BS ISO 764:2020

BSI Standards Publication

Horology — Magnetic resistant watches

bsi.

National foreword

This British Standard is the UK implementation of ISO 764:2020. It supersedes BS ISO 764:2002, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee STI/53, Specifications and test methods for jewellery and horology.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2020

ISBN 978 0 539 02603 0

ICS 39.040.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 29 February 2020.

Amendments/corrigenda issued since publication

Date	Text affected

BS ISO 764:2020

INTERNATIONAL STANDARD

ISO 764

Fourth edition
2020-02-21

Horology — Magnetic resistant watches

Horlogerie — Montres résistantes au magnétisme

Reference number
ISO 764:2020(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Requirements **1**
4.1 General 1
4.2 Requirements for mechanical watches 1
4.2.1 Running conditions of mechanical watches during magnetic fields application 1
4.2.2 Residual effect for mechanical watches after magnetic fields application 2
4.2.3 Other effects 2
4.3 Requirements for electronic watches 2
4.3.1 Running conditions of electronic watches during magnetic fields application 2
4.3.2 Other effects 2
5 Test methods **2**
5.1 Test conditions 2
5.2 Test apparatus 3
5.3 Test procedure 3
5.3.1 General 3
5.3.2 Test procedure for mechanical watches 3
5.3.3 Test procedure for electronic watches 4
6 Marking **4**
Annex A (normative) **Enhanced magnetic resistant watches** **6**
Annex B (informative) **Flow chart for the test procedure** **8**
Annex C (informative) **Relationship with the distance from products generating magnetic fields** **12**
Bibliography **14**

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 114, *Horology*, Subcommittee SC 12, *Antimagnetism*.

This fourth edition cancels and replaces the third edition (ISO 764:2002), which has been technically revised. The main changes compared to the previous edition are as follows:

— additions of enhanced magnetic resistant watches and relationship with the distance from products generating magnetic fields in Annex C.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Before all, we are exposed to various magnetic fields in daily life and, the watches we wear are also exposed to magnetic fields.

Unfortunately, the exposure of watches to strong magnetic fields may influence their accuracy.

In the case of mechanical watches, the motion of the spring balance oscillator responsible for the accuracy of the watch may be adversely affected, resulting in an influence on their accuracy. In the case of electronic watches, the rotation of the motor(s) that moves the hand(s) is affected.

Also, as magnetic fields are invisible, they are not easily understood by consumers. Furthermore, the strengths of magnetic fields are closely related to the distances between the watch and the sources of magnetic fields generated by products. For the effect on the accuracy of watches, since the strengths of magnetic fields differ with the distances from the sources of magnetic fields, it is advisable to make consumers understand magnetic fields encountered in daily life and their strengths, and the distance relationship between watches and the sources of magnetic fields.

Based on the above, products generating magnetic fields encountered in daily life, and the relationship between the strengths of magnetic fields generated by these products and the distances from the sources of magnetic fields are summarized in Annex C.

Also, the following two types are defined: magnetic resistant watches that can withstand the strengths of magnetic fields encountered in normal daily life and enhanced magnetic resistant watches that can withstand strong magnetic fields.

This page deliberately left blank

INTERNATIONAL STANDARD **ISO 764:2020**

Horology — Magnetic resistant watches

1 Scope

This document specifies the minimum requirements and test methods for magnetic resistant watches.

This document applies to magnetic resistant watches designed to withstand daily magnetic fields.

Moreover, it indicates the marking which the manufacturer is authorized to apply to them.

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.

ISO 3158, *Timekeeping instruments — Symbolization of control positions*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
magnetic resistant watch
watch designed to withstand a homogeneous and continuous direct current magnetic field of 4 800 A/m encountered on a daily basis

3.2
enhanced magnetic resistant watch
watch designed to withstand a homogeneous and continuous strong direct current magnetic field equal or higher than 16 000 A/m encountered in close proximity

3.3
residual effect
difference of rates before and after the magnetic resistance test

4 Requirements

4.1 General

Magnetic resistant watches shall meet the requirements of 4.2 or 4.3 when applying magnetic fields of 4 800 A/m. Enhanced magnetic resistant watches shall meet the requirements of Annex A.

