



THE CHEMICAL MANUFACTURING GUIDE

Approved formulas. Tested batches. Correct labels out the door.

From raw material to shipped drum, complaint and recall

A capability and evaluation guide for formulators, blenders, toll manufacturers and specialty chemical producers who want raw materials, batches, lab results, labels and shipments in one connected record.



RAW MATERIAL TO DRUM

FORMULA, TESTS, LABELS

SHIP, TRACE, RECALL

Global edition / October 2026

v5ultimate.com

Scope: practical orientation, not legal advice. Photos are staged; batches, values and numbers are worked examples. Your own PPE must follow the safety data sheet and your risk assessment. Diagrams show control concepts, not V5 screenshots.

INSIDE THE GUIDE

Raw material to drum, batch by batch.

Chemical plants turn bulk liquids, powders and intermediates into products their customers rely on. This guide follows one batch, CH-2216, an industrial cleaner concentrate made to formula revision 6, and shows what each step must leave behind.

01 / FRAME

pp. 03–05

Rules, hazards, one day

Hazard communication, transport, chemical inventory and process safety rules in the U.S., EU and Canada, the GHS model, voluntary schemes; one production day.

02 / MATERIAL

pp. 06–08

Supplier to store

Raw material specifications and supplier approval, bulk and packed receipts, segregated storage, status and retest dates.

03 / MAKE

pp. 09–16

Charge, react, adjust, fill

Approved formulas, checked charging, process checks, additions to bring a batch into specification, lab release, holds, filling, SDS and labels.

04 / CONTROL

pp. 17–20

Fix, respond, change, train

Corrections and CAPA, complaints, formula and supplier changes, people, permissions and hazmat training.

05 / SUSTAIN

pp. 21–27

Equipment, trace, share

Vessels and pumps, instruments, yield and OEE, hazmat shipping and trace, a mock recall, portals, records and AI.

06 / APPLY

pp. 28–36

Evidence map, tools, sources

Evidence map, four worksheets, roadmap, four-week evaluation and 15 linked sources.

Who it is for. Plant, quality, EHS and technical managers, chemists, operators, warehouse and dispatch teams, toll manufacturers, and anyone choosing a system for batch chemical production.

How to read it. Every operational page ends with a teal Where V5 fits panel. Everything above it is practice and regulation, useful whether or not you ever use V5. U.S. rules are covered in most detail; other markets are summarised. Check the current text for your products, sites and markets.

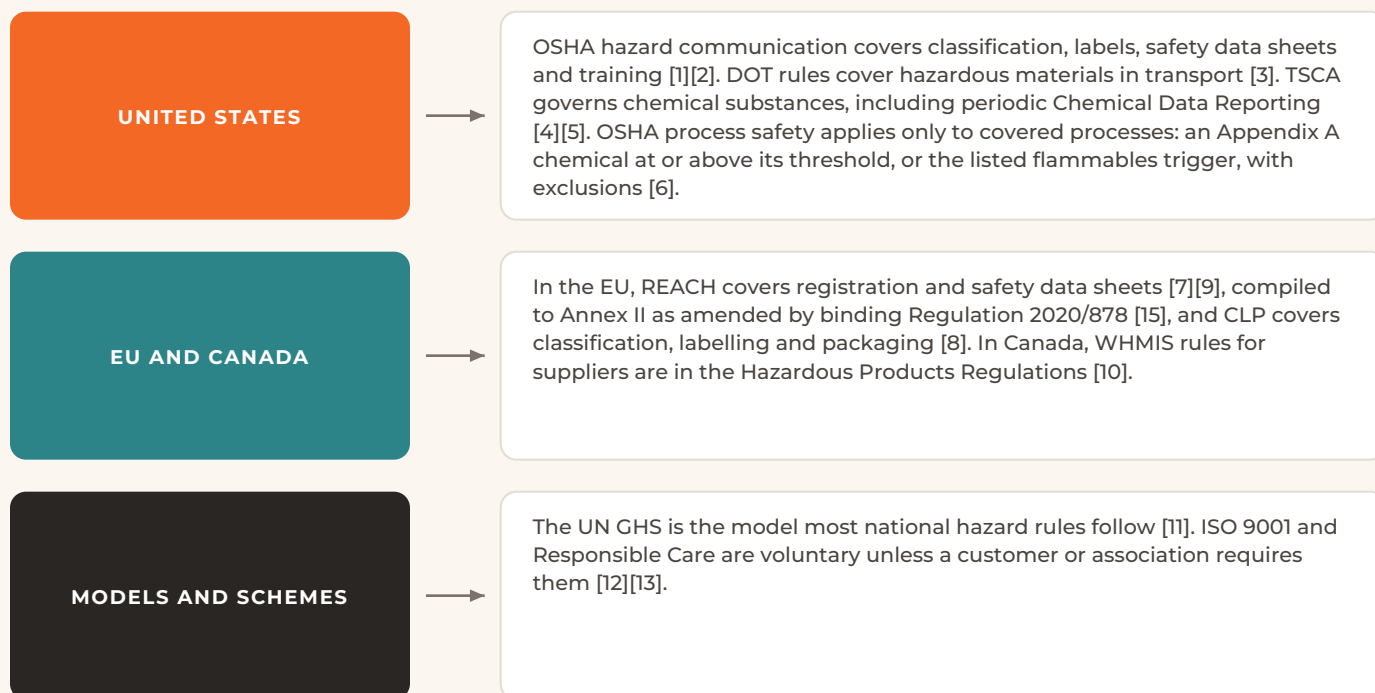
WHERE V5 FITS

V5 records the receiving, charging, checking, testing, filling, labelling and shipping work your procedures define, and links it to lots, batches and customers. It does not classify hazards, author safety data sheets, decide transport classification, file regulatory reports, release product or decide recalls. Your EHS, regulatory and quality teams do.

FRAME / 01

Which rules reach your plant?

Chemical makers answer to several regimes at once: hazard communication for workers and customers, transport rules for shipping, chemical inventory rules for substances, and process safety rules for the most hazardous operations.



Your product, your duties

Duties depend on what you make, how much, where you ship and who uses it. Many rules have thresholds.

