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## Technical Data Bulletin

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### TURCO DY-CHEK PENETRANT STEP 2 AERO

Material No. 382782 / 379181

BY THE HAND WIPE OR SOLVENT REMOVAL METHOD

Material No. 385491 (Handikit)

#### **DESCRIPTION:**

TURCO DY-CHEK PENETRANT INSPECTION is a method of non-destructive testing which effectively detects material discontinuities open to the surface. It is one of the most sensitive of the penetrant inspection techniques.

#### **FEATURES:**

TURCO DY-CHEK SOLVENT REMOVAL METHOD offers these benefits:

1. Exposes surface discontinuities in magnetic and nonmagnetic parts.
2. Detects very minute flaws.
3. Economical to use.
4. Results are easy to see within minutes.
5. Ideal for spot application on both small and large articles.
6. Conforms to MIL-I-25135D & E, NAVSEA 250-1500-1 and many other industry specifications.

TURCO DY-CHEK HAND WIPE OR SOLVENT REMOVAL PROCESS may be conducted at locations where water for rinsing is not available or prohibited as in NAVSEA 250-1500-1, where inspection volume does not warrant a production line installation, or where spot application on large parts is required.

#### **PROCEDURE:**

The following steps are necessary to obtain accurate results:

1. Clean and dry parts.
2. Apply TURCO DY-CHEK PENETRANT.
3. Apply TURCO DY-CHEK REMOVER #3.
4. Dry.
5. Apply TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER.
6. Inspect and Evaluate.
7. Post-cleaning.

1. **PRECLEANING AND DRYING:**

It is absolutely necessary that parts be dry and free from all surface contamination. Not only can surface soils cover or bridge a discontinuity, inhibiting entrance of the dye penetrant, they can also absorb the penetrant and render a false indication. Typical surface soils which must be removed include oils, rust, paint, carbon, grease, oxide deposits, and residues from previous inspections. Your HENKEL Representative will assist you in precleaning and post cleaning product recommendations. Product recommended for this step is Turco Prechek LF Cat.No. 15883.

**CAUTION:**

TURCO PRE-CHEK LF contains hydrocarbons. Use with adequate (equivalent to outdoor) ventilation. Avoid prolonged breathing and contact with eyes, skin and clothing. Do not take internally Refer to product label, or HENKEL MATERIAL SAFETY DATA SHEET for additional precautionary, handling, disposal or first aid information. Do not use near open flames, torches or welding arcs, since product and propellant are FLAMMABLE.

Ultrasonic cleaning techniques have been found to assist in removing penetrant residues and other contamination for critical parts.

Abrasive cleaning, such as vapour blasting with coarse abrasive, is not recommended since it tends to peen flaws and obscure their detection. When an abrasive surface finishing method is used prior to inspection, an etch treatment is recommended.

Before penetrant application, it is absolutely necessary that all parts be dry. Drying may be accomplished by any conventional method.

2. **APPLYING TURCO DY-CHEK PENETRANT:**

Application of the dye penetrant is the second step in the penetrant inspection process. This step must not be attempted until precleaning and drying have been completed.

TURCO DY-CHEK PENETRANT is a red liquid which penetrates surface discontinuities, even extremely minute ones. Apply TURCO DY-CHEK PENETRANT liberally, either by brush, spray or dip methods. Under normal conditions, a penetrant dwell time of 10 minutes is sufficient. Shorter dwell times on the order of 1 - 5 minutes are generally adequate. Some trial of the process on known flaws is helpful in establishing the optimum dwell times and technique to be employed.

**CAUTION:**

TURCO DY-CHEK PENETRANT contains petroleum distillates. Avoid contact with eyes and skin. Do not take internally. Use with adequate (equivalent to outdoor) ventilation. Do not use near open flames, torches or welding arcs, since hazardous gases\* may be formed.

\*Aerosol Cans only

Refer to container label, HENKEL MATERIAL SAFETY DATA SHEET for additional handling, precautionary, disposal, and first aid information.

3. **APPLYING TURCO DY-CHEK REMOVER #3:**

The next step in the process is penetrant removal. Wipe off the excess penetrant with clean, dry rags or absorbent paper towels. Dampen a rag or towel with TURCO DY-CHEK REMOVER #3 and remove any remaining surface penetrant by hand wiping.

**CAUTION:**

TURCO DY-CHEK REMOVER #3 contains petroleum distillates. Avoid contact with eyes, skin and clothing. Do not take internally. Use with adequate (equivalent to outdoor) ventilation. Do not use near open flames, torches or welding arcs, since hazardous gases\* may be formed.

\*Aerosol Cans only

4. **DRY:**

Before application of the developer, it is necessary to dry all parts. A clean dry cloth or towel is usually sufficient to dry the parts.