4.2 Requirements for mechanical watches

4.2.1 Running conditions of mechanical watches during magnetic fields application

When observed during the magnetic fields application, watches shall not stop.

5.2 Test apparatus

The test apparatus used shall produce homogeneous and continuous direct current magnetic fields of the test value according to the directions specified in 5.3. Admissible variations in magnetic fields strength during the magnetic resistance test shall be 0 % to +5 %.

5.3 Test procedure

5.3.1 General

Flowcharts summarizing these procedures (5.3.2 and 5.3.3) are described in Annex B.

5.3.2 Test procedure for mechanical watches

5.3.2.1 Preparation before magnetic resistance test

For mechanical watches, the following procedures are performed before magnetic resistance test.

5.3.2.1.1 Demagnetization

A demagnetization of the watch is required in order to take into account a possible effect on the rate by repeated magnetizations and demagnetizations.

The watch shall be demagnetized in each of the three 3H-9H, 6H-12H and CH-FH directions.

5.3.2.1.2 Winding

At least 1 h before the initial rate measurement, the watch shall be completely winded up.

5.3.2.1.3 Measurement of the initial rate $M_{\text{CH-0}}$

A measurement of the initial rate shall be carried out prior to applying any magnetic field.

Switchable mechanisms shall be stopped and the hands, the date and other mechanisms shall be set up such to avoid any disturbance during the rate measurement.

The rate shall be measured during at least 180 s in CH position, according to ISO 3158, by using a rate measurement apparatus.

This duration shall be increased if necessary, based on the stability and periodicity of the rate.

The initial rate ($M_{\text{CH-0}}$) is the average of instantaneous rates measured for 180 s or longer.

5.3.2.2 Magnetic resistance test

Magnetic resistance tests shall be carried out as follows:

a) Switchable mechanisms shall be stopped and the hands, the date and other mechanisms shall be set up such to avoid any disturbance during the rate measurement and magnetic fields application.

b) Place the watch on the test apparatus so that the magnetic field is applied in the 3H-9H direction parallel to the watch face.

c) Increase progressively, at least 5 s, the strength of the magnetic field to the test value (in this case 4 800 A/m).

d) Observe the watch for 60 s to confirm that the watch does not stop during magnetic field application.

Especially for watches not equipped with a second hand and with the spring balance oscillator not visible in the testing position, increase the magnetic field application time to bring clarity to their stoppage.

e) Decrease progressively, at least 5 s, the strength of the magnetic field back to zero.

f) Remove the watch from the test apparatus.

g) The rate ($M_{CH\text{-}1}$) shall be measured for at least 180 s in the CH position, according to ISO 3158, by using a rate measurement apparatus.

This duration shall be increased if necessary, based on the stability and periodicity of the rate.

The rate ($M_{CH\text{-}1}$) is the average of instantaneous rates measured for 180 s or longer.

h) Demagnetize the watch in each of the three 3H-9H, 6H-12H and CH-FH directions.

i) Carry out steps from a) to h) also in the 6H-12H and CH-FH directions of magnetic fields application in order to define respectively the $M_{CH\text{-}2}$ and $M_{CH\text{-}3}$ rates.

5.3.3 Test procedure for electronic watches

5.3.3.1 Magnetic resistance test

Magnetic resistance tests shall be carried out as follows:

a) Place the watch on the test apparatus for each stepper motor installed in the direction most affected by the magnetic fields.

NOTE When the most affected direction is unknown, the tester (laboratory) is responsible to determine it (e.g. turning the watch in the horizontal plane while applying the field; testing the watch 6 times every 30° in the horizontal plane and once perpendicularly).

b) Increase progressively, at least 5 s, the strength of the magnetic field to the test value (in this case 4 800 A/m)

c) Observe the watch for 60 s to confirm that the watch does not stop during magnetic field application.

In the case of a stepper motor having an interval of impulses of 20 s or more, observe the running condition during five stepper motor runs.

