



IWAKI CTE33 PROPERTIES



Main Chemical Components

BENCHMARK

COMPOUNDS	BOROSILICATE	SODALIME*	Main Purpose (General)
Silica (SiO ₂)	81%	69-75%	Basic Material
Sodium Oxide(Na ₂ O)- Soda	4%	12-17%	To Lower temperature Transition /Melting Point and viscosity
Potassium Oxide (K ₂ O)		~0.5%	
Calcium Oxide (CaO) -Lime	-	5 –12%	Soda Stabilizer (solubility)
Boron Oxide (B ₂ O ₃)	13%	-	To Lower Coefficient Expansion (CTE)
Magnesium Oxide (MgO)	-	~ 6%	To Increase elasticity
Aluminum Oxide (Al ₂ O ₃)	2%	~ 4%	To Increase forming capabilities (Cut, Bend, Blow)
Iron Oxide (Fe ₂ O ₃)	-	~.0.1%	Other Compounds of Glass Impurities

(Ref. ISO3585:1998 ; IWAKI Glass Technical Data 2018 SDS No..S17-0005 May 2021 ; Sciencedirect.com , Soda lime Technical DS , Advanceoptics.com and various source) (* taken from some SDS depend on each manufacturer's standard)

BASIC ADVANTAGES

High Silica and Borate content make Glass Borosilicate superior in resilience to chemical and temperature. In commercial, it's applied for laboratory Glassware , Hot lenses/mirrors, Aquarium heaters, Cooking ware/bakeware, aircraft exterior lenses, glasses/bottles of drinks with high alcohol content, etc.

Low Coefficient expansion $33 \times 10^{-7} \text{ } ^\circ\text{C}$ (CTE 33), make borosilicate glass has own superior durability, however more economical in industrial processes compared to another (the lower the CTE, the Higher Melting point temperature)

ENDURANCE HOT TEST EXPERIMENT



Heat Test Iwaki CTE33 Beaker product without liquid with burner up to 240 °C. Test Result: PASS



Thermal Shock Test of Iwaki CTE33 Beaker Glass with $\Delta T \geq 190$ °C transfer time 4 seconds. Test Result: PASS

(Ref. ISO 718:1990(E) :Thermal Shock Test Laboratory Glassware)

Safety Advice :

The endurance test above is experimental purpose . For user safety concern, recommended :

1. Do Not heat at locally by open flame, for long time.
2. Do Not change temperature of the product blank with $\Delta T > 100$ °C with short transfer time ($\Delta t < 4$ seconds)
3. Ensure glassware has no defects before the heating
4. Use PPE (handglove, tongs for cup /barrel, Safety eye glasses) when heat the glass

BOROSILICATE GLASS THERMAL RESISTANCE PROPERTY IWAKI CTE33

Iwaki Glass CTE33 is generally safe in wet sterilization or steaming by Autoclave at temperature $\sim 134^{\circ}\text{C}$, Pressure of $\sim 30\text{ Psi}$ (214 Kpa)

IGI Testing is carried out on flat bottom Test tube, Beaker, Erlenmeyer and Soda lime Petri Dish products, With sample glass wall thickness (varies 1mm \sim 1.5 mm)

Table of reference condition the General Sterilization with Pressure Steamer

Reference	STEAM STERILIZATION	
	APPLICATION OF AUTOCLAVE (at Level of Microbial Lethality)	
	Temperature Exposure	Time (Minutes)
US Pharmacopoeia, 2015	121°C	15
9th, International Pharmacopoeia (WHO), 2019	121°C - 124°C	15
	126 °C - 129°C	10
	134°C - 138°C	5
ISO 17665-2 :2009	121°C	15
	126°C	10
	134°C	3
EN285 (European Standard), 2016	121°C	15
	134°C	3
CDC,2008 (Update May 2019)	121°C	30
	132°C	4

