex C (informative) Determination of noise emission values – Examples	18
C.1 Example 1.....	18
C.2 Example 2.....	18
C.3 Example 3.....	19
Bibliography.....	21
Figure 1 – Quantile of the standardized distribution	14
Table A.1 – Standard deviation	16
Table C.1 – Calculated noise emission values as a function of the total standard deviation σ_t and the probability of acceptance P_a as assumed by the labeller	18

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –
TEST CODE FOR THE DETERMINATION OF AIRBORNE
ACOUSTICAL NOISE –****Part 3: Procedure for determining and verifying
declared noise emission values**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60704-3 has been prepared by IEC technical committee 59: Performance of household electrical appliances.

IEC 60704-1:2010 has served as a basis for the elaboration of this standard.

This third edition cancels and replaces the second edition published in 2006. This edition constitutes a technical revision. It includes the following significant technical changes with respect to the previous edition:

- a) in Annex A, standard deviations that are now specified for various appliance categories in the parts of IEC 60704-2 have been excluded from Table A.1;
- b) furthermore, this edition makes reference to new standards and is implementing ISO/IEC Directives, Part 2 in a more accurate manner.

Standard deviations specified in part 2 documents of the IEC 60704 series supersede the values given in Table A.1.

The text of this International Standard is based on the following documents:

CDV	Report on voting
59/675/CDV	59/680A/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

This International Standard is to be used in conjunction with IEC 60704-1:2010 and the latest edition of IEC 60704-2 (all parts).

A list of all parts in the IEC 60704 series, published under the general title *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

INTRODUCTION

~~Although the noise levels produced by household appliances are not known to present a hazard to the hearing of users or other exposed persons, and as a result no noise limits have been specified by relevant authorities responsible for health protection,~~ A comprehensive and correct declaration of noise emission ~~will be~~ is very helpful to enable the potential buyer to make a good choice between appliances of the same category (serving for the same purpose) of different makes or for different models.

In order to ensure a correct declaration of noise emission values, this part of IEC 60704 ~~prescribes~~ describes a simple method for verifying declared values and provides information for determining the noise emission values.

~~The necessary measurements are carried out according to the relevant parts of IEC 60704.~~

Different countries are implementing different market surveillance strategies. This document is not implementing a mandatory market surveillance strategy.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 60704-3:2019](#)

<https://standards.iteh.ai/catalog/standards/iec/a7c6f157-577f-4d13-bc5f-9490ee7a21e3/iec-60704-3-2019>

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – TEST CODE FOR THE DETERMINATION OF AIRBORNE ACOUSTICAL NOISE –

Part 3: Procedure for determining and verifying declared noise emission values

1 Scope

This part of IEC 60704 describes procedures for determining and verifying the declared values of the noise emitted by household and similar appliances.

It applies to all categories of household and similar electrical appliances covered by IEC 60704-1 and all parts of IEC 60704-2 ~~dealing with~~, which include particular requirements for special categories of appliances.

It applies to appliances being produced in quantity, such as in batches, series or lots, which are manufactured to the same technical specification and characterized by the same ~~labeled~~ declared value of noise emission.

This part of IEC 60704:

- considers the term "declaration" to include all means for providing information on the noise emission values to potential users (consumers) of the appliances; this includes labels, brochures, advertisements, commercial and technical information papers, etc.;
- considers the declaration for appliances manufactured by mass production, ~~with the same declared value for the lot (batch)~~;
- specifies a simple statistical method for verifying the declared values by investigating a sample of only three appliances. [IEC 60704-3:2019](http://standards.iteh.ai/catalog/standards/iec/a7c6f157-577f-4d13-bc5f-9490ee7a21e3/iec-60704-3-2019)

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 60704-1: ~~1997~~2010, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 1: General requirements*

IEC 60704-2 (all parts), *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2: Particular requirements*

ISO 3534-1: ~~1993~~2006, *Statistics – Vocabulary and symbols – Part 1: Probability and general statistical terms*

ISO 7574-4:1985, *Acoustics – Statistical methods for determining and verifying stated noise emission values of machinery and equipment – Part 4: Methods for stated values for batches of machines*

3 Terms, definitions and calculations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60704-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1.1 sound power level

L_W

ten times the logarithm to the base 10 of the ratio of the sound power of a source to the reference sound power, expressed in decibels

$$L_W = 10 \lg \frac{W}{W_0} \text{ dB}$$

Note 1 to entry: The reference sound power is 1 pW (10^{-12} W). The frequency weighting, or the midband frequency of the frequency band used, is indicated in the symbol.

