
CT-003 • MODULE 3 OF 5

Hazardous Materials in Coatings

SDS Sheets and Chemical Safety. Read the SDS, run the verification, escalate the right thing.

COATINGS TECHNOLOGY TRACK

FOUNDATION TIER

FIELD SAFETY FOR COATING INSPECTORS

~30 MINUTES

BY THE END OF THIS MODULE

You'll be able to -

- Name the 16 SDS sections and identify what's actionable in each for the field tech.
- Identify hazardous ingredients in a coating product via CAS number and concentration range.
- Describe the lead-removal verification step and the regulated-work-area controls when lead is confirmed.
- Explain the four elements of a HazCom program: container labels, training, written program, SDS access.
- Apply emergency procedures from SDS Sections 4, 5, and 6 — and recognize when an incident requires external escalation.

THE PAIL IN FRONT OF YOU

Five gallons of unfamiliar chemistry, fifteen minutes to know what it is

A new product on the truck. Brand name on the label. GHS pictograms. Hazard statements. The lid hasn't come off yet. Inside is a chemistry that's about to be on a steel surface in a few minutes.

The label answers a slice of what a tech needs to know. The Safety Data Sheet — the SDS — answers the rest. Reading it isn't a clerical exercise. It's the move that turns an unfamiliar product into a known hazard with named controls.

QUESTIONS A TECH NEEDS TO ANSWER

Bigger than what's on the label

- What's actually in the pail — both as a hazard class and as the specific compounds doing the work?
- What PPE does the SDS recommend, and why?
- What happens if it gets on skin? In an eye? Onto a hot surface? Into a drain?
- If something goes wrong, what's the first move?

The SDS is the document that takes a tech from "never worked with this product before" to "knows what it does, what it can hurt, and how to handle it" — in fifteen minutes of reading.

THE FRAME

Chemistry into procedure

Reading the SDS isn't **filing**. It's the move that turns chemistry into **procedure**.

01

IDENTIFY

What's in the container

Section 3 lists ingredients by CAS number and concentration. That's exactly what you're handling, in writing.

02

PROTECT

What gear it takes

Section 8 translates the chemistry into the PPE, ventilation, and engineering controls the work actually requires.

03

RESPOND

What to do when something goes wrong

Sections 4, 5, and 6 turn an incident from improvisation into a known sequence. Read before, not during.

ROADMAP

Five sections, in this order

01**The SDS**

Document of record. 16
standardized sections.

02**The 16 sections**

What's in each. What's
actionable.

03**Ingredients**

CAS numbers. Concentration.
Patterns.

04**Lead + heavy metals**

Pre-1978 presumption.
Verification. Controls.

05**HazCom + emergency**

The program. The escalation.

SECTION 1 · THE SDS

What the SDS is. Why it has 16 sections.

THE MSDS TO SDS TRANSITION

Same 16 sections, same order, every product, worldwide

The Safety Data Sheet replaced the older MSDS format around 2012 to 2015 in the US, as part of OSHA's adoption of the UN Globally Harmonized System (GHS).

The point of the change was alignment — same format used in the US, EU, Asia, and elsewhere, with the same 16 sections in the same order. A worker reading an SDS in one country can find the same information in the same place as a worker reading it in another.

Older paperwork on a job site may still say "MSDS." Information is similar but not always identically structured. Confirm the format before relying on the document.

THE HAZCOM PROGRAM HOLDS THE SDS

Site office binder or digital archive

Supervisor's responsibility

Maintain SDS for every product on site — every coating, solvent, abrasive, and ancillary product the crew is working with. Keep them accessible during every shift.

Worker's responsibility

Read the SDS when an unfamiliar product enters the work zone. Federal HazCom rules give every worker the right to access during the shift; the value comes from actually using the right.

SECTION 2 · THE 16 SECTIONS

**What's in each. What's
actionable.**

THE "WHAT IS IT AND WHAT CAN IT DO TO YOU" BLOCK

The first four sections

SECTION 1**Identification**

Product name, manufacturer, emergency contact phone, recommended use. The first call after an exposure incident.

SECTION 2**Hazards Identification**

Hazard classification, GHS pictograms, signal word ("Danger" or "Warning"), hazard statements. The at-a-glance summary.