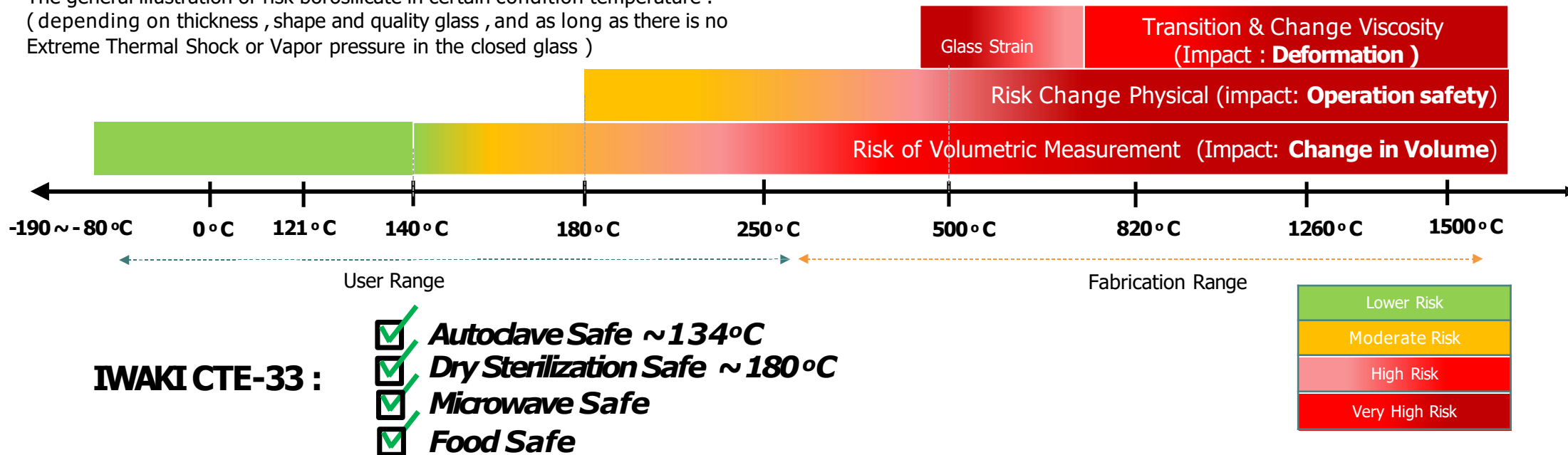
Safety Advice :

1. Follow Safety Procedure in Autoclave operations, for example :
 - If it contain liquid, Max 2/3 of Capacity Full
 - If with using stopper, apply with loosen
 - Don't close container tightly (need a gap)
 - No glass defects: deep scratches, cracks, bubble/void or blister pre Autoclave
2. Follow Operation Procedure and safety protocols recommended by Autoclave machine maker (instructions / guide book)
3. For Sterilization out of general setting recommendation, need test in advance.

BOROSILICATE GLASS THERMAL RESISTANCE PROPERTY IWAKI CTE33

GENERAL DESCRIPTION OF IWAKI BOROSILICATE GLASS CTE 33 OPERATING TEMPERATURE RANGE

The general illustration of risk borosilicate in certain condition temperature .
(depending on thickness , shape and quality glass , and as long as there is no Extreme Thermal Shock or Vapor pressure in the closed glass)