Note 2 to entry: For example, the A-weighted sound power level is L_{WA} .

3.1.2 A-weighted sound power level

L_{WA}

sound power level of an appliance, ~~in decibels~~, determined according to the appropriate requirements specified in IEC 60704-1 and the relevant part of IEC 60704-2

Note 1 to entry: Henceforth, the subscript $_{WA}$ is left out for reasons of simplicity.

3.1.3 noise emission value

single value of the noise emission quantity

3.1.4 measured value

L_i

noise emission value for an individual appliance determined in accordance with the appropriate requirements of IEC 60704

3.1.5 family of appliances category of appliances

appliances of similar design or type, or intended to perform the same functions

[SOURCE: ISO 7574-1:1985, 3.5, modified – The notes have been deleted, "category of appliances" has been added as a preferred term, "machines" has been replaced by "appliances" in the term and in the definition, and "or equipment" has been deleted from the definition.]

3.1.6 declared value

L_c

value of the noise emission quantity which is rounded to the nearest decibel stated for all appliances of a complete series of production or of a batch thereof, when the appliances are new

Note 1 to entry: The declared value indicates the upper statistical value below which a specified large proportion of noise emission values of the relevant batch lies. L_c depends on the specified verification procedure, which is designed such that there is a probability of acceptance of 95 % for the batch, when no more than 6,5 % of all noise emission values exceeds L_c , and if the specified reference standard deviations σ_M equals the actual total standard deviation σ_r .

[SOURCE: ISO 7574-1:1985, 3.6, modified – The term "stated value; labelled value" has been replaced by "declared value"; the first sentence has been rephrased to "which is rounded to

the nearest decibel stated for all appliances of a complete series of production or of a batch thereof" and "when the appliances are new" has been added; the second sentence has been deleted; the fact "are new" is integrated in first sentence and notes 1 and 2 have been replaced by a Note 1 to entry.]

3.1.7

declaration

statement of the declared value, L_c , which is included in brochures, advertisements, product or commercial literature and/or affixed to an appliance or part thereof for providing information on the noise emission values to potential users (buyers, consumers) of the appliance

Note 1 to entry: The term "labeller" is used in this document for a person making declarations.

[SOURCE: ISO 7574-1:1985, 3.7, modified – The term "label" has been replaced by "declaration", "brochures, advertisements, or commercial literature" have been added, the phrase after "and/or affixed" has been replaced by "to an appliance or part thereof for providing information on the noise emission values to potential users (buyers, consumers) of the appliance" and Note 1 to entry has been added.]

3.1.8

batch of appliances

group of the same family produced in quantity, manufactured to the same technical specifications and characterized by the same declared value, L_c

Note 1 to entry: A batch may be either an entire production series or a portion thereof.

[SOURCE: ISO 7574-1:1985, 3.8, modified – The term "batch (lot) of machines" has been replaced by "batch of appliances" and the note has been transferred into Note 1 to entry.]

3.1.9

size of the batch

size of the population

N

number of items (appliances in the batch or noise emission values in the population) of the batch (or of the population)

[SOURCE: ISO 7574-1:1985, 3.9, modified – The term "size of the population" has been explicitly added as a preferred term, word "machines" is replaced by "appliances" and phrase "of the batch (or of the population)" is added.]

3.1.10

sample

one or more appliances (or measured values) randomly selected from a lot (or population)

[SOURCE: ISO 7574-1:1985, 3.10, modified – "Machines" is replaced by "appliances".]

3.1.11

size of the sample

n

number of items in the sample

[SOURCE: ISO 7574-1:1985, 3.11].

3.1.12**arithmetic mean of a batch
arithmetic mean of a population** μ

sum of the noise emission values in a batch (or in a population) divided by the size of the batch (or of the population)

$$\mu = \frac{1}{N} \sum_{i=1}^N L_i$$

[SOURCE: ISO 7574-1:1985, 3.12, modified – The term "arithmetic mean of a population" has been explicitly added and the formula has been deleted.]

