

# D-350 HI-TEMP<sup>®</sup> DEVELOPER

Approved All Groups, MIL-I-25135 Rev. C



## PRODUCT INFORMATION

**Description:** D-350 along with KO-17 Penetrant and KO-19 Cleaner comprise Sherwin Incorporated's **Hi-Temp Penetrant System**, which works at temperatures above which ordinary penetrants are ineffective.

D-350 developer consists of refined white particles suspended in isopropyl alcohol to give enhanced sensitivity for locating tight, incipient flaws. By solvent and capillary action, it pulls flaw-entrapped penetrant to part surfaces for display against a white background.

D-350 is not recommended for use at temperatures lower than 175°F. At lower temperatures, D-350 dries more slowly. Also, the particles are more adhering at lower temperatures and require greater effort to remove upon completion of the inspection process. Removing D-350 requires wiping with water-dampened toweling.

The product meets low sulfur, halogen, and sodium requirements.

**Companion Materials:** Use KO-19 Cleaner and KO-17 Penetrant.

**Container Sizes:**

- case of 12 aerosol cans
- one-gallon cans
- case of 4 one-gallon cans
- five-gallon pail
- 55-gallon drum

**Basic Instructions:** (These instructions describe the basic process. They may need to be amended by the user to comply with applicable specifications and/or inspection criteria provided by the contracting agency.)

1. **Cleaning:** Cleaning may be unnecessary prior to applying Hi-Temp<sup>®</sup> KO-17 Penetrant because the penetrant itself is highly detergent and dissolves organic contaminants, especially on heated surfaces. In addition, at higher temperatures certain contaminants, such as oils, greases, and waxes, will liquify and be easily displaced, while other contaminants, such as water and solvents, will evaporate. Even so, it may be necessary to use Hi-Temp<sup>®</sup> KO-19 Remover before applying the penetrant.
  - a. **KO-19 Application:** Spray or brush Hi-Temp<sup>®</sup> KO-19 Remover on the surface and allow to dwell for 1 to 4 minutes; use shorter times for higher temperatures and less contamination.

Wipe KO-19 Remover from the surface with clean, dry cloth or paper towels. Then, wipe with water saturated towels. A final wipe with dry towels in order to speed drying may be required at lower temperatures.

Repeat the application/wiping procedure if necessary.
  - b. **Drying:** The part must be dry before applying Hi-Temp<sup>®</sup> KO-17 Penetrant. Hotter parts dry more quickly than cooler parts.
2. **Apply Penetrant:** Spray or brush Hi-Temp<sup>®</sup> KO-17 Penetrant on a limited area. It is important that the area to which the penetrant is applied not be too large so processing can be completed within penetrant and developer dwell time restraints. The acceptable area size will vary with inspection temperatures, part geometry, and operator experience.

The penetrant must dwell on the part in order to penetrate surface flaws. At higher temperatures, penetration occurs more quickly. The following table suggests how KO-17 dwell times vary with temperature. Allowances must be made for contamination levels and flaw sizes.

225° - 350°F	30 seconds to 1 minute
175° - 225°F	1 - 2 minutes
125° - 175°F	2 - 3 minutes
75° - 125°F	3 - 10 minutes
50° - 75°F	10 - 30 minutes

3. **Remove Excess Penetrant:** It is important that all excess penetrant be removed, otherwise the developer step may be adversely affected.

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a. **Wipe Surface:** Remove as much **Hi-Temp® KO-17 Penetrant** as possible using paper or soft, clean cloth towels to wipe the surface.

b. **Apply Remover:** Use **Hi-Temp® KO-19 Remover** to clean remaining penetrant from the surface. **KO-19** may be directly sprayed in a thin coat and immediately wiped from the surface. If part surfaces are smooth, using **KO-19** may be unnecessary. In either case, as a final step, the part should always be wiped with a water saturated towel or cloth to remove the last traces of penetrant. Immediately follow water wipe with a dry wipe.

Note: The surface must be completely free of both penetrant and remover, or **Hi-Temp® D-350 Developer** will not lay in an even coat.

c. **Drying:** Use paper or cloth toweling to dry the part's surface thoroughly. Special drying time before applying developer to heated parts should not be required.

4. **Apply Developer:** Two non-aqueous developers may be used with the **Hi-Temp®** system: **D-100**, a conventional developer which is recommended for temperatures from 50° - 175°F, and **D-350** which is recommended for temperatures between 175°F and 350°F. When temperatures exceed 175°F, and the more they approach 250°F, the more **D-350** is preferred. (A separate information sheet is available for **D-350**.)

The developer should be sprayed on the part surface from a distance of 6-8 inches immediately after the excess penetrant has been removed and the part has dried. Apply a thin even coat over the entire surface to which **KO-17 Penetrant** was originally applied; two or three thin coats are preferred to a single, heavy coat. If penetrant removal is incomplete, the developer will not go evenly on the part.

5. **Observe Indications:** Observe the surface for defect indication formation while the developer is applied.

At high temperatures, flaw indications appear almost instantly. Color depth is greatest within a few seconds after applying developer. Therefore, final surface examination should begin within a minute or two after developer application.

At high temperature, developed indications have a tendency to spread and lose their definition more rapidly. Moreover, some color fading with extended development times must be anticipated. Surface examination should be completed as quickly as practical, and within ten or fifteen minutes.

**General Information:** Do not attempt to inspect large areas that cannot be processed quickly. Permitting the penetrant to dwell longer than maximum times produces color degradation and excess vapors. Also, penetrant indications lose their resolution and tend to fade when exposed to heat.

### **Applicable Specifications:**

AMS-2644  
ASME Codes III and V

MIL-I-25135 Rev. C  
RDT F3-6T

Navships 250-1500  
ASTM E-165

## **PRECAUTIONARY INFORMATION**

**D-350** is highly flammable; flash point approximately 53°F. Fight small fires with carbon dioxide or dry chemical extinguishers. The greatest hazard is high vapor concentration which can result in fire or explosion, or can anesthetize personnel. Use in well ventilated area. Avoid prolonged or repeated inhalation of vapor. Avoid contact with skin. Do not take internally; if taken internally contact physician. In the event of a spill, eliminate all sources of ignition, stand by with fire extinguisher, and contact authorities. Never puncture, heat, or burn spray cans: store at less than 120°F; keep out of direct sun.