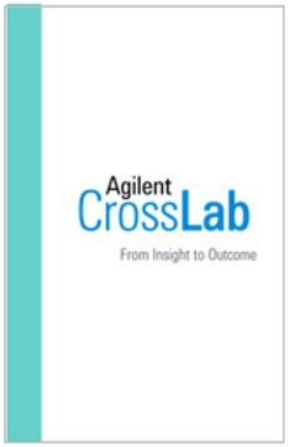
EQUIPMENT QUALIFICATION PLAN

Agilent CrossLab Compliance Services



EQP Name: AgilentRecommended

Service Type: OQ

Company Name: _____

Customer Name/Title: _____

EQP Filename: ES.02.51.eqp

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Scope and Purpose

Overview

An Equipment Qualification Plan (EQP) documents the work performed during qualification services provided using the Agilent Automated Compliance Engine (ACE) software. The EQP must be approved before the work is performed (see customer responsibilities) and the results are reported in an Equipment Qualification Report (EQR), which documents the following.

-Tests performed during the qualification work
-Setpoints used (for example, wavelength, temperature, and flow settings, as applicable)
-Limits (acceptance criteria) applied to tests and setpoints
-Test descriptions and rationales for tests performed (these and test parameters are also reported EQR)
-Traceability of the Agilent qualification protocol

EQP PDF review documents support customer review and approval and are digitally produced directly from the electronic EQP contained within ACE. Two different EQP approval formats can be created.

-Concise: standard format, typically used for Agilent-recommended EQPs
-Tabular: expanded format, typically used for configured EQPs

Many customers approve the Agilent-recommended EQP in the concise format. The tests, setpoints, and limits applied are typically organized in a concise table format (see information below and the Operational Qualification (OQ) test suite). The table can also display which qualification tests can be configured, which Agilent designates as variance (see Glossary).

In a concise EQP approval document used for Agilent-recommended EQPs, the test, setpoints and parameters, and limits (as applicable) are displayed in a concise abbreviated format as shown below.

Key:	Fixed HPLC setpoints/limits	UHPLC setpoints	Variance allowed

Test	Setpoints and Parameters	Limits
CDS Logon Verification	N/A	Evidence of logon used to collect qualification data
Pump Flow Accuracy and Precision (> 400 bar)	Flow Rate 1: 0.500 ml/minute Flow Rate 2: 5.000 ml/minute Flow Rate 2: 2.000 ml/minute (G4220B) Flow Rate 2: 1.500 ml/minute (with ULD kit)	Accuracy Ò3.00% Precision RSD Ò0.50%

By design, ACE EQPs can be configured to align the qualification work to laboratory use of the system and / or satisfy user requirements such as range of use for parameter settings (for example, HPLC flow). This requires close collaboration with Agilent to align the configured EQP with laboratory requirements and may include additional optional tests and/or changes to test setpoints and limits. With configured EQPs, an expanded tabular test format is used. Changes from the Agilent-recommended EQP are displayed at the individual test level (so the test section of a tabular EQP document is longer). The electronic EQP file used to create the customer configured EQP is displayed on front page of the EQP. When the qualification work is complete, the results will be reported in the Equipment Qualification Report (EQR) for review and approval.

Understanding the Test Specification Section in Tabular Review Documents

Tabular formatted EQP PDF review documents are typically used for configured EQPs (or if this format is requested by customers). When this EQP approval format is used, which applies to hardware qualifications only, tests are displayed in an expanded tabular arrangement, where the setpoints and limits are explicitly displayed for each test. Agilent-recommended setpoints and limits and the range of allowable values are designated as L (for low) and H (for high). Changes are noted relative to these limits é W (changes within the Agilent range) and O (changes outside the Agilent range). Where dual reporting limits are enables, these are designated as DW (within the Agilent limits) and DO (outside the Agilent limits). Optional tests that are enabled are included and marked as such. Additionally, any required tests that are disabled at customer request are included and marked as such. The EQP documents changes that are within the Agilent variance range as well as any out of variance range tests (see Glossary).

Note: (1) Agilent is NOT responsible for test failures for O (out of range) setpoints and limits. (2) Limit ranges must be more tightly managed than setpoint ranges because they often reflect physical measurement limits and are directly linked to the testing method. Therefore *within range* user limits are subject to best effort repairs if they cannot be met. In particular, Agilent is not be responsible for test failures for limits tighter (more demanding or challenging) than the recommended values. (3) Changes from the Agilent-recommended EQP are also displayed in the Test Summary section of the EQR. (4) For hyphenated systems (for example, LC-LCMS), an EQP for each system needs to be approved.

In a tabular EQP approval document, the test, setpoints and parameters, and limits are typically displayed in the following representative format.

Pump Flow Accuracy

Flow 1

	Analytical Agilent and non-Agilent pump							
	Setpoint:	0.500	mL/min		L:	0.100	H:	5.000
W	Setpoint:	0.200	mL/min					
	Limit:	<=	5.00	%	L:	5.00	H:	10.00

Injection Precision Additional FLD

This optional test is enabled for this EQP.

Agilent or non-Agilent injector with FLD detector							
Vial verification performed?	No						
Injection Volume on Column:	5	uL		L:	1	H:	5
Area RSD Limit:	<=	1.00	%	L:	1.00	H:	5.00
Height RSD Limit:	<=	1.00	%	L:	1.00	H:	5.00

Column Temperature Accuracy

This standard default test is disabled for this EQP.

Customer Responsibilities

To perform ACE instrument qualification services, requirements associated with instrument control and use of ACE software on site need to be understood and satisfied.

- Instrument control to perform the qualification tests.
- ACE software access by the field service engineer (FSE) to load the electronic EQP, run the qualification workflow, and publish the EQR.

ACE is designed to satisfy ALCOA+ data integrity requirements and provide qualification tests that are independent of the instrument control software. This Agilent qualification design philosophy facilitates a harmonized approach to analytical instrument qualification and ensures consistent application of validated algorithms (such as those used to perform gradient pump HPLC testing), independent of instrument and software manufacturer. Additional documentation is available to provide further information on these subjects.

Agilent recommends that the software routinely used in the lab to control the instrument is used by the FSE to perform qualification tests. Therefore, appropriate access to the instrument control software, such as the customer data system (CDS), needs to be set up for the Agilent representative before they arrive on site. For ACE software access on site, Agilent recommends installation of Network ACE to load the electronic EQP, run the qualification workflow, and publish the EQR.

Customers need to address the following responsibilities.

- EQP review
  - Review the EQP supplied (standard or configured).
  - Request changes to the EQP if required (to meet user requirements such as testing range of use) or approve the supplied EQP (that satisfies user requirements).
  - Return an electronic copy of the EQP to Agilent prior to qualification delivery.
- Agree and set up instrument control access to perform the work (provide a CDS logon for the FSE).
- Agree and approve ACE usage on site (Network ACE).
- For configured EQPs, maintain change control and revision history of the specific approved EQP.
- Safely store and archive an approved copy of this EQP.
- Review and sign the EQR when the qualification work is complete and reported.

NOTE: If Agilent representatives use customer software such as a CDS account to acquire test data during the qualification, they log off from the CDS account at the end of test acquisition. Account credentials created for FSE CDS access are a customer responsibility (that is, some labs disable the account when the work is complete).