Customers add more

Food, pharma, electronics and automotive customers often add their own specifications and audits.

Write the scope down

Products, sites, markets, rules and customer standards, as a controlled document with an owner.

WHERE V5 FITS

Keep the scope list, specifications and procedures as controlled documents with revisions, owners and review dates. V5 does not decide which rules apply, classify hazards or decide whether thresholds are met.

Sources: [1], [2], [3], [4], [5], [6], [7], [8], [9], [10], [11], [12], [13], [15] (linked on pages 35–36)

FRAME / 02

Labels, shipments and reports: the U.S. detail.

Three U.S. rules touch most chemical plants every day. The details below are from the current regulation text; read the full sections for your situation.

SHIPPED-CONTAINER LABEL, 29 CFR 1910.1200(f)(1) [1]

Identity	Product identifier
Hazard	Signal word, hazard statements and pictograms
Precautions	Precautionary statements
Supplier	Name, U.S. address and U.S. telephone number of the responsible party

HAZMAT EMPLOYEE TRAINING, 49 CFR 172.704 [3]

New staff	May work under direct supervision; training completed within 90 days
Recurrent	At least once every three years
Records	Current training, covering the preceding three years, kept while employed and 90 days after

TSCA CHEMICAL DATA REPORTING, 40 CFR 711.20 [4]

When	Recurring submission periods every 4 years, June 1 to September 30, beginning in 2028
Who	Manufacturers and importers who meet the rule's thresholds; check 40 CFR 711.8

WHERE V5 FITS

Batch, lot and shipment records give production and import quantities per substance and site for your team to check before reporting, and training records sit in the skills matrix with dates. V5 does not file CDR reports or classify substances.

Sources: [1], [3], [4] (linked on pages 35–36)

FRAME / 03

One production day.

A worked example: batch CH-2216, an industrial cleaner concentrate, 8,000 kg in blend tank BT-3, filled into 200 L drums and 1,000 L IBCs. Times and values are an example only.

06:00	●	Batch record issued from formula rev 6; BT-3 confirmed clean and empty
06:30	●	Caustic, surfactant and chelant lots scanned at the charge
07:30	●	Exotherm watched; temperature held under the batch record's limit
09:00	●	In-process pH and active content low; addition calculated
09:40	●	Addition approved by the shift chemist and charged
11:00	●	Lab results in specification; QC releases the batch
12:00	●	Filling: net weights checked, hazard labels and batch codes verified
15:00	●	Drums and IBCs reconciled; shipping papers prepared

Additions are normal

Many batches need an adjustment to hit specification. What matters is that it is calculated, approved and recorded.

Orange is where risk lives

Exotherms, additions and release are where safety and quality can go wrong.

Recorded as it happens

Who charged what, which lot, how much, what reading, when.

WHERE V5 FITS

Batches sit on the schedule with product, vessel, filler and materials. Kiosk steps capture charges, readings, additions, samples and fill counts as the batch runs, and the batch record grows with them.

MATERIAL / 01

Specify the material, approve the source.

Raw materials vary by grade, concentration and impurity. A specification says exactly what may be used, and an approved supplier list says who may supply it.

Identity

Name, CAS, grade, supplier

Properties

Assay, water, colour, density

Impurities

Limits your customers care about

Hazards

SDS, classification, storage

Packaging

Bulk, IBC, drum, bag, lot label

Equivalent is not identical

A cheaper grade or a new plant from the same supplier can change impurities and behaviour. Treat it as a change.

Substance status

In the EU, substances must be registered under REACH by the manufacturer or importer above set tonnages [7][9]; check your suppliers' status.

Safety data sheets

Each hazardous raw material needs a current safety data sheet from its supplier [1][7].

WHERE V5 FITS

Approved supplier lists, qualification, documents and scorecards tell receiving which supplier and grade is approved for which material. Suppliers can upload certificates and SDSs through the supplier portal where configured; a person reviews each before it counts.

Sources: [1], [7], [9] (linked on pages 35–36)

MATERIAL / 02

Goods-in decides what can be charged.

A tanker of caustic or a pallet of surfactant drums arrives. What is checked and captured before it is unloaded or stored decides every trace that follows, and a wrong tank can be a safety event.



- Right material, right tank**
Confirm material and destination tank before a bulk hose is connected; mixing incompatible chemicals in a tank is dangerous.
- Capture the lot**
Supplier lot, certificate values, quantity, containers or tanker and date received.
- Verify, don't just file**
Compare certificate values with the specification; sample bulk deliveries when your plan says.

WORKED EXAMPLE: BULK RECEIPT

Material	Sodium hydroxide solution, 25 t by road tanker
Supplier / lot	Approved supplier S-031, lot NA-88412
Destination	Tank T-04, confirmed before connection
Certificate	Concentration within specification; sample taken
Status	Tank status Quarantine until QC result

WHERE V5 FITS

Receiving records supplier, material, lot, quantity, containers or tank, and places material in quarantine until release. Bulk receipts can be booked to a tank location. Certificate values can be read from an upload for a person to confirm; AI never releases a lot.

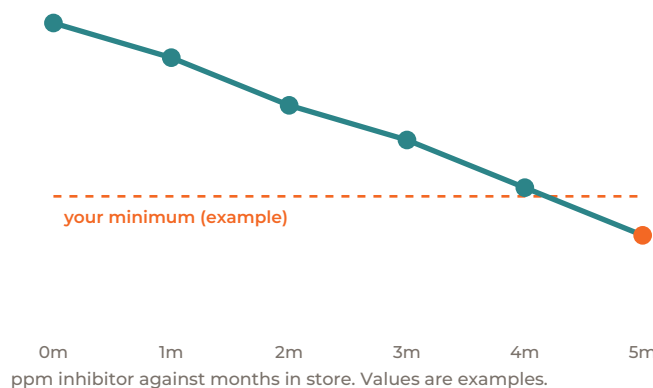
MATERIAL / 03

Store it apart, use it in date.

Flammables, oxidisers, acids and alkalis need separate storage. Some materials degrade or polymerise over time, so retest dates decide whether a lot can still be used.



