## TKS ANTI-ICE LEADING EDGE POROUS PANEL - ADJUSTMENT/TEST

# 1. General

- A. This section contains the procedures to remove (purge) the air from the porous panels on the wing, wing strut, and horizontal and vertical stabilizer leading edges. The porous panel flow operational test is also in this section. The procedures apply to the cargo pod and the fairing TKS system installation.
- B. The porous panel flow operational test is applicable when you need to do a test if the TKS system is serviceable.
- C. The panel purge and test procedures are only necessary after you install a replacement porous panel, or if you remove and install or replace the fluid tank.
- D. The function of the panel purge and test procedures is to remove most of the air and make the membrane in the panel completely wet and to make sure that there is no leakage from the panel and its connections to the tubing.
- E. Recommended maintenance to keep the TKS fluid at its correct viscosity is as follows:
  - Operate the pumps monthly, or as necessary, in the HIGH mode until the air is removed from the fluid system.
  - Keep the TKS system operational at all times to keep air pockets out of the system.
  - If the fluid tank is removed and installed or replaced, do the porous panel purge and test procedures.
  - NOTE: If the fluid is too thick, the porous panels can become blocked or clogged.

## 2. Tools and Equipment

- A. For a list of tools and equipment, refer to Ice and Rain Protection General.
  - NOTE: It is necessary that you have access to clean dry cloths, 30 gallons of approved TKS fluid, a TKS system test cart with connection hardware, 75 psi filtered shop air (to use with a test cart), and a container with a capacity of three to five gallons.
  - NOTE: You can fabricate a fluid collector system, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.

## 3. Porous Panel Purge and Test

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

- WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed because it is possible that high pressure is still in the system.
- WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.
- WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.
- CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.
- CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.
- CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.
- CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and 5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling as shown in Figure 501. This will help to prevent fluid leakage from the coupling. Refer to TKS Anti-Ice Fluid Distribution System - Maintenance Practices for Nylon Tubing Repair/Replacement.
- A. Do the Panel Purge and Test (Refer to Figure 501 and Figure 502).
  - (1) Remove external electrical power from the airplane.
  - (2) Disengage the circuit breakers on the left circuit breaker panel that follow:
    - PRIMARY ANTHCE
    - W/S ANTHCE

BACKUP ANTHCE.

- (3) On airplanes that have the G1000 system installed, disengage the ENG INTFC circuit breaker on the avionics circuit breaker panel.
- (4) On airplanes that do not have the G1000 system installed, disengage the ANTI-ICE GAGE circuit breaker on the left circuit breaker panel.
- (5) To get access to the tubing for the vertical panel at the proportioning unit in the tail bracket assembly, remove tailcone access panel 320A. Refer to Chapter 6, Access Plates and Panels Identification Description and Operation.
- (6) To get to the horizontal panel fittings, remove the access panels 373BL and 374BR Refer to Chapter 6, Access Plates and Panels Identification Description and Operation as applicable.
- (7) To get access to the wing panel fittings, remove wing access panels 501BB, 501EB, 503AB, 503DB, and 503HB left, or 601BB, 601EB, 603AB, 603DB, and 603HB right as applicable. Refer to Chapter 6, Access Plates and Panels Identification Description and Operation.

NOTE: On airplanes that have a radome installed on the right wing, you can only remove wing access panel 603AB.

- (8) Attach a fabricated fluid collector system below the area of the panel that will be purged.
  - NOTE: You can fabricate a fluid collector system, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material. Refer to Ice and Rain Protection - General.
- (9) Disconnect the fluid inlet tube from the panel fitting.
  - NOTE: The strut panel has two membranes (upper and lower). Each membrane has a fluid supply tube. You can install a tee fitting and connect the test cart supply tube to each membrane.
- (10) Connect the test cart fluid supply tube to the fluid inlet fittings.
  - NOTE: On the vertical stab panel and strut panel the test cart must be connected to the tubing, since you cannot get access to the fittings. Label the strut tubing to make sure that it is connected to the correct fittings when the test is complete.
- (11) Follow the operation and safety instructions that are supplied with the test cart.
  - (a) Use the Panels Installed on Aircraft TKS Panel Test section of the TKS Ice Protection Panel Flow Check Procedure Using TKS System Test Cart publication.
- (12) Slowly start the fluid flow through the panel at 10 psi.
  - (a) Correct any leaks as needed.
- (13) Set the fluid pressure to 20 psi.
- (14) When fluid starts to come through panel pores along the entire length of the panel set the pressure as appropriate to each panel. Refer to Table 1
- (15) Increase the pressure at the test cart outlet as follows:

