

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Sample preparation for measurement of mercury level in fluorescent lamps

Préparation des échantillons en vue de la mesure du niveau de mercure dans les lampes fluorescentes

IEC 62554:2011

<https://standards.iteh.ai/catalog/standards/iec/beca6acf-6b65-47b5-8511-75c2e26d74f8/iec-62554-2011>



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2017 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 l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC 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.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

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 also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions 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

65 000 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 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 l'IEC

La Commission Electrotechnique Internationale (IEC) 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 IEC

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

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

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

La recherche avancée permet de trouver des publications IEC 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.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. 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 de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 16 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

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.



IEC 62554

Edition 1.1 2017-10
CONSOLIDATED VERSION

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Sample preparation for measurement of mercury level in fluorescent lamps

Préparation des échantillons en vue de la mesure du niveau de mercure dans les lampes fluorescentes

[IEC 62554:2011](https://standards.iteh.ai/catalog/standards/iec/beca6acf-6b65-47b5-8511-75c2e26d74f8/iec-62554-2011)

<https://standards.iteh.ai/catalog/standards/iec/beca6acf-6b65-47b5-8511-75c2e26d74f8/iec-62554-2011>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.140.30

ISBN 978-2-8322-4982-6

**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.**

REDLINE VERSION

VERSION REDLINE



Sample preparation for measurement of mercury level in fluorescent lamps

Préparation des échantillons en vue de la mesure du niveau de mercure dans les lampes fluorescentes

IEC 62554:2011

<https://standards.iteh.ai/catalog/standards/iec/beca6acf-6b65-47b5-8511-75c2e26d74f8/iec-62554-2011>

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
INTRODUCTION to Amendment 1	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 General	7
5 Procedure for collecting mercury from a fluorescent lamp.....	7
5.1 General.....	7
5.2 Reagents.....	7
5.3 Chemical lab ware.....	8
5.4 Sample preparation	8
5.4.1 Cold spotting methods	8
5.4.2 Sample preparation of fluorescent lamps by non-cold-spot (sectioning) methods	10
5.4.3 Sample preparation of fluorescent lamps by non-cold-spot (crushing) methods	11
5.4.4 Nitric acid rinse method for linear fluorescent lamps.....	12
5.4.5 Direct mercury measurement.....	12
5.4.6 Sample preparation of other fluorescent lamps	13
5.5 Sample digestion.....	13
5.5.1 Ambient conditions	13
5.5.2 Glass samples (in 250 ml, 500 ml, 1 000 ml or 2 000 ml container).....	13
5.5.3 Metal samples (in 125 ml container)	13
5.6 Filtering.....	14
6 Measurement	14
6.1 Blank test.....	14
6.2 Data reporting	14
6.3 Analysis	14
Annex A (informative) Electrothermal vaporization atomic absorption spectrometry (EVAAS) method.....	15
Annex B (informative) Information on the cold spotting method.....	18
Bibliography.....	21
Figure A.1 – Configuration of the electrothermal vaporization atomic absorption spectrometry testing apparatus.....	15
Figure A.2 – An example of the electrothermal vaporization atomic absorption spectrometer test apparatus layout	16
Figure B.1 – Example of glass cell arrangement	19
Figure B.2 – Example of cooling device arrangement.....	20

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAMPLE PREPARATION FOR MEASUREMENT OF MERCURY LEVEL IN FLUORESCENT LAMPS

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 consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 62554 edition 1.1 contains the first edition (2011-08) [documents 34A/1484/FDIS and 34A/1502/RVD] and its amendment 1 (2017-10) [documents 34A/1997/CDV and 34A/2028/RVC].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 62554 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

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

The committee has decided that the contents of the base publication and its amendment will remain unchanged until the stability 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.

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 document using a colour printer.

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

[IEC 62554:2011](#)

<https://standards.itih.ai/catalog/standards/iec/beca6acf-6b65-47b5-8511-75c2e26d74f8/iec-62554-2011>

INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning Cold spotting given in 5.4.1.

IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she is willing to negotiate licences free of charge with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from:

General Electric Company

Appliance Park AP35-1002, Louisville, KY, 40225-0001, US

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. IEC shall not be held responsible for identifying any or all such patent rights.

ISO (www.iso.org/patents) and IEC (<http://patents.iec.ch>) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.

