

GCC / KSA EDITION

FREE
EBOOK

QA/QC in Construction

Beginner  **Expert**

The visual, practical guide for site engineers, inspectors and future quality managers.



 5 levels

 100+ pages

 8 templates

 25 quiz questions

 Cheat sheet

Amir Usman

Construction Manager · GCC / KSA

ruzani.com



QA/QC in Construction: Beginner to Expert

GCC / KSA Edition · First edition 2026

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Edition 1.0 · Feedback and corrections are welcome via ruzani.com

Disclaimer — please read



This book teaches you **how QA/QC works**. Your project contract and specification always decide the final numbers.



Your contract rules

Specifications, drawings and the contract are always the final authority. This book is general guidance, not a project specification.



Values marked **VERIFY**

Where you see **VERIFY**, the value depends on code edition, project spec or authority. Check before you use it.



Safety first

Testing (pressure, electrical, NDT, radiography) has real hazards. Follow your HSE plan, permits and competent persons.



Professional judgement

Engineering decisions need qualified, authorised people. Use this book to ask better questions — not to replace the Engineer.



Standards change

ISO, ASTM, BS EN, SBC and FIDIC are revised over time. Always check the edition your contract names.



No liability

The author and publisher accept no liability for loss or damage from using this material. Use it wisely.



Pro Tip

When in doubt, raise an **RFI** or ask the Consultant in writing. A two-line email today can save a two-week demolition tomorrow.



Consultant and contractor QC team reviewing a specification on site

About the Author



 Site-tested advice

Amir Usman

Construction Manager



QA/QC

site quality in practice



GCC

KSA site experience

Amir grew on construction sites from junior engineer to **Construction Manager**. He has written WIRs at midnight before a pour, defended NCRs in client meetings and handed over buildings that passed first time.

Why I wrote this book



When I started, nobody gave me a simple map of QA/QC. I learned by making mistakes on site. This book is the map I wish I had — short, visual and practical. — **Amir**



Site first

Every chapter is built from real site situations.



Paper that works

Documents explained by what they do, not just what they are called.



Career focused

From first day as inspector to QA/QC Manager interviews.

HANDOVER DAY



Handing over a finished building to the client



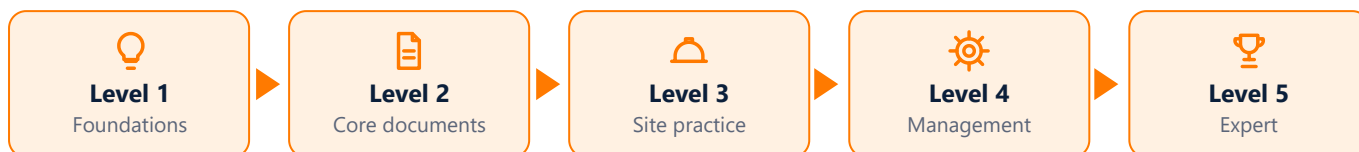
Free resources for site teams

Free QA/QC guides and templates, plus **ADoc Flow** — a document tool for WIR, MIR, MAR and registers you can try in your browser.

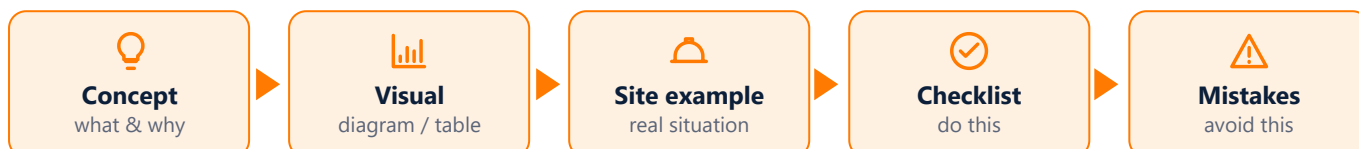
Visit ruzani.com →

How to use this book

This book is a **5-level game**. Each level takes you one step closer to expert. Read in order the first time, then use it as a site reference.



Every chapter follows the same 5 steps



Look out for these boxes

Pro Tip

Short advice that saves time, money or arguments.

Common Mistake

Errors we see again and again on site. Learn them here, not in an NCR.

Checklist

Tick-box lists you can copy into your notebook or ITP.

Site Story

Short real-life site stories (names removed).

Did you know?

Quick facts that make you sound like an expert.

SA GCC / KSA Note

Points specific to Saudi Arabia and the GCC.

Plus...



Level Up badges

Celebrate after each level.



5-question quizzes

Answers at the back.



8 ready templates

PQP, ITP, WIR, MIR, MAR, NCR, SOR, pre-qual.

Suggested reading plan

Who you are	Start with	Then
Fresh graduate / new inspector	Levels 1 → 2 → 3, in order	Use templates + cheat sheet daily
QC inspector, 2–5 years	Skim Level 1, focus Levels 2 + 3	Level 4 to prepare for engineer role
QA/QC Engineer	Levels 3 + 4	Level 5 for audits, KPIs and career
Site / project engineer	Levels 2 + 3	Level 4.4 QA/QC–HSE interface



YOUR GUIDE

Meet QC Ali

Ali is a QA/QC engineer on a big project in KSA. He has seen it all: perfect pours, failed cubes, leaking roofs and audits that went great.

He will pop up with **tips, warnings and stories**. When Ali raises his hand — stop and read!

Ali's moods



Explaining

Here is how it works.



Well done

You got it right!



Warning

Stop — common mistake.



Did you know?

Interesting fact ahead.

Your journey

01

Foundations

QA vs QC, roles, drawings, specs, BOQ

02

Core Documents

PQP, ITP, MAR, WIR, NCR and more

03

Site Practice

Concrete, steel, waterproofing, MEP, finishes

04

Management

Root cause, vendors, documents, standards

05

Expert

FIDIC, audits, KPIs, career

Ali's 3 golden rules



1. If it is not recorded, it did not happen

Signed WIRs, test reports and photos are your evidence.



2. Check before you cover

Once concrete, plaster or backfill goes on, the defect is buried — and expensive.



3. Quality is everyone's job

QC finds problems. The whole team prevents them.

Contents

Click any line to jump to that page.

Disclaimer	3
About the Author	4
How to use this book	5
Meet QC Ali, your guide	6

Level 1 – Foundations 9

1.1 QA vs QC and the cost of poor quality	10
1.2 Roles: QC Inspector, QA/QC Engineer, QA/QC Manager	13
1.3 Reading drawings, specifications and BOQ	15
Level 1 Quiz	18

Level 2 – Core Documents 20

The document journey map	21
2.1 Planning: PQP, Method Statement, ITP	22
2.2 Pre-qualification: subcontractors, suppliers, labs, AVL	25
2.3 Submittals: MAR, Shop Drawings, RFI, Mock-ups, FAT	27
2.4 Inspections: WIR, MIR, test reports, calibration	30
2.5 Non-conformance: SOR, NCR, CAPA	33
2.6 Close-out: snag list, as-built drawings, TOC, O&M	35
Level 2 Quiz	37
Tool spotlight: ADoc Flow by Ruzani	39

Level 3 – Site Practice 40

3.1 Civil: earthworks, rebar, formwork, concrete pouring and curing	41
3.2 Concrete tests: slump, cube/cylinder, temperature	45
3.3 Steel structure and welding: NDT, welder qualification	48
3.4 Waterproofing and insulation: flood test, inspections	51
3.5 MEP: pipe pressure testing, cable testing, commissioning basics	53
3.6 Finishes: blockwork, plaster, tiling, painting	56
3.7 Material sampling and lab testing	59
Level 3 Quiz	61



Start at Level 1 even if you have experience — the basics are where most NCRs come from!

Contents (continued)

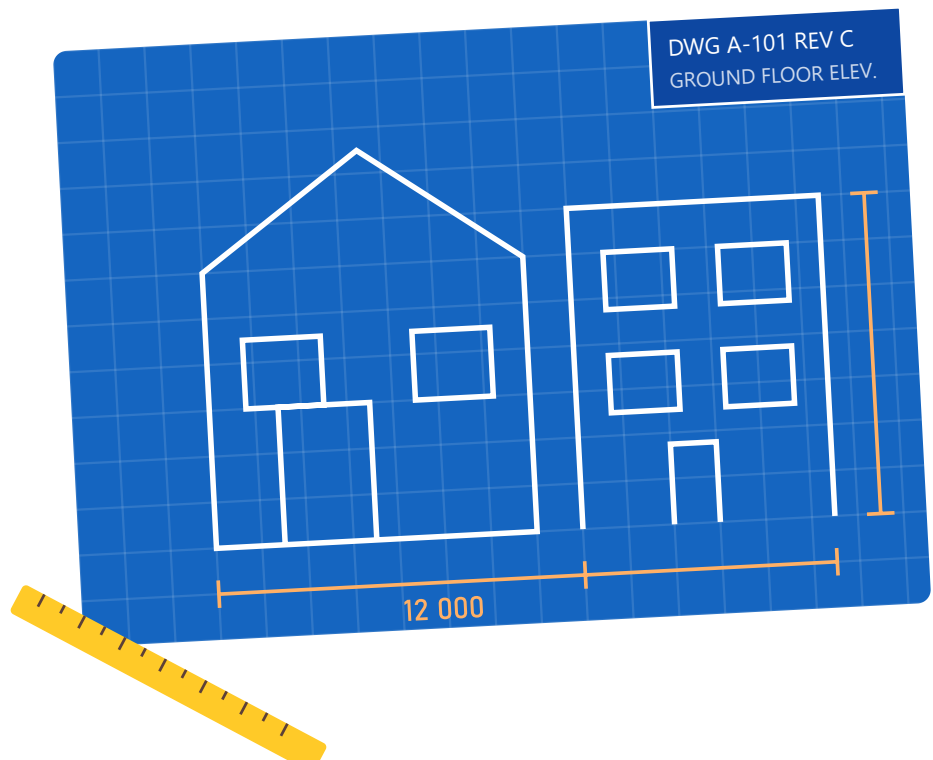
Level 4 – Management	63
4.1 NCR handling, root cause (5 Whys, Fishbone), CAPA	64
4.2 Subcontractor and supplier quality control	68
4.3 Document control and traceability	70
4.4 QA/QC and HSE interface	72
4.5 Standards: ISO 9001, ASTM, BS EN, SBC	74
Level 4 Quiz	76
Level 5 – Expert	78
5.1 FIDIC quality clauses, defects notification period	79
5.2 Audits: internal, client, third party	81
5.3 KPIs, quality dashboard, digital QA/QC tools	83
5.4 Lessons learned and continuous improvement	86
5.5 Career roadmap: certifications, CV and interview tips	88
Level 5 Quiz	90
Templates	92
PQP outline template	93
ITP template	94
WIR template	95
MIR template	96
MAR template	97
NCR template	98
SOR template	99
Pre-qualification checklist template	100
Glossary of abbreviations	101
Quick-reference cheat sheet	103
Quiz answer key	105
Contact and free resources – ruzani.com	106



Templates, glossary and the cheat sheet are at the back. Print them!

Foundations

Understand what quality really means, who does what, and how to read the three documents that rule every site.



Welcome to Level 1! Every expert started here. Master these basics and the rest of the book becomes easy.

WHAT YOU WILL MASTER



QA vs QC — and why the difference matters



The real cost of poor quality



Inspector, Engineer, Manager — who does what



Reading drawings like a pro



Finding answers in the specification



Using the BOQ and order of precedence

1.1

CHAPTER 1.1

QA vs QC

Two words everyone mixes up. After this page, you never will.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

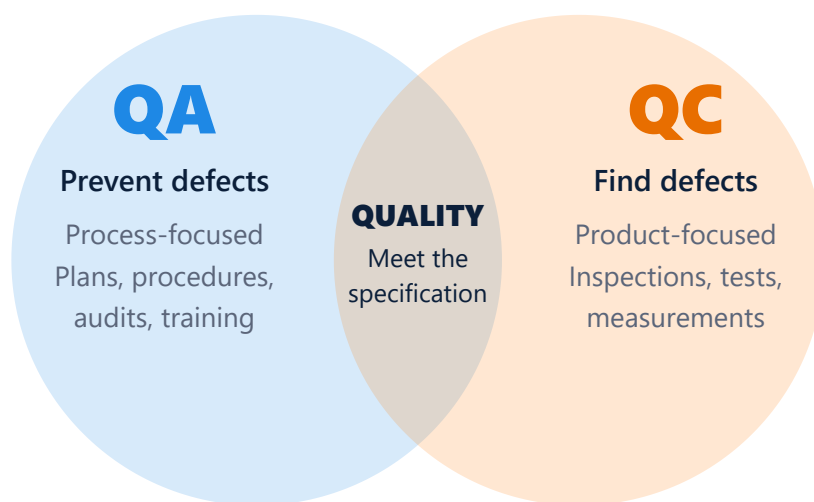
 The concept

Quality Assurance (QA)

Planned activities that give **confidence** the work **will** meet requirements. It is about the **system**: plans, procedures, training, audits.

Quality Control (QC)

Checking the **actual work** to confirm it **does** meet requirements. It is about the **product**: inspections, tests, measurements.



QA prevents, QC detects. Together they deliver a product that meets the specification.

 Side by side

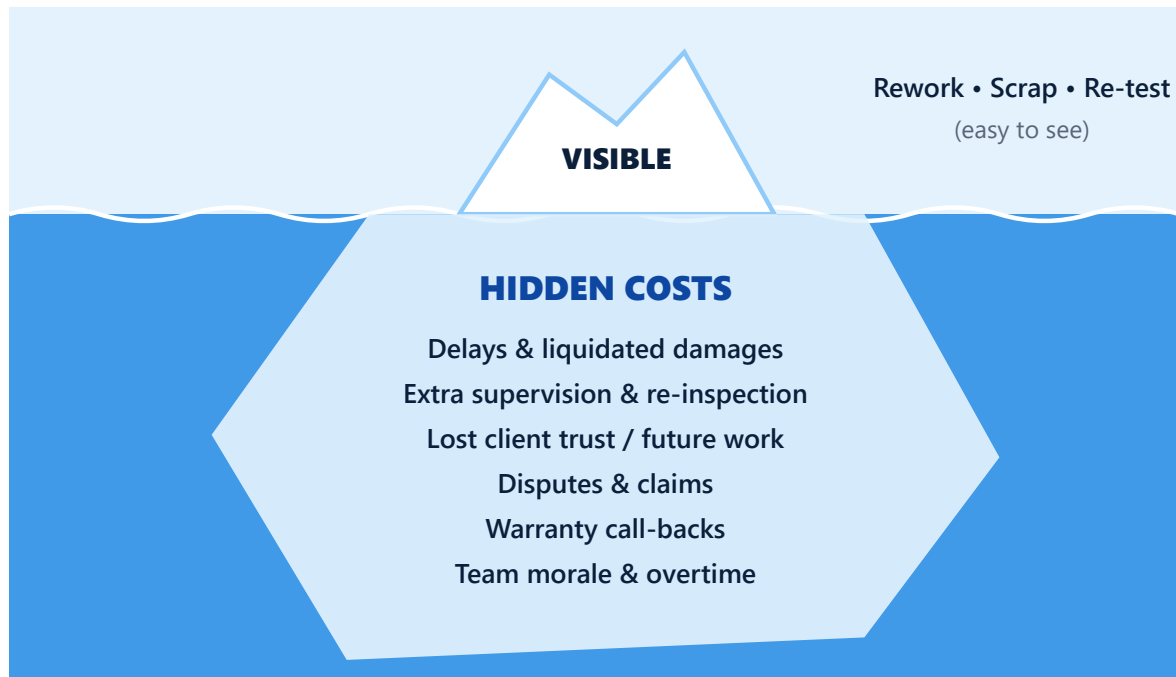
Aspect	QA — Assurance	QC — Control
Main goal	Prevent defects	Detect and correct defects
Focus	Process / system	Product / result
Timing	Before and during work	During and after work
Typical tools	PQP, procedures, method statements, training, audits	WIR, MIR, ITP checks, lab tests, surveys
Key question	"Are we doing it the right way?"	"Is the result right?"
Owner	Whole organisation, led by QA/QC Manager	Inspectors, engineers, testing labs



Easy way to remember: **QA is the recipe. QC is tasting the food.** A good recipe means fewer bad meals — but you still taste before serving!

The cost of poor quality (COPQ)

Poor quality is not just “a bit of rework”. Most of its cost is **hidden** below the waterline — like an iceberg.



The iceberg of poor quality: what you see on site is only the tip.

The 1-10-100 rule of thumb



A widely used rule of thumb, not an exact formula: the later a defect is found, the more it costs to fix.

4 types of quality cost

Type	Site example
Prevention	Training, method statements, mock-ups
Appraisal	Inspections, lab tests, calibration
Internal failure	Breaking and recasting a defective column
External failure	Roof leak after handover, warranty repair

Known as the PAF model. Spend on the first two to avoid the last two.

Did you know?

In most quality models, money spent on **prevention** is the cheapest money in the project. One toolbox talk can prevent a week of rework.

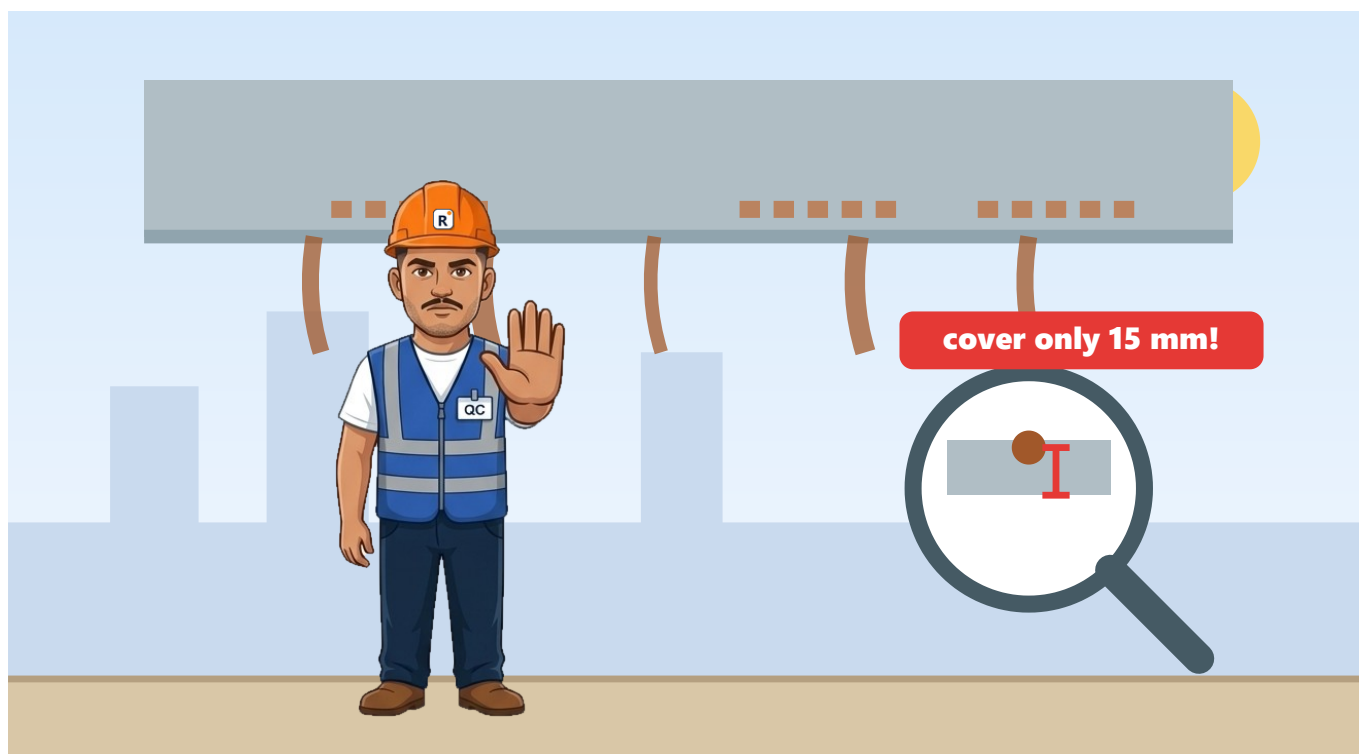


Rework on site: breaking out a defective concrete element

Site example

Site Story: The missing spacers

On a residential tower in Riyadh, spacer blocks were missing under a slab's bottom bars. Nobody checked before the pour. Months later, rust stains appeared on the soffit. The fix — breaking out cover, treating bars, repair mortar, re-painting — cost far more than one 20-minute inspection. **Lesson: check before you cover.**



Soffit of a slab showing rust staining caused by low concrete cover

✓ Checklist: QA/QC mindset every day

- ☐ I know the spec clause for today's activity
- ☐ The approved method statement is on site
- ☐ The ITP tells me what to inspect and when
- ☐ Materials have approved MAR + MIR
- ☐ Inspection is done **before** covering
- ☐ Results are recorded, signed and photographed
- ☐ Any issue is raised the same day

⚠ Common Mistake

- ✗ Thinking QA/QC is "the inspector's job" only
- ✗ Inspecting after the work is already covered
- ✗ Treating QC as paperwork, not prevention
- ✗ Ignoring small defects until they repeat
- ✗ No photos — then no evidence in disputes



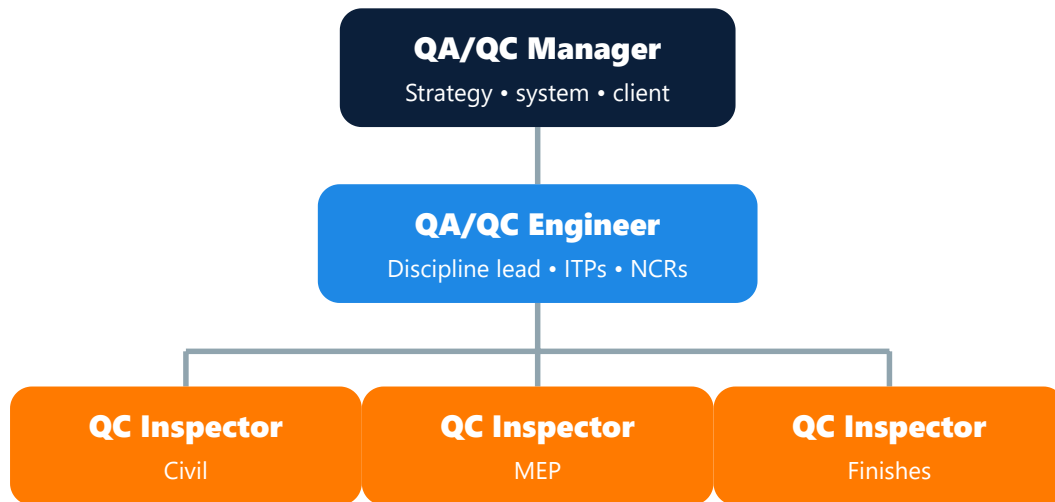
Remember: **quality is cheaper than rework**. Every check you do today protects the project budget — and your name.

1.2

CHAPTER 1.2

Roles: Inspector, Engineer, Manager

Three roles, one team. Know who does what — and where you fit.

[💡 Concept](#)[📊 Visual](#)[🏠 Site example](#)[✅ Checklist](#)[⚠️ Mistakes](#)

Typical contractor QA/QC structure on a GCC building project (sizes vary with project).

👁️ QC Inspector

- Daily inspections on site
- Raises and attends WIRs / MIRs
- Checks work vs drawings + ITP
- Records results, takes photos
- Reports defects immediately

⚙️ QA/QC Engineer

- Prepares ITPs and checklists
- Reviews method statements
- Coordinates with Consultant
- Raises / closes NCRs
- Trains inspectors and foremen

🎯 QA/QC Manager

- Owns the PQP and quality system
- Plans and leads audits
- Reports KPIs to management
- Client / Consultant interface
- Drives root-cause and CAPA



Who's who on a GCC project

Party	Role in quality
Client / Employer	Owns the project; sets quality expectations in the contract
PMC (if appointed)	Project Management Consultant; manages delivery on the client's behalf
Consultant / "The Engineer"	Designs and/or supervises; reviews submittals, inspects, approves
Main Contractor	Builds the works; runs QA/QC system, PQP, ITPs, inspections
Subcontractor / Supplier	Delivers parts of the work; follows contractor's QA/QC plan
Third-party lab / inspector	Independent tests and inspections (concrete, soil, NDT...)
Authorities	Permits and inspections (e.g. municipality, civil defence) VERIFY

A day in the life

Time	QC Inspector	QA/QC Engineer	QA/QC Manager
06:30	Toolbox talk, check today's WIR list	Review today's inspections vs ITP	Check dashboard: open NCRs, overdue items
08:00	Rebar inspection, level 5 slab	Joint inspection with Consultant	Meeting with Project Manager
11:00	Receive cement delivery (MIR)	Review subcontractor method statement	Review audit findings / CAPA
14:00	Witness cube sampling at pour	Draft NCR for honeycombing	Client quality meeting
16:30	Update log, upload photos	Update registers, plan tomorrow	Weekly quality report

Skills that get you promoted



Inspector

Sharp eyes, reads drawings fast, knows tolerances, honest records, good with foremen.



Engineer

Writes clear ITPs and NCRs, knows specs and standards, solves problems with the site team.



Manager

Builds systems, leads audits, uses data, influences management and client.

SA GCC / KSA Note

Engineers practising in KSA normally need professional accreditation with the **Saudi Council of Engineers (SCE)**. Requirements change — check the current rules for your role and grade. **VERIFY**

Checklist: know your role

- ☐ I know who signs each document on my project
- ☐ I know my Consultant counterpart by name
- ☐ I know which ITP activities are mine
- ☐ I escalate issues the same day
- ☐ I keep my own daily log

Common Mistake

- ✗ Inspector approving work they are not authorised to approve
- ✗ Engineer hiding NCRs to “keep the peace”
- ✗ Manager stuck in the office, never on site
- ✗ QC reporting to the production manager it inspects



QC inspector and Consultant inspector during a joint inspection

Site Story

A new inspector signed a WIR “approved” on behalf of the Consultant because “he was busy”. The slab failed a later audit and the signature was challenged. **Only sign for yourself and your company.**

1.3

CHAPTER 1.3

Reading Drawings, Specs & B0Q

The three documents that tell you what “right” looks like.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

 Drawings: what you inspect against
**Architectural**

Layouts, finishes, doors, levels

**Structural**

Foundations, rebar, concrete, steel

**MEP**

Mechanical, electrical, plumbing, fire

**Shop drawings**

Contractor's detailed drawings for fabrication / installation

**Sections & details**

Zoomed views — where most defects hide

**As-built**

What was actually built, for handover

Anatomy of a title block

PROJECT: Residential Tower – Riyadh Client • Consultant • Contractor logos			
DRAWING TITLE Typical Floor – Slab Reinforcement		REVISION C	
SCALE 1:50 @ A1	DATE 2026-03-14	STATUS IFC	
DRAWING No. PRJ-STR-DWG-2105	DRAWN / CHECKED AK / MS	SHEET 05	OF 12

Always check drawing number, revision and status before you inspect.

Status	Meaning	Build from it?
IFA / For Approval	Under review by the Consultant	No
IFT / For Tender	Used for pricing	No
IFC / For Construction	Approved for building	Yes
Approved shop drawing	Contractor detail, approved (code A/B)	Yes , with comments
Superseded	Replaced by a newer revision	Never

Status names vary by project — use your project's document control procedure.

Specifications: the rule book

The specification tells you **what materials**, **what standard** and **what workmanship**. Many GCC projects use the **CSI MasterFormat** division numbers.

Division	Covers	Division	Covers
03	Concrete	21	Fire suppression
04	Masonry (blockwork)	22	Plumbing
05	Metals (steel structure)	23	HVAC
07	Thermal & moisture protection	26	Electrical
08	Openings (doors, windows)	31	Earthwork
09	Finishes (plaster, tile, paint)	33	Utilities

Every spec section has 3 parts



QC gold is in **Part 3 – Execution**: look for “Field Quality Control” and “Tolerances”. That is your inspection list!

BOQ: the money map

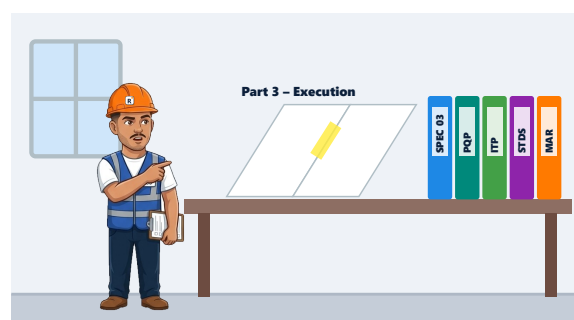
Item	Description	Unit	Qty	Rate	Amount
03.2.1	Grade 40 concrete in suspended slabs, incl. formwork as spec 03 30 00	m ³	1,250	...	...
03.3.4	High-yield deformed bars, cut, bent and fixed	ton	180	...	...

Pro Tip

The BOQ description often names the **spec section** and **grade**. Use it to cross-check what is being built.

SA GCC / KSA Note

GCC BOQs often follow a measurement standard such as **POMI** (Principles of Measurement International). Check which one your contract names. **VERIFY**



Specification binder open at Part 3 – Field Quality Control, highlighted

When documents disagree

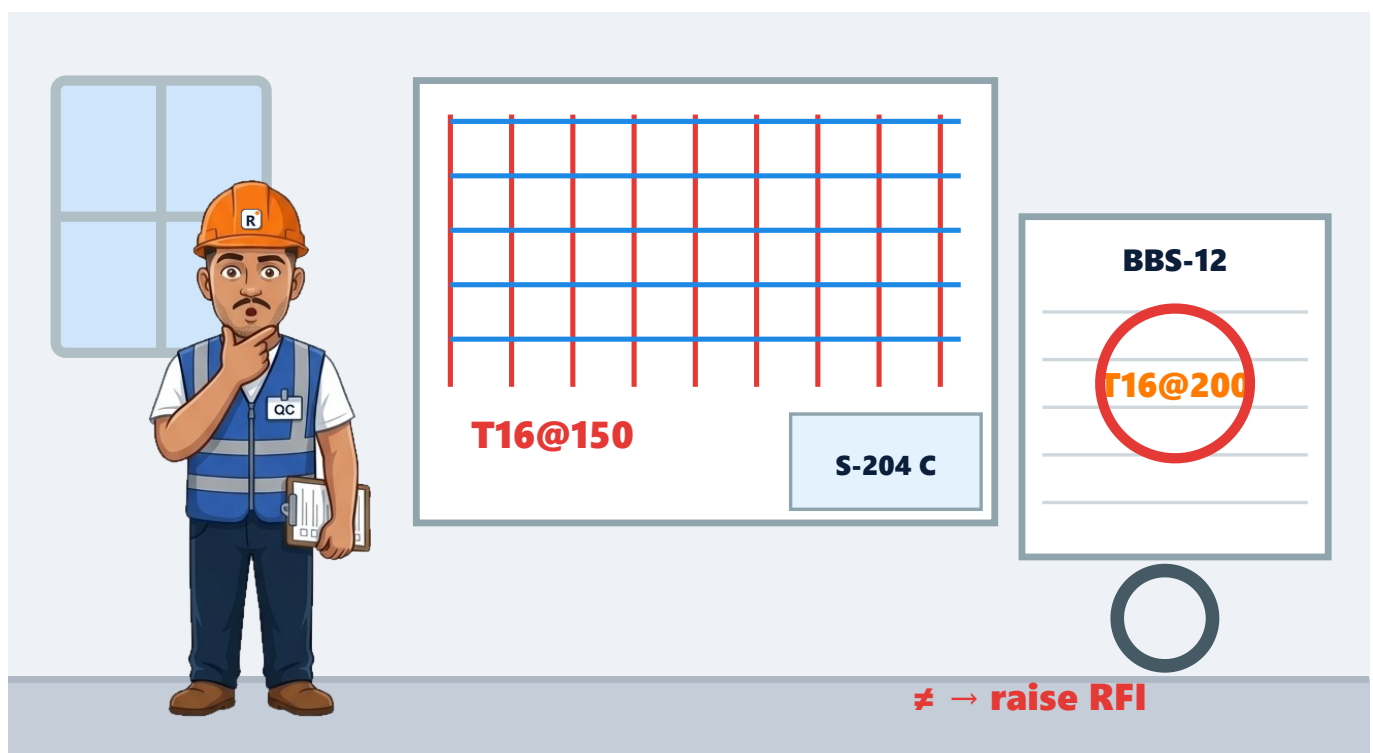
Drawings, specs and BOQ will sometimes conflict. The **contract** decides which one wins — the “order of precedence”.



Example order from FIDIC 1999 Red Book Sub-Clause 1.5. Your contract may differ — always check. **VERIFY**

Site Story: The two spacings

Structural drawing showed T16 bars @150; the bar schedule showed T16 @200. The inspector stopped the fixing and raised an **RFI**. The designer confirmed @150. If he had followed the schedule, the slab would have had 25% less steel. **Never choose the easy answer — ask in writing.**



Engineer comparing a structural drawing with a bar bending schedule on site

✓ Checklist: before you inspect

- ☐ Latest revision and IFC status confirmed
- ☐ Read general notes on every drawing
- ☐ Spec Part 3 tolerances noted
- ☐ Cross-check drawing vs schedule vs BOQ
- ☐ Conflicts raised by RFI before work starts
- ☐ Superseded prints removed from site

⚠ Common Mistake

- ✗ Building from an old revision kept in the site office
- ✗ Ignoring the “General Notes” box
- ✗ Scaling dimensions from a printed drawing
- ✗ Assuming the BOQ description is the spec
- ✗ Solving conflicts verbally — no record



Level 1 Quiz



5 quick questions. No peeking! Answers are in the **Answer Key** at the back.

