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CT-005 - MODULE 5 OF 5

# Fall Protection and Scaffolding Safety in Coating Work

The four-tier hierarchy of controls, the personal fall-arrest ABCDs, scaffold and ladder safety, and the coating-specific complications that change the answer in the field. Closing the Field Safety for Coating Inspectors set — the last of five Foundation-tier modules in the Coatings track.

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COATINGS TECHNOLOGY

FOUNDATION TIER

~25 MIN

## BY THE END OF THIS MODULE

# What you will be able to do.

- **Read a coating site for fall hazards** — recognize the height ranges, the locations, and the coating-specific surfaces that change the answer.
- **Walk the four-tier hierarchy of controls** from elimination through prevention, arrest, and administrative — landing on the highest tier the geometry allows.
- **Name the PFAS ABCDs** and the spec each one carries: anchorage rating, body-harness configuration, connector type, deceleration threshold.
- **Verify total fall distance** below the anchor for a shock-absorbing lanyard, and recognize when an SRL or restraint configuration is the right answer.
- **Inspect a scaffold** using the competent-person framework, the green / yellow / red tag system, and the common defect punch list.
- **Document a fall-protection work plan** that names the controls, the inspection schedule, and the rescue plan within the federal timing target.

7:00 AM — TANK FARM

# A 60-foot tank shell, two access methods staged.

Two-thirds of the perimeter is wrapped in a tube-and-clamp scaffold. The other third — the bermed side — is queued for a swinging stage rigged from anchor points on the tank roof.

The supervisor wants your read. Both setups are routine on coating sites. Both can be done correctly. Both are described in the federal fall-protection rules.

The question is not whether either method works. The question is which one belongs on this site, given what the geometry of the job actually allows.

## THE DECISION HAS WEIGHT

# The scaffold caps controls at guardrails. The swinging stage caps them at active arrest.

**Two defensible answers, two different tiers of control.** The scaffold delivers passive prevention — the fall is impossible because the geometry does not permit it. The swinging stage delivers active arrest — the fall happens, but the system stops it before injury, and worker discipline becomes the load-bearing factor.

Walking the hierarchy from the top is the move that turns the choice into a defensible answer. The framework is the focus of this module.

**Walk the hierarchy **from the top.****  
**The right answer is the highest tier the geometry of the job actually allows.**

## FIVE SECTIONS

# How this module is built.

1

**Where falls happen**

Heights routine. Coating-site locations. Why this trade is different.

2

**Hierarchy of controls**

Four tiers. Top-to-bottom walk. The framework.

3

**PFAS ABCDs**

Anchorage. Body harness. Connector. Deceleration. Clearance math.

4

**Scaffolds & ladders**

Three families. Inspection. Tagging. Defect punch list.

5

**Coating-specific**

Slick surfaces. Lanyard interference. Anchorage on coated surfaces. Weather.

## KEY TERMS — QUICK REFERENCE

# The vocabulary that the work plan uses.

**ROLES****Competent person**

A person who can identify hazards in surroundings or working conditions, and who has authorization to take prompt corrective action — including stopping the work.

**HARDWARE****Anchorage**

The point a fall-arrest system attaches to. Rated 5,000 lb per worker, or designed to 2× the maximum arresting force with a competent person's sign-off.

**SYSTEM****PFAS**

Personal fall-arrest system. Anchorage, body harness, connector, deceleration. Stops the fall before injury when worker action is in place.

**CONFIGURATION****Restraint**

Worker tethered short enough that the leading edge cannot be reached. The fall is impossible by geometry, not arrested by hardware.

**GEOMETRY****Leading edge**

The open edge of a roof, deck, pipe rack, or scaffold lift. Leading-edge work uses dedicated leading-edge-rated hardware.

**THRESHOLD****6 ft trigger**

The federal trigger height for fall-protection requirements on a construction-coating site. Most coating-work fall exposure clusters higher.