According to IEC SMB 136/7 decision, the technical committee decided to remove designation of a reference method.

INTRODUCTION to Amendment 1

[IEC 62554:2011](#)

[http://www.iteh.com/standards/IEC/62554/2011/IEC-62554-2011-AMD1-2017-INTRODUCTION-to-Amendment-1](#)
IEC 62554 specifies the method of sample preparation for the measurement of mercury level in fluorescent lamps. It refers to IEC 62321:2008 for the technique for determining the amount of mercury.

In the meantime it has been found that for fluorescent lamps, some of the techniques specified in IEC 62321 can lead to inaccurate and misleading results and in addition this standard has been split into several parts.

In bilateral discussions between members of subcommittee 34A and technical committee 111, it was agreed to update the relevant part of IEC 62321 and the reference made to it in IEC 62554. Amendment 1 to IEC 62321-4 has now been published (IEC 62321-4:2013/AMD1:2017).

SAMPLE PREPARATION FOR MEASUREMENT OF MERCURY LEVEL IN FLUORESCENT LAMPS

1 Scope

This International Standard specifies sample preparation methods for determining mercury levels in new tubular fluorescent lamps (including single capped, double capped, self-ballasted and CCFL for backlighting) containing 0,1 mg mercury or more. The intended resolution of the methods described in this standard is of the order of 5 %.

Mercury level measurement of spent lamps is excluded, as during lamp operation, mercury gradually diffuses into the glass wall and reacts with the glass materials. The test method of this standard does not recover mercury that is diffused into or reacted with or otherwise incorporated irreversibly with the glass wall of discharge tubes.

This standard does not contain information on measurement. Measurement is specified in IEC 62321.

2 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.

ISO/IEC 17025:2005, *General requirements for the competence of testing and calibration laboratories*

~~IEC 62321:2008, *Electrotechnical products – Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)*~~

IEC 62321-4:2013, *Determination of certain substances in electrotechnical products – Part 4: Mercury in polymers, metals and electronics by CV-AAS, CV-AFS, ICP-OES and ICP-MS*
IEC 62321-4:2013/AMD1:2017

ISO 3696:1987, *Water for analytical laboratory use – Specification and test methods*

3 Terms and definitions

For the purposes of the present document, the following terms and definitions apply.

3.1

new lamp

a lamp that has not been energized since manufacture

3.2

cold cathode fluorescent lamp (CCFL) for backlighting

small diameter fluorescent lamp having cold cathode in the lamp, in which most of light is emitted by the excitation of phosphors coated in discharge tube and used as backlight in LCD

3.3

external electrode fluorescent lamp (EEFL) for backlighting

small diameter fluorescent lamp having cold cathode attached outside the lamp, in which most of light is emitted by the excitation of phosphors coated in discharge tube and used as backlighting in LCD

EEFL is a subtype in CCFL lamp group.

4 General

Mercury in fluorescent lamps exists in the following states:

- a) vapour in a lamp;
- b) liquid metal;
- c) compound;
- d) alloy.

There is a wide variety of mercury dosing solutions including appearance and placement of mercury dispensing devices and also composition and structure of those devices. Although some of the lamps are dosed with amalgam or solid mercury alloy, there are also many fluorescent lamps dosed with liquid mercury.

Amalgam dosed lamps often have device(s) that act as an auxiliary amalgam. Form and location of these devices vary widely as well.

The introduction of a cold spot (see Annex B) minimizes the loss of mercury in the vapour state when the discharge tube is opened. With the lamp operating, the cold spot will condense all the mercury in the discharge, allowing superior control for mercury recovery.

The procedure in Clause 5 below includes a method to collect liquid mercury, mercury compounds and alloys and amalgams. [IEC 62554:2011](https://standards.iteh.ai/catalog/standards/iec/be6a6acf-6b65-47b5-8511-75c2e26d74f8/iec-62554-2011)

<https://standards.iteh.ai/catalog/standards/iec/be6a6acf-6b65-47b5-8511-75c2e26d74f8/iec-62554-2011>

The total amount of mercury is determined by measuring the amount of liquid mercury, mercury compounds and alloys and amalgam.

The amount of mercury is calculated from the measured mercury concentration, the volume of the filtered solution and the dilution factor.

