

PRODUCT: "Power-Grip" Self Cleaning Hot Line Connector SCH-636 DATE: May 13, 1993

TYPE TEST: 500 Hour Salt Fog Test Reference ASTM-B117

TEST FACILITY: Utilco Lab

REVIEWED BY: [Signature] 5/14/93

TESTED BY: [Signature] 5-14-93

SUPERVISOR: [Signature] 5-14-93

PURPOSE:

To witness the effect of 500 hours of salt fog on the "Power-Grip" Self Cleaning Hot Line Connector, SCH-636, the gold anodized eyebolt and hexbolt.

DEVICE:

Utilco "Power-Grip" Self Cleaning Hot Line Connector SCH-636 is made from extruded 6061-T6 aluminum and is plated with Safety-Film 616 Protector Film. The eyebolt is manufactured from 6061-T6 aluminum and is gold anodized. The hexagon tap bolt is manufactured from 6262-T9 aluminum and is also gold anodized.

PROCEDURE:

Standard 5 percent salt solution was used. Plain tap water was used. The salt solution was used at ambient temperature or about 20-25°C.

The SCH-636 clamps were attached to the sides of the salt fog tank and the fog enters the tank at the top. The SCH-636 clamps were emersed in 5 percent salt solution fog.

Two SCH-636 clamps were subjected to 500 hours of salt fog. One clamp had a short piece of 636 MCM all aluminum conductor placed in the main connection and the second had a short piece of 500 MCM copper conductor placed in the main connection.

The samples were rinsed off with tap water and visually checked after every 24 hours of salt fog. After 500 hours the main eyebolt in each clamp was torqued to 20 foot-pounds (240 inch-pounds) ten times.

RESULTS:

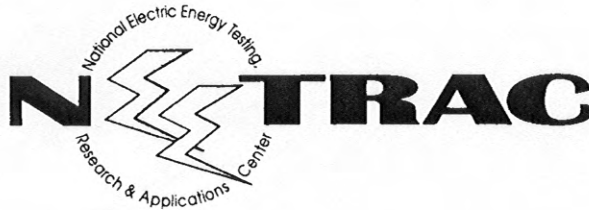
After 500 hours in the 5 percent salt solution fog the SCH-636 with aluminum conductor in the main had salt spots on the body. The body and rider were tarnished. The main connection where the aluminum conductor was torqued had some corrosion, but all of the serrations were in place. The eyebolt successfully completed 10 tightening and loosnings to 20 foot-pounds (240 inch-pounds).

**UTILCO Hot Line Clamp Connector Evaluation  
Model SCH-63640**

**ILSCO Inc.**

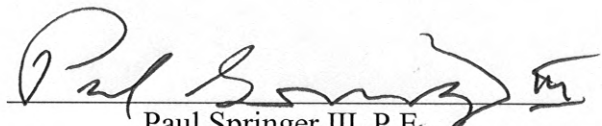
**NEETRAC Project Number: 01-108**

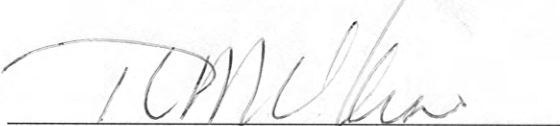
**August , 2001**



*A Center of  
The Georgia Institute of Technology*

**Requested by:** Mr. Ed Schutte  
ILSCO

**Principal Investigator:**   
Paul Springer III, P.E.

**Reviewed by:**   
Tommy McKoon

# UTILCO Hot Line Clamp Connector Evaluation Model SCH-63640

ILSCO Inc.

NEETRAC Project Number: 01-108

August , 2001

## Summary:

Ed Schutte of ILSCO requested a special test on ILSCO's model SCH-63640 hot line clamp connector. The test conforms to the requirements of ANSI C119.4 - 1998, with one exception: the test was run in a salt fog chamber to simulate a high-contamination environment. All connectors passed the ANSI C119.4 requirements for connector performance.

## Samples:

- 1) Four (4) model SCH-63640 hot line clamp connectors
- 2) Four pin type connectors, matched to jaw of model SCH-63640 hot line clamp connector
- 3) #4/0 AWG insulated copper welding cable for control conductor
- 4) 477 kcmil AAC "Cosmos" conductor for test loop conductors
- 5) Compression equalizers for test loop terminals