Agilent Responsibilities

Agilent representatives follow an approved structured training process, which is represented by the training certificates included in the EQR. Additionally, any customer-specific training that is required to perform the work should be specified and complete before the work is scheduled and can be optionally added as a PDF attachment to an EQR, if required. Agilent representatives do the following.

- Deliver the approved services following the test programs described in the approved EQP;
- Provide a locked and e-signed EQR upon completion of the service;
- If requested, provide an optional ink-signed EQR CD to the customer.

Statement of Intent

The qualification is delivered according to the approved EQP. The standard EQP is followed unless a configured EQP has been requested and approved. If a configured EQP has been created and approved, Agilent defines variances as changes to the default recommended values (stated in the standard EQP) that fall within a well-defined range. These changes are considered to be within the intended use range of the system under test.

Customizations are (a) values that subject the system to limits that exceed the typical operational range or (b) additional tests that are not considered part of the core program required for completion of the selected service. Because user-defined setpoints and limits may exceed the operational envelope of the equipment, Agilent reserves the right to warrant conformance only to the closest variance value. The user is notified of this stipulation at EQP setup time and the qualification report (EQR) reflects this situation.

The service is delivered according to the terms and conditions stated in the corresponding service exhibit. After approval, it is recommended that this EQP be archived with the electronic EQP file.

General Statements on the Testing Program

The hardware OQ tests described within this EQP are designed to satisfy analytical instrument qualification (AIQ) requirements for regulated laboratories. The laboratory is responsible for documenting that analytical instruments are suitable for the analytical procedures they use and the decisions they make on the reportable values / quality attributes being measured. Diligent application of an instrument life cycle framework such as USP <1058> help define and satisfy this requirement.

Agilent-recommended EQPs are derived from Agilent's interpretation of the analytical instrument life-cycle framework defined in USP <1058> and authoritative literature requirements from sources such as ISO9001, FDA, GAMPÉ, PIC/S, ASTM 2500, and others. User requirements and intended use can vary from laboratory to laboratory. Therefore, it is recommended that prior to EQP approval, laboratories determine if additional set points and/or optional additional tests are required to test their user requirements. Additional charges may apply to any changes. This can be accommodated in a configured or customized EQP. In line with the USP <1058> requirements, Agilent qualification services include Installation Qualification (IQ) and Operational Qualification (OQ). Typically, the range of instrument use should be tested in the OQ. Laboratories are responsible for addressing PQ requirements of the USP <1058> life cycle.

Agilent CrossLab Compliance uses a balanced selection of direct metrology and chemical-based tests to directly determine the performance of the systems without unnecessary reliance on graphical extrapolation, interpolation, inferred or derived results. For example, for HPLC qualification, direct metrology measurements are used to test pump flow rate accuracy and precision, and thermal-controlled column compartment and autosampler modules. Holistic chemical testing is used for the evaluation of the following critical instrument characteristics: linearity, precision, signal to noise, and carry over.

EQP Revision History

ACE qualification protocols follow a standardized software development life cycle within Agilent. The electronic EQP files used by ACE are managed under change control within this life cycle. Changes to the core electronic EQP are recorded in the Agilent EQP Revision History and are available on request. Change control processes vary between organizations; therefore, although Agilent maintains a revision history for electronic EQPs contained within ACE, it is recommended that, for configured EQPs, laboratories maintain EQP-independent revision history information appropriate to their own policies and procedural requirements.

CDS Software Pre-requisites for Hardware Qualifications

The software used to control instruments during hardware qualification needs to be suitable. Agilent recommends that software used during the qualification has been qualified within the qualification period specified by the customer s software qualification SOP.

Glossary

Agilent EQP
ACE: Agilent Automated Compliance Engine or Agilent software used to provide qualification services
EQP: Equipment Qualification Plan that documents qualification work to be performed
EQR: Equipment Qualification Report that documents qualification results

CDS:

Customer data system

Network ACE:

ACE is installed on a network node within the laboratory LAN infrastructure

Local ACE:

ACE resides on an independent external drive connected to the LAN infrastructure

Alternative Method:

ACE is installed and run from a PC not connected to the laboratory network

Standard EQP:

EQP pre-defined by Agilent that includes default tests, setpoints, and limits

Configured EQP:

EQP that has been changed based on user requirements

Variance, Range:

The range of operating values for a test parameter within ACE (flow, temperature, and so on) that were defined and tested when the test was first developed and set up

Variance, W:

Change to a test parameter that is within the Agilent variance range

Variance, O:

Change to a test parameter that is outside the Agilent variance range

Variance, DW:

Dual reporting limits within the Agilent supported range

Variance, DO:

Dual reporting limits outside the Agilent supported range

Optional Test:

An optional additional test that is not included in the standard EQP

Additional Setpoint:

Additional measurement value for a test parameter (flow, temperature, and so on)

Qualification Life Cycle Stages

URS:

User Requirement Specification that documents intended instrument use

DQ:

Design Qualification that documents suitability of instrument for intended use

IQ:

Installation Qualification that documents the installation of the instrument

OQ:

Operational Qualification that tests the range of use

PQ:

Performance Qualification that tests the system under conditions of use

RQ:

Repair Qualification that tests the instrument after an instrument repair

PM:

Planned Maintenance for scheduled preventive maintenance

Reference Sources

ASTM:

American Society for Testing and Materials

FDA:

United States Food and Drug Administration

GAMPÉ:

Good Automated Manufacturing Practice

ISO:

International Organization for Standardization

ISO9001:

ISO Standard for Quality Management Systems

PIC/S:

Pharmaceutical Inspection Cooperation Scheme

USP:

United States Pharmacopeia

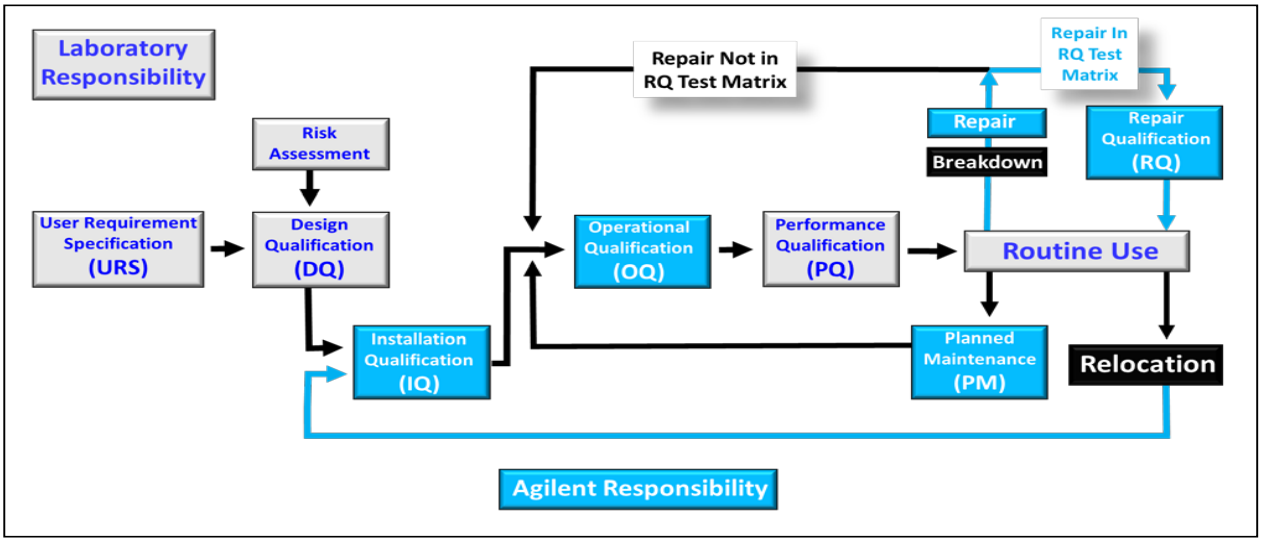
HOW AGILENT CROSSLAB COMPLIANCE SERVICES INTEGRATE WITH QUALITY SYSTEMS AND REGULATIONS

