

SECTION 32 17 23

LINE STRIPING AND SAFETY MARKINGS

DTI LineMark System

PART 1 - GENERAL

1.1 SUMMARY

A. This Section covers layout and application of interior line striping and safety markings on concrete floors using the DTI LineMark Striping System, including:

1. Pedestrian walkways and travel lanes.
2. Forklift and vehicle traffic lanes.
3. Work zones and production cell markings.
4. Staging boxes, storage squares, and pallet positions.
5. Pedestrian crosswalks at aisle and lane intersections.
6. Safety borders around equipment, pits, docks, and restricted areas.
7. Equipment outlines, column markings, and floor identification as scheduled.

B. Facilities include warehouses, distribution centers, and manufacturing plants. The work includes preparation and approval of a striping plan, surface preparation, an adhesion test patch, application of the scheduled material class, and protection of the markings through the specified traffic return time.

1.2 REFERENCES

- A. ASTM D711 - Standard Test Method for No-Pick-Up Time of Traffic Paint.
- B. ASTM D2486 - Standard Test Methods for Scrub Resistance of Wall Paints, used as a comparative abrasion reference for marking materials.
- C. 29 CFR 1910.176(a) - OSHA requirement that permanent aisles and passageways be appropriately marked.
- D. 29 CFR 1910.22 - OSHA walking and working surface requirements.

1.3 DEFINITIONS

- A. Striping Plan: the layout drawing or marked-up floor plan showing the location, width, color, and material class of every marking, approved by the Owner before application.
- B. Test Patch: a small area of marking material applied to the actual floor under the same preparation and conditions as production work, used to verify adhesion and appearance before full application.
- C. Traffic Return: the point at which a cured marking may be opened to the specified traffic, stated separately for foot traffic and for wheeled and forklift traffic.
- D. Wear Surface: a surface-applied marking that is consumed by traffic over time and is renewed by re-striping rather than repaired.

1.4 SUBMITTALS

- A. Striping plan or floor plan markup showing all markings, dimensions, colors, and material classes for Owner approval.
- B. Product data for the scheduled marking material: DTI LineMark, DTI LineMark Epoxy, or DTI Poly Guard.
- C. Color schedule identifying the color of each marking type.

- D. Cure and traffic return data for the scheduled material class.
- E. Maintenance and re-stripe instructions for the finished markings.

1.5 QUALITY ASSURANCE

- A. Pre-installation conference with the Owner, General Contractor, and striping contractor to confirm the striping plan, material class for each area, colors, line widths, surface preparation, phasing, and traffic return requirements.
- B. Installer qualifications: minimum five years of industrial floor marking experience and completed striping projects of similar size in operating warehouse or manufacturing facilities.
- C. Adhesion verification: no production striping shall proceed on polished, sealed, or coated floors until a test patch under 1.6 has cured and passed.
- D. Application conditions: apply markings only on dry floors, at floor and air temperatures within the material manufacturer's stated range, and in areas cleared of traffic and operations for the full application and traffic return period.

1.6 TEST PATCH

- A. Before production work, apply a test patch of the scheduled material, minimum 10 linear feet of line, on each distinct floor type to be striped (polished, sealed, or coated), prepared exactly as the production work will be prepared.
- B. Allow the test patch to cure to its full traffic return time, then verify adhesion by firm tape pull and knife cross-cut check. A test patch that lifts, peels, or releases the underlying coating has failed.
- C. Where a test patch fails, adjust the preparation method (see 3.2), change the material class, or add a primer, and repeat the test patch until adhesion passes. The passing test patch establishes the preparation and material standard for that floor type.
- D. The approved test patch may remain as part of the finished markings if it falls within the approved layout.

