

Workflow and permissions

Exomaly LIMS: from the customer's request to the issued test report and the handling of the sample; who may do what; how the data is protected

Written against the version running on 23 October 2026 · For laboratory staff, quality managers, assessors and customers who want to understand how the system works

Note: this is the standard workflow of Exomaly LIMS. The steps, roles, permissions and forms can be **adjusted and changed to fit the business processes of each laboratory or organisation**; the adjustments are agreed with the laboratory at deployment. The controls that help meet ISO/IEC 17025 (four eyes, the audit trail, issued reports that cannot be edited) are always kept.

What is a LIMS?

A LIMS (Laboratory Information Management System) is software that replaces notebooks, spreadsheets and loose paperwork in a testing laboratory. It records the journey of every sample, from the moment a customer sends it to the moment the result report is issued, so the laboratory always knows which sample is where, who worked on it, who checked it and whether the result can be trusted.

Example: a factory sends a wastewater sample to a testing laboratory to measure heavy metals. Without a LIMS, samples and results are scattered across notebooks and spreadsheets, easy to mix up and hard to trace when a customer or an assessor asks. With a LIMS, every step leaves a record.

1. Sample receipt

The sample gets a unique number; a QR-code label is printed and attached to it.

2. Assignment

The tests to run are chosen and assigned to the right section and person.

3. Result entry

The analyst enters the result; the system checks it against the limits and flags unusual values.

4. Review and approval

A second person checks and an authorised person approves: whoever enters a result cannot approve it (the "four-eyes" principle).

5. Result report

The report is issued to the customer. An issued report is never edited, only replaced by a new version; every change is logged.

Beyond the sample flow, a LIMS also manages what a laboratory must be able to prove during an ISO/IEC 17025 assessment: equipment and calibration, staff competence, document control, complaints and corrective actions. Exomaly LIMS supports meeting ISO/IEC 17025 in the clauses the software is responsible for.

1. Purpose and scope

This document describes **who does what, in which order, and what the system does or blocks by itself** at each step of a test job, the way Exomaly LIMS runs today. Which button to press on each screen is in the User guide; this document is about the **workflow**.

The controls are designed to **support** a testing laboratory in meeting ISO/IEC 17025:2017 (which clause, see the Appendix). The software is a tool that supports the laboratory; it does not replace assessment by an accreditation body.

Not part of this workflow yet: a live customer portal (the screens exist, not yet set up for any laboratory), sending reports and notices by e-mail, entering results straight from instrument files, capturing raw data from instruments automatically, electronic signatures. These are done outside the system today.

2. The overall picture

A test job goes through ten steps. Step 1 (quotation) is optional; from step 5 on, when the reviewer or the signatory chooses **Return**, the test goes back to step 5 to be done again.

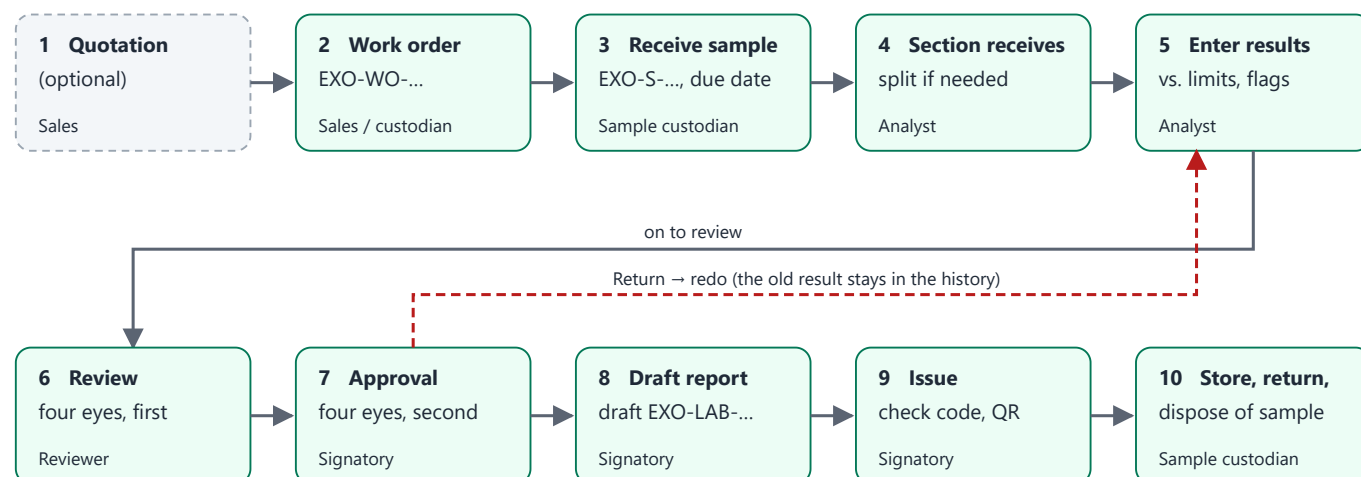


Figure 1. The ten steps of a test job; the red dashed line is the redo loop.

3. Who does what: the roles

One person may hold several roles. The roles of analyst, reviewer and signatory **apply only in the lab sections the person is assigned to**. The administrator manages settings and the catalogue only, and holds no business rights by default.

Role	Main work in the workflow	Step
Sales	Prepare quotations, open work orders, create announced-sample lists	1, 2
Sample custodian	Open work orders, receive samples into the laboratory, print labels, store, return to the customer, confirm disposal	2, 3, 10
Analyst	Receive the sample in their section, mark splitting, enter results, redo when returned	4, 5
Reviewer	Review the results of their section: accept or return	6
Signatory	Approve, revoke approval, draft and issue reports, amend reports, allow overdue equipment for the day, approve sample disposal	7, 8, 9, 10
Quality manager	Keep the quality register (nonconformities, complaints, incidents), withhold and release reports, approve sample disposal, view the audit trail	Throughout
Administrator	Laboratory details, report template, catalogue (staff, sections, tests, methods, customers, equipment...), approve large discounts	Set-up

3.1 Who sees the customer's name

The customer's name, number, address, contact person and sampling place are shown only to the **sample custodian, sales, signatory, quality manager and administrator**. Analysts and reviewers see only the **sample number**, matrix, tests, date received and due date. The data is removed on the server, not merely hidden on the

screen, so the exports, printouts and searches of these two roles do not contain the customer's name either. This rule is on in every deployment; a laboratory that wants it otherwise asks at deployment.