Q1**Quality Assurance (QA) mainly focuses on...**

- ☐ A Testing finished concrete
- ☐ B Preventing defects through planned processes
- ☐ C Writing NCRs
- ☐ D Approving invoices

Q2**Using the 1-10-100 rule of thumb, a defect found after handover costs about...**

- ☐ A The same as at design
- ☐ B 10× the design-stage cost
- ☐ C 100× the design-stage cost
- ☐ D Nothing — it is under warranty

Q3**Who normally owns the Project Quality Plan (PQP) on the contractor side?**

- ☐ A QC Inspector
- ☐ B Foreman
- ☐ C QA/QC Manager
- ☐ D Quantity Surveyor

Q4**A drawing marked "IFC" means...**

- ☐ A Issued for Construction
- ☐ B Information for Client
- ☐ C Issued for Comments
- ☐ D Internal Final Copy

Q5**In a 3-part spec section, field quality control is usually found in...**

- ☐ A Part 1 – General
- ☐ B Part 2 – Products
- ☐ C Part 3 – Execution
- ☐ D The BOQ



Scoring: 5/5 Expert-in-training · 4/5 Ready for Level 2 · 3 or less — re-read the chapter summaries



Level Up! Foundations unlocked

Great work. Here is what you can now do on site:

☆ Explain QA vs QC in one sentence

☆ Show why prevention is cheaper

☆ Know who does what in the QA/QC team

☆ Read a title block and drawing status

☆ Find tolerances in a spec

☆ Handle conflicts with an RFI



Next up: **Level 2 – Core Documents**. This is where you learn the paperwork that runs every site.

Your challenge: before moving on, do the 5-question quiz and check your answers at the back. Score 4/5 or more? You are ready for the next level. 🚀

Core Documents

The paperwork that runs every site — what each document is for, who prepares it and who approves it.



Documents are not “paperwork”. They are the **evidence** that the building is right. Let’s make them simple.

WHAT YOU WILL MASTER

✓ PQP, Method Statement and ITP

✓ Pre-qualifying subcontractors, suppliers, labs

✓ Submittals: MAR, shop drawings, RFI, mock-ups, FAT

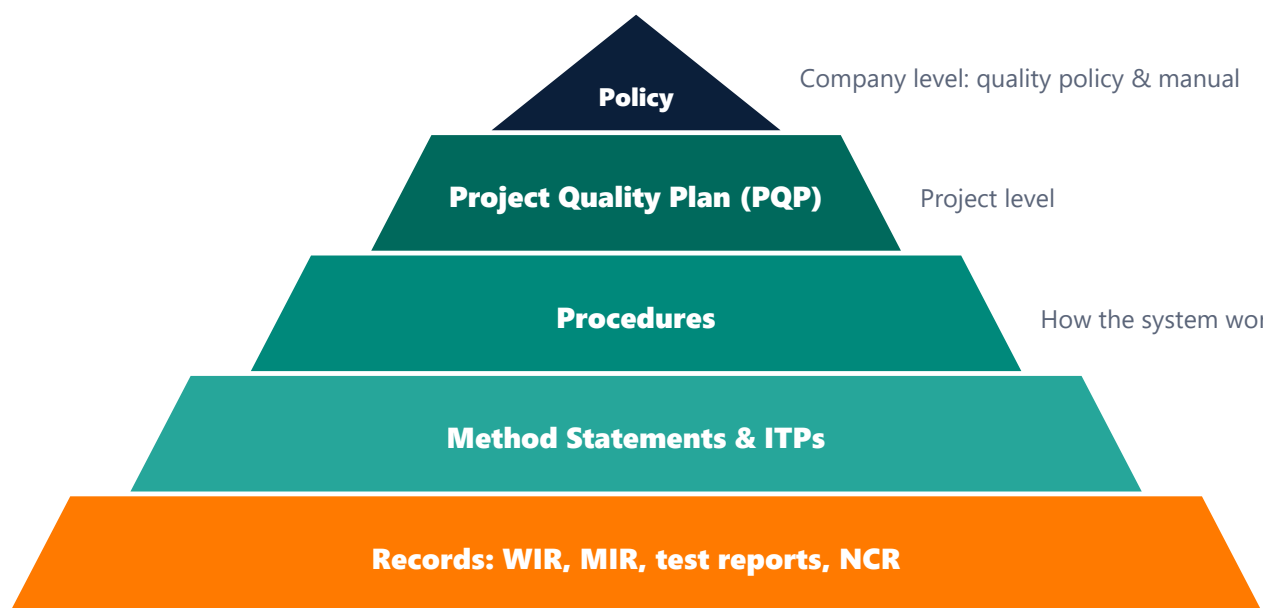
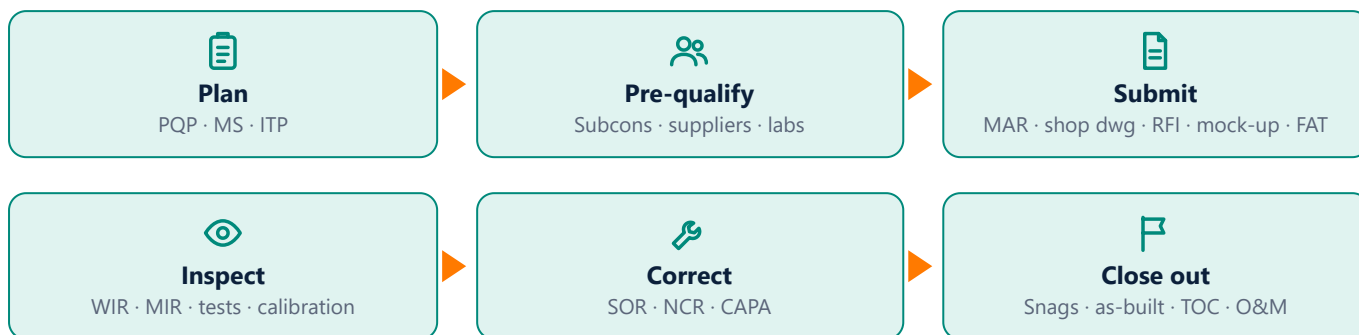
✓ Inspections: WIR, MIR, test reports, calibration

✓ Non-conformance: SOR, NCR, CAPA

✓ Close-out: snags, as-builts, TOC, O&M

The document journey — one page map

Every document has a place in the project life cycle. Learn this map and you will always know **what comes next**.



The quality document pyramid: policy at the top, records at the bottom. Records prove the levels above were followed.

The golden rule of approvals

Before you...	You must have...
Order a material	Approved MAR (and supplier on the AVL)
Start an activity	Approved Method Statement + ITP
Fabricate or install	Approved shop drawing
Use material on site	Accepted MIR
Cover or pour	Released WIR (Hold point cleared)
Hand over	Snags closed, as-builts , O&M , test records



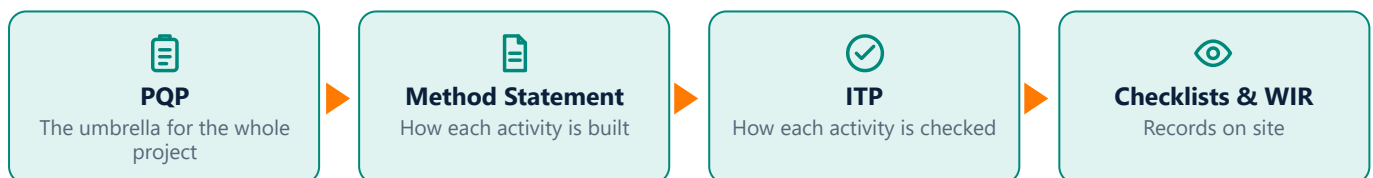
Print this page and stick it in the site office. It answers half the questions you will get every day!

2.1

CHAPTER 2.1

Planning Documents

PQP, Method Statement and ITP: the plan before the work.

 Concept Visual Site example Checklist Mistakes **PQP** Project Quality Plan**Purpose** How quality will be managed on **this** project: organisation, procedures, registers, audits.**Prepared by** Contractor QA/QC Manager**Approved by** Consultant / Engineer (and Client / PMC if required) **MS** Method Statement**Purpose** Step-by-step how an activity is done safely and to spec: resources, sequence, checks, risks.**Prepared by** Contractor discipline / construction engineer (QA/QC + HSE input)**Approved by** Consultant / Engineer **ITP** Inspection & Test Plan**Purpose** Every inspection and test for an activity: what, when, criteria, records, and who attends (H/W/R).**Prepared by** Contractor QA/QC Engineer**Approved by** Consultant / Engineer **How they connect****What goes inside a PQP**

Scope & quality policy Organisation chart & roles Document control Submittal procedure Inspection & test procedure

ITP list NCR & CAPA procedure Calibration control Subcontractor control Audits schedule Training

KPIs & reporting Handover / close-out

What goes inside a Method Statement

Scope References (spec, drawings) Responsibilities Plant & equipment Materials Sequence of work

Quality checks (link to ITP) Risk assessment / JSA Permits Emergency arrangements

SA GCC / KSA Note

On many GCC projects the method statement must be approved **together with** its risk assessment before any work starts — and the Consultant will check the site matches it.

ITP deep dive: Hold, Witness, Review



HOLD

Work STOPS until the inspector releases it



WITNESS

Inspector invited; work may proceed if they don't attend



REVIEW

Documents / records checked – no attendance



SURVEILLANCE

Random spot checks during the work

Inspection point types. Exact definitions are set in your PQP / ITP procedure.

Sample ITP lines — cast-in-place concrete slab

#	Activity	Criteria / reference	Record	Contr.	Cons.
1	Formwork: line, level, stability	Spec 03 10 00, approved MS	Checklist	I	W
2	Reinforcement: size, spacing, cover, laps	IFC drawings, BBS	WIR + checklist	I	H
3	Embedded MEP items before pour	Coordinated shop drawing	MEP clearance	I	H
4	Concrete delivery: ticket, slump, temp.	Approved mix design	Delivery note, test log	I	W
5	Cube / cylinder sampling	Spec frequency VERIFY	Sampling record	I	W
6	Curing method and duration	Spec 03 30 00	Curing log	I	S
7	28-day strength results	Mix design strength	Lab report	R	R

I = Inspect (contractor) · H = Hold · W = Witness · R = Review · S = Surveillance. Codes vary between projects.

Pro Tip

Put the **acceptance criteria** in the ITP line (e.g. "cover 40 mm, -0/+10 mm"), not just "as per spec". Inspectors on site need the number, not the book. Use your spec values.

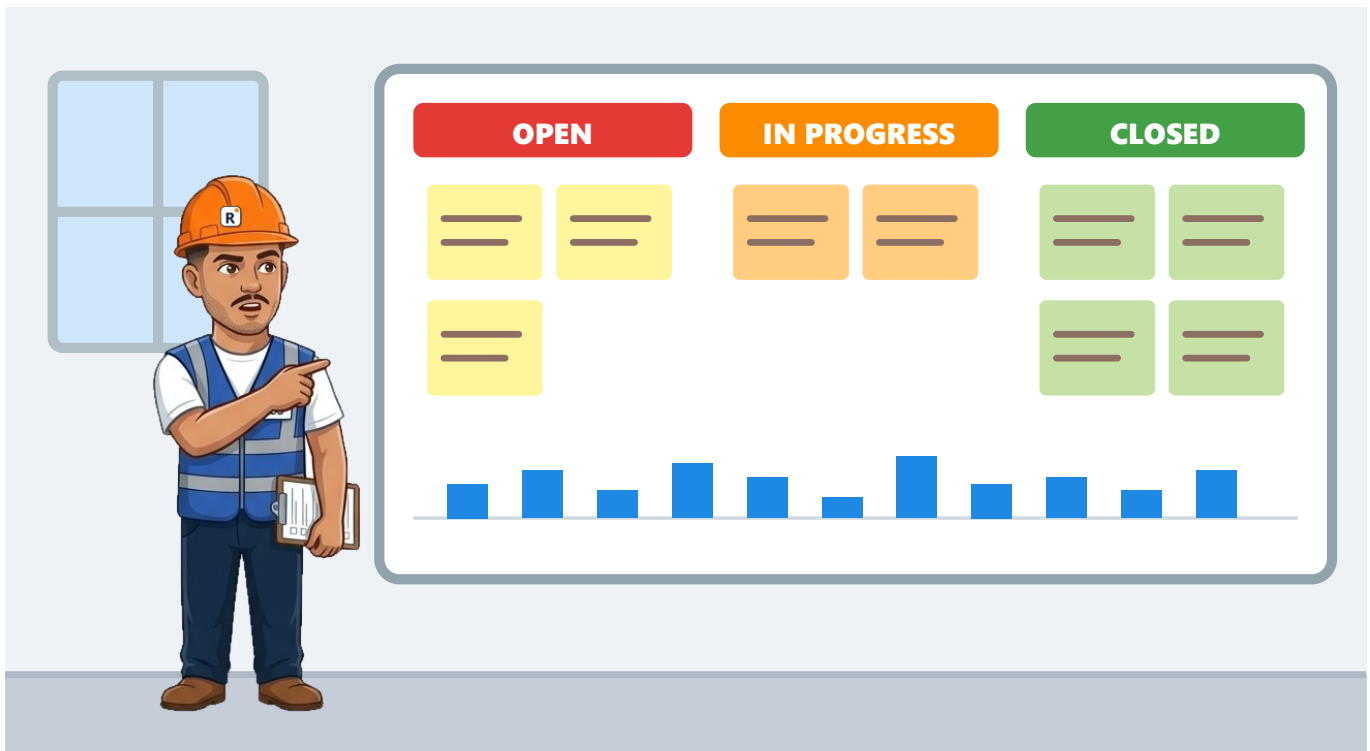
Did you know?

A **Hold point** is the strongest control on site. Work that passes a Hold point without release can be ordered opened up — at the contractor's cost.

Site example

Site Story: The early start

A subcontractor started waterproofing a basement before the method statement was approved. The Consultant stopped the work: the primer used was not the approved one. Two days of membrane were stripped. **No approved MS + ITP = no start.**



Planning board in the site office showing approved MS and ITP status per activity

✓ Checklist: planning documents

- ☐ PQP approved and issued to all engineers
- ☐ MS approved for every activity before start
- ☐ ITP attached to each MS
- ☐ H/W/R points agreed with the Consultant
- ☐ Acceptance criteria written as numbers
- ☐ Latest revisions in the field file
- ☐ Crew briefed on MS + ITP (signed attendance)

⚠ Common Mistake

- ✗ Copy-pasting a PQP from another project
- ✗ Method statement written by someone who never visited site
- ✗ ITP says "as per spec" everywhere
- ✗ Too many Hold points — site cannot move
- ✗ Updating the MS but not the ITP (or the reverse)
- ✗ Approved MS kept in the office, not with the crew



A good ITP is **short enough to use** and **clear enough to sign**. If inspectors don't read it, it is not working.

2.2

CHAPTER 2.2

Pre-qualification

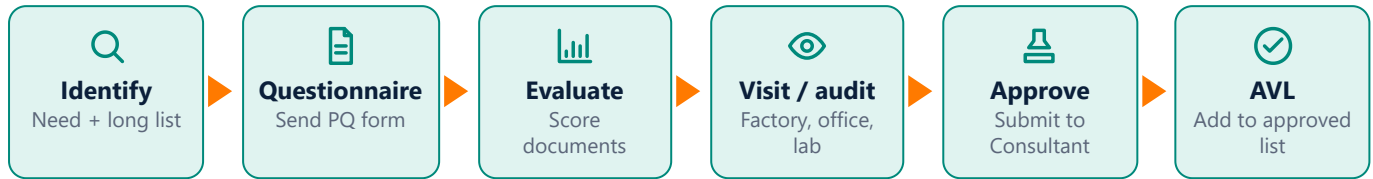
Choose the right subcontractors, suppliers and labs — before they touch your project.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

 SUB Subcontractor PQ

Purpose	Prove capacity, experience and quality system for a work package.
Prepared by	Contractor procurement + QA/QC
Approved by	Contractor; Consultant / Client if contract requires

 SUP Supplier PQ

Purpose	Prove product quality, certification, capacity and delivery.
Prepared by	Contractor procurement + QA/QC
Approved by	Contractor; Consultant for named products

 LAB Testing lab PQ

Purpose	Prove accreditation, equipment, staff and independence.
Prepared by	Contractor QA/QC
Approved by	Consultant / Engineer

 Required documents

Document	Sub-con	Supplier	Lab
Commercial Registration (CR) / trade licence	✓	✓	✓
Company profile + organisation chart	✓	✓	✓
Similar project references / completion letters	✓	✓	✓
Quality system certificate (e.g. ISO 9001)	✓	✓	✓
HSE records / policy	✓	–	✓
Key staff CVs and qualifications	✓	–	✓
Equipment list + calibration	✓	–	✓
Product certificates, test reports, data sheets	–	✓	–
Manufacturing capacity / stock, delivery plan	–	✓	–
Accreditation scope (ISO/IEC 17025)	–	–	✓
Financial statements	✓	✓	–

SA GCC / KSA Note

In KSA, also check registrations required by the client or authority — e.g. product conformity schemes (SASO) or a client's own approved vendor list. **VERIFY**

Scoring: make it fair and visible

Use a scoring matrix so decisions are **objective** and can be defended in an audit. Example weights only — set your own.

Criterion	Weight	Score 1–5	Weighted
Technical experience (similar projects)	25%	4	1.00
Quality system & certification	20%	5	1.00
Key staff qualifications	15%	3	0.45
Resources: equipment, capacity	15%	4	0.60
HSE performance	10%	4	0.40
Financial stability	10%	3	0.30
Past performance / references	5%	5	0.25
Total	100%		4.00 / 5

Example decision rule

- $\geq 3.5 \rightarrow$ **Approved**, add to AVL
- $2.5 - 3.4 \rightarrow$ **Conditional**, improvement plan
- $< 2.5 \rightarrow$ **Not approved**

What is an AVL?

The **Approved Vendor List**: the register of pre-qualified subcontractors, suppliers and labs. Procurement must buy only from it. Review it regularly using performance data.

Site Story

A cheap block supplier won on price but had no curing yard. Blocks arrived “green”, cracked during laying, and failed compressive tests. The replacement cost more than the saving. **Visit the factory before you approve.**

Checklist: pre-qualification

- ☐ PQ questionnaire complete and signed
- ☐ Certificates valid (check expiry dates)
- ☐ References actually called
- ☐ Factory / lab visit done for key items
- ☐ Score sheet signed by evaluators
- ☐ AVL updated and shared with procurement

Common Mistake

- ✗ Choosing on price alone
- ✗ Accepting expired ISO / accreditation certificates
- ✗ Lab accredited — but not for the test you need
- ✗ Never re-evaluating vendors after poor performance
- ✗ Buying from a supplier not on the AVL “just this once”

2.3

CHAPTER 2.3

Submittals

Get it approved on paper before you build it in concrete.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

MAR Material Approval Request

Purpose Get a specific product/material approved against the spec before ordering.

Prepared by Contractor (discipline engineer / QA/QC)

Approved by Consultant / Engineer

RFI Request for Information

Purpose Ask the designer to clarify a conflict, gap or unclear detail.

Prepared by Contractor

Approved by Answered by Consultant / Designer (not "approved")

FAT Factory Acceptance Test

Purpose Test equipment at the factory before shipping (e.g. generators, switchgear, chillers).

Prepared by Manufacturer (procedure + test)

Approved by Witnessed and accepted by Contractor / Consultant / Client

SD Shop Drawing

Purpose Detailed fabrication / installation drawings based on IFC design.

Prepared by Contractor technical office / subcontractor

Approved by Consultant / Engineer

MU Mock-up

Purpose Build a sample area/item to agree look and workmanship — becomes the benchmark.

Prepared by Contractor

Approved by Consultant / Client

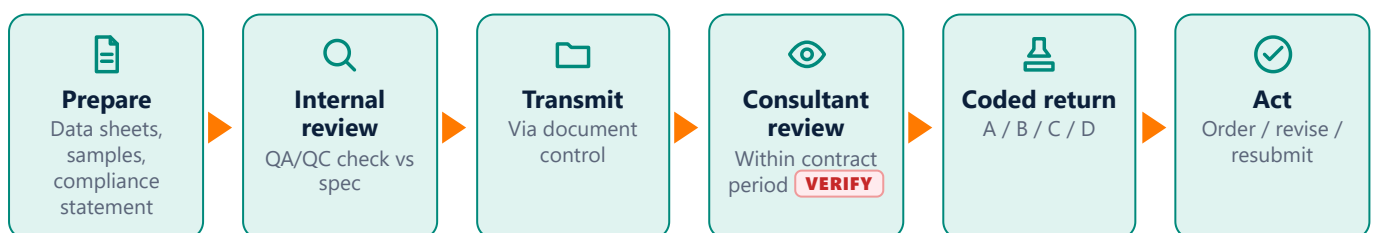
TRN Transmittal

Purpose Cover sheet listing what is submitted, revision and purpose.

Prepared by Contractor document control

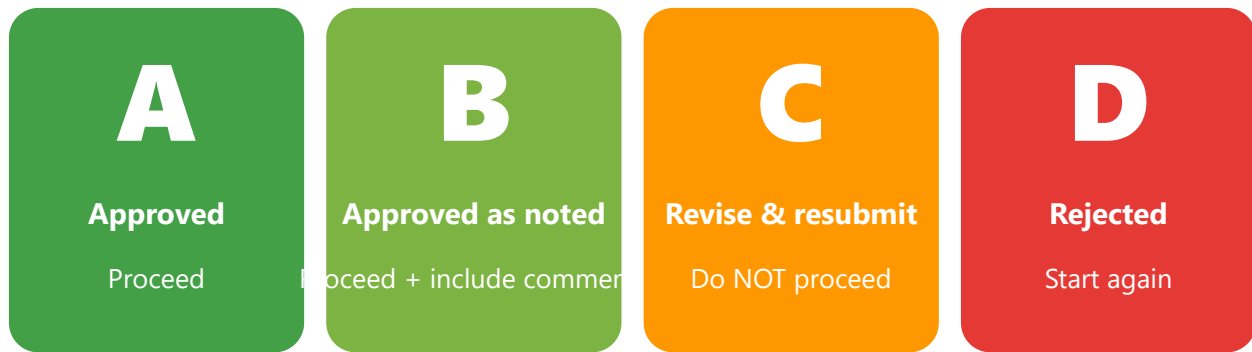
Approved by Received / stamped by Consultant DC

Submittal flow



Always add a **compliance statement**: spec clause vs offered product, line by line. Consultants approve faster when you do their homework!

Review codes — what the stamp means



Common 4-code system. Some projects use 1–4 or different words — check your PQP.

A good MAR package contains

- ☐ Transmittal + MAR form
- ☐ Compliance statement (spec vs offered)
- ☐ Manufacturer data sheets
- ☐ Test certificates / third-party reports
- ☐ Samples (if required)
- ☐ Manufacturer / supplier approval (AVL)
- ☐ Country of origin + warranty
- ☐ Previous approvals / references
- ☐ Installation instructions
- ☐ Certificates required by authority **VERIFY**

RFI: good vs bad

Bad RFI

"Please clarify slab details."

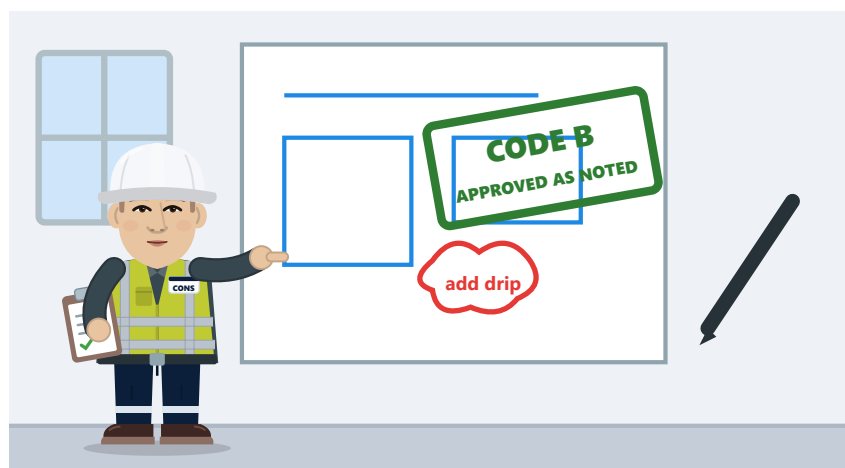
Which slab? Which detail? What is the conflict?

Good RFI

"Slab S3 level 4: drawing S-204 rev C shows T16@150 bottom; BBS-12 shows T16@200.

Please confirm which governs. Proposed: @150 as per drawing."

Submittal	Typical trigger	Tip
Mock-up	Finishes, façade, wet areas, doors	Photo + sign the approved mock-up; keep it until handover
FAT	Major MEP equipment	Agree test procedure and witness dates early — flights and factory slots take time
Shop drawing	Before fabrication / installation	Coordinate MEP + structure first (clash check)

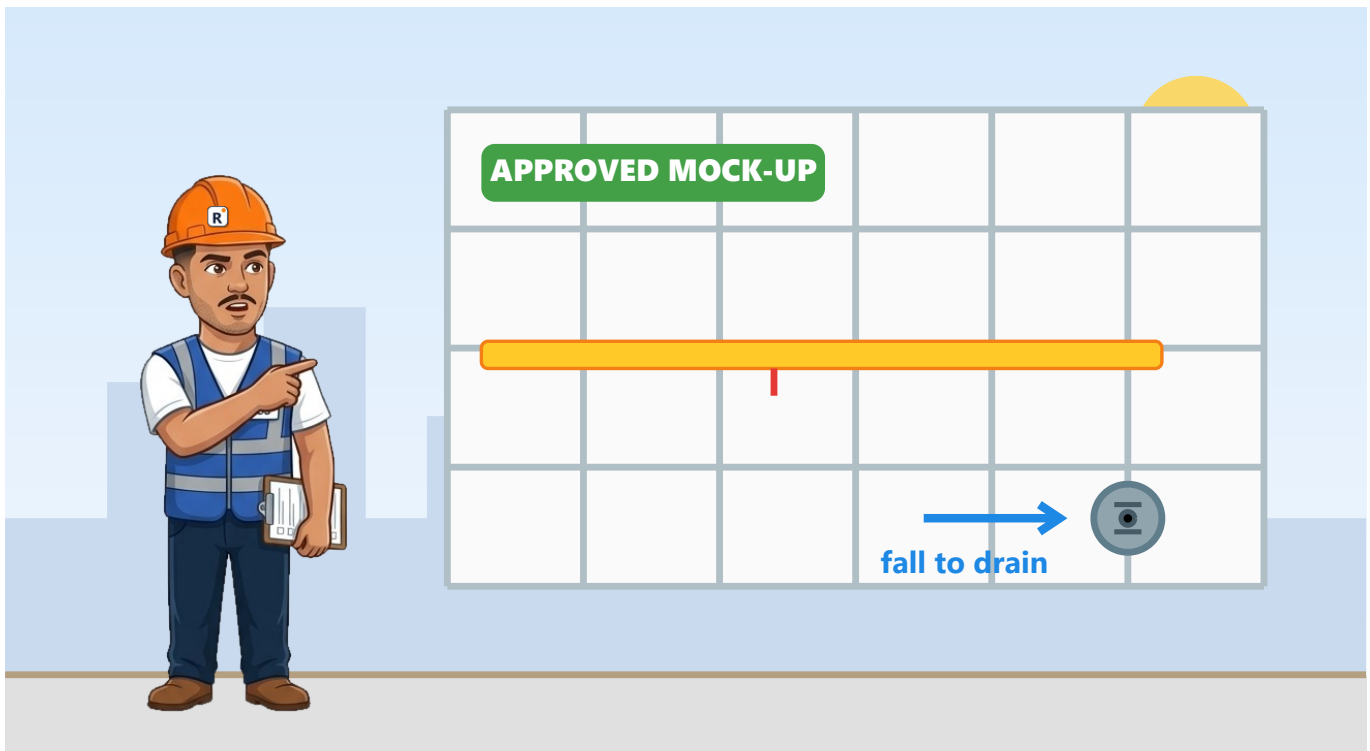


Consultant review stamp (code B) on a returned shop drawing

Site example

🎯 Site Story: Same brand, different tile

Floor tiles were delivered from a different factory than the approved MAR — same brand, different series. The colour was slightly different from the mock-up. The Consultant rejected the delivery. **The MAR approves a specific product, not a brand.**



Approved mock-up area with signed approval label next to a delivered tile batch

✅ Checklist: submittals

- ☐ Submittal register updated daily
- ☐ Compliance statement attached to every MAR
- ☐ Shop drawings coordinated across disciplines
- ☐ RFIs specific: location, drawing, conflict, proposal
- ☐ Approved mock-ups labelled and protected
- ☐ FAT procedure approved before travel
- ☐ Code C/D comments closed before resubmission

⚠️ Common Mistake

- ✗ Ordering material before the MAR is approved
- ✗ Resubmitting without answering all comments
- ✗ Using a code B drawing but ignoring the comments
- ✗ Verbal RFIs answered in meetings — no record
- ✗ Demolishing the mock-up too early
- ✗ Late submittals that delay procurement

🔍 Did you know?

Most projects track submittals in a **register** with dates submitted, returned and code. Average review time is one of the best early warnings of delay.

2.4

CHAPTER 2.4

Inspection Documents

WIR, MIR, test reports and calibration certificates: the proof on site.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

 WIR Work Inspection Request

Purpose	Request the Consultant to inspect completed work before the next stage / covering.
Prepared by	Contractor QC (site engineer + QC inspector)
Approved by	Consultant inspector (approved / approved with comments / rejected)

 MIR Material Inspection Request

Purpose	Inspect delivered material against the approved MAR before use.
Prepared by	Contractor QC / store
Approved by	Consultant inspector

 TR Test Report

Purpose	Record results of lab or field tests (concrete, soil, pressure, NDT...).
Prepared by	Testing lab / specialist (accredited)
Approved by	Reviewed by contractor QA/QC, accepted by Consultant

 CAL Calibration Certificate

Purpose	Proves measuring equipment is accurate and traceable.
Prepared by	Accredited calibration lab (ISO/IEC 17025)
Approved by	Reviewed by contractor QA/QC; Consultant on request

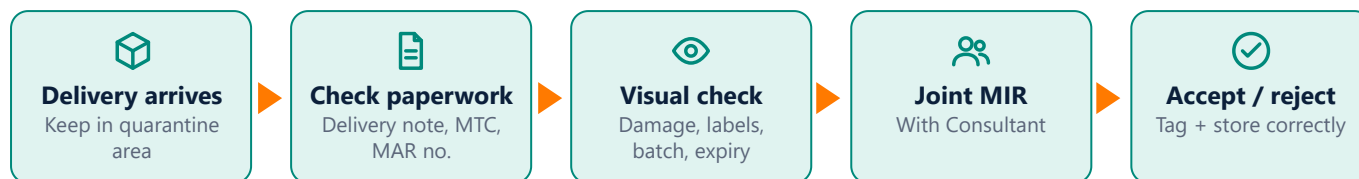
 WIR flow
**SA GCC / KSA Note**

Many GCC specs require WIRs to be submitted a fixed time before inspection (often quoted as 24 hours) — check your contract. Late WIRs are a top cause of disputes. **VERIFY**



Golden rule: never call the Consultant to inspect work you have not checked yourself. A rejected WIR costs you time and reputation.

