

KO-17 HI-TEMP® DYE PENETRANT

Approved Type II, Methods A & C, MIL-I-25135 Rev. D & E, and AMS-2644
Approved Group III of MIL-I-25135 Rev. C



PRODUCT INFORMATION

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

KO-17 is a red colored, water-washable dye penetrant liquid used to locate cracks, laps, pores, lack of bonding, and similar surface flaws in any insoluble, nonporous substance including both ferrous and nonferrous metals. Referred to as the "visible dye penetrant" method or "color contrast" method of inspection.

Special Features: KO-17 Dye Penetrant is effective at higher temperatures, up to 350°F. Using the **Hi-Temp Penetrant System** can lower inspection costs, and waiting times are reduced. KO-17 offers the following advantages.

1. KO-17 performs more reliably over a greater range of temperatures.
2. KO-17 when used with KO-19 Cleaner and D-100 Developer does an excellent job of finding cracks at normal and, even, low temperatures. Also, in a manual wipe method, at lower temperatures, the penetrant removal step is too laborious for routine use.
3. KO-17 is better at showing shallow flaws than conventional penetrants. However, the penetrant is not as fluid at lower temperatures. So penetrant dwell time should be longer.
4. Water washable; easy to remove when used as intended.

Companion Materials:

Developers -	Sherwin D-100 Nonaqueous (form d) Sherwin D-350 Hi-Temp Nonaqueous (form d)
Removers -	Sherwin KO-19 Hi-Temp Remover

Container Sizes:	case of 12 aerosol cans one-gallon cans case of 4 one-gallon cans five-gallon pail 55-gallon drum
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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® 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® KO-19 Remover** before applying the penetrant.
 - a. **KO-19 Application:** Spray or brush **Hi-Temp® 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® KO-17 Penetrant**. Hotter parts dry more quickly than cooler parts.
2. **Apply Penetrant:** Spray or brush **Hi-Temp® 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.

SHERWIN
INCORPORATED

5530 Borwick Ave.
South Gate, CA 90280
(562) 861-6324
FAX (562) 923-8370

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.
 - 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:** Allow the part to dry completely before applying developer. 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.

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:

MIL-I-25135 Rev's. C & D & E
ASME Code III and V
RDT F3-6T

AMS-2644
MIL-STD-271 E

ASTM-E-165
Navships 250-1500

PRECAUTIONARY INFORMATION

KO-17 is a combustible liquid. Use with adequate ventilation and away from sparks, fire or open flame. Avoid prolonged or repeated contact with skin. Do not take internally. Avoid prolonged or repeated breathing of vapors. Read the label on the container for additional precautionary information. Never puncture, heat, or burn spray cans: store at less than 120°F; keep out of direct sun.