

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Polymeric thermistors – Directly heated positive step function temperature coefficient –
Part 1-1: Blank detail specification – Current limiting application**

**Thermistances polymères – Coefficient de température positif de fonction
échelon à chauffage direct –
Partie 1-1: Spécification particulière cadre – Application de la limitation de
courant**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2005 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.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

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

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
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 corrigenda or an amendment might have been published.

Useful links:

IEC publications search - www.iec.ch/searchpub

The advanced search enables you 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It also gives information on projects, replaced and withdrawn publications.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 on-line and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

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: csc@iec.ch.

A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Liens utiles:

Recherche de publications CEI - www.iec.ch/searchpub

La recherche avancée vous permet de trouver des publications CEI en utilisant différents critères (numéro de référence, texte, comité d'études,...).

Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

Just Published CEI - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications de la CEI. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 30 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (VEI) en ligne.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Polymeric thermistors – Directly heated positive step function temperature coefficient –
Part 1-1: Blank detail specification – Current limiting application**

**Thermistances polymères – Coefficient de température positif de fonction échelon à chauffage direct –
Partie 1-1: Spécification particulière cadre – Application de la limitation de courant**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

PRICE CODE
CODE PRIX

M

ICS 31.040.30

ISBN 978-2-83220-726-0

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**POLYMERIC THERMISTORS –
DIRECTLY HEATED POSITIVE STEP FUNCTION
TEMPERATURE COEFFICIENT –**

**Part 1-1: Blank detail specification –
Current limiting application**

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 provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 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.

International Standard IEC 62319-1-1 has been prepared by IEC technical committee 40: Capacitors and resistors for electronic equipment.

This bilingual version (2013-05) corresponds to the monolingual English version, published in 2005-02.

The text of this standard is based on the following documents:

FDIS	Report on voting
40/1506/FDIS	40/1535/RVD

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

The French version of this standard has not been voted upon.

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

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

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

iTeh STANDARD PREVIEW **(standards.iteh.ai)**

[IEC 62319-1-1:2005](https://standards.iteh.ai/catalog/standards/sist/16b7187b-bb8e-45c4-bd3f-69d44702357b/iec-62319-1-1-2005)

<https://standards.iteh.ai/catalog/standards/sist/16b7187b-bb8e-45c4-bd3f-69d44702357b/iec-62319-1-1-2005>

**POLYMERIC THERMISTORS –
DIRECTLY HEATED POSITIVE STEP FUNCTION
TEMPERATURE COEFFICIENT –**

**Part 1-1: Blank detail specification –
Current limiting application**

INTRODUCTION

Blank detail specification

A blank detail specification is a supplementary document to the generic specification and contains requirements for style and layout and minimum content of detail specifications. Detail specifications not complying with these requirements shall not be considered as being in accordance with IEC specifications nor shall they so be described.

In the preparation of detail specifications, the content of 4.1 of the generic specification shall be taken into account.

The numbers between brackets on the first page correspond to the following information which shall be inserted in the position indicated.

Identification of the detail specification

- STANDARD PREVIEW**
(standards.iteh.ai)
IEC 62319-1-1:2005
<https://standards.iteh.ai/catalog/standards/sist/16b7187b-bb8e-45c4-bd3f-69d44702357b/iec-62319-1-1-2005>
- [1] The “International Electrotechnical Commission” or the National Organisation under whose authority the detail specification is drafted.
 - [2] The IEC or National Standards number of the detail specification, date of issue and any other information required by the national system.
 - [3] The number and issue number of the IEC or national generic specification.
 - [4] The IEC number of the blank detail specification.

Identification of the thermistor

- [5] A short description of the type of thermistor.
- [6] Information on typical construction (if applicable).

NOTE When the thermistor is not designed for use on printed boards, this should be stated in the detail specification in this position.

- [7] Outline drawing with main dimensions which are important for the interchangeability and/or reference to the national or international documents for outlines. Alternatively, this drawing may be given in the annex to the detail specification.
- [8] Application or group of applications covered and/or assessment level.
- [9] Reference data on the most important properties, to allow comparison between the various thermistor types.

[1]	IEC 62319-1-1-XXX QC XXXXXX-XXX	[2]
ELECTRONIC COMPONENTS OF ASSESSED QUALITY IN ACCORDANCE WITH: [3]	IEC 62319-1-1 QC XXXXXX	[4]
Outline drawing: (see Table 1) (... angle projection)	POLYMERIC POSITIVE TEMPERATURE COEFFICIENT THERMISTORS FOR CURRENT LIMITING APPLICATION	[5]
[7]		[6]
(Other shapes are permitted within the dimensions given)	Assessment level(s): EZ	[8]
NOTE For [1] to [9] see preceding page.		

Information on the availability of components qualified to this detail specification is given in IEC QC 001005.

[9]

(standards.iteh.ai)

1 General data

1.1 Method(s) of mounting (to be inserted)

See 4.9 of IEC 62319-1.