5 Procedure for collecting mercury from a fluorescent lamp

5.1 General

For test arrangement and ambient conditions, relevant parts of ISO/IEC 17025:2005 shall be followed.

WARNING – Persons using this International Standard should be familiar with normal laboratory practice. This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices, to avoid pollution of the environment and to ensure compliance with any national regulatory conditions.

5.2 Reagents

The following reagents shall be used:

- water: Grade 1, as specified in ISO 3696;

- the mass fraction of mercury in the following reagents shall be below 1×10^{-9} ;
- potassium permanganate 5 % aqueous solution (m/v);
- nitric acid, concentrated 65 %;
- hydrochloric acid, concentrated 37 %;
- hydrofluoric acid, concentrated 40 %.

5.3 Chemical lab ware

Chemical lab ware shall be verified to be mercury non-absorbing.

Chemical lab ware shall be as follows:

- disposable vacuum filter pack with medium retention filter;
- disposable wide mouth screw-capped plastic bottles: 125 ml, 250 ml, 500 ml, 1 000 ml, 2 000 ml;
- disposable wide mouth sturdy plastic bag nominal 500 ml, 1 000 ml;
- beaker 50 ml, 100 ml, 125 ml, 250 ml, 500 ml;
- volumetric flasks: 50 ml, 100 ml, 250 ml, 500 ml;
- micropipettes;
- dispensers;
- bench coat: sheet of plastic lined laboratory bench paper.

NOTE The plastic bag may be clear polyethylene or similar chemical and acid resistant material nominally 0,01 mm or thicker. The 1 000 ml bag would be approximately 200 mm × 300 mm. Sometimes known as a “blender or stomacher bag” they are available from biological laboratory suppliers. Bag size may be adjusted to suit availability and lamp size being tested.

5.4 Sample preparation

Sample preparation process shall be a continuous operation without excessive hold time.

5.4.1 Cold spotting methods

5.4.1.1 General

Cold spotting is a method for condensing free mercury in a localized position (see Annex B).

The mercury localization occurs while the low-pressure discharge lamp is “ON” under normal operating conditions while a small area (the cold spot) of the discharge tube is maintained at a low temperature. During the cold spotting process, no heavy end blackening should be observed.

When the free mercury is fully condensed, the light output of the lamp will drop significantly and the discharge colour will typically turn pink. The process of free mercury localization (cold-spotting) is then completed.

NOTE Mercury collection with cold spot below 0 °C and operating with the normal control gear of the lamp may take several days.

5.4.1.2 Sample preparation of self-ballasted and single capped compact fluorescent multi limbed lamps with cold-spotting

Discharge tube cutting operations shall be carried out above the wide mouth screw capped plastic bottle to minimize the risk of material loss.

Sample containers shall be as follows.

- Use 250 ml wide mouth screw-capped plastic bottle for cold spot section as first container.

- Use 125 ml wide mouth screw-capped plastic bottle for end portions of discharge tube as second container.
- Use 500 ml or 1 000 ml wide mouth screw-capped plastic bottle for glass parts of discharge tube, depending on which one fits better to the discharge tube dimensions under test as third container.

The sample preparation shall be executed according to the process steps listed below.

- a) Separate discharge tube from its outer bulb, if any.
- b) Clean the discharge tube with chemical wipe.
- c) Mark discharge tube in a non-destructive manner for first sectioning. Mark 3 cm on both sides of the cold spot.
- d) Collect the free mercury with cold spotting – see 5.4.1.1 – until mercury starvation is verified.
- e) Remove lamp from cooler. Keep lamp in same position as it was during cold spotting until sectioning.
- f) Place the lamp on cutting table covered by bench coat – with the plastic side up, toward the lamp.
- g) Score and break the discharge tube at the first mark allowing the arc tube to fill with air slowly so that no fluorescent powder coating of the tube is blown off.
- h) Break the lamp fully at the first mark. Score and break the lamp at the other mark around the cold spot. Place cold spot section (6 cm) immediately into the first container. Close the container. Shake first container allowing the discharge tube section to crush. Keep the first container in crushed ice until digestion. Allow 5 min for the floating dust to settle before continuing. Proceed to 5.5.2 sample digestion with the first container immediately.
- i) Next, separate discharge tube from plastic surrounds and associated electronics, if any. Cut associated lead wires as close to the glass seal as possible. Only the discharge tube will be used for mercury level measurement.
- j) Score and break all tip offs and check for metal parts. Crush tip offs with pliers into the second container.
- k) Score both of the lead wire containing ends of the discharge tube approximately 7 mm from the end of the tube. Pre-score discharge tube for sectioning, step n) below. Use the minimum possible number of sections allowing the parts to fit into the third container.
- l) Cut lead wire containing ends of the discharge tube at the score using hot rod or hot wire.
- m) Check end portions for any hollow glass objects and crush them gently with pliers into the second container. Carefully avoid touching the content of hollow glass objects with the pliers. Place the removed end portions – inclusive of metal parts in them – of the discharge tube into the second container and close the container.
- n) Section the discharge tube using hot rod or wire at scores marked in step k) above.
- o) Place discharge tube section(s) into the third container.
- p) Check bench coat for material chips. Any material on bench coat shall be placed into the third container. Then, close the third container.
- q) Shake the third container allowing the discharge tube sections(s) to crush. Allow 5 min for the floating dust to settle before continuing.

Samples are ready for digestion. Proceed to 5.5 sample digestion immediately.

5.4.1.3 Sample preparation of linear fluorescent lamps with cold spotting

Sample containers shall be as follows.

- Use 250 ml or 500 ml wide mouth screw-capped plastic bottle for cold spot section as first container.
- Use 125 ml wide mouth screw-capped plastic bottle for end portions of discharge tube as second container.

- Use 250 ml, 500 ml, 1 000 ml or 2 000 ml wide mouth screw-capped plastic bottle for glass parts of discharge tube, depending on which one fits better to the discharge tube dimensions under test as third container.

The sample preparation shall be executed according to the process steps listed below.

- a) Separate discharge tube from its fragment retention cover, if any.
- b) Mark discharge tube in a non-destructive manner for first sectioning. Mark 12 cm from the labelled end for the initial cut; mark 6 cm on both sides of the cold spot.
- c) Collect the free mercury with cold spotting – see 5.4.1.1 – until mercury starvation is verified.
- d) Remove lamp from cooler. Keep lamp horizontal until sectioning.
- e) Place the lamp on cutting table covered by bench coat – with the plastic side up, toward the lamp.
- f) Score and break the discharge tube at the first mark allowing the arc tube to fill with air slowly so that no fluorescent powder coating of the tube is blown off.
- g) Score and break the lamp at the remaining two marks. Place cold spot section (12 cm) immediately into the first container. Close the first container. Shake the first container allowing the discharge tube section to crush. Keep the first container in crushed ice until digestion. Allow 5 min for the floating dust to settle before continuing. Proceed to the 5.5.2 sample digestion immediately.
- h) Next, separate discharge tube from its plastic and metallic surrounds. Cut associated lead wires as close to the glass seal as possible. Only the discharge tube will be used for mercury level measurement.
- i) Score both of the lead wire containing ends of the discharge tube approximately 7 mm from the end of the tube. Pre-score discharge tube for sectioning. Use the minimum possible number of sections allowing the parts to fit into the third container.
- j) Section the ends of the discharge tube using hot rod or wire at scores marked. Score and break tip offs and check for metal parts. Crush tip offs with pliers into the second container. Check end portions for any hollow glass objects and crush them gently with pliers into the second container. Carefully avoid touching the content of hollow glass objects with the pliers. Place the end portions – inclusive of metal parts in them – of the discharge tube into the second container and close the second container.
- k) Section the remaining discharge tube using hot rod or wire at scores marked in step i).
- l) Place discharge tube sections into the third container.
- m) Check bench coat for material chips. Any material on bench coat shall be placed into the third container. Then close the third container.
- n) Shake the third container allowing the discharge tube to crush. Allow 5 min for the floating dust to settle before opening.

Samples are ready for digestion. Proceed to 5.5 sample digestion immediately.

5.4.2 Sample preparation of fluorescent lamps by non-cold-spot (sectioning) methods

Sample containers shall be as follows.

- Use 500 ml or 1 000 ml wide mouth screw-capped plastic bottle for glass parts of discharge tube, depending on which one fits better to the discharge tube dimensions under test as first container.
- Use 125 ml wide mouth screw-capped plastic bottle for end portions of discharge tube as second container.

The sample preparation shall be executed according to the process steps listed below.

- a) Separate discharge tube from its outer bulb, if any.