3.2 Permissions by function

T: does it (creates, records, enters). **D:** approves or decides. **X:** views only. Empty cell: the role cannot do this. A person has the rights of every role they hold; the rights tied to a lab section apply only to the sections the person is assigned to. These are the default permissions; a laboratory can ask for them to be adjusted to the way it is organised.

Function	Sales	Sample custodian	Analyst	Reviewer	Signatory	Quality manager	Administrator
Quotations	T				X	X	T, D (large discount)
Work orders	T	T					
Announced-sample lists	T	T					
Receive samples, receive a batch, print labels		T					
Store, move, return to customer, confirm disposal		T					
Extend sample retention		T				T	
Approve sample disposal					D	D	
Receive in the section, split, enter results, analysis batches			T				
QC results, proficiency testing results			T				
Review results				D			
Approve, revoke approval of results					D		
Bulk review				D	D		
Draft, issue, amend test reports					T		
Withhold and release reports					D	D	
Approve measurement uncertainty					D		
Evaluate proficiency testing				D	D		T (open rounds)
Equipment: catalogue							T
Equipment: record calibration					T		T
Equipment: report a fault, maintenance, checks			T	T	T		T
Equipment: allow overdue use for the day					D		
Equipment: calibration and maintenance plans					T	T	

Reagents and standards: view	X	X	X	X	X	X	X
Reagents: receive a lot			T	T	T	T	T
Reagents: open a bottle, prepare a solution, record use			T	T	T	T	
Reagents: review flagged uses, void a lot record						D	
Quality register: open an entry, add actions	T	T	T	T	T	T	T
Quality register: evaluate, conclude					D	D	
Quality register: close an entry						D	
Controlled documents: view, acknowledge reading	T	T	T	T	T	T	T
Controlled documents: draft				T	T	T	
Controlled documents: review				D		D	
Controlled documents: approve					D	D	
Competence: view the matrix			X	X	X	X	X
Competence: record training, assessments				T	T	T	
Competence: grant, revoke authorisations					D	D	
Method validation: prepare the record			T	T	T	T	X
Method validation: approve					D	D	
Assessment readiness, record pack for assessors					T	T	T
Raw data files: upload			T	T	T	T	
Audit trail, CSV export						X	X
Record retention periods						X	T
Laboratory settings, staff, catalogue, import from file							T

Risks, customer feedback, internal audits and management reviews: every role records the part assigned to it; the quality manager leads and concludes. Equipment, reagents, the quality register, controlled documents, competence, proficiency testing, measurement uncertainty, method validation and assessment readiness belong to the Standard ISO 17025 base plan; the Sample Operations base plan has none of those rows.

4. Step by step

Step 1. Quotation (optional)

ISO/IEC 17025 clause 7.1

Who	Sales prepares it; the administrator approves a large discount.
What	Pick the customer; add sample groups (matrix, number of samples, test package or single tests); set a discount (at most 50%, with a reason), VAT, validity (30 days by default), the regulation and the decision rule. Save the draft → approve the discount (if large) → mark it sent to the customer → record the customer's acceptance or refusal with the customer's confirmation (e-mail reference, purchase order number).
The system	Prices are computed on the server from the laboratory's price list (not typed in); it gives the number EXO-QUO-YYMM-NNN ; once sent, the amounts, customer and lines are locked; validity runs from the day it was sent.
Blocks	No "accepted" after the validity date. An accepted quotation is a contract and is not edited: prepare a new quotation. To change a quotation already sent, create an amendment -R1 (the old one is cancelled).
Records	The quotation (printable; a draft carries the line "DRAFT"); the provisional cost of the work order created from the quotation.

Step 2. Open a work order

ISO/IEC 17025 clause 7.1

Who	Sales or the sample custodian.
What	Pick the customer, the priority (Normal, Fast, Urgent), the purpose, the regulation to compare against (optional), the report language, the delivery method, the e-mail address. If an accepted quotation exists, pick it: the customer is locked and the regulation and decision rule come from the quotation.
The system	Gives the number EXO-WO-YYMM-NNN (Vietnam time).
Blocks	Each quotation has one original work order; extra work uses a supplementary work order.

Step 3. Receive the sample

ISO/IEC 17025 clauses 7.4.1, 7.1.5

Who	The sample custodian.
What	Pick an open work order, the matrix, a package or single tests, the description, the quantity, the condition on receipt, the storage place. For a sample with a deviation on receipt, fill in the description, the decision (test anyway , the report will carry a disclaimer, or reject the sample) and who was told. When a customer brings many samples, use Receive many samples (paste from Excel or load a file, up to 50 samples per batch), press Check , then Receive the batch . When the customer announces which samples will come, create an announced-sample list to match them on arrival.
The system	Gives the sample number EXO-S-YYMM-NNNN ; computes the due date in the laboratory's working days (Normal: the longest standard time of the tests; Fast: half of it; Urgent: one working day); sends the sample to each section that has tests on it; prints a QR label (the sample number only, no customer name).
Blocks	A batch is received all or nothing : one bad row and no sample is received. A receipt time more than 15 minutes before now needs a reason for the late entry. A rejected sample goes to no section and has no due date. A sample not on the announced list can still be received, but who at the customer confirmed it, and by what channel, must be recorded.

Step 4. The section receives the sample

ISO/IEC 17025 clause 7.4.1

Who	An analyst of the section the sample was sent to.
What	In the Waiting for section box (urgent and early-due samples first), open the sample and press Receive on their section's line. When the sample must be divided, mark Needs splitting , and Split done when finished.
The system	Records who received it and when; when the first section receives it, the sample moves from Received to In testing . A sample sent to several sections is received by each one separately.
Blocks	Only in the sections the person is assigned to. A sample On hold or Rejected takes no results.