## Table 501. Panel Purge Pressure Table

PANEL PURGE PRESSURE TABLE		
Panel	Pressure (Maximum)	
Inboard wing (Note 1)	60 psi <b>(Note 2)</b>	
Middle wing	60 psi	
Outboard wing (Note 1)	65 psi	
Strut	75 psi	
Horizontal Stabilizer	65 psi	

#### NOTE 1:

The inboard and outboard wing panels have two supply tubes. It is necessary to disconnect the second tube and put a cap or plug in the tube end to keep sufficient pressure in the panel.

#### NOTE 2:

During the panel purge, take the pressure to 60 psi.

- (16) Make sure that the fluid flows from the porous panels as follows:
  - (a) The fluid flows from the porous panels without any dry spots.
  - (b) The fluid flows evenly and not in streams.
  - (c) There are no areas with clusters of bubbles.
    - NOTE: The bubbles will be very small and continue to flow even after you wipe fluid across the area.
- (17) Stop the fluid supply.
- (18) Wait until the fluid pressure is released.
- (19) Slowly disconnect the test cart fluid supply tube from the fluid inlet fitting.
- (20) Remove the cap or plug from the tube end, if applicable.
- (21) Install a new seal(s) in the coupling(s) as shown in Figure 501.
- (22) Connect the panel supply tube(s) to the proportioning unit port.
- (23) Remove the fluid collector system from the airplane.

# NOTE: If you are to continue and do the Porous Panel Flow Operation Test drain the collection system but do note remove it.

- (24) Clean the floor and the airplane surfaces as necessary.
- (25) Install wing access panels 503AB and 503BB left, or 603AB and 603BB right as applicable. Refer to Chapter 6, Access Plates and Panels Identification Description and Operation.
- (26) Install tailcone access panel 320A. Refer to Chapter 6, Access Plates and Panels Identification Description and Operation.
- (27) Engage the circuit breakers on the left circuit breaker panel that follow:
  - PRIMARY ANTI-ICE
  - W/S ANTHCE
  - BACKUP ANTHCE.
- (28) On airplanes that have the G1000 system installed, engage the ENG INTFC circuit breaker on the avionics circuit breaker panel.
- (29) On airplanes that do not have the G1000 system installed, engage the ANTI-ICE GAGE circuit breaker on the left circuit breaker panel.
- (30) Remove external electrical power from the airplane, if applicable.
- (31) Do a system operational test. Refer to Porous Panel Flow Operational Test.

# 4. Porous Panel Flow Operational Test

WARNING: For health and environmental data, review the applicable Safety Data Sheet (SDS).

- WARNING: Before you disconnect components of the TKS anti-ice system, slowly loosen the coupling that is connected to the component to be removed because it is possible that high pressure is still in the system.
- WARNING: Immediately remove (clean) or contain all the TKS fluid that is spilled. TKS fluid on the floor will cause a slip hazard.
- WARNING: Discard all unwanted TKS fluid and/or dirty cloths correctly. TKS fluid is a hazardous waste and must be discarded in accordance with approved procedures.
- CAUTION: Do not use MEK, acetone, paint thinner, or similar chlorinated solvents on the porous panels. To prevent damage, only use water and detergent, isopropyl alcohol, and/or approved anti-ice fluid on the porous panel surfaces.
- CAUTION: Use only approved TKS fluids in accordance with specification DTD 406B. Fluid density is approximately 9.2 lbs/gal.
- CAUTION: Use only clean, filtered fluid in the TKS system. Contamination will cause fluid blockage and/or damage to the porous panel.
- CAUTION: Do not use the seals again after you loosen or disconnect a tube coupling. Replace the 3/16-inch and

5/16-inch sealing ring and/or 1/2-inch O-ring, as applicable, when you assemble a tube coupling. Examine the seal for damage and make sure that it is in the correct position in the coupling as shown in Figure 501. This will help to prevent fluid leakage from the coupling. Refer to TKS Anti-Ice Fluid Distribution System - Maintenance Practices for Nylon Tubing Repair/Replacement.

