Noxious gas climate tests

Temperature and climate test chambers Series WK

with noxious gas dosing device type BSB

Type WK ... with BSB

Corrosive gasses (noxious gasses) in the atmosphere damage materials, components, appliances and buildings. Noxious gas climate tests in research, design and quality assurance are necessary to assess the suitability of materials for particular applications.

In order to be able to compare results, tests are specified by various standards.

For the systematic research of corrosion patterns, test systems are called for that reproducibly precipitate corrosion by way of the adjustable dosing of noxious gasses and simulating of climates in accordance with standards.
The test systems meet the extremely high design and material requirements necessary for continuous exposure to corrosive test atmospheres.

Why noxious gas tests?

Corrosion is to be found almost everywhere and is influenced by various external factors. For instance, the parameters temperature, air humidity, wind and radiation can accelerate or retard corrosion.

A contaminated atmosphere - caused to a large extent by traffic, industry, power stations, heating installations and waste disposal - plays a very important part. This is the so-called “industrial atmosphere”. There is no exact definition of the “industrial atmosphere”, as its composition differs depending upon the type of emitters in the vicinity of the place under view.

Aim of research:

- research of effects of corrosive substances
- to find suitable materials or protective coatings to prevent or at least to reduce corrosion

The atmospheric gasses with the most corrosive properties are:

- sulphur dioxide (SO_2)
- hydrogen sulphide (H_2S)
- nitrogen oxide (NO_2)
- chlorine (Cl_2)
- ozone (O_3)

Provision of noxious gasses

Storable noxious gasses are made available in cylinders equipped with the appropriate fittings. It could be the case that, for certain tests, thinned gasses or mixed gasses must be dosed instead of concentrated gasses. Gasses that cannot be stored (e.g. ozone), are produced within the system itself.

Standards and regulations

Until recently, noxious gas climate tests were performed mainly in the electronics industry for testing the corrosion of contacts. Hence, the most frequently used noxious gas standards derive from this industry. The most common standards are listed here:

Standard	Test room Temperature (°C)	Test room Humidity (% r. F.)	Concentration SO_2 (ppm)	Concentration H_2S (ppm)	Testing time in days
Pre-standard DIN 40046 Part 36, 3.87 Test Kx	25 ± 2	75 ± 5	1 ± 0,3 (10 ± 2)	–	4 / 10 / 21
Pre-standard DIN 40046 Part 37, 3.87 Test Ky	25 ± 2	75 ± 5	–	1 ± 0,3	
IEC 68-2-42 Test Kc	25 ± 2	75 ± 5	25 ± 5	–	
IEC 68-2-43 Test Kd	25 ± 2	75 ± 5	–	10 – 15	

Contemporary test standards distinguish between the following testing methods:

- single-gas tests
- series of single-gas tests
- mixed gas tests

A series of single-gas tests as well as mixed gas tests pose specific problems (compatibility of the gasses, the creation of new compounds, separate measurement of the individual components, memory effects etc.).

The ozone endurance test is of great importance for the testing of organic materials and in particular for the testing of elastomers.

When exposed to ozone, these materials embrittle quickly.

Hair cracks form on the surface of materials subjected to ozone that then lead to extensive material destruction.

IEC 68-2-60 (identical with DIN EN 60068-2-60)
Environmental testing procedures
Part 2: Test methods
Test Ke: Corrosion test with flowing gas mixture

Parameter	Methode 1	Methode 2	Methode 3	Methode 4
H_2S (10^{-9} vol/vol)	100 ± 20	10 ± 5	100 ± 20	10 ± 5
NO_2 (10^{-9} vol/vol)	–	200 ± 50	200 ± 50	200 ± 20
Cl_2 (10^{-9} vol/vol)	–	10 ± 5	20 ± 5	10 ± 5
SO_2 (10^{-9} vol/vol)	500 ± 100	–	–	200 ± 20
Temperature °C	25 ± 1	30 ± 1	30 ± 1	25 ± 1
Humidity in % r.h.	75 ± 3	70 ± 3	75 ± 3	75 ± 3
Volume change per hour	3 – 10	3 – 10	3 – 10	3 – 10

Preferred test periods: 4, 7, 10, 14 and 21 days

Climate test cabinet with noxious gas system

Design characteristics of the noxious gas test system

Basic units consist of the well-known climate test cabinets of the WK series

- Design details of the climate test chambers can be found in the WK series leaflet
- Noxious gas test chamber made of acrylic glass or PVDF (polyvinylidene-fluoride)
- Dosing pump (PTFE) or mass flow controller
- Monitor of low pressure in interior test chamber
- Thinning of the discharge air containing noxious gas

Temperature range
with acrylic glass +15 ... +40 °C
with PVDF +15 ... +80 °C

Humidity range 40 ... 75 % r.h.