Step 5. Enter results

ISO/IEC 17025 clauses 6.2, 6.4, 7.7, 7.8

Who	An analyst of the section, after the section has received the sample.
What	Enter the value (number or text), a qualifier if needed (<LOD, <LOQ, >), the unit; optionally the measurement uncertainty U with its coverage factor k ; pick the equipment used and the analysis batch; press Save .
The system	Compares with the regulation (Pass / Fail); raises the flags Implausible , Far from the limit , Outlier against history (Analytics module); records who entered it and when; the test becomes "entered". Flags are hints only; a flagged result is still saved.
Blocks	The unit must be the test's unit. Broken equipment, or equipment whose calibration failed, cannot be picked; equipment overdue for calibration can be recorded only when a signatory of the section has allowed it for the day. A method with Equipment check on requires the equipment. A method with the competence gate on accepts results only from people with a valid authorisation. A failed quality control (QC) result warns, it does not block by itself.
Redo	When returned, the test goes back to "in progress"; press Re-enter ; the old result stays in the history.

Step 6. Review

ISO/IEC 17025 clauses 7.8.1.1, 7.10.1

Who	A reviewer of the section, not anyone who entered a result of that batch.
What	When every test of the section is "entered", choose Accept or Return , with a note. A note is required on a return, and on accepting a batch with a result flagged as anomalous. Routine items can go through bulk review (up to 50 items at a time).
The system	The decision applies to the whole batch of that section's tests on the sample and is recorded under Review and approval . Each item of a bulk review is still a decision, with its own audit-trail line. The QC status of the batch is shown (information only, no block).
Blocks	The four-eyes principle, checked in two layers: in the application and in database triggers. An item with an anomaly flag or done under supervision must be reviewed on its own, not in bulk; an item that changed after it was viewed is skipped and listed.

Step 7. Approval

ISO/IEC 17025 clause 7.8.1.1

Who	A signatory of the section, other than whoever entered results and whoever reviewed that batch.
What	When every test of the section is "reviewed": Accept or Return with a note. To withdraw it: Revoke approval with a required reason; the test goes back to "in progress".
Blocks	Approval cannot be revoked once the test is in a draft or issued report (discard the draft first, or amend the issued report).

Step 8. Draft the test report

ISO/IEC 17025 clause 7.8.2

Who	A signatory.
What	Pick the work order, tick the approved tests to include, press Create draft . On the draft: change the language, show or hide the limit and pass/fail columns, remove tests (for a partial report), or discard the draft.
The system	A report with every test of the work order gets the number EXO-LAB-YYMM-NNN ; a partial report gets the suffix -1, -2.
Blocks	Only approved tests go in.

Step 9. Issue

ISO/IEC 17025 clauses 7.8.1.1, 7.8.8

Who	A signatory who entered no result of the report.
What	Press Issue , read the warning, press Confirm ; then Print and save the PDF.
The system	The report becomes "issued"; its tests become "reported"; the sample status updates. It gives a check code , a QR code and a report seal printed on the paper copy. Whoever receives the report scans the QR code to compare the report number, issue date and every result line on a public verification page, without signing in.
Blocks	Reports can be issued only once the administrator has entered the laboratory details and the report template. A report whose sample, test or report is withheld by an open quality-register entry cannot be issued. An issued report cannot be edited (a database trigger blocks it). The check code can be revoked (by a signatory or the quality manager, with a reason) if a picture of the QR code is published.
To correct a report	A signatory presses Amend (replacement) , enters the reason (required) and ticks the tests to redo. The system creates a draft -R1 ; the reopened tests are redone, reviewed and approved, then the amendment is issued. The old report stays valid until the new one is issued, then becomes "superseded".

Step 10. Store, return, dispose of the sample

ISO/IEC 17025 clauses 7.4.1, 7.4.2

Who	The sample custodian; a signatory or the quality manager approves disposal.
What	After testing, store it (record the place), move it, extend retention (with a reason), take it out to retest , return it to the customer (record who received it), or dispose of it. Scan the QR label with a scanner to open the sample quickly.
The system	Records every move: who, when, where, why (the Sample custody history). Lists samples past their retention date under Due for disposal .
Blocks	Return or disposal only when every test is on a report (or cancelled) and the sample is not held (on hold, or with an open quality-register entry). Disposal takes two people : a signatory or the quality manager approves it, another sample custodian confirms it was done. A change of mind before disposal: Cancel the disposal approval , the sample goes back to storage.

5. States: what the system tracks

Tests and samples change state only by a fixed **state transition table**; the screens never change it by themselves. A sample has **two state machines that do not mix**: its testing state (derived from its tests) and its physical location (custody).

5.1 Tests

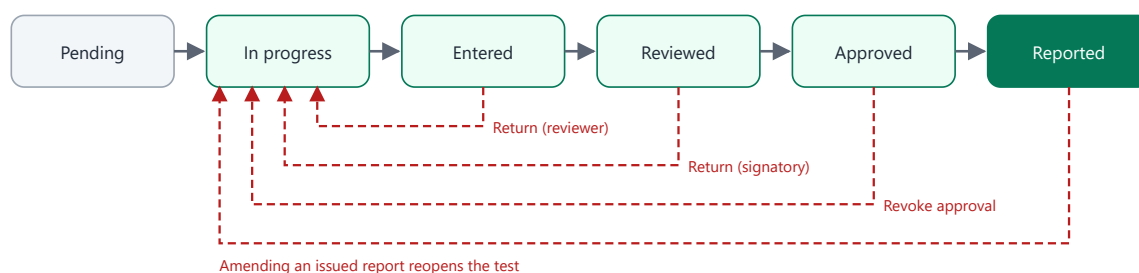


Figure 2. The life of a test. The red dashed lines are the ways back to "in progress"; each needs a person with the right to do it and (for revoking approval and amending) a reason.

5.2 Samples

The system derives the sample's state by itself from the progress of its tests, the hand-overs and the reports:



On hold and **Rejected** are "sticky" states: a sample rejected on receipt goes to no section; a sample on hold takes no results and cannot be returned or disposed of until it is released. The only manual actions at sample level are rejecting on receipt, holding and releasing.