Agilent CrossLab Compliance Services

Agilent CrossLab Compliance Services

Agilent CrossLab Compliance Services are designed to seamlessly integrate with traditional quality systems used by firms and recognized by regulatory agencies worldwide. Analytical instruments must be suitable for their intended use. This requirement is good science in all laboratories and a regulatory requirement in pharma and biopharma laboratories. A life-cycle process for documenting and testing the suitability of laboratory instruments should be followed and Agilent recommends the life cycle framework defined in USP General Chapter <1058> on Analytical Instrument Qualification (AIQ). USP <1058> defines the governing framework and requirements that need to be satisfied, but the laboratory is responsible for how they satisfy these requirements.

- The United States Pharmacopoeia (USP) is the only major pharmacopeia with a general chapter dedicated to analytical instrument qualification, making <1058> an important global regulatory reference. The information is provided in a scientific, risk-based approach to analytical instrument qualification (AIQ). However, the life-cycle framework contained within USP <1058> is not prescriptive in its implementation, making the embedded scientific and risk-based principles flexible and universally applicable.
- The scientific process followed by CrossLab uses the Agilent's Automated Compliance Engine (ACE) to deliver paperless electronic qualification. The life-cycle stages Agilent perform are highlighted in the life-cycle diagram below. As part of this life-cycle, Agilent can configure the qualification tests performed to align with user requirements.



USP <1058> AIQ Framework

***NOTE**: RQ services, described later in this document, can be added to standard qualification services.*

ACE Workflow and Equipment Qualification Plans (EQPs)

Overview

Within the ACE workflow, the qualification tests, setpoints, and limits are defined in an EQP that can be configured to ensure that testing satisfies user requirements. When the qualification work is complete, an Equipment Qualification Report (EQR) is issued. The electronic workflow used within ACE has significant data integrity advantages over traditional paper or Excel-based qualification protocols, as validated calculations can be performed directly using electronic data such as chromatograms and metrology test values. Several of the instrument life-cycle stages are the responsibility of the laboratory, Agilent can provide compliance consultancy services and documentation which can help customers satisfy these requirements. These additional services are not included in our typical qualification offering.

High-level ACE Qualification Workflow

Standard and User-defined Limits

(Hardware qualifications only)

EQPs are available for download and approval as standard documents with Agilent recommended tests, setpoints, and limits, or they can be electronically configured by approved personnel to align with user requirements and intended range of use requirements. The degree of configuration depends on the analytical technology, but most EQPs can be configured to some degree, and one feature that can typically be changed is test limits.

EQPs are designed to be configurable (dependent on the analytical technology and standard requirements), but including additional tests or setpoints can impact the qualification time and associated cost. If a test limit is changed, ACE includes the capability to report results against the Agilent approved limit and any customer required limits (that is, both can be reported simultaneously).

If a user-defined test limit is more stringent than an Agilent recommended limit, Agilent makes no guarantee or obligation regarding the instrument passing the tighter test specification requirements. It is important to appreciate that tests performed under conditions of use (that is, to satisfy pharmaceutical monograph and application requirements) can have different limits than those defined in the OQ. It is the continuum of the combined OQ, PQ, and any point of use testing performed each time the instrument is used that together satisfy regulatory requirements.

User Requirements Specification (URS)

The purpose of user requirements is to document the intended use of the instrument within the life-cycle process and quality management system (QMS) being followed. Therefore, the URS is a customer / laboratory responsibility. Defining user requirements is often used to guide the customer in instrument selection and is stated as the first activity that should be followed in <1058>. The URS is important for two main reasons.

- It is a regulatory requirement for FDA and EU GMP that the intended use of the instrument and any software must be specified.
- Investment protection perspective means getting the right instrument for the right job.

Qualification protocols should test the instrument against any limits or specifications listed in the URS, which should document the intended range of use. Depending on the instrument complexity and how it is classified, a separate URS document may not be needed, but the URS requirements of the <1058> framework must be satisfied. A separate URS is almost always recommended for computerized systems.

An instrument performance specification is a product of the instrument development process by the supplier. It typically documents the performance the instrument can achieve. The URS should be based on intended use of the instrument and not the instrument specification. Additionally, if the intended use of a system changes, this may trigger a need to review the URS and associated qualification testing (for example, to ensure range of use is tested if used with a new analytical procedure).

Agilent offers compliance consultation services and documentation that can help customers address URS requirements.

Design Qualification (DQ)

The main function of the DQ stage of the laboratory instrument life-cycle process is to document why the selected instrument is suitable. Typically, this includes consideration of the instrument specification, how the instrument will be qualified, and the QMS followed by the instrument manufacturer. All together, these confirm that instrument performance is capable of satisfying user requirements. Depending on laboratory instrument life-cycle policy or SOPs being followed, instrument requirements and the relationship between the URS and DQ stages may vary – but as long as the <1058> framework principles are satisfied, this is not a problem, as it is left to each laboratory to justify and document its specific approaches.

The responsibility for satisfying DQ requirements primarily lies with the laboratory, with support from the supplier.

Agilent's approach to satisfying DQ requirements of USP <1058> includes the following.

- All Agilent hardware and software laboratory products, including the ACE software used to deliver qualification services, are designed, manufactured, and tested according to Agilent internal quality life-cycle development procedures.
- Certificates of Agilent testing, validation, and conformance to standards are provided with new Agilent instruments and similar certification can be provided for ACE software.
- Agilent is capable of installation, support, preventive maintenance, on-going qualification, and re-qualification after repair and user training worldwide.

Agilent offers a compliance consultation service that can help customers with DQ documentation.

Installation Qualification (IQ)

The main functions of the IQ stage are to document that laboratory is suitable (for example, critical systems typically include a site inspection / checklist), that the instrument is installed correctly in the environment, and IQ checks such as module start up are completed. IQ is provided and automated by ACE, which collects, checks, and tests Agilent hardware and software products for the following.

1. Purchase Order Details: Allows the customer to verify that the instrument being qualified matches their design requirements (if available) and purchase order.
2. Preparation and Installation Details: Gathers and records information about preparation and installation documents.
3. Documentation: Gathers and records information about reference and user manuals for initial installations.
4. Product Quality Assurance Details: Collects and records certificates and other forms that verify that the vendor has developed and built the product according to internal standards.
5. Startup: Verifies that all modules/components start up properly.
6. Installation Verification (software only): Verifies the correctness of all installation-related files.