Especially for watches not equipped with a second hand, increase the magnetic field application time to bring clarity to their stoppage.

d) Decrease progressively, at least 5 s, the strength of the magnetic field back to zero.

e) Remove the watch from the test apparatus.

6 Marking

Magnetic resistant watches meeting the requirements of Clause 4 may be marked as shown below in an easily visible position on the main body or a tag in the language of each country.

In English: magnetic resistant

In French: résistante au magnétisme

In Russian: магнитозащитные

In German: magnetfeldresistent

In Japanese: 耐磁

In Chinese: 防磁

Annex A
(normative)

Enhanced magnetic resistant watches

A.1 General

Products generating strong magnetic fields have increased in recent years, but from the relationship of distance to a product, the performance of magnetic resistant watches can be maintained even under the influence of magnetic fields in daily life.

However, there are instances of coming to close to products that generate stronger magnetic fields. Enhanced magnetic resistant watches are defined as watches that can withstand such conditions.

Test methods and requirements for enhanced magnetic resistant watches are shown below.

A.2 Requirements

Enhanced magnetic resistant watches shall meet the requirements specified in Clause 4.

A.3 Test methods

A.3.1 Test conditions

The test conditions shall be in accordance with 5.1.

A.3.2 Test apparatus

The test apparatus used shall be as specified in 5.2. The required magnetic field shall be equal or higher than 16 000 A/m.

A.3.3 Test procedure

The test procedure shall be in accordance with 5.3. The required magnetic field shall be equal or higher than 16 000 A/m.

A.4 Marking

Enhanced magnetic resistant watches meeting the requirements of A.2 shall be marked as shown below in an easily visible position on the main body or a tag in the language of each country.

In English: magnetic resistant XX A/m.

In French: résistante au magnétisme XX A/m.

In Russian: магнитозащитные XX A/m.

In German: magnetfeldresistent XX A/m.

In Japanese: □□ XX A/m.

In Chinese: □□ XX A/m.

The letters XX indicate the intensity of the magnetic field, in amperes per metre, guaranteed by the manufacturer and shall be equal or higher than 16 000 A/m.