SECTION 3**Composition**

Actual chemicals + CAS numbers + concentration ranges. Where the product's chemistry lives.

Section 4 — First-Aid Measures. Skin, eye, inhalation, ingestion responses. Specific to the product. *Read this BEFORE the work, not while you're rinsing someone's eye.*

THE "HOW TO HANDLE IT AND WHAT TO DO WHEN IT GOES WRONG" BLOCK

The next four sections

SECTION 5

Fire-Fighting

Suitable extinguishing media. Hazardous combustion products. Coating fires often produce toxic smoke that ordinary fire response isn't ready for.

SECTION 6

Spill Response

Containment, clean-up, environmental precautions. The first move when a pail goes over.

SECTION 7

Handling + Storage

Safe handling, storage conditions, incompatibilities. Ignition-source separation, ventilation, segregation.

Section 8 — Exposure Controls / PPE. Respirator type, glove material, eye protection, ventilation, exposure limits (TLV, PEL). *The section the work plan's PPE list ultimately comes from.*

THE SCIENCE BEHIND THE PROCEDURE

The numbers and the long-term picture

SECTION 9**Physical / Chemical**

Boiling point, flash point, vapor pressure, density, solubility, specific gravity. The numbers that ground the fire and chemical-hazard analysis.

SECTION 10**Stability + Reactivity**

Conditions to avoid, incompatible materials, hazardous decomposition products. Whether the product reacts badly with water, acids, oxidizers.

SECTION 11**Toxicology**

Acute and chronic exposure effects by route, target organs, carcinogenicity, sensitization, reproductive effects. Long-term-exposure picture.

LESS DIRECTLY ACTIONABLE, BUT SPECIFIC CASES TRIGGER THEIR USE

The remaining five sections

- **Section 12 — Ecological Information:** environmental fate and effects. Matters for spill response and disposal planning.
- **Section 13 — Disposal Considerations:** how to dispose of unused product, contaminated containers, contaminated PPE. Often a hazardous-waste pathway.
- **Section 14 — Transport Information:** DOT / IMDG / IATA classification, UN number, packing group. For shipping to or from a job site.
- **Section 15 — Regulatory Information:** specific federal and state regulations that apply (TSCA, SARA, Prop 65, etc.).
- **Section 16 — Other Information:** date of preparation, revision history, references. The version-currency check.

Field-actionable concentration is in Sections 1 through 11. Sections 12 through 16 are reference data that specific situations call out.

SECTION 3 · HAZARDOUS INGREDIENTS

Section 3. Where the chemistry actually shows up.

TRADE NAMES VARY. CAS NUMBERS DON'T.

One number per chemical, no ambiguity

Chemical names vary. Manufacturers use trade names. Some chemicals have multiple synonyms.

The **Chemical Abstracts Service (CAS) Registry Number** is the unique identifier — one CAS number per chemical, no ambiguity. When you look up a chemical to learn more about it (toxicity profile, exposure limits, regulatory status), the CAS number is what gets you the right entry.

Ignore the trade name. Track the CAS number for any ingredient you want to research.

WHAT SECTION 3 TELLS YOU AND WHAT IT DOESN'T

Ranges, thresholds, and what's NOT listed

Concentration ranges

Section 3 typically lists concentration as a percentage range — e.g., "10 to 30%." The range exists because manufacturers can keep exact formulations confidential as trade secret.

Hazardous ingredient at 0.1 to 1% = trace level. Same ingredient at 10 to 30% = major component. The hazards of the ingredient drive the hazards of the product.

Federal disclosure thresholds

1% for most hazardous chemicals.

0.1% for known carcinogens.

Anything above those thresholds has to be disclosed in Section 3. *Anything below those thresholds may not appear at all.* Absence isn't presence-not-zero.

WHAT TO EXPECT TO SEE IN COATING-PRODUCT SECTION 3

Five patterns to recognize

- **Solvents** — toluene, xylene, MEK, mineral spirits, glycol ethers. Flammability and inhalation hazards mostly from these.
- **Isocyanates** in 2K urethanes — HDI homopolymer, HMDI, MDI. Sensitizers — recognize them when they appear; respiratory PPE step-up follows automatically.
- **Amines** in 2K epoxies — diethylenetriamine, triethylenetetramine, polyamide curing agents. Skin sensitizers; glove and face-shielding discipline drives from here.
- **Heavy metals** — lead compounds, chromates (zinc chromate, strontium chromate), cadmium pigments. Modern formulations have moved away, but legacy and specialty products still contain them.
- **Crystalline silica** in some abrasive blast media. The respirable-silica hazard.