MIR: receiving material the right way



What to check on delivery

- ☐ Product = approved MAR (name, model, series)
- ☐ Manufacturer test certificate (MTC) / batch
- ☐ Quantity vs delivery note
- ☐ Damage, corrosion, moisture
- ☐ Expiry / shelf life (sealants, chemicals, cement)
- ☐ Storage needs (shade, pallets, temperature)

Reading a test report

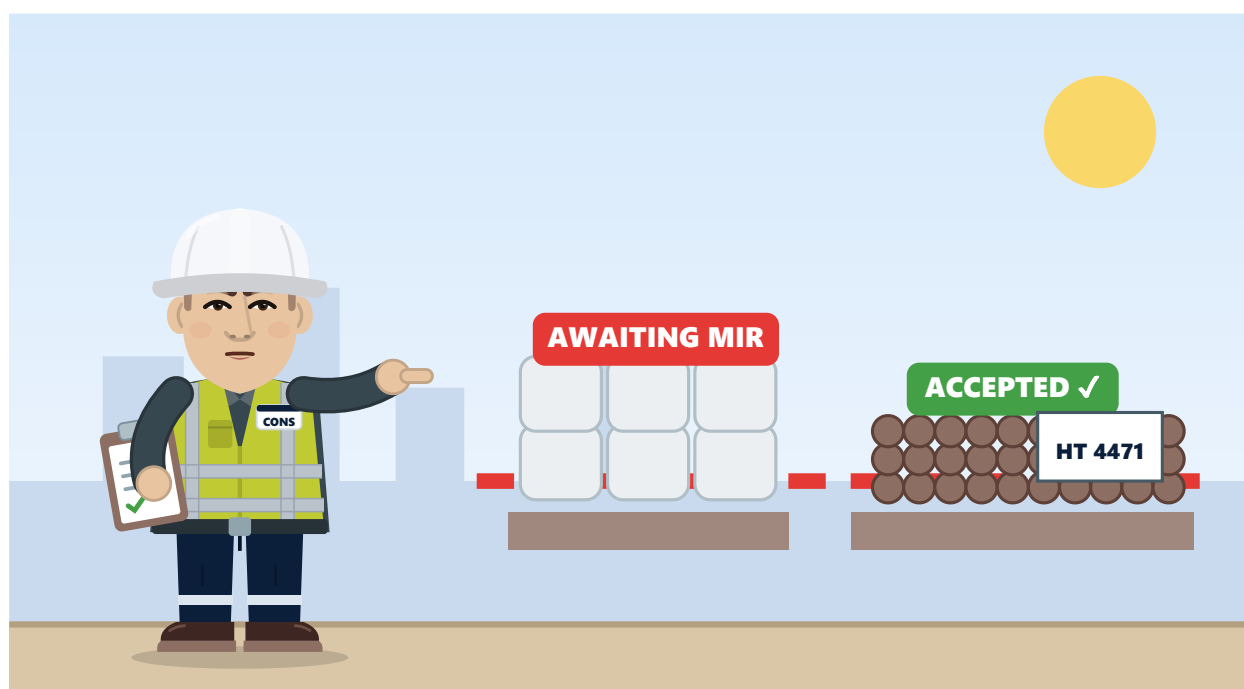
- ☐ Lab name + accreditation scope
- ☐ Sample ID matches your record
- ☐ Test standard named (e.g. ASTM / BS EN)
- ☐ Date sampled vs date tested
- ☐ Result vs acceptance criteria
- ☐ Signed by authorised person

Calibration: is your gauge telling the truth?

Check on the certificate	Why
Equipment serial number matches the tool	Certificate for another tool is worthless
Calibration date and due date	Expired = results can be rejected
Lab accredited for that calibration	Traceability to national/international standards
Results within tolerance / "as found" data	Shows if past readings were reliable
Sticker on the equipment	Quick check for inspectors on site

Pro Tip

Keep a **calibration register** with due dates and a 2-week reminder. If a gauge is found out of tolerance, review all tests done with it since the last good calibration.



Material quarantine area with "Awaiting MIR" and "Accepted" tags

Site example

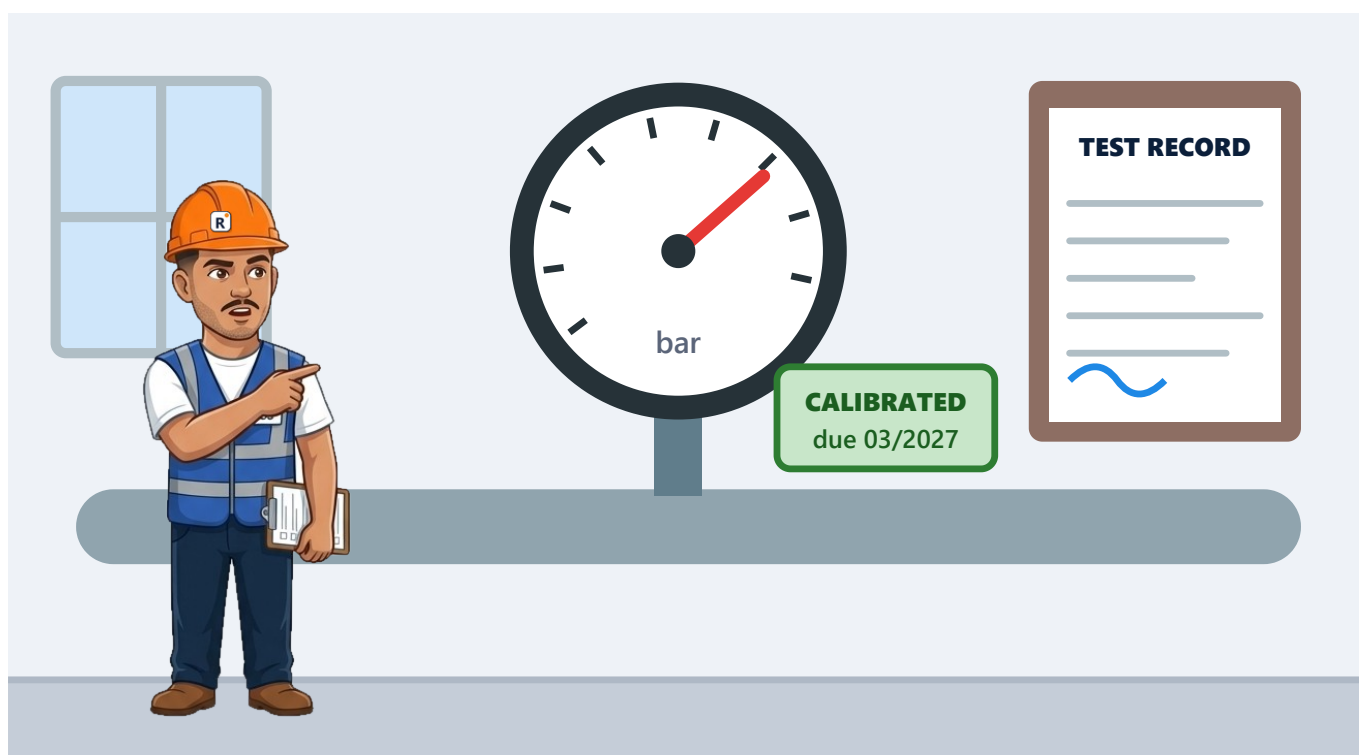
R RUZANI | Raise WIRs in seconds

ADoc Flow numbers every WIR, MIR and MAR automatically, keeps the register live and shows each engineer what needs action. New to WIRs? Read the free guide too.

[Free WIR guide →](#)

Site Story: The expired gauge

A pressure test passed — but the Consultant noticed the gauge calibration had expired two weeks earlier. All tests done with that gauge had to be repeated on a finished, ceiling-closed floor. **One sticker check would have saved a week.**



Calibrated pressure gauge with valid calibration sticker showing due date

Checklist: inspections

- ☐ Self-inspection done and recorded before WIR
- ☐ WIR has drawing refs + revision + location
- ☐ Previous stage WIR approved (sequence)
- ☐ MIR done before material is used
- ☐ Test reports match sample IDs
- ☐ Calibration valid for all instruments
- ☐ Photos attached, file named by WIR no.

Common Mistake

-  Raising WIR for incomplete work "to save time"
-  Using material before MIR approval
-  No location / grid in the WIR
-  Accepting test reports without checking criteria
-  Calibration stickers but no certificates
-  Approved with comments — but comments never closed

2.5

CHAPTER 2.5

Non-conformance

When something is wrong: SOR, NCR and CAPA.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

SOR Site Observation Report

Purpose Record a minor issue or bad practice early, before it becomes a non-conformance.

Prepared by Consultant inspector (or contractor QC internally)

Approved by Closed by contractor action; verified by issuer

NCR Non-Conformance Report

Purpose Formally record work/material that does not meet the requirements, plus the agreed disposition.

Prepared by Consultant (or contractor QA/QC / client)

Approved by Disposition proposed by contractor, approved by Consultant; closure verified by issuer

CAPA Corrective & Preventive Action

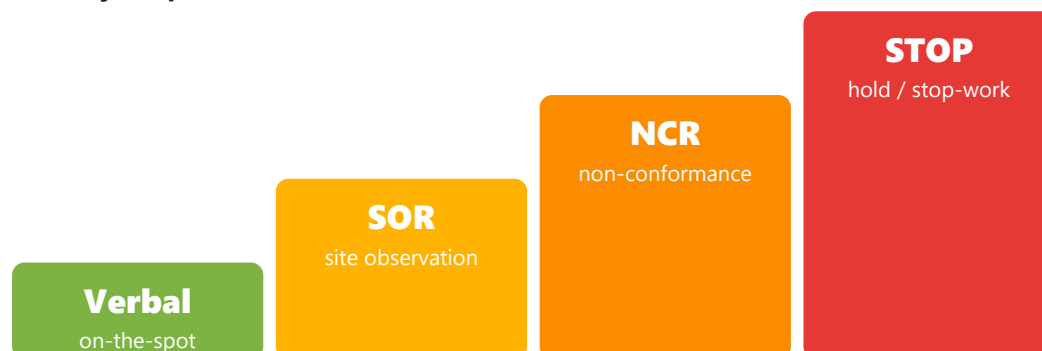
Purpose Fix the root cause so the problem does not happen again (or anywhere else).

Prepared by Contractor QA/QC with the responsible team

Approved by Reviewed by QA/QC Manager / Consultant; effectiveness checked later

The escalation ladder

Severity / repeat issue ↗

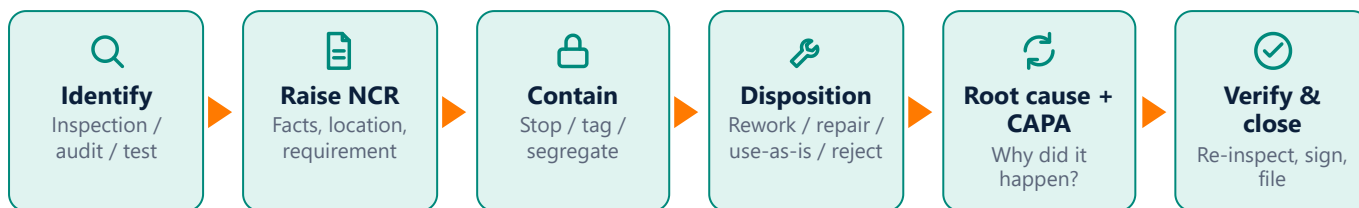


Issues escalate with severity and repetition. Most should be solved at the bottom step.

NCR dispositions

Disposition	Meaning	Example
Rework	Make it comply with the original requirement	Re-fix rebar to correct spacing
Repair	Make it acceptable with an approved repair method	Approved repair of honeycombing
Use as is (concession)	Accept without change — needs designer approval	Minor dimension deviation accepted by designer
Reject / replace	Remove and replace	Demolish failed blockwork wall

NCR life cycle



How to write a strong NCR

Part	Write like this
Requirement	"Spec 03 30 00 cl. 3.4: min. cover 50 mm to columns." [VERIFY values per your spec]
Non-conformance	"Column C-12, level 3, grid B/4: measured cover 25–30 mm on north face."
Evidence	Photos with tape measure, cover-meter readings, WIR no.
Immediate action	"Pour on hold. Area tagged."
Proposed disposition	Reposition bars and re-inspect (rework).
Root cause	Spacers of wrong size supplied to the gang.
Corrective / preventive	Spacer check added to the rebar checklist; toolbox talk; supplier briefed.

✓ Checklist: NCRs

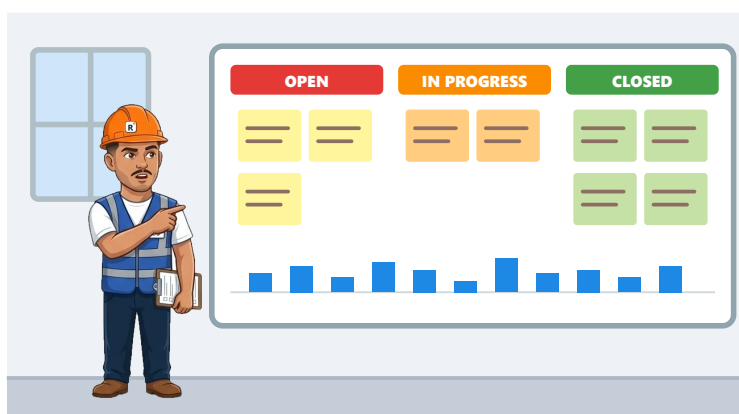
- ☐ Facts, not opinions
- ☐ Exact location + reference
- ☐ Requirement quoted
- ☐ Photos attached
- ☐ Target date agreed
- ☐ Root cause, not just the fix
- ☐ Closure verified on site

⚠ Common Mistake

- ✗ Writing NCRs to punish people
- ✗ Closing an NCR on paper only
- ✗ "Root cause: carelessness" (not a cause!)
- ✗ Same NCR repeating every month
- ✗ No containment — defect gets covered

🔗 Site Story

A QA/QC Manager tracked NCRs by root cause and noticed 40% came from one activity: blockwork bonding. One training session and a mock-up later, blockwork NCRs dropped sharply. **NCR data is gold — use it.**



NCR board in the site office showing open and closed NCRs by trade

2.6

CHAPTER 2.6

Close-out Documents

Finish strong: snags, as-builts, Taking-Over and O&M.

🔍 Concept

📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes

📋 **SNAG** Snag / Punch List

Purpose List of minor defects and incomplete items to fix before or after handover.

Prepared by Consultant / Client inspection (contractor pre-snags first)

Approved by Closed by contractor; verified by Consultant

📖 **ABD** As-built Drawings

Purpose Show what was actually built, including all approved changes.

Prepared by Contractor (with subcontractors)

Approved by Reviewed / approved by Consultant

🚧 **TOC** Taking-Over Certificate

Purpose Confirms the Works are complete enough to be taken over; starts the DNP.

Prepared by Contractor applies

Approved by Issued by the Engineer (FIDIC Cl. 10.1)

📖 **O&M** Operation & Maintenance Manuals

Purpose How to operate and maintain each system and equipment.

Prepared by Contractor (from suppliers / subcontractors)

Approved by Consultant; accepted by Client / FM team

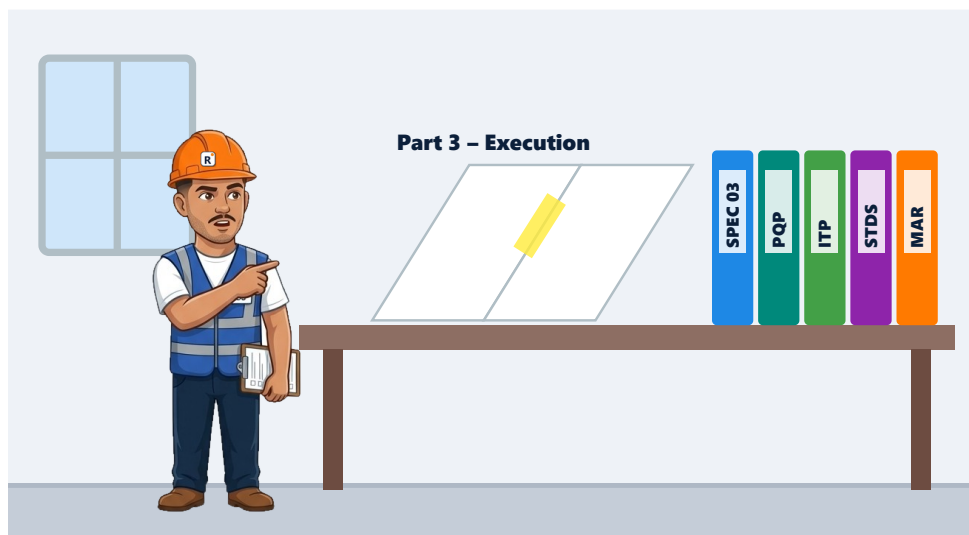
🚧 **Handover flow**

Typical handover pack

As-built drawings O&M manuals Warranties & guarantees Test & commissioning records Material approvals (MAR)

Inspection records (WIR/MIR) NCR log — all closed Spare parts & tools list Training records for FM staff

Authority approvals / certificates **VERIFY** Keys & access cards register



Handover pack binders and USB index ready for the client

Snag categories



Category A — Critical

Safety / function issue. Must be fixed before handover.



Category B — Major

Affects use or appearance. Fix in an agreed short time.



Category C — Minor

Cosmetic. Can be fixed during the DNP if agreed.

Category names and rules vary by project — agree them with the Consultant before snagging starts.

Site Story: The pre-snag win

On a villa project, the contractor did a strict pre-snag of every room using a tablet checklist. The Consultant's snag list came back with less than a quarter of the usual items, and handover was signed on schedule. **Snag yourself before anyone snags you.**



Snag tags placed on a wall and door during a joint snagging walk

✓ Checklist: close-out

- ☐ Start as-builts from day one — not at the end
- ☐ Pre-snag every room with photos
- ☐ Commissioning records signed
- ☐ O&M manuals reviewed for completeness
- ☐ Warranties in the client's name
- ☐ Snag list closed and verified
- ☐ Handover pack indexed and digital

⚠ Common Mistake

- ✗ Copying IFC drawings and calling them as-built
- ✗ Snag lists without locations or photos
- ✗ O&M manuals that are just brochures
- ✗ Warranties missing start dates
- ✗ Leaving FM training to the last day



Level 2 Quiz



Documents level — let's see if you can find your way around the paperwork.

Q1**At a HOLD point in an ITP...**

- ☐ A Work may continue if the inspector is late
- ☐ B Work must stop until the inspector releases it
- ☐ C Only records are reviewed
- ☐ D The inspector visits randomly

Q2**Which document asks the designer to clarify a conflict between drawings?**

- ☐ A NCR
- ☐ B MIR
- ☐ C RFI
- ☐ D SOR

Q3**A submittal returned with code "C – Revise & resubmit" means...**

- ☐ A Proceed with the work
- ☐ B Proceed and include comments
- ☐ C Do not proceed; revise and resubmit
- ☐ D The supplier is blacklisted

Q4**Before using delivered material on site you need an accepted...**

- ☐ A WIR
- ☐ B MIR
- ☐ C TOC
- ☐ D CAPA

Q5**Which certificate starts the Defects Notification Period under FIDIC?**

- ☐ A Performance Certificate
- ☐ B Taking-Over Certificate
- ☐ C Calibration Certificate
- ☐ D Payment Certificate



Level Up! Core Documents unlocked

Great work. Here is what you can now do on site:

☆ Explain PQP, MS and ITP

☆ Use Hold / Witness / Review points

☆ Pre-qualify vendors with a score sheet

☆ Prepare a strong MAR and RFI

☆ Raise WIRs and MIRs correctly

☆ Write an NCR that gets closed



Next up: **Level 3 – Site Practice**. Boots on — we are going to the site!

Your challenge: before moving on, do the 5-question quiz and check your answers at the back. Score 4/5 or more? You are ready for the next level. 🚀

TOOL SPOTLIGHT · FROM THE PUBLISHER

You just learned the documents. Now stop chasing them.



ADoc Flow by Ruzani turns WIRs, MIRs, MARs, ITPs and registers into one simple system for your site and QA/QC team — from field to folder in seconds.

- ✓ WIR, MAR, MIR & method statements
- ✓ Internal QC review before submission
- ✓ ITP & registers, always up to date
- ✓ Drawing room highlight
- ✓ Automatic document numbering
- ✓ Client status A / B / C tracking
- ✓ Live dashboard for the whole team
- ✓ One-click PDF packages + Excel reports



Try it free in your browser

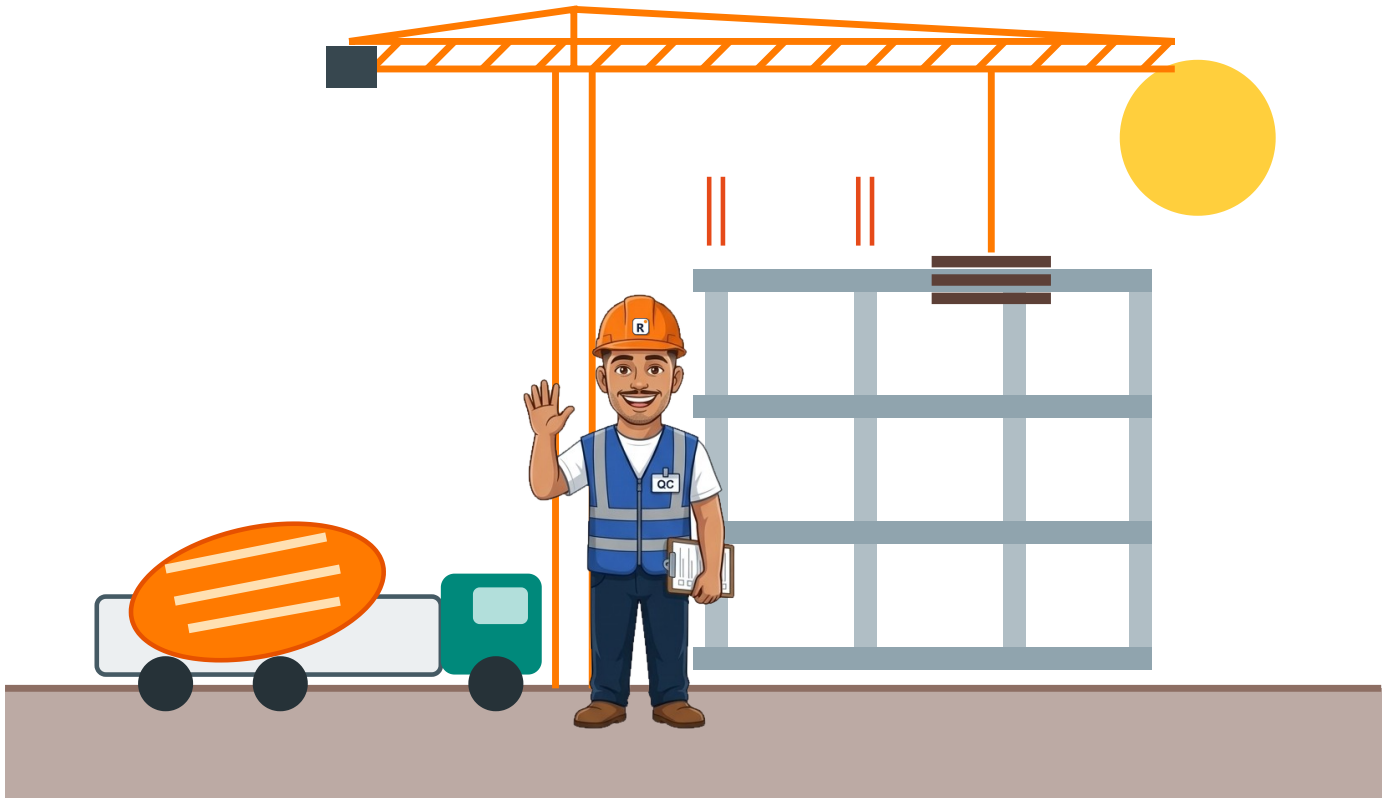
Real app, sample project, nothing to install. Scan the code or open
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Company edition for the whole team (roles for engineers, QA/QC, admin, management) · Personal edition for one engineer on one PC · Contact us for pricing.

Site Practice

Boots on. What to check, how to test and what goes wrong — trade by trade.



This is my favourite level. Every page here is something you will check **this week** on site. Let's go!

WHAT YOU WILL MASTER

✓ Earthworks, rebar, formwork, concrete

✓ Slump, cubes, cylinders, temperature

✓ Steel structure, welding and NDT

✓ Waterproofing, insulation and flood tests

✓ MEP pressure tests, cable tests, commissioning

✓ Finishes, sampling and lab testing

3.1

CHAPTER 3.1

Civil Works

Earthworks, rebar, formwork and concrete — the backbone of every building.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

Earthworks: build on solid ground



Test	Purpose	Common standard
Modified Proctor	Lab max. dry density (MDD) + optimum moisture (OMC)	ASTM D1557
Field density – sand cone	In-place density of compacted layer	ASTM D1556
Field density – nuclear gauge	Fast in-place density + moisture	ASTM D6938
Particle size (sieve)	Is the fill material within spec grading?	ASTM D6913
Atterberg limits	Plasticity of fines	ASTM D4318
CBR	Strength of subgrade / sub-base	ASTM D1883

Pro Tip

Acceptance is usually a % of lab MDD (often quoted as 95% for structural fill) and a max. loose layer thickness. Use the values in **your** spec.

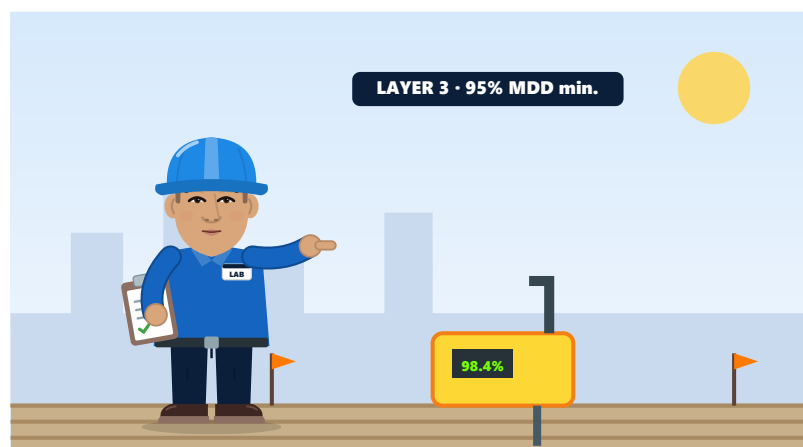
VERIFY

SA GCC / KSA Note

KSA soils can include **sabkha**, collapsible or high-salt soils. Follow the soil investigation report — and check anti-termite treatment and polythene before slab-on-grade where specified.

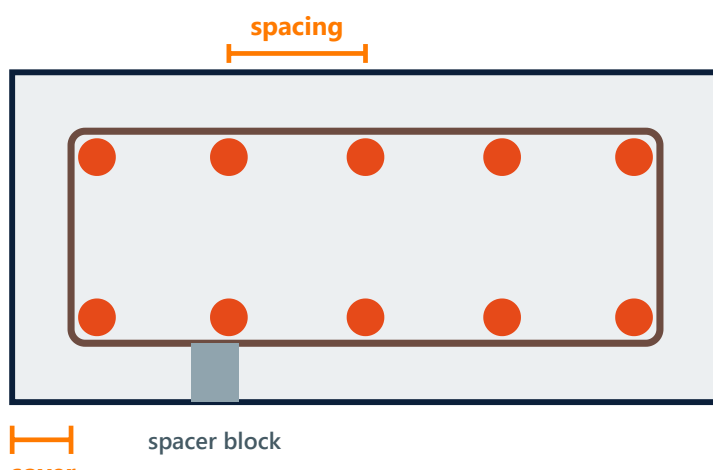
Common Mistake

- ✗ Testing only the top layer of a thick fill
- ✗ Compacting dry fill in summer heat (no moisture control)
- ✗ Backfilling before the waterproofing / pipe WIR is released
- ✗ Using excavated material as fill without lab approval



Nuclear density gauge test on a compacted fill layer, grid marked

Reinforcement: check every bar before you cover it



Check on every element:

- Bar size & count
- Spacing
- Concrete cover (spacers)
- Lap length & location
- Stirrups / links & hooks
- Clean – no rust flakes, oil, mud
- Tied & stable, chairs

Section through a beam: what the inspector checks.

Check	How	Watch out for
Bar size + grade	Tag, MTC, bar markings	Mixed diameters in one bundle
Number + spacing	Tape along the element vs IFC / BBS	Bars moved by other trades
Concrete cover	Measure from bar to formwork; spacer size	Spacers too small or missing
Laps + anchorage	Length and location vs drawing	All laps at one section (should be staggered if required)
Stirrups / links	Spacing, hooks (e.g. 135°), closure	Wide spacing near column joints
Condition	Clean: no loose rust, oil, mud, form oil	Bars contaminated by release agent
Stability	Tied, chairs strong enough to walk on	Top mesh pushed down during pour

Did you know?

Rebar in the GCC is commonly specified to **ASTM A615** (Grade 60) or **BS 4449** (B500B), with local conformity marks. Always check the mill test certificate (MTC) against the spec. **VERIFY**

Pro Tip

Cover is the **No. 1** durability defect in hot, salty Gulf environments. Check spacer size before the WIR — not during it.



Slab reinforcement with spacer blocks and chairs, tape measure showing cover

Formwork: the mould decides the shape

Before rebar

- ☐ Line, level and plumb vs setting-out
- ☐ Dimensions of the element
- ☐ Joints tight — no grout loss
- ☐ Release agent applied (before rebar!)
- ☐ Clean: no wood chips, wire, water

Before concrete

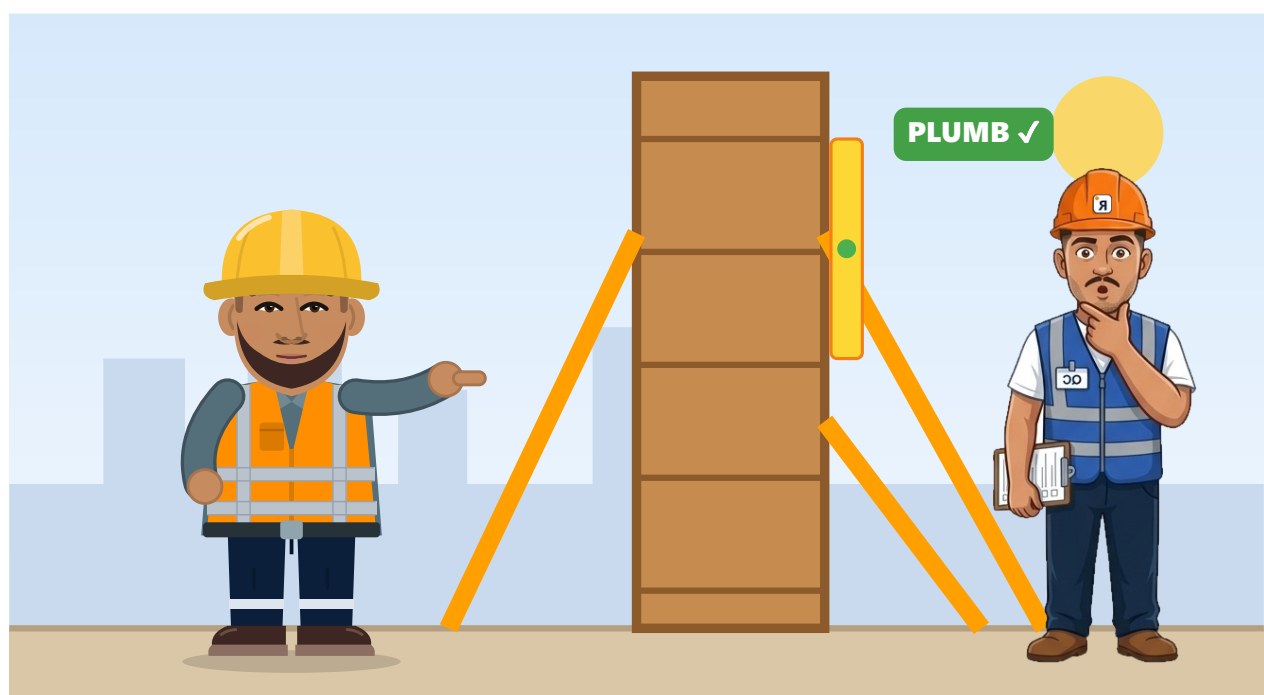
- ☐ Props, ties and bracing as per design
- ☐ Openings, sleeves, boxes fixed
- ☐ Chamfers / drip details in place
- ☐ Construction joints prepared
- ☐ Access and working platform safe

Pre-pour checklist — the big one

Item	Status
Formwork + rebar WIR approved (Hold released)	☐
MEP embedded items inspected (MEP clearance)	☐
Approved mix design + supplier confirmed	☐
Pump, vibrators (+ standby), lighting, tools ready	☐
Testing technician + moulds + slump cone on site	☐
Curing materials ready at the pour location	☐
Weather checked: heat / wind / dust plan	☐
Pour sequence and construction joints agreed	☐

⚠ Common Mistake

- ✗ Stripping formwork too early — follow the spec stripping times **VERIFY**
- ✗ Release agent sprayed after rebar is fixed
- ✗ No standby vibrator — one breaks, honeycombing follows
- ✗ Props removed from a slab still carrying the floor above



Column formwork with bracing and plumb check using a spirit level

Concrete pouring & curing



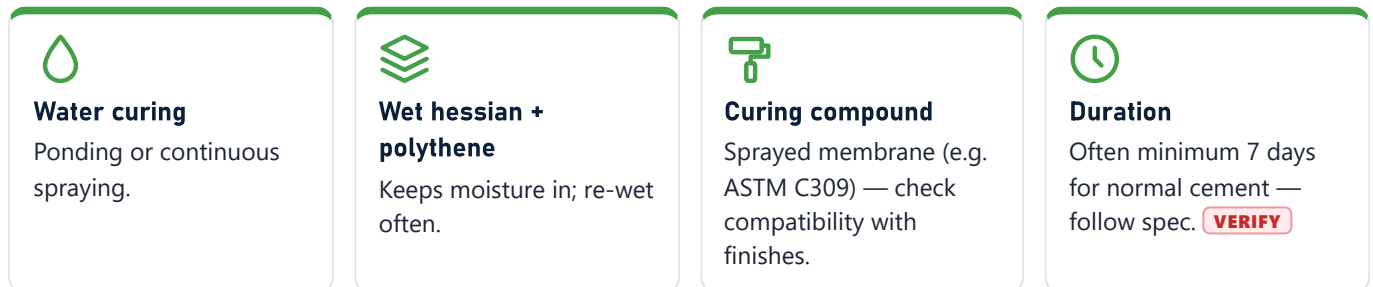
Delivery ticket — check every truck

- ☐ Mix ID = approved mix design
- ☐ Time of batching (time limit) — often 90 min. **VERIFY**
- ☐ Volume and truck number
- ☐ No water added on site unless allowed by mix design
- ☐ Admixtures as approved

Hot weather concreting (GCC summer)

- ☐ Pour at night / early morning
- ☐ Chilled water or ice in the mix
- ☐ Shade aggregates, cool the pump line
- ☐ Concrete temperature limit — often 32 °C max. at placing **VERIFY**
- ☐ Evaporation retarder + early curing

Curing methods



Site Story: The 2 pm pour

A slab poured at 2 pm in August cracked within hours: plastic shrinkage from heat and wind. The next pours were moved to 2 am with wind breaks and fogging. No more cracks. **In the Gulf, the clock is a quality tool.**



Night concrete pour with pump, lighting and curing hessian ready

3.2

CHAPTER 3.2

Concrete Tests

Slump, cubes, cylinders and temperature — the numbers that decide the pour.

