

# The IFA's Test Gas Stream and its Possible Applications for Proficiency Testing Schemes

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## Introduction

Due to the growing demand of measuring stations and analytical laboratories for external quality control proficiency testing (PT) schemes with on-site or without own sampling are still of great interest. Participation in a PT scheme is one of the best ways to carry out external quality control. Successful performance can be demonstrated towards third parties like accrediting bodies or customers and could therefore confer an advantage towards competing companies. Since 1989, IFA offers PT schemes for a wide range of analytes.

## PT Schemes at the IFA

As sampling can be one potential source of error within the complete package of sampling and analytics, it is a great advantage for in-house or external measuring stations that IFA offers PT schemes with on-site sampling, where the participants can perform the sampling on their own at the large test gas stream. However, participants can also choose to have loaded samples sent to them, which is an advantage for foreign analytical laboratories worldwide.

In recent years PTs were performed for five different substance groups:

Table 1: Offered PT schemes

PT Scheme / Substance Group	Sample Carrier
Aldehydes	DNPH cartridges
Organic solvents	Activated charcoal tubes
Volatile organic compounds (VOC)	Thermal desorption tubes
Inorganic acids (volatile and non-volatile*)	Quartz fibre filters
Metal dusts*	Membrane filters

\*This PTs are only offered without own sampling because the preparation of the samples cannot be accomplished at the test gas stream.

## Dynamic Test Gas Stream

At the IFA realistic workplace samples can be simulated at the large dynamic test gas stream. It has a length of 30 m and a tube diameter of 80 mm. Up to 25 institutions can participate in a PT scheme with on-site sampling, for a PT scheme without own sampling the IFA can produce samples for up to 50 institutions.

The test gas stream is composed of three different units:

- test gas preparation and conditioning
- thermostated section for active sampling
- metrology for online control and analysis of the test gas

The test gas consists of a basic gas, purified and if necessary humidified air, with a gas flow of 1-12 m<sup>3</sup>/h, and a secondary gas flow which contains the volatile analytes. At a heated transfer point the secondary gas is introduced into the basic gas.

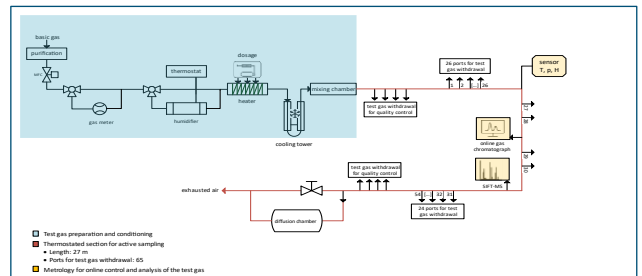


Figure 1: Schematic structure of the dynamic test gas stream of the IFA, Source: IFA

Different methods to produce the secondary gas flow are used:

- calibration gas generators with push-pull syringe or peristaltic
- permeation oven
- syringe doser

These systems allow introduction of a large variability of test gas mixtures in the test gas stream. The basic gas flow and the second gas flow which contains the volatile analytes are mixed and homogenised. High precision with a variability of less than 2 % for the test gas is guaranteed. The test gas mixture is available at the thermostated measuring section over a length of 27 m at 65 ports for active sampling. The climatic conditions in the test gas stream can be individually adjusted to the conditions that predominantly occur at workplaces (temperatures 20 to 40 °C; relative humidities 20 to 80 %). While the test gas is available for active sampling IFA also takes quality control samples to ensure the homogeneity of the test gas over the entire measurement section.

In addition to actively sampled quality control samples, the stability of the test gases is monitored online. An online TDS-GC-MS-system and an online SIFT-MS are used for this purpose.

## Attendance Numbers

The PT schemes offered by the IFA enjoy great popularity. The attendance numbers are consistently high. In 2022 a total of 205 participants from 19 different countries took part in the PTs.

Table 2: Participants in PT schemes

PT Scheme	Number of Participants on-site Sampling	Number of Participants without own Sampling	Participating Countries (beside DE)
Aldehydes	28	44	AT, BE, CH, ES, FI, FR, IT, JP, LU, LT, NL, NO, PL, PT, SI, US
Organic solvents	22	-	AT, CH, NO
VOC	23	41	AT, BE, CH, FR, GB, JP, LU, NL, NO, PL, US
Inorganic acids	13	16	AT, BE, CA, CH, CL, ES, FR, GB
Metal dusts	-	18	AT, BE, CH, FR

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