Dew point - temperature range
with acrylic glass +10 ... +38 °C
with PVDF +10 ... +60 °C

Noxious gas test chambers

Volume approx. 64 l [1)]
usable height approx. 400 mm
width approx. 400 mm
depth approx. 400 mm

Volume approx. 125 l [2)]
usable height approx. 500 mm
width approx. 500 mm
depth approx. 500 mm

[1)] suitable for WK340 and larger
[2)] suitable for WK500 and larger

Switch cabinet

Suitable to accommodate up to four gas dosing devices

Dimensions
height approx. 1.900 mm
width approx. 800 mm
depth approx. 400 mm

Function

Temperature and air humidity are maintained within the specified tolerance values in test room 1 of the climate test cabinet. The test room 1 and its installations are not exposed to noxious gas.

Test room 2 made of a corrosion-resistant material is designed as interior test room of test room 1. The conditioned air of test room 1 flows around the entire outer jacket of the interior test room thus sustaining the selected temperature (air-jacket tempering. The aerosol-free evaporative humidification and the dehumidification of the supply air is effected within test room 1.

The conditioned air mixed with noxious gas flows through test room 2. The perforated floor ensures that the mixture is evenly distributed.

The corrosion-resistant suction pump ensures a slight low pressure in the interior test chamber.

The volume flow being extracted is measured. If a specific differential pressure is not achieved a solenoid valve closes the gas supply line.

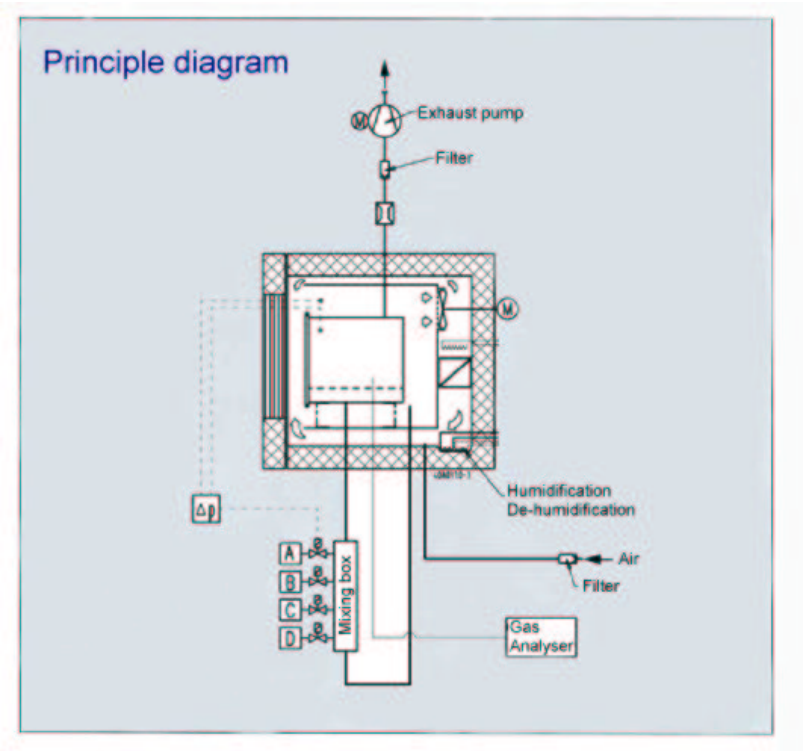
Removing the noxious gas test chamber from the climate test chamber permits the use of the chamber for climate tests without the application of noxious gasses.

The gas cylinders and pressure reducers required for gas dosing must be provided by the user.

A gas dosing pump with infinitely variable capacity or a mass flow controller is fitted downstream after the pressure reducer.

The required concentration is calculated from the ratio of noxious gas volume flow to that of air volume flow (conditioned air from the climate test cabinet).

The user must provide safe disposal of the discharged air (scrubber, filter, fume cabinet).



Test the best ...

A complete line of systems is available offering test space volumes ranging from approx. 60 l to 1,500 l, a working range from -75 ... +180 °C and relative humidity values ranging from 10 ... 98 % r.h.