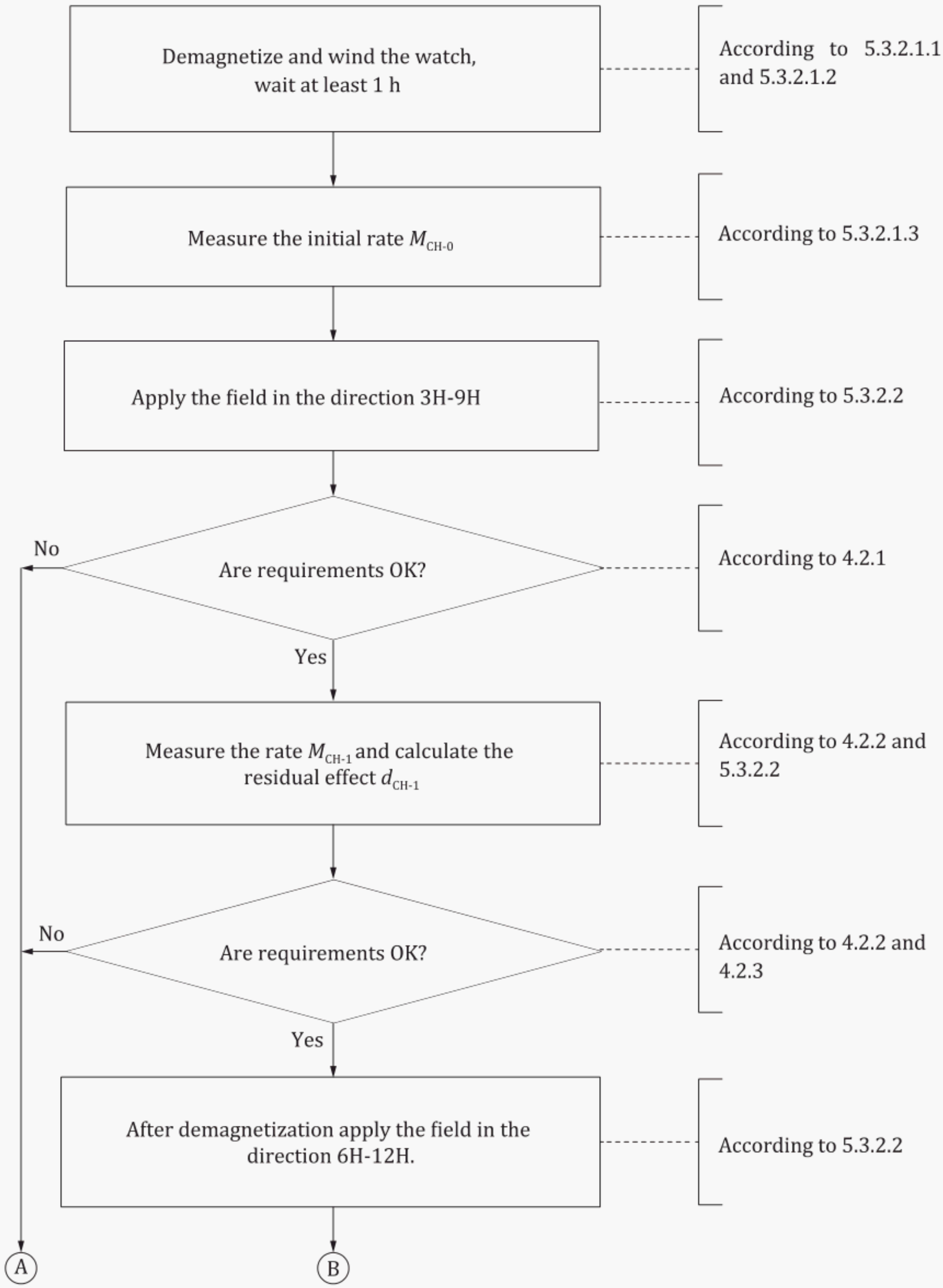
EXAMPLES

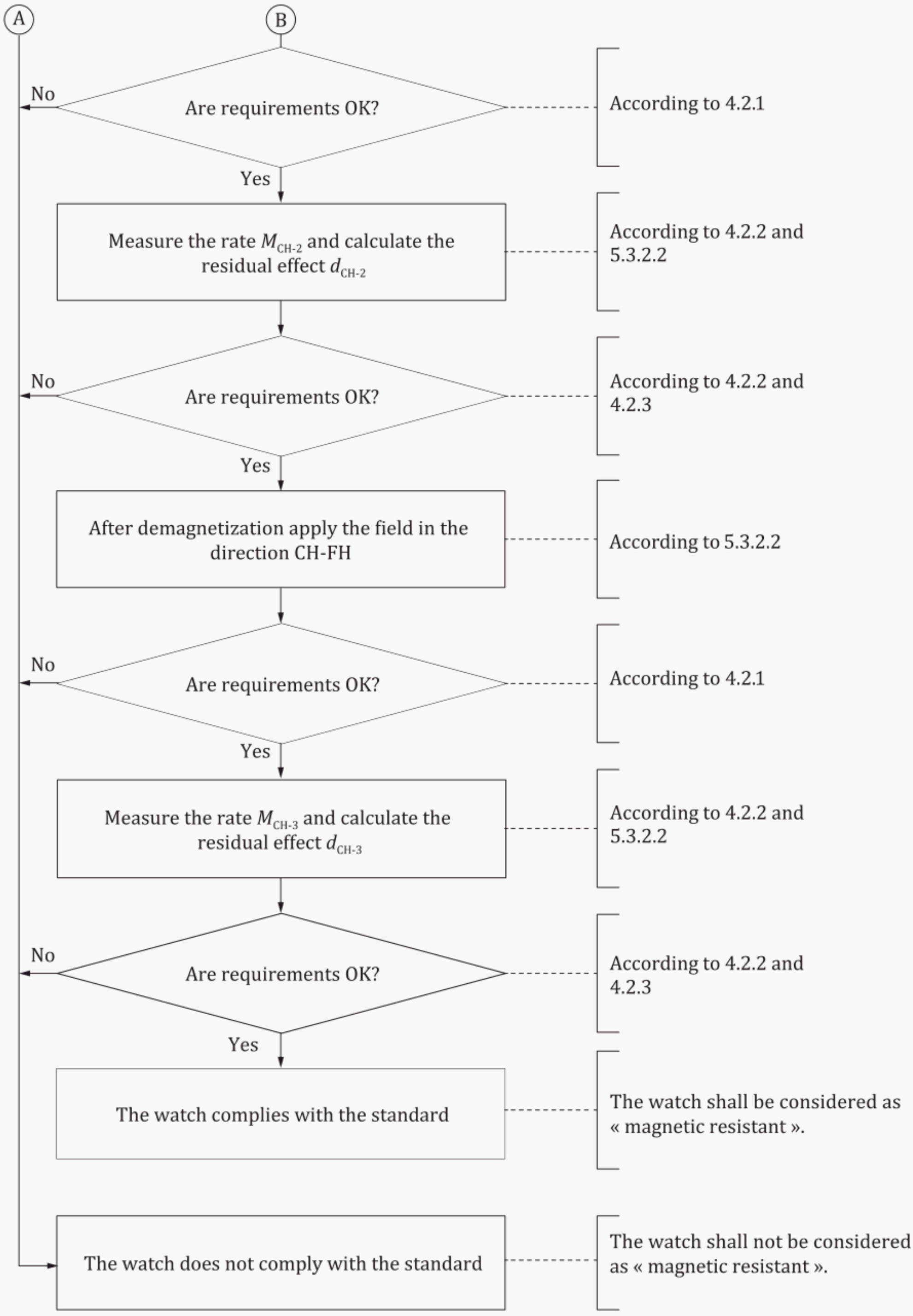
magnetic resistant 16 000 A/m
magnetic resistant 16 kA/m.