1.2 Dimensions

All dimensions are in millimetres or inches and millimetres; it shall be stated which dimensions are suitable for gauging.

Dimensional drawing(s) shall be given in the detail specification. If necessary, the dimensions may be listed in tabular form with reference to styles or codes.

1.3 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.

IEC 60068, *Environmental testing*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

IEC 62319-1; *Polymeric thermistors – Directly heated positive step function temperature coefficient – Part 1: Generic specification*¹

¹ To be published.

1.4 Coating

The detail specification shall state (if applicable):

- a) whether the coating is insulating or non-insulating;
- b) the material;
- c) the colour, if applicable.

1.5 Terminations

The detail specification shall state whether the terminations are suitable for soldering. If they are not, suitable methods of connection shall be stated for example: welding, clamping or crimping.

1.6 Flammability

The detail specification shall state whether the thermistor is actively or passively flammable, if applicable.

1.7 Resistance to solvents

The detail specification shall state whether the coating and the marking of the thermistor are solvent resistant, if applicable.

1.8 Packaging

The detail specification shall give the following information (if required):

- a) whether bulk packed or taped and if taped, drawing or references;
- b) the dimensions of the immediate packaging and the number of thermistors packed;
- c) the dimensions of the outer package and the number of immediate packages;
- d) methods of disposal of the packaging material.

1.9 Electrical data/ratings and characteristics

The detail specification shall give the units and tolerances or limiting values for the following parameters, if applicable. If necessary, electrical data may be listed in tabular form, with reference to style and codes.

Operating temperature range

Maximum voltage (U_{max})

Zero power resistance (R_t)

Isolation voltage (insulated thermistors only)

Insulation resistance (insulated thermistors only)

Trip current (I_t)

Hold current (I_h)

Residual current at U_{max} (I_{res})

Maximum current (I_{max})

Time-to-trip (t_{trip})

Fault current (I_{fault})

Power dissipation (P_d)

1.10 Marking

The marking of the thermistors and package containing the thermistors shall be in accordance with the requirements of 2.4 of the generic specification IEC 62319-1.

The details of the marking of the thermistors and package containing the thermistors shall be given in full in the detail specification.

1.11 Ordering information

Orders for thermistors covered by this specification shall contain the number and issue reference of the detail specification.

1.12 Additional information (not for inspection purposes)

1.13 Additional or increased severities or requirements to those specified in the generic specification

NOTE Additions or increased requirements should be specified only when essential.

2 Inspection requirements

2.1 Procedures

2.1.1 For qualification approval, the procedures shall be in accordance with the generic specification IEC 62319-1.

2.1.2 For quality conformance inspection, the test schedules (Tables 1 and 2) include sampling, periodicity, severities and requirements. The formation of inspection lots is covered by 3.5.7 of the generic specification.

The following list applies to the test schedules developed in Tables 1 and 2:

- 1) Subclause numbers of tests and performance requirements refer to the generic specification IEC 62319-1 and Clause 1 of this specification.
- 2) Number to be tested: sample size as directly allotted to the code letter for *IL* in Table IIA of IEC 60410 (single sampling plan for normal inspection).
- 3) In these tables: *p* is the periodicity (in months);
n is the sample size;
c is the acceptance criteria (permitted number of non-conforming items);
D indicates a destructive test;
ND indicates a non-destructive test;
IL is the inspection level.
- 4) The temperature at which the zero power resistance shall be measured is the temperature specified in the detail specification. This temperature shall be stated, where required, in the test schedule.
- 5) The specimens used for this group may, at the discretion of the manufacturer, be used for any subsequent group which is identified as being “destructive”.
- 6) The soldering tests (solderability and resistance to solder heat) shall only be applied where the thermistor has terminations which are appropriate for soldering.
- 7) Where the terminations are stated to be suitable for printed wiring applications, the appropriate test conditions in IEC 60068 shall apply.
- 8) The thermistors shall be mounted by their normal means.
- 9) Vibration, bump, and shock tests are only conducted if required in the detail specification. The bump test and the shock test are alternatives.

- 10) 100 % production testing shall be followed by re-inspection by sampling in order to monitor outgoing quality level by non-conforming items per million (10^{-6}). The sampling level shall be established by the manufacturer. For the calculation of $x \cdot 10^{-6}$ values, any parametric failure shall be counted as a non-conforming item. If one or more non-conforming items occur in a sample, this lot shall be rejected.
- 11) The number of cycles for a high breaking current device ($I_{max} > 100$ A) in the cycle life test shall be specified in the detail specification.
- 12) The duration for a high breaking current device ($I_{max} > 100$ A) in the trip endurance test shall be specified in the detail specification.
- 13) The subgroup B2 tests are only conducted if required in the detail specification.