THE FOUR TIERS – PREVIEW

# The framework that picks the access method.

| Tier   | Control type   | What it does                                                                     | Worker action                                       |
|--------|----------------|----------------------------------------------------------------------------------|-----------------------------------------------------|
| Tier 1 | Elimination    | The work happens at ground level. The height exposure is removed entirely.       | None — the height is gone.                          |
| Tier 2 | Prevention     | A physical barrier makes the fall impossible without leaving the protected zone. | None — the barrier works on its own.                |
| Tier 3 | Arrest         | The fall happens, but the system stops it before injury.                         | Wear it, attach it, inspect it, know how to use it. |
| Tier 4 | Administrative | Procedures, training, observers, restricted-access zones, work-rest cycles.      | Follow the procedure every time.                    |



SECTION 1 OF 5

**Where falls happen on a coating site —  
and the hierarchy that picks the  
controls.**

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## THE EXPOSURE RANGES

# Most coating-work fall exposure clusters above the federal trigger.

**6 TO 30 FT****Routine industrial**

Tank-shell preparation and recoating on smaller above-ground tanks. Pipe-rack work. Vessel exterior coating in process plants. Most of this work happens from supported scaffolds, manlifts, or extension ladders.

**30 TO 100 FT****Mid-tier industrial**

Larger storage-tank shells. Bridge underdeck and superstructure access. Mid-rise water tanks. Industrial tower exteriors. Suspended scaffolds and powered manlifts dominate.

**100 FT AND ABOVE****Tall structures**

Tall stacks, communication towers, transmission structures, large bridges, elevated water tanks. Rope-access work, climbing stages, and specialty rigging dominate. The rescue window narrows.

**Federal trigger:** fall-protection requirements on a construction-coating site begin at 6 ft above a lower level — the height where active controls become mandatory, not the height where falls become serious.

## COATING-SITE FALL LOCATIONS

# Most exposure clusters in a small number of places.

## Structural geometry

- **Leading edges** of roofs, decks, pipe racks, partial scaffold lifts.
- **Scaffold platforms** — every type, including the gap to the structure.
- **Suspended platforms** — swinging stages, bosun's chairs, multi-point.
- **Aerial work platforms** — manlifts, scissor lifts, articulated booms.

## Access & openings

- **Ladders** — extension at the wrong angle, step ladders used as platforms.
- **Tank roofs** — slick crowns, wet primer, steep cone-roof slopes.
- **Holes & openings** — manways, hatches, blocked-out floor sections, removed handrails.
- **Stack and tower work** — climbing stages, cages, ropes, exposed lifts.

**The cluster is small.** Knowing it cold is the first move in any planning conversation — before the hardware decision, before the rigging plan, before the schedule.

THE HIERARCHY OF CONTROLS

# From highest reliability to lowest.

| Tier   | Control type   | Examples on coating sites                                                                                                      | Reliability driver                       |
|--------|----------------|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| Tier 1 | Elimination    | Prefab on the ground; coat structural steel before erection; use longer-reach lifts to bring the work to a stable platform.    | The hazard is gone.                      |
| Tier 2 | Prevention     | Tube-and-clamp scaffold with full guardrails; bermed roof platforms; tank-roof catwalks with continuous handrail; hole covers. | The barrier works without worker action. |
| Tier 3 | Arrest         | Personal fall-arrest systems on swinging stages, leading-edge work, rope-access on tall structures, climbing stages.           | Worker discipline + program.             |
| Tier 4 | Administrative | Documented work plans, morning briefings, observers, restricted-access zones, no-solo-work rules.                              | Procedure compliance every time.         |

## TOP-TO-BOTTOM – FOR EVERY HEIGHT TASK

# The right answer is the highest tier the geometry actually allows.

**Tier 1 first.** Can any of this work happen at grade? Prefab, sub-assembly, longer-reach lift, scheduling change. Costs nothing to ask. Sometimes changes the work plan.

**Tier 2 second.** Can a passive system reach the work? Full-guardrail scaffold, parapet, hole cover. The fall is impossible because the geometry does not permit it. No worker action required.

**Tier 3 third.** When the geometry won't allow Tier 1 or Tier 2, PFAS becomes the right answer. Bridge underdeck inspection. Stack work. Rope access. The framework does not say PFAS is wrong — it says PFAS is right when the higher tiers cannot deliver.

*Walk the hierarchy from the top. Land on the highest tier the geometry actually allows. Document the decision. The plan reads to the crew, the inspector, and the next shift the same way every time.*

SECTION 2 OF 5

# Personal fall-arrest systems — the ABCDs.

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## THE POINT EVERYTHING HANGS FROM

# Anchorage — if it fails, nothing downstream matters.

**RATING****5,000 lb per worker**

The static-load standard. Permanent anchor points on tank roofs, beam clamps, davits, certified-installed pad-eyes.

**ALT****Or 2× max arresting force**

Designed alternative under the personal fall-protection standard. Requires a competent person's sign-off and a documented design basis.

**FIELD****Field-rigged anchorage**

Wrapping a beam, choking a member, using improvised attachment. Competent person evaluates the configuration before the shift. Documents the call.

