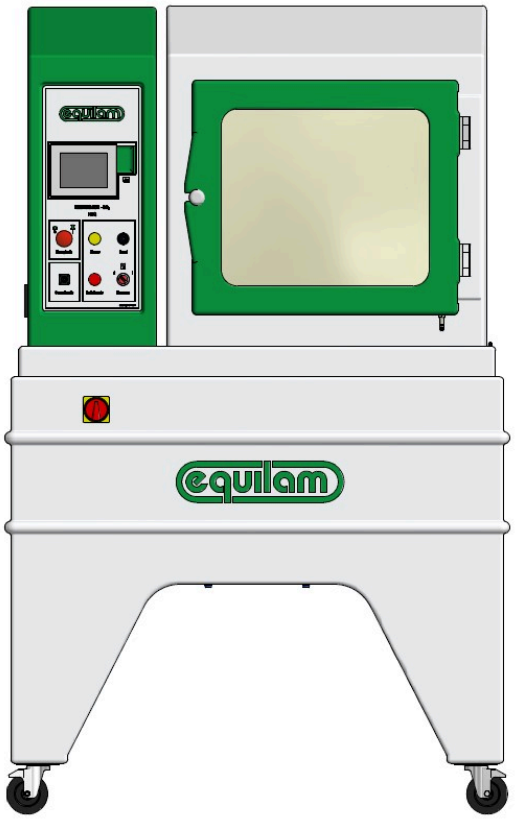
CORROSION TEST EQUIPMENT

SO_2 – Kesternich Test Chamber

Model KEQ300 · 300 L standard · Custom, Walk-In & Drive-In versions



Illustrative figure – KEQ300

A fully controlled, acid-humid environment that reproduces the corrosive attack of industrial atmospheres, engine and heating-system exhaust gases and acid rain.

Built entirely in fiberglass with a vinyl-ester resin of high chemical and temperature resistance – inside and out – with no metallic parts in the test space.

Optional second gas line for **CO_2**, combined with SO_2 or separately.

US PATENT # 10371623

300 L	40 °C	25–6,000 mL	Walk-In
Standard test volume (79.3 gal)	Typical test temperature, 97–100 % RH	SO_2 dosing range per cycle	Custom sizes up to Walk-In & Drive-In

AUTOMATIC CYCLES IN ACCORDANCE WITH

ISO 22479 · ASTM G87 · DIN 50018 · ISO 6988 · ISO 3231 · Others on request

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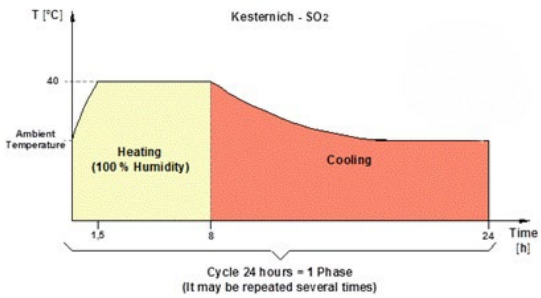
TEST PRINCIPLE

The Kesternich (moist SO_2) test

An accelerated corrosion test in which specimens are exposed to a heated, saturated atmosphere containing a fixed amount of sulfur dioxide. Condensate forms on the specimens and becomes acidic, reproducing industrial and urban atmospheres in a matter of days.

Typical 24-hour cycle

- Approx. **2 L of deionized water** in the chamber floor (300 L chamber).
- **SO_2 dose** injected at the start of each cycle – typically **0.2 L, 1 L or 2 L** per 300 L.
- Heat-up to **40 ± 3 °C** in about 1.5 h; condensation at 100 % RH on the specimens.
- Exposure for **8 h** (or 24 h), then purge / drying phase for the remainder of the 24 h.
- Cycles repeated as required by the product specification (e.g. 5, 10, 15 cycles) or until a defined failure.



Method 1 / Method A – Continuous

Specimens are exposed to SO_2 for the full 24 h at 40 °C. Used when specimens are seriously affected by temperature and humidity alone.

Method 2 / Method B – Alternating

8 h exposure to SO_2 at 40 °C, followed by 16 h in a standard atmosphere (approx. 23 °C, < 72 % RH) with the chamber vented.