Annex B
(informative)

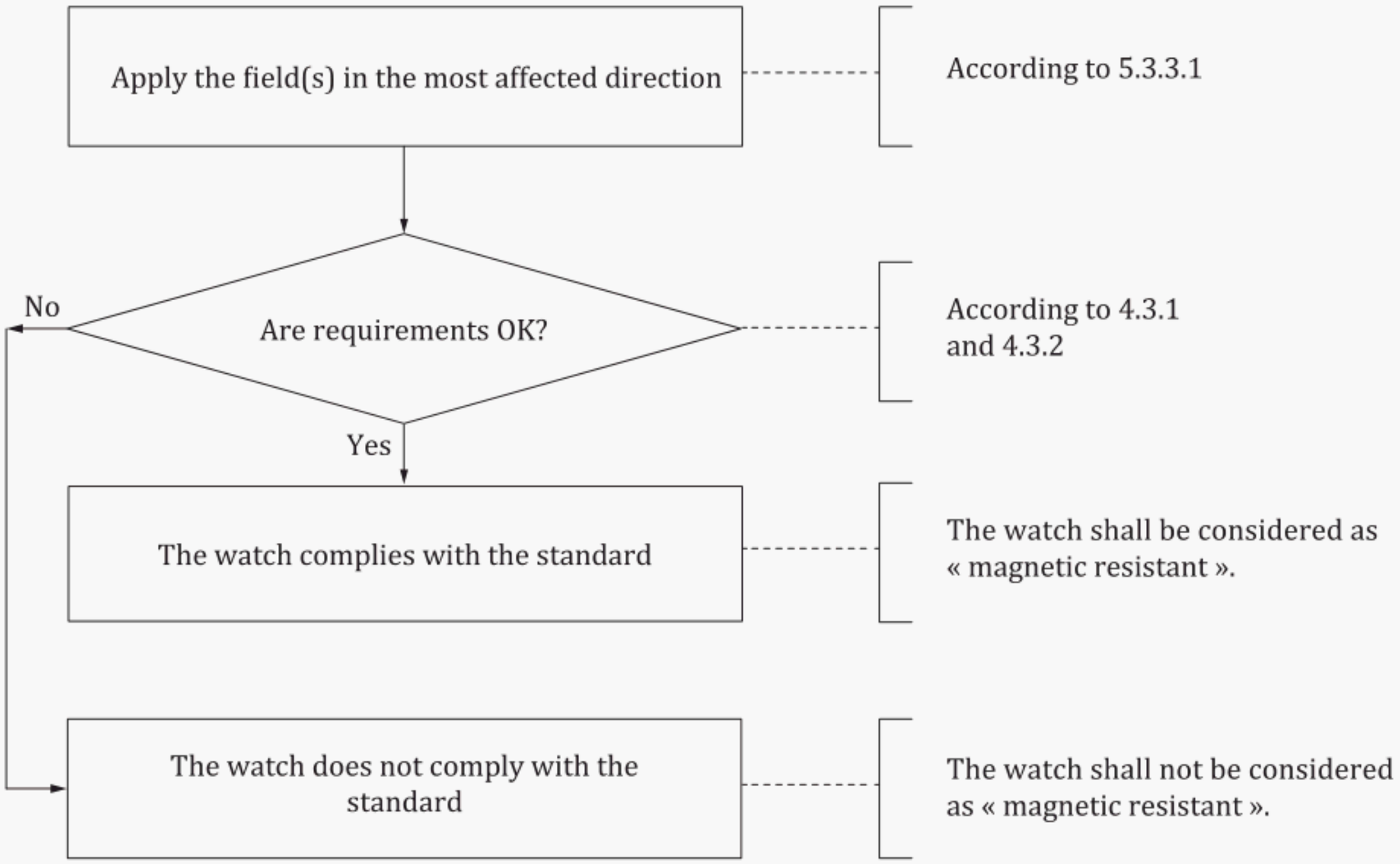
Flow chart for the test procedure

B.1 Flow chart for the test procedure applicable to mechanical watches