Operational Qualification (OQ)

The main function of the OQ stage is to evaluate and document instrument performance at the intended operational range of use. OQ protocols should include a mix of metrology, functional, and operational tests. ACE qualification protocols include information about the test description and rational, setpoints, and the limits (acceptance criteria) for each technique, category, and instrument configuration.

OQ is provided and automated by ACE. ACE checks and tests for Agilent hardware and software products include the following.

- Metrological tests such as flow, temperature, pressure, and so on that ensure that the system is performing within Agilent (or user) specifications.
- Qualification results are reported in the EQR, which can include details of all test certificates, standards, and training information for the engineer performing the work. (Note that the EQR can be configured to customer requirements.)
- System or "holistic" tests verify the combined functions of the various system components
- The qualification testing can be configured to ensure URS requirements, such as range of use are tested.

For software qualification, the OQ consists of automated diagnostics regression testing and verification of the software installation. This supports continued use of the software in regulated environments (at install and as part of supporting periodic review).

In line with regulatory requirements, the EQPs should be approved before work is performed and the EQR should be reviewed and approved when the work is complete (as illustrated in Figure 2). The EQR contains all the raw data, results, and relevant information and attachments for complete compliance and traceability.

Mechanical Qualification (MQ)

(Dissolution systems only)

The main function of the MQ stage is to document that the mechanical performance of the instrument meets specifications and is functioning properly.

Performance Qualification (PQ)

The main function of the PQ stage is to document that the instrument is fit for purpose under conditions of intended use and to create an approved framework that ensures the instrument continues to perform as required. Because instrument range of use is tested within the OQ stage, it is usually not necessary to test this during PQ. It should be noted that requirements for instrument maintenance and repair fall within the PQ life cycle stage within the USP <1058> framework, as they are components of ensuring the continued performance of the instrument.

The customer is responsible for satisfying PQ requirements. (NOTE: Agilent can provide a PQ for Dissolution systems only.)

It is important to note that PQ is a lifecycle activity and not a one-time event. PQ tests may include activities such as method validation or system suitability tests (SST), but in Agilent's opinion, SSTs contribute towards ensuring continued performance of the instrument (that is, PQ testing), but do may not fully satisfy <1058> PQ requirements.

Repair Qualification (RQ)

After an instrument is repaired, tests should be performed to evaluate the effectiveness of the repair and document that repaired instrument satisfies performance requirements. Agilent offers a service called Repair Qualification (RQ), which refers to the requalification of laboratory instrument hardware after a repair. For some laboratory systems, to document the performance after repair may require a full OQ. However, for some modular or component-based systems, such as HPLC and GC for example, partial qualification testing can be justified. This is accomplished by performing the qualification tests that are applicable to only the module or system component related to the repair, reducing the time the instrument is out of service. Re-qualifying the instrument after repair is a regulatory requirement defined in USP <1058>.

Because of the modular/component-based dependency of RQ service, it is only available for the following instrument platforms: GC, GC/MS, LC, LC/MS, GPC, and SFC.

Agilent offers service contracts to repair and requalify an instrument during the period between scheduled annual OQs.

The level of retesting is prescribed in the RQ section of ACE: a form is displayed for the operator showing all types of repairs possible and the retesting required. Part of an example form for an LC system is shown below.

Re-Qualification After Repair		
Pump Strategies		
Repair/Replace Strategy	Modules	OQ Testing
Internal pump head parts, active inlet valve (or AIV cartridge), (parts of) check valves, reference valves, inlet manifold or pump drive, or taking pump head apart to clean (versus repair)	Any pump	Flow Accuracy & Precision
Pulse damper, pressure transducer	Any pump	Flow Accuracy & Precision
Multi-channel gradient valve	Quaternary	Flow Accuracy & Precision Gradient Composition

The full list of RQ repair and retest guidance is available for customer review.

www.agilent.com/chem/qualification

SERVICE DELIVERY METHODS

CUSTOMER APPROVAL OF ALTERNATIVE METHOD AND EQR STORAGE

Agilent CrossLab Compliance Services

Overview

Agilent recommends use of **Network ACE** for CrossLab qualification services that are enabled using the Agilent Automated Compliance Engine (ACE) software. Network ACE and Local ACE both access data directly (default methods) and are considered equivalent from a data integrity and data traceability perspective (see below). To provide additional flexibility in qualification service delivery, an alternative method is also available that accesses data indirectly. Use of the alternative method requires customer pre-approval using this form.

Available Methods

Method	Definition
Network ACE (Agilent recommended)	ACE software is installed on a network node within the laboratory LAN infrastructure. Raw data locations are always captured in the equipment qualification report (EQR), which provides end to end traceability and a fully characterized data workflow in the delivery. This method requires collaboration with the customer to load ACE behind the customer firewall.
Local ACE	ACE software resides on an independent external drive that can be driven from the system controller, where the customer data system (CDS) resides. Because the external drive is connected to the CDS, the data integrity of this method is equivalent to that of the Network ACE delivery method. Raw data is imported directly into ACE by the Data Manager tool, with the data paths always captured in the report, which provides data traceability assurance.
Alternative (Requires pre-approval)	Pre-approval for this method is required to remove later questions on data integrity. ACE software is installed and run from a PC not directly connected to the CDS, such as the FSE laptop. System data files are transferred indirectly from the CDS to the laptop instead of directly like Network and Local ACE methods. **NOTE**: Software used in this method is qualified for data collection purposes; this method is not an option for software qualification.

EQR Storage

Select the checkbox below to authorize Agilent to store a copies of the EQRs generated by ACE for Agilent internal assessments. The intention of the assessment is to evaluate the delivery of the qualification service, with a focus to improve delivery and assess the appropriateness of data integrity measures. The storage is exclusively for the internal assessment by Agilent and is not shared with other organizations. It is not to be considered a backup for the EQR provided at qualification delivery.

Customer Approval of Alternative Method and EQR Storage

Authorize Agilent to use the alternative method (check for approval):	☐
Authorize Agilent to store EQRs for their internal assessment (check for approval):	☐

Approved By/Title:	
Date Approved:	
Comments:	

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AGILENT CROSSLAB QUALIFICATION SERVICES

USE CASES FOR SERVICE DELIVERY

Agilent CrossLab Compliance Services

Introduction

With heightened scrutiny of data integrity, the Agilent Automated Compliance Engine (ACE) software must be able to access instrument-generated raw data files one of two ways: directly, using the connection between network nodes or with the server; and indirectly, through storage in a secure transfer location. (In this document, data integrity refers to the who, what, and where of data used in generating an ACE equipment qualification report, or EQR.)

ACE includes three main service delivery methods that address data integrity requirements; the rest of this document provides details to determine which one best fits a customer's needs.

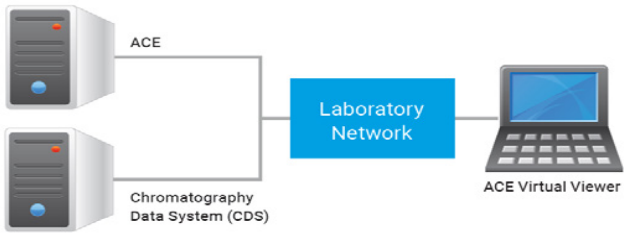
Regardless of the delivery method, ACE features and delivery procedures are compatible.