Applicable standards

STANDARD	TITLE / SCOPE	STATUS
ISO 22479:2019	SO_2 test in a humid atmosphere (fixed gas method) – metals, metallic, non-organic and organic coatings.	Current – replaces ISO 6988 and ISO 3231
ASTM G87-02 (2023)	Conducting moist SO_2 tests – 300 L reference chamber.	Current (reapproved 2023)
DIN 50018	Saturated atmosphere with SO_2 (KFW 0.2 S / 2.0 S, AHT).	Legacy – still widely specified
ISO 6988	Metallic and non-organic coatings – SO_2 with condensation.	Legacy – superseded by ISO 22479
ISO 3231	Paints and varnishes – humid SO_2 atmospheres.	Legacy – superseded by ISO 22479

Common designations

KFW 0.2 S / KFW 2.0 S – constant condensation climate with 0.2 L or 2.0 L of SO_2.
AHT – alternating climate: humid phase followed by a drying phase in ambient air.

Typical applications

Organic and metallic coatings, plated and galvanized parts, fasteners, roofing and façade materials, solar-module frames, electrical contacts and automotive components. Results are commonly rated per ISO 10289 and ISO 4628.

CONSTRUCTION DETAILS

Built for an aggressive acid atmosphere

Every surface in contact with the test atmosphere is made of inert, non-metallic material, so the chamber itself never contaminates the test.



PLC control panel

Programmable logic controller with colour touch screen to view and adjust all test parameters. Programmable SO_2 injection start, heating ramp and fully automatic cycle; RH indication during the cooling phase.



Touch-screen interface

Shows programmed and executed modes, live trend graph, elapsed and remaining time, and date/time log of alarms. °C / °F selectable.



Front door with tempered glass

Front-opening door per the technical standards, with 0.23" (6 mm) tempered glass viewing window.



Non-metallic specimen supports

6 specimen supports in non-metallic material. 15° inclined racks and special customer racks available as options.



Fiberglass cabinet on casters

Vinyl-ester fiberglass inside and out, smooth finish for easy cleaning and no drip points over the specimens. Mobile design on casters.



Data acquisition (optional)

Supervisory software for recording and exporting test data via RS-232 / RS-485 / USB / Ethernet.

Water tray & climate

- DI-water tray in inert, non-metallic material – 0.52 gal (2 L).
- Internal cabinet heaters; low-water and over-temperature protection.
- Chamber cooling by air circulation **with the door closed**, avoiding release of SO_2 to the laboratory.

SO_2 dosing

- High-precision SO_2 dosing device with electronic sensors.
- Gas line in PTFE (Teflon®) and 316 stainless steel.
- Dose 25 – 6,000 mL (0.0083 – 2 % of chamber volume); other ranges on request.

CONTROL SYSTEM

Automatic, programmable, safe

- Fully automatic cycles per ISO 22479, ASTM G87, DIN 50018, ISO 6988 and ISO 3231 – other standards on request.
- Program loops: 20 modes, up to 100 repetitions per program.
- Independent P.I.D. control and auto-tuning for each mode, with ramps as required by the standard.
- Independent timers for heating, cooling and total test time (SV and PV), plus hour meter.
- Timer with indication of test time and interruption time.
- Scheduled start by date and time.
- Live graph of test parameters with a single touch.
- Resolution 0.1 °C; scan rate 30 ms maximum.
- Audible and visual alarms with error-type indication; depending on the alarm, power is cut automatically.
- Preventive-maintenance function to avoid unplanned stops.
- Optional ON/OFF event outputs (220 V, 5 A) for dynamic tests.
- Temperature display in °C or °F.

TECHNICAL INFORMATION

KEQ300 – technical data

PERFORMANCE	
Internal temperature range	Ambient + 9 °F (+5 °C) to +140 °F (+60 °C)
Temperature homogeneity	± 1.8 °F (± 1 °C)
Relative humidity (warm-up / exposure phase)	97 – 100 %
SO_2 dosing	25 – 6,000 mL per cycle (0.0083 – 2 % of chamber volume) – others on request
CO_2 dosing (optional)	50 – 1,500 mL per cycle, combined with SO_2 or separately – others on request
Cycle	Fully automatic
DIMENSIONS & WEIGHT	
Internal test volume	79.3 gal (300 L) – other volumes on request
Internal dimensions (L × W × H)	28" × 19.5" × 29.5"–34.3" (710 × 495 × 750–870 mm)
External dimensions (L × W × H)	45.3" × 39.4" × 78.7" (1,150 × 1,000 × 2,000 mm)
DI-water tray volume	0.52 gal (2 L)
Net weight (approx.)	143 lb (65 kg)
Shipping weight, crated (approx.)	309 lb (140 kg)
UTILITIES & INSTALLATION	
Electrical supply	208–220 VAC, 1 Ø, 60 Hz, 10 FLA (others on request)
Installation environment	+73.4 °F (+23 °C), ≤ 72 % RH recommended

OPTIONAL GAS CONFIGURATION

CO_2 introduction – combined with SO_2 or separately

The chamber can be supplied with a second, independent gas line for carbon dioxide. SO_2 and CO_2 can then be introduced together or separately in the same test chamber, under the same temperature and condensation conditions of the Kesternich cycle.