MONOMER LOT M-2207 · INHIBITOR LEVEL (WORKED EXAMPLE)



Retest, don't guess

Set retest intervals from supplier data and your own stability results, and block use after the date.

Keep incompatibles apart

Segregation follows the SDS and your fire and storage rules; record which store holds what.

Know what is on site

Process safety and emergency planning rules can depend on quantities held [6]; keep stock accurate.

WHERE V5 FITS

Warehouse locations, lot status and retest or expiry dates support FEFO picking and holds; a lot past its retest date can be blocked at picking. Storage areas and segregation rules can be set per location, and on-hand quantities are reportable by material.

Sources: [6] (linked on pages 35–36)

MAKE / 01

The approved formula, under revision.

The formula is your recipe and your customer's promise: which materials, how much, in what order and under what conditions. The batch record is issued from its current approved revision.



FORMULA IC-600 · REV 6 · PER 8,000 KG BATCH (WORKED EXAMPLE)			
ORDER	MATERIAL	TARGET	CONDITION
1	Water	Per formula	Agitator on
2	Sodium hydroxide 25%	Per formula	Slow, watch temp
3	Chelant	Per formula	After cooling
4	Surfactant blend	Per formula	Low shear
5	Dye and fragrance	Per formula	Last

Order can be a hazard
Adding caustic too fast, or water to acid, can boil or splash. The order and rate are safety steps.

Adjust for strength
Raw material strength varies; charges can be calculated from the lot's assay.

Protect the formula
Formulas are trade secrets; limit who can see them.

WHERE V5 FITS

Formulas live as controlled recipes with revisions, approvals and restricted access. Batch records are issued from the current approved revision, with charge amounts calculated from released lots' assays for a person to confirm.

MAKE / 02

Charge the right lot, in the right amount.

Most batch errors are wrong material, wrong amount or wrong order. Scanning and weighing at the charge point stops them before they are mixed in, and some wrong materials are dangerous, not just off-specification.

CHARGE CHECKS, CH-2216 (WORKED EXAMPLE)

Vessel status	BT-3 clean, empty	OK
Caustic lot	NA-88412 released	OK
Caustic amount	Within tolerance	OK
Chelant lot	CL-1190 scanned	OK
Surfactant	Acid cleaner scanned	Block

An acid product was scanned into an alkaline batch. The block stops a dangerous reaction, not just a quality problem.



Second check where it matters

Many plants require a second person or a scale-linked check for critical charges.

Record actual amounts

Record what was charged and when, not just that it was.

Exposure controls

Charging powders and volatile liquids needs the controls and PPE the SDS and your risk assessment set.

WHERE V5 FITS

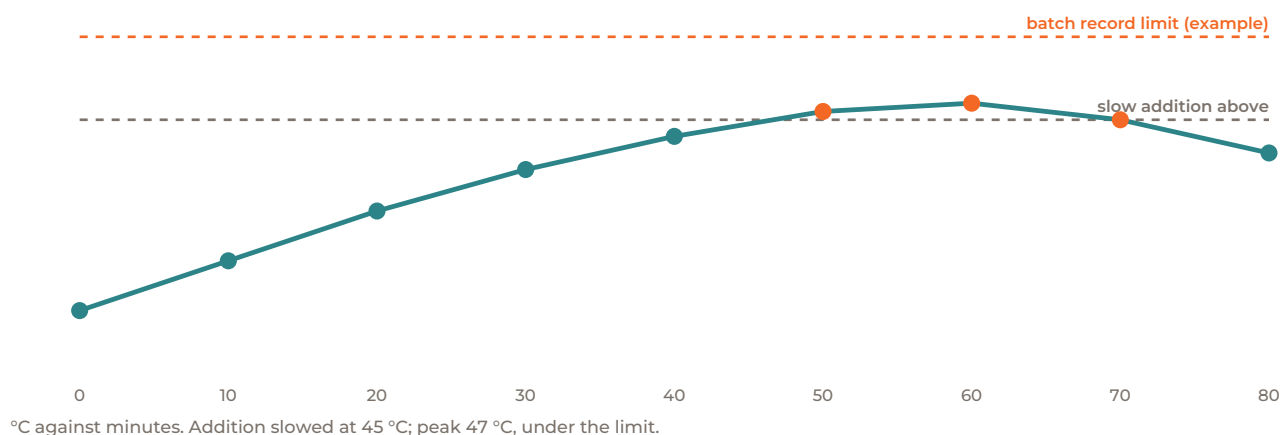
Weigh and dispense steps run at the kiosk with lot scanning, target and tolerance checks and blocks on the wrong or unreleased material; supported connected scales and meters send quantities. A second-person check can be required where configured.

MAKE / 03

Watch the process.

Temperature, pH, viscosity and appearance tell you a batch is behaving. Some readings are quality checks; others, like an exotherm, are safety limits.

CH-2216 · BATCH TEMPERATURE DURING CAUSTIC ADDITION (WORKED EXAMPLE)



Safety limits are not quality checks

Exotherm and pressure limits come from your process hazard analysis and protect people.

Plan the checks

What, when and with which instrument, per product, written in the batch record.

Process safety

Where OSHA process safety applies, operating limits and procedures are part of the program [6].

WHERE V5 FITS

In-process checks run as kiosk steps with limits; results feed control charts in quality, and an out-of-limit reading can hold the batch. Supported connected sensors can send readings where configured. V5 does not control your process or replace safety systems.

Sources: [6] (linked on pages 35–36)

MAKE / 04

Adjust, then confirm.

Many chemical batches miss on the first test and need an addition: more active, more caustic, more water. Done well it is routine. Done by guesswork it is the root of many complaints.

ADDITION RECORD, CH-2216 (WORKED EXAMPLE)

FIRST RESULT

pH 12.1 · active 9.4%

SPECIFICATION

pH 12.5–13.0 · active 9.8–10.4%

CALCULATED

+64 kg NaOH 25%, +120 kg surfactant

APPROVED BY

Shift chemist, 09:38

CHARGED

Scanned lots, actual weights

RETEST

pH 12.7 · active 10.1%

Calculate, don't guess

Use the formula and the result to calculate the addition; record the calculation.

Limit the number of additions

Set how many additions are allowed before the batch goes to investigation.