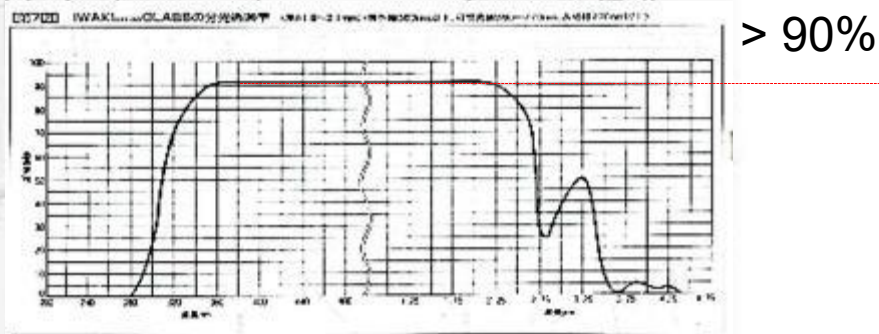
"However, under extreme temperature changes (such as a high temperature difference or rapid heating/cooling), there is still a risk of glass damage. To reduce this risk, it is recommended to keep the temperature difference (ΔT) below 100°C with longer transition time (Δt), preferably more than 5 seconds."

"For users operating borosilicate glass products CTE-33 that require specific high temperature conditions, it is recommended to confirm the glass characteristics in advance, in order to evaluate potential safety and quality risks."

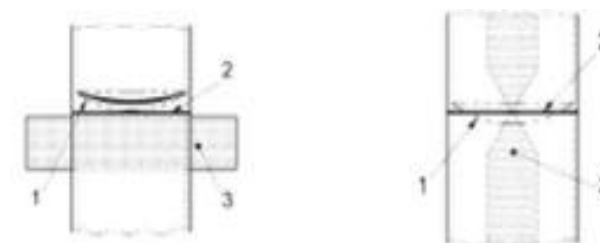
BOROSILICATE GLASS OPTICAL PROPERTY IWAKI CTE33 - CLEAR GLASS

Iwaki borosilicate CTE33 which has very low impurity which is impact to glass's Clarity and Good Transmission with low refractive index and dispersion.

With this clarity, it superior in visual or optical accuracy for fluid color, Meniscus position, and useful for required content with certain light radiation or wavelength .



Spectrum Transmission Chart of IWAKI Glass for Visible Light (Wavelength 380-770nm and Infra Red > 770nm , transmitted ratio light > 90%)



Key
1. meniscus
2. graduation line or ring mark
3. disk or back mark, paper or back label tubing

Key
1. meniscus
2. graduation line
3. Scheibchen (disk)

Ref:

- www.Glass Properties. com , LD Pye, VD Frechette, NJ Kreidl v : "Borate Glasses"; Plenum Press, New York, 1977
- <https://refractiveindex.info/>

Reading of the water meniscus on volumetric ware. (Ref.: ISO 4787: 2010)

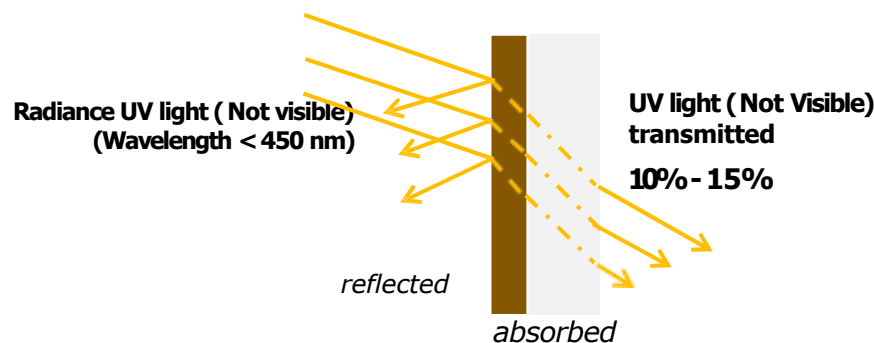
BOROSILICATE GLASS OPTICAL PROPERTIES IWAKI CTE33 - **AMBER COAT**

Amber coloring (coat) volumetric ware Glass Iwaki CTE-33 is intended for protect the product with sensitive to ultraviolet light .