SO_2 only Standard Kesternich test	**CO_2 only** Carbon dioxide atmosphere	**SO_2 + CO_2** Combined atmosphere
Sulfur dioxide test per ISO 22479, ASTM G87 and DIN 50018. The CO_2 line stays closed.	Humid CO_2 atmosphere per customer or product specification. The SO_2 line stays closed.	Both gases dosed in the same cycle, each with its own programmed volume and injection start.

What the option includes

- Independent SO_2 and CO_2 dosing devices with electronic mass flow control.
- Separate gas lines in PTFE (Teflon®) and 316 stainless steel, with check valves against back-flow between lines.
- PLC program selects SO_2, CO_2 or both, and the injection start of each gas.
- Method 1 (24 h exposure) and Method 2 (8 h exposure + 16 h standard atmosphere) for either gas or both.

DOSING RANGES	
SO_2	25 – 6,000 mL per cycle
CO_2	50 – 1,500 mL per cycle
Other ranges	Consult factory

Recommended with this option: EQOP.0150 SO_2 / CO_2 leak detection · EQOP.3000 nitrogen purge or EQOP.3001 compressed-air purge · SO_2 / CO_2 safety cabinet. Gas cylinders not included.

Chemical cross-contamination can distort the test result. SO_2 forms sulfurous and sulfuric acid in the condensate; residues stay on the walls, water tray, racks and gas lines, and the fiberglass is conditioned by the gas it has been exposed to (ASTM G87 requires ten 24 h conditioning cycles with 2 L of SO_2 before a new chamber is used). A chamber that has run SO_2 will carry sulfur residues into a later CO_2-only test – and the reverse also applies – producing more (or different) corrosion than the specified atmosphere would cause. Results of combined SO_2 + CO_2 tests are not comparable with standard Kesternich results.

Recommended practice

- **One chamber, one gas regime.** The safest way to avoid distorted results – mandatory when results must be compared over time or with other laboratories.
- Before changing gas: drain and replace the DI water, rinse chamber, tray and racks with DI water, and dry.
- Purge the chamber and both gas lines with nitrogen (EQOP.3000) or compressed air (EQOP.3001).
- Run conditioning or blank cycles with the new gas regime before testing specimens.
- Verify the chamber with a corrosivity check (reference specimens) after a change of regime.
- Record the chamber's gas history and cleaning in every test report.

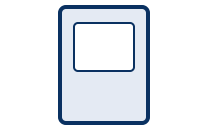
SIZES & CUSTOMIZATION

From 300 L benchtop testing to Drive-In

The KEQ300 is our standard 300 L chamber – the reference volume used by ASTM G87, ISO 22479 and DIN 50018. Equilam N.A. also designs and builds Kesternich chambers to the customer's dimensions, from larger cabinets up to Walk-In rooms and Drive-In chambers for complete assemblies and vehicles.

KEQ300

Standard · 300 L (79.3 gal)



- Reference chamber volume of the main standards.
- Mobile, on casters.
- Fast delivery, standard configuration.

Custom size

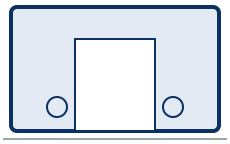
Volume to customer specification



- Larger internal volume for bigger or more specimens.
- SO_2 dose, water volume and heating scaled to keep the standard concentration.
- Racks designed for the customer's parts.

Walk-In / Drive-In

Room-size chambers



- For large structures, assemblies, equipment and vehicles.
- Fiberglass construction, sealed doors, SO_2 monitoring and exhaust scrubbing.
- Engineered to the customer's site and standard.

How a custom chamber stays in accordance with the standard. The test standards define the SO_2 dose for a 300 L reference chamber. For other volumes the SO_2 dose, DI-water quantity and heating capacity are scaled so the test reproduces the same SO_2 concentration, temperature and condensation conditions as the 300 L reference.