**FAIL****The shortcut**

"This looks strong enough." The default failure mode for anchorage. Replace it with the inspection log entry, the rating verification, and the sign-off.

DISTRIBUTES THE ARRESTING LOAD ACROSS THE BODY

# Body harness — full-body, dorsal D-ring at the back.

## Full-body only

Waist belts left fall-arrest service decades ago. The deceleration loads they put on the spine were not survivable. The full-body harness distributes the arresting load across chest, hips, and thighs.

## Dorsal D-ring at the back

Between the shoulder blades. The attachment point for fall-arrest. Front and side D-rings on some models are positioning, suspension, and rescue points — not arrest points.

**Front-D-ring attachment during a fall** produces a face-first arrest with loads concentrated on the wrong parts of the body. The dorsal D-ring is the only fall-arrest attachment.

**Inspection.** Webbing, stitching, hardware, buckles, D-rings, label legibility, date of manufacture. Per-shift visual; documented periodic inspection. Damaged components come out of service immediately.



## JOINS THE HARNESS TO THE ANCHOR

# Two main families — lanyard or self-retracting lifeline.

## Shock-absorbing lanyard

- Fixed-length tether, typically 6 ft.
- Tear-out shock pack absorbs energy during the arrest.
- Total fall distance to about 18 ft below the anchor.
- Right answer when clearance is generous — tank-shell exterior, structural steel.

## Self-retracting lifeline (SRL)

- Spring-loaded reel; locks within inches of fall onset.
- Total fall distance to about 4 to 5 ft.
- Right answer when clearance is tight — bridge underdeck, work close to grade.
- Leading-edge rating required for use over an edge.

**Connector hardware:** self-locking snap hooks or carabiners. No daisy-chained lanyards. No knot-tied connections. The connector matches the use case — not the storage convenience of the truck.

HOLDS THE PEAK LOAD ON THE WORKER UNDER 1,800 LB

# Deceleration — the part of the system that makes the arrest survivable.

## Without the shock absorber

A 6-ft free-fall on a static lanyard generates arresting forces in the 4,000 to 8,000 lb range — outside survivable limits.

The shock pack tears or deploys to absorb energy. Holds the peak on the worker to under 1,800 lb. After deployment, the system is one-shot — out of service.

## REQUIRED CLEARANCE

|                                |             |
|--------------------------------|-------------|
| Lanyard length                 | 6 ft        |
| Deceleration distance          | + 3.5 ft    |
| Harness stretch / D-ring shift | + 1 ft      |
| Worker height below D-ring     | + 5 ft      |
| Safety margin                  | + 2 ft      |
| <hr/>                          |             |
| Total below anchor             | about 18 ft |

**Less clearance than 18 ft below the anchor** means the lanyard is the wrong connector. SRL or restraint configuration is the right answer.

SECTION 3 OF 5

# Scaffold safety — the workhorse access method on industrial coating sites.

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SUPPORTED, SUSPENDED, MOBILE

# The three families of scaffolds.

## SUPPORTED

### Built up from a base

Tube-and-clamp, frame, system (Cuplok, Layher), tower scaffolds, baker scaffolds. Tank-shell exteriors, vessel work, pipe racks, structural steel.

## SUSPENDED

### Hung from above

Two-point swinging stages, single-point bosun's chairs, multi-point platforms. Tall tanks, stacks, tower work, bridge superstructures.

## MOBILE

### Rolling on casters

Rolling towers, baker (utility) scaffolds with casters, larger powered units. Plant interiors, warehouse coating, wide-open exteriors.

**Each family has its own inspection and operating discipline.** The competent person owns the call — before the shift, after weather, after structural alteration, before initial use after erection.

## LOAD RATINGS AND THE SUSPENDED-SCAFFOLD-ONLY RULES

# Capacity ratings, weather thresholds, independent fall arrest.

## Capacity ratings (load per square foot)

- **Light-duty** — 25 psf. Inspection access, light tools.
- **Medium-duty** — 50 psf. Most coating crews land here with paint pots, hoses, and full PPE.
- **Heavy-duty** — 75 psf. Abrasive blasting with material on the platform, heavy tooling.

## Suspended scaffolds — the extras

- **Independent fall arrest.** The platform is never the anchor — PFAS attaches to a separate roof anchor.
- **Wind threshold.** Stop-work at 30 mph in most jurisdictions; 25 mph in some sites.
- **Rigging certification.** Suspension hardware inspected before each shift.
- **Stop-work conditions.** Lightning, hail, freezing precipitation.