The 3 Ranges of UV light (based on Wavelength) :

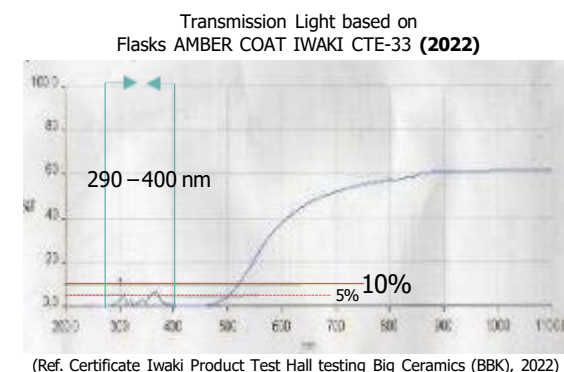
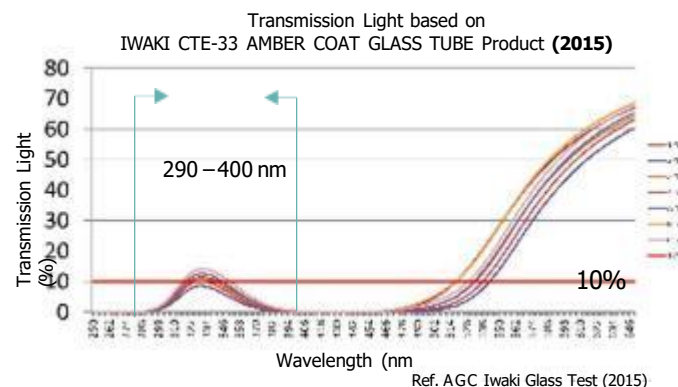
- UVA (315-400 nm)
- UVB (280-315 nm)
- UVC (100-280 nm)

Ref. World Health Organization (WHO), March 2016



Product **amber coat** IWAKI CTE-33
Minimize transmission light (10%~ 15%)
in the wavelength range 290 to 400nm.

**Good For UV sensitive products and
however still maintain convenience in
water level meniscus reading.**



HAZARDOUS SUBSTANCE FREE

ANALYTICAL REPORT



This analytical report is prepared for:

PT Iwaki Glass Indonesia

Kawasan Industri Dwipapuri Abadi Blok N.8, Jl Raya Rancaekek Km 24,5 Sumedang 45364

Attention to : Ibu Nurul Azizah
 Report Title : RoHS Testing
 Report No : P22009LHU002 Rev. 00
 Report Date : February 14, 2022
 Customer Sample ID : Glass + Amber
 PO/Contract No : 0112/PO/01/2022
 PO/Contract Date : January 31, 2022
 Project No : P22009

Signed for and behalf of PT Pramatek Andal Analitika

Fakhri Muflih
 Technical Manager

The test results shown in this Analytical Report refer only to the sample(s) tested by PT Pramatek Andal Analitika. Any use of or action based on the test results is entirely the responsibility of the client. This document can not be reproduced except in full, without prior written approval of PT Pramatek Andal Analitika.

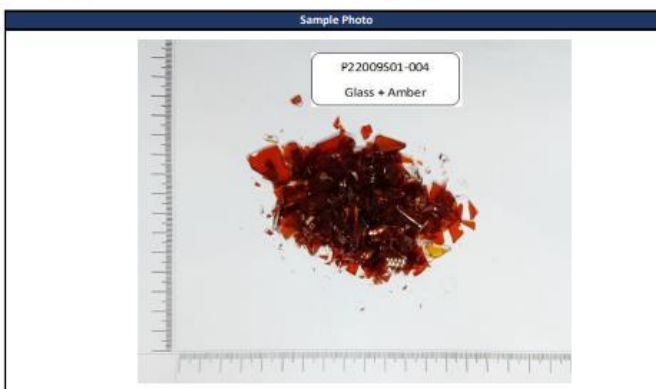
PT Pramatek Andal Analitika

Jl. Dr. Ratna No. 108 A, Jatikramat, Jatiasih, Kota Bekasi, 17421, Jawa Barat - Indonesia
 P : 021-22106968 E : info@pramatek.co.id W : www.pramatek.co.id