5. **APPLY TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER:**

The next step in the TURCO DY-CHEK PENETRANT PROCESS is the application of DY-CHEK/FLURO CHEK NAD DEVELOPER. The Developer serves two purposes.

- a. A fine film of TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER applied to the parts provides a white contrasting background for the red TURCO DY-CHEK PENETRANT.
- b. It draws the penetrant from flaws to the surface of the part so it can be readily observed and evaluated.

Spray a thin, even coating of TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER onto the area being inspected. TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER is a liquid suspension of a powdered absorbent material and must be thoroughly agitated before use to insure complete suspension.

Spray application of TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER should be employed since this method provides a thin, even coating, precluding laps and runs, and insures clear flaw indications: A spray gun with an atomising tip, operated with a minimum flow of developer under 25 to 30 psi air pressure, is recommended. The rapid drying of TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER exposes indications as rapidly as parts can be handled. When spraying facilities using compressed air are not available, a light even coating of developer may be applied by means of the TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER press spray

aerosol containers. TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER should be applied in a spray booth or in a well ventilated area.

The application of TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER is somewhat critical. Application of a thin uniform film is essential. Too light a film will provide insufficient background for good detection; too heavy a film will tend to obscure the indications. A few experimental trials will familiarise the operator with the desired developer film thickness.

For coarse, deep defects, bleed-out into the developer will continue for some time, causing the indications to run together and lose their definition. In such instances, observation of indications should be made as soon as the developer dries.

#### **CAUTION:**

TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER contains alcohol, silica and calcium carbonate. Avoid contact with eyes, skin and clothing. Do not take internally. Use with adequate (equivalent to outdoor) ventilation. Do not use near open flames, torches or welding arcs, since hazardous gases may be formed.

Refer to container label, HENKEL MATERIAL SAFETY DATA SHEET for additional handling, precautionary, disposal and first aid information

#### **6. INSPECTION AND EVALUATION:**

As the TURCO DY-CHEK/FLURO CHEK NAD DEVELOPER dries to a smooth even white coating, red indications will appear at the locations of defects. If the inspection process has been properly performed and no red indications appear, there are no surface discontinuities present. Depth of discontinuities will be indicated by richness of the red colour and speed of bleed-out.

Since red indications will remain visible until wiped off manually, there is no need to rework defective parts immediately. If salvage is practical, defective parts can be reworked with the location and extent of flaws still showing, thus, simplifying repairs.

The extent and seriousness of the flaws are evaluated by trained personnel.

#### **7. POST CLEANING:**

To remove residual penetrant following the process, it has been found that vapour degreasing or a suitable solvent removal method is generally adequate. Prior to vapour degreasing, remove developer residues by flushing with water applied by spray. Parts need to be dried before vapour degreasing. For critical cleanliness, such as that required for some aerospace applications, ultrasonic cleaning techniques have been found to be satisfactory.

#### **DISPOSAL INFORMATION:**

Dispose of all materials per local, state and regional regulations. Refer to your local HENKEL REPRESENTATIVE or HENKEL MATERIAL SAFETY DATA SHEET for additional disposal information.

## TURCO DY-CHEK VISIBLE PENETRANT SYSTEMS

CAT NO.	PRODUCT	DESCRIPTION	MIL-1 25135D&E	PROCEDURE
15883	PRE-CHEK LF Cleaner and Remover Aero - Step 1	Clear fast drying hydrocarbon solvent. Used to pre-clean surfaces prior to penetrant application. Also used to remove surface penetrant.	Type I & II METHOD C Class (1)	For precleaning brush or spray liberally on surface to be inspected. Wipe clean with lint free towel or cloth. For removal of surface penetrant wipe with dampened lint Free towel or cloth. <u>Product is flammable.</u>
15045 15799 15370	DY-CHEK PENETRANT Aero - Step 2 Bulk Kit	Red liquid penetrant for detection of surface flaws by post-emulsification or solvent wipe methods.	Type II METHODS B & C	Apply by dip, brush or spray. Dwell 5-10 min. Use Remover or Pre Chek LF to remove surface penetrant. Develop with NAD Developer. Dry parts before applying NAD Developer.
15046 15800	DY-CHEK REMOVER Aero - Step 3 Bulk	Clear non-halogenated solvent used to remove surface penetrant by hand wipe method.	Type I & II METHOD C Class (2)	Remove excess penetrant from surface by first wiping with a dry lint free towel or cloth. Remove remaining surface penetrant by wiping with towel or cloth dampened with Remover.
15043 15797	DY- CHEK/FLUROCHEK NAD DEVELOPER Aero - Step 4 Bulk	Non-aqueous suspension which dries to an absorbent white film drawing penetrant from flaws to surface.	Type I & II  Form d, METHODS A,B,C,D	Apply thin even coating to dry surface by spray. Allow to dwell 5-30 min. Inspect.
15370	DY-CHEK HANDI-KIT	4 Steps, aerosol kit in carry case.		