B.2 Flow chart for the test procedure applicable to electronic watches



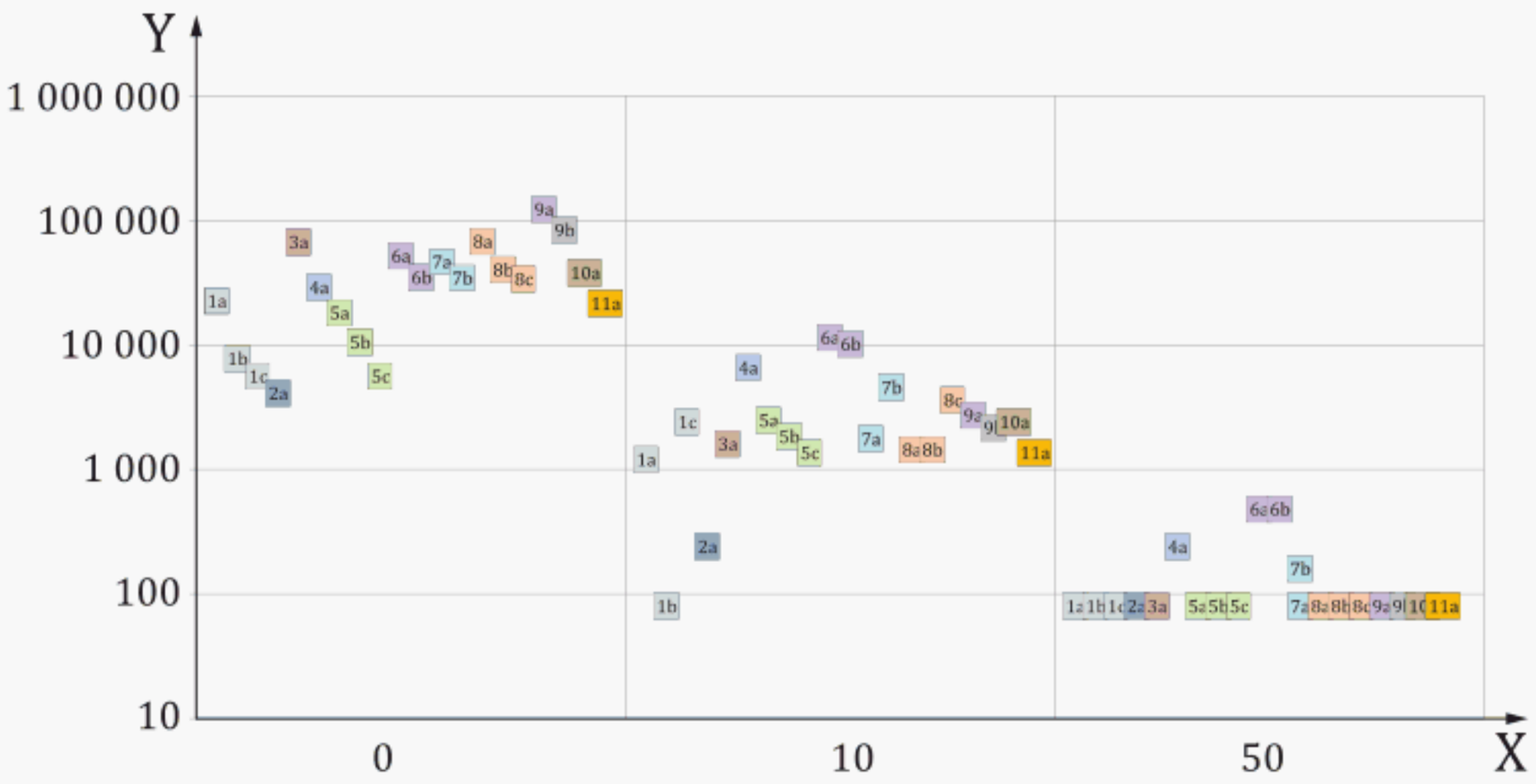
Annex C
(informative)