5.3 Physical location of the sample

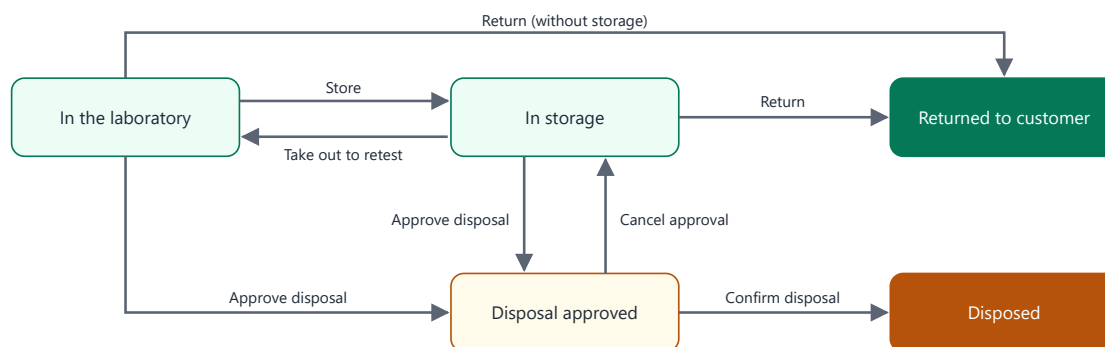


Figure 3. Physical location of the sample. "Returned to customer" and "Disposed" are final. Approving disposal and confirming it are done by two different people.

6. Controls throughout

Control	How it works	Enforced in
Four eyes	Whoever entered a result (including a result that was replaced) does not review or approve it; the reviewer does not approve that batch; the reviewer and the signatory must be assigned to that section; a result flagged as anomalous passes only with a reviewer's note; the signatory of a report entered no result of it.	Application and database triggers
Work belongs to a section	Analysts, reviewers and signatories act only in the lab sections they are assigned to.	Application
States change only by the table	Nobody changes a sample or test state by hand; an issued report is never edited, only replaced by -R1, -R2... with a reason.	Application and triggers
Numbers come from the server	Work orders, samples, reports, quotations... are not typed in and never repeat, even when many people work at once.	Server
Audit trail	Every change records who, when, the value before and after; important changes need a reason. The audit trail is sealed with a cryptographic chain that reveals later edits or deletions.	Database
Equipment must be fit for use	A result records only equipment that is not broken and is in calibration (or allowed by a signatory for the day); equipment whose calibration failed cannot be used even with permission.	Application
Staff competence	The laboratory can switch on a competence gate per method: only people with a valid authorisation can enter results for that method.	Application
Withholding through the quality register	An open nonconformity, complaint or incident can withhold reports: the related reports are not issued and the related samples are not returned or disposed of until the quality manager releases them or closes the entry.	Application
Predictions are hints	The turnaround-time prediction (P50, P90) helps to prioritise work; the due date is the commitment to the customer.	Convention
Catalogue changes do not rewrite the past	New prices, standard times, LOD/LOQ and U apply only to samples received afterwards.	Application
Customer identity hidden	Analysts and reviewers do not receive the customer's name, number or address (section 3.1).	Server

Reagents must be fit for use	A bottle or solution that is past its expiry, not yet accepted or discarded cannot be recorded as used; a use that already happened is recorded as such with a note, and the quality manager reviews it.	Application and triggers
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7. Supporting processes

7.1 Equipment and calibration (ISO/IEC 17025 clause 6.4)

The administrator or a signatory of the section **records calibrations** (certificate number, provider, expiry date, pass or fail), maintenance and intermediate checks. Analysts and reviewers of the section can also **report a fault** (the safe direction); only the administrator or a signatory **returns equipment to use** after showing it works correctly. A wrong line is not edited but **voided** with a reason and recorded again. The system reminds of equipment due within 30 days and traces the results that may be affected when equipment has a problem.

7.2 Quality control, proficiency testing, measurement uncertainty (ISO/IEC 17025 clause 7.7)

QC sample results are plotted on control charts; QC samples that drift or go out of control are listed with the results that may be affected. Proficiency testing results are evaluated by round; a warning or unsatisfactory result can open a quality-register entry directly. A suggested measurement uncertainty applies only when **a signatory approves it**, and only to samples received afterwards.

7.3 Quality register: nonconformities, complaints, incidents (ISO/IEC 17025 clauses 7.9, 8.5 to 8.9)

1. **Open an entry** (numbers EXO-NC-... nonconformity, EXO-CP-... complaint, EXO-IN-... incident), linked to the related samples, reports, QC results or PT rounds. What was opened is not edited.
2. The quality manager or a signatory ticks **Withhold reports** when the risk is high enough not to release results yet.
3. **Add actions** (immediate correction, root-cause investigation, corrective action, customer contact, decision, note): added only, never edited or deleted.
4. **Evaluate** the severity and root cause; a corrective action is always a task with an owner; once done, **verify its effectiveness** (not by the owner).
5. **Closing an entry** is for the quality manager only; a complaint must be closed by someone not involved in the work complained about, and its outcome must be **approved** before the customer is told it is closed.

7.4 Documents, competence, risks (ISO/IEC 17025 clauses 8.3, 6.2, 8.5)

Controlled documents go through three people (drafting, review, approval); the current version is worked out by date; there are periodic reviews and read acknowledgements. The competence matrix records each person's authorisation per method, with an expiry and a warning before it lapses. The risk register, customer feedback, internal audits and management reviews are in the **Quality system** screen.

7.5 Reagents and standards (ISO/IEC 17025 clauses 6.4, 6.5, 6.6)

The reagent register records each **lot** (supplier, lot number, expiry, certificate, acceptance check), each **bottle** (date opened, expiry after opening) and each **prepared solution** (from which lots, who prepared it, expiry). Each use is linked to a result or an analysis batch, so it can be traced back: when a lot has a problem, the results that used it are listed at once. The system reminds of lots, bottles and solutions close to expiry.

7.6 Assessment readiness (ISO/IEC 17025 clauses 8.8, 8.9)

One screen sums up, clause by clause, the open items (overdue equipment, authorisations about to lapse, expired QC materials, methods due for revalidation, open quality-register entries...) and the places with "no data yet". From it a **record pack** for assessors is prepared for a date range, with an integrity check code; each pack is recorded in the audit trail.