💡 Concept

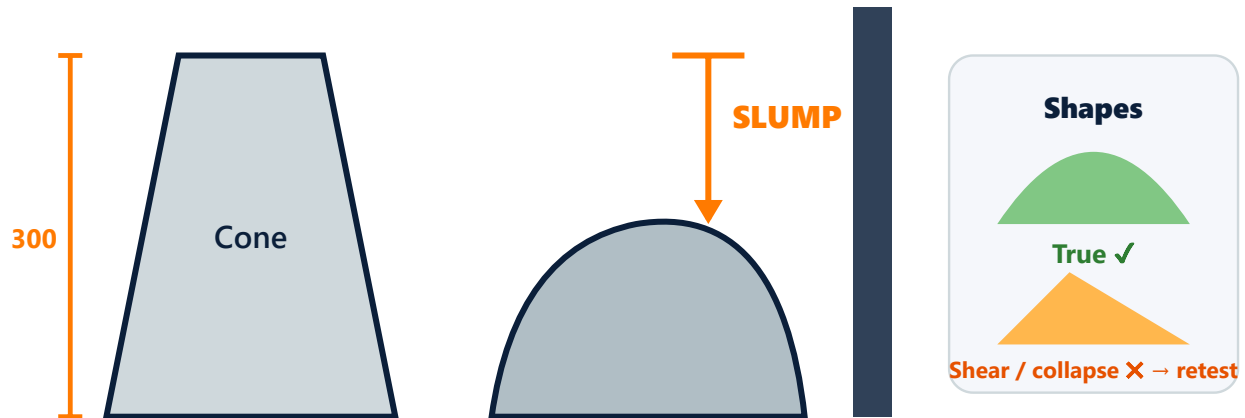
📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes

💧 Slump test: is the workability right?



1. Fill in 3 layers, 25 rods each

2. Lift cone, measure drop

Slump test steps (ASTM C143 / BS EN 12350-2). Cone height 300 mm.

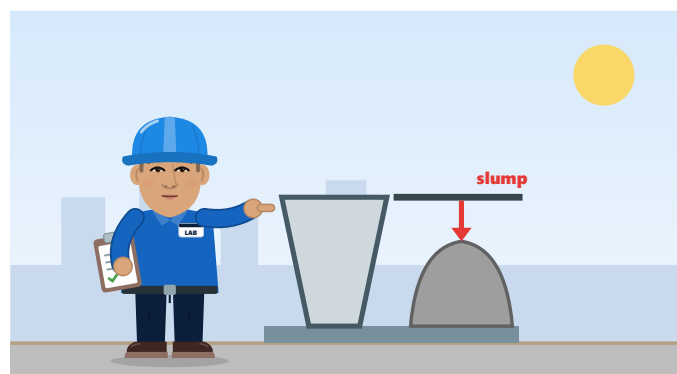
Fresh test	Purpose	Common standard
Sampling	Take a representative sample from the truck	ASTM C172 / BS EN 12350-1
Slump	Workability vs mix design range	ASTM C143 / BS EN 12350-2
Temperature	Hot-weather limit at placing	ASTM C1064
Making specimens	Cylinders / cubes for strength	ASTM C31 / BS EN 12390-2

💡 Pro Tip

Test the **first truck** of every pour, then at the frequency in your spec. If slump is out of range, stop and call the plant — don't "fix" it with water.

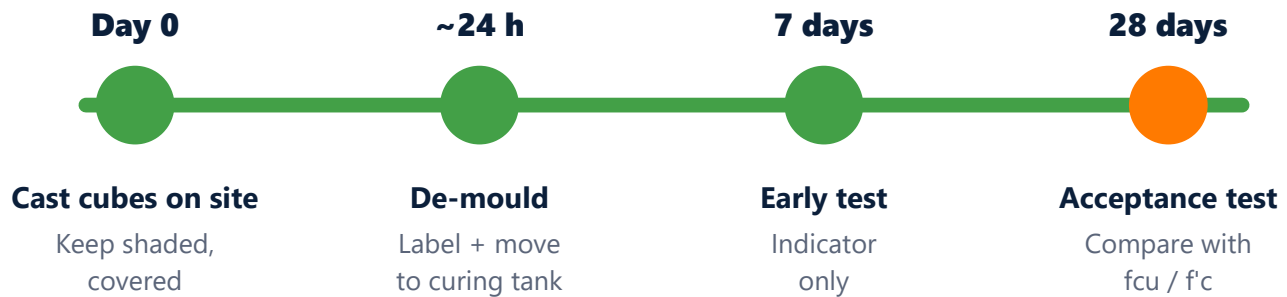
⚠️ Common Mistake

- ✗ Slump done on the ground, not a flat rigid base
- ✗ Cone lifted with a twist
- ✗ Sample taken from the first splash out of the chute
- ✗ Measuring slump of a sheared sample



Technician measuring slump next to the inverted cone

Cubes & cylinders: proving strength



Typical life of a strength specimen.

	Cylinders (ASTM)	Cubes (BS EN)
Size	150 × 300 mm (or 100 × 200 mm)	150 mm cube (100 mm sometimes)
Make / cure	ASTM C31	BS EN 12390-2
Test	ASTM C39	BS EN 12390-3
Strength class example	$f'_c = 30$ MPa	C30/37 → 30 cylinder / 37 cube
Typical ages	7 and 28 days	7 and 28 days

Acceptance — example: ACI 318 (when $f'_c \leq 35$ MPa)

- Average of any 3 consecutive tests $\geq f'_c$
- No single test result below $f'_c - 3.5$ MPa
- A "test" = average of 2 cylinders 150×300 (or 3 of 100×200) at 28 days

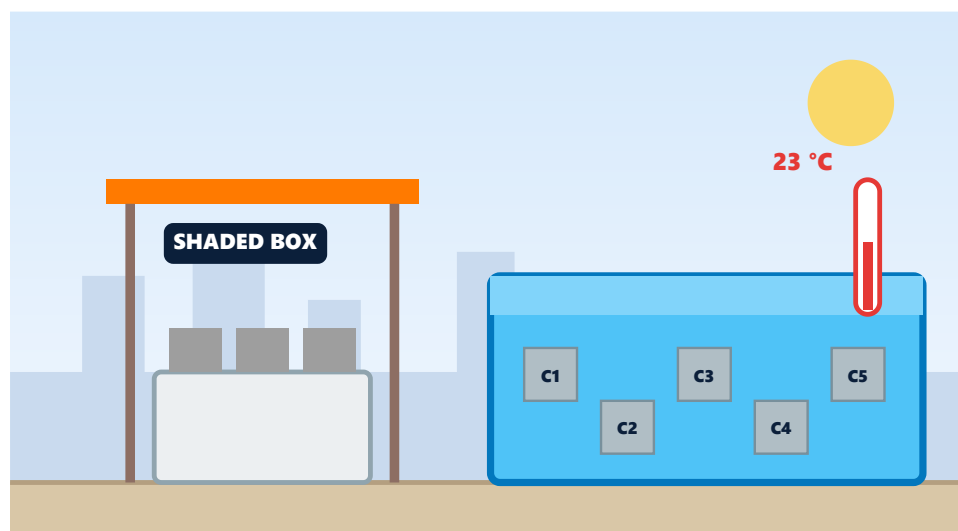
BS EN 206 uses different conformity rules. Always use the criteria in your specification. **VERIFY**

Did you know?

If results fail, the next steps are usually: check sampling/lab records → non-destructive tests (rebound hammer, UPV) → cores (ASTM C42). Under ACI 318, cores are typically accepted if average $\geq 85\%$ f'_c and no single core $< 75\%$ f'_c .

SA GCC / KSA Note

Sampling frequency is set by the spec (ACI 318 gives a minimum per day / per volume / per area). Many GCC specs ask for more — check yours. **VERIFY**

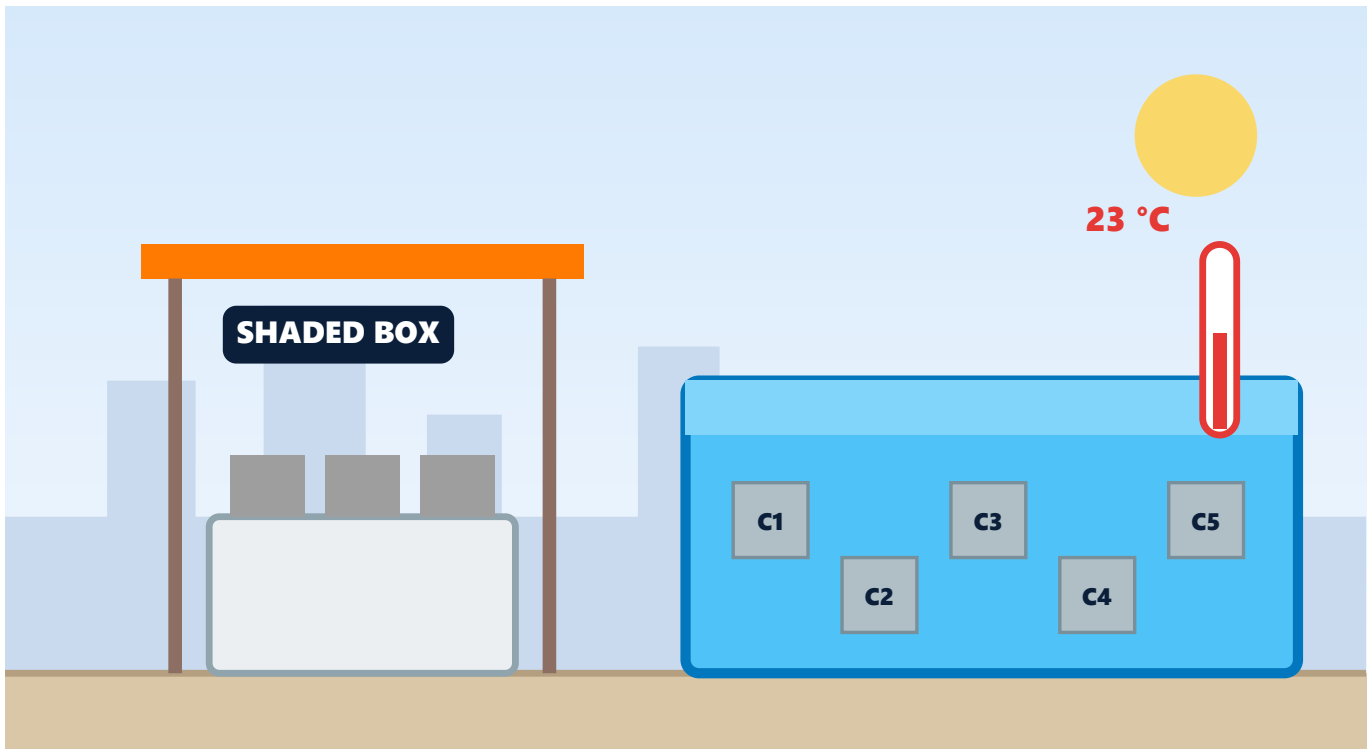


Labelled cubes in a curing tank with temperature log

Site example

Site Story: The sunburnt cubes

Three cubes from a column pour failed at 28 days. Before panic, the QA/QC engineer checked records: the cubes had been left in the sun on site for two days before transfer to the lab. Cores were taken and passed. The fix: a shaded, covered cube storage box and next-day pickup by the lab. **Bad specimens give bad results — even on good concrete.**



Shaded cube storage box on site with labelled moulds

✓ Checklist: concrete testing

- ☐ Mix design approved and on site
- ☐ Delivery tickets checked for every truck
- ☐ Slump + temperature at the agreed frequency
- ☐ Specimens labelled: date, element, truck, ID
- ☐ Specimens protected for the first 24 h
- ☐ Lab pickup arranged, chain of custody signed
- ☐ Results tracked against f'c in a register

⚠ Common Mistake

- ✗ Moulds not cleaned / oiled — damaged specimens
- ✗ No ID on the specimen (cannot trace the element)
- ✗ Ignoring 7-day results until it is too late
- ✗ Adding water to pass the slump test
- ✗ Missing the element location in the sampling record



Trace every specimen back to **one element, one truck, one time**. When results fail, traceability is your best friend.

3.3

CHAPTER 3.3

Steel Structure & Welding

Bolts, welds, tolerances and NDT — get the connections right.

🔍 Concept

📐 Visual

🏗️ Site example

✅ Checklist

⚠️ Mistakes

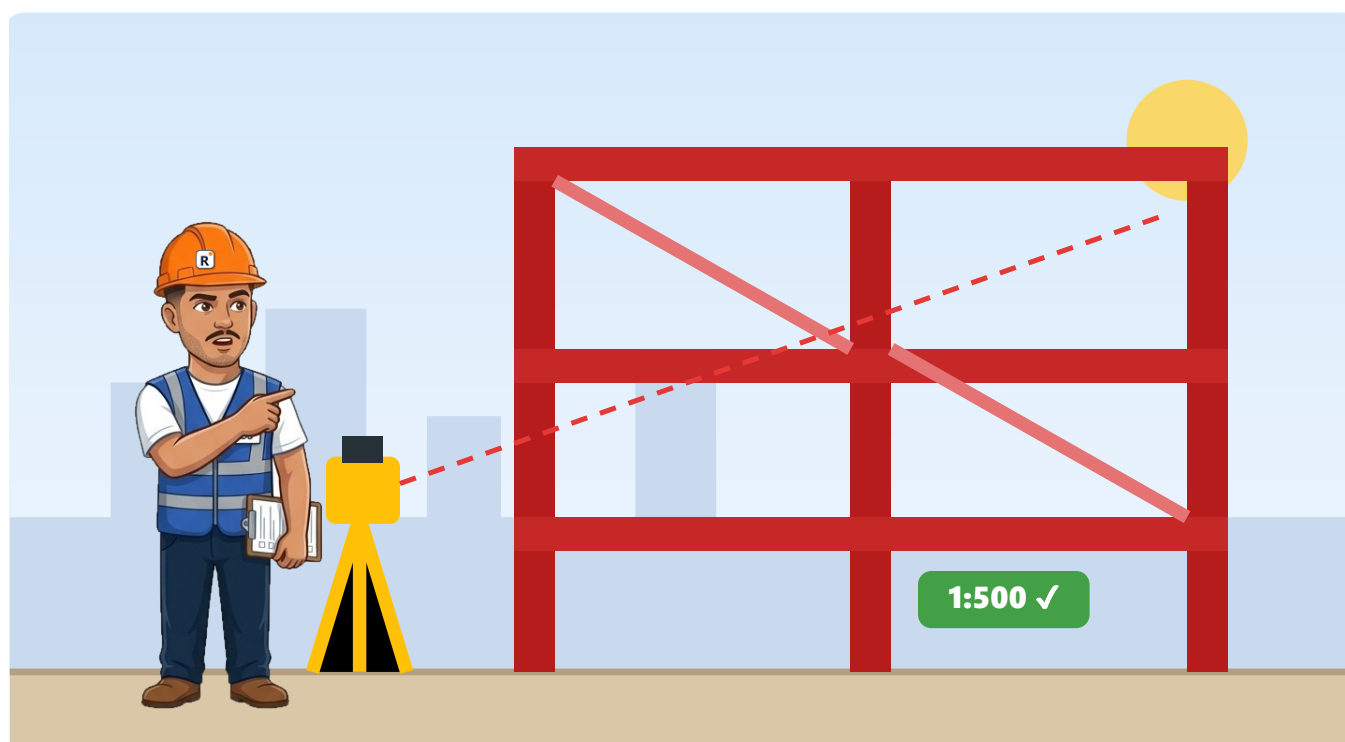
📋 Steel structure inspection



Check	What to look for
Incoming steel	Section size, grade marks, MTC heat numbers match material
Fabricated members	Length, camber, holes, cleats vs approved shop drawing; piece marks
Anchor bolts	Survey position + projection before erection
Erection	Columns plumb (AISC 303 commonly 1:500), alignment, levels VERIFY
High-strength bolts	Grade (e.g. ASTM F3125), washers, method: snug-tight / pretensioned (turn-of-nut, DTI)
Grouting	Approved non-shrink grout under base plates after final alignment
Coating	Surface profile, DFT per coat, touch-up after erection

💡 Pro Tip

Before the first erection day, hold a short **kick-off** with the steel subcontractor: bolt tightening method, inspection points and who signs what.



Erected steel frame with inspector checking column plumb with a total station

⚡ Welding: procedure, people, proof



WPS

Welding Procedure Specification — the recipe: process, material, position, settings.



PQR

Procedure Qualification Record — test proof that the WPS works.



WPQ / WQT

Welder Performance Qualification — proof that **this welder** can weld to that procedure.

Common codes: AWS D1.1 (structural steel), ASME IX (pressure piping), ISO 15614-1 / ISO 9606-1. Use the code named in your spec.

🔍 NDT methods at a glance

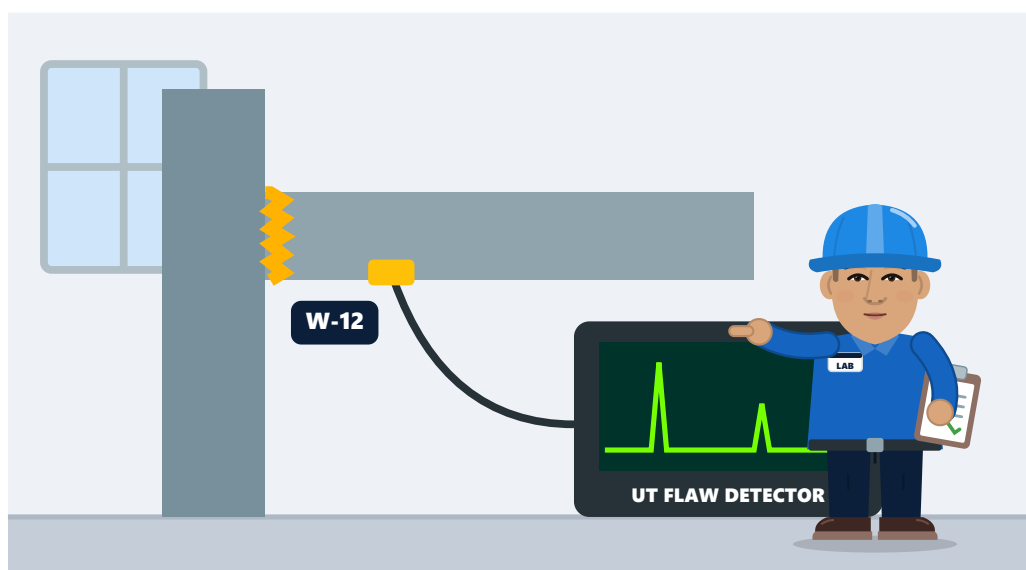
Method	Finds	Good for	Limits
VT – Visual	Surface defects, size, profile	100% of welds — always first	Only what you can see
PT – Dye penetrant	Surface-breaking cracks	Any non-porous metal	Surface only, clean surface needed
MT – Magnetic particle	Surface + near-surface cracks	Ferromagnetic steel, fillet welds	Not for stainless / aluminium
UT – Ultrasonic	Internal defects, lack of fusion	Thick full-penetration welds	Needs skilled Level II operator
RT – Radiography	Internal porosity, slag, voids	Butt welds, pipes	Radiation safety, site exclusion zones

🔍 Did you know?

NDT technicians are normally certified to **ASNT SNT-TC-1A** or **ISO 9712**, usually Level II to interpret results. The extent of NDT (e.g. % of welds) is set by the spec. **VERIFY**

⚠️ Common Mistake

- ✗ Welder not on the approved welder list
- ✗ Welding outside the WPS range (position, thickness)
- ✗ No pre-heat when the WPS requires it
- ✗ NDT done before the required waiting time after welding **VERIFY**
- ✗ Paint applied before weld inspection



Ultrasonic testing of a full-penetration beam-to-column weld by a Level II technician

⚠ Common weld defects



Cracks

Never acceptable — reject and investigate.



Porosity

Gas pockets — check shielding, moisture.



Undercut

Groove at the weld toe — limit set by code.



Lack of fusion

Weld not bonded to base metal.



Incomplete penetration

Root not fully fused.

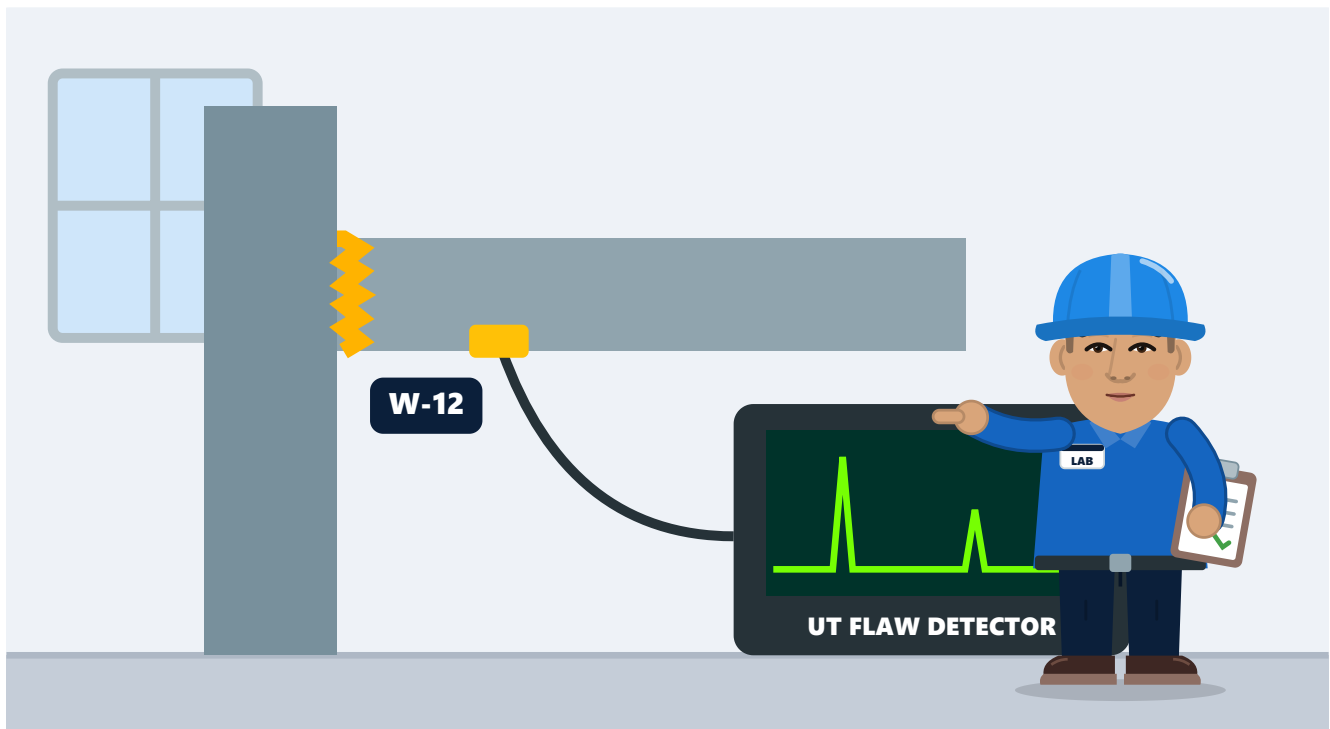


Slag inclusion

Trapped slag between passes.

🔗 Site Story: Wrong position

A welder qualified in flat position was found welding overhead on a transfer girder. UT found lack of fusion in several joints. All were gouged and re-welded by a welder qualified for that position. **Check the welder's card against the joint — every time.**



Weld visual inspection with fillet gauge and welder ID marking

✅ Checklist: welding

- ☐ Approved WPS on site, near the work
- ☐ Welder ID card valid + matches WPS range
- ☐ Consumables stored dry (electrode oven if required)
- ☐ Pre-heat / interpass temperatures checked
- ☐ Visual inspection by qualified inspector (e.g. CWI)
- ☐ NDT by certified technicians, reports filed
- ☐ Weld map with joint IDs + results

✅ Checklist: steel erection

- ☐ MTCs match heat numbers
- ☐ Shop drawings approved before fabrication
- ☐ Anchor bolt survey approved
- ☐ Bolt tightening verified (method + record)
- ☐ Plumb / level survey after erection
- ☐ Grouting after final alignment
- ☐ Coating DFT and touch-up records

3.4

CHAPTER 3.4

Waterproofing & Insulation

Water always finds the mistake. Your job: leave none.

 Concept

 Visual

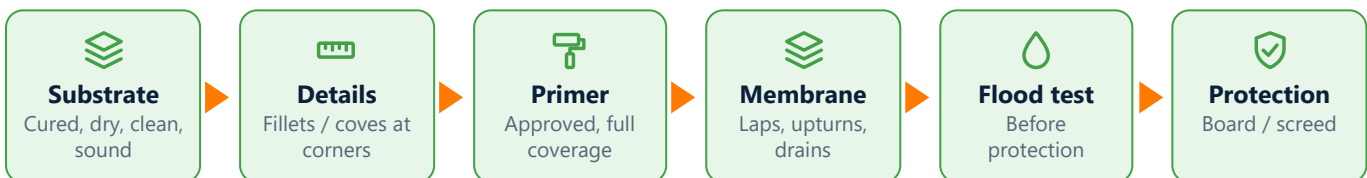
 Site example

 Checklist

 Mistakes

 Common systems

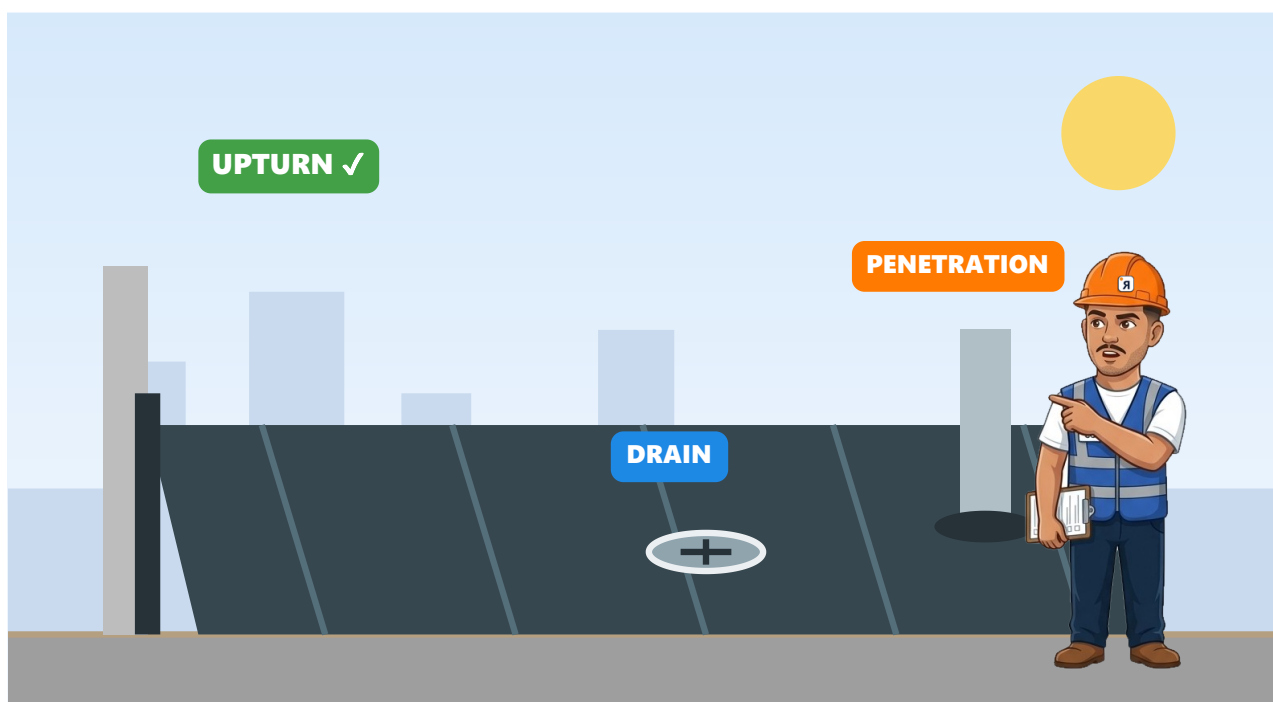
System	Typical use	Key inspection
Bituminous membrane (torch-on)	Roofs, basements, podiums	Laps, torching, upturns, detailing
Liquid-applied (PU, cementitious)	Wet areas, complex roofs, balconies	Thickness (WFT/DFT), coats, curing
Single-ply (PVC / TPO)	Large roofs	Seam welds (probe test), fixings
Bentonite / crystalline	Below-ground structures	Coverage, protection, joints
Water stops	Construction joints in tanks / basements	Continuity, joints welded, position

 Inspection stages

 Pro Tip

Most leaks happen at **details**: drains, pipe penetrations, upturns, door thresholds and expansion joints. Inspect them one by one and photograph each.

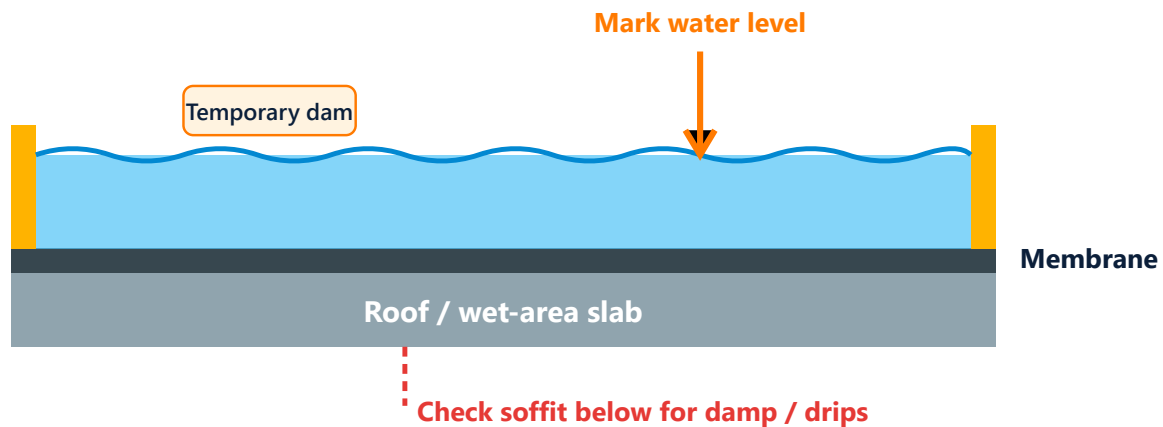
 Did you know?

Lap widths and upturn heights are set by the manufacturer and spec — many specs ask for upturns of at least 150 mm above finished level.

VERIFY


Roof membrane detail around a drain outlet and pipe penetration

The flood test



Flood test of a roof or wet area before protection is applied.

1. Plug drains and build temporary dams at openings
2. Flood to the depth in your spec (often min. ~50 mm at the highest point) **VERIFY**
3. Mark the water level, record time + date, photograph
4. Hold for the specified duration (commonly 24–48 h) **VERIFY**
5. Inspect the soffit and walls below for damp or drips
6. Record the result on the test form, Consultant to witness
7. Drain carefully and protect the membrane immediately

Thermal insulation

- | | |
|---|---|
| ☐ Approved material, thickness and density (MAR) | ☐ Pipe / duct insulation: thickness, vapour seal, cladding |
| ☐ Boards tight, joints staggered, no gaps | ☐ No compressed or wet insulation |
| ☐ Correct side of vapour barrier | ☐ Fire-rating where required |
| ☐ Protected from UV / damage until covered | ☐ Energy code values (e.g. SBC 601 / 602) met |
| | VERIFY |

Common Mistake

- ✗ Flood test after the screed or tiles are laid
- ✗ Skipping the test on small wet areas
- ✗ Walking on unprotected membrane with steel tools
- ✗ Insulation boards left in the sun for weeks
- ✗ Puncturing membrane when fixing items later

3.5

CHAPTER 3.5

MEP Testing & Commissioning

Pressure tests, cable tests and bringing systems to life.

