

IEC 60335-1 / GB 4706.1 CLAUSE 22.32

Ceramic Material Pressure Test Apparatus

Model KP-Y3501

A purpose-built laboratory system for high-pressure basic-fuchsine penetration testing of ceramic materials used in household and similar electrical appliances. Automatic pressurization, timed holding and automatic pressure release support controlled long-duration exposure cycles.



TEST OBJECT	PRESSURE	TIME SETTING	VESSEL VOLUME
Ceramic fragments	15 to 20 MPa*	1 to 99 h	450 mL

PRODUCT OVERVIEW

The apparatus checks for internal pathways in ceramic material that may not be tightly sintered. Prepared fragments are

What the test evaluates Dye penetration pathways that may indicate interconnected pores or insufficiently sintered ceramic material.	Important distinction This is not a compression-strength tester and does not measure the maximum mechanical load of a finished ceramic part.
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TECHNICAL SPECIFICATIONS

PARAMETER	SUPPLIED SPECIFICATION
Model	KP-Y3501
Power supply	AC 380 V, 50 Hz
Rated power	4 kW
Test pressure	Standard condition not less than 15 MPa; adjustable up to 20 MPa. Exact lower limit and control tolerance require confirmation.
Test time setting	1 to 99 h
Completion reminder	3 min
Test vessel volume	450 mL
Pressurization	Automatic electric pressurization
Pressure release	Automatic pressure release
Approx. dimensions	1200 x 500 x 1360 mm (L x W x H)

* Final pressure range, pressure indication accuracy, control tolerance, vessel working capacity, protection devices and documentation package must be confirmed in the technical agreement.

Standard Position and Test Purpose

How the apparatus supports the referenced ceramic tight-sintering evaluation

APPLICABLE STANDARD AND COMPLIANCE NOTE

KP-Y3501 was originally designed with reference to GB 4706.1-2005, Clause 22.32. The same test concept is associated with IEC 60335-1, Clause 22.32. The applicable edition, national adoption and any relevant appliance-specific Part 2 standard must be confirmed before quotation. The apparatus supports performance of the referenced test method; it is not itself an IEC-certified product.

WHY THIS TEST IS REQUIRED

Ceramic components may contribute to insulation or protective construction in electrical appliances. A surface can appear intact while internal interconnected pores remain. The pressure-assisted dye method is intended to reveal these pathways by driving a visible solution into ceramic material that is not tightly sintered.

TEST PURPOSE AND SELECTION BOUNDARY

Suitable use

Ceramic fragments are pressure-exposed in basic-fuchsin solution, then rinsed, dried, re-broken and visually inspected. Select this apparatus when the project specifically calls for a dye penetration or tight-sintering evaluation.

Different equipment is required for

Compression strength, dielectric strength, thermal shock, finished-product pressure resistance or other mechanical and electrical performance tests. Confirm the intended method before equipment selection.

PRESSURE-DURATION RELATIONSHIP

Test pressure (MPa) x test duration (h) = about 180

Illustrative values only - use the condition required by the selected standard edition and approved test plan.

SELECTED PRESSURE	CALCULATED DURATION	APPLICATION NOTE
15 MPa	approximately 12 h	Typical minimum-pressure example
18 MPa	approximately 10 h	Intermediate calculated example
20 MPa	approximately 9 h	Upper value in supplied configuration

Edition confirmation is essential

GB 4706.1-2005 has been superseded in China by GB/T 4706.1-2024. International projects may also use different IEC editions or national adoptions. State the exact standard and clause when requesting a quotation.

Test Principle and Laboratory Workflow

A controlled sequence from sample preparation to fracture-surface inspection

TEST PRINCIPLE

Prepared ceramic fragments are fully immersed in a solution containing 1 g of basic fuchsin in each 100 g of methylated spirit. Pressure and exposure time encourage the colored solution to enter interconnected pathways. After the exposure cycle, freshly created fracture surfaces are examined for visible dye traces in accordance with the laboratory's controlled procedure and selected standard edition.

DETAILED TEST SEQUENCE

01 Prepare and identify samples

Break the ceramic material into pieces suitable for the 450 mL vessel. Record sample identity, material and batch information. Ensure the intended quantity can be immersed without obstructing safe vessel closure.

Operator task: Sample breaking, identification and loading plan.

02 Prepare the test solution

Prepare the specified basic-fuchsin and methylated-spirit solution using the laboratory's approved method. Confirm reagent identification, concentration, storage condition and chemical-safety controls.

Operator task: Solution preparation, labeling and chemical handling.

03 Load, close and pressurize

Immerse the fragments, close the vessel correctly and select the approved pressure-duration condition. The electric pump raises the pressure and the system enters the holding stage after reaching the selected condition.