7.7 Choosing modules per laboratory

A laboratory that keeps its quality-system records on paper takes the **Sample Operations** base plan: those screens **are hidden** (documents, staff, quality system, reagents, assessment readiness). The sample workflow runs as usual; entering results is not blocked for lack of competence or equipment records when the laboratory does not use these modules.

7.8 Analysis batches (ISO/IEC 17025 clause 7.7.1)

An **analysis batch** (number EXO-B-...) is one run of one method. The analyst links the customer results and the QC results of the same run to the same batch, so the reviewer sees the QC that goes with the results. The system concludes on the batch from its QC values by itself: **QC passed**, **QC failed** (a value out of its criteria; a wrong entry is voided with a reason, never deleted), **QC missing** (not yet every QC type the method requires) or **No QC**. The administrator declares the QC types each method requires. Today the batch conclusion informs the reviewer; it does not block review by itself yet.

7.9 Raw data files (ISO/IEC 17025 clauses 7.5.1, 7.5.2)

The analyst attaches the files exported by the instrument (CSV, TXT, pictures, PDF, Excel, ZIP...) to each result or analysis batch, before the test is reviewed; after that the files are locked. Each file gets an **integrity check code** (SHA-256) on upload, so a replaced file is detected. Files are never deleted: **voiding a file** (by whoever uploaded it or a reviewer of the section) requires a reason, and the file stays in the list, struck through, with who, when and why.

7.10 Method validation (ISO/IEC 17025 clauses 7.2.1.5, 7.2.2)

Before a method is used for customers' samples, the laboratory shows it is fit for purpose: **verification** for a standard method, **validation** for a laboratory-developed or modified method, **revalidation** when the method, the equipment or the standard changes.

1. **Draft the record**: record type, intended use, procedure, the tests the record covers.
2. **Studies** for each test: LOD/LOQ, repeatability, trueness (certified reference material) or recovery. **The acceptance criteria are set before any measurement** and cannot change afterwards; the server computes LOD, LOQ, RSD, bias and recovery and concludes pass or fail. Other characteristics are entered by hand or marked not applicable with a reason.
3. **Submit**: the record is locked. **Approve**: a signatory or the quality manager, not whoever drafted, submitted or entered measurements; they write the fitness-for-purpose statement, choose pass or fail and set a revalidation date; the new LOD/LOQ can be applied to the catalogue (samples already received keep the old values).
4. Each test carries a status: **Current**, **Due soon**, **Revalidation overdue**, **Failed**, **Withdrawn**, **No record**. Older records kept on paper are recorded with where they are filed.

7.11 Record retention (ISO/IEC 17025 clause 8.4)

The laboratory sets its **retention period** (a number of years with its basis, such as a procedure number) and, when a contract asks for longer, a **period per customer** with the contract clause. The records of a work order are kept for the longer of the two, counted from the issue date of its latest test report. The system **deletes nothing by itself** when the period ends: the date tells the laboratory how long it must keep the records. Every change of a period is recorded in the audit trail.

8. Exceptions

Situation	Handling in the system
A sample with a deviation on receipt	Fill in the Deviation on receipt block: choose to test anyway (the report prints a disclaimer) or to reject the sample; record who was told.

A result flagged as anomalous	Still saved. The reviewer must add a note to accept it; flagged items do not go into bulk review.
The reviewer or signatory disagrees	Return with a note: the test goes back to "in progress", the analyst enters it again, the old result stays in the history.
An approval must be withdrawn	Revoke approval with a reason, only while the test is not on a report.
Equipment overdue for calibration and the work cannot wait	A signatory of the section presses Allow use today with a reason; valid for the day only, stored with the result. Not for broken equipment or a failed calibration.
QC fails or drifts	The system lists the results that may be affected; the laboratory decides what to do and can open a quality-register entry from that QC line.
An error is found after the report was issued	Amend the report into a replacement -R1 with a reason; if it affects the customer, open a quality-register entry.
A customer complains	Open a complaint entry (sales, the quality manager or a signatory); it can withhold the related reports and samples; handle it as in section 7.3.
The network drops while receiving a whole batch	The screen says "Not sure it was received": do not receive it again , press Check again to ask the server.
The customer keeps the sample longer than the retention period	Extend retention with the new date and a reason (sample custodian or quality manager).
An announced sample does not arrive	Mark the announced line Not received (with a reason) or Withdrawn ; a sample arriving later can still be received. Close the list when no line is waiting.

9. Numbers and records created

Number	What it is	Given when
EXO-QUO-YYMM-NNN	Quotation (amendment: -R1)	The quotation draft is saved
EXO-WO-YYMM-NNN	Work order	The work order is opened
EXO-S-YYMM-NNNN	Sample	The sample is received (consecutive in a batch)
EXO-LAB-YYMM-NNN	Test report (partial: -1, -2; replacement: -R1, -R2...)	The draft is created
EXO-B-...	Analysis batch	The batch is opened
EXO-EQ-...	Equipment	The equipment is added to the catalogue
EXO-NC-..., EXO-CP-..., EXO-IN-...	Nonconformity, complaint, incident	A quality-register entry is opened
EXO-RL-..., EXO-RP-...	Reagent lot, prepared solution	The lot is received, the solution is prepared

YYMM is the year and month in Vietnam time; in a new month the number starts again at 001. Every number is given by the server.

10. Sign-in, data and security

Protection	How it works
A separate deployment per laboratory	Each laboratory has its own address, database and sign-in gate; its data is not stored with any other laboratory's. The public demonstration holds mock data only.

Sign-in	One account per staff member, by e-mail; sign-in with a code sent to that e-mail. Only addresses on the laboratory's list and active staff can enter; someone who leaves is locked out at once, while their past records are kept.
Permissions	By role and lab section (section 3), checked on the server for every action. The administrator holds no business rights by default.
Customer confidentiality	Customer identity hidden from analysts and reviewers (section 3.1); every view and export of important data is recorded.
An audit trail that cannot be edited	Every change records who, when, before and after, with a reason when needed; the audit trail is sealed with a cryptographic key to reveal any edit or deletion.
Backup and restore	The database can be restored to any moment in the last 30 days; backups are encrypted and kept outside the main infrastructure; restores are rehearsed regularly.
The data belongs to the laboratory	The laboratory can export its sample and result lists at any time; when the service ends, the laboratory receives a full copy of its data.
Software changes	Every release is tested automatically before it goes live; the laboratory is told in advance of feature upgrades.