SAMPLE INFORMATION



Registration No : P22009501
 Registration Date : February 3, 2022
 Sampling By : PT Iwaki Glass Indonesia
 Cust Sample ID : Glass + Amber
 Type of Sample : Glass Ware
 Testing Description : RoHS Testing
 Lab Sample ID : P22009501-003
 Interval Analysis : February 7, 2022 to February 11, 2022



PT Pramatek Andal Analitika authenticates the photo on original report only

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Test Result



Cust Sample ID : Glass + Amber
 Type of Sample : Glass Ware
 Testing Desc : RoHS Testing
 Lab Sample ID : P22009501-003

No	Testing Item	Unit	Result	Max Values	Testing Method
1	Lead, Pb	%	n.d.	0,1	IEC 62321-2008, FAAS
2	Cadmium, Cd	%	n.d.	0,01	IEC 62321-2008, FAAS
3	Mercury, Hg	%	n.d.	0,1	IEC 62321-2008, CVASS
4	Hexavalent Chromium, Cr(VI)	%	n.d.	0,1	IEC 62321-2008, Spectro Visible
5	Sum of Polybrominated Biphenyls, PBB	%	n.d.	0,1	IEC 62321-2008, GCMS
	Monobromobiphenyl				
	Dibromobiphenyl				
	Tribromobiphenyl				
	Tetrabromobiphenyl				
	Pentabromobiphenyl				
	Hexabromobiphenyl				
	Heptabromobiphenyl				
	Octabromobiphenyl				
	Nonabromobiphenyl				
Decabromobiphenyl					
6	Sum of Polybrominated Diphenyl Ethers, PBDE	%	n.d.	0,1	IEC 62321-2008, GCMS
	Monobromodiphenyl ether				
	Dibromodiphenyl ether				
	Tribromodiphenyl ether				
	Tetrabromodiphenyl ether				
	Pentabromodiphenyl ether				
	Hexabromodiphenyl ether				
	Heptabromodiphenyl ether				
	Octabromodiphenyl ether				
	Nonabromodiphenyl ether				
Decabromodiphenyl Ether, DecaBDE					

Remarks :
 1. The maximum values refer to RoHS EU Directive 2015/863
 2. "n.d." - Not Detected. The value is below method detection limit

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Our customers concern about hazardous Substance in Materials use.

Iwaki Borosilicate Glass CTE-33 **comply criteria safe** from **Restriction of Hazardous Substances**

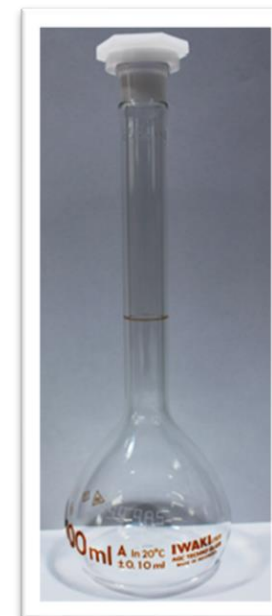
Quality Assurance

Traceability



Lot No.

Batch No.



Lot No :
030725 57 IS QC3.



Batch No :
14Z25

Batch Certificate

Product Code: Kode Produk	7100-25-IS	
Product Description: Deskripsi Produk	Volumetric Pipette, Class A, Amber Graduation, ISO Specification, 25 ml, Color Code, Not Blow Out	
Tolerance at 20°C: Toleransi pada 20°C	± 0.03 mL	
Product Batch No: No Batch Produk	24Y25-25	
References of Product Volume Tolerance: Referensi Toleransi Volume Produk	ISO 648:2008	
Sampling inspection according to ISO 3951 Inspeksi sampling sesuai dengan ISO 3951		
Calibration Method : Metoda Kalibrasi	ISO 4787:2021	Remarks: Type Not Blow Out
Location : Lokasi	Laboratory of PT. Iwaki Glass Indonesia	
Average Value at 20°C : 100% Volume Rata-rata pada 20°C	25.008 mL	
Standard Deviation : 100% Deviasi Standar	0.006 mL	
Balance : Timbangan	498/TE/LK-AS/III/25	
Number of Batch : Jumlah Batch	281 Pcs	
Date of Test : Tanggal Pemeriksaan	30 June 2025	
Raw Material : Bahan Baku	Borosilicate Glass with Linear Coefficient 33 x10 / °C	
Result : Lot is Accepted	Approved by : Calibration Laboratory Disahkan oleh Erna Hernayati	



Note : Batch Certificate

- ✓ Guarantee of volume in one batch no.
- ✓ ISO 3951
- ✓ Free of charge

This document has been verified electronically
Dokumen ini sudah terverifikasi secara elektronik

PT. IWAKI GLASS INDONESIA
 MANUFACTURE LABORATORY GLASSWARE

CALIBRATION CERTIFICATE
SERTIFIKAT KALIBRASI

Number : 2556002
Nomor :

1 Description of Product
Keterangan Produk

Product Code : 5645-100-WC
Kode Produk

Name of Product : Volumetric Flask, With Plastic Stopper, Class A, 100 ml With Certificate
Nama Produk

Brand : IWAKI
Merek

Capacity / Readability : 100 mL / - mL
Kapasitas / Daya Baca

Volume of Tolerance : ± 0.10 mL
Toleransi Volume

Class : A
Kelas

Batch No / Identification No. : 14Z25-100
No. Batch / No. Identifikasi

2 Method, Standard and Traceability
Metode, Standar dan telurusan

Calibration Method : - ISO 4787:2021 - References of product volume tolerance based on ISO 1042:1998
Metode Kalibrasi : - WIS/CAL/064

Reference Standard : Balance Certificate No. 843/TE/LK-AS/24
Water Thermometer Certificate No. 6191/025/KAL/06/2024
Thermohygrometer Certificate No. CE00637
Barometer Certificate No. S.24 009 267

Traceability : The reported results of calibration traceable to SI units
Keterelusuran of measurement through
Balance LK-081-IDN
Water Thermometer LK-045-IDN
Thermohygrometer LK-160-IDN
Barometer LK-032-IDN

Date of Issue : April 17, 2025
Diterbitkan Tanggal

Calibration Laboratory
Erna Hernayati

This certificate consists of two pages
Sertifikat ini terdiri dari dua halaman

Attention :
1 The result of calibration is only valid for the tested product.
2 It is prohibited to quote/reproduce and/or publish part of this certificate without written permission from calibration laboratory of PT Iwaki Glass Indonesia

Page 1 of 2

Jl. Raya Rancaekek, Km. 24.5
Kawasan Industri Dwipapuri Abadi, Blok N.8, Sumedang, 45364
Phone/Fax : 62-22-7780022 / 62-22-7793823 | Email : info-iwaki@igi-id.com

PT. IWAKI GLASS INDONESIA
 MANUFACTURE LABORATORY GLASSWARE

Number : 2556002
Nomor :

3 Calibration Data
Data Kalibrasi

Location of Calibration : Calibration Laboratory PT. Iwaki Glass Indonesia
Lokasi Kalibrasi

Calibration Date : April 10, 2025
Tanggal Kalibrasi

The Condition of Room : Temperature : 20.4 °C ~ 20.4 °C
Kondisi Ruangan : Humidity : 49.6 % ~ 49.9 %
Air Pressure : 937.4 hPa ~ 937.5 hPa

4 Result of Calibration
Hasil Kalibrasi

Nominal mL	Volume at 20°C mL	Uncertainty k=2 mL
100	99.985	0.020

Note :