Operator task: Vessel closure, set-point entry and pre-cycle safety check.

04 Hold and complete the cycle

Maintain the selected condition for the calculated duration. At the end of the programmed time, the pressure-release mechanism operates and the audible reminder indicates cycle completion.

Operator task: Monitor status and verify safe pressure release before access.

05 Rinse, dry, re-break and inspect

After confirming that pressure has returned to a safe level, remove the samples, rinse and dry them, then break them into smaller pieces. Examine the newly created fracture surfaces with the naked eye for visible dye penetration. Record observations according to the applicable acceptance criteria and laboratory procedure.

Operator task: Post-test handling, visual examination, result recording and waste management.

RESULT INTERPRETATION

What is examined

Only the newly exposed fracture surfaces are evaluated for visible dye traces after the prescribed rinsing and drying sequence.

Who determines acceptance

The laboratory applies the criteria of its selected standard edition and approved procedure. The apparatus performs the exposure cycle but does not make the final conformity decision.

Equipment Functions, Installation and Safety

Practical information for laboratory planning and controlled operation

OPERATING FUNCTIONS

- Automatic electric pressurization: reduces manual pumping during a long-duration high-pressure exposure cycle.
- Adjustable high-pressure operation: supports the prescribed condition of not less than 15 MPa and adjustment up to 20 MPa, subject to the confirmed configuration.
- Timed pressure holding: allows the operator to set a test period from 1 to 99 hours.
- Automatic pressure release: initiates pressure release when the programmed holding period has elapsed.
- Audible completion reminder: provides a 3-minute end-of-cycle alert.
- Integrated laboratory format: combines the 450 mL pressure vessel, booster, release mechanism and control system in one floor-standing cabinet.

EQUIPMENT VIEWS



Front view



Angled view



Rear connections

INSTALLATION PLANNING

- Confirm AC 380 V, 50 Hz supply, protective earthing and local electrical requirements before installation.
- Provide a stable laboratory floor and adequate clearance for operation, inspection and service access around the 1200 x 500 x 1360 mm cabinet.
- Plan suitable ventilation and chemical handling controls for methylated spirit and basic fuchsin.
- Confirm the required drainage, fluid handling and waste-disposal arrangements with the laboratory safety team.
- Verify whether the standard 450 mL vessel can accommodate the intended fragment size, quantity and solution level.

LABORATORY SAFETY NOTE

- Operation should be limited to trained personnel under an approved risk assessment.
- Follow current safety data sheets for methylated spirit and basic fuchsin; control ignition sources and use suitable ventilation and PPE.
- Inspect the vessel, sealing surfaces and pressure-related components before each cycle as required by the operating instructions.
- Never open the vessel until pressure has been fully released and a safe condition has been independently verified.

Applications and Configuration Support

Information required to match the apparatus to the intended test program

TYPICAL USERS AND APPLICATIONS

Typical users

- Household appliance safety testing laboratories
- Third-party testing and certification organizations
- Manufacturer quality-control and product-validation laboratories
- Ceramic insulating component suppliers
- Research institutes and inspection organizations

Typical laboratory uses

- Incoming ceramic material verification
- Product development and construction evaluation
- Pre-compliance or type-test preparation
- Supplier quality investigation
- Controlled comparison of ceramic sample batches

COMPLIANCE AND REGULATORY ASSURANCE

The KP-Y3501 Pressure Test Apparatus is designed for the high-pressure fuchsine penetration test of ceramic materials in accordance with the relevant requirements of IEC 60335-1 and GB 4706.1 Clause 22.32. Please confirm the applicable standard edition, test pressure, holding time and documentation requirements before ordering.

TECHNICAL INQUIRY AND EXPERT SUPPORT

To confirm the correct configuration, please provide the following project information:

INFORMATION	DETAILS REQUIRED
Standard	Number, edition and clause
Sample	Ceramic material, fragment size and quantity
Test conditions	Required pressure and holding time
Vessel configuration	Confirm whether 450 mL is sufficient for the intended batch
Power supply	Voltage, frequency, phase and installation conditions
Documentation	Calibration, inspection or operating document requirements

Special pressure ranges, vessel capacities or test procedures should be specified before quotation.

DOCUMENTATION AND FINAL TECHNICAL AGREEMENT

- State any required calibration points, accuracy class or traceability expectations.
- Confirm whether dimensional inspection records, factory test records or operating instructions are required.
- Agree the final pressure range, control tolerance, protection devices and vessel configuration before production.
- Use the signed technical agreement as the controlling reference for the supplied configuration.

Submit a technical inquiry

Send the standard edition, sample details, pressure-duration condition, local power supply and documentation requirements for configuration review.