Stay within the formula

Additions must stay within what the approved formula and your customers allow.

Retest after every addition

A batch is released on its final result, not its corrected calculation.

Trend the additions

If most batches need the same addition, the formula or a raw material is wrong.

Mass balance

Additions change batch size; update the expected yield and fill quantities.

Who may approve

Name the roles allowed to approve additions.

WHERE V5 FITS

Additions can be recorded as batch steps with the calculation, approver, scanned lots and actual weights, followed by a required retest. Addition counts per product can be reported to show formula or material problems.

MAKE / 05

Test, review, release.

The lab confirms the batch meets its specification: assay, pH, density, viscosity, colour, appearance and any customer-specific tests. A named person reviews the batch record before it ships.



RELEASE REVIEW, CH-2216 (WORKED EXAMPLE)

Materials	Released lots, in date
Charges	All within tolerance
Safety limits	Peak 47 °C, under limit
Additions	One, approved, retested
Final tests	All in specification
Decision	Release by QC

Tests, methods and limits are yours and your customers'.

Certificates of analysis

Most customers expect a certificate with each lot. Build it from the actual results.

Retained samples

Keep a retained sample of each batch for complaints and questions.

Out of specification

Investigate a failing result before retesting; do not test into compliance.

WHERE V5 FITS

Lab & QC holds methods, specifications and results; release review can draw the batch record into one place, and the release is recorded by an authorised person. Certificates can be generated from batch results. V5 does not approve results or release product.

MAKE / 06

A hold that actually holds.

An out-of-specification result, a skipped check or a label mix-up means product must stop. A hold that only lives in an email does not stop a forklift.

A WORKED HOLD

Batch CH-2209 passes all tests, but a customer reports a **haze in drums from the same batch**. The remaining 18 drums and 2 IBCs are held, along with the surfactant lot used. The retained sample shows the same haze after two weeks at low temperature. QC rejects the stock; the customer is offered replacement; CAPA opens.

HOLD SCOPE, CH-2209 (WORKED EXAMPLE)

Drums in stock	18 x 200 L held
IBCs in stock	2 x 1,000 L held
Shipped	22 drums to two customers
Surfactant lot	SF-4471, held pending review
Decision by	QC manager

Hold by scope

Hold the batch, its remaining stock and other batches made with the same suspect material.

One named decision

Only roles you authorise can release, rework or reject, with a reason kept.

Rework follows a procedure

Reblending or reprocessing must stay within an approved procedure.

WHERE V5 FITS

Lots and batches carry status; a held lot is blocked at picking and at the dispatch scan according to your rules. Holds link to the nonconformance that caused them, and release, rework or rejection is recorded by an authorised person.

MAKE / 07

Fill and count every container.

Filling turns released bulk into drums, IBCs and pails. Net weights prove each container holds what its label says, and reconciliation proves no bulk or label went missing.



RECONCILIATION, CH-2216 (WORKED EXAMPLE)

Bulk after addition	8,184 kg
Drums filled	20 x 220 kg = 4,400 kg
IBCs filled	3 x 1,200 kg = 3,600 kg
Line hold-up and flush	160 kg, to rework tank
Samples	24 kg (lab and retained)
Unaccounted	0 kg

Right container

Containers must suit the chemistry and, for hazmat, the transport packaging rules [3].

Labels must balance

Issued labels equal used plus spoiled plus returned. A gap is a possible mislabelled container.

Static and vapour

Filling flammables needs grounding and ventilation as your risk assessment sets.

WHERE V5 FITS

Filling runs as kiosk steps with net weights and label verification; supported connected scales send weights. Container and label reconciliation is calculated at batch close, and a gap holds the batch until explained.

Sources: [3] (linked on pages 35–36)

MAKE / 08

SDS and labels travel with the drum.

Every hazardous chemical you ship needs a correct label and a current safety data sheet. A wrong pictogram or an old SDS can hurt someone downstream.



WHAT TRAVELS WITH A U.S. SHIPMENT [1][3]

- Container label: identifier, signal word, hazard statements, pictograms, precautions, responsible party with U.S. address and phone
- Safety data sheet in the 16-section format
- Transport marks and labels for hazmat packages
- Shipping papers for hazmat shipments
- Batch code linking the drum to its record

Classification is a decision

Hazard classification is done by qualified people under each market's rules [1][8][10]; GHS versions differ by country [11].

U.S. HazCom 2024

In Jan 2026 OSHA moved the substance evaluation deadline to 19 May 2026 and other dates by four months; in the meantime the previous or updated standard, or both, may be followed [14].

Many markets, many labels

The same product may need different labels and SDSs for the U.S., EU and Canada.

WHERE V5 FITS

Label templates and SDS documents are controlled with revisions and approval; printing pulls batch codes and dates from the batch, and the kiosk can verify the label version at the line. V5 does not classify hazards or author SDS content.

Sources: [1], [3], [8], [10], [11], [14] (linked on pages 35–36)

CONTROL / 01

Correct now, prevent next time.

A wrong drum blocked at the scan is a correction. Additions on four batches in a row need a cause. Telling the two apart keeps the system honest and the paperwork proportionate.

CORRECTION

Act on the spot: fetch the right lot, repeat a check, make an approved addition, hold the batch. Record what happened, what was done and by whom.

CORRECTIVE ACTION

When it repeats, reaches a customer or shows a weak process: find the root cause, fix it, check the fix worked, and update the formula, specification or training.

WORKED EXAMPLE: ESCALATION

Month 1	Four batches of IC-600 need caustic additions	Corrections
Review	Addition trend reviewed; NC opened	NC-302
Cause	Caustic supplier concentration at low end	Found
Action	Charge from lot assay, not nominal	Done
Verify	No caustic additions over 15 batches	Closed

ISO 9001 and Responsible Care describe improvement and corrective action expectations [12][13]. They are voluntary unless a customer or association requires them.

WHERE V5 FITS

Nonconformances link to batches, lots, equipment and people, and can be escalated to CAPA with root cause, owners, due dates and effectiveness checks. AI can suggest a classification or draft a summary for a person to edit.

CONTROL / 02

Complaints, causes and lasting fixes.