Relationship with the distance from products generating magnetic fields

C.1 General

In daily life, we are surrounded by various products that generate magnetic fields. Meanwhile, since the strengths of magnetic fields become weaker with increasing distances from the sources of magnetic fields, it is unlikely that the performance and functions of watches are hindered unless they are brought to within approximately 30 mm of the sources of magnetic fields.

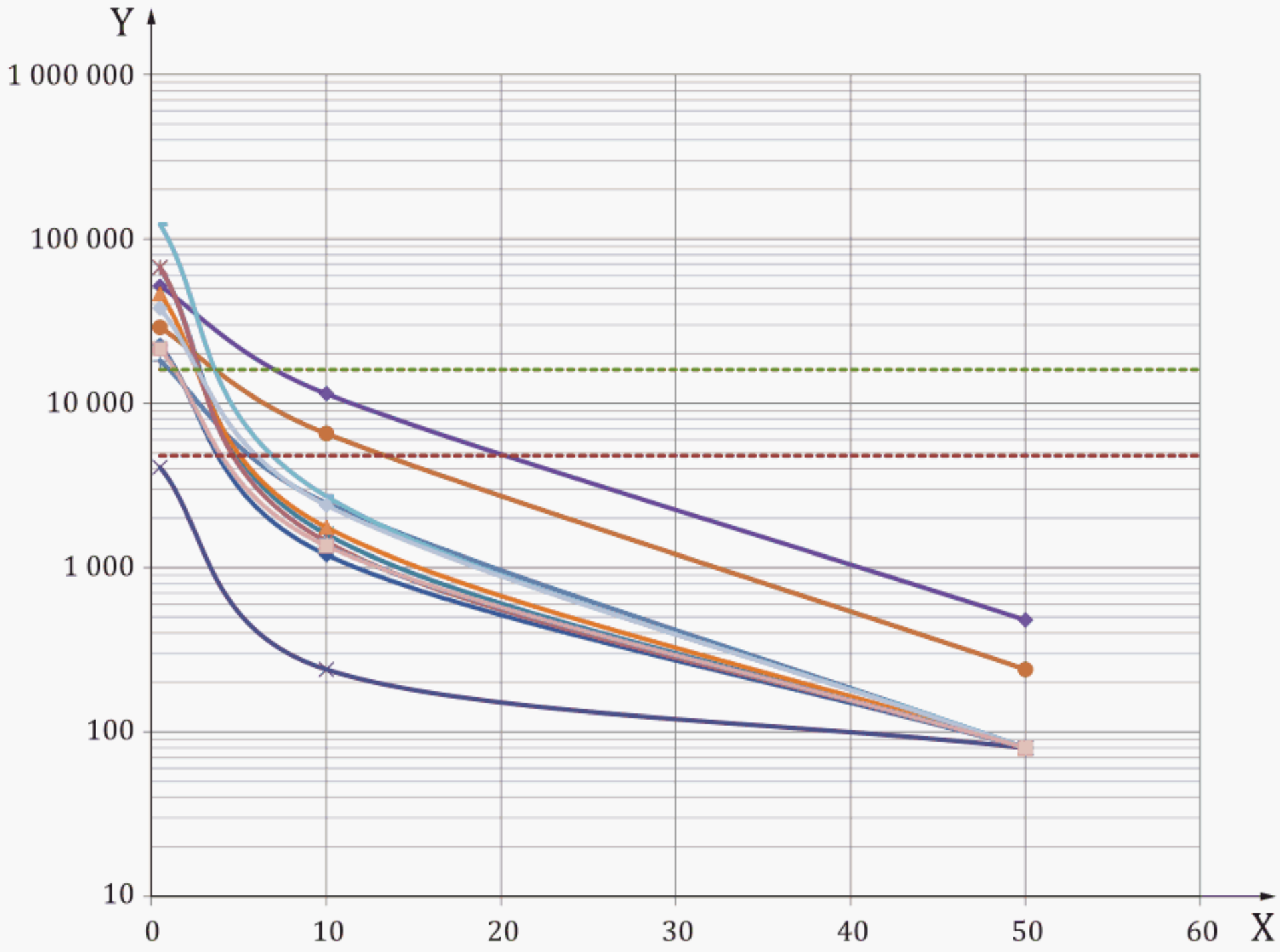
C.2 Relationship with the distance from products generating magnetic fields



Key

X	distance from equipment/products generating magnetic fields (mm)	6a	handbag/outer side of magnet
		6b	handbag/inner side of magnet
Y	strengths of magnetic fields (A/m)	7a	notebook PC/open-close magnetic switch section
1a	flip phone/external speaker section	7b	notebook PC/speaker section
1b	flip phone/camera infrared port section	8a	tablet PC/cover affixing section
1c	flip phone/ear piece speaker	8b	tablet PC/sleeve switch section
2a	earphone/speaker section	8c	tablet PC/speaker section
3a	magnetic necklace	9a	tablet PC cover/tablet PC affixing section
4a	headphone/speaker section	9b	tablet PC cover/sleeve switch section
5a	land-line phone/cordless handset external speaker	10a	portable game console/speaker section
5b	land-line phone/main body speaker section	11a	smartphone/speaker section
5c	land-line phone/receiver speaker section		

Figure C.1 — Relationship with the distance from products generating magnetic fields



Key

X	distance from equipment/products generating magnetic fields (mm)	6a: handbag/outer side of magnet	
Y	strengths of magnetic fields (A/m)	7a: notebook PC/open-close magnetic switch section	
1a: flip phone/external speaker section		8a: tablet PC/cover affixing section	
2a: earphone/speaker section		9a: tablet PC cover/tablet PC affixing section	
3a: magnetic necklace		10a: portable game console/speaker section	
4a: headphone/speaker section		11a: smartphone/speaker section	
5a: land-line phone/cordless handset external speaker		4 800 A/m	
		16 000 A/m	

Figure C.2 — Relationship with the distance from products generating magnetic fields

Bibliography

[1] ISO 6426-2, *Horological vocabulary — Part 2: Technical and commercial definitions*

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than one device provided that it is accessible by the sole named user only and that only one copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than one copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright and Licensing team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member.**

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email cservices@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Useful Contacts

Customer Services
Tel: +44 345 086 9001
Email: cservices@bsigroup.com

Subscriptions
Tel: +44 345 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK