



JAPANESE
INDUSTRIAL
STANDARD

Translated and Published by
Japanese Standards Association

JIS C 1731-2 : 1998

**Instrument transformers
for testing purpose and
used with general instrument
Part 2 : Voltage transformers**

ICS 17.220.20

Descriptors : instrument transformers, potential transformers, transformers

Reference number : JIS C 1731-2 : 1998 (E)

Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. By this establishment JIS C 1731 : 1988 is withdrawn and replaced by this Standard.

Constitution of Standard

JIS C 1731-1 *Instrument transformers for testing purpose and used with general instrument Part 1 : Current transformers*

JIS C 1731-2 *Instrument transformers for testing purpose and used with general instrument Part 2 : Voltage transformers*

Date of Establishment: 1998-03-20

Date of Public Notice in Official Gazette: 1998-03-20

Investigated by: Japanese Industrial Standards Committee
Divisional Council on Electricity

JIS C 1731-2:1998, First English edition published in 2000-09

Translated and published by: Japanese Standards Association
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

© JSA 2000

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 the publisher.

Printed in Japan

Contents

	Page
Introduction	1
1 Scope	1
2 Definitions	1
3 Service conditions	3
3.1 Standard service conditions	3
3.2 Special service conditions	3
4 Construction	3
4.1 Construction in general	3
4.2 Mechanical strength	4
4.3 Porcelain tubes	4
4.4 Internal construction	4
4.5 Sealing	4
4.6 Polarity	4
5 Classification and ratings	4
5.1 Highest voltage for equipment	4
5.2 Rated voltages	5
5.3 Accuracy classes	6
5.4 Rated burdens	7
5.5 Rated frequencies	7
6 Performances	7
6.1 Secondary short-circuit (withstand capability)	7
6.2 Temperature rise	7
6.3 Dielectric withstanding voltage	8
6.3.1 Lightning impulse withstand voltage	8
6.3.2 Power frequency withstand voltage	8
6.3.3 Induced withstand voltage	8

6.3.4	Partial discharge	8
6.3.5	Long-time power frequency withstand voltage	9
6.4	Abnormal phenomenon	9
6.5	Limits of ratio error and phase displacement	13
6.6	Frequency characteristic	14
7	Tests	14
7.1	Classification of tests	14
7.2	Items and sequence of tests	14
7.3	Test methods	15
7.3.1	Secondary short-circuit	15
7.3.2	Temperature rise	16
7.3.3	Dielectric withstand voltage tests	16
7.3.4	Abnormal phenomenon	21
7.3.5	Ratio error and phase displacement	22
7.3.6	Frequency characteristic	22
8	Terminals	22
8.1	Location of terminals	22
8.2	Terminal marks	22
9	Markings	24
	Annex 1 (normative) Inductive voltage transformers	27
	Introduction	27
1	General	27
1.1	Scope	27
1.2	Normative references	27
2	Definitions	28
2.1	General definitions	28
2.2	Additional definitions for single-phase inductive protective voltage transformers	31

3	General requirements	31
4	Normal and special service conditions	31
4.1	Normal service conditions	31
4.2	Special service conditions	33
4.3	System earthing	33
5	Ratings	34
5.1	Standard values of rated voltages	34
5.2	Standard values of rated output.....	34
5.3	Standard values of rated voltage factor	35
5.4	Limits of temperature rise	35
6	Design requirements	37
6.1	Insulation requirements	37
6.2	Short-circuit withstand capability	42
6.3	Mechanical requirements	42
7	Classification of tests	43
7.1	Type tests	43
7.2	Routine tests	44
7.3	Special tests	44
8	Type tests	44
8.1	Temperature-rise test	44
8.2	Short-circuit withstand capability test	45
8.3	Impulse test on primary winding	45
8.4	Wet test for outdoor type transformers	47
9	Routine tests	47
9.1	Verification of terminal markings	47
9.2	Power-frequency withstand tests on primary windings and partial discharge measurement	47
9.3	Power-frequency withstand tests between sections and on secondary windings	49

10	Special tests	50
10.1	Chopped impulse test on primary winding	50
10.2	Measurement of capacitance and dielectric dissipation factor	50
10.3	Mechanical tests	50
11	Markings	51
11.1	Rating plate markings	51
11.2	Terminal markings	52
12	Accuracy requirements for single-phase inductive measuring voltage transformers	53
12.1	Accuracy class designation for measuring voltage transformers	53
12.2	Limits of voltage error and phase displacement for measuring voltage transformers	53
12.3	Type tests for accuracy of measuring voltage transformers	54
12.4	Routine tests for accuracy of measuring voltage transformers	54
12.5	Marking of the rating plate of a measuring voltage transformer	54
13	Additional requirements for single-phase inductive protective voltage transformers	54
13.1	Accuracy class designation for protective voltage transformers	54
13.2	Limits of voltage error and phase displacement for protective voltage transformers	54
13.3	Rated voltages for secondary windings intended to produce a residual voltage	55
13.4	Output for secondary windings intended to produce a residual voltage	55
13.5	Accuracy class for secondary windings intended to produce a residual voltage	56
13.6	Type tests for protective voltage transformers	56
13.7	Routine tests for protective voltage transformers	56
13.8	Marking of the rating plate of a protective voltage transformer	57

Instrument transformers for testing purpose and used with general instrument

Part 2 : Voltage transformers

Introduction This Japanese Industrial Standard specifies voltage transformers, of the instrument transformers formerly specified in JIS, in its text, while the items stated in the corresponding International Standard IEC 60044-2, *Instrument transformers—Part 2 : Inductive voltage transformers* published in 1997 as the first edition are adopted in Annex 1 (normative) without any modification in the technical contents.

For capacitor voltage transformers not specified in IEC 60044-2, IEC 60186 applies.

1 Scope This Standard specifies newly manufactured voltage transformers for testing purpose and used with general instrument which serve within power frequency range.

2 Definitions For the purpose of this Standard, the following principal definitions apply:

- a) **instrument transformer** This is an equipment for transformation of current or voltage used with electric instrument(s) or measuring device(s). This is the generic name of current transformer and voltage transformer.
- b) **voltage transformer** An instrument transformer in which the primary voltage is transformed to the secondary voltage which is proportional to the former.
- c) **unearthed voltage transformer** A voltage transformer in which the both primary terminals are connected across the lines during its service.
- d) **earthed voltage transformer** A voltage transformer in which one primary terminal is connected to the line and the other terminal is earthed during its service.
- e) **capacitor voltage transformer** A voltage transformer which utilizes the divided voltages by the capacitors.
- f) **voltage transformer for protected region** A voltage transformer to be used in a region always protected by lightning arrester(s).
- g) **voltage transformer for non-protected region** A voltage transformer to be used in a region not always protected by lightning arrester(s).
- h) **high-voltage capacitor of capacitor voltage transformer** A capacitor connected between primary line side terminal and voltage dividing point of a capacitor voltage transformer.
- i) **intermediate-voltage capacitor of capacitor transformer** A capacitor connected between the voltage dividing point and earth terminal of a capacitor voltage transformer.