Haze, colour drift, a cleaner that stopped working, a leaking drum, a wrong label. Each complaint links to a batch, its materials, its additions and its customers.

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graph TD; Contain --> Investigate; Investigate --> Act; Act --> Verify; Verify --> Contain; CAPA((CAPA))
```

Start from the batch code
It gives the batch record, materials, additions, tests and retained sample.

Test the retained sample
It shows whether the product left the plant as specified.

Safety complaints first
An injury or exposure report goes to EHS at once; your team decides any reporting.

WORKED EXAMPLE: CAPA FROM A CUSTOMER COMPLAINT

Problem	Customer reports haze in drums of IC-600
Linked batches	CH-2209 and CH-2212
Cause found	Surfactant lot with higher cloud point after supplier change
Action	Cloud point added to incoming spec and release tests
Effectiveness	No haze complaints over 6 months
Status	Closed after review

WHERE V5 FITS

Complaints link to batches, lots and retained samples; CAPA links to its sources, with root-cause workflow, owners and effectiveness checks. Supplier corrective action requests can go through the supplier portal where configured.

CONTROL / 03

Change on purpose.

A new raw material source, a formula tweak, a new tank or a revised label can each change the product or its hazards. Changes need assessment before they reach production.



IMPACT QUESTIONS FOR CHANGE CC-118: NEW SURFACTANT SOURCE (WORKED EXAMPLE)

Hazards	Does the new material change classification, SDS or labels?	OPEN
Process	Does it change order, temperature or additions?	Trial
Customers	Do customers require notice or approval?	Yes
Stock	What happens to existing material?	Use up
Effective	From which batch?	CH-2240

Process safety changes

Where OSHA process safety applies, changes to chemicals, technology or equipment follow management of change [6].

Labels follow change

A changed hazard needs new labels and SDS before shipping, and withdrawal of old stock.

Train before you run

Changed formulas and instructions are read and understood before the first changed batch.

WHERE V5 FITS

Change control links requests to formulas, specifications, SDS, labels and suppliers with impact assessment, approvals and effectivity; approved changes release new revisions and can assign read-and-understood training. V5 does not run your process safety program.

Sources: [6] (linked on pages 35–36)

CONTROL / 04

Trained, protected and permitted.

Operators handling corrosive, flammable or toxic materials need training in the process and in safe handling. Who may approve an addition or release a batch must be clear and enforced.

Hazard training

Workers are trained on the hazards of chemicals in their work area and how to read labels and SDSs [1].

Hazmat training

Staff who prepare hazmat for shipment are trained and retrained at least every three years [3].

Training to the task

Train on the batch record and instruments for each product, with records of who was trained on which revision.

EXAMPLE COMPETENCE AND PERMISSION MATRIX

	Charge materials	Approve addition	Release batch	Sign hazmat papers
Operator	Trained	Not permitted	Not permitted	Not permitted
Shift chemist	Trained	Trained	Not permitted	Not permitted
QC analyst	Not permitted	Not permitted	Trained	Not permitted
Shipping clerk	Not permitted	Not permitted	Not permitted	Trained

Contractors too. Tank cleaners, maintenance contractors and drivers need to know the hazards on your site. Record who was briefed and when.

WHERE V5 FITS

Document control keeps batch records and procedures under revision with read-and-understood training. The skills matrix tracks training dates, including hazmat recurrence, can block untrained people at the kiosk where configured, and role permissions decide who can approve or release.

SUSTAIN / 01

Look after tanks, pumps and seals.

Blend tanks, reactors, pumps, seals, hoses and filters corrode, leak and drift. Planned maintenance, safe isolation and a record of what ran in each item protect quality and people.



EQUIPMENT RECORD, TRANSFER PUMP P-12 (WORKED EXAMPLE)

Service	Caustic and alkaline products only	Dedicated
PM due	Mechanical seal inspection, quarterly	9 days
Last repair	Seal replaced; isolation permit closed	Done
Hoses	Transfer hose H-07 pressure test	Due
Next action	Seal leak reported by operator	OPEN

Safe isolation

Opening equipment that held chemicals needs isolation, draining and permits per your procedures.

Materials of construction

Seals, gaskets and hoses must suit the chemistry. Record what was fitted.

Mechanical integrity

Where OSHA process safety applies, inspection and testing of equipment is part of the program [6].

WHERE V5 FITS

Equipment records hold PM schedules, repairs, spare parts, inspections and the batches each item ran, so maintenance and product history sit together. Work orders are tracked in maintenance. Predictive failure analytics are not offered today.

SUSTAIN / 02

Trust the scales and sensors.

Every charge, net weight and test is only as good as the instrument. Floor scales, flow meters, temperature probes, pH meters and lab instruments need checks you can show.

DAILY AND PERIODIC CHECKS (WORKED EXAMPLE)

Floor scale FS-05 (check weight)	Within your tolerance	OK
Mass flow meter FM-3	Calibration certificate current	OK
BT-3 temperature probe	Reference check within tolerance	OK
pH meter PH-2	Buffer check failed	HOLD
Titration T-1	Standardisation done today	OK

WHEN AN INSTRUMENT FAILS