**Mobile scaffolds:** casters locked any time the platform is not actively being repositioned. Workers off the platform during repositioning. Height-to-base ratio constrained — typically 4× the smallest base dimension without outriggers.

## COMPETENT-PERSON DISCIPLINE

# The tag at the access point tells the crew what they're walking onto.

## GREEN TAG

Inspected and approved. Full use authorized.  
Date and inspector name on the tag.

## YELLOW TAG

Restricted use. Restrictions written on the tag — no top platform, fall-arrest required, weight limit reduced. Common during partial erection or after weather.

## RED TAG

Do not use. Scaffold is being modified, has failed inspection, or has a known defect.  
Workers do not cross the tag.

**Competent person:** a person who can identify hazards in surroundings or working conditions, and who has authorization to take prompt corrective action — including stopping the work. The authorization is part of the role, not an upward referral.

**Inspection cadence:** before each shift; after any storm, high-wind event, or structural alteration; before initial use after erection. The inspection log is the audit trail.

## THE FIELD PUNCH LIST

# What pulls a scaffold from service.

## Structural

- Damaged frames, dented or bent tubing, corroded couplers.
- Missing or improperly installed cross-bracing.
- Tie-ins to the structure missing or loose.
- Mud sills missing on soft ground; base plates not seated; casters not locked.

## Platform & access

- Missing toe boards; missing mid-rails; gaps in guardrails.
- Improper plank overhang at the bearer (typical 6 to 18 in).
- Distance from platform to structure greater than 14 in — the federal trigger for additional fall protection on the inboard side.
- Workers on the platform during erection or dismantling, before the structure is complete and tagged.

**Any of these:** the scaffold comes out of service until the competent person clears the defect and re-tags. Workers do not enter a scaffold without a current tag.

SECTION 4 OF 5

# Ladders — and the coating-specific complications.

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## THE SHORT VERSION

# Ladders — most-used, most-misused.

**EXTENSION****4-to-1 angle**

4 vertical rise for every 1 horizontal base out from the wall. Three-point contact climbing. Top extends 3 ft above the upper landing. Tie off the top to prevent shift.

**STEP****Locked spreaders**

Spreader bars locked before use. Top step never used as a step — the rating is invalidated when a worker stands on the cap.

**FIXED****Cage above 24 ft**

Cage required at heights above 24 ft on new installations under current federal rules. Phased compliance for older fixed ladders. Three-point contact applies.

**When the ladder is not the answer:** work that requires both hands, work longer than a few minutes at one position, work in wind above about 25 mph, anything where a manlift, bucket truck, or stage is feasible.

**Rule of thumb:** if the work takes longer than the climb up plus the climb down, the ladder is access only — the work itself happens on a stable platform.

## COATING-SPECIFIC COMPLICATION 1 AND 2

# The two complications that come up daily on a spray job.

## Slick surfaces

Overspray on guardrails. Wet primer on stage planks. Abrasive media on scaffold platforms. Rinse water from washdowns. Condensate on cooled steel.

The work plan names the surfaces that need cleaning before access, the cleaning schedule, and the responsibility. Slick surfaces are a daily issue, not an exception.

## Lanyard interference with spray

Spray gun, air hose, paint hose, and lanyard sharing the same shoulder turns into a tangle that pulls the gun off-target.

- **SRL** — smaller cable footprint than a 6-ft lanyard.
- **Rope grab** — auto-feeds with worker movement.
- **Restraint** — for non-leading-edge work; removes the tangle entirely.

The morning briefing names the configuration.

## COATING-SPECIFIC COMPLICATION 3

# The anchor is sometimes on the same shell that's mid-recoat.

## Cure-state coordination

The pad-eyes were prepped along with the rest of the roof. The new primer is on. Re-walking on the surface and re-rigging hardware is a "handle" event.

Most epoxy primers reach handle-cure in 4 to 8 hours at typical ambient temperature. The product data sheet defines the window. Handle cure has to be reached before the rigging starts.

## Rating documentation

The blast cycle may have removed or compromised the marking on the pad-eye. The competent person verifies the marking against the anchorage register; if illegible, the register entry and the welder's certification become the rating record.

New anchorage drilled into structural members requires competent-person approval before the work starts.

**The anchor doesn't change because the coating around it changed** — but the inspection has to happen because the coating around it changed. Documentation is the difference between routine and audited.