- The Reported Uncertainty is the uncertainty at the 95% confidence level with a coverage factor of k=2
Ketidakpastian yang dilaporkan adalah ketidakpastian pada tingkat kepercayaan 95% dengan faktor cakupan k=2
- The material used is Borosilicate Glass with coefficient of linear thermal expansion $3.3 \times 10^{-6}/^{\circ}\text{C}$
Bahan yang digunakan adalah Gelas Borosilikat dengan koefisien muai termal linier $3.3 \times 10^{-6}/^{\circ}\text{C}$

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Page 2 of 2

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www.iwaki-glass-indonesia.com

PT. IWAKI GLASS INDONESIA
MANUFACTURE LABORATORY GLASSWARE

CALIBRATION CERTIFICATE
SERTIFIKAT KALIBRASI

Number : 2556002
Nomor :

1 Description of Product
Keterangan Produk

Product Code : 5645-100-WC
Kode Produk :

Name of Product : Volumetric Flask, With Plastic Stopper, Class A, 100 ml With Certificate
Nama Produk :

Brand : IWAKI
Merek :

Capacity / Readability : 100 mL / - mL
Kapasitas / Daya Baca :

Volume of Tolerance : ± 0.10 mL
Toleransi Volume :

Class : A
Kelas :

Batch No / Identification No. : 14Z25-100
No. Batch / No. Identifikasi :

2 Method, Standard and Traceability
Metode, Standar dan Telusuran

Calibration Method : - ISO 4787:2021
Metode Kalibrasi : - WIS/CAL/064

Reference Standard : Balance : Certificate No. 843/TE/LK-AS/V/24
Water Thermometer : Certificate No. 6191/025/KAL/06/2024
Thermohygrometer : Certificate No. GE00637
Barometer : Certificate No. S.24 009 267

Traceability : The reported results of calibration traceable to SI units
Keterelusuran : of measurement through
Balance : LK-081-IDN
Water Thermometer : LK-045-IDN
Thermohygrometer : LK-160-IDN
Barometer : LK-032-IDN

Date of Issue : April 17, 2025
Diterbitkan Tanggal :

Calibration Laboratory
Erna Hernayati

This certificate consists of two pages
Sertifikat ini terdiri dari dua halaman

Attention :
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Page 1 of 2

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Kawasan Industri Dwipapuri Abadi, Blok N.8, Sumedang, 45364
Phone/Fax : 62-22-7780022 / 62-22-7793823 | Email : info-iwaki@ig-id.com



Certificate No.



5645-100-WC

Note : Calibration Certificate

- ✓ ISO 4787
- ✓ Guarantee of volume in one product.
- ✓ Listed , volume and uncertainty value .

PT. IWAKI GLASS INDONESIA
MANUFACTURE LABORATORY GLASSWARE

Number : 2556002
Nomor :

3 Calibration Data
Data Kalibrasi

Location of Calibration
Lokasi Kalibrasi : Calibration Laboratory PT. Iwaki Glass Indonesia

Calibration Date
Tanggal Kalibrasi : April 10, 2025

The Condition of Room
Kondisi Ruang : Temperature : 20.4 °C ~ 20.4 °C
Humidity : 49.6 % ~ 49.9 %
Air Pressure : 937.4 hPa ~ 937.5 hPa

4 Result of Calibration
Hasil Kalibrasi

Nominal mL	Volume at 20°C mL	Uncertainty k=2 mL
100	99.985	0.020

Note :

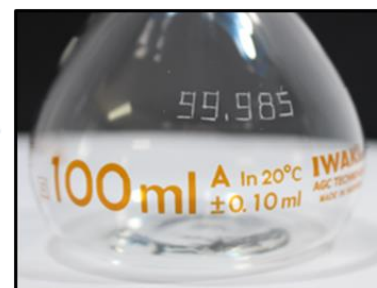
- The Reported Uncertainty is the uncertainty at the 95% confidence level with a coverage factor of k=2
Ketidakpastian yang dilaporkan adalah ketidakpastian pada tingkat kepercayaan 95% dengan faktor cakupan k=2
- The material used is Borosilicate Glass with coefficient of linear thermal expansion $3.3 \times 10^{-6}/^{\circ}\text{C}$
Bahan yang digunakan adalah Gelas Borosilikat dengan koefisien muai termal linier $3.3 \times 10^{-6}/^{\circ}\text{C}$