pH meter PH-2 fails its buffer check. Which batches did it measure since its last good check? Results close to a limit are re-measured on another meter, and any addition based on PH-2 readings is reviewed. PH-2 is taken out of use until repaired and checked.

Identify every instrument

A unique ID on each, recorded with each reading, makes the look-back possible.

Safety instruments

Temperature and pressure devices that protect people need their own test schedules.

Lab instruments too

Titration, balances and viscometers need calibration and standardisation.

WHERE V5 FITS

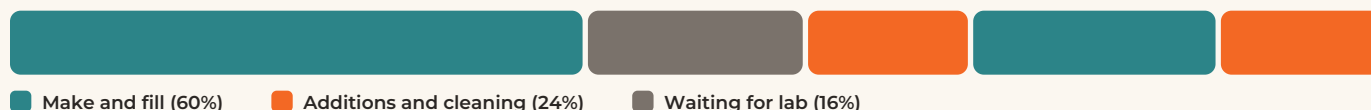
Each scale, meter, probe and instrument can have an equipment record with calibration schedule, results, certificates and use history. Out-of-calibration equipment can be blocked at the kiosk, and checks link to the results they produced.

SUSTAIN / 03

Yield, cycle time and where the day goes.

In batch chemical plants, waiting for the lab, additions and cleaning often take as long as making. Batch cycle time and a mass balance show where time and material go.

BT-3 · ONE BATCH CYCLE OF 10 HOURS (WORKED EXAMPLE)



WORKED OEE ARITHMETIC FOR BT-3

Availability

75%

18 h used of 24 h planned

Performance

80%

8 h standard ÷ 10 h actual

Quality

96%

batches right first time

OEE

57.6% $0.75 \times 0.80 \times 0.96$

WORKED MASS BALANCE FOR CH-2216 (EXAMPLE)

8,000 kg charged plus 184 kg addition = 8,184 kg. Filled 8,000 kg; hold-up to rework 160 kg; samples 24 kg. Balance closes to 0 kg. Packed yield = $8,000 \div 8,184 = 97.8\%$.

Right first time

Batches released without additions are a strong signal of formula and material health.

Waiting for the lab

Lab turnaround is often the biggest hidden loss in batch plants.

Rework adds up

Track rework and hold-up so it is reused, not lost.

WHERE V5 FITS

Batch step times, waits, additions, yields and OEE come from events your team and supported connected equipment record, with reports and dashboards where your plan includes them. AI demand and yield forecasting and process anomaly detection are coming soon, not available today.

SUSTAIN / 04

Ship it right, trace it both ways.

A supplier warns that chelant lot CL-1190 may be contaminated. Which batches, which drums, which customers, and what is still in your warehouse? And was everything shipped with the right papers?



Shipping papers

U.S. hazmat shipments need shipping papers, marks, labels and placards as Part 172 requires [3].

Distributors

Many chemicals reach users through distributors. Agree how you will reach them.

Recall decisions

Your quality and EHS teams decide whether to recall and who to tell.

WHERE V5 FITS

Genealogy links raw material lots to batches, containers, pallets and shipments, so a trace runs forward from a material lot or back from a batch code, with customers and quantities listed and exportable. Shipping documents can carry hazmat details you maintain; V5 does not decide transport classification.

Sources: [3] (linked on pages 35–36)

SUSTAIN / 05

Time a mock recall, kilo by kilo.

Pick a raw material lot nobody expects, start the clock, and see how long it takes to account for every kilogram and every container made from it.

- 0:00 ● Start: chelant lot CL-1190 named; quality manager opens the trace
- 0:04 ● Batches found: CH-2216 and CH-2221
- 0:10 ● Containers, customers and shipped quantities listed
- 0:15 ● Remaining chelant and finished stock placed on hold
- 0:22 ● Customer contacts confirmed
- 0:30 ● Balance: received vs charged vs in product vs stock

BALANCE FOR CHELANT LOT CL-1190 (WORKED EXAMPLE)

Received	4 IBCs, 4,800 kg
Charged to CH-2216	320 kg
Charged to CH-2221	320 kg
Charged to other batches	2,880 kg, nine batches
Still in IBCs	1,279 kg, held
Retained sample and unaccounted	1 kg / 0 kg

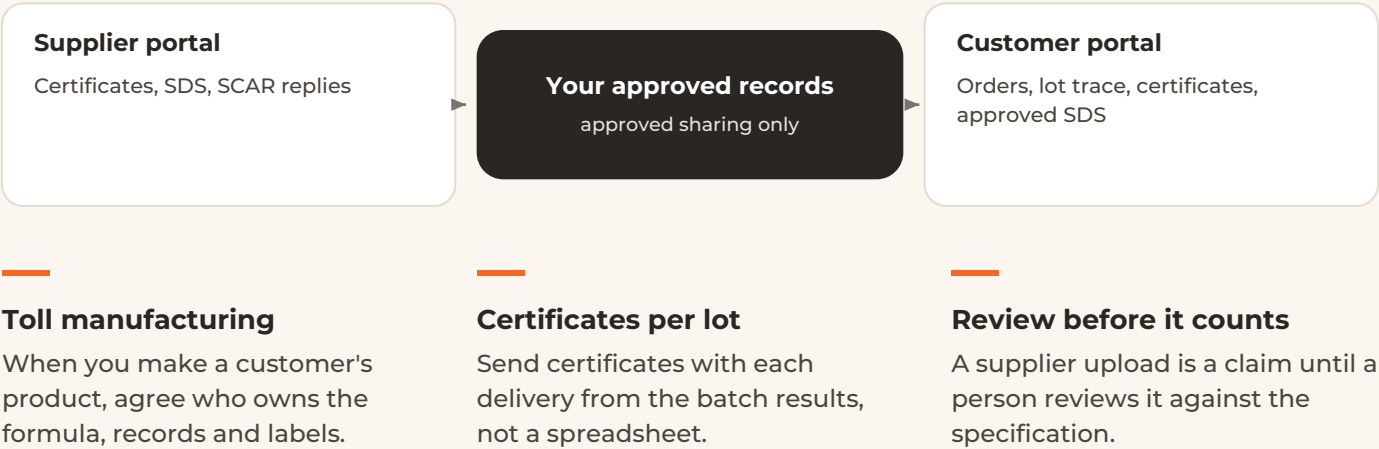
Times are an example of what to measure, not a benchmark. Include your distributors: a trace that stops at your dock does not take a drum off a customer's line.

WHERE V5 FITS

Trace reports list batches, containers, pallets, customers and quantities from a material lot or a batch code, and stock can be held from the trace. Mock recalls can be logged as exercises with times and findings that feed CAPA.

Suppliers, customers, shared well.

Customers ask for certificates, SDSs, ASNs and lot data; toll customers want batch records; raw material suppliers send certificates and answer corrective action requests. Each sees only what you approve.



A SHARING POLICY TO AGREE BEFORE ANYONE LOGS IN

Certificates of analysis	With each delivery	Customer QA
Safety data sheets	Current approved versions	Customer EHS
Batch records (toll)	Agreed scope only	Toll customer
Formulas	Never	—
Supplier certificates and SCARs	Reviewed before they count	Your QA

WHERE V5 FITS

Customer and supplier portals give branded access to what you approve. EDI and ASN exchange (X12 850, 855, 856, 810) with GSI-128 SSCC labels is available where your plan includes it. Portal scope depends on configuration; check the current plan comparison.

SUSTAIN / 07

Trustworthy records. Honest AI.

Electronic records help only if they are made at the time, by a known person, with actual values, and if AI stays a helper under human control.

What a record holds

Who, what, which batch or lot, the measured value and limit, the instrument used, and when. Corrections keep the original visible.

Records others rely on

Training records, inspection records and quantities on site feed safety and regulatory duties [3][6].

Make them findable

A batch record, a certificate or a trace is only useful if it can be produced quickly.