Table 1 – Test schedule for quality conformance inspection: lot-by-lot

Subclause number and test (see list item 1)	D or ND 3)	Conditions of test (see list item 1)	<i>IL</i> <i>n</i> <i>c</i>			Performance requirements (see list item 1)
			(see list item 3)			
GROUP A INSPECTION (lot-by-lot)						
Subgroup A0	ND	100 % of production followed by sampling re-inspection (see list item 10)	S-4	2)	0	
4.4 Zero power resistance		Temperature: ... °C				$R_{min} < R < R_{max}$
Subgroup A1	ND		S-4	2)	0	As in 4.3.1
4.3.1 Visual examination						
Subgroup A2	ND		S-3	2)	0	As in 4.3.2
4.3.2 Marking						
4.3.3 Dimensions (detail)						As in 4.3.3
GROUP B INSPECTION (lot-by-lot)						
Subgroup B1	D		S-2	2)	0	Voltage across PTC \leq ... V
4.15 Hold Current		Current: ... A Time \geq ... min Temperature: ... °C				
4.17 Time-to-trip		Applied voltage: ... V Fault current: ... A Temperature: ... °C				Time: \leq ... s
Subgroup B2 (see list item 13)	D		S-2	2)	0	The terminations shall be uniformly tinned.
4.8.1 Solderability (see list item 6)		Method: ...				
4.6 Voltage proof (insulated types only)		Method: ... Applied voltage: ... V				As in 4.6.4

Table 2 – Test schedule for quality conformance inspection: periodic

Subclause number and test (see list item 1)	D or ND 3)	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance requirements (see list item 1)
			<i>p</i>	<i>n</i>	<i>c</i>	
GROUP C INSPECTION (periodic)						
Subgroup C1A Part of sample (5 with lowest resistance)	D		24	5	0	
4.14 Trip current		Current: ... A Time: ≤ ... min Temperature: ... °C				Voltage across PTC ≥ ... V
4.16 Residual current and power dissipation		Voltage: ... V Time ≥ ... min Temperature: ... °C				Residual current ≤ ... mA Power dissipation ≤ ... W
Subgroup C1B Other part of sample (5 with highest resistance)	D		24	5	0	
4.15 Hold current		Current: ... A Time: ≥ ... min Temperature: ... °C				Voltage across PTC ≤ ... V
Power dissipation and hold current (for >100 A types only)		Time: ≥ ... min Temperature: ... °C				Power dissipation ≤ ... W
Subgroups C1A and C1B Combined sample of specimens of Subgroups C1A and C1B	D		24	5	0	
4.6 Voltage proof (insulated types only)		Method: ... Applied voltage: ... V				As in 4.6.4
Subgroup C2A Part of sample	D		24	5	0	
4.8.2 Resistance to soldering heat (see list item 6)		Solder temperature: 260 °C Time: ... s Zero power resistance				See 4.4, with $\Delta R/R$: from .. % to .. % As in 4.3.1
4.7 Robustness of terminations		Visual examination As appropriate Final measurements: Visual examination Hold current (4.15): Current : ... A Time: ≥ ... min Temperature ... °C Time-to-trip (4.17): Applied voltage: ... V Fault current: ... A Temperature: ... °C				As in 4.3.1 As in 4.3.1 Voltage across PTC ≤ ... V Time ≤ ... s

Table 2 – Test schedule for quality conformance inspection: periodic (continued)

Clause/subclause number and test (see list item 1)	D or ND 3)	Conditions of test (see list item 1)	Sample size and acceptance criterion (see list item 3)			Performance requirements (see list item 1)
			<i>p</i>	<i>n</i>	<i>c</i>	
Subgroup C2B Other part of sample (see list item 9) B.1 Vibration B.2 Bump (or shock) B.3 Shock (or bump)	D	Frequency range = ... Hz to ... Hz Amplitude: ... mm, or acceleration: ... m/s ² Sweep endurance: ... h Number of sweep cycles: ... Visual examination Acceleration: ... m/s ² Number of bumps: ... Visual examination Pulse shape: halfsine Acceleration: ... m/s ² Pulse duration: ... ms Final measurements: Visual examination Hold current (4.15): Current: ... A Time ≥ ... min Temperature: ... °C Time-to-trip (4.17): Applied voltage: ... V Fault current: ... A Temperature: ... °C	24	5	0	As in 4.3.1 As in 4.3.1 As in 4.3.1 Voltage across PTC ≤ ... V Time ≤ ... s
Subgroup C3 4.10 Rapid change of temperature	D	$T_A = LCT$ $T_B = UCT$ Final measurements: Visual examination Hold current (4.15): Current: ... A Time ≥ ... min Temperature: ... °C Time-to-trip (4.17): Applied voltage: ... V Fault current: ... A Temperature: ... °C	24	10	0	As in 4.3.1 Voltage across PTC ≤ ... V Time ≤ ... s
Subgroup C4 4.3.3 Dimensions (detail) (see list item 5)	ND	The detail specification shall define dimensions to be measured	24	10	0	As specified in the detail specification