## COATING-SPECIFIC COMPLICATION 4

# Wind, ice, and the differential-expansion problem on tall tanks.

## Wind on suspended work

Federal rules call for stop-work on suspended scaffolds at 30 mph (25 mph in some jurisdictions). Gusts count, not just sustained wind. The threshold is a stop-work trigger that always stops the work; the judgment call is when to stop earlier.

## Ice and differential expansion

Heated tanks and steam-traced piping can run at 100°F surface temperature with ice on the access path from condensate. Sun-side heating and shade-side cooling on tall tanks creates differential expansion that loosens scaffold tie-ins.

Each surface is verified on its own.

*The work-area weather doesn't automatically describe the working surface weather. The competent person checks both.*

## PUTTING IT TOGETHER

# The work plan documents the controls-hierarchy walk for every height task.

1

**Task and exposure**

The work step, the height range, the duration.

2

**Control tier selected**

Why each higher tier was ruled out.

3

**Systems and components**

Specific scaffold type, anchor point, connector model, guardrail layout.

4

**Inspection schedule**

Who, when, what they sign, where the documentation lives.

5

**Rescue plan**

The method, the timing target (about 6 minutes for suspended-worker rescue), the staged equipment.

6

**Trigger conditions**

Weather thresholds, surface contamination, schedule changes that change the plan.

**The morning briefing walks the plan with the crew. The afternoon walk-down inspects the previous shift's work.** Documentation is the audit trail; it is also the record the next crew reads when the project rolls forward.

## THE HOOK RESOLVED

# The scaffold goes around the full perimeter.

**Tier 1.** Can the work happen at ground level? No — the shell is structurally fixed. Eliminated.

**Tier 2.** Can a passive system reach the bermed side with a re-sequenced erection plan? Yes, with about 8 hours of additional setup. The contractor's competent person has done it before. The scaffold delivers full guardrails on every level, no PFAS dependence, no fall-distance calculations to verify.

**Tier 3.** Can the swinging stage with PFAS do the bermed-side work? Yes — anchors are rated, harnesses are fit, the rescue plan is staged. But the controls cap at active arrest. Worker discipline becomes the load-bearing factor.

*The scaffold is the higher tier of control, the geometry allows it, and the schedule penalty is manageable. The supervisor re-sequences. The day is longer; the protection is higher in the hierarchy.*

## SET COMPLETE

# What you can do across the five modules of the set.

**Module 1****Hazard recognition**

Read a coating site for physical, chemical, and fire hazards. Recognize what's live in each category.

**Module 2****Confined space**

Read a permit, work the atmospheric monitor, name the three entry roles, recognize when the rules apply.

**Module 3****SDS & chemical safety**

Read an SDS in fifteen minutes. Find the hazards, the PPE, the emergency procedures.

**Module 4****Respiratory protection**

Pick the right respirator class by walking the seven-step decision sequence.

**Module 5****Fall protection**

Walk the controls hierarchy, pick the access method, document the work plan.

**The five modules together are the field-safety toolkit for coating-inspection work.** Hazard recognition, confined-space procedure, SDS reading and chemical safety, respiratory selection, and fall-protection systems. Five pieces of one toolkit.

**"FIELD SAFETY FOR COATING INSPECTORS" – COMPLETION CERTIFICATE**

# Set complete. The next set opens up when you're ready.

**COMPLETION CERTIFICATE**

## Field Safety for Coating Inspectors

Earned by completing all five modules in the Field Safety for Coating Inspectors set — the credential that says you can run the safety side of a coating site with the framework, the systems, and the discipline that the work needs.

- **Books** — Corrosion Prevention by Protective Coatings (Munger / Vincent). Coating Inspector Training Materials.
- **Federal regulation** — 29 CFR 1926 Subpart M (Fall Protection), Subpart L (Scaffolds), Subpart X (Stairways and Ladders); 29 CFR 1910.28 / 1910.29 (Walking-Working Surfaces); 29 CFR 1910.140 (Personal Fall Protection Systems).
- **Industry standards** — ANSI / ASSP Z359 series (Fall Protection Code); ANSI A14 series (Ladders); ANSI / ASSP A10.8 (Scaffolding Safety). SSPC / AMPP guidance on coating inspection at height.

**PATH FORWARD**

## The next set in your CT track opens up when you are ready.

The work in the field is what sharpens the framework. Every job adds a case the framework didn't quite predict. Read each module again when a job comes up that lives in its space. The Foundation tier is the foundation. The field is where it gets tested.