More detail: the Exomaly LIMS "Security overview" and "Incident procedure" documents.

11. Features available and planned

The table sums up by group. A laboratory chooses one base plan (Sample Operations or Standard ISO 17025) and adds modules when needed. The full list, with the plan, the module and the order of work, is in the "Plans and features" document. The planned items are a plan: their order changes with customers' needs and carries no date commitment.

Base plan, module	Available	Planned
Sample Operations base plan: sample workflow	Receiving one sample or many at once, announced-sample lists, QR labels; entering results, comparison with regulations, anomaly flags; four-eyes review and approval, bulk review; test reports that cannot be edited, -R1 replacements, a public report verification page; storing, returning and disposing of samples, storage conditions, retained samples	Automatic calculation from several readings; calibration curves; Westgard and Nelson rules on QC charts; a batch QC gate before review and specifications per product (partly available); view-only accounts for management
Standard ISO 17025 base plan: adds the quality system	Proficiency testing, measurement uncertainty; equipment and calibration; competence and authorisations; controlled documents; the quality register, corrective actions, risks, customer feedback, internal audits, management reviews; reagents and standards; assessment readiness and record packs; method validation (partly)	One-click trace of a result; an accreditation application and maintenance dossier; a monthly data-integrity certificate; out-of-specification (OOS) investigations; retraining when a document changes; a quality metrics dashboard; reagent stock by mass
Business module (basic quotations are in the base plan)	Quotations by test, discount approval, provisional cost of a work order (base plan)	Copying old quotations; extended quotations (framework contracts, customer price lists); invoices, receivables, margins; report templates per customer; advanced reports; reports in government-agency formats
Customer module	Customer portal (screens ready, not yet set up for any laboratory); e-mail (partly)	E-mail for reports and notifications; Zalo, SMS

Instrument Data module, Advanced Compliance module	Not yet	Importing results from instrument files, sending sample worklists to instruments, automatic capture of raw data; electronic signatures, digital signing of reports, a software validation pack for pharmaceutical laboratories; an open API (on request)
Analytics module	QC drift detection, proficiency testing trends, measurement uncertainty monitoring, outliers against history, risk-based review ordering; turnaround-time prediction, late risk, intake forecast (switched on once the laboratory has real history)	Result trends by sampling point and customer; capacity forecast, assignment hints; advanced statistics; a result confidence score before approval; a read-only AI assistant (in trial, charged per use)
Operations and interface	Vietnamese and English; usable on narrow screens; in-app notifications and task counts on the menu; CSV export, catalogue import from Excel; feedback from inside the application; customer identity hidden by role; modules chosen per laboratory	Bulk actions (receive, assign section, print labels); draft autosave, keyboard shortcuts; QR scanning with a phone camera; export and deletion of personal data; rules configured per laboratory (number of approval levels, steps, flag thresholds)
By industry	A common workflow for physico-chemical, microbiology, water and food testing laboratories	On request: microbiology (colony counts, MPN); water and environment; stability studies; product lot management; several sites in one laboratory

12. Deployment for a laboratory

These are the steps by which Exomaly LIMS goes into a testing laboratory. The adjustments to the laboratory's processes (the note at the top of this document) are agreed in steps 2 and 3.

#	Step	What happens
1	Requirements	The laboratory describes its roles, number of users, sections, sites, the forms it uses and the modules it needs; Exomaly sends a questionnaire to clarify.
2	Process description for the laboratory to confirm	Exomaly sends a description of the workflow and permissions the way the laboratory works; the laboratory corrects and confirms it.
3	Demonstration on a separate deployment with mock data	The laboratory sees the workflow run on its own deployment holding mock data only; scope, adjustments and cost are agreed.
4	Setting up the laboratory's deployment	Its own address, database and sign-in gate; the adjustments are built and tested.
5	Catalogue and users	Customers, tests, methods, prices and equipment are imported from the Excel templates; accounts are created by role and section; record retention, laboratory details and report template are set.
6	Training by role	Online training sessions for each group of users, with the User guide.
7	Trial run	A round of real samples runs alongside the current way of working; Exomaly supports closely and fixes what does not fit yet.
8	Acceptance and go-live	Exomaly hands over the software validation record for the release put into use (ISO/IEC 17025 clause 7.11.2); the laboratory runs the acceptance checklist on its own configuration and signs it; then it goes live.

The laboratory should prepare: the list of users with their e-mail addresses and roles, the customer and test catalogue, the report forms in use, the sample numbering rule and record retention period, and one contact person. The laboratory's real data goes in

only after the laboratory agrees in writing.

13. Glossary

Term	Meaning in this document
Four-eyes principle	Important work needs at least two people: whoever enters a result does not review or approve it.
Work order	The customer's order: customer, priority, regulation to compare against, the samples sent with it.
Test	One determination on one sample by one method, for example lead in domestic water by ISO 17294-2.
Regulation, limit	The permitted level of a test used to conclude pass or fail.
Decision rule	How measurement uncertainty is taken into account when concluding pass or fail, agreed with the customer.
Measurement uncertainty (U)	The interval around a result within which the true value lies at a stated level of confidence (with the coverage factor k).
LOD, LOQ	Limit of detection and limit of quantification: the smallest value the method can detect, can quantify.
QC (quality control)	Samples of known value run with the customer's samples to check the measurement is still right.
Proficiency testing (PT)	Comparing the laboratory's results with other laboratories' on the same samples sent by a provider.
Analysis batch	One run of one method, with the customer samples and the QC samples run together.
Verification, validation	Showing a standard method works correctly in the laboratory; showing a laboratory-developed or modified method is fit for purpose.
Quality register	Where nonconforming work, complaints, incidents and their handling are recorded.
Corrective action (CAPA)	Removing the cause of a nonconformity so that it does not happen again, with an effectiveness check.
Replacement (-R1)	A new test report that replaces an issued report with an error; the old report is kept and marked as replaced.
Check code	A code printed on the report with a QR code so the recipient can check the report is genuine on a public page.
Audit trail	A record of every change that cannot be edited: who, when, value before and after, reason.
Due date	The date the laboratory commits to report by, in working days and by priority.
On hold, withheld report	A sample or report stopped (waiting for the customer, or because of an open quality-register entry) until it is released.