🔗 Concept

📊 Visual

🏠 Site example

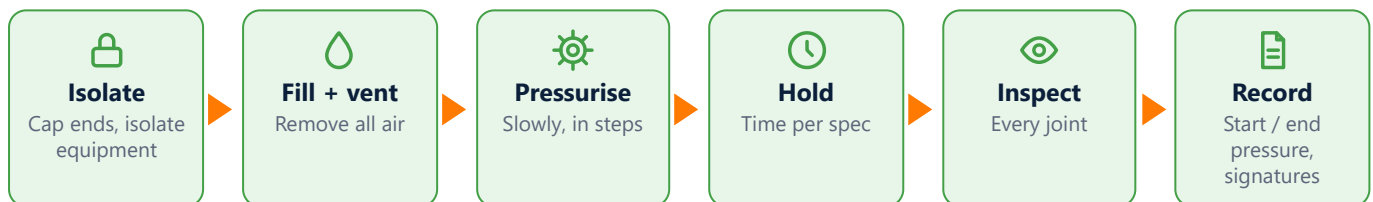
✅ Checklist

⚠️ Mistakes

🔗 Pipe pressure testing



Test pressure held for the specified time – no drop, no leaks

Hydrostatic test set-up.

System	Typical test (check spec!)
Water supply (plumbing)	Often 1.5 × working pressure, held for a set time VERIFY
Fire sprinklers (NFPA 13)	Typically 200 psi (13.8 bar) for 2 h, or 50 psi above max. pressure VERIFY
Drainage (gravity)	Water or air test per spec / plumbing code VERIFY
Chilled water / HVAC piping	Per spec, before insulation VERIFY
Gas / compressed air	Pneumatic test with strict safety controls VERIFY

⚠️ Common Mistake

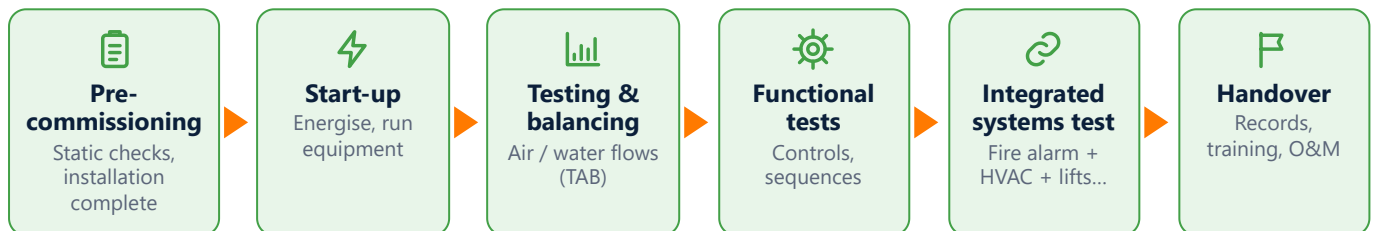
- ✗ Testing with an uncalibrated gauge
- ✗ Testing after the ceiling is closed
- ✗ Equipment not isolated — damaged valves or meters
- ✗ Pneumatic test without exclusion zone / permit

⚡ Cable testing (LV)

Test	Purpose	Note
Continuity of protective conductors	Earth path is complete	Before energising
Insulation resistance (megger)	No leakage between conductors / earth	Test voltage and minimum MΩ per IEC 60364-6 / BS 7671 VERIFY
Polarity	Switches and devices on the right conductor	Before energising
Earth fault loop impedance	Protective device will trip in time	Energised test
RCD test	Trips within required time	Energised test
Earth electrode resistance	Earthing system value	Value per spec VERIFY

MV/HV cables need specialist tests (e.g. VLF / withstand) by qualified testers. Follow the electrical safety rules and permit-to-work.

⚙️ Commissioning basics

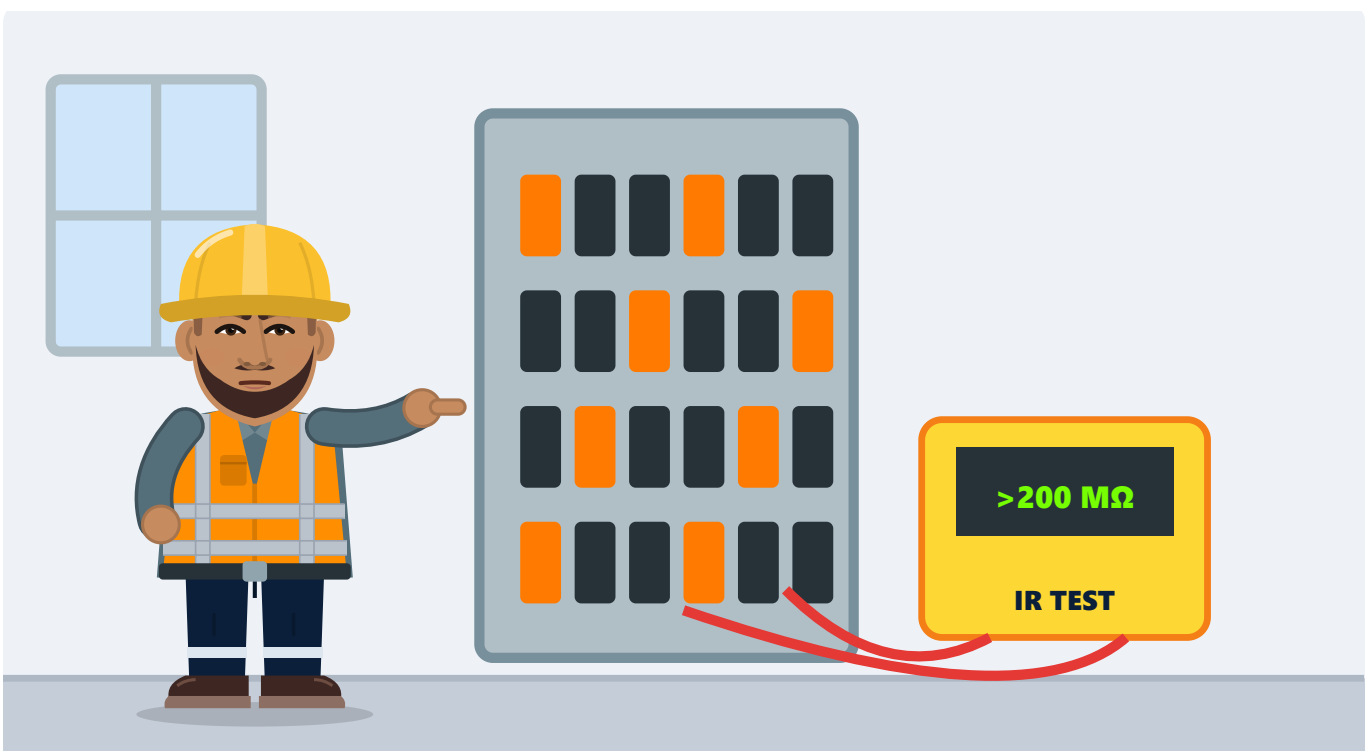


🔍 Did you know?

Large projects often appoint an independent **Commissioning Authority (CxA)** to plan and witness commissioning for the client.

💡 Pro Tip

Start the commissioning plan early. Most delays come from missing permanent power, incomplete BMS points and late authority inspections.

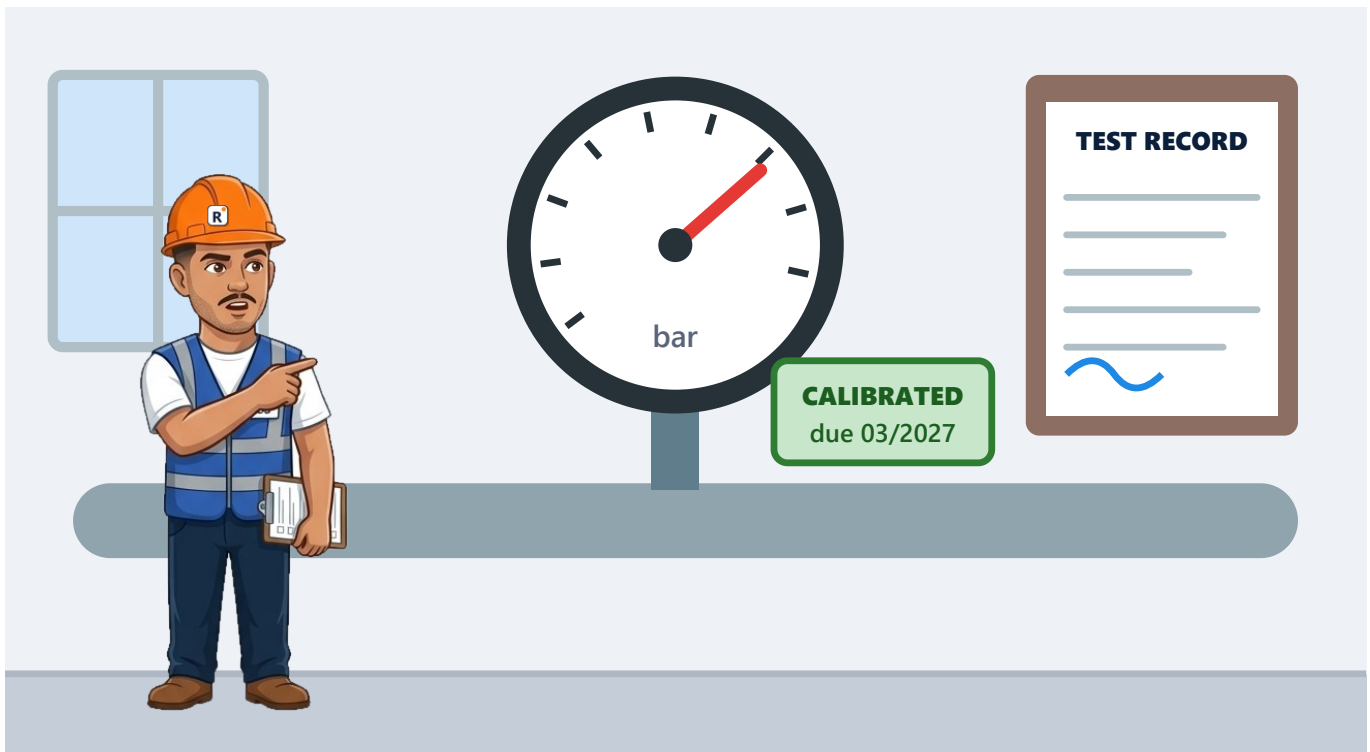


Electrician performing an insulation resistance test on a distribution board

Site example

Site Story: The forgotten valves

A chilled water riser passed its pressure test, but nobody isolated the control valves before raising pressure. Two valve actuators were damaged and replaced. Now the test method statement includes a **valve and equipment isolation list** signed before every test.



Pressure test record board with gauge reading and signatures

Checklist: MEP testing

- ☐ Approved test procedure and test pack
- ☐ Calibrated gauge / meter + certificate
- ☐ Isolation list signed
- ☐ Test limits and duration written on the form
- ☐ Consultant witness booked (WIR)
- ☐ Readings + photos at start and end
- ☐ Lines tagged "TESTED" before closing ceilings

Common Mistake

- ☒ Testing whole floors at once — hard to find leaks
- ☒ No MEP clearance before closing ceilings / shafts
- ☒ Commissioning without approved O&M data
- ☒ Changing set points without record
- ☒ Mixing up as-built and design schedules



For MEP, **test before you close** is the rule. Ceilings, shafts and walls are the concrete of MEP!

3.6

CHAPTER 3.6

Finishes

Blockwork, plaster, tiling and painting — what the client actually sees.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

Blockwork

Before

- ☐ Approved blocks (MAR + MIR), strength test results
- ☐ Setting out of walls + door openings
- ☐ Starter bars / wall ties to columns
- ☐ Mortar mix approved

During

- ☐ Joints full and even (thickness per spec) **VERIFY**
- ☐ Plumb, line and level every few courses
- ☐ Bonding pattern, no straight vertical joints
- ☐ Bed-joint reinforcement as specified
- ☐ Max. height per day per spec **VERIFY**

After

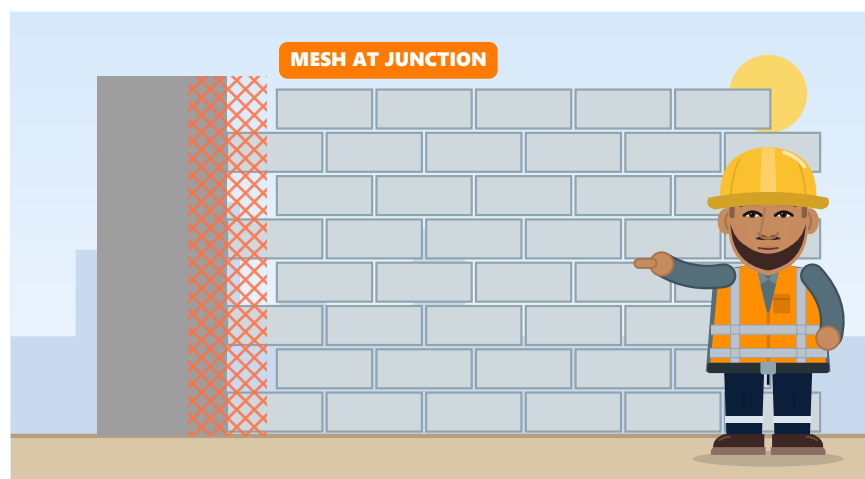
- ☐ Lintels with correct bearing **VERIFY**
- ☐ Gap under slab + fire / acoustic sealing as detailed
- ☐ Movement joints where shown
- ☐ Curing of mortar in hot weather
- ☐ MEP chases cut neatly (not hammered)

Common Mistake

- ✗ Dry blocks laid in summer heat — mortar dries before it bonds
- ✗ Wall built tight to the slab with no deflection gap
- ✗ Mixing approved and unapproved block batches

Plaster

Check	Detail
Background	Clean, wet, spatterdash / bonding coat if specified
Mesh	At block–concrete junctions and over chases
Beads	Corner and stop beads straight and plumb
Thickness + coats	As spec VERIFY
Flatness	Straightedge check, tolerance per spec VERIFY
Defects	Tap test for hollowness, cracks, curing



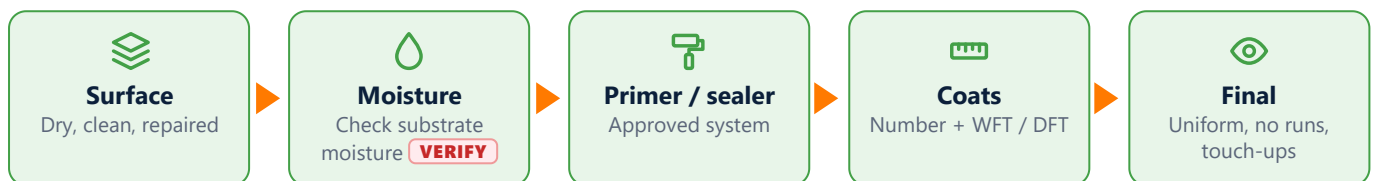
Blockwork wall with mesh at the column junction ready for plaster

Tiling

- ☐ Tile = approved MAR + mock-up (same batch/shade)
- ☐ Substrate level, cured and clean
- ☐ Approved adhesive (e.g. EN 12004 class) and trowel
- ☐ Adhesive coverage — lift a tile to check [VERIFY %]
- ☐ Joint width uniform, spacers used
- ☐ Lippage and flatness within spec **VERIFY**
- ☐ Falls to drains in wet areas
- ☐ Movement joints at perimeter and set spacing
- ☐ Tap test: no hollow tiles
- ☐ Protection after laying

A common reference for tiling workmanship is BS 5385. Use your project spec first.

Painting

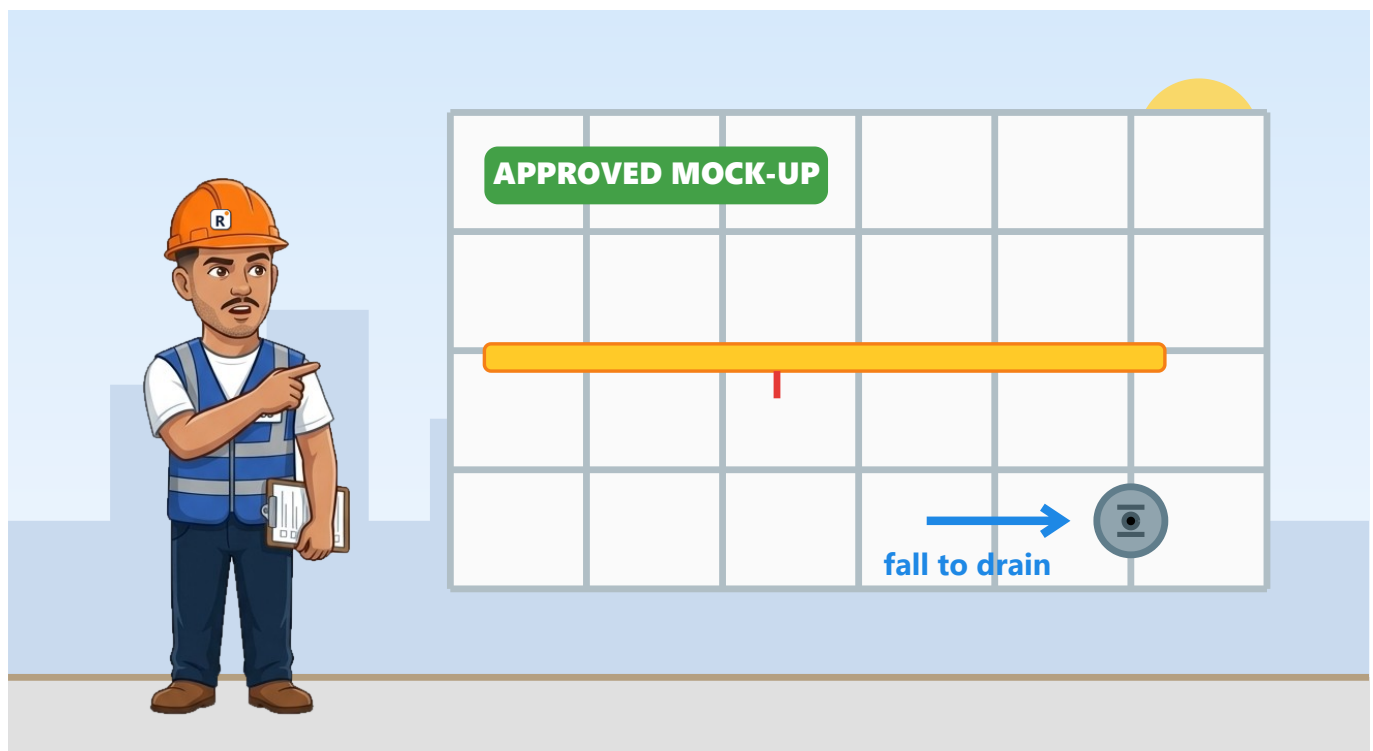


Pro Tip

For steel coatings, check air temperature, humidity and surface temperature — a common rule is surface at least **3 °C above dew point**. Measure WFT with a comb while wet, DFT with a gauge when dry.

Common Mistake

- ✗ Painting fresh plaster that is still wet
- ✗ Skipping primer “to save time”
- ✗ Final coat before MEP and joinery are finished
- ✗ Inspecting finishes under poor light only

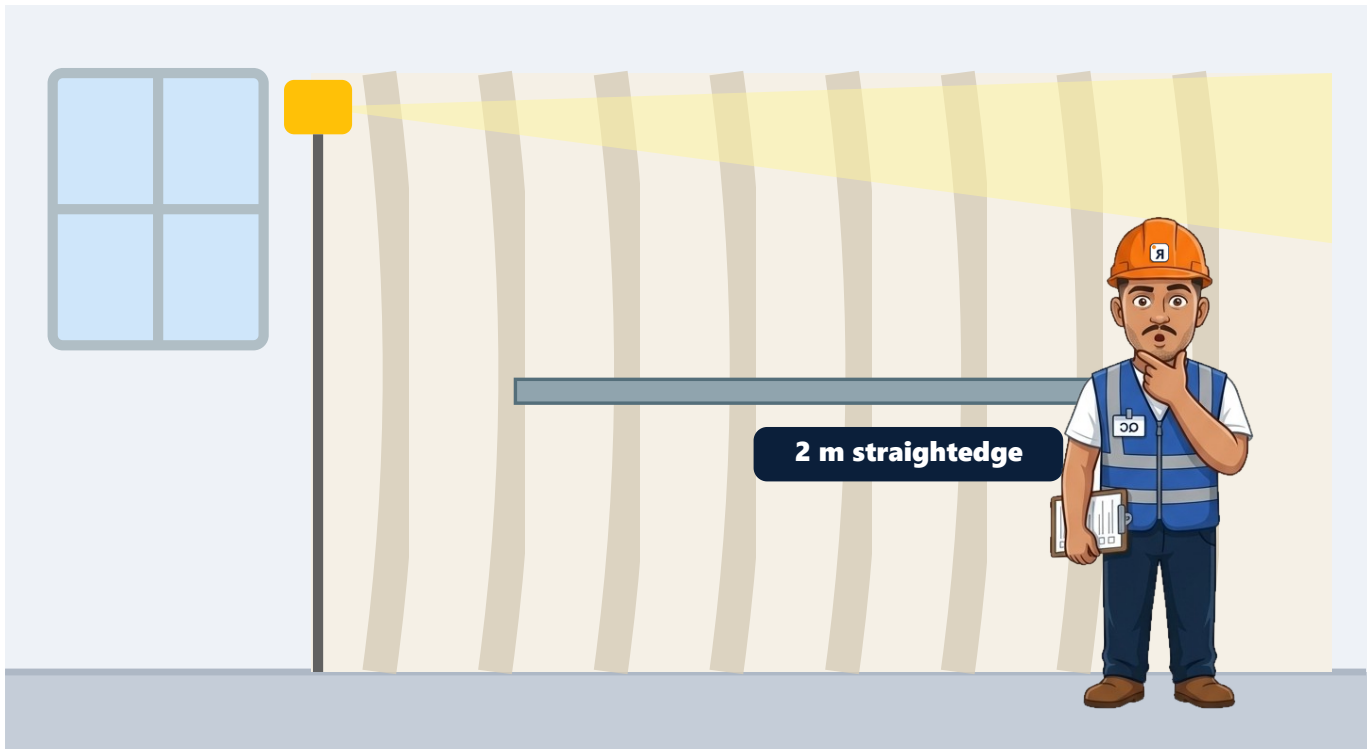


Tile lippage check with a straightedge and wet-area falls to the drain

Site example

Site Story: The morning sun test

Finished apartments failed the client walk-through: under morning sun, plaster waves were visible on long corridor walls. The plaster had been checked with a short level only. The team re-skimmed 40 walls. Now every wall is checked with a 2 m straightedge and a **raking light** before painting.



Raking light test on a plastered wall showing surface waves

✓ Checklist: finishes

- ☐ Mock-up approved for every finish type
- ☐ Substrate inspected and accepted before next trade
- ☐ MEP clearance before plaster and ceilings
- ☐ Tolerances measured, not guessed
- ☐ Raking-light check before final paint
- ☐ Finished areas protected and locked
- ☐ Snag as you go — room by room

⚠ Common Mistake

- ✗ Treating finishes as “easy” work
- ✗ No protection — damage by other trades
- ✗ Different shades from different batches
- ✗ Repairs that look worse than the defect
- ✗ Leaving finish QC to the snag list

🔍 Did you know?

Clients judge the **whole building** by its finishes. A perfect structure with poor finishes still feels like a poor building.

3.7

CHAPTER 3.7

Material Sampling & Lab Testing

Representative samples, accredited labs, traceable results.

🔍 Concept

📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes

**Plan**Test +
frequency
from spec**Sample**Random,
representative**Label**ID, date,
location**Witness**Consultant if
required**Transport**Chain of
custody**Test**Accredited
lab**Review**

vs criteria

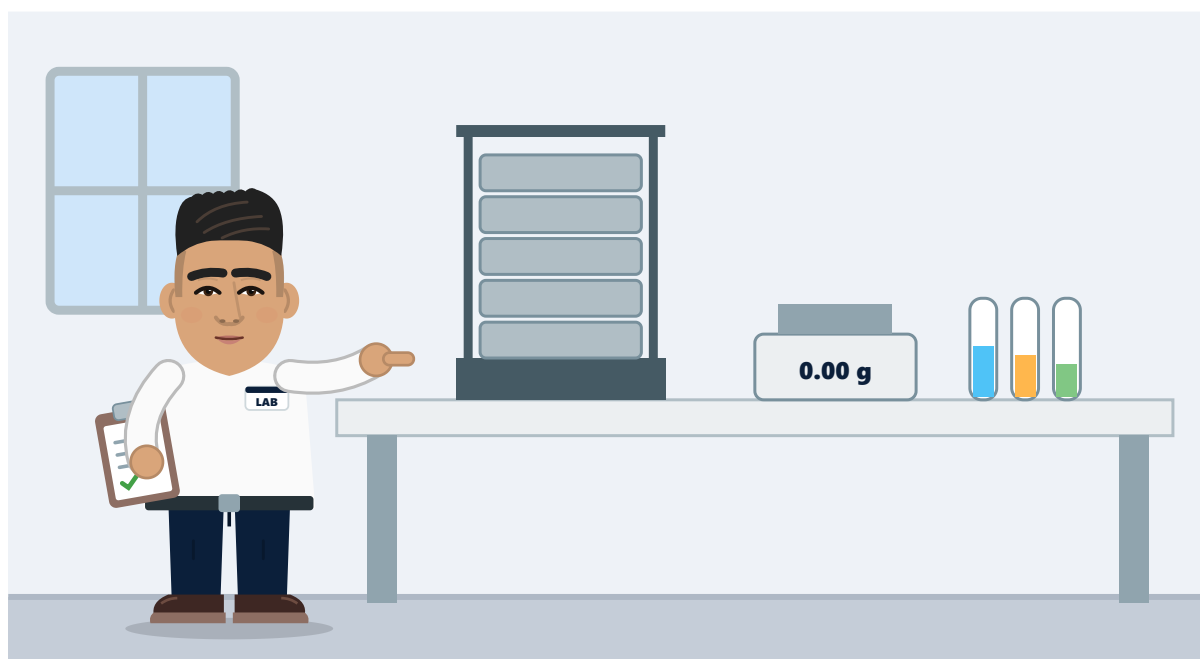
Material	Common tests	Example standards
Aggregates	Grading, fines, chlorides + sulphates, absorption	ASTM C136, ASTM C117, BS EN 1744-1
Mixing water	Chlorides, sulphates, pH, solids	ASTM C1602
Rebar	Tensile, bend, mass per metre	ASTM A370 / A615, BS 4449
Concrete blocks	Compressive strength, absorption, dimensions	ASTM C140 / C90
Soil / fill	Proctor, field density, CBR, classification	ASTM D1557, D1556, D1883
Asphalt	Density, binder content, Marshall	ASTM D6926 / D6927 VERIFY
Welds	VT, PT, MT, UT, RT	AWS D1.1 / ASME IX

SA GCC / KSA Note

Gulf aggregates and water can carry high **chlorides and sulphates** — a major cause of rebar corrosion and concrete attack. These tests matter more here than in many other regions.

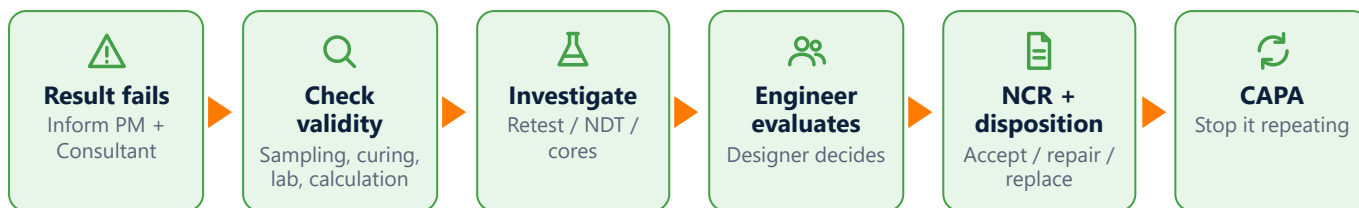
**Pro Tip**

Keep a **test register**: sample ID → element → date → lab → result → pass/fail. When a result fails, you can trace and act within minutes.

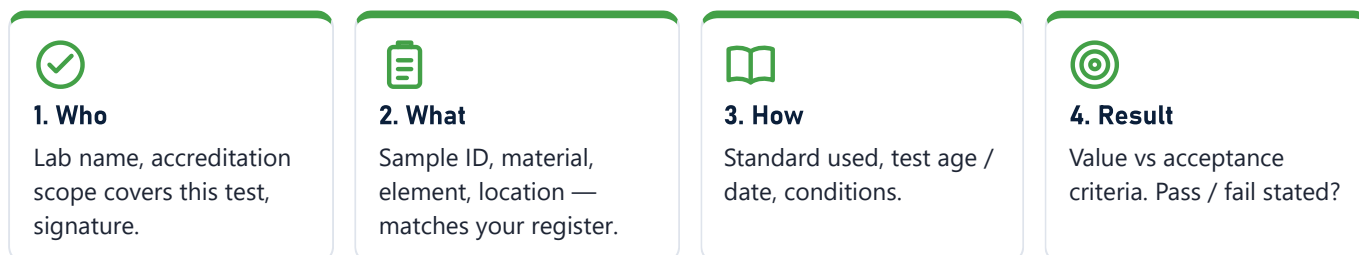


Lab technician testing aggregate grading with a sieve shaker

⚠ When a test fails



🕒 How to read a lab report in 60 seconds



✅ Checklist: sampling & testing

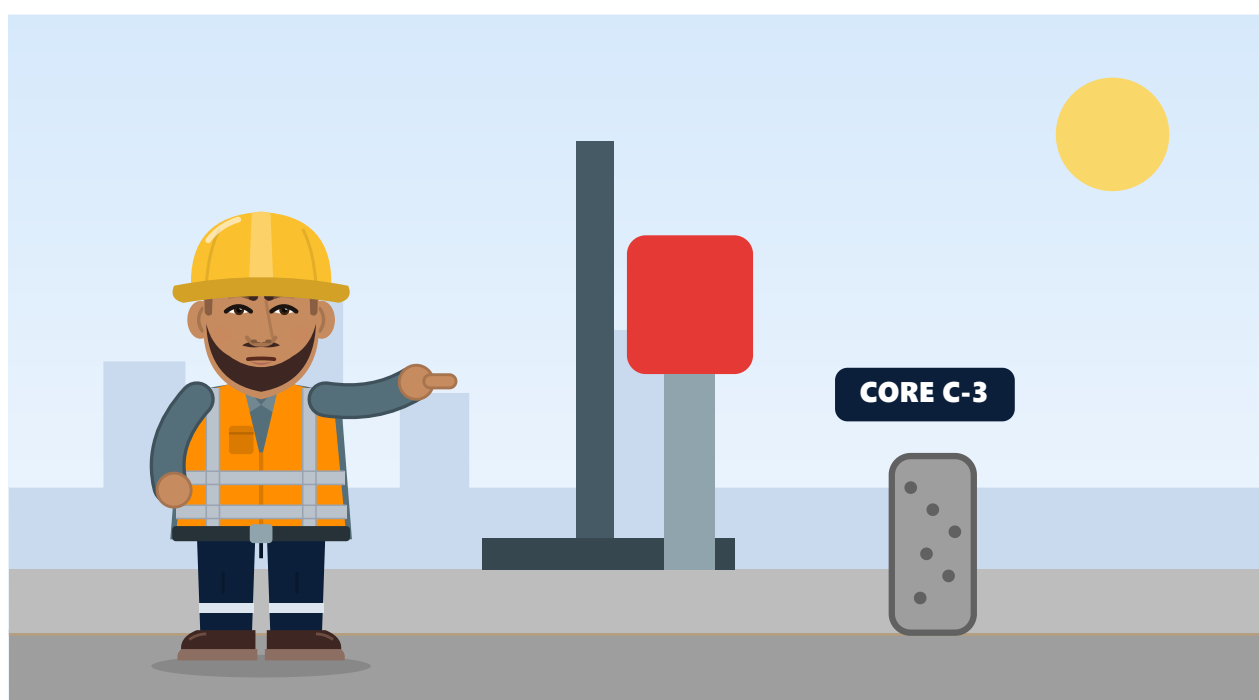
- ☐ Sampling plan approved
- ☐ Lab pre-qualified + accredited for each test
- ☐ Samples witnessed where required
- ☐ Chain-of-custody form signed
- ☐ Results reviewed within 24 h of receipt
- ☐ Failures escalated the same day
- ☐ Register updated + filed

⚠ Common Mistake

- ✗ Sampling only the “best” looking material
- ✗ Sending samples with no ID
- ✗ Using a lab not accredited for that test
- ✗ Filing reports without reading the result
- ✗ Retesting until it passes — without investigation



A test report you don't read is just expensive paper. **Read every result. Compare every number.**



Concrete core being extracted for strength investigation

 Level 3 Quiz

Site level! These are the questions inspectors get asked in interviews.