- NOTE: It is necessary that you have access to clean dry cloths, 30 gallons of approved TKS fluid, a TKS system test cart with connection hardware, 75 psi filtered shop air (to use with a test cart), and a container with a capacity of three to five gallons.
- NOTE: You can fabricate a fluid collector system, which will contain the fluid and keep it off the floor. Recommended materials you can use are plastic sheets, tubing, aluminum tape, and rigid aluminum and/or plastic gutter material.
- A. Do the porous panel flow operational test procedures.
  - (1) Make sure the circuit breakers that follow on the left circuit breaker panel are engaged:
    - PRIMARY ANTHCE
    - W/S ANTHCE
    - BACKUP ANTHCE.
    - (2) On airplanes that have the G1000 system installed make sure that the ENG INTFC circuit breaker on the avionics circuit breaker panel is engaged.
    - (3) On airplanes that do not have the G1000 system installed make sure that the ANTI-ICE GAGE circuit breaker on the left circuit breaker panel is engaged.
    - (4) Connect the ground power unit (GPU) to the airplane and adjust to 28 Vdc +0.5 or -0.5 Vdc.
    - (5) Make sure that he switches that follow are in the OFF position:
      - EXTERNAL POWER (SC006)
      - BATTERY
      - FLUID CONTROL PRIMARY
      - FLUID CONTROL MAX FLOW
      - FLUID CONTROL BACKUP
    - (6) Put a 3 to 5 gallon bucket below the TKS system drain line.
    - (7) Put a 3 to 5 gallon bucket below the propeller slinger.

## NOTE: Put one blade of the propeller vertical and down with bucket under it.

- (8) Attach the fluid collector system below to the airplane.
  - (a) Put a 3 to 5 gallon bucket in the correct position to collect fluid from the system.
- (9) Make sure that the TKS fluid is above the minimum dispatch level in the sight glass.
- (10) Set the EXTERNAL POWER switch to the ON position.
- (11) Set the BATTERY switch to the On position.
- (12) Set the FLUID CONTROL PRIMARY switch to the HIGH position.
- (13) Set the FLUID CONTROL BACKUP switch to the ON position.
- (14) Operate the system until fluid is flowing out of all of the porous panels.
- (15) Make sure that fluid is flowing from all the panels and the propeller slinger. Refer to Figure 502.
- (16) Set the FLUID CONTROL PRIMARY switch to the OFF position.
- (17) Set the FLUID CONTROL BACKUP switch to the OFF position.
- (18) Empty the fluid collected in the buckets.
- (19) Set the FLUID CONTROL PRIMARY switch to the HIGH position.
  - (a) Operate the system for 5 minutes.
- (20) Measure the fluid collected from the left side and right side of the airplane porous panels.

# **NOTE:** The fluid is collected from the wing panels and the strut panels.

- (a) Each side should have 1550 +600 or -300 ml.
- (b) Make sure that the quantity of fluid collected from each side is within 600 ml of each other.

- (21) Set the FLUID CONTROL PRIMARY switch to the OFF position.
- CAUTION: Do not run the windshield pump more than 10 seconds continuously. Wait at least 10 seconds between pump operations.
- (22) Set the MAX FLOW switch to the windshield position and then release.
  - NOTE: The switch is spring loaded.
  - NOTE: The windshield pump will start when you put the spring-loaded MAX FLOW switch in the WINDSHIELD position and it will spray fluid on the windshield for four seconds after you release it.
  - (a) Make sure that the windshield spray collection tube dispenses fluid through each supply hole and fluid is visible on pilots windshield.

# NOTE: It may be necessary to operate the MAX FLOW may have to be set to the WINDSHIELD position several times to get fluid to the windshield bar.

- (23) Set the BATTERY switch to the OFF position.
- (24) Set the EXTERNAL POWER switch to the OFF position.
- (25) Remove external electrical power from the airplane.
- (26) Remove the fluid collector system from the airplane.
- (27) Clean the floor and the airplane surfaces as necessary.







Figure 501 : Sheet 2 : TKS Nylon Tubing Assembly



come out while the rest of the panel is flowing evenly. These bubbles will be very small and

will continue to come out even after you wipe fluid across the area.

Figure 502 : Sheet 1 : Leading Edge Porous Panel Purge

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**NOTE 2:** When the vertical stabilizer porous panel is purged correctly per NOTE 1, fluid will flow off to each side of the panel in streams as it goes beyond the porous area. This is not an indication of incorrect purging.



Figure 502 : Sheet 3 : Leading Edge Porous Panel Purge



Figure 9 : Sheet 1 : Aft Fuselage, Horizontal and Vertical Stabilizer Panels





Figure 8 : Sheet 1 : Right Lower Wing Panels