

TERMS AND CONDITIONS FOR SERVICES

SCOPE OF WORKS FOR QAL2/AST and PARALLEL MEASUREMENTS

WORKING TIME: Night work: 20:00 p.m. to 06:00 a.m./Overtime over 8 hours of work.

PRICING - INVOICING: Lump-sum prices include the accommodation and the transportation of our equipment & personnel, if all tests-works are performed in series (during consecutive days).

Unless the offer is a lump-sum, final invoicing will be based on service report performance hours per the type of days/hours.

Additional working time and delays on the construction site for which we are not responsible (waiting times, safety training, etc.) as well as any multiple journeys to and from the site will be charged separately according to our cost rates or effort per our services Price List.

Working or travel time or other unexpected costs which were not recorded in the report and which can incur after the signature of the service report (for example return travel) may be charged additionally.

For overtime the rates are increased by 50%. For work on Weekends, night work and public holidays the rates are increased by 100%. Waiting and travel time beyond the previously defined period of time or beyond the maximum standard hours per day will be charged separately as overtime.

NOT INCLUDED: Consumables and spare parts. Any installation works including welding any cutting works. Crane supply and operation. Linearity check of analyzers.

SAFETY: Accessibility to the machines and constructions should be in accordance with the regulations for accident prevention. Safety plan to be provided by the customer and mutually agreed. Confirmation of completion of customer works should arrive prior to SICK visit. Access to all installation points should be available and safe.

PLANNING: The requested date for site inspection has to be announced in written form and to be arranged with the sales organization four (4) weeks in advance.

In case that at time of order placement, the operating conditions at site are not clearly defined or potential danger for our field service personnel was not advised, we reserve the right to invoice additional expenses (e.g. waiting times, purchase of work safety equipment or expenses for abortion of a field service operation).

If site of service is not vessel in berth but on sea, an agreement in written form between sales organization and customer is required.

The requested date has to be announced in written form and to be arranged with our responsible department four (4) weeks in advance. In case that at time of order placement, the operating conditions at site are not clearly defined or potential danger for our field service personnel was not advised or the works are repeated resulting by customer's fault, we reserve the right to invoice additional expenses (e.g. waiting times, purchase of work safety equipment or expenses for abortion of a field service operation), per our current Price List.

DELIVERABLES: Signed-off Agreement (service report and timesheet including scope of works) has to be counter signed by SICK-Service and customer after service.

The services to be provided are specified within our financial offer, per the procedure to be used (QAL2 or AST) and the parameters to be tested (gases, dust etc.). The equipment to be used for the measurements, will be accompanied with all the necessary valid calibration certificates. Temperature, pressure and humidity measurements of emissions will be performed as well, regardless of the procedure and parameters. The analysis of the samples will be performed in our facilities or by other accredited laboratories with which we collaborate. In case our offer is accepted, we will inform you for the collaborating laboratories (subcontractors) before starting the measurements. One month after conclusion of measurements, you will receive the respective report for each plant. The test report will include short technical description, the equipment that will be used and the personnel that performed the measurements according to the requirements of the EN 17025. The QAL2 or AST report will include homogeneity of flue gas according to the EN 15259 provisions.

QAL2LAB is accredited from Hellenic Accreditation System S.A. (E.SY.D.) according to EN ISO/IEC 17025:2017 with certificate number 523 for measurements in stack emissions from stationary sources (we enclose the relevant certification).

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PRECONDITIONS

To be provided by the customer

- a short description of the plant including technical data (raw materials, fuels, etc).
- a person to accompany our team on the site and give them safety instructions, as well as, coordinating all the necessary actions that need to happen at the plant in order to enable our team to perform the measurements.
- values of important parameters during the measurement, in order to describe the emission situation.
- cranes to lift the equipment at sampling point, in case they are needed. (cranes are not included in our offer)

The location of the measurements shall comply with the following conditions:

- electrical power (220V, 16A), at the sampling place
- the sampling place should comply with the EN 15259 regulation
- safe access to the sampling place
- the sampling place should have enough working space and proper hygiene conditions for the personnel according to the EN 15259 regulation.

QAL2/AST SERVICES

Short description of QAL2 procedure

1. The functional test of each analyzer according to Annex A of EN 14181:2014 before the beginning of measurements. According to annex A, specifically the visual inspection of the sampling system, documentation and records, leak test, zero and span check, linearity interferences, zero / span drift & response time.
2. We will be performed at least 15 parallel measurements for each gas and dust with below Standard Reference Methods (SRM). We use the SRM to determine the calibration function and the range of validity. The single measuring time will be at least 30 minutes. The parallel measurements are going to be performed at 3 days with at least 5 measurements taking place each day and they will be carried out under normal operation of the plant and if possible, under conditions, which guarantee higher concentrations for each gas and dust. According to the requirements of EN 14181 at the duration of parallel measurements we will receive the measured (analog signal) of analyzers, mA, in our datalogger without influencing the signal.
3. The calculation of variability of the AMS measured values (calibrated values) and the check of compliance with the required uncertainty according to the guideline of EN 14181:2014 for each gas and dust.

Short description of AST procedure

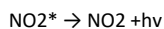
1. The functional test of each analyzer according to Annex A of EN 14181:2014 before the beginning of measurements. According to annex A specifically the visual inspection of the sampling system, documentation and records, leak test, zero and span check, linearity interferences, zero / span drift & response time.
2. At least 5 parallel measurements for each gas and dust with below Standard Reference Methods (SRM). The sampling time per measurement shall be the same as used during the initial QAL2. The parallel measurements shall be uniformly spread over the whole measuring day. According to the requirements of EN 14181 at the duration of parallel measurements we will receive the analog signal of analyzer, mA, of each component in our datalogger without to influence the signal to you.
3. Verification if the calibration function of each gas and dust analyzer is still valid and if the precision of the analyzer is still within the required limits.

Short description of Standard Reference Methods

Dust - EN 13284.01. "A sample stream of the gas is extracted from the main gas stream at representative sampling points for a measured period of time, with an isokinetically controlled flow rate and a measured volume. The dust entrained in the gas sample is separated by a pre-weighed plane filter, which is then dried and re-weighed. The increase of mass of the filter is attributed to dust collected from the sampled gas, which allows the dust concentration to be calculated".

SO₂ - EN 14791. "A representative sample of gas is extracted via a heated temperature-controlled probe. The sample is filtered and drawn through hydrogen peroxide absorber solutions for a specified time and at a controlled flow rate. The sulphur dioxide in the sampled gas is absorbed and oxidized to sulphate ion. The mass concentration of sulphate in the absorption solutions is subsequently determined using ion chromatography."

NO_x as NO₂ - EN 14792. "Chemiluminescence principle. The principle to measure NO_x is based on the following reaction between NO and O₃.



Some of the NO₂ created during the reaction of NO and O₃ is in a excited state. When returning to the basic state, these NO₂ molecules can radiate light, the intensity of which depends on the NO content. For the determination of the amount of nitrogen dioxide, the sampled gas is fed through a converter where the nitrogen dioxide is reduced to nitrogen monoxide".

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HCl - EN 1911 “A representative sample of gas is extracted via a heated temperature-controlled probe. A heated filter removes the dust in the sampled volume, thereafter the gas stream contacting gaseous chlorides is passed through a series of absorbers containing an absorption solution (chloride-free water). The mass concentration of HCl in the absorption solutions is subsequently determined using ion chromatography.”

NH₃ – VDI 3878 “A representative sample of gas is extracted via a heated temperature-controlled probe. The ammonia and the ammonium compounds passing through the filter are collected in an absorption system acidified with H₂SO₄. The mass concentration of NH₄⁺ is determined using the ion selective electrode technique”.

HF – ISO 15713 “A representative sample of gas is extracted via a heated temperature-controlled probe. Gaseous fluoride compound or more precisely those water-soluble fluoride compounds that pass through the filter are absorbed using a sampling train made up a series of impingers containing a sodium hydroxide solution. The mass concentration of dissolved fluoride ions in the collected solutions are measured using the ion selective electrode technique.

TOC - EN 12619 “FID method. The measurement technique utilized by the flame ionization detector (FID) is the ionization of organically bound carbon atoms in a hydrogen flame. The ionization current measured by the FID depends on the number of C-atoms of organic compounds burning in the fuel gas flame, the form of bonding (straight chain or branched chain) and of bonding partners”.

CO - EN 15058 “NDIR method. CO/ CO₂ concentration is measured with use of non-dispersive infrared methods. The attenuation of infrared light passing through a sample cell is a measure of the concentration of CO in the cell, according to the Lambert-Beer law”.

Hg - EN 13211 “A sample stream of flue gas is extracted representatively from the main gas stream over a certain period of time with a controlled flow and known volume. Dust in the sampled gas stream is collected on a filter where after the gas stream is passed through a series of absorbers, which contain an appropriate absorption solution for collecting gaseous mercury. The filter and the absorption solutions are collected for analysis.

PCDDs/PCDFs - EN 1948 “Sampling of PCDDs/PCDFs was done according to the method filter/condenser of EN 1948.01:2006. The spiking of the filter and cleanup of the solid XAD-2 was done according to §7.2.g and the annex C.2 of EAOT EN 1948-1 from the analysis laboratory. A sample stream of flue gas is extracted representatively from the main gas stream over a certain period of time with a controlled flow and known volume. Dust in the sampled gas stream is collected on a filter where after the gas stream is passed through a XAD-2 resin. The filter the XAD-2 resin and the rinsing solutions are collected for analysis.

Flow - EN ISO 16911-1 “The average velocity of the gas stream is determined using a Pitot tube at selected points in the cross-section of the duct. The volume flowrate is calculated by multiplying the cross-sectional area by the average velocity of the gas stream at the cross-section”.

O₂ - EN 14789 “Paramagnetic method. The oxygen molecules are strongly attracted to a magnetic field. Gas sample containing oxygen, when exposed to the combined effect of a magnetic gradient in a confined space, shall be constrained to flow in the direction of the magnetic field. The magnitude of this flow is dependent on the oxygen concentration in the gas sample induced flow”.

Humidity - EN 14790 “A measured quantity of sampled gas is extracted from the gas stream through a trapping unit. The mass gain of the trapping unit is measured and divided by the volume sampled in order to determine the mass concentration of water vapour”.

PARALLEL MEASUREMENTS

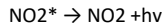
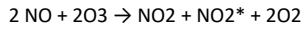
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Cd, Tl, As, Sb, Pb, Cr, Co, Cu, Mn, Ni & V - EN 14385 “A sample stream of flue gas is extracted representatively from the main gas stream over a certain period of time with a controlled flow and known volume. Dust in the sampled gas stream is collected on a filter where after the gas stream is passed through a series of absorbers, which contain an appropriate absorption solution for collecting gaseous heavy metals. The filter and the absorption solutions are collected for analysis.