SECTION 4 · LEAD AND HEAVY METALS

The legacy-coatings depth.

PRE-1978 METAL STRUCTURE PRESUMPTION

Lead-based industrial paints were standard through the 1970s

Federal rules treat any pre-1978 coating on a metal structure as presumed lead-containing until laboratory testing confirms otherwise.

Where lead-based paints were used

- Bridges
- Water towers
- Ships
- Locks and dams
- Oil and chemical storage tanks
- Heavy industrial equipment

The legacy lead pigments

- **Red lead** — primary inhibitor pigment in vinyl primers
- **Lead chromates** — chrome yellows, chrome oranges
- **Metallic lead** — secondary pigments

Used because they were effective inhibitors. Phased out because of worker-health costs.

TEST BEFORE BLASTING, NOT AFTER

Paint-chip sampling to a certified lab

Paint-chip samples collected from representative locations on the structure, sent to a certified analytical laboratory, results in hand BEFORE any abrasive blasting starts.

Why the timing matters. Blasting is what aerosolizes the lead. Once impact starts on an untested coating, exposure has begun and the regulatory framework activates. "We'll send chips in if there's time" doesn't satisfy the standard. The work plan flexes around the test result, not around the schedule.

LAYERED CONTROL SET

"Coating recoat" becomes "regulated lead-removal"

- **Containment** — physical enclosure around blasting work, often negative-pressure to keep dust at the source
- **Restricted access** — regulated entry only, signage, transition zones
- **Hygiene facilities** — wash stations, dedicated work clothing, lockers, decontamination shower at exit on larger jobs
- **Air monitoring** — sampling tracks airborne lead vs. action level (30 ug/m3 8-hr TWA) and PEL (50 ug/m3 8-hr TWA)
- **Medical surveillance** — workers above the action level enrolled, periodic blood-lead testing, medical-removal protections if blood-lead climbs
- **Hazardous-waste handling** — spent abrasive plus removed coating is hazardous waste with separate disposal pathway, manifests, documentation

WHAT STANDARD COATING PPE DOESN'T COVER

The full PPE set for confirmed-lead work

- **Disposable Tyvek-class coverall** — seam-sealed, with hood, to keep lead-contaminated abrasive and dust off skin and street clothes
- **Full-face HEPA respirator** at minimum (above the action level); supplied-air at higher exposures
- **Chemical-rated gloves** dedicated to the work, taped at the cuff to the coverall
- **Dedicated work boots** that stay on site, or boot covers worn and disposed
- **Eye protection** integrated into the full-face respirator

The depth on respirator selection vs. supplied-air decision logic lives in the next module.

LEAD IS THE MOST-REGULATED, BUT NOT THE ONLY ONE

Three other metals worth knowing

HEXAVALENT CHROMIUM

Cr VI

In chromate primers and some industrial coatings. **Known human carcinogen** with its own federal exposure rule.

CADMIUM

Pigments + plating

In some coating pigments. Has its own federal exposure rule. Often phased out in modern formulations.

ZINC

Zinc-rich primers

Mostly a fume hazard during welding on coated steel — not a concern during normal coating application.

Section 3 names them. The regulatory regime defines the controls.

SECTION 5 · HAZCOM

The program around the SDS.

THE SDS DOESN'T WORK ALONE

Container labels + training + written program + SDS access

- **Container labeling** — every container of a hazardous chemical has a label. Manufacturer's GHS label on original; in-house label on secondary containers (the bucket transferred for the day's work). A pail with no label or only a marker scrawl doesn't meet the standard.
- **Worker training** — required before assignment to work involving hazardous chemicals, and again whenever a new chemical hazard is introduced. Covers labels, SDS reading, workplace hazards, controls, release response.
- **Written program** — the contractor's document tying it together: chemicals on site, SDS binder location, label compliance, training records, non-routine task procedures.
- **SDS access** — every worker has the right to access during their shift. Site office binder or digital archive.