1.7 DESIGN LIMITATIONS AND EXCLUSIONS

- A. Striping is a wear surface. Markings are consumed by tire traffic, dragging pallets, and turning wheels, and shall be renewed by re-striping. High-traffic crossings, dock approaches, and tight turning areas wear first and fastest; shortened service life in those locations is expected and is not a defect.
- B. Markings are only as sound as the surface under them. Markings applied over a failing, peeling, or delaminating coating will fail with that coating. Coating failure under a marking is not a marking failure, and repair of the underlying coating is excluded from this Section.
- C. This Section does not include complete removal of existing markings. Loose and failing existing markings are removed under 3.2; sound existing markings scheduled for removal, ghosting elimination, and blackout or cover-up work are included only where scheduled in the striping plan.
- D. Faint ghost images of removed or relocated markings may remain visible in the floor and are not a defect.
- E. Colors fade gradually under abrasion, tire marking, and ultraviolet exposure at dock doors and glazed openings. Color change alone, without loss of the marking, is not a defect.
- F. Markings do not correct floor defects. Lines follow the floor as it exists; slab joints, cracks, slopes, and surface irregularities will show through the marking.
- G. Slip characteristics: markings have a different surface texture than the surrounding floor, particularly when wet. Walkway markings in wet or washdown areas shall be scheduled with an anti-slip additive where required by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. DTI LineMark Striping System: a family of interior floor marking materials sharing one layout, preparation, and application standard, with the material class selected per area based on durability requirements and available return-to-service time.
- B. Single-component striping paint: DTI LineMark, a single-component industrial striping paint for interior concrete, fast drying and economical to renew. Standard class for pedestrian walkways, staging boxes, and light traffic areas, and for layouts expected to change.
- C. Two-component epoxy striping: DTI LineMark Epoxy, a two-component epoxy marking material providing the highest abrasion and chemical resistance of the system. Standard class for forklift lanes, crosswalks, dock areas, and other heavy traffic markings where the longest service life is required.
- D. Polyaspartic striping: DTI Poly Guard, a polyaspartic marking material providing epoxy-class durability with a fast cure for facilities that cannot close lanes or areas overnight. Standard class for phased work in operating facilities and expedited traffic return.
- E. Colors: safety yellow is the standard color for traffic lanes, walkways, and safety borders. White is standard for staging boxes, storage squares, and equipment outlines. Other colors, including red for restricted and fire access areas, blue, and green, as scheduled in the approved striping plan.
- F. Primer: a compatible bonding primer for use over polished, sealed, or coated floors where the test patch under 1.6 shows one is required.
- G. Anti-slip additive: fine broadcast or admixed aggregate for markings in wet areas, washdown zones, and ramps, where scheduled.
- H. Cleaning and preparation materials: neutral or alkaline degreaser compatible with the existing floor finish, and masking tape and layout materials that leave no residue on the floor.

2.2 EQUIPMENT

- A. Walk-behind line striping machine capable of holding a consistent line width and crisp edge, or spray and roller equipment appropriate to the material class and line width scheduled.
- B. Mechanical preparation equipment: auto scrubber, swing buffer or diamond grinding equipment with vacuum dust collection, sized to the preparation specified in 3.2.
- C. Layout equipment: chalk lines, laser line projector, steel tape, and removable layout tape.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify the condition of each floor type to be striped. Identify whether the surface is polished, sealed, or coated, and document the condition of any existing coating, including peeling, delamination, and worn areas.
- B. Verify floors are clean, dry, and free of standing water, oil accumulation, shrink wrap, pallets, and stored materials in the work area before layout begins.
- C. Document existing markings, including locations scheduled to remain, to be removed, and to be relocated, with photographs before starting.

3.2 PREPARATION

- A. Cleaning: scrub the full striping area with an auto scrubber and the specified degreaser, with particular attention to tire tracks, oil spots, and forklift lanes. Rinse or recover all residue and allow the floor to dry completely. Markings applied over dirt, dust, or oil will not adhere and are not acceptable.
- B. Existing markings: remove loose, peeling, and failing existing markings by mechanical means. Sound existing markings that fall outside the approved layout are addressed as scheduled under 1.7.
- C. Mechanical preparation: where scheduled, and wherever striping is applied over sealed or coated floors, lightly abrade the striping path by diamond grinding, sanding, or scrub pad to remove surface gloss and provide tooth for adhesion. Vacuum or scrub all preparation dust from the path before application. The preparation method used on the approved test patch is the minimum preparation for production work.
- D. Masking: mask line edges where required for crisp borders at boxes, outlines, and intersections. Remove masking within the material's stated working time so edges cure clean.