## Equipment Used:

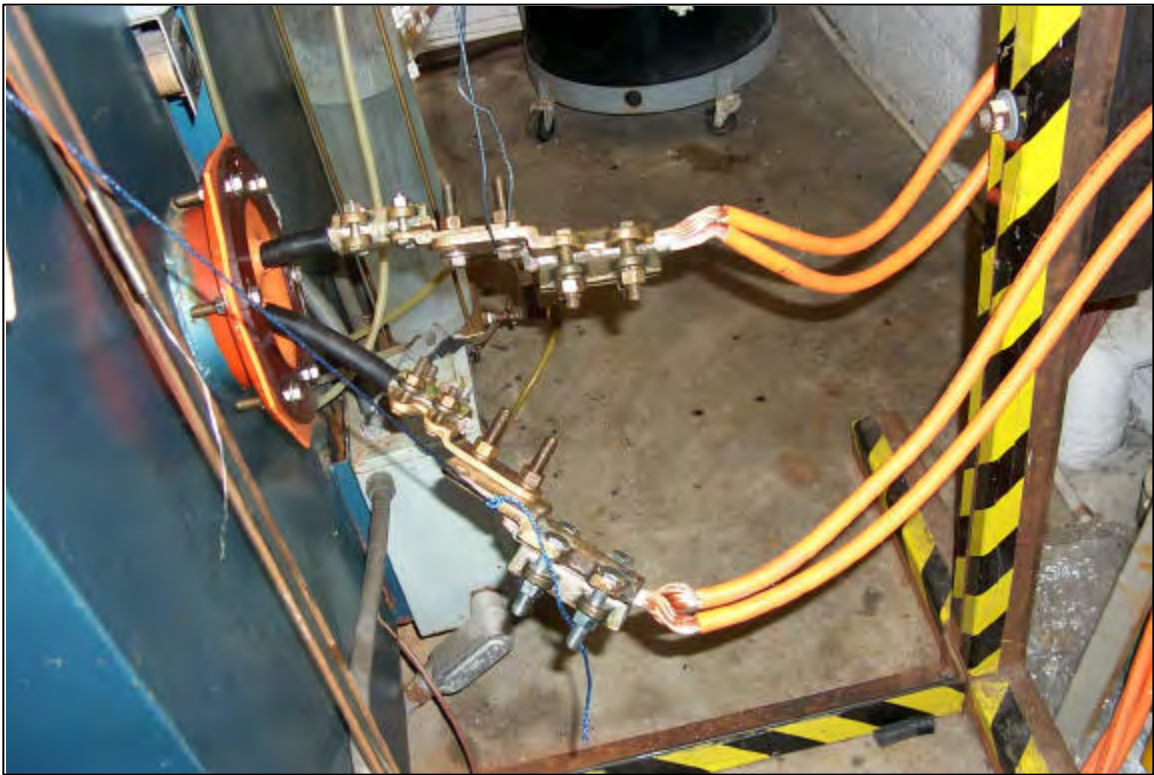
- 1) Singleton salt fog chamber, Control # CN 0066
- 2) Connector lab current loading power supply
- 3) Connector lab data acquisition system, Control #s 2338A06325 and 2338A09926

## Procedure and Results:

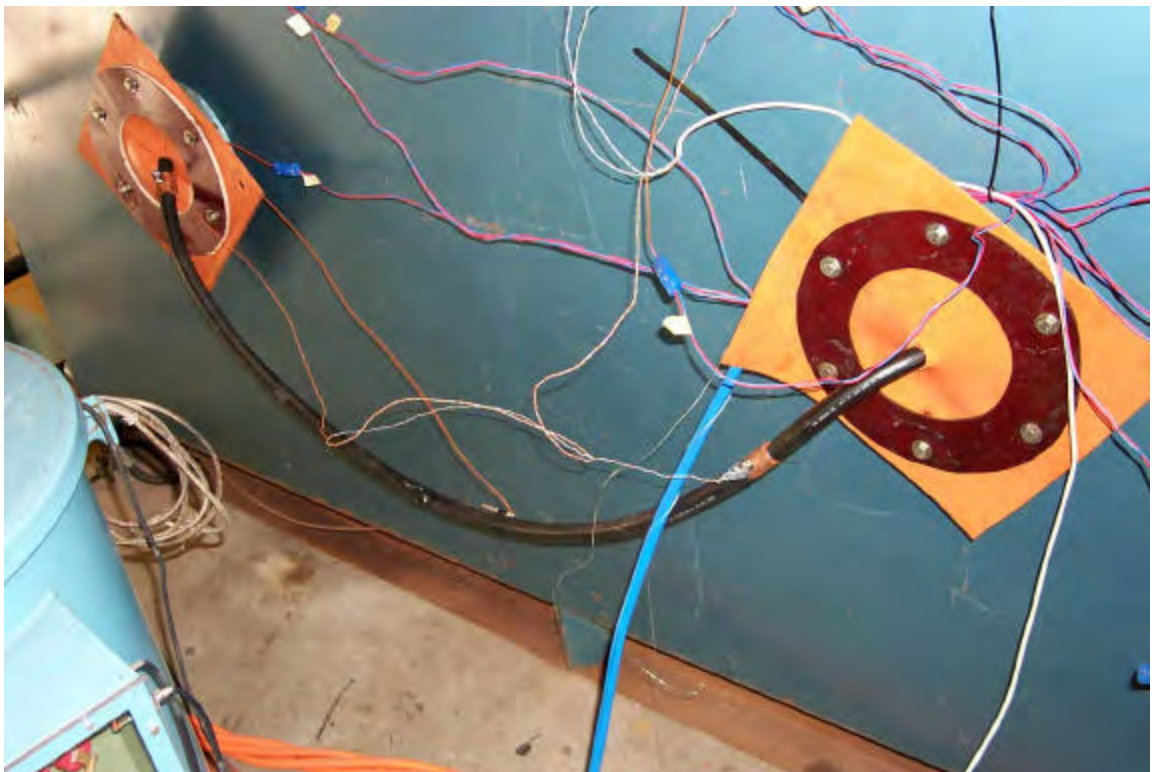
A test loop was constructed in accordance with a sketch provided by ILSCO dated 5/2/2001. ILSCO personnel visited NEETRAC in June 2001, and assisted with loop construction. The test loop was instrumented with thermocouples as shown on the sketch. ILSCO requested the current be set for 100° C rise of the control conductor above ambient temperature, or 600 Amperes, whichever was more severe. The current required for 100° C rise was 634 Amperes.

Photograph 1 shows the current leads entering the test chamber. Photograph 2 shows the location of the control conductor outside the chamber. All the connectors are inside the box, and exposed to a corrosive 5% salt fog environment in accordance with ASTM B117. Photograph 3 shows the connector loop inside the salt fog machine. Photograph 4 shows a connector following the test.





Photograph 1, Current feed to connector test loop



Photograph 2, control conductor and instrument leads outside test chamber



Photograph 3  
Salt Fog Chamber with Connector Loop



Photograph 4, Connector Following Test  
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