Network ACE (Agilent Recommended)

Overview

ACE software is installed on a network node within the laboratory LAN infrastructure, which requires collaboration with the customer to load ACE behind their firewall. Raw data locations are always captured in the EQR, which provides end-to-end traceability and a fully characterized data workflow in the delivery.

Details



Typical Network ACE installation diagram

Installing ACE in a separate node (a.k.a. the host PC) on the same network as the system controller offers data traceability that is equivalent to an installation on the system controller itself. The system controller (where the CDS resides) and the ACE host PC are identified and seen by the server and subject to the customer's data access controls and general IT policies. The CDS's audit trail records data movements between nodes or between the client and server, and ACE's data traceability features identify the original data directory and therefore ensures end-to-end data traceability

The ACE host PC has a separate/partitioned drive for ACE software. During ACE's installation, two services are setup on the operating system (OS): one for security and the other as a watchdog. Because the ACE host PC sits on the network as a shared drive, engineers access ACE through the networked drive: ACE is not installed on ACE Virtual Viewer PCs.

Requirements

Installation

- Install on a host PC with a separate drive (different from that of the OS)
- Attach to a network that clients can access
- 500 GB
- NTFS format
- User has local administration rights
- Customer installation instruction document is available

Operational

- User has an ACE node logon with a minimum of power user rights permissions; user also has a personal ACE account and password added through the ACE licensing tool
- Up to 5 users with 3 open sessions each can access the NDA simultaneously
- Exception to ports 11121-11141 on ACE node, clients, and switch's/Smart Hubs to be open on the network

Local ACE

Overview

ACE software resides on an independent drive that can be driven from the system controller, where the CDS resides. Because the drive is connected to the CDS, this method's data integrity is equivalent to preferred 1 method's. Raw data is imported directly into ACE by ACE's Data Manager tool, and data paths are captured in reports to provide data traceability.

ACE software resides on an independent drive that can be driven from the system controller, where the CDS resides. Because the drive is connected to the CDS, this method's data integrity is equivalent to the Network ACE method. Raw data is imported directly into ACE by ACE's Data Manager tool, and data paths are captured in reports to provide data traceability.

Details

ACE is designed to run from a dedicated drive, without leaving a footprint on the host PC. Therefore, it can be connected directly to the system controller (where the CDS resides) without altering the system's qualification status. For additional protection, the drive can be driven by another host PC on the same network; also, the drive can remain on site with the customer for use by the Agilent Field Service Engineer (FSE) during service deliveries only.

Alternative Method

The ACE software is installed on and run from a PC not directly connected to the CDS, such as the FSE's laptop. System data files are transferred indirectly from the CDS to the laptop instead of directly like Network and Local ACE methods.

This method requires customer pre-approval to remove later questions on data integrity.

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EMISSION SPECTROSCOPY HARDWARE (ICP-OES)

OPERATIONAL QUALIFICATION

Agilent CrossLab Compliance Services

Standard OQ Test Suite

This document describes the test program for qualifying ICP-OES instruments and their autosamplers. The ICP-OES tables list all tests run from software that controls the instrument; setpoints and limits cannot be changed and, for Agilent instruments, are internal to the controlling software.

ICP-OES: Agilent 5800, 5900, 5100, and 5110 Series

Note: Tests and test components are configuration specific as noted.

RV:	Radial Dual View
SVDV:	Synchronous Vertical Dual View
VDV:	Vertical Dual View

Test	Setpoint	Limits	
CDS Logon Verification	N/A	Evidence of logon used to collect qualification data	
Preparation			
Plasma ignition	N/A	Within three attempts	
Detector calibration	N/A	Completes successfully	
Wavelength calibration	N/A	Completes successfully	
Instrument Test			
Subsystem Communication	N/A	Within acceptance criteria	
Air Flow	N/A	Within acceptance criteria	
Water Flow	N/A	Within acceptance criteria	
Gas Flows	N/A	Within acceptance criteria	
RF Generator	N/A	Within acceptance criteria	
Camera	N/A	Within acceptance criteria	
Optics	N/A	Within acceptance criteria	
		Models	
		5800 and 5900 Series	5110 and 5100 Series
Resolution	N (174.213 nm)	≤ 8.2	≤ 9.4
	As (188.980 nm)	≤ 8.2	≤ 8.2
	C (193.027 nm)	≤ 9.2	≤ 11.5
	Mo (202.032 nm)	≤ 8.2	≤ 8.2
	Cr (206.158 nm)	≤ 11.0	≤ 13.4
	Zn (213.857 nm)	≤ 8.7	≤ 8.7
	Pb (220.353 nm)	≤ 9.5	≤ 9.5
	Co (228.615 nm)	≤ 13.2	≤ 17.2
	Ba (230.424 nm)	≤ 9.4	≤ 9.4
	Mn (257.610 nm)	≤ 13.3	≤ 13.3
	Mn (260.568 nm)	≤ 15.0	≤ 20.3
	Cr (267.716 nm)	≤ 11.0	≤ 11.0
	Cu (324.754 nm)	≤ 24.0	≤ 25.0
	Cu (327.395 nm)	≤ 14.2	≤ 14.2
	Sr (338.071 nm)	≤ 25.0	≤ 33.5

Test		Setpoint	Limits			
		Ba (455.403 nm)	≤ 40.0		≤ 44.0	
		Sr (460.733 nm)	≤ 36.0		≤ 36.0	
		Ba (493.408 nm)	≤ 30.0		≤ 36.0	
		Ba (614.171 nm)	≤ 42.0		≤ 42.0	
		Ar (675.283 nm)	≤ 61.0		≤ 74.0	
		K (766.491 nm)	≤ 80.0		≤ 80.0	
Sensitivity, Axial	(VDV, SVDV)	As (188.980 nm)	≥ 335.0		≥ 208.0	
		Se (196.026 nm)	≥ 205.0		≥ 159.0	
		Zn (206.200 nm)	≥ 2205.0		≥ 234.0	
		Zn (213.857 nm)	≥ 5325.0		≥ 1743.0	
		Cd (214.439 nm)	≥ 7465.0		≥ 4227.0	
		Pb (220.353 nm)	≥ 420.0		≥ 320.0	
		Mn (257.610 nm)	≥ 14625.0		≥ 10625.0	
		Cr (267.716 nm)	≥ 2210.0		≥ 1048.0	
		Cu (324.754 nm)	≥ 1620.0		≥ 19.0	
		Al (396.152 nm)	≥ 820.0		≥ 6.0	
		Ba (493.408 nm)	≥ 15080.0		≥ 60.0	
		K (766.491 nm)	≥ 5215.0		≥ 24.0	
Sensitivity, Radial		As (188.980 nm)	≥ 120.0	(VDV, SVDV)	≥ 46.0	
			≥ 110.0	(RV)		
		Se (196.026 nm)	≥ 60.0	(VDV, SVDV)	≥ 41.0	
			≥ 58.0	(RV)		
		Zn (206.200 nm)	≥ 660.0	(VDV, SVDV)	≥ 70.0	
			≥ 490.0	(RV)		
		Zn (213.857 nm)	≥ 2300.0		≥ 1421.0	
		Cd (214.439 nm)	≥ 2570.0	(VDV, SVDV)	≥ 522.0	
			≥ 1900.0	(RV)		
		Pb (220.353 nm)	≥ 130.0	(VDV, SVDV)	≥ 46.0	
			≥ 110.0	(RV)		
		Mn (257.610 nm)	≥ 5240.0	(VDV, SVDV)	≥ 3518.0	
			≥ 5600.0	(RV)		
		Cr (267.716 nm)	≥ 990.0	(VDV, SVDV)	≥ 379.0	
			≥ 1050.0	(RV)		
		Cu (324.754 nm)	≥ 560.0	(VDV, SVDV)	≥ 15.0	
			≥ 830.0	(RV)		
		Al (396.152 nm)	≥ 210.0	(VDV, SVDV)	≥ 3.4	(VDV, SVDV)
			≥ 290.0	(RV)	≥ 4.6	(RV)
		Ba (493.408 nm)	≥ 6180.0	(VDV, SVDV)	≥ 34.0	(VDV, SVDV)
			≥ 9500.0	(RV)	≥ 55.0	(RV)
		K (766.491 nm)	≥ 240.0	(VDV, SVDV)	≥ 1.8	(VDV, SVDV)
			≥ 340.0	(RV)	≥ 3.0	(RV)
Precision (RSD), Axial	(VDV, SVDV)	As (188.980 nm)	≤ 1.5%			
		Se (196.026 nm)				
		Zn (206.200 nm)				
		Zn (213.857 nm)				
		Cd (214.439 nm)				
		Pb (220.353 nm)				
		Mn (257.610 nm)				
		Cr (267.716 nm)				
		Cu (324.754 nm)				