# TURCO DY-CHEK PENETRANT INSPECTION

## BY THE POST EMULSIFICATION METHOD

**Material No's. 379181 / 382782 / 385491**

The TURCO DY-CHEK Post Emulsification Process may be conducted at any location where water for rinsing is available and convenient to use. Either a continuous production line scale or a simple spot application may be used, depending on volume, type of parts and frequency of inspection.

Where a high volume of production parts are being inspected, the preferred method of TURCO DY-CHEK Penetrant Inspection is through a production line operation consisting of spray booths or tanks, rinse facilities, a drying station and a developer application booth. The following steps are necessary to obtain accurate results.

### **PROCEDURE:**

1. Clean and dry parts.
2. Apply TURCO DY-CHEK Penetrant and allow excess to drain.
3. Apply TURCO DY-CHEK Remover.
4. Rinse.
5. Dry.
6. Apply TURCO DY-CHEK Developer.
7. Inspect and evaluate.
8. Post cleaning.

### **1. PRECLEANING AND DRYING:**

Before the penetrant inspection is performed, it is absolutely necessary that parts be dry and free from all surface contamination. Not only can surface soils cover or bridge a discontinuity, inhibiting entrance of the dye penetrant, they can also absorb the penetrant and render a false indication. Typical surface soils which must be removed include oils, rust, paint, carbon, grease, oxide deposits and residues from previous inspections. Your HENKEL REPRESENTATIVE will assist you in precleaning and post cleaning product recommendations.

Ultrasonic techniques have been found to be an ideal way to remove penetrant residues and other contamination for very critical parts. Abrasive cleaning, such as vapour blasting with coarse abrasives, is not recommended since it tends to peen flaws and obscure their detection. When an abrasive surface finishing method is used prior to inspection, an etch treatment is recommended.

Before penetrant application, it is absolutely necessary that all parts be dry. Drying can be accomplished by a conventional method.

### **2. APPLYING TURCO DY-CHEK PENETRANT:**

Application of the dye penetrant is the second step in the penetrant inspection process. This step must not be attempted until precleaning and drying have been completed.

TURCO DY-CHEK PENETRANT is a red liquid which penetrates surface discontinuities, even extremely minute ones. Evaluation of the size, shape and number of specific articles to be inspected will determine whether spraying, brushing, or dipping should be employed as the method of penetrant application. If only certain critical areas are to be inspected, application of the TURCO DY-CHEK PENETRANT can be confined to these areas by spraying or brushing. However, if a great number of parts are to be inspected simultaneously, dip application of the TURCO DY-CHEK PENETRANT may prove more desirable.

If perforations are suspected of extending through the entire thickness of the part, the bleed-through method may be employed. In this application of the DY-CHEK PENETRANT INSPECTION PROCESS, the DY-CHEK PENETRANT is applied to one surface of the part, and the developer is applied to the opposite surface. Flaws which extend completely through the article are shown as red indications on the white developer background.

Under normal conditions, a penetrant dwell time of 10 minutes is sufficient. Shorter dwell times on the order of 1 to 5 minutes are generally adequate. The area being inspected should be kept wet with penetrant during dwell time. Allow the excess penetrant to drain before removing. This procedure is normally performed by dipping the part into a tank of penetrant and placing it on a drain tray. The penetrant can then penetrate and drain simultaneously. Baskets of parts are allowed to drain over the penetrant tank or on a drain tray draining back into the tank to conserve product.

Some trial of the process on known flaws are helpful in establishing the optimum dwell times and technique to be employed.

**CAUTION:**

TURCO DY-CHEK PENETRANT contains petroleum distillates. Avoid contact with eyes and skin. Do not take internally. Use with adequate (equivalent to outdoor) ventilation. Do not use near open flames, torches or welding arcs, since hazardous gases\* may be formed.

*\* Aerosol Cans only*

Refer to container label or HENKEL MATERIAL SAFETY DATA SHEET for additional precautionary, handling and first aid information.

3. **APPLYING TURCO DY-CHEK REMOVER:**

After the excess penetrant has drained from the parts, an emulsifier which renders the part water-washable is applied to the area that has been exposed to the penetrant. Where the penetrant has been applied by dip operation, it is also convenient to apply the emulsifier by the immersion process.