AI CAN HELP

- Read certificate values for a person to confirm
- Draft an instruction or inspection plan for approval
- Suggest a nonconformance classification or draft a summary
- Explain a batch's history in plain language
- Find records and screens faster

AI NEVER

- Classifies hazards or writes SDS content
- Decides transport or reporting duties
- Approves an addition or changes a formula
- Releases a batch or decides a recall
- Predicts defects or yield today (forecasting is coming soon)

WHERE V5 FITS

Every record keeps who, what and when in an audit trail every plan can view; tamper-evident trails, electronic signatures and a validation pack are available where your plan includes them. AI features need configured provider access and human review.

Sources: [3], [6] (linked on pages 35–36)

APPLY / 01

Evidence map.

One page to check that every theme a customer, auditor or regulator may ask about has an owner and a record. Map it to the rules and standards that apply to you [1][3][4][7][8][12].

THEME	TYPICAL EVIDENCE	WHERE IT LIVES IN V5	OWNER
Scope	Products, sites, rules	Document control	EHS + QA
Suppliers	Approval, certificates, SDS	Suppliers, portal	Purchasing
Receipts	Lot, quantity, tank	Receiving	Warehouse
Storage	Status, retest, segregation	Warehouse	Warehouse
Formula	Approved revision, access	Recipes	Technical
Charging	Lots, actual amounts	Weigh & dispense	Production
Process limits	Readings, safety limits	Kiosk, quality	Production
Additions	Calculation, approval, retest	Batch steps	Chemist
Testing	Results, specs, release	Lab & QC	Quality
SDS and labels	Versions, verification	Documents, labels	EHS
Shipping	Papers, quantities, customers	Shipping	Dispatch
Equipment	PM, calibration, history	Equipment	Engineering
Trace and recall	Exports, mock recalls	Trace reports	Quality
Training	HazCom, hazmat, tasks	Skills matrix, docs	HR + EHS

Plan inclusion varies; some areas need Professional or Enterprise. Confirm against the current plan comparison before you scope a project.

WORKSHEET 01

Could you back this drum?

Pick one drum shipped last month. Find each record and time it. Mark Yes, Partly or No, then note the gap and its owner.

	YES	PARTLY	NO
Batch record Formula revision, lots and actual amounts charged.	☐	☐	☐
Process limits Safety and quality readings within limits.	☐	☐	☐
Additions Each addition calculated, approved and retested.	☐	☐	☐
Tests and release Final results and who released the batch.	☐	☐	☐
Certificate Certificate matches the actual results.	☐	☐	☐
Label Label version and hazard content were current.	☐	☐	☐
SDS The SDS sent was the current version.	☐	☐	☐
Shipping papers Hazmat papers and marks were correct, if needed.	☐	☐	☐
Customer and quantity Who received it, when and how much.	☐	☐	☐
Raw materials Every raw material lot traced back to its supplier.	☐	☐	☐

NOTES AND OWNERS

WORKSHEET 02

Ready for a wrong-charge event?

Walk through a real or invented case: the wrong material was charged to a batch. Mark Yes, Partly or No.

	YES	PARTLY	NO
Prevent Scanning at the charge blocks wrong and unreleased lots.	☐	☐	☐
Safety first Operators know which wrong charges are dangerous and what to do.	☐	☐	☐
Detect Checks would catch a wrong charge that got past the scan.	☐	☐	☐
Scope The batch and anything it touched can be identified.	☐	☐	☐
Hold The batch and related stock can be held at once.	☐	☐	☐
Decide A named person decides disposition and records why.	☐	☐	☐
Equipment Vessels and lines are checked and cleaned before reuse.	☐	☐	☐
Customers Customers can be told if affected product left the site.	☐	☐	☐
Cause A corrective action with root cause follows.	☐	☐	☐
Records Every step, decision and result is in one record.	☐	☐	☐

NOTES AND OWNERS

WORKSHEET 03

Ask to see it work.

Questions for any software demonstration. Ask the vendor to show each one with your products and equipment, not a slide.

	SHOWN	PARTLY	NOT SHOWN
Wrong material Scan an incompatible drum at the charge; show the block.	☐	☐	☐
Assay-based charge Show a charge calculated from a lot's assay.	☐	☐	☐
Addition Record an addition with calculation, approval and retest.	☐	☐	☐
Retest date Pick a lot past its retest date; show what happens.	☐	☐	☐
Hold Put a batch on hold; try to ship a drum from it.	☐	☐	☐
Label version Release a new label revision; show which batches use it.	☐	☐	☐
Certificate Generate a certificate from actual results.	☐	☐	☐
Training Show hazmat training due dates for shipping staff.	☐	☐	☐
Trace From a raw material lot, list batches, customers and kilograms.	☐	☐	☐
Audit trail Show who changed a recorded value, when and why.	☐	☐	☐

NOTES AND OWNERS

APPLY / 02

Roll out in phases.

Start where value is visible and risk is contained, often materials and batch records for one product family. Run old and new side by side until each phase is verified.

PHASE 1
Foundations

Scope, roles, formulas, specifications and procedures under document control, training records, equipment register for tanks, pumps and instruments.

PHASE 2
Material

Approved suppliers and grades, bulk and packed receipts, quarantine and release, segregated locations, retest dates.

PHASE 3
Make

Batch records with checked charging, process readings, additions, lab results and release; paper kept in parallel.

PHASE 4
Pack and control

Filling and reconciliation, label and SDS control, holds, nonconformances and CAPA, complaints, change control.

PHASE 5
Connect

Shipments, trace export, mock recalls, customer and supplier portals, EDI and ASNs, cycle time and yield review.