Q1**Field density of compacted fill is commonly tested by...**

- ☐ A Slump cone
- ☐ B Sand cone or nuclear gauge
- ☐ C Rebound hammer
- ☐ D Megger

Q2**The concrete class C30/37 means...**

- ☐ A 30 MPa cube, 37 MPa cylinder
- ☐ B 30 MPa cylinder, 37 MPa cube
- ☐ C 30 days curing, 37 °C max.
- ☐ D 30 mm cover, 37 mm laps

Q3**Which NDT method is NOT suitable for stainless steel or aluminium?**

- ☐ A Visual testing (VT)
- ☐ B Dye penetrant (PT)
- ☐ C Magnetic particle (MT)
- ☐ D Ultrasonic (UT)

Q4**When should a roof flood test be done?**

- ☐ A After tiles are laid
- ☐ B Before the protection layer / screed
- ☐ C During the DNP
- ☐ D Only if it rains

Q5**What is the first step when a lab result fails?**

- ☐ A Demolish the element
- ☐ B Retest until it passes
- ☐ C Inform and check the validity of sampling and testing
- ☐ D Ignore if 7-day result



Level Up! Site Practice unlocked

Great work. Here is what you can now do on site:

☆ Inspect earthworks, rebar and formwork

☆ Run fresh concrete tests

☆ Check welds and choose NDT

☆ Witness a flood test

☆ Supervise pressure and cable tests

☆ Inspect finishes and lab results

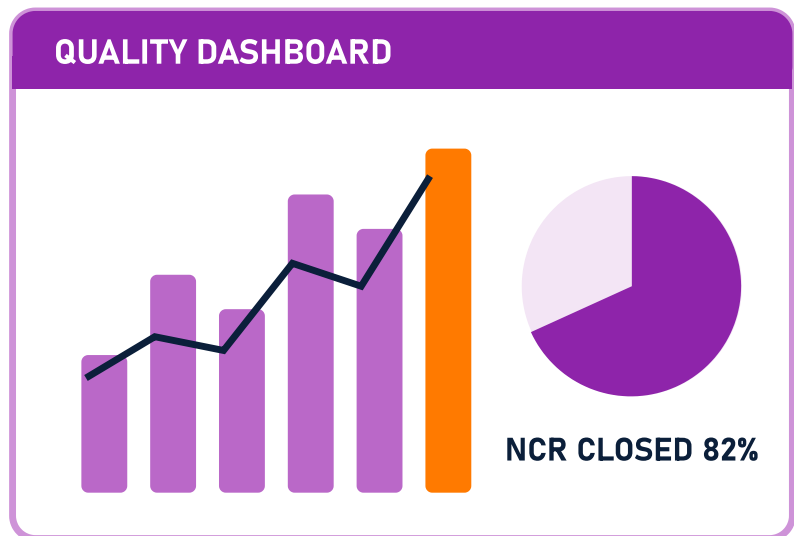


Next up: **Level 4 – Management**. Time to think like a QA/QC Engineer who runs the system.

Your challenge: before moving on, do the 5-question quiz and check your answers at the back. Score 4/5 or more? You are ready for the next level. 🚀

Management

Run the quality system: root causes, vendors, documents, safety and standards.



At Level 4 you stop just finding problems. You start **building systems** so problems don't happen.

WHAT YOU WILL MASTER

✓ NCR handling like a manager

✓ Root cause: 5 Whys and Fishbone

✓ CAPA that actually works

✓ Subcontractor and supplier control

✓ Document control and traceability

✓ ISO 9001, ASTM, BS EN and SBC

4.1

CHAPTER 4.1

NCR Handling & Root Cause

From “fix it” to “make sure it never happens again”.

🔍 Concept

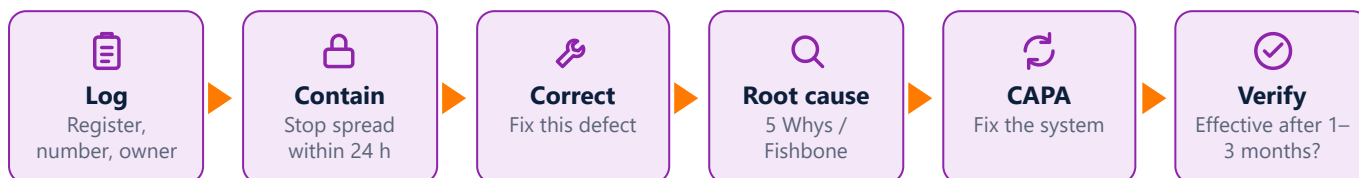
📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes

🎯 The manager's view of an NCR



Term	Meaning	Example
Correction	Fix the defect itself	Re-fix the misplaced bars
Corrective action	Remove the cause so it does not repeat	Add spacer check to checklist + supplier change
Preventive action	Stop a potential problem elsewhere	Brief all rebar gangs on all towers
Effectiveness check	Prove the action worked	No cover NCRs in next 3 months

Track every NCR by

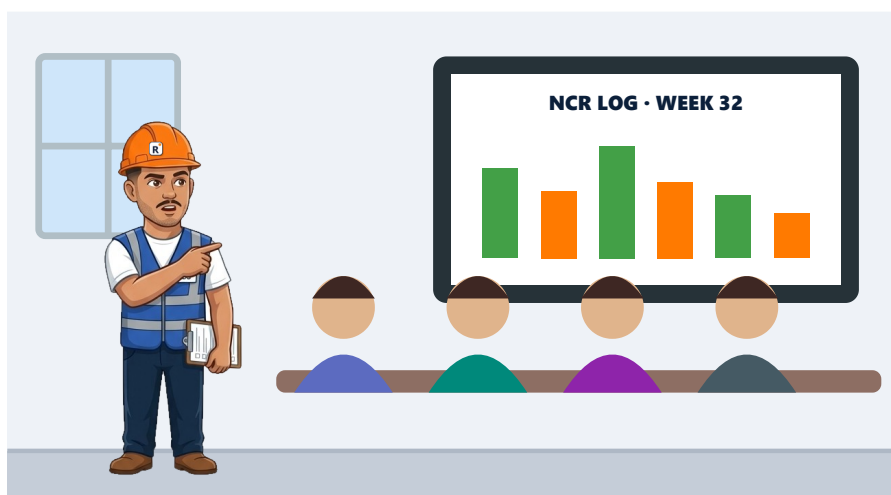
- Trade / subcontractor
- Root-cause category (6M)
- Age (days open)
- Cost of rework
- Repeat or new

Manager rules

- Each NCR has **one owner** and a date
- Overdue NCRs go to the weekly meeting
- Repeat NCRs trigger root-cause review
- Close on site, never only on paper

🔍 Did you know?

ISO 9001:2015 clause **10.2** (Nonconformity and corrective action) asks you to react, evaluate the need for action on causes, implement, review effectiveness and keep records.



Weekly quality meeting reviewing the NCR log on a screen

Tool 1: The 5 Whys

Ask “**Why?**” until you reach a cause you can fix with a **system** change. Usually 3–5 times.



Problem

Honeycombing at column base, level 2



Why 1?

Concrete not fully compacted at the bottom



Why 2?

Vibrator did not reach the bottom of a 4 m column



Why 3?

Only short pokers on site; long poker broken



Why 4?

No standby equipment check before pour



Root cause

Pre-pour checklist has no equipment item



CAPA from this 5 Whys

- ☐ Add “vibrators incl. standby + length” to pre-pour checklist
- ☐ Buy 2 long pokers for column pours
- ☐ Brief foremen in toolbox talk
- ☐ Check next 10 column pours

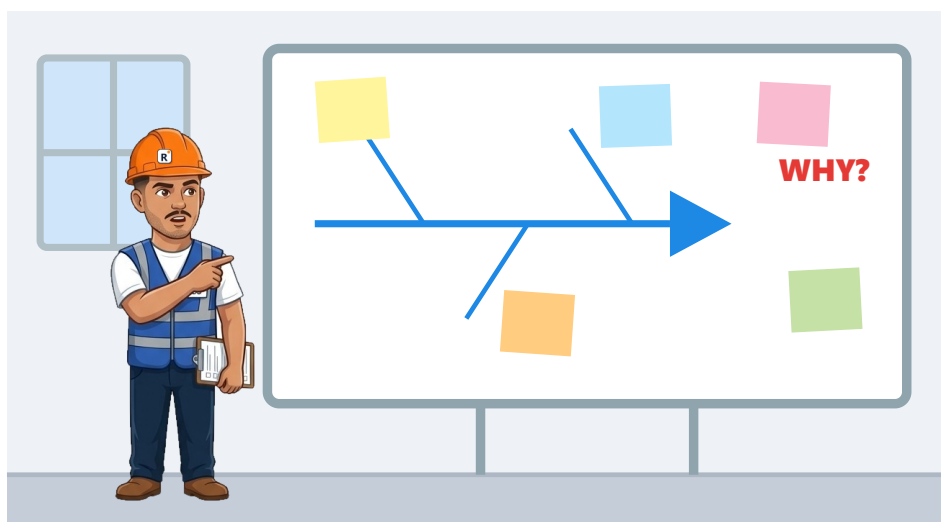


Common Mistake

- ✗ Stopping at “worker was careless”
- ✗ Blaming a person instead of a process
- ✗ Asking why only once
- ✗ Writing a cause you cannot act on



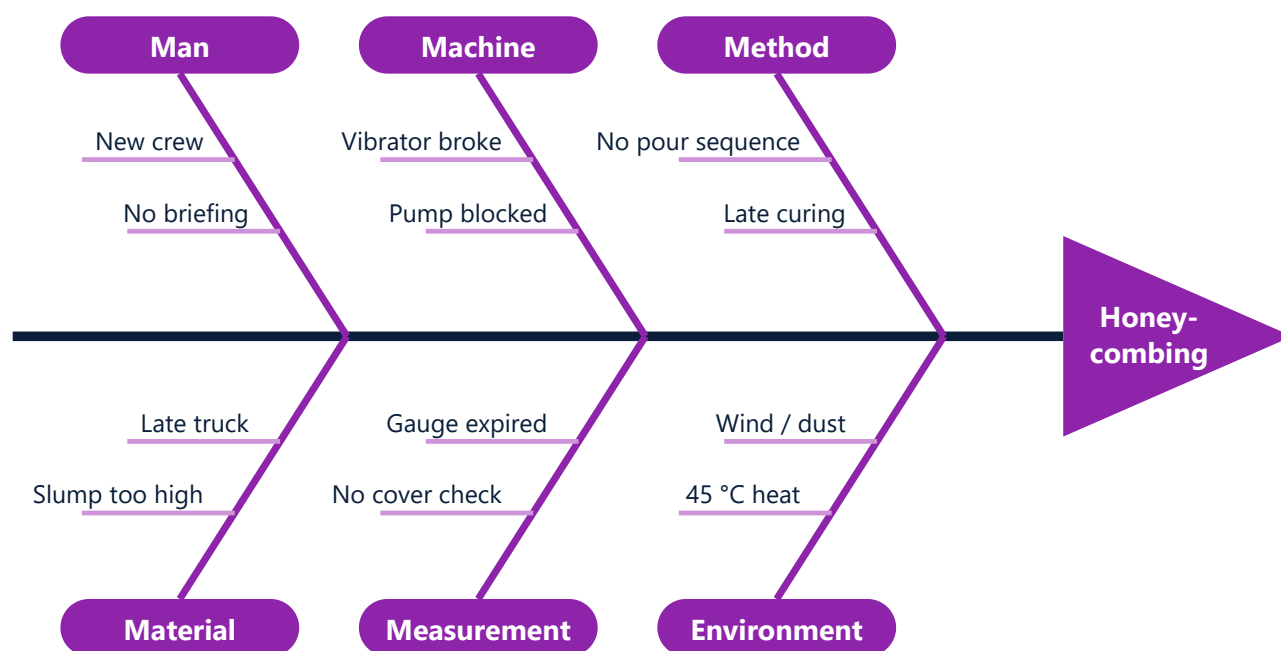
If your root cause is a **person's name**, keep asking why. Good root causes point to **methods, tools and checks**.



Team using a whiteboard to run a 5 Whys session after an NCR

Tool 2: The Fishbone (Ishikawa) diagram

Use it when a problem has **many possible causes**. Brainstorm with the team under the 6M headings, then test the most likely ones.

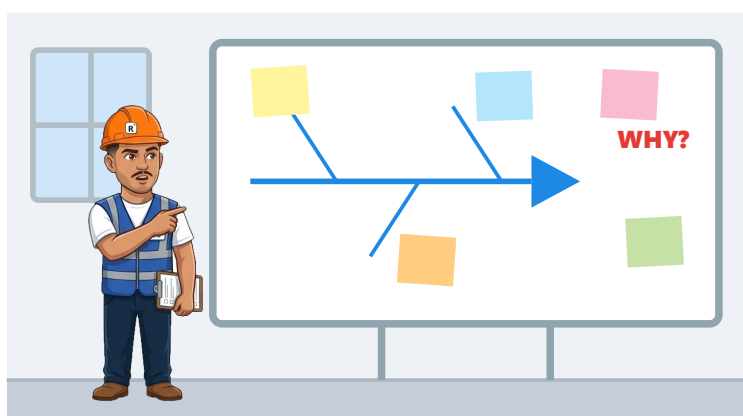


Fishbone for honeycombing — example causes under the 6M categories.

6M	Ask...
Man (people)	Trained? Briefed? Enough crew? Fatigue on night pours?
Machine	Equipment working, right size, standby available?
Method	Approved MS followed? Sequence? Pour rate?
Material	Mix as designed? Slump? Delivery delays?
Measurement	Checks done? Gauges calibrated? Criteria clear?
Environment (Mother nature)	Heat, wind, dust, night lighting, access?

Pro Tip

Run the fishbone **with the people who did the work** — foreman, operator, supplier. They know the real causes. Keep it blame-free.

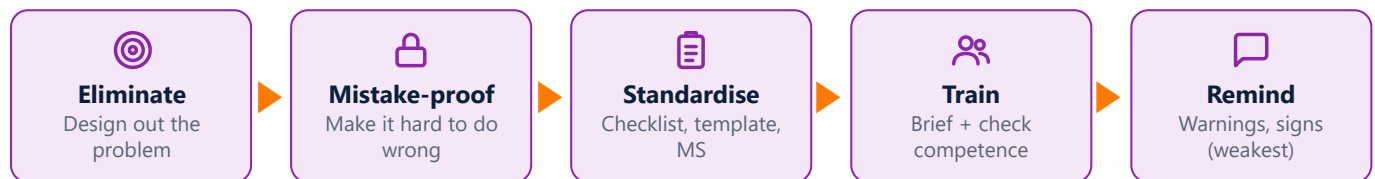


Fishbone diagram drawn on a whiteboard during a root-cause meeting

🔄 CAPA that actually works

Weak CAPA	Strong CAPA
"Workers will be careful"	Checklist item added + verified at next 10 WIRs
"Toolbox talk given"	Toolbox talk + mock-up + competency sign-off
"Supplier warned"	Supplier scorecard updated, incoming test frequency increased
No due date	Owner + due date + effectiveness check date

The hierarchy of fixes — strongest first



🔗 Site Story: The arrow on the floor

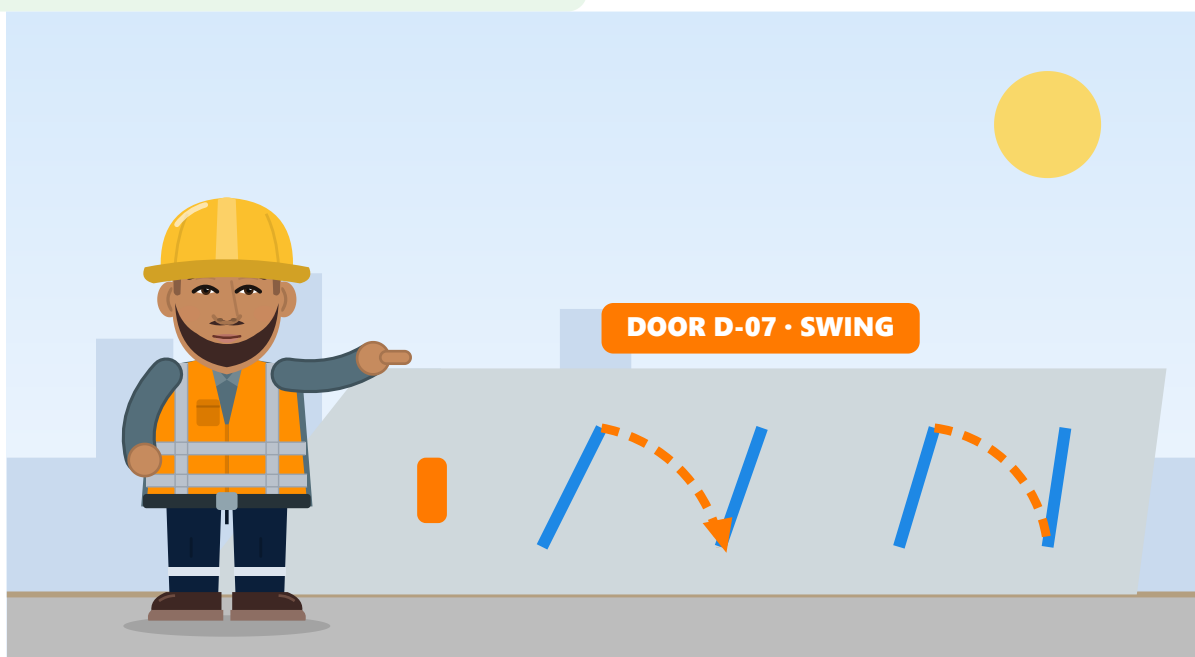
Doors were repeatedly installed on the wrong swing. The fix was not more warnings — the QA/QC engineer added door swing arrows to the floor setting-out by the surveyor. Wrong swings dropped to zero. **Mistake-proof beats "be careful".**

✅ Checklist: NCR management

- ☐ NCR log reviewed weekly
- ☐ Every NCR has an owner + date
- ☐ Root cause for repeats and majors
- ☐ CAPA uses the strongest practical fix
- ☐ Effectiveness checked and recorded
- ☐ Trends reported to management monthly

⚠️ Common Mistake

- ✗ Hundreds of open NCRs nobody tracks
- ✗ Root cause done for every minor issue (waste)
- ✗ CAPA closed the same day it opened
- ✗ No feedback to the design team
- ✗ Treating NCR count as the only KPI



Door swing arrows painted on the floor slab during setting out

4.2

CHAPTER 4.2

Subcontractor & Supplier Quality

Their quality is your quality — the client only sees one contractor.

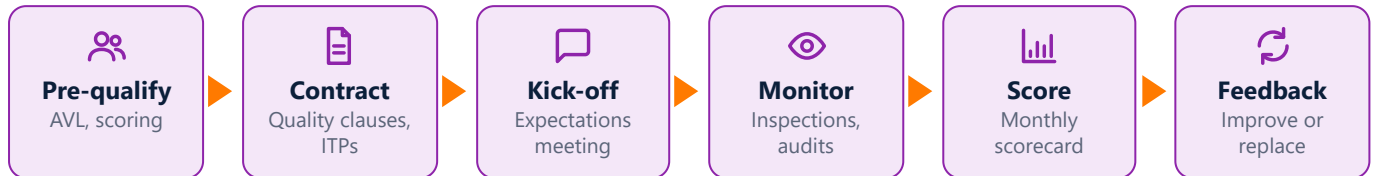
💡 Concept

📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes



🗨️ Kick-off meeting agenda

- ☐ Project PQP and their quality plan
- ☐ Approved MS + ITP for their scope
- ☐ Inspection points and who signs
- ☐ Material approval process (MAR/MIR)
- ☐ NCR / CAPA process and timescales
- ☐ Records they must hand over
- ☐ Mock-up and first-work inspection
- ☐ Escalation contacts

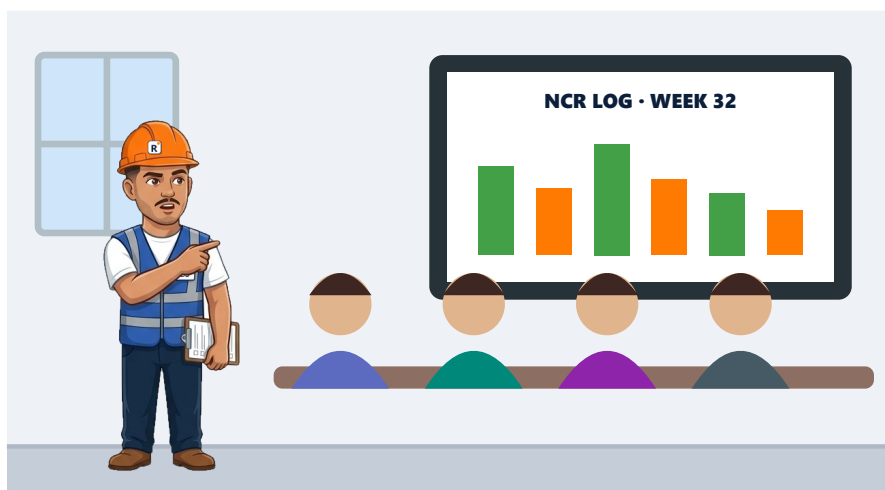
📊 Monthly subcontractor scorecard (example)

KPI	Target	Sub A	Sub B
WIR first-time approval	≥ 90%	95%	72%
Open NCRs > 30 days	0	0	4
Repeat NCRs	0	0	2
Records submitted on time	100%	100%	85%
Rating		Green	Red — action plan

Example targets only — set your own based on project requirements.

💡 Pro Tip

Do a **first-work inspection** on every new crew: inspect the first room, first slab or first weld together and agree the standard before they scale up.



Kick-off meeting with a subcontractor's supervisors and the QA/QC team

Supplier quality control



Source inspection

Visit the factory for critical items: process, tests, storage.



FAT

Witness factory tests for major equipment before shipping.



Certificates

MTCs, conformity certificates, test reports with every batch.



Incoming tests

Sample and test on arrival per spec frequency.



Delivery control

Shelf life, storage, handling, packaging.



Performance

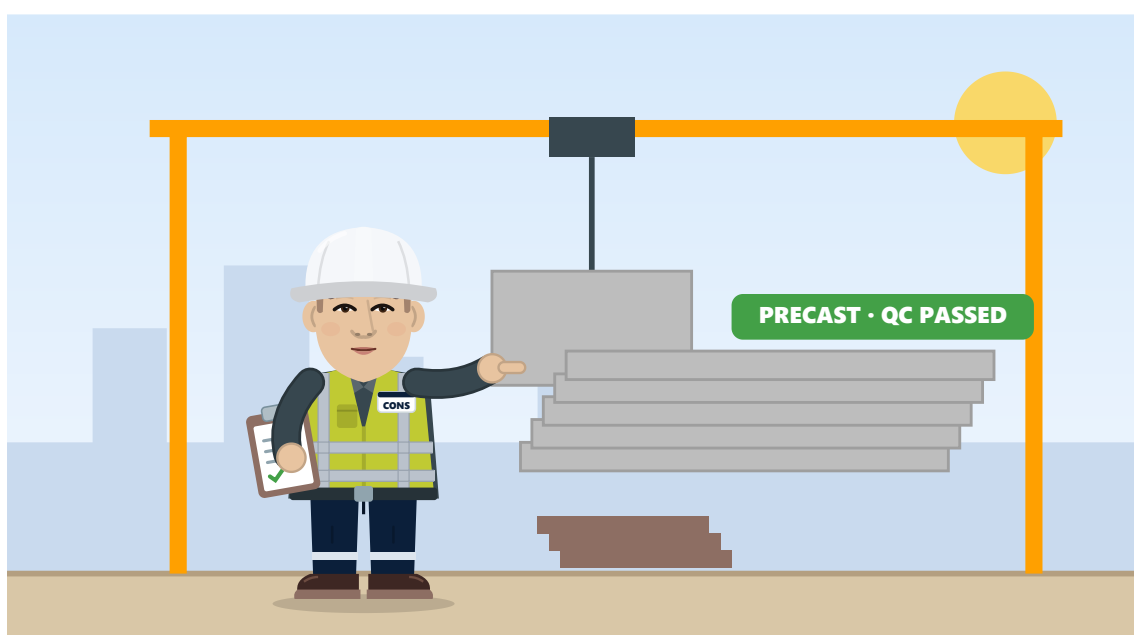
Rejections, delays, NCRs → AVL review.

Did you know?

ISO 9001:2015 clause **8.4** covers “control of externally provided processes, products and services” — your subcontractors and suppliers are part of your quality system.

Site Story

Ready-mix trucks from one plant kept arriving late during summer afternoons, causing cold joints. The scorecard showed the pattern. The contractor moved pours to night and added a second approved plant as backup. **Data turned an argument into a solution.**



Factory visit: inspector checking precast elements in the supplier's yard

✓ Checklist: vendor control

- ☐ Only AVL vendors used
- ☐ Quality clauses in every subcontract / PO
- ☐ Kick-off held and minuted
- ☐ First-work inspection done
- ☐ Monthly scorecard shared
- ☐ Poor performers on an action plan

⚠ Common Mistake

- ✗ Letting subcontractors raise WIRs without contractor QC check
- ✗ No quality clauses in the purchase order
- ✗ Scorecards nobody reads
- ✗ Accepting delivery without certificates

4.3

CHAPTER 4.3

Document Control & Traceability

The right document, the right revision, the right person — every time.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

A document number that tells a story

PRJ-B02-ABC-WIR-ST-0457 Rev 1

Part	Meaning
PRJ	Project code
B02	Building / zone
ABC	Originator (company code)
WIR	Document type
ST	Discipline (e.g. ST structural, AR architectural, ME mechanical)
0457	Sequence number
Rev 1	Revision (first issue often Rev 0)

Example format only — follow your project's numbering procedure. ISO 19650 is widely used for information management on larger projects.

Revision control rules

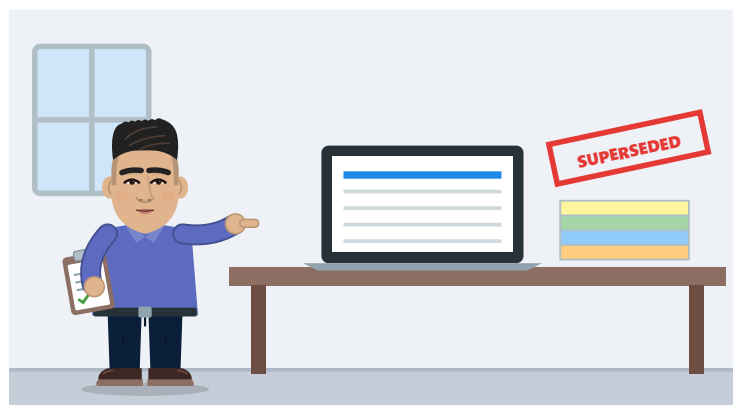
- ☐ One master register (drawings, submittals, WIRs, NCRs)
- ☐ Every issue via transmittal
- ☐ Superseded copies stamped and removed
- ☐ Site sets updated the same day
- ☐ Controlled copies marked as such
- ☐ Access rights in the CDE / EDMS
- ☐ Back-ups and audit trail
- ☐ Retention period per contract **VERIFY**

R RUZANI

Numbering done for you

ADoc Flow builds document numbers like this automatically from your project's own format — and keeps every revision in the register.

[See how it works →](#)



Document controller updating the drawing register; superseded stamp

Traceability: follow the chain

Traceability means you can go from a finished element **back** to every material, test and approval — and forward again.

Concrete



Reinforcement



Registers every project needs

Drawing register Submittal / MAR register RFI log WIR log MIR log Test register NCR log SOR log
 Calibration register Welder register Concrete pour register Snag register

Site Story

Two years after handover, a client asked which cement batch was used in a cracked water tank. The contractor answered in one hour: pour register → batch tickets → MIR → MTC. The cement was cleared and the real cause (a missing water stop) was found. **Good records protect good contractors.**

Checklist: traceability

- ☐ Every record has a unique number
- ☐ Registers updated daily
- ☐ Records linked to element + location
- ☐ Scans named consistently
- ☐ Back-up weekly (at least)

Common Mistake

- ☒ Records saved on personal laptops
- ☒ Photos without date, location or ID
- ☒ WIRs not linked to drawings + revisions
- ☒ Losing test reports in email



Rebar bundle tag showing heat number next to its mill test certificate

4.4

CHAPTER 4.4

QA/QC and HSE Interface

Quality and safety are partners, not rivals.

💡 Concept

📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes



Method statements

One MS covers quality steps **and** risk assessment.



Permits

Testing often needs a permit: pressure, electrical, hot work, radiography.



Inspector safety

Inspectors work at height, in excavations, near live systems — PPE and training apply.



Hazardous materials

SDS, storage and handling for chemicals, coatings, sealants.



Housekeeping

Clean sites have fewer defects and fewer injuries.



Joint inspections

QHSE walk-downs find both kinds of problems.

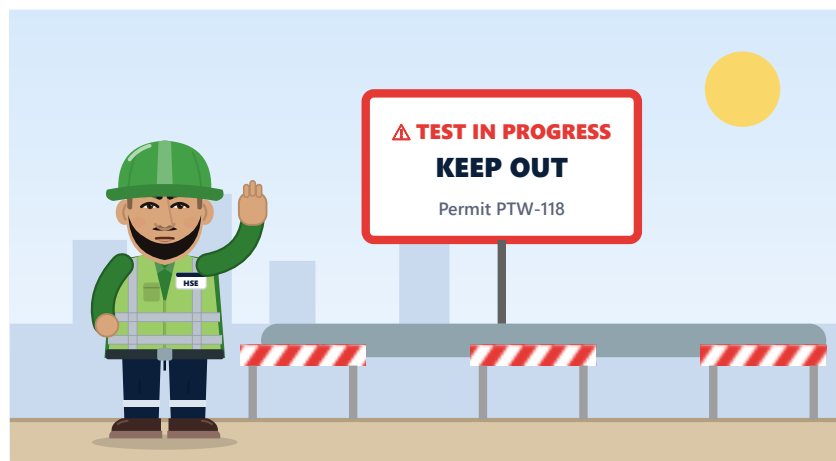


Where quality failures become safety failures

Quality failure	Safety consequence
Formwork props not as design	Formwork collapse during pour
Scaffold components not inspected	Fall from height
Wrong cable size / poor termination	Fire, electric shock
Failed welds on lifting lugs	Dropped load
Fire-stopping missing at penetrations	Fire and smoke spread in use
Uncontrolled pressure test	Burst, flying parts

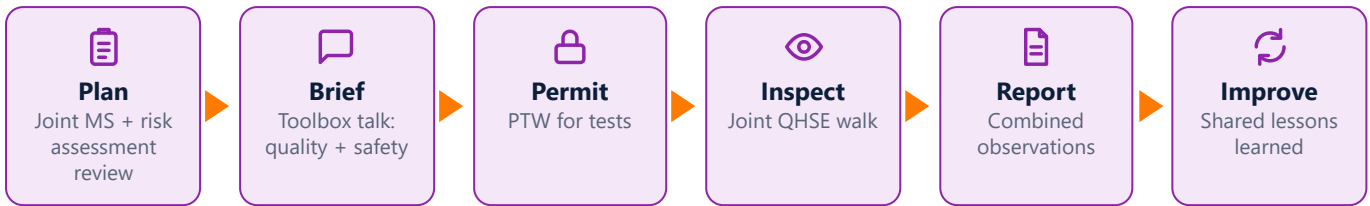
🔍 Did you know?

Many companies run an **integrated QHSE system** combining ISO 9001 (quality), ISO 14001 (environment) and ISO 45001 (occupational health & safety).



Pressure test exclusion zone with barriers and permit board

Working together on site



Site Story: The stopped test

During a pneumatic test of a gas line, the QC engineer noticed there was no exclusion zone and the HSE officer was not informed. He stopped the test. With a permit, barriers and a relief valve in place, the test was done safely the next morning. **A quality test is never more important than a life.**



Joint QHSE walk-down: QC engineer and HSE officer inspecting scaffolding and formwork

✓ Checklist: QHSE interface

- ☐ Testing activities have a permit where needed
- ☐ Inspectors trained for heights / confined spaces
- ☐ Inspection access is safe (ladders, platforms)
- ☐ Joint QHSE walk weekly
- ☐ Chemicals have SDS on site
- ☐ Lessons shared between teams

⚠ Common Mistake

- ✗ Inspector climbing formwork without harness "for a quick check"
- ✗ Pressure testing without warning other trades
- ✗ HSE and QC giving conflicting instructions
- ✗ Removing safety items to "inspect better"

4.5

CHAPTER 4.5

Standards You Must Know

ISO 9001, ASTM, BS EN and the Saudi Building Code (SBC).

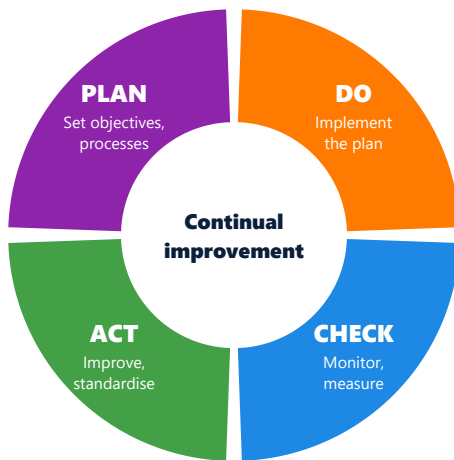
💡 Concept

📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes



ISO 9001 is built on Plan-Do-Check-Act.