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Page 2 of 2

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www.iwakiglassindonesia.com



Volume



5645-100-WC

PT. IWAKI GLASS INDONESIA
MANUFACTURE LABORATORY GLASSWARE

Certificate of Assurance

Certificate No. : 25/2570COND200-34/45/022
 Date of Issue : May 07th, 2025
 Manufacturer : PT. Iwaki Glass Indonesia
 Kawasan Industri Dwipapuri Abadi Blok N.8
 Jl Raya Rancaekek Km 24.5 Sumedang 45364
 Jawa Barat, Indonesia
 PO No. : 000586/CMSI/L/02/2025
 Product : Condensor Dimroth 200 mm, TS 34/45
 Product Code : 2570COND200-34/45

Lot No.	Qty (pcs)
140425 57	2

We hereby certify that the above product met with the specifications and passed our QC process as follows;

- 1) Raw material
Body : Borosilicate Glass with Linear Coefficient of Expansion $3.3 \times 10^{-6}/^{\circ}\text{C}$
- 2) Dimensions based on a drawing No. 010/SCS/Sales/25
Iwaki Glass Indonesia's standard and a drawing, Passed QC inspection
- 3) Traceability of measuring devices
Dimensions : National Standard Institute

Quality Assurance Manager

Signed : Hadian Wibisono Adhi

Jl. Raya Rancaekek, Km. 24.5
Kawasan Industri Dwipapuri Abadi, Blok N. 8, Sumedang, 45364
Phone/Fax : 62-22-7780022 / 62-22-7793823 | Email : info-iwaki@igi-id.com
www.iwakidassolodonesia.com

Note : Certificate of Assurance

- **Guarantee quality product .**
Information related to :
 - ✓ Materials used
 - ✓ Specification
 - ✓ Traceability tool of the measurement used
- **Free of charge.**

igi PT. IWAKI GLASS INDONESIA
MANUFACTURE LABORATORY GLASSWARE

Date : 29 April 2025

No. COO : 004/COO/2025

To whom it may concern:

Certificate of Origin

Buyer : PT PASIFIK KIMIA INDONESIA

Supplier : PT. CAHAYATIARA MUSTIKA SCIENTIFIC INDONESIA
Kawasan Industri Jababeka I
Jl. Jababeka IX B Blok P-6H, Cikarang – Bekasi
Tel. 021-898355311 Fax. 89835317

Manufacturer : PT. IWAKI GLASS INDONESIA
Kawasan Industri Dwipapuri Abadi Blok N. 8
Jl. Raya Rancaekek Km. 24.5 Sumedang 45364
Tel. 022-7780022 Fax. 7793823

Purchase order no. : 000287/CMSI/L/02/2025

We hereby certify that the goods described here in are of PT. IWAKI GLASS INDONESIA Origin with IWAKI brand name.

Description of Goods : Measuring Cylinder, Class A, Amber Graduation, 250 ml

Product Code : 3022-250-N

Lot no. : 311024 54

Qty : 5 pcs

Yours sincerely,
Hadian Wisono Adhi
Quality Assurance Manager
PT. IWAKI GLASS INDONESIA

Jl. Raya Rancaekek, Km. 24.5
Kawasan Industri Dwipapuri Abadi, Blok N. 8, Sumedang, 45364
Phone/Fax : 62-22-7780022 / 62-22-7793823 | Email : info-iwaki@igi-id.com
www.iwakiid.com

Note : Certificate of Origin

- ✓ This certificate provides information about the product's manufacturer.
- ✓ Free of charge