We also offer an extensive line of field-proven test systems specially for simulating exposure to weather, temperature shock, corrosion and long-time tests for application in research, development, quality control and production.

Of course, Weiss - as one of the leading producers of environmental simulation systems world-wide - offers the entire spectrum of high-tech test systems starting from a series of cost-effective test systems up to customised walk-in chambers and in-line systems.

If it's know-how, service and reliability that you are looking for - contact Weiss Umwelttechnik.

Technical Sales Offices

Berlin
13407 Berlin-Reinickendorf · Flottenstraße 58
Tel. (0 30) 40 99 05-10 · Fax (0 30) 40 99 05-50
eMail: berlin@wut.com

Hamburg
22459 Hamburg-Niendorf · Sperberhorst 6
Tel (0 40) 68 59 96 · Fax (0 40) 68 52 91
eMail: hamburg@wut.com

Hannover
30853 Langenhagen · Walsroder Straße 149
Tel. (05 11) 7 28 19-10 · Fax (05 11) 7 28 19-30
eMail: hannover@wut.com

Oberhausen
46045 Oberhausen · Mühlheimer Straße 48
Tel. (02 08) 6 20 65-10 · Fax (02 08) 6 20 65-20
eMail: oberhausen@wut.com

Stuttgart
70567 Stuttgart-Möhringen · Zettachring 10
Tel. (07 11) 90 02 45-10 ·Fax (07 11) 90 02 45-30
eMail: stuttgart@wut.com

Nürnberg
90592 Schwarzenbruck · Robert-Bosch-Straße 15
Tel. (0 91 28) 92 37 55 · Fax (0 91 28) 92 37 65
eMail: nuernberg@wut.com

München
82166 Gräfeling · Wandlhamer Straße 31
Tel. (0 89) 89 80 45-10 · Fax (0 89) 89 80 45-30
eMail: muenchen@wut.com

Leipzig
04105 Leipzig · Tschaikowskistraße 14
Tel. (03 41) 9 84 57-10 · Fax (03 41) 9 84 57-30
eMail: leipzig@wut.com

Subsidiaries

Weiss Umwelttechnik Ges.m.b.H.
A-1230 Wien · Ober-Laaer Straße 316
Tel. (01) 6 16 66 97 · Fax (01) 6 16 66 97-13
eMail: wien.wuw@schunk-group.com

Weiss Technik Belgium B.V.B.A.
B-1770 Liedekerke
Nijverheidszone · Begijnenmeers 63
Tel. (0 53) 68 10 10 · Fax (0 53) 68 10 20
eMail: sales@weisstechnik.be

Weiss Technik AG
CH-8802 Kilchberg · Böndlerstraße 29
Tel. (01) 7 16 10 66 · Fax (01) 7 16 10 76
eMail: info@weiss-technik.ch

Weiss Technik France E.U.R.L.
F-78955 Carrières sous Poissy
283, route d'Andrésy
F-78304 Poissy Cedex · B.P. 4015
Tel. (1) 34 01 11 00 · Fax (1) 39 27 37 84
eMail: info@weissfr.com

Weiss Technik Ltd.
GB-Marlow · Buckinghamshire SL7 1NX
Willowbank House · 84 Station Road
Tel. (0 14 94) 43 43 24 · Fax (0 14 94) 43 43 25
eMail: info@weisstechnik.co.uk

Weiss Technik Italia S.r.l.
I-20013 Magenta (Mi) · Via Murri, 22-28
Tel. (02) 97 29 16 16 · Fax (02) 97 29 16 18
eMail: info@weissitalia.it

Weis Enet Industrietechniek B.V.
NL-4004 JP Tiel · Morsestraat 8
Tel. (03 44) 67 04 00 · Fax (03 44) 67 04 05
eMail: info@weissenet.nl

Weiss Environmental Technology Inc.
Menomonee Falls, WI 53051, USA
W146 N9300 Held Drive
Tel. (2 62) 2 53-87 30 · Fax (2 62) 2 55-13 91
eMail: info@schunkgraphite.com

4.04

WEISS TECHNIK
Weiss Umwelttechnik GmbH
Simulationsanlagen • Messtechnik
35447 Reiskirchen-Lindenstruth / Germany • Greizer Str. 41–49
Telefon (0 64 08) 84-0 • Telefax (0 64 08) 84-87 10
www.weiss.info • www.wut.com • eMail: info@wut.com