Test	Setpoint	Limits
	Al (396.152 nm)	
	Ba (493.408 nm)	
	K (766.491 nm)	
Precision (RSD), Radial	As (188.980 nm)	≤ 2.6%
	Se (196.026 nm)	
	Zn (206.200 nm)	≤ 1.5%
	Zn (213.857 nm)	
	Cd (214.439 nm)	
	Pb (220.353 nm)	≤ 2.6%
	Mn (257.610 nm)	≤ 1.5%
	Cr (267.716 nm)	
	Cu (324.754 nm)	
	Al (396.152 nm)	
	Ba (493.408 nm)	
	K (766.491 nm)	

ICP-OES: Agilent 700 Series

Note: Tests and test components are configuration specific as noted.

ACK:	Axial Cyclonic Spraychamber, K-style Nebulizer
ACO:	Axial Cyclonic Spraychamber, OneNeb Nebulizer
ACS:	Axial Cyclonic Spraychamber, Seaspray Nebulizer
ATO:	Axial Twister Spraychamber, OneNeb Nebulizer
ATS:	Axial Twister Spraychamber, Seaspray Nebulizer
RSMO:	Radial Sturman Masters Spraychamber, OneNeb Nebulizer
RSMV:	Radial Sturman Masters Spraychamber, V-groove Nebulizer
RTO:	Radial Twister Spraychamber, OneNeb Nebulizer
RTS:	Radial Twister Spraychamber, Seaspray Nebulizer

Test	Setpoint	Limits	
CDS Logon Verification	N/A	Evidence of logon used to collect qualification data	
Preparation			
Plasma ignition	N/A	Within three attempts	
Detector calibration (71x-ES)	N/A	Completes successfully	
RF power check	N/A	Completes successfully	
Argon ratio check (72x-ES and 73x-ES)	N/A	Completes successfully	
Zinc wavelength position check	N/A	Completes successfully	
Dark current scan (72x-ES and 73x-ES)	N/A	Completes successfully	
Wavelength calibration	N/A	Completes successfully	
Hardware calibration (71x-ES)	N/A	Completes successfully	
Torch alignment	N/A	Completes successfully	
Instrument Test		Models	
		71x-ES	72x-ES
Resolution (72x-ES and 73x-ES)	Al (167.019 nm)	N/A	≤ 9.7
	N (174.213 nm)		≤ 9.4
	As (188.980 nm)	≤ 10.5	≤ 8.2
	C (193.027 nm)	N/A	≤ 11.5
	Mo (202.032 nm)		≤ 8.2
	Cr (206.158 nm)		≤ 13.4
	Zn (213.857 nm)	≤ 11.5	≤ 8.7

Test	Setpoint	Limits			
	Pb (220.353 nm)	N/A		≤ 9.5	
	Co (228.615 nm)			≤ 17.2	
	Ba (230.424 nm)			≤ 9.4	
	Mn (257.610 nm)			≤ 13.3	
	Mn (260.568 nm)			≤ 20.3	
	Cr (267.716 nm)			≤ 11.0	
	Cu (324.754 nm)			≤ 25.0	
	Cu (327.395 nm)			≤ 14.2	
	Sr (338.071 nm)	≤ 42.0		≤ 33.5	
	Ba (455.403 nm)	≤ 55.0		≤ 44.0	
	Sr (460.733 nm)	N/A		≤ 36.0	
	Ba (493.408 nm)			≤ 36.0	
	Ba (614.171 nm)			≤ 42.0	
	Ar (675.283 nm)	≤ 88.0		≤ 74.0	
	K (766.491 nm)	≤ 101.0		≤ 80.0	
		Models			
		710-ES		715-ES	
Signal Background Ratio	Pb (182.143 nm)	≥ 7.2		≥ 2.7	
	As (188.980 nm)	≥ 13.0		≥ 6.0	
	Se (196.026 nm)	≥ 7.5		≥ 3.8	
	Zn (206.200 nm)	≥ 60.0		≥ 11.0	
	Pb (220.353 nm)	≥ 12.0		≥ 3.4	
	Co (228.615 nm)	≥ 49.0		≥ 15.0	
	Ni (231.604 nm)	≥ 34.0		≥ 11.0	
	Cu (327.395 nm)	≥ 15.0		≥ 9.0	
	K (766.491 nm)	≥ 37.5		≥ 2.3	
		Models			
		720-ES 730-ES ACK, ACS, ACO	720-ES 730-ES ATO, ATS	725-ES 735-ES RSMO, RSMV	725-ES 735-ES RTO, RTS
Signal Background Ratio	Al (167.019 nm)	≥ 300	≥ 265	≥ 75.0	≥ 112.0
	Pb (182.143 nm)	≥ 11	≥ 9	≥ 6	≥ 8
	As (188.980 nm)	≥ 15.0	≥ 12.0	≥ 7.5	≥ 11.0
	As (193.696 nm)	≥ 7.5	≥ 6.0	≥ 6.0	≥ 9.0
	Se (196.026 nm)	≥ 9.0	≥ 7.0	≥ 4.5	≥ 6.5
	Zn (206.200 nm)	≥ 105	≥ 84	≥ 15	≥ 22
	Zn (213.857 nm)	≥ 190	≥ 150	≥ 110	≥ 150
	Cd (214.439 nm)	≥ 260	≥ 210	≥ 56.5	≥ 85.0
	Pb (220.353 nm)	≥ 15.0	≥ 12.0	≥ 3.8	≥ 6.0
	Mn (257.610 nm)	≥ 375	≥ 300	≥ 150	≥ 225
	Cr (267.716 nm)	≥ 52.5	≥ 45.0	≥ 22.5	≥ 34.0
	Cu (324.754 nm)	≥ 22.5	≥ 19.0	≥ 19.0	≥ 26.0
	Al (396.152 nm)	≥ 7.5	≥ 6.0	≥ 3.8	≥ 6.0
	Ba (493.408 nm)	≥ 75.0	≥ 60.0	≥ 75.0	≥ 112.0
	K (766.491 nm)	≥ 30.0	≥ 24.0	≥ 2.0	≥ 4.0
		All models			
QC Test - Accuracy	Same as precision setpoints	± 3.0%			
		Models			