3.1.13**arithmetic mean of a sample** \bar{L}

sum of the measured values, L_i , in a sample divided by the size of the sample

$$\bar{L} = \frac{1}{n} \sum_{i=1}^n L_i$$

Note 1 to entry: The arithmetic mean value of the sample, \bar{L} is used as an estimator of the mean value of a batch (or of a population), μ .

[SOURCE: ISO 7574-1:1985, 3.13, modified – The formula has been deleted and the explanation has been transferred to Note 1 to entry.]

3.1.14**standard deviation of a batch
standard deviation of a population** σ

standard deviation of the noise emission values of the batch (or of the population) ~~of the size N is given by the equation~~

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^N (L_i - \mu)^2}$$

[SOURCE: ISO 7574-1:1985, 3.14, modified – The phrase "of size N is given by the equation" and the related formula have been deleted.]

3.1.15**standard deviation of a sample** s

~~standard deviation of the sample is given by the equation~~

$$s = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (L_i - \bar{L})^2}$$

standard deviation of the noise emission values of the sample

Note 1 to entry: The standard deviation of the sample, s , is used as an estimator of the standard deviation of a batch (or of a population), σ .

[SOURCE: ISO 7574-1:1985, 3.15, modified – Phrase "of the noise emission" has been added, formula has been deleted and the explanation has been transferred to Note 1 to entry.]

**3.1.16
standard deviation of repeatability**

σ_r

standard deviation of noise emission values obtained under repeatability conditions, that is the repeated application of the same noise emission measurement method on the same noise source within a short interval of time under the same conditions (same laboratory, same operator, same measuring equipment)

Note 1 to entry: Values for the standard deviation of repeatability, σ_r , obtained in practice, are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.16, modified – The phrase "same apparatus" has been replaced by "same measurement equipment", reference to ISO 5725 has been deleted and Note 1 to entry has been added.]

**3.1.17
standard deviation of reproducibility**

σ_R

standard deviation of noise emission values obtained under reproducibility conditions, that is the repeated application of the same noise emission measurement method on the same noise source at different times and under different conditions (different laboratory, different operator, different measuring apparatus)

Note 1 to entry: The standard deviation of reproducibility includes ~~therefore~~ the standard deviation of repeatability (see 3.1.16).

Note 2 to entry: Estimates of the standard deviation of reproducibility, σ_R , obtained in practice, are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.17, modified – The reference to ISO 5725 has been deleted, the second sentence has been transferred to Note 1 to entry and Note 2 to entry has been added.]

**3.1.18
standard deviation of production**

σ_p

standard deviation of noise emission values obtained on different appliances from batches of the same category (family), using the same noise emission measurement method under repeatability conditions (same laboratory, same operator, same measuring apparatus)

Note 1 to entry: Estimates of the standard deviation of production, σ_p , obtained in practice, are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.18, modified – Phrase at the beginning has been replaced by "of noise emission values obtained on different appliances from batches of the same category (family)", the note has been deleted and Note 1 to entry has been added.]

**3.1.19
total standard deviation**

σ_t

square root of the sum of the squares of the standard deviation of reproducibility (see 3.1.17) and of the standard deviation of production (see 3.1.18)

$$\sigma_t = \sqrt{\sigma_R^2 + \sigma_p^2}$$

Note 1 to entry: Estimates of the total standard deviation, σ_t , obtained in practice are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.19, modified – The formula has been deleted and Note 1 to entry has been added.]

3.1.20 reference standard deviation

σ_M

total standard deviation specified and fixed for the family of appliances under consideration which is considered to be typical for batches from this family

Note 1 to entry: The use of a fixed σ_M for each category of appliances enables the application of a statistical method to deal with small sample sizes.

Note 2 to entry: Values of the reference standard deviation, σ_M , fixed for the various categories of household appliances (obtained from practical investigations) are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.20, modified – The words "and fixed" have been added, "machines" has been replaced by "appliances", first sentence of note has been transferred to a Note 1 of entry, remaining part of the note has been deleted and Note 2 to entry has been added.]