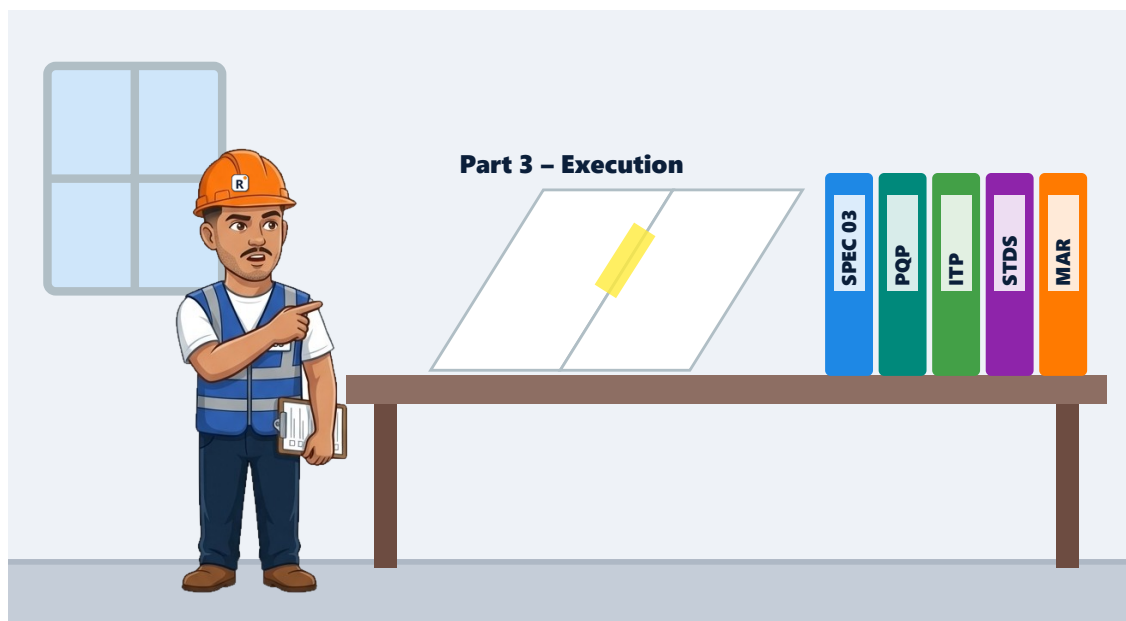
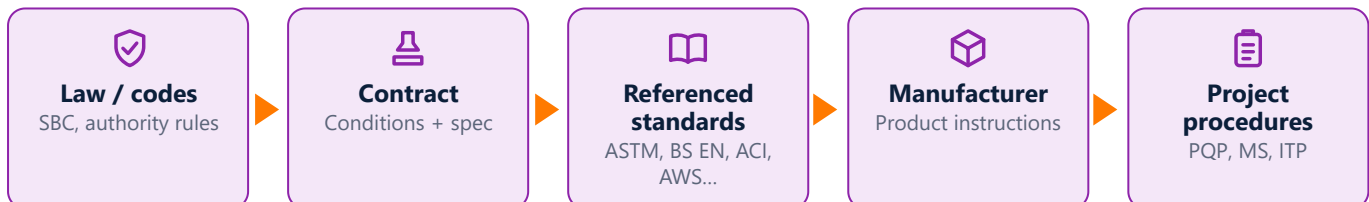
ISO 9001:2015 — the structure

Clause	Topic	On site it means...
4	Context	Client needs, scope, risks
5	Leadership	Policy, roles, commitment
6	Planning	Risks & opportunities, objectives
7	Support	People, calibration (7.1.5), documents (7.5)
8	Operation	Planning, vendors (8.4), control of work
9	Performance evaluation	KPIs, internal audit (9.2), management review (9.3)
10	Improvement	NCR + corrective action (10.2), continual improvement

💡 Pro Tip

You don't need to memorise ISO 9001. Know the **clause numbers for the things you do daily**: calibration 7.1.5, documents 7.5, vendors 8.4, audits 9.2, NCRs 10.2.

📁 How standards fit together



Shelf of standards and the project specification in the QA/QC office

ASTM, BS EN and SBC — quick guide

Family	What it is	Examples you will meet
ASTM	US standards for materials and test methods	C143 slump, C39 cylinders, A615 rebar, D1557 Proctor
BS EN	European standards adopted in the UK	EN 206 concrete, EN 12390 testing, EN 1992 (Eurocode 2)
BS	British standards (some still used)	BS 4449 rebar, BS 5385 tiling, BS 7671 wiring
ACI	American Concrete Institute	ACI 318 structural concrete, ACI 305 hot weather
AWS / ASME	Welding and pressure codes	AWS D1.1, ASME IX, ASME B31
NFPA	Fire protection	NFPA 13 sprinklers, NFPA 72 fire alarm

Saudi Building Code (SBC) — main parts

Code	Subject	Code	Subject
SBC 201	General building code	SBC 401	Electrical
SBC 301	Structural loads	SBC 501	Mechanical
SBC 303	Soils and foundations	SBC 601 / 602	Energy conservation
SBC 304	Concrete structures	SBC 701	Sanitary / plumbing
SBC 305	Masonry structures VERIFY	SBC 801	Fire protection
SBC 306	Steel structures	SBC 1001	Green construction VERIFY

SBC codes are updated in new editions. Confirm the current list and edition with the Saudi Building Code National Committee before citing. **VERIFY**

SA GCC / KSA Note

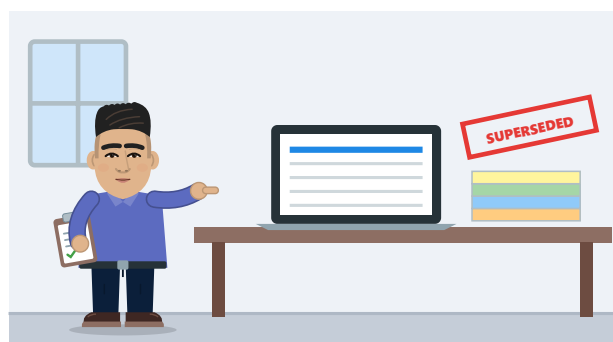
Your project spec may name ASTM, BS EN **and** SBC together. If two standards conflict, raise an RFI — don't pick the easier one.

Common Mistake

- ✗ Citing an old edition
- ✗ Mixing ASTM test with BS EN acceptance criteria
- ✗ Saying "as per international standards" with no number
- ✗ Never reading the standard you quote



How to cite a standard like a pro: **name + number + year + clause**. Example: "ASTM C143/C143M – current edition, slump test".



Project specification open at the referenced standards list

Level 4 Quiz



Management level — think like the person who runs the system.

Q1

Which is a **CORRECTIVE** action (not just a correction)?

- ☐ A Re-fixing the misplaced bars
- ☐ B Adding a spacer check to the checklist so it does not repeat
- ☐ C Taking photos of the defect
- ☐ D Closing the NCR

Q2

A Fishbone diagram groups causes under headings such as...

- ☐ A Plan-Do-Check-Act
- ☐ B Man, Machine, Method, Material, Measurement, Environment
- ☐ C Hold, Witness, Review
- ☐ D A, B, C, D

Q3

ISO 9001:2015 clause covering control of external suppliers is...

- ☐ A 7.1.5
- ☐ B 8.4
- ☐ C 9.2
- ☐ D 10.2

Q4

Which link proves traceability for reinforcement?

- ☐ A Heat number → MTC → MIR → element → WIR
- ☐ B Slump → cube → core
- ☐ C RFI → NCR → TOC
- ☐ D BOQ → invoice

Q5

The strongest type of fix in the CAPA hierarchy is...

- ☐ A Reminders and signs
- ☐ B Training
- ☐ C Mistake-proofing / eliminating the cause
- ☐ D Warning letters



Level Up! Management unlocked

Great work. Here is what you can now do on site:

☆ Run NCRs from log to effectiveness

☆ Use 5 Whys and Fishbone

☆ Write strong CAPAs

☆ Control subcontractors with scorecards

☆ Set up document control + traceability

☆ Navigate ISO 9001, ASTM, BS EN, SBC

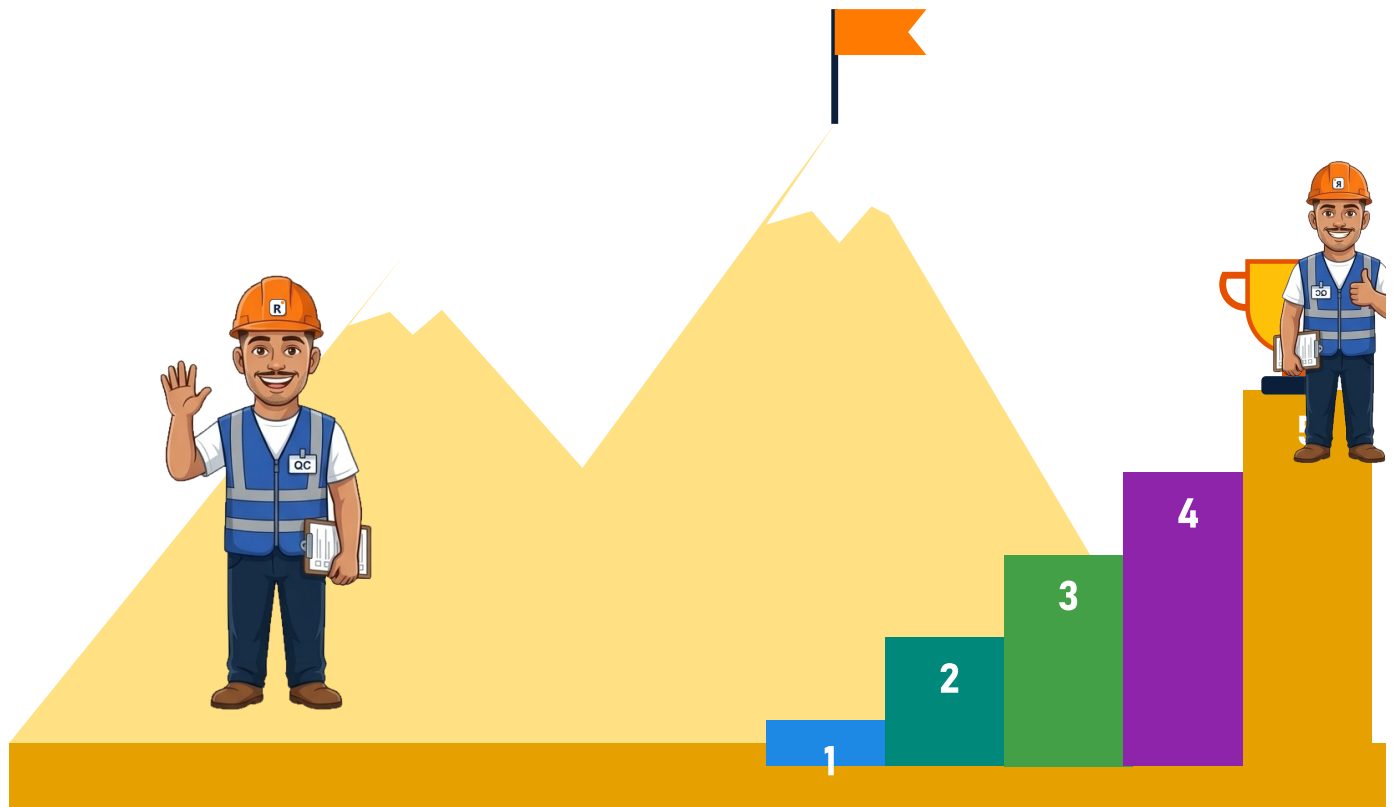


Final level next: **Level 5 – Expert**. Contracts, audits, dashboards and your career.

Your challenge: before moving on, do the 5-question quiz and check your answers at the back. Score 4/5 or more? You are ready for the next level. 🚀

Expert

Contracts, audits, data and your career — the skills of a QA/QC Manager.



Welcome to the top level. Experts don't just know the answers — they know **where the answers are written**.

WHAT YOU WILL MASTER

- ✓ FIDIC quality clauses and the DNP
- ✓ Internal, client and third-party audits
- ✓ KPIs and a quality dashboard
- ✓ Digital QA/QC tools
- ✓ Lessons learned and continuous improvement
- ✓ Certifications, CV and interviews

5.1

CHAPTER 5.1

FIDIC Quality Clauses

What the contract says about quality — and why it matters to you.

 Concept

 Visual

 Site example

 Checklist

 Mistakes

FIDIC contracts are widely used in the GCC. The **Red Book** (construction designed by the Employer) is the most common. Clause numbers below are from the **2017 Red Book**; the 1999 edition uses similar numbers.

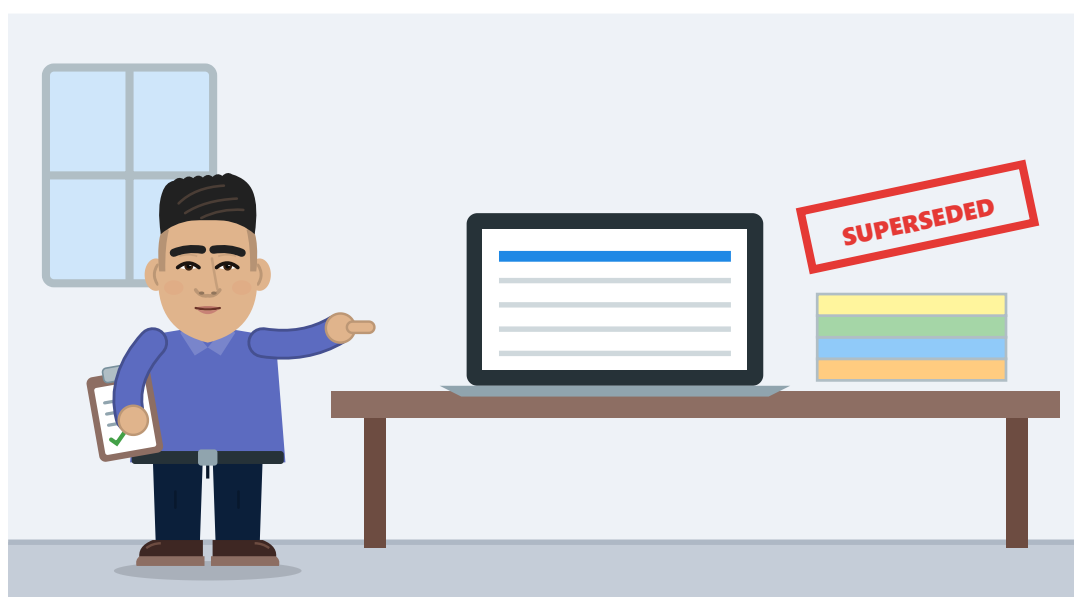
Clause (2017)	Topic	What it means for QA/QC
4.9	Quality Management & Compliance Verification Systems	Contractor must run a QM system and a compliance verification system; Engineer may audit
7.1	Manner of execution	Work done properly, with good practice, as per the Contract
7.2	Samples	Submit samples of materials for review
7.3	Inspection	Engineer can inspect; contractor gives notice before covering work
7.4	Testing by the Contractor	Tests as specified; notice to the Engineer to attend
7.5	Defects and rejection	Engineer can reject defective work; contractor must fix
7.6	Remedial work	Engineer can instruct removal / re-execution
9	Tests on Completion	Tests before taking over
10.1	Taking over the Works	Taking-Over Certificate when Works are complete
11	Defects after Taking Over	Remedy defects notified during the DNP
11.9	Performance Certificate	Issued after the DNP — completion of contractor's obligations

Always read your Particular Conditions — they often change these clauses. 1999 edition: 4.9 was "Quality Assurance" and Clause 11 "Defects Liability".

VERIFY

SA GCC / KSA Note

Many public projects in KSA use government contract forms under the Government Tenders and Procurement Law rather than FIDIC. Saudi law may also impose long-term liability on contractors and designers for structural defects. Check with your contracts team. **VERIFY**



Contract documents and Particular Conditions on the QA/QC manager's desk

The Defects Notification Period (DNP)



Key facts

- DNP length is stated in the Contract Data (FIDIC 2017) / Appendix to Tender (1999)
- If not stated, FIDIC defaults to one year **VERIFY**
- DNP can be extended for defective items, but not by more than 2 years in total under FIDIC **VERIFY**
- Performance Certificate = contractor's obligations completed

QA/QC during the DNP

- Keep a defects register with dates
- Respond within the time in the contract
- Root-cause repeat defects
- Record access dates and client sign-off
- Keep spares, warranties and O&M ready

Site Story: 12 rooms → 180 rooms

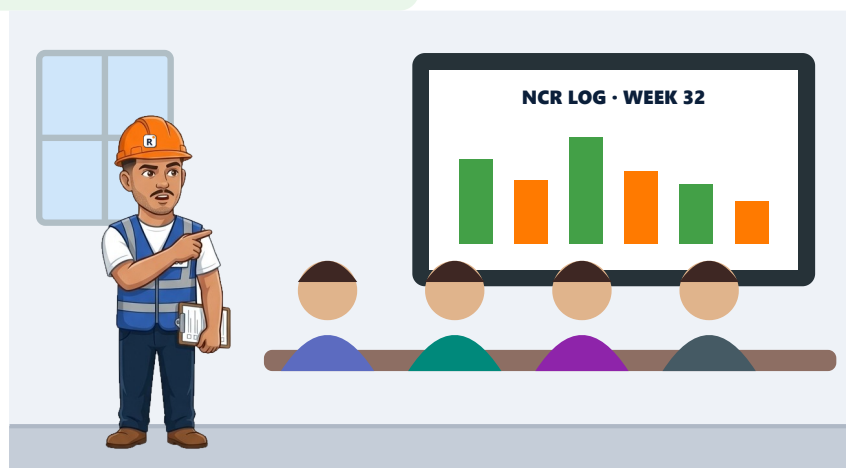
During the DNP a hotel reported water staining in 12 rooms. The contractor's QA/QC team traced all 12 to the same balcony detail, fixed the detail in all 180 rooms (not just 12) and closed the issue before it became a claim. **Fix the pattern, not just the complaint.**

Checklist: contract quality

- ☐ Know the clause numbers in your contract
- ☐ Give written notice before covering work (Cl. 7.3)
- ☐ Keep test records ready for the Engineer
- ☐ Track DNP dates and extensions
- ☐ Close defects with evidence

Common Mistake

- ✗ Never reading the Particular Conditions
- ✗ Ignoring defect notices during the DNP
- ✗ No record of when defects were notified / fixed
- ✗ Thinking handover ends quality responsibility



Defects register review during the DNP with the client's FM team

5.2

CHAPTER 5.2

Audits

Internal, client and third-party — prepare once, pass every time.

💡 Concept

📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes

Type	Who audits	Purpose
Internal (1st party)	Your own trained auditors	Check your system works; find gaps before others do (ISO 9001 cl. 9.2)
Client / Consultant (2nd party)	Client, PMC or the Engineer	Confirm contract quality requirements are met (e.g. FIDIC 4.9)
Third party	Certification body	ISO 9001 certification and surveillance audits



Audit finding grades

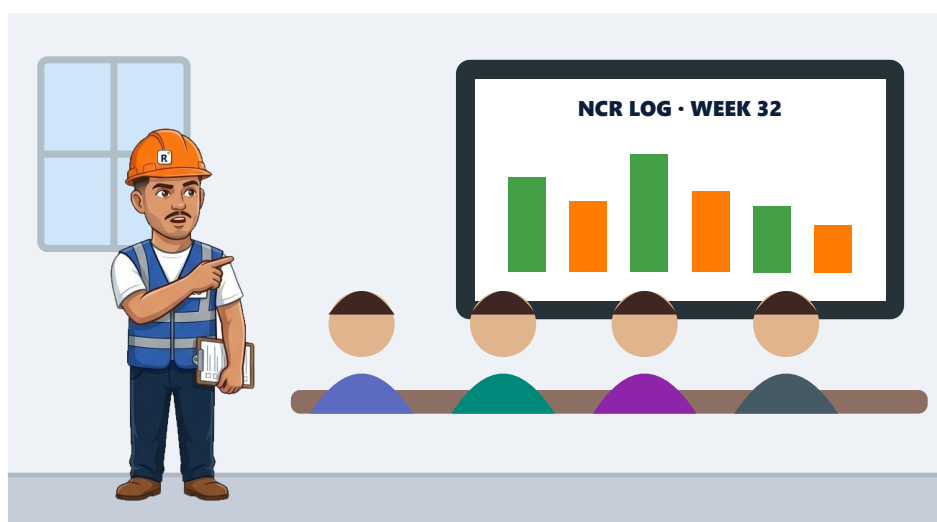
Grade	Meaning
Major NC	System failure or requirement not met at all
Minor NC	Single lapse; system mostly works
Observation	Potential issue if not addressed
OFI	Opportunity for improvement

Grade names vary between certification bodies and clients.

A typical audit cycle (guidance: ISO 19011).

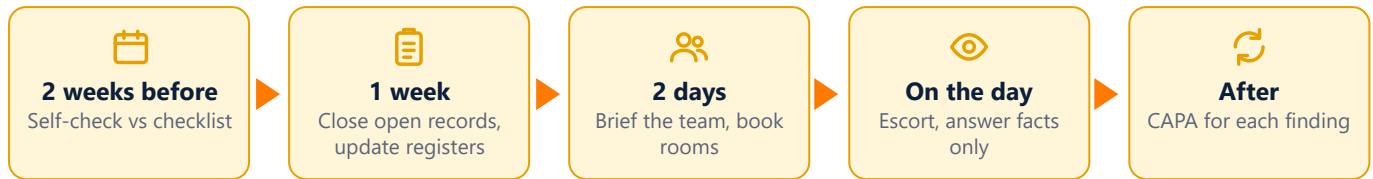
💡 Pro Tip

Audit evidence must be **objective**: records, observations, interviews. “I think” is not evidence; “WIR 0457 has no Consultant signature” is.



Audit opening meeting with auditors and the project team

Getting ready for an audit



✓ Checklist: audit readiness

- ☐ PQP and procedures current
- ☐ Registers up to date (WIR, NCR, MAR, calibration)
- ☐ Training records + CVs
- ☐ Previous audit findings closed
- ☐ Sample files ready: 3 WIRs per discipline
- ☐ Site areas tidy and safe to visit

⚠ Common Mistake

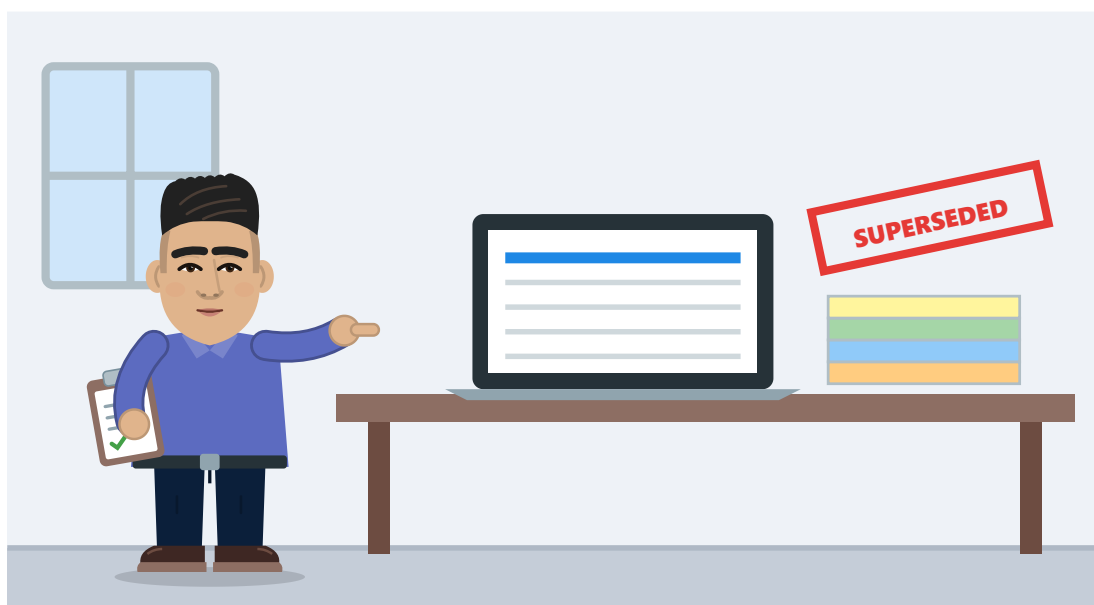
- ✗ Hiding documents from the auditor
- ✗ Arguing about every finding
- ✗ Different people giving different answers
- ✗ Closing findings with "noted"
- ✗ Auditing your own work (no independence)

Common audit questions

Auditor asks...	Show them...
"How do you know this gauge is accurate?"	Calibration register + certificate + sticker
"How do you control drawing revisions?"	Drawing register, transmittals, superseded stamps
"Show me the ITP for this activity."	Approved ITP + signed WIRs for the activity
"What did you do about last month's NCRs?"	NCR log, root cause, CAPA, effectiveness check
"How are subcontractors controlled?"	AVL, kick-off minutes, scorecards

🎯 Site Story

A third-party auditor picked a random column and asked for everything about it. In 10 minutes the team showed the IFC drawing, rebar WIR, concrete ticket, cube results and curing log. **Zero findings in that area.**



Sample files and registers laid out for an audit

5.3

CHAPTER 5.3

KPIs, Dashboards & Digital Tools

If you can't measure it, you can't improve it.

💡 Concept

📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes

📊 Quality KPIs that matter

KPI	Formula	Why it matters
WIR first-time approval %	$\text{WIRs approved first time} \div \text{total WIRs} \times 100$	Shows workmanship and self-inspection
Open NCRs / NCR ageing	Count open, and days open	Shows closure discipline
Avg. NCR closure time	$\text{Sum of days to close} \div \text{NCRs closed}$	Speed of response
Repeat NCR rate	$\text{Repeat NCRs} \div \text{total NCRs}$	Is root cause analysis working?
Submittal first-time approval	$\text{Code A/B on 1st submission} \div \text{total}$	Quality of submittals
Test failure rate	$\text{Failed tests} \div \text{total tests}$	Material / process control
Calibration compliance	$\text{Valid instruments} \div \text{total in use}$	Reliability of measurements
Audit findings closed on time	$\text{Closed by due date} \div \text{total}$	System health
Snags per unit / room	$\text{Snags} \div \text{units inspected}$	Readiness for handover
Cost of rework	$\text{Rework cost} \div \text{work done value [VERIFY method]}$	Money lost to poor quality



Leading

KPIs predict: training, first-time approval



Lagging

KPIs report: NCRs, rework cost

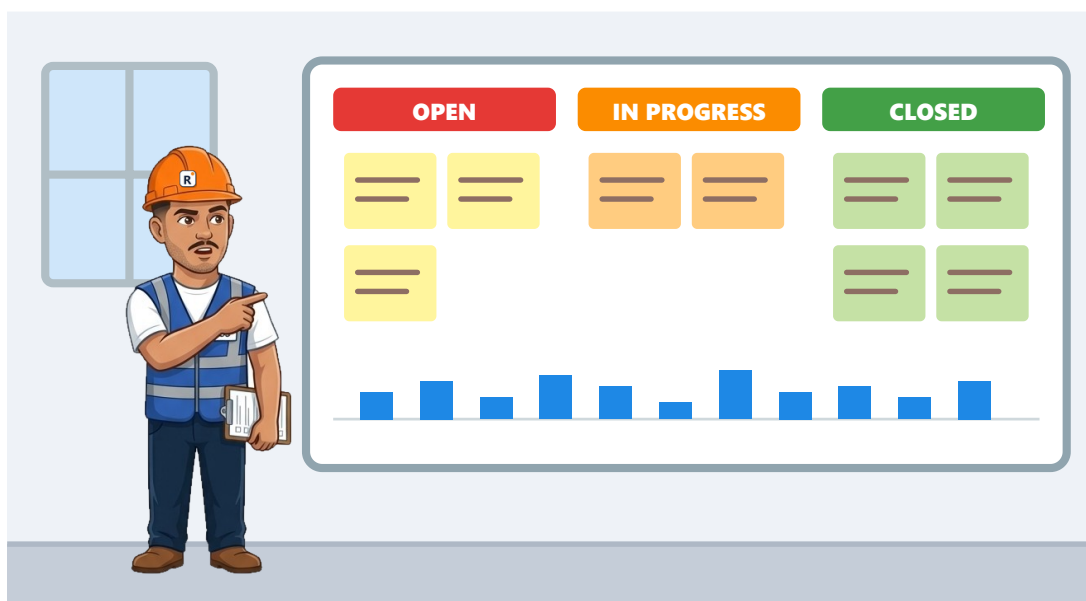


5-8

KPIs is enough for a dashboard

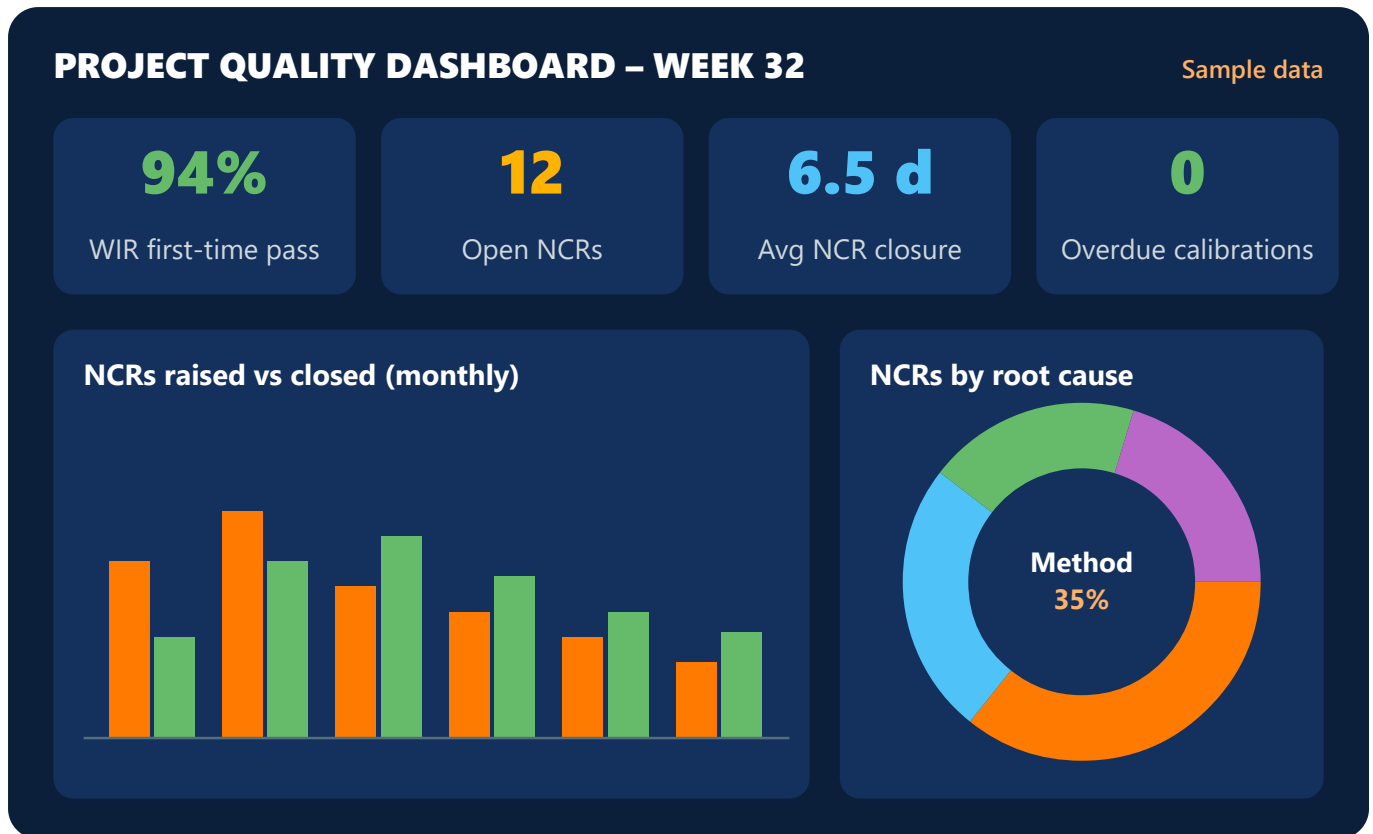
💡 Pro Tip

Mix **leading** KPIs (things that prevent problems) with **lagging** KPIs (results). Only lagging KPIs means you always look in the mirror.



Quality KPI board in the site office

A one-page quality dashboard



Example dashboard layout with sample data. Keep it to one screen.

Dashboard design rules

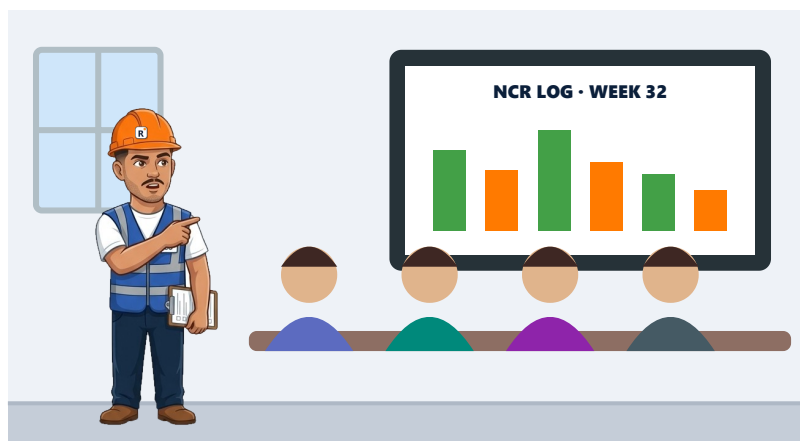
- ☐ One page, one message per chart
- ☐ Trend over time beats a single number
- ☐ Red/amber/green against a target
- ☐ Drill-down to the list behind each number
- ☐ Update weekly — same day every week

Who sees what

Audience	Wants
Site team	Open items by area + owner
Project Manager	Trends, overdue, risks
Client	Compliance + readiness
Directors	Cross-project comparison

Did you know?