THE STANDARDIZED SHORTHAND ON EVERY GHS LABEL

Six common pictograms on coating products

- **Flame** — flammable. Almost every solvent-borne coating.
- **Exclamation mark** — irritant or low-grade health hazard.
- **Health hazard** (silhouette with starburst on chest) — sensitizer, mutagen, carcinogen, reproductive toxin, target-organ toxicity. The category most coating cure chemistries fall under.
- **Skull and crossbones** — acute toxicity, severe.
- **Corrosion** — corrosive to skin, eyes, or metals.
- **Environment** — dead fish symbol, hazardous to aquatic life.

Same set, in the same form, on every GHS-compliant product worldwide.

SECTION 6 · EMERGENCY PROCEDURES

**Sections 4, 5, 6 — read before the
incident, not during it.**

WHEN PREVENTION HAS ALREADY FAILED

What's in Sections 4 / 5 / 6, and when to escalate beyond

SECTION 4**First Aid**

By exposure route — skin (rapid wash), eye (15-min flush), inhalation (fresh air + medical), ingestion (NO induced vomiting, call poison control).

SECTION 5**Fire-Fighting**

Extinguishing media + hazardous combustion products + special PPE for firefighters. Coating fires often produce toxic smoke ordinary response isn't ready for.

SECTION 6**Spill Response**

Eliminate ignition, contain with absorbent (varies by product), collect to hazardous-waste containers, document.

Escalate when: release reaches surface water / groundwater / stormwater inlet, federally-listed hazardous substance exceeds reportable quantity, worker injury beyond first aid, uncontrolled fire or explosion, public complaint. *Late notification is worse than over-notification.*

BOOKEND

Same scene. Framework activated.

Walk back to the truck. Five-gallon pail of new coating, label visible, GHS pictograms, lid still on.

Two reads, fifteen minutes total:

- **The label first** — product name, manufacturer, GHS pictograms, signal word. The immediate hazard summary.
- **The SDS second** — fifteen minutes focused on Sections 2 (hazards), 3 (composition), 4 (first aid), 6 (spill), 7 (handling), 8 (PPE), 9 (physical/chemical numbers).

The work plan takes its PPE from Section 8 plus the site safety plan. The supervisor's briefing references Section 4 in case of an incident. The HazCom program holds the whole stack together.

WHAT TO WALK AWAY WITH

The SDS turns chemistry into procedure.

- **The SDS is the document of record.** 16 standardized sections in fixed order. GHS-compliant since 2012-2015 transition from MSDS
- **The 16 sections** — field-actionable concentration is in Sections 1 through 11. Sections 12 through 16 are reference data
- **Section 3 is where the chemistry is** — chemical name, CAS number, concentration range. Disclosure thresholds: 1% for most hazardous, 0.1% for known carcinogens
- **Lead in legacy coatings** — pre-1978 metal structures presumed lead-containing until tested. Verification before disturbance. Regulated work area + full lead-removal PPE + medical surveillance + hazardous-waste handling
- **Other heavy metals** — hexavalent chromium (Cr VI, known carcinogen), cadmium, zinc. Section 3 names them; regulatory regime defines controls
- **HazCom program** — labels + training + written program + SDS access. The four elements interact
- **Emergency procedures** — Sections 4/5/6 walk first aid, fire, spill response. Read before the incident. Escalate the right things

FURTHER READING + THE NEXT MODULE

Sources used + where this goes

- Munger, Corrosion Prevention by Protective Coatings
- AMPP / NACE Coating Inspector Training Materials
- 29 CFR 1910.1200 - Hazard Communication (general industry)
- 29 CFR 1926.59 - Hazard Communication (construction)
- 29 CFR 1910.1025 - Lead (general industry)
- 29 CFR 1926.62 - Lead in Construction
- 29 CFR 1910.1026 - Hexavalent Chromium
- 29 CFR 1910.1027 - Cadmium
- 29 CFR 1926.1153 - Respirable Crystalline Silica
- 40 CFR Part 261 - EPA Hazardous Waste Identification
- UN GHS - Globally Harmonized System
- ANSI Z400.1 / Z129.1 · NFPA 704 · ACGIH TLVs

UP NEXT

Respiratory Protection for Coating Environments

The depth behind the Section 8 PPE recommendations. Cartridge selection logic, fit testing, when supplied-air becomes the standard, and how the HazCom and respiratory rules interact.