3.1.21 single sampling

type of sampling which consists in taking only one sample from the batch

Note 1 to entry: See ISO 3534-1:19932006.

[SOURCE: ISO 7574-1:1985, 3.21, modified – Reference to ISO 3534-1 has been transferred to Note 1 to entry.]

3.1.22 inspection by variables

method which consists in measuring a quantitative characteristic for each item of a population or of a sample taken from this population

Note 1 to entry: The quantitative characteristic is the noise emission quantity.

Note 2 to entry: See ISO 3534-1:19932006.

[SOURCE: ISO 7574-1:1985, 3.24, modified – Second sentence has been transferred to Note 1 to entry, reference to ISO 3534-1 has been transferred to a Note 2 to entry and notes 1 and 2 have been deleted.]

3.1.23

probability of acceptance

P_a

probability that a batch of given quality (expressed by its proportion p of noise emission values exceeding the ~~labelled~~ declared value) will be accepted by a given sampling plan

Note 1 to entry: $(1-P_a)$ is called "probability of rejection". If $(1-P_a)$ has the fixed value α (see 3.1.25), this is called the "producer's risk". If P_a has the fixed value β (see 3.1.26), this is called the "consumer's risk".

Note 2 to entry: See ISO 3534-1:19932006.

[SOURCE: ISO 7574-1:1985, 3.20 3.25, modified – Word "labelled" has been replaced by "declared", the note has been transferred to Note 1 of entry and ISO 3534-1 has been transferred to Note 2 to entry.]

3.1.24 operating characteristic curve

OC

curve showing, for a given sampling plan, the probability of acceptance P_a of a batch as a function of its proportion p of noise emission values exceeding the declared values

Note 1 to entry: The operating characteristic curve is fully determined by two specified points [for example, the producer's risk point (see 3.1.25) and the consumer's risk point (see 3.1.26)] or by one point (for example, the producer's risk point) and the sample size n .

Note 2 to entry: See ISO 3534-1:19932006.

[SOURCE: ISO 7574-1:1985, 3.26, modified – The note has been transferred to Note 1 to entry and reference to ISO 3534-1 is made in Note 2 to entry.]

**3.1.25
producer's risk point**

point on the operating characteristic curve corresponding to a predetermined and usually low probability of rejection α

Note 1 to entry: This probability of rejection is called the "producer's risk".

Note 2 to entry: The corresponding quality level is the proportion $p_{1-\alpha}$ of noise emission values of the batch exceeding the declared value. For a continuous production, the proportion $p_{1-\alpha}$ would be approximately equal to the acceptable quality level (*AQL*).

Note 3 to entry: See ISO 3534-1:1993:2006.

[SOURCE: ISO 7574-1:1985, 3.27, modified – The last sentence has been transferred to Note 1 to entry, the explanation has been transferred to Note 2 to entry, NOTE 1 has been deleted, NOTE 2 has been added to Note 2 to entry and reference to ISO 3534-1 is made in Note 3 to entry.]

**3.1.26
consumer's risk point**

point on the operating characteristic curve corresponding to a predetermined and usually low probability of acceptance β

Note 1 to entry: This probability of acceptance is then called the "consumer's risk".

Note 2 to entry: See ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.28, modified – The second sentence has been transferred to Note 1 to entry, the third sentence has been deleted and reference to ISO 3534-1 is made in Note 2 to entry.]

3.2 Calculations

For the purposes of this document, the following calculation formulas apply:

**3.2.1
sound power level**

L_W

IEC 60704-3:2019

$$L_W = 10 \cdot \lg \frac{W}{W_0} \text{ dB}$$

where W is the sound power of a source and W_0 is the reference sound power, 1 pW (10^{-12} W).

Note 1 to entry: See 3.1.1.

**3.2.2
arithmetic mean of a batch (or of a population)**

μ

$$\mu = \frac{1}{N} \sum_{i=1}^N L_i$$

where N and L_i are defined in 3.1.9 and 3.1.4, respectively.

Note 1 to entry: See 3.1.12.

**3.2.3
arithmetic mean of a sample**

\bar{L}

$$\bar{L} = \frac{1}{n} \sum_{i=1}^n L_i$$

where n and L_i are defined in 3.1.11 and 3.1.4., respectively.