3.3 LAYOUT AND APPROVAL

- A. Lay out all markings with chalk lines or layout tape in accordance with the striping plan, at the widths, dimensions, and locations shown.
- B. Standard line width is 4 inches. Other widths, including 2 inch, 3 inch, and 6 inch lines, as scheduled in the approved striping plan.
- C. Walk the complete layout with the Owner before any material is applied. Application shall not begin until the Owner approves the layout in writing. Layout changes requested after approval, including relocated lines and added markings, are a change in the work.
- D. Verify aisle widths, crosswalk locations at every pedestrian crossing of a traffic lane, and clearance at racking, docks, and equipment against the approved plan during the layout walk.

3.4 APPLICATION

- A. Apply the scheduled material class in accordance with the manufacturer's instructions, at the wet film thickness required for full opacity over the existing floor color. Apply a second coat where one coat does not achieve full opacity or the specified film build.
- B. Lines shall be straight, uniform in width within 1/4 inch, and finished with clean, crisp edges. Boxes and outlines shall be square to the references in the approved plan.
- C. Apply markings over polished, sealed, and coated floors only in areas prepared under 3.2 and proven by the approved test patch under 1.6. Do not apply markings over wet floors, curing compounds not scheduled for removal, or coatings documented as failing under 3.1.
- D. Keep application areas closed to all traffic until the traffic return times in 3.5 are met. Barricade wet markings and post the return time at each closure.

3.5 CURE AND TRAFFIC RETURN

- A. General: cure and traffic return times are minimums at 70 degrees F and moderate humidity. Cold floors, high humidity, and heavier film builds extend these times. The striping contractor shall confirm actual return times on site before reopening an area.
- B. DTI LineMark (single-component): dry to no-pick-up in 15 to 30 minutes per ASTM D711 principles; foot traffic in 1 hour; wheeled and forklift traffic in 24 hours.
- C. DTI LineMark Epoxy (two-component): foot traffic in 8 to 12 hours; wheeled and forklift traffic in 48 hours; full chemical cure in 5 to 7 days. Do not drag pallets across epoxy markings during the first 7 days.
- D. DTI Poly Guard (polyaspartic): foot traffic in 1 to 2 hours; wheeled and forklift traffic in 4 to 6 hours; full cure in 24 hours.

E. Traffic returned before the specified time that damages a marking is excluded from warranty correction, and repair of that damage is a change in the work.

3.6 FIELD QUALITY CONTROL

A. Verify line widths, dimensions, and locations against the approved striping plan, and colors against the approved color schedule.

B. Verify edges are crisp, lines are continuous without skips or holidays, and boxes and outlines are fully closed.

C. Perform tape-pull adhesion spot checks at a minimum of one location per floor type and per shift of application. Markings that release at a spot check shall trigger additional preparation or a material change for the remaining work on that floor type.

D. Compare production adhesion and appearance against the approved test patch. Work visibly below the test patch standard shall be corrected.

3.7 DURABILITY, MAINTENANCE, AND TURNOVER

A. Durability expectations, under normal warehouse and manufacturing traffic and with the material class matched to the traffic under 2.1:

1. Pedestrian walkways and staging areas: 18 to 36 months before renewal is typically required.
2. Forklift lanes and main travel aisles: 12 to 24 months.
3. Crosswalks, intersections, dock approaches, and turning areas: 6 to 12 months; these locations wear first and are renewed most often.
4. Single-component markings in traffic areas wear at the short end of these ranges; two-component epoxy and polyaspartic markings wear at the long end.

B. Maintenance: clean markings with the same neutral cleaning program used on the surrounding floor. Do not use aggressive solvents or steel brushes on markings. Tire marks on light colored markings are a maintenance item, not a marking failure.

C. Re-stripe intervals: inspect markings at 6 month intervals. Plan re-striping when a marking has lost legibility or more than approximately 25 percent of its width or continuity in traffic paths, and budget crossings and dock areas on a shorter cycle than lanes and boxes. Re-striping follows the preparation, test patch, and application requirements of this Section.

D. Turnover: remove all masking, chalk, layout materials, and barricades; deliver the approved striping plan as built, the maintenance instructions, and the traffic return confirmation for each area.

END OF SECTION 32 17 23