Apply TURCO DY-CHEK REMOVER over the area covered with TURCO DY-CHEK PENETRANT. Avoid overly long dwell times, 30 seconds dwell is normally sufficient and shorter dwell times may be advisable for extremely shallow discontinuities. Longer times may be necessary on certain types of surfaces, such as porous castings.

**CAUTION:**

TURCO DY-CHEK REMOVER contains petroleum distillates. Avoid contact with eyes, skin and clothing. Do not take internally. Use with adequate (equivalent to outdoor) ventilation. Do not use near open flames, torches or welding arc, since hazardous gases\* maybe formed.

*\*DY-CHEK REMOVER in Aerosol containers only.*

Refer to container label, HENKEL Material Safety Data Sheet for additional precautionary, handling and first aid information.

4. **RINSE:**

Flush TURCO DY-CHEK REMOVER and emulsified penetrant from the surface of the part with a stream or spray of water until the surface is free of red coloration. Avoid over rinsing which may tend to remove penetrant from discontinuities. Inadequate rinsing and over-rinsing will become apparent with experience. Trial applications will help establish proper rinse parameters.

5. **DRYING:**

Following rinsing, parts should be allowed to air dry or drying can be accelerated by placing the wet parts in a drying oven at up to 82°C for a sufficient time. Overly long drying times should be avoided.

6. **APPLYING TURCO DY-CHEK DEVELOPER:**

The next step in the TURCO DY-CHEK PENETRANT process is the application of TURCO DY-CHEK DEVELOPER. The Developer serves two purposes:

1. A fine film of TURCO DY-CHEK DEVELOPER applied to the part provides a white contrasting background for the red TURCO DY-CHEK PENETRANT.
2. It draws the penetrant from flaws to the surface of the part where it can be readily observed and evaluated.

**IMPORTANT** - SHAKE AEROSOL CANS WELL.

Spray a thin, even coating of TURCO DY-CHEK DEVELOPER onto the area being inspected. TURCO DY-CHEK DEVELOPER is a liquid suspension of a powdered absorbent material and must be thoroughly agitated before use to insure complete suspension.

Spray application of TURCO DY-CHEK DEVELOPER should be employed since the method provides a thin, even coating, precluding laps and runs, and insures clear flaw indications. A spray gun with an atomising tip, operated with a minimum flow of developer under 35 to 30 psi air pressure is recommended. The rapid drying of TURCO DY-CHEK DEVELOPER exposes indications as rapidly as parts can be handled. When spraying facilities using compressed air are not available, a light even coating of developer may be applied by means of TURCO DY-CHEK DEVELOPER press spray aerosol containers. TURCO DY-CHEK DEVELOPER should be applied in a spray booth or in a well ventilated area.

The application of TURCO DY-CHEK DEVELOPER is somewhat critical. Application of a thin uniform film is essential. Too light a film will provide insufficient background for good detection; too heavy a film will tend to obscure the indications. A few experimental trials will familiarise the operator with the desired developer film thickness.

For coarse, deep defects, bleed-out into the developer may continue for some time, causing the indications to run together and lose their definition. In such instances, test evaluations should be made as soon as the developer dries.

**CAUTION:**

TURCO DY-CHEK DEVELOPER contains alcohol, silica and calcium carbonate. Avoid contact with eyes, skin and clothing. Do not take internally. Use with adequate (equivalent to outdoor) ventilation. Do not use near open flames.

Refer to container label or HENKEL MATERIAL SAFETY DATA SHEET for additional handling, precautionary, disposal and first aid information.

7. **INSPECTION AND EVALUATION:**

As TURCO DY-CHEK DEVELOPER dries to a smooth, even white coating, red indications will appear at the location of defects. If the inspection has been properly performed and no red indications appear, there are no surface discontinuities present. Depth of discontinuities will be indicated by richness of the red colour and speed of bleed-out.



Since red indications will remain visible until wiped off manually, there is not need to rework defective parts immediately. If salvage is practical, defective parts can be reworked with the location and extent of flaws still showing, thus, simplifying accurate repair.

The extent and seriousness of the flaws can be evaluated by trained personnel.

8. **POST CLEANING:**

To remove residual penetrant following the process, it has been found that vapour degreasing or a suitable solvent removal method is generally adequate. Prior to vapour degreasing, remove developer residues by flushing with water applied by spray. Parts need to be dried before vapour degreasing. For critical cleanliness, such as that require for some aerospace applications, ultrasonic cleaning techniques have been found to be satisfactory.

**DISPOSAL INFORMATION:**

Dispose of all materials per local, state and regional regulations. Refer to your local HENKEL REPRESENTATIVE or HENKEL MATERIAL SAFETY DATA SHEET for additional disposal information.

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