Information we need to quote a custom chamber

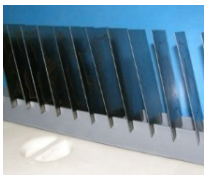
- Test standard(s) and method(s) to be run.
- Size, weight and quantity of specimens / parts.
- Required internal dimensions or test volume.
- Available floor space, door access and ceiling height.
- Site utilities: power, DI water, drain and exhaust.
- Gas regime: SO_2, CO_2 or combined (see page 5), and other special requirements.

Also available: corrosion test chambers for combined SO_2 / CO_2 atmospheres (model SSe28-810, approx. 1,200 × 810 × 850 mm internal), with independent SO_2 and CO_2 dosing. Specification sheet available on request.

OPTIONAL ACCESSORIES

Options & accessories

Complete the installation with safety, exhaust-treatment and specimen accessories.



EQOP.0006

Sample rack, 15° inclination

One rack for the 300 L (79.3 gal) chamber.



EQOP.0047

Digital RH indicator

Relative-humidity indication. Included as standard in the KEQ300.



EQOP.0113 · 1 chamber

Safety cabinet for Kesternich – SO_2

Fiberglass walls and doors, 130.66 CFM fiberglass fan, fiberglass fume hood smooth on both sides. 63.0" × 49.2" × 114.2" (1,600 × 1,250 × 2,900 mm). Two-way door (2) 27.6" × 74.9" (700 × 1,900 mm).



EQOP.0113 · 2 chambers

Safety cabinet for Kesternich – SO_2

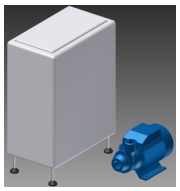
Same construction for two chambers. 99.6" × 74.9" × 114.2" (2,530 × 1,900 × 2,900 mm). Two-way door (2) 27.6" × 74.9" (700 × 1,900 mm).



EQOP.0152

Gas scrubber for Kesternich SO_2

Chamber discharge into a counter-flow scrubber with aqueous sodium-hydroxide solution.



EQOP.0112

Condensate drainage compartment

With pump, to drain the solution into the customer's existing sewage-treatment system.

EQOP.0150

Gas leak-detection safety system

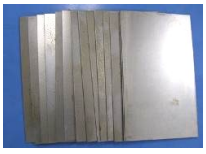
SO_2 detection (SO_2 and CO_2 with the CO_2 option), integrated with the chamber PLC and the safety cabinet.



EQOP.0037

Supervisory software

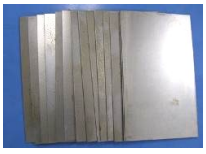
Data acquisition and test records.



EQOP.0076

Test panels 2" × 4" (50 × 100 mm)

Per DIN 50018 / ISO 6988 – 100 pieces.