Test	Setpoint	Limits			
		710-ES	715-ES	720-ES 730-ES	725-ES 735-ES
QC Test - Precision	Al (167.019 nm)	N/A	N/A	≤ 1.50%	≤ 2.60%
	Pb (182.143 nm)	≤ 1.60%	≤ 1.50%		
	As (188.980 nm)	≤ 1.00%	≤ 2.60%		
	As (193.696 nm)	N/A	N/A		
	Se (196.026 nm)	≤ 1.00%	≤ 2.60%		
	Zn (206.200 nm)	≤ 1.60%	≤ 1.50%		≤ 1.50%
	Zn (213.857 nm)	N/A	N/A		
	Cd (214.439 nm)				
	Pb (220.353 nm)	≤ 1.60%	≤ 1.50%		≤ 2.60%
	Co (228.615 nm)			N/A	N/A
	Ni (231.604 nm)				
	Mn (257.610 nm)	N/A	N/A	≤ 1.50%	≤ 1.50%
	Cr (267.716 nm)				
	Cu (324.754 nm)				
	Cu (327.395 nm)	≤ 2.00%	≤ 1.50%	N/A	N/A
	Al (396.152 nm)	N/A	N/A	≤ 1.50%	≤ 1.50%
	Ba (493.408 nm)				
	K (766.491 nm)	≤ 1.00%	≤ 2.60%		

		Models				
		710-ES	715-ES	720-ES 730-ES	725-ES 735-ES RSMO RMSV	725-ES 735-ES RTO RTS
Detection Limits	Al (167.019 nm)	N/A	N/A	≤ 2.00	≤ 13.0	≤ 9.0
	As (188.980 nm)	≤ 10.0	≤ 65.0	≤ 10.0	≤ 65.0	≤ 45.0
	Se (196.026 nm)	N/A	N/A	≤ 13.0	≤ 80.0	≤ 50.0
	Mo (202.032 nm)			≤ 2.00	≤ 11.0	≤ 8.0
	Cd (214.439 nm)			≤ 0.50	≤ 5.50	≤ 4.0
	Pb (220.353 nm)	≤ 6.50	≤ 65.0	≤ 6.50	≤ 65.0	≤ 45.0
	Mn (257.610 nm)	≤ 0.20	≤ 0.90	≤ 0.20	≤ 0.90	≤ 0.60
	Cr (267.716 nm)	N/A	N/A	≤ 2.00	≤ 5.50	≤ 5.50
	Cu (324.754 nm)			≤ 2.00	≤ 5.50	≤ 5.50
	Al (396.152 nm)			≤ 6.50	≤ 13.0	≤ 13.0
	Ba (493.408 nm)			≤ 0.70	≤ 0.90	≤ 0.90
	K (766.491 nm)			≤ 20.0	≤ 265	≤ 265

ICP-OES: PerkinElmer Optima 4300DV, 5300DV, 7300DV, and 8000DV

Note: Test components are model specific as noted; **Scott** refers to an instrument with a Scott spray chamber and Gem tip crossflow nebulizer, as opposed to an instrument with a glass cyclonic spray chamber and concentric nebulizer.

Test	Setpoint	Limits
CDS Logon Verification	N/A	Evidence of logon used to collect qualification data
Preparation		
OQ user creation	N/A	Completed
Software user paths defined	N/A	Completed
OQ support files loaded	N/A	Completed
Results data set and log files setup	N/A	Completed
Plasma ignition	N/A	Within three attempts
Detector calibration	N/A	Completes successfully

Test	Setpoint	Limits
Optics initialization (8000 DV only)	N/A	Completes successfully
Radial and axial torch alignment	N/A	Completes successfully
UV wavelength calibration (4300DV, 5300DV, 7300DV only)	N/A	Completes successfully
VIS wavelength calibration (4300DV, 5300DV, 7300DV only)	N/A	Completes successfully
Spectral Resolution		
8000DV	As (193.696 nm)	≤ 0.009
	Ni (231.604 nm)	≤ 0.011
	Ni (341.476 nm)	≤ 0.015
	Ba (455.403 nm)	≤ 0.020
4300DV, 5300DV, 7300DV DV	As (193.696 nm)	≤ 0.007
	Ni (231.604 nm)	≤ 0.008
	Ni (341.476 nm)	≤ 0.012
	La (408.672 nm)	≤ 0.020
	Ba (455.403 nm)	≤ 0.025
Precision (RSD)		
8000DV	Zn (206.200 nm)	≤ 1.0%
	Mg (280.271 nm)	
	Mg (285.213 nm)	
	Ba (455.403 nm)	
4300DV, 5300DV, 7300DV	As (193.696 nm)	≤ 1.0%
	Zn (213.856 nm)	
	Mn (257.610 nm)	
	La (379.478 nm)	
	Ba (455.403 nm)	
	Ba (493.408 nm)	
Axial Detection Limits		
8000DV	Tl (190.801 nm)	≤ 10 µg/L
	As (193.696 nm)	≤ 10 µg/L
	Se (196.026 nm)	≤ 5 µg/L
	Pb (220.353 nm)	≤ 3 µg/L
4300DV, 5300DV, 7300DV *(*N/A for Scott)*	Tl (190.800 nm)	≤ 10 µg/L
	As (193.696 nm)	≤ 10 µg/L
	Se (196.026 nm)*	≤ 5 µg/L
	Pb (220.353 nm)	≤ 3 µg/L
Radial Detection Limits		
8000DV	As (193.696 nm)	≤ 60 µg/L
	Zn (213.857 nm)	≤ 2 µg/L
	Mn (257.610 nm)	≤ 1 µg/L
	La (379.478 nm)	≤ 3 µg/L
	Ba (455.403 nm)	≤ 0.3 µg/L
	Ba (493.408 nm)	≤ 0.6 µg/L
4300DV, 5300DV, 7300DV	As (193.696 nm)	≤ 60 µg/L
	Zn (213.856 nm)	≤ 2 µg/L
	Mn (257.610 nm)	≤ 0.75 µg/L
	La (379.478 nm)	≤ 3 µg/L
	Ba (455.403 nm)	≤ 0.3 µg/L
	Ba (493.408 nm)	≤ 0.6 µg/L

Autosamplers and Switching Valve Accessories

This tests are qualitative; no setpoints or limits apply.

Test	Setpoint	Limits
Autosampler Operation		
Autosampler successfully moves to location(s) specified in software	N/A	Completed
Switching Valve Operation		
Automated test results are within acceptance criteria	N/A	Completed

Test Design and Rationale

Overview

Many GMP/GLP enforcement agency inspectors now ask firms to provide a risk assessment of their equipment and computer systems plus a science-based rationale for subsequent validation and qualification testing.

GENERAL RISK STATEMENT: Any laboratory chemical system used for raw material testing or final drug product / medical device testing in GMP or used in formal GLP studies will likely fall into a HIGH RISK category. This risk assessment will imply the need for IQ & OQ & on-going qualification. ANY USER SPECIFIC RISK ANALYSIS SUPERCEDES THIS GENERAL RISK STATEMENT.