Appendix A. Mapping to ISO/IEC 17025:2017

Clause	Content (paraphrased)	Where in the workflow
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4.2	Confidentiality of customer information	Sections 3.1, 10
6.2	Personnel: competence, authorisation	Step 5; sections 3.2, 7.4
6.4, 6.5, 6.6	Equipment, reagents and standards: calibration, expiry, traceability	Step 5; sections 7.1, 7.5
7.1	Review of requests, tenders and contracts	Steps 1, 2, 3
7.2	Selection, verification and validation of methods	Section 7.10
7.4	Handling of test items: receipt, storage, return, disposal	Steps 3, 4, 10
7.7	Ensuring the validity of results: QC, proficiency testing, measurement uncertainty	Step 5; sections 7.2, 7.8
7.8	Reporting of results; 7.8.8 amendments to issued reports	Steps 6 to 9
7.9	Complaints	Section 7.3
7.10 / 8.7	Nonconforming work; corrective action	Steps 6, 7; section 7.3
8.3	Control of documents	Section 7.4
8.5 to 8.9	Risks, improvement, corrective action, internal audits, management review	Sections 7.3, 7.4, 7.6
7.5, 7.11	Technical records; control of data and information management	Sections 6, 7.9, 10
8.4	Control of records: storage, protection, retention	Section 7.11

Exomaly LIMS supports the laboratory in meeting the clauses above for the part the software covers; many of them also need the laboratory's own procedures, people and records.

Appendix B. Clause-by-clause ISO/IEC 17025:2017 checklist

This list is the Ready for assessment table of the software, updated on 2026-10-22. The "Software" column is how far the software supports the clause: Supported (the software has the function and the records for it), Partial (the note says what is missing), Not yet, Outside the software (the laboratory's own task, the software does not replace it). It helps the laboratory prepare; it is not a conclusion of an accreditation body.

76 rows in all: 18 supported, 41 partial, 3 not yet, 14 outside the software.

Clause	Requirement	Software	Note
Chapter 4 · General requirements			
4.1.1–4.1.3	Commitment and responsibility for impartiality	Outside the software	The laboratory's own task: its impartiality commitment and assignment of responsibility; the software does not replace it.
4.1.4, 4.1.5	Identifying and addressing risks to impartiality	Partial	The software has the risk register and role-based hiding of customer names; it does not yet check free text for customer names or support hand-entered blind codes.
4.2	Confidentiality of customer information	Partial	Every active staff member can read the data of every section; reading is not yet limited by section.
Chapter 5 · Structural requirements			
5.1	Legal entity	Outside the software	The laboratory's own task; the software holds no record of it.
5.2	Management with overall responsibility	Outside the software	The laboratory's own task; roles in the software only grant access rights and do not identify management.
5.3	Scope of laboratory activities	Partial	The software holds the test catalog and the accredited flag; the laboratory defines and publishes its own scope of activities.
5.4	Activities meet the standard, customers and authorities	Outside the software	The laboratory's own task; the software holds no record of it.
5.5	Organization and management structure	Outside the software	The laboratory's own task; role-based permissions in the software are not an organization structure.
5.6	Authority and resources to run the management system	Outside the software	The laboratory's own task; the software holds no record of it.
5.7	Communication and integrity of the management system	Outside the software	The laboratory's own task; the software holds no record of it.
Chapter 6 · Resource requirements			
6.1	Resources: personnel, facilities, equipment	Outside the software	The laboratory's own task; the software keeps records for parts of it under clauses 6.2 to 6.6.

6.2.1–6.2.4	Impartiality and competence of personnel	Outside the software	The laboratory's own task; competence and authorization records per person are under clauses 6.2.5 and 6.2.6.
6.2.5	Personnel competence and authorization records	Partial	Certificate files are not yet attached to personnel records, and reading the current SOP is not yet required before authorization.
6.2.6	Authorizing each person for each task	Partial	The competence gate is off by default and does not yet cover QC, proficiency testing or analysis batches; removing a role does not reassign work already assigned.
6.3	Facilities and environmental conditions	Outside the software	Outside the software: laboratory and storage temperatures are recorded outside the LIMS; no sensor connection yet.
6.4.1	Equipment, reference materials and reagents	Partial	For equipment see the 6.4.13 row; for chemicals and reference standards see the row below.
6.4.1, 6.4.4, 6.4.13 f, 6.5, 6.6.2 c	Chemicals, reagents and reference standards	Partial	Stage 1: using a bottle or solution that is not fit for use is refused, but entering results is not blocked; QC materials are not yet linked to reagent lots.
6.4.7, 6.4.9, 6.4.10, 6.4.13	Calibration programme and equipment records	Partial	Older results carry no equipment; the report does not yet print the equipment used; there is no equipment status label yet (6.4.8).
6.5	Metrological traceability	Partial	The LIMS keeps calibration records; choosing a competent calibration provider and judging the traceability chain is the laboratory's task.
6.6, 7.1.1 c	Externally provided products and services, subcontractors	Partial	The customer's prior agreement to subcontracting is only planned; the evaluation records of subcontractors are kept outside the software.
Chapter 7 · Process requirements			
7.1.1	Review of requests, tenders and contracts	Partial	No invoices, receivables or electronic signatures yet; the tax rate and the discount-approval threshold await the accountant.
7.1.2	Informing the customer when the requested method is unsuitable	Not yet	There is no place yet to record that the customer was told when they asked for a different method.
7.1.3	Statements of conformity and the agreed decision rule	Supported	—
7.1.4	Resolving differences between a tender and the contract	Supported	—