Start with one product family. Prove charging, additions and trace on a few products before rolling out. Tell customers early if certificates, labels or ASN formats will change.

WORKSHEET 04

Find your first improvement.

Score each area today: E evidenced, P partial, G gap. Start with the gap that carries the most risk to people, customers or compliance.

	E	P	G
Supplier approval Approved grades, certificates, SDS	☐	☐	☐
Receipts Lot, quantity, right tank	☐	☐	☐
Storage Status, retest, segregation	☐	☐	☐
Formula control Approved revision, access	☐	☐	☐
Charging Scan, weigh, second check	☐	☐	☐
Process limits Readings and safety limits	☐	☐	☐
Additions Calculated, approved, retested	☐	☐	☐
Testing Results, specs, release	☐	☐	☐
SDS and labels Current, verified at the line	☐	☐	☐
Shipping Papers, customers, quantities	☐	☐	☐
Equipment PM, calibration, history	☐	☐	☐
Trace Both ways, timed, exportable	☐	☐	☐

NOTES AND OWNERS

APPLY / 03

A fair evaluation in four weeks.

A practical way to test any system with your own people and one real product, without touching live records.

WEEK 1

Agree the product, vessel, filler and the five questions that matter most. Load suppliers, materials, the formula and specifications.

WEEK 2

Run a batch end to end with test data: receipt, charging, readings, an addition, lab, filling, labels, dispatch.

WEEK 3

Break it on purpose: wrong drum, lot past retest, failed test, label gap, failed instrument.

WEEK 4

Run a timed mock trace from a raw material lot with an export, and a mock complaint. Review with every team.

Rules for the evaluation. Use test data only. Keep your current records and trace process live until a verified change is approved. Record what was shown, not what was promised.

ASK V5

“We blend [cleaners / coatings / adhesives / water treatment chemicals] in [number] tanks and fill [drums / IBCs / pails], [own brand / toll]. Our hardest moment is [e.g. additions to hit spec]. Which workflows should we evaluate first?”

Start a 7-day free trial, no card required, or ask V5 on v5ultimate.com.

WHERE V5 FITS

Try V5 with your own product in a trial workspace using test data. The assistant can answer questions about features and plans; it does not give regulatory advice.

SOURCES

Keep the evidence close.

Primary sources behind this guide, checked October 2026. Click a title to open the publisher's page.

- | | | |
|-----|---|-------------------------|
| [1] | U.S. eCFR, 29 CFR 1910.1200: OSHA Hazard Communication | BINDING U.S. REGULATION |
| | https://www.ecfr.gov/current/title-29/subtitle-B/chapter-XVII/part-1910/subpart... | |
| [2] | OSHA, Hazard Communication overview | OSHA GUIDANCE |
| | https://www.osha.gov/hazcom | |
| [3] | U.S. eCFR, 49 CFR Part 172: Hazardous materials communications and training | BINDING U.S. REGULATION |
| | https://www.ecfr.gov/current/title-49/subtitle-B/chapter-I/subchapter-C/part-172 | |
| [4] | U.S. eCFR, 40 CFR Part 711: TSCA Chemical Data Reporting | BINDING U.S. REGULATION |
| | https://www.ecfr.gov/current/title-40/chapter-I/subchapter-R/part-711 | |
| [5] | EPA, Summary of the Toxic Substances Control Act | EPA SUMMARY OF U.S. LAW |
| | https://www.epa.gov/laws-regulations/summary-toxic-substances-control-act | |
| [6] | OSHA, 29 CFR 1910.119: Process safety management | BINDING U.S. REGULATION |
| | https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.119 | |
| [7] | Regulation (EC) 1907/2006: REACH (EU chemicals) | BINDING EU REGULATION |
| | https://eur-lex.europa.eu/eli/reg/2006/1907 | |
| [8] | Regulation (EC) 1272/2008: CLP classification and labelling (EU) | BINDING EU REGULATION |
| | https://eur-lex.europa.eu/eli/reg/2008/1272/oj | |

SOURCES

Sources, continued.

[9] ECHA, Understanding REACH

ECHA GUIDANCE

<https://echa.europa.eu/regulations/reach/understanding-reach>**[10] Canada, Hazardous Products Regulations (SOR/2015-17)**

BINDING CANADIAN LAW

<https://laws-lois.justice.gc.ca/eng/regulations/SOR-2015-17/>**[11] UNECE, Globally Harmonized System (GHS)**

UN MODEL SYSTEM

<https://unece.org/about-ghs>**[12] ISO 9001:2015 Quality management systems: requirements**

VOLUNTARY INTERNATIONAL

<https://www.iso.org/standard/62085.html>**[13] ICCA, Responsible Care**

VOLUNTARY INDUSTRY

<https://icca-chem.org/focus/responsible-care/>**[14] OSHA, HCS 2024 compliance date extension notice (15 Jan 2026)**

OSHA NOTICE

<https://www.osha.gov/hazcom/rulemaking/extension>**[15] Commission Regulation (EU) 2020/878: REACH Annex II, safety data sheets**

BINDING EU REGULATION

<https://eur-lex.europa.eu/eli/reg/2020/878/oj>

How to read the status labels. Regulations are law in their jurisdiction. Regulator pages explain them; the GHS is a UN model; ISO 9001 and Responsible Care are voluntary.

SCOPE AND LIMITS

Practical orientation for evaluating chemical manufacturing and software; not legal, safety or regulatory advice. Requirements depend on substance, quantity, site, market and customer. Classifications, thresholds, exposure and process limits are not given; take them from current rules and your EHS team. V5 capability statements reflect the V5 product reference reviewed on 1 October 2026 and depend on plan, configuration, devices and permissions. AI forecasting and anomaly detection are coming soon. V5 does not classify hazards, author SDSs, decide transport classification, file reports, control your process, release product or decide recalls, and does not by itself make you compliant.



Approved formulas. Tested batches. Correct labels out the door.

See chemical manufacturing workflows at v5ultimate.com · Global edition · October 2026