A good dashboard starts conversations: “Why did first-time approval drop in Tower B?” is worth more than ten pages of report.



Weekly quality dashboard on a meeting room screen

Digital QA/QC tools



CDE / EDMS

Common data environment for drawings, submittals and transmittals with revision control.



Mobile inspection apps

WIR/MIR checklists on a tablet, photos, signatures, offline mode.



Live dashboards

Registers feed charts automatically — no copy-paste reports.



BIM

3D models for clash detection, quantities and as-built information.



QR / barcode tagging

Scan an element or material to see its records.



Drones + 360° photos

Progress, roofs and façades without risky access.



IoT sensors

Concrete maturity / temperature sensors for curing and stripping decisions.



Laser scanning

Compare as-built vs design for tolerances.



Pro Tip

Digital tools amplify your system — they don't replace it. A bad process on a tablet is still a bad process. Fix the workflow first, then digitise.



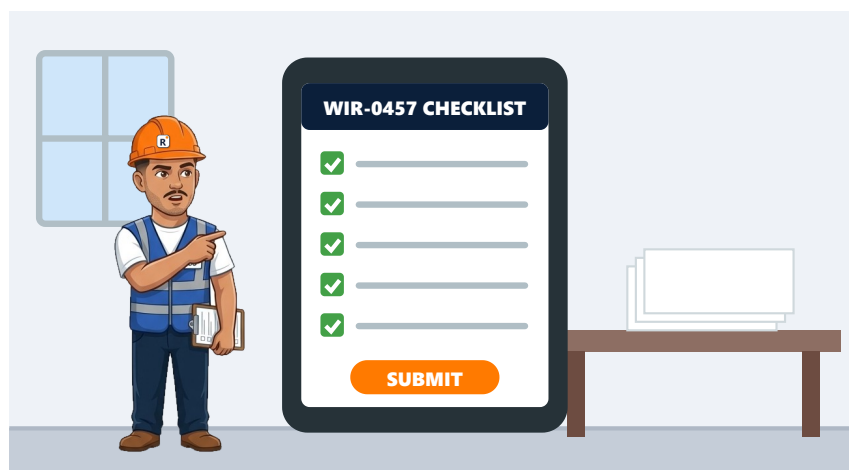
Example: ADoc Flow

Built for GCC site teams: WIR, MAR, MIR and method statements with automatic numbering, internal QC review, client status A/B/C, ITP registers, a live dashboard and one-click PDF packages. Try it in your browser — nothing to install.

[Try the free demo →](#)

Choosing a tool — ask these 5 questions

1. Does it match our document numbering and approval workflow?
2. Does it work offline on site?
3. Can the Consultant use it (or receive clean PDFs)?
4. Can we export all data if we stop using it?
5. Is our data stored where the client/authority allows? [VERIFY data residency rules]



QC inspector using a tablet to complete a WIR checklist on site

5.4

CHAPTER 5.4

Lessons Learned & Continuous Improvement

Make every project better than the last one.

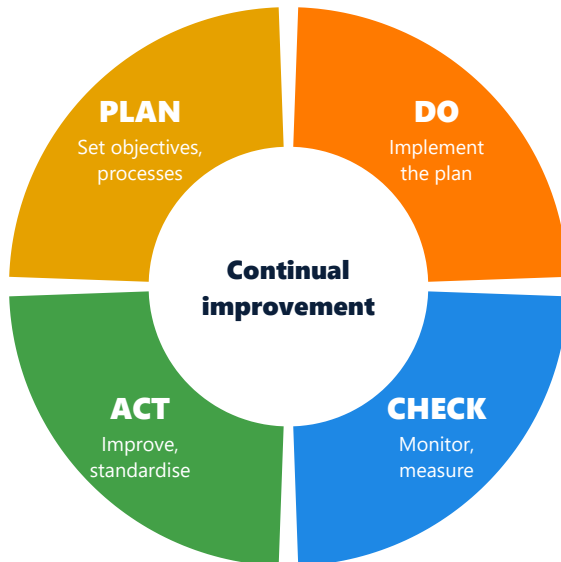
💡 Concept

📊 Visual

🏠 Site example

✅ Checklist

⚠️ Mistakes



PDCA — the engine of continual improvement.

Lessons learned in 5 steps

**Capture**

At milestones, not only at the end

**Analyse**

Root cause, cost, impact

**Decide**

What changes?

**Share**

Toolbox, library, next tender

**Embed**

Update procedures, ITPs, templates



Simple improvement tools

Tool	Use it to...
Pareto chart (80/20)	Find the few causes behind most NCRs
Trend charts	See if things get better or worse
Kaizen / small improvements	Let site teams suggest quick fixes
Mock-ups & first-work inspections	Agree the standard before scaling up
Benchmarking	Compare towers, subcontractors, projects

✅ **Checklist: lessons learned**

- ☐ Lessons logged at each milestone
- ☐ Each lesson has an owner and action
- ☐ Procedures / ITPs updated
- ☐ Shared with the next project team

A lesson learned card (example)

LL-017 Wet-area waterproofing upturns

What happened Leaks at shower thresholds in 9 apartments after handover.

Root cause Upturn not continued under door threshold; detail missing on shop drawing.

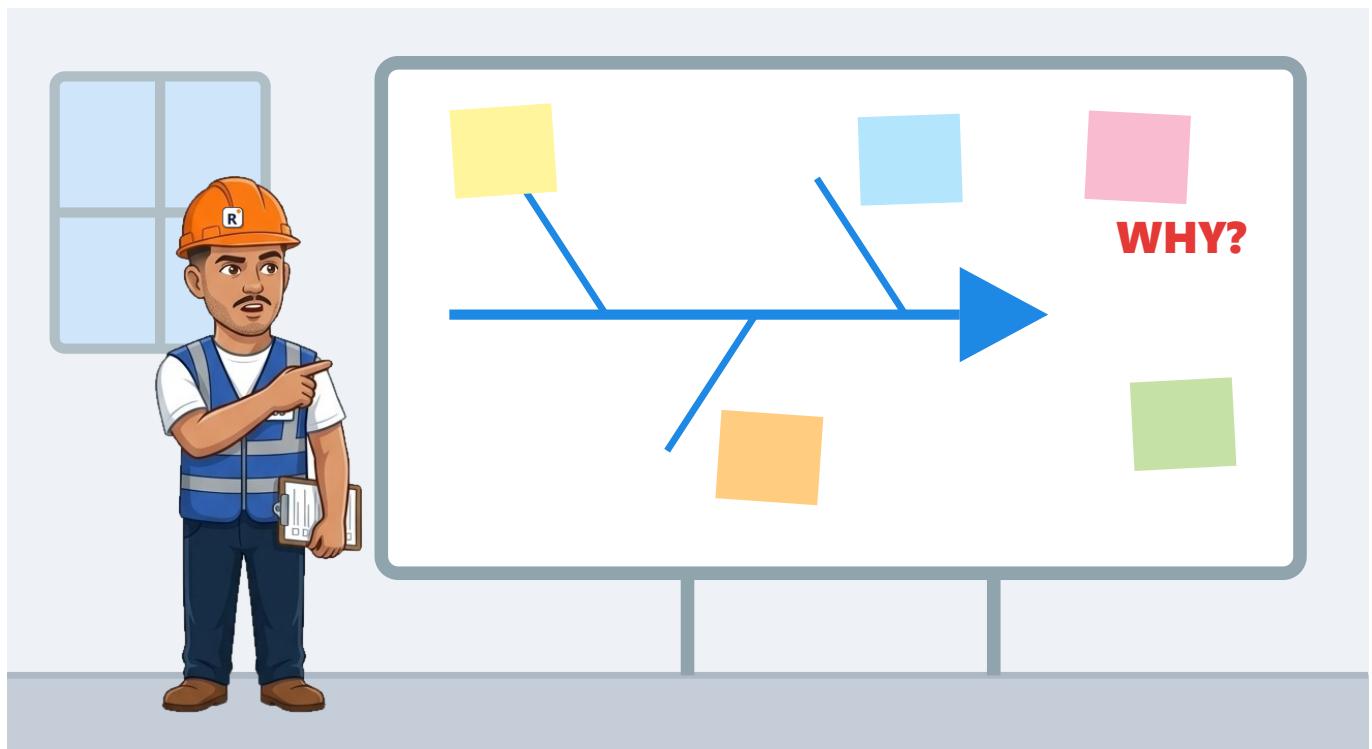
Cost / impact Tile removal, re-waterproofing, client complaints, DNP extension.

Action Threshold detail added to standard drawings; ITP line added; flood test includes threshold.

Shared with All projects — QA/QC library, design team, waterproofing subcontractors.

Site Story: Tower four

A contractor reviewed NCRs from three finished towers using a Pareto chart. Four causes created most of the rework. They built four mock-ups at the start of the fourth tower, and NCRs for those items fell dramatically. **History is your cheapest consultant.**



Lessons-learned workshop with sticky notes grouped by root cause

Common Mistake

- ✗ Lessons learned only at project close (everyone has left)
- ✗ A list of complaints with no actions
- ✗ Lessons stored where nobody looks
- ✗ Blaming instead of learning



Expert habit: at every project start, read the **last three projects'** lessons learned. It takes one hour and saves months.

5.5

CHAPTER 5.5

Your Career Roadmap

From inspector to QA/QC Manager — and beyond.

 Concept Visual Site example Checklist Mistakes

Quality Director

15+ yrs (typical – varies)

QA/QC Manager

10+ yrs (typical – varies)

Senior QA/QC Engineer

6–10 yrs (typical – varies)

QA/QC Engineer

3–7 yrs (typical – varies)

QC Inspector

0–3 yrs (typical – varies)

Typical progression. Years vary by person, company and project size.

Certifications that open doors

Certification	Body	Good for
ISO 9001 Lead Auditor	CQI/IRCA-certified course providers	QA/QC Engineers → Managers; audits
CQE – Certified Quality Engineer	ASQ	Quality engineering, statistics, tools (experience requirement applies VERIFY)
CQA – Certified Quality Auditor	ASQ	Audit specialists
Six Sigma Green / Black Belt	Various (e.g. ASQ)	Data-driven improvement
CWI – Certified Welding Inspector	AWS	Steel / welding inspection
ACI Field Testing Technician	ACI	Concrete testing on site
NDT Level II (UT, MT, PT...)	ASNT / ISO 9712 schemes	NDT inspection roles
PMP	PMI	Moving into project management
SCE accreditation	Saudi Council of Engineers	Required to practise as an engineer in KSA VERIFY



Pro Tip

Start with what your **next job** needs, not the longest list. For most inspectors moving up: Lead Auditor + a discipline certificate (CWI, ACI, NDT) is a strong combination.

A CV that gets interviews

Do

- ☐ 2 pages max., clean layout, PDF
- ☐ Headline: "QA/QC Engineer – Civil | 6 yrs GCC"
- ☐ Projects: type, size, client, your role
- ☐ Numbers: "Reduced NCR closure time from 21 to 8 days"
- ☐ Codes you know: ACI 318, SBC 304, AWS D1.1...
- ☐ Certifications with dates
- ☐ SCE status (for KSA) **VERIFY**

Avoid

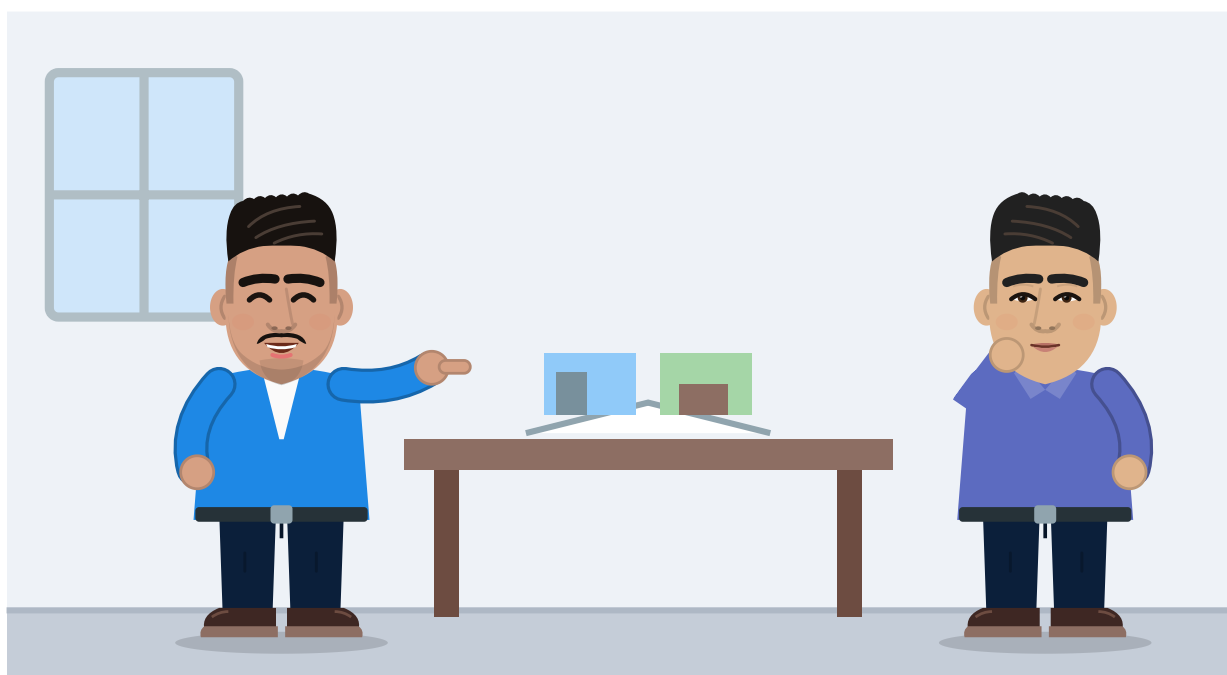
- ✗ Copying the job description as your duties
- ✗ Photo, age, religion, passport details (not needed)
- ✗ Long lists of software with no proof
- ✗ Spelling mistakes — you are applying for **quality!**
- ✗ No achievements, only responsibilities

Interview: questions you will be asked

Question	What a strong answer includes
"Difference between QA and QC?"	Prevent vs detect; process vs product; give a site example
"What is a Hold point?"	Work stops until released; give an example (rebar before pour)
"Cubes failed — what do you do?"	Check validity → NDT → cores → engineer → NCR → CAPA
"How do you handle a subcontractor who ignores QC?"	Facts, escalation ladder, scorecard, kick-off reset
"Tell me about an NCR you raised."	Situation, root cause, action, measurable result (STAR)
"How do you prepare for an audit?"	Self-check, registers, sample files, team briefing



Use the **STAR** method: Situation, Task, Action, Result. And always end with a **number**. Good luck — you are ready!



Young engineer presenting a portfolio of site work at an interview



Level 5 Quiz



Final quiz! Get 4 out of 5 and you have earned the Expert badge.

Q1

In the FIDIC 2017 Red Book, which clause deals with the Quality Management and Compliance Verification Systems?

- ☐ A 1.5
- ☐ B 4.9
- ☐ C 8.4
- ☐ D 14.1

Q2

The Defects Notification Period normally starts at...

- ☐ A Contract signature
- ☐ B The Taking-Over Certificate
- ☐ C The Performance Certificate
- ☐ D The first NCR

Q3

An ISO 9001 certification audit by an external body is a...

- ☐ A First-party audit
- ☐ B Second-party audit
- ☐ C Third-party audit
- ☐ D Self-assessment

Q4

Which is a LEADING quality KPI?

- ☐ A Cost of rework last month
- ☐ B Number of NCRs raised
- ☐ C % of crews trained and first-work inspected
- ☐ D Defects found after handover

Q5

The STAR method in interviews stands for...

- ☐ A Standard, Test, Audit, Report
- ☐ B Situation, Task, Action, Result
- ☐ C Start, Train, Assess, Repeat
- ☐ D Site, Team, Activity, Risk



Level Up! **Expert** unlocked

Great work. Here is what you can now do on site:

☆ Use FIDIC quality clauses

☆ Manage the DNP

☆ Lead and pass audits

☆ Build a KPI dashboard

☆ Drive continuous improvement

☆ Plan your certifications and career



You did it — **all 5 levels complete!** Keep the templates, glossary and cheat sheet close on site. 🏆

Your challenge: before moving on, do the 5-question quiz and check your answers at the back. Score 4/5 or more? You are ready for the next level. 🚀



TOOLKIT

Ready-to-use Templates

One page per document. Copy, add your logo, adapt to your PQP.



These templates follow the structure used on many GCC projects. Your Consultant may have their own format — always use the **approved project format** first.

Template	Use it for	Page
PQP outline	Contents checklist for a Project Quality Plan	93
ITP	Inspection & Test Plan for one activity	94
WIR	Work Inspection Request	95
MIR	Material Inspection Request	96
MAR	Material Approval Request	97
NCR	Non-Conformance Report	98
SOR	Site Observation Report	99
Pre-qualification checklist	Subcontractor / supplier / lab evaluation	100



How to adapt

- Keep the same numbering system as your document control procedure
- Add drawing/spec references to every form
- Make forms fillable PDFs or digital checklists
- Get the Consultant to agree the formats at project start



Common Mistake

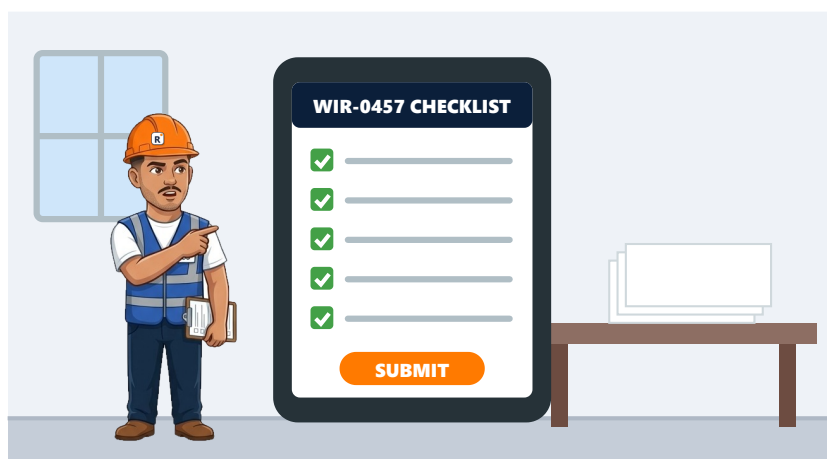
- ✗ Changing the form every month
- ✗ Forms with no space for comments
- ✗ No revision number on the template itself
- ✗ Signature boxes for people who never sign



More free templates & guides

New QA/QC templates and step-by-step guides (like *What is a WIR?*) are published on ruzani.com — free, no sign-up.

[Get free templates →](#)



Printed forms and a tablet showing a digital WIR on a site table

[COMPANY LOGO]	Project Quality Plan – Outline Contents checklist · tick when complete	Doc No: PRJ-___-PQP-___ Rev: ___ Date: ___ / ___ / ___ Page: ___ of ___	
1. PROJECT INFORMATION			
Project name:	Contract no.:		
Client:	Consultant / Engineer:		
Main contractor:	Location:		
2. CONTENTS CHECKLIST			
#	Section	Ref. / owner	✓
1	Purpose, scope and quality policy		
2	Project organisation chart and QA/QC roles		
3	Quality objectives and KPIs		
4	Document control and numbering procedure		
5	Submittal procedure (MAR, shop drawings, samples, mock-ups)		
6	RFI procedure		
7	Inspection and test procedure (WIR, MIR) + notice periods		
8	List of method statements and ITPs		
9	Testing laboratories and sampling plan		
10	Calibration control		
11	Non-conformance, SOR, NCR and CAPA procedure		
12	Subcontractor and supplier control (AVL)		
13	Material handling, storage and preservation		
14	Internal audits schedule		
15	Training and competence		
16	Records and registers list		
17	QA/QC – HSE interface		
18	Testing, commissioning and handover		
19	Defects notification period procedure		
20	Management review and reporting		
Remarks / notes:			
Prepared – QA/QC Manager Name: Signature: Date:		Reviewed – Project Manager Name: Signature: Date:	
		Approved – Consultant / Engineer Name: Signature: Date:	



Keep the PQP short and project-specific. Put long procedures in annexes and **reference** them.

 Write the **acceptance criteria as numbers** from your spec. "As per spec" helps nobody on site.

 Raise a WIR only after your own checklist is **100% done**. Attach the signed checklist.



Keep rejected material **tagged and separated** until it leaves site — never “just in case”.



The compliance table is where approvals are won. Fill **every** spec line — honestly.

[COMPANY LOGO]	Non-Conformance Report Raised by: ☐ Consultant ☐ Contractor QA/QC ☐ Client		Doc No: PRJ-__-NCR-__ Rev: __ Date: __ / __ / __ Page: __ of __
	NCR No.:	Date raised:	
Location / grid / level:	Discipline / activity:		
Subcontractor:	Category: ☐ Major ☐ Minor		
1. REQUIREMENT (spec / drawing / standard)			
2. DESCRIPTION OF NON-CONFORMANCE (facts + evidence)			
3. IMMEDIATE ACTION / CONTAINMENT			
4. PROPOSED DISPOSITION			
☐ Rework ☐ Repair (method attached) ☐ Use as is (designer approval) ☐ Reject / replace			
5. ROOT CAUSE (5 Whys / Fishbone)			
6. CORRECTIVE & PREVENTIVE ACTION			
Action		Owner	Due date
Contractor QA/QC Manager Name: Signature: Date:	Consultant – disposition approved Name: Signature: Date:	Closure verified (date) Name: Signature: Date:	



Facts, location, requirement, evidence. An NCR should make sense to someone who was **not** there.

[COMPANY LOGO]	Site Observation Report For minor issues and early warnings		Doc No: PRJ-__-SOR-__ Rev: __ Date: __ / __ / __ Page: __ of __
	SOR No.:	Date / time:	
Location:	Discipline / trade:		
Issued to:	Response required by:		
OBSERVATION			
PHOTO(S)			
[PHOTO 1]		[PHOTO 2]	
REQUIRED ACTION			
CONTRACTOR RESPONSE / ACTION TAKEN			
☐ Closed ☐ Not closed – escalate to NCR			
Issued by Name: Signature: Date:	Received by (contractor) Name: Signature: Date:	Closure verified by Name: Signature: Date:	



Use SORs generously and early. Ten closed SORs are better than one NCR.

[COMPANY LOGO]	Pre-qualification Checklist ☐ Subcontractor ☐ Supplier ☐ Testing laboratory		Doc No: PRJ-__-PQ-__ Rev: __ Date: __ / __ / __ Page: __ of __
	Company name:	Scope / package:	
CR / licence no. & expiry:	Contact person:		
DOCUMENTS RECEIVED			
Document	Received	Valid / expiry	Remarks
Company profile + organisation chart	☐		
Commercial registration / licences	☐		
ISO 9001 (and 14001 / 45001) certificates	☐		
Similar project references + completion letters	☐		
Key staff CVs + qualifications	☐		
Equipment list + calibration certificates	☐		
Product certificates / test reports (suppliers)	☐		
Accreditation scope ISO/IEC 17025 (labs)	☐		
HSE statistics + policy	☐		
Financial statements	☐		
SCORING			
Criterion	Weight	Score 1–5	Weighted
Technical experience	25%		
Quality system	20%		
Key staff	15%		
Resources / capacity	15%		
HSE performance	10%		
Financial stability	10%		
Past performance	5%		
Total	100%		
☐ Approved – add to AVL ☐ Conditional – improvement plan ☐ Not approved			
Remarks / notes:			
Evaluated by – Procurement Name: Signature: Date:	Evaluated by – QA/QC Name: Signature: Date:	Approved by Name: Signature: Date:	



Weights are an **example**. Agree them before you open the first submission — that keeps it fair.

A-Z

REFERENCE

Glossary of Abbreviations

Every short form used in this book.

A

ACI	American Concrete Institute
ASNT	American Society for Nondestructive Testing
ASQ	American Society for Quality
ASTM	ASTM International (standards body)
AVL	Approved Vendor List
AWS	American Welding Society

B

BBS	Bar Bending Schedule
BIM	Building Information Modelling
BOQ	Bill of Quantities
BS EN	British-adopted European Standard

C

CAPA	Corrective and Preventive Action
CBR	California Bearing Ratio
CDE	Common Data Environment
COPQ	Cost of Poor Quality
CQE	Certified Quality Engineer (ASQ)
CR	Commercial Registration
CWI	Certified Welding Inspector (AWS)
CxA	Commissioning Authority

D

DFT	Dry Film Thickness
DNP	Defects Notification Period

E

EDMS	Electronic Document Management System
-------------	---------------------------------------

F

FAT	Factory Acceptance Test
FDT	Field Density Test

FIDIC

International Federation of Consulting Engineers

FM

Facility Management

H

H / W / R Hold / Witness / Review point

HSE

Health, Safety and Environment

I

IFA Issued for Approval

IFC Issued for Construction

IFT Issued for Tender

IR Insulation Resistance

IRCA International Register of Certificated Auditors

ISO International Organization for Standardization

IST Integrated Systems Test

ITP Inspection and Test Plan

J

JSA Job Safety Analysis

K

KPI Key Performance Indicator

L

LD Liquidated Damages

M

MAR Material Approval Request

MDD Maximum Dry Density

MEP Mechanical, Electrical and Plumbing

MIR Material Inspection Request

MS Method Statement

MT Magnetic Particle Testing

MTC Mill / Manufacturer Test Certificate

N

NC / NCR Non-Conformance / Non-Conformance Report

Glossary (continued)

N

NDT	Non-Destructive Testing
NFPA	National Fire Protection Association

O

O&M	Operation and Maintenance
OFI	Opportunity for Improvement
OMC	Optimum Moisture Content

P

PAF	Prevention–Appraisal–Failure cost model
PDCA	Plan–Do–Check–Act
PMC	Project Management Consultant
PO	Purchase Order
POMI	Principles of Measurement International
PQ	Pre-qualification
PQP	Project Quality Plan
PQR	Procedure Qualification Record
PT	Penetrant Testing
PTW	Permit to Work

Q

QA	Quality Assurance
QA/QC	Quality Assurance / Quality Control
QC	Quality Control
QHSE	Quality, Health, Safety and Environment

R

RFI	Request for Information
------------	-------------------------

RT	Radiographic Testing
-----------	----------------------

S

SASO	Saudi Standards, Metrology and Quality Organization
-------------	---

SBC	Saudi Building Code
------------	---------------------

SCE	Saudi Council of Engineers
------------	----------------------------

SD	Shop Drawing
-----------	--------------

SDS	Safety Data Sheet
------------	-------------------

SOR	Site Observation Report
------------	-------------------------

STAR	Situation–Task–Action–Result
-------------	------------------------------

T

T&C	Testing and Commissioning
----------------	---------------------------

TAB	Testing, Adjusting and Balancing
------------	----------------------------------

TOC	Taking-Over Certificate
------------	-------------------------

U

UPV	Ultrasonic Pulse Velocity
------------	---------------------------

UT	Ultrasonic Testing
-----------	--------------------

V

VT	Visual Testing
-----------	----------------

W

WFT	Wet Film Thickness
------------	--------------------

WIR	Work Inspection Request
------------	-------------------------

WPQ	Welder Performance Qualification
------------	----------------------------------

WPS	Welding Procedure Specification
------------	---------------------------------



Learn 5 new abbreviations a day. In three weeks you will speak fluent “site”.



QUICK REFERENCE

Cheat Sheet

The whole book on two pages. Print, fold, keep in your pocket.

💡 QA vs QC

- QA = prevent (process, system)
- QC = detect (product, inspection)
- Prevention is the cheapest cost
- 1-10-100: later = costlier

👤 Who prepares / approves

- PQP, MS, ITP → Contractor / Consultant
- MAR, shop dwg → Contractor / Consultant
- RFI → Contractor asks, designer answers
- NCR → raised by issuer, disposition approved by Consultant

📋 Before you...

- Order → approved MAR + AVL vendor
- Start → approved MS + ITP
- Use material → accepted MIR
- Cover / pour → WIR Hold released

✅ ITP points

- H = Hold — work stops
- W = Witness — invite, may proceed
- R = Review — records only
- S = Surveillance — spot checks

📄 Review codes

- A = Approved
- B = Approved as noted
- C = Revise & resubmit (don't proceed)
- D = Rejected

📊 Escalation ladder

- Verbal → SOR → NCR → Stop-work
- Dispositions: rework, repair, use-as-is, reject
- Close on site, not on paper

🏠 Concrete

- Check ticket: mix, time, no added water
- Slump + temp. on first truck + per spec
- Specimens: 7 + 28 days, labelled, shaded
- Cure immediately; hot weather = night pours
- C30/37 = cylinder 30 / cube 37 MPa

🏗️ Rebar & formwork

- Size, spacing, cover, laps, links
- Clean bars, strong chairs, right spacers
- Release agent before rebar
- Props + standby vibrator before pour

⚡ Welding & NDT

- WPS = recipe · PQR = proof · WPQ = welder
- VT first, always
- PT/MT surface · UT/RT internal
- MT only on ferromagnetic steel

💧 Waterproofing

- Substrate dry, clean, coved
- Details: drains, upturns, penetrations
- Flood test before protection [VERIFY duration]
- Protect immediately

🔧 MEP testing

- Calibrated gauge + isolation list
- Test before closing ceilings / shafts
- Megger, continuity, polarity, RCD
- Pre-comm → start-up → TAB → IST

🔨 Finishes

- Mock-up first
- Tolerances measured (2 m straightedge)
- Tap test tiles + plaster
- Raking light before final paint

🔍 Root cause

- 5 Whys → stop at a system cause
- Fishbone: Man, Machine, Method, Material, Measurement, Environment
- Fix hierarchy: eliminate › mistake-proof › standardise › train › remind

📖 ISO 9001 clauses

- 7.1.5 calibration · 7.5 documents
- 8.4 suppliers · 9.2 internal audit
- 9.3 management review · 10.2 NCR + CA

📄 FIDIC 2017 (Red Book)

- 4.9 quality management system
- 7.3 inspection · 7.4 testing · 7.5 rejection
- 10.1 Taking-Over · 11 defects · 11.9 Performance Cert.
- Always read Particular Conditions

📊 KPIs to track

- WIR first-time approval %
- Open NCRs + ageing, repeat NCR %
- Test failure rate · calibration compliance
- Snags per unit · rework cost

👁️ Audit ready

- Registers up to date
- Previous findings closed
- Sample files: 3 WIRs per discipline
- Facts only, one voice

★ Ali's golden rules

- Not recorded = not done
- Check before you cover
- Quality is everyone's job
- When in doubt — RFI in writing



Values marked **VERIFY** depend on your project. When the spec and this sheet disagree — **the spec wins.**



CHECK YOURSELF

Quiz Answer Key

How did you score? 4/5 or more in every level = expert path unlocked.

Level 1 – Foundations

- Q1 B – QA prevents defects through planned processes.
- Q2 C – about 100× the design-stage cost (rule of thumb).
- Q3 C – the QA/QC Manager owns the PQP.
- Q4 A – Issued for Construction.
- Q5 C – Part 3 Execution (Field Quality Control).

Level 2 – Core Documents

- Q1 B – work must stop until the inspector releases it.
- Q2 C – an RFI asks the designer to clarify.
- Q3 C – do not proceed; revise and resubmit.
- Q4 B – an accepted MIR.
- Q5 B – the Taking-Over Certificate starts the DNP.

Level 3 – Site Practice

- Q1 B – sand cone or nuclear density gauge.
- Q2 B – 30 MPa cylinder / 37 MPa cube.
- Q3 C – MT needs ferromagnetic material.
- Q4 B – before the protection layer or screed.
- Q5 C – inform and check validity of sampling and testing.

Level 4 – Management

- Q1 B – it removes the cause (the checklist change).
- Q2 B – the 6M categories.
- Q3 B – clause 8.4.
- Q4 A – heat no. → MTC → MIR → element → WIR.
- Q5 C – mistake-proofing / eliminating the cause.

Level 5 – Expert

- Q1 B – Sub-Clause 4.9.
- Q2 B – at the Taking-Over Certificate.
- Q3 C – a third-party audit.
- Q4 C – % of crews trained and first-work inspected.
- Q5 B – Situation, Task, Action, Result.

Your score card

L1 ___ / 5
 L2 ___ / 5
 L3 ___ / 5
 L4 ___ / 5
 L5 ___ / 5
 Total ___ / 25



20+ out of 25? You think like a QA/QC professional. Now go and prove it on site! 🙌



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Thank you for reading!

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WIR-0457 CHECKLIST

- ☒ _____
- ☒ _____
- ☒ _____
- ☒ _____
- ☒ _____

SUBMIT