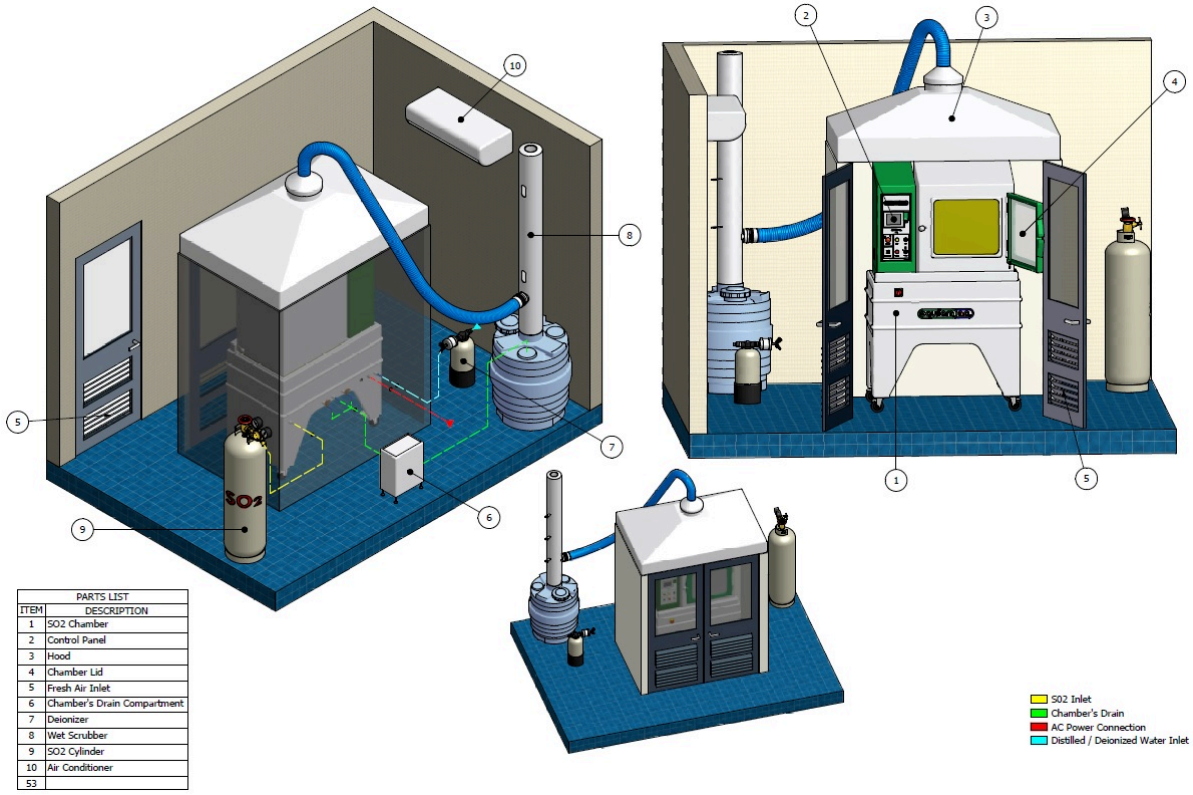
EQOP.0077

Test panels 10" × 15" (250 × 400 mm)

Per DIN 50018 / ISO 6988 – 25 pieces.

LABORATORY PLANNING

Recommended corrosion laboratory – SO_2



Illustrative layout of a complete installation with safety cabinet, scrubber, drain compartment and SO_2 cylinder.

Recommended facilities

- DI water: 0.52 gal (2 L) per 24 h cycle; pressure 0.4–1.0 bar; Ø 3/8".
- DI-water quality per ASTM D1193 Type IV.
- City water supply for chamber cleaning.
- Electrical: 208–220 VAC, 1 Ø, 60 Hz, 10 FLA.
- Exhaust: to outside of the room where the equipment is installed, or via gas scrubber EQOP.0152.
- Drain: 1/2" tubing, to sewage treatment.

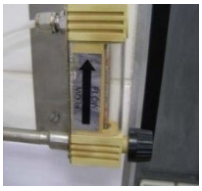
Safety recommendations

- Dedicated, non-recirculating ventilation; test room kept at negative pressure.
- SO_2 (and CO_2) detectors near floor level and in the gas cabinet, with readout outside the room.
- Emergency exhaust and shut-off activated by gas detection or manual button.
- Gas cylinders stored in a ventilated gas cabinet; equipment grounded.
- Never vent SO_2 directly to atmosphere – scrub with an alkaline solution.

Warning – This document does not purport to address all safety concerns, if any, associated with the use of sulfur dioxide. It is the user's responsibility to establish appropriate safety and health practices and to determine the applicability of regulatory limitations before use.

OPTIONAL ACCESSORIES (CONTINUED)

Gas supply, services & warranty



EQOP.0054

SO_2 flow meter

316 stainless-steel flow meter for SO_2 dosing, with adjusting valve.



EQOP.0055

SO_2 cylinder

SO_2 3.0 – 99.9 %, 247.2 ft³ (7 m³), with pressure-regulating valve and two 316 stainless-steel pressure gauges.

EQOP.3000

Chamber purge with inert gas

Nitrogen purge of chamber and gas lines (cylinder not included). Recommended with the CO_2 option.

EQOP.3001

Chamber purge with compressed air

Compressed-air purge of chamber and gas lines.

Special racks for customer test samples and further options: consult factory.

Services

SERVICE	DESCRIPTION
Start-up & commissioning	On-site installation check, start-up and operator training (approx. 3–4 days).
Compliance certificate	Temperature compliance certificate (electronic).
Chamber corrosivity verification	Verifies reproducibility and repeatability in two specimen-exposure zones of the chamber, using a total of 6 standard specimens.

Warranty & support

Warranty

One (1) year parts warranty against manufacturing defects from the date of delivery at the customer's site, assuming the equipment is used under normal operating conditions in accordance with the instruction manual. This warranty does not apply to glassware (lamps). For non-warranty issues during the warranty period, actual expenses apply.

Documentation & training

All equipment is delivered with Installation, Maintenance and User manuals. Our team is available for questions and clarifications. If required, we provide on-site assembly and staff training (cost available on request).

Request a quote

Ask us about other standards, voltages, custom sizes, Walk-In and Drive-In configurations.

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Equipment appearance and specifications are subject to change without notice. Product images are illustrative.