The rest of this section outlines the science-based rationale for each test in the Agilent hardware OQ plus a brief test design and procedure description.

The recommended set of hardware OQ tests described in this EQP derives from Agilent's interpretation of FDA, USP, and GAMP guidelines and other authoritative expert literature.

OQ test design incorporates both modular and holistic testing, which is a proven and regulatory acceptable approach. When applicable, direct metrology is used to test pump flow rates and thermal-controlled column compartments, for example. Holistic chemical testing is used to evaluate critical instrument characteristics

When applicable, certified reference standards and calibrated equipment are used.

Considering the number of setpoints, parameters, and conditions of each recommended OQ test, the proven concepts of worst case, range, and representative have been applied. If a property or characteristic is known to have its worst performance at one end of a range of use, this is the setpoint that should be tested and other setpoints are not required. If a property or characteristic has no known worst case, testing at the high and low points of the range of use is required. If there are too many possible use cases and conditions to realistically test (and none is a worst case), a representative sample for test is the best approach.

All Systems

CDS Logon Verification

Description: For traceability, evidence of the logon used to collect qualification data must be provided.

Procedure: Service delivery engineer captures evidence that is automatically included with this test in the EQR.

ICP-OES: Agilent 5800, 5900, 5100, and 5110 Series

Preparation

Description: This preliminary test must be completed before the actual OQ tests. It verifies that:

- plasma ignited;
- detector was calibrated;
- instrument wavelength scale was calibrated.

Procedure: From the Agilent ICP Expert software (1) plasma is ignited and then extinguished; (2) while the plasma is off, the native software is used to calibrate the detector; (3) the instrument wavelength scale is calibrated.

Instrument Tests

Description: This test includes three automated instrument performance tests:

- Resolution
- Sensitivity
- Precision

Procedure: From the Agilent ICP Expert software, execute the Instrument Tests. The software prompts the user to aspirate the blank or standard solution as required. When the tests are completed, the software generates a report with the results.

ICP-OES: Agilent 700 Series

Preparation

Description: This preliminary test must be completed before the actual OQ tests. It verifies that:

- plasma ignited;
- (71x-ES only) detector was calibrated;
- RF power was checked;
- (72x-ES and 73x-ES only) argon ratio was checked;
- zinc wavelength position was checked;
- (72x-ES and 73x-ES) dark current was scanned;
- wavelength scale was calibrated;
- (71x-ES) hardware was calibrated;
- torch was aligned.

Procedure: From the Agilent ICP Expert II software (1) plasma is ignited; (2) all applicable functions are completed.

Instrument Tests

Description: This test includes three automated instrument performance tests:

- Resolution
- Signal Background Ratio
- QC Accuracy
- QC Precision
- Detection Limits

Procedure: From the Agilent ICP Expert II software, execute the Instrument Tests. The software prompts the user to aspirate the blank or standard solution as required. When the tests are completed, the software generates a report with the results.

ICP-OES: PerkinElmer Optima 4300DV, 5300DV, 7300DV, and 8000DV

Preparation

Description: This preliminary test must be completed before the actual OQ tests. It verifies that:

- prerequisites were completed (software's OQ user, user file paths, and OQ files have been installed; instrument and software log files are set up);
- plasma ignited;
- detector was calibrated;
- (8000DV only) optics initialization was completed;
- axial and radial torch views were aligned;
- (4300DV, 5300DV and 7300DV only) instrument UV wavelength scale was calibrated;
- (4300DV, 5300DV and 7300DV only) instrument VIS wavelength scale was calibrated.

Procedure: From the instrument's software (1) prerequisites are completed; (2) plasma is ignited; (3) detector is calibrated; (3) 8000DV instrument's optics are initialized; (4) instrument's axial and radial torch views are aligned; (5) 4300DV, 5300DV, and 7300DV instrument's UV and VIS wavelength scales are calibrated.

Spectral Resolution

Description: This test measures the resolution, or full width at half height (FWHH), of the relevant element's spectral peak.

Procedure: A standard solution containing the relevant elements is aspirated using a dedicated method. The software is set up to log the three replicate resolution measurements for each element. The highest resolution measurement is recorded in ACE as the result.

Precision

Description: This test determines the precision (% RSD) of the relevant element's emission signal.

Procedure: A standard solution containing relevant elements is aspirated using a dedicated method. The method measures a number of replicates and calculates the % RSD for each element. The calculated result is then recorded in ACE.

Axial Detection Limits

Description: This test determines the minimum concentration at which the relevant element can be detected in the axial viewing mode.

Procedure: A dedicated method is used to aspirate a 2% nitric acid blank and then a multi-element calibration standard solution to formulate a calibration curve. The sample introduction system is then flushed with a 10% nitric acid wash solution. The 2% nitric acid blank solution is aspirated again and the replicate measurements are interpolated from the calibration curve. Statistical calculations are then applied to the interpolated results and the calculated results are recorded in ACE.

Radial Detection Limits

Description: This test determines the minimum concentration at which the relevant element can be detected in the radial viewing mode.

Procedure: A dedicated method is used to aspirate a 2% nitric acid blank and then a multi-element calibration standard solution to formulate a calibration curve. The sample introduction system is then flushed with a 10% nitric acid wash solution. The 2% nitric acid blank solution is aspirated again and the replicate measurements are interpolated from the calibration curve. Statistical calculations are then applied to the interpolated results and the calculated results are recorded in ACE.

Autosamplers and Switching Valve Accessories

Autosampler Operation

Description: This test verifies the functional operation of the installed autosampler.

Procedure: From the instrument software, the autosampler probe is directed to several sample locations and a pass or fail is recorded in ACE.

Switching Valve Operation

Description: This test verifies the functional operation of the installed switching valve.

Procedure: From the instrument software, run the automated switching valve test and follow the prompts. When the tests are completed, the software generates a report with the results and a pass or fail is recorded in ACE.

www.agilent.com/chem/qualification

Report and Delivery Options

This list below includes options selected for inclusion in the EQR. By default, repeated run logs and transaction logs are always included; all other options can be included or excluded.

(For hyphenated system types only) If different options are chosen for the primary and supported system types, the primary system options are used for both techniques.

- Show chromatograms
- Show header and footer on cover
- Include repeated run logs
- Include Transaction logs

Selected Signature Options

Status: EQP is not locked

- Reporting variance is allowed in this EQP

Customer Approval

Name:	
Title:	
Date:	
Signature:	

Name:	
Title:	
Date:	
Signature:	

Name:	
Title:	
Date:	
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Name:	
Title:	
Date:	
Signature:	

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Agilent CrossLab Compliance and its primary components (ACE software tool, procedures, test design, metrology tools, chemical reference standards, and operator training materials) have been designed, tested, validated, and released for commercial use following Agilent's Life Cycle Development Quality Assurance methodology. A review of the following life cycle stages is a key part of the ACE software and associated protocol development process.

-Product Description / Specification
-Life Cycle Phases / Transition Approval
-Quality Assurance / Testing
-Documentation and Change Management
-Source Code

Validation certificates for the ACE software and associated protocols are generated automatically as part of the life cycle process, prior to software release, and are available on request. The certificate includes a declaration of intent statement and is representative of the life cycle process followed.

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