7.1.5	Informing the customer of deviations from the contract	Partial	There is no place yet to record that the customer was told of deviations from the quotation or of a method change during the work.
7.1.6	Review when a contract is amended	Supported	—
7.1.7	Cooperation with the customer	Outside the software	The laboratory's own task; the software only keeps the records (clause 7.1.8).
7.1.8	Records of contract review and communication with the customer	Partial	Communication with the customer outside quotations and advance lists is not recorded; no automatic email yet.
7.2.1	Selection, verification and validation of methods	Partial	Entering results is not blocked when a test has no current validation record.
7.2.1.7	Deviations from the method	Partial	The customer's acceptance is written in the deviation text, with no field of its own; changing the method during the work has no API yet.
7.2.2	Validation of methods	Partial	Source files are not yet attached, the SOP is not yet linked, entering results is not blocked when the record is missing; the formulas have not been reviewed by laboratory QA.
7.3.1–7.3.2	Sampling plan and sampling method	Partial	Only free text on each sample; a controlled sampling plan (versions, approval) is the laboratory's task.
7.3.3	Sampling records	Partial	The name of the person who took the sample and the environmental conditions at sampling are missing.
7.4.1	Handling, receipt, protection, storage, disposal or return of items	Supported	—
7.4.2	Unique identification of items	Supported	—
7.4.3	Deviations on receipt of items	Supported	—
7.4.4	Storage conditions of items	Supported	—
7.5.1	Technical records	Supported	—
7.5.1, 7.11.3 a, 7.11.3 b, 8.4.2	Controlled retrieval and export of records	Partial	Exported CSV files are not yet digitally signed or hashed to show they were not altered after download.
7.5.2	Amendment of technical records keeps the earlier version	Supported	—

7.6, 7.8.3.1 c	Measurement uncertainty	Partial	U is suggested from QC and PT data by the Nordtest method; ranges of measurement, sampling uncertainty and the uncertainty of microbial counts are not yet handled; a per-source uncertainty budget is the laboratory's task.
7.7.1	Monitoring the validity of results	Partial	QC samples, QC charts, drift detection and analysis batches exist; batches do not block anything yet; there is no internal comparison between persons or instruments.
7.7.2	Comparison with other laboratories, proficiency testing	Partial	There is no risk-based plan for taking part in proficiency testing, and no warning for an accredited test that has not taken part for a long time.
7.7.3	Analysis of monitoring data, preventing wrong reports	Partial	A failed QC is flagged but does not yet block review; a failed PT is flagged and does not block results; the note for flagged results is one note for the whole batch.
7.8.1.1	Review and approval before release	Supported	—
7.8.1.2	Accurate, clear reports; every issued report kept	Supported	—
7.8.1.3	Simplified reports	Not yet	There is no simplified report agreed with the customer yet.
7.8.2.1	Required content of a report	Partial	Printed pages are not yet numbered "Page x of y".
7.8.2.2	Marking information supplied by the customer	Partial	Marked per sample, not yet per field.
7.8.4	Calibration certificates	Outside the software	Out of scope: the software serves testing and does not issue calibration certificates.
7.8.6.1	Decision rule	Supported	—
7.8.6.2	The report states the conclusion and the decision rule used	Supported	—
7.8.7	Opinions and interpretations	Not yet	The report has no separate section for opinions and interpretations given only by an authorized person.
7.8.8.1–7.8.8.3	Amending an issued report	Supported	—
7.9.3, 7.9.5, 7.9.6	Receiving and handling complaints	Partial	The complaints process is not yet described for customers (the laboratory's task); the formal closing notice is recorded by hand, with no automatic email.
7.10.1–7.10.2	Nonconforming work	Partial	Items are not yet opened automatically from every source (returned batches, faulty equipment); there is no structured assessment of significance.

7.11.1	Access to the data needed for the work	Partial	Every active staff member can read the data of every section; reading is not yet limited by section.
7.11.2	Validation of the laboratory information management system	Partial	The author and the approver of the system validation record are on the supplier side, with no independent reviewer; the annex has not been tried by a real laboratory.
7.11.3 a	Protection against unauthorized access	Supported	—
7.11.3 b	Protection against unauthorized alteration and loss	Partial	Nightly backups outside Cloudflare, retention locks and a restore drill exist; the drill does not yet fetch an attached file, and the B2 key for the file copy is not yet set.
7.11.3 c	Operation to the supplier specification	Supported	—
7.11.3 d	Data integrity	Supported	—
7.11.3 e	Recording system failures and corrective action	Partial	System failures are recorded by hand, not automatically from machine logs.
7.11.4	System managed off-site or by an external provider	Partial	A commitment document for customers is needed when selling.
7.11.5	Instructions and documentation available to staff	Partial	Written guidance exists; the PDF version with screenshots is in progress.
7.11.6	Calculations and data transfers checked systematically	Supported	—
Chapter 8 · Management system requirements			
8.1	Establishing and maintaining the management system (option A or B)	Outside the software	The laboratory's own task; the software keeps records for parts of it under clauses 8.3 to 8.9.
8.2	Policies and objectives of the management system	Outside the software	The laboratory's own task; document versions and read confirmations are under clause 8.3.
8.3	Control of management system documents	Partial	Not yet linked to controlled forms, and no email reminders for document reviews.
8.4.1–8.4.2	Control of records	Partial	Retention periods are set by the laboratory and recorded in the system; the LIMS never deletes records on its own (except the machine data of the audit log), and disposing of expired records is the laboratory's task.
8.5	Risks and opportunities	Partial	The risk register keeps the records; identifying, assessing and deciding how to treat risks is the laboratory's task.
8.6.1	Improvement	Partial	The software only supplies figures; choosing and carrying out improvements is the laboratory's task.

8.6.2	Customer feedback	Partial	The software records customer feedback; analysing it and using it to improve is the laboratory's task.
8.7.1	Nonconformities and corrective action	Partial	The quality register requires actions, an assessment and an effectiveness check before closing; items are not yet opened automatically from every source.
8.8	Internal audits	Partial	Independence by section does not stop the quality manager from auditing clauses 8.x themselves; the programme and the audits are the laboratory's task.
8.9	Management review	Partial	The rework rate is not yet in the minutes' figures; some sections of the demo minutes are left blank; the review itself is the laboratory management's task.