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Qualification Specifications and Test Points for Agilent GC Systems

Test	Set Points/ Range	Acceptance Criteria
Oven Temperature Accuracy	Temperature 1 = 40°C Temperature 2 = 100°C Temperature 3 = 230°C	±2.0°C
Oven Temperature Stability	Temperature 1 = 100°C	±2.0°C
Headspace Oven Temperature Accuracy	Temperature 1 = 100°C	±4.0°C
Inlet Leak Test	Pressure 1 = 25 psi	≤ 2.0 psi over 5 minutes
Inlet Pressure Accuracy	Pressure 1 = 25psi	±1.2 psi
FID Flow Rate Accuracy	Air Flow Rate = 400ml/min Hydrogen Flow Rate = 30ml/min Make-up Flow Rate = 25 ml/min	Air: ± 40.0 ml/min Hydrogen: ±3.0 ml/min Make-up: ± 2.5 ml/min
TCD Flow Rate Accuracy	Reference Flow Rate = 30 ml/min Make-up Flow Rate = 5 ml/min	Reference: ± 3.0 ml/min Make-up: ± 0.5 ml/min
Injection Precision (ALS)	Injection Volume = 1µl	%RSD < 3.0%
Headspace Injection Precision	Injection Volume = loop	%RSD < 5.0%
Carryover (HS only)	Injection Volume = 0mL	< 1.00%
Linearity (ALS only)	Five (5) appropriate injection volumes based on detector response. Ex: 0.5, 1.0, 1.5, 2.0, 2.5 µl	$R^2 \leq 0.9990$
Noise/Drift	Detector Signal	≤ 0.20%

Variance Allowed

Overview for Above Mentioned Tests

1. Oven Temperature Accuracy

DESCRIPTION:

A calibrated digital thermometer is used to measure the oven temperature at three set points.

ACCURACY CALCULATION:

Abs ($Temperature_{Setpoint}$ – $Temperature_{Measured}$)

UNDERLYING PRINCIPLE:

Temperature accuracy is important for transferring methods between instruments.

2. Oven Temperature Stability

DESCRIPTION:

After a 30 minute equilibration period at 100°C, a calibrated digital thermometer is used to measure the oven temperature. Temperature Readings are taken at 2 minute intervals for ten minutes.

STABILITY CALCULATION:

%RSD of the temperature readings is calculated by dividing the standard deviation of the temperature readings by the average of the temperature readings then multiplied by 100.

UNDERLYING PRINCIPLE:

Temperature stability is critical for repeatability and for transferring methods between instruments.

3. Headspace Oven Temperature Accuracy

DESCRIPTION:

A calibrated thermocouple is used to measure the headspace oven temperature at 100°C.

ACCURACY CALCULATION:

Abs ($Temperature_{Setpoint}$ – $Temperature_{Measured}$)

UNDERLYING PRINCIPLE:

Temperature accuracy is important for transferring methods between instruments.

4. Inlet Leak Test

DESCRIPTION:

Inlet is capped. Pressure is set to 25 psi. Pressure is turned off and pressure recorded fter equilibration. After 5 min pressure is recorded again.

CALCULATION:

Pressure Drop = $\text{Pressure}_{\text{Initial}} - \text{Pressure}_{\text{Final}}$

UNDERLYING PRINCIPLE:

The Leak Test is critical for transferring methods between systems and accuracy of peak area and peak response time.

5. FID/TCD Flow Rate Accuracy

DESCRIPTION:

Detector gas flow rates are set and measured using a calibrated gas flow meter at the detector exit vent.

ACCURACY CALCULATION:

Abs ($\text{Flow Rate}_{\text{Set Point}} - \text{Flow Rate}_{\text{Measured}}$)

UNDERLYING PRINCIPLE:

Flow rate accuracy is important for transferring methods between systems.

6. Injection Precision

DESCRIPTION:

Sample is injected 6 consecutive times using the appropriate method based on inlet/detector configuration. Peaks are integrated and the %RSD for all peak areas is calculated.

PRECISION CALCULATION:

$$\frac{Standard\ Deviation_{Area/RT}}{Average_{Area/RT}} * 100$$

UNDERLYING PRINCIPLE:

Injector precision is critical for quantitative analysis accuracy.

7. Carryover (Headspace only)

DESCRIPTION:

A blank injection is made after the six precision injections.

CARRYOVER CALCULATION:

$$\frac{Area_{Blank}}{Area_{Injection\ \#\ 6}} * 100$$

UNDERLYING PRINCIPLE:

To have low or no carryover is critical for quantitative and qualitative analysis accuracy and reliability.

8. **Injector/Detector Linearity**

DESCRIPTION:

Five injections of different injection volumes of a traceable Standard are made onto a column.

LINEARITY CALCULATION:

R^2 is calculated.

UNDERLYING PRINCIPLE:

Linearity is important for transferring methods between systems and for quantitative and qualitative analysis accuracy and reliability.

9. **Noise and Drift**

DESCRIPTION:

If the software controlling the instrument has the ability to measure noise and drift, a blank injection is made and a signal is take over a 20min span.

CALCULATION:

Noise and Drift are calculated by instrument software.

UNDERLYING PRINCIPLE:

Noise and drift are important for quantitative and qualitative analysis accuracy and reliability. It shows the stability and sensitivity of the detector.

Pre-approval of Qualification for Company Name

The undersigned person(s) approve the following:

1. The use of a validated Excel Spreadsheet to calculate the test results.
2. The delivery of tests appropriate to the actual configuration of the systems covered by the services.
3. The specifications described in this document where the setpoints and possible optional tests follow:

Standard Setpoints

Name and Role	Signature and Date

This pre-approval is applicable to the following systems.

After signing; print this page (and the next if there are variances) to PDF and return it to Analytical@Transcat.com.

Variances (if applicable)

Ignore this section if you have selected to follow the standard setpoints.

Test	Setpoint	Standard	Variance	Units
Oven Temp	Temperature 1	40	No Variance	°C
	Temperature 2	100	No Variance	
	Temperature 3	230	No Variance	
Stability Temp	Temperature 1	100	No Variance	°C
Headspace Oven Temp	Temperature 1	100	No Variance	°C
Inlet Leak Test	Pressure	25	No Variance	psi
Inlet Accuracy	Pressure	25	No Variance	psi
ALS Injection Precision	Injection Volume	1	No Variance	µL

Optional Tests (additional cost)

Injector/Detector Linearity ☐

Engineer completing service: sign here to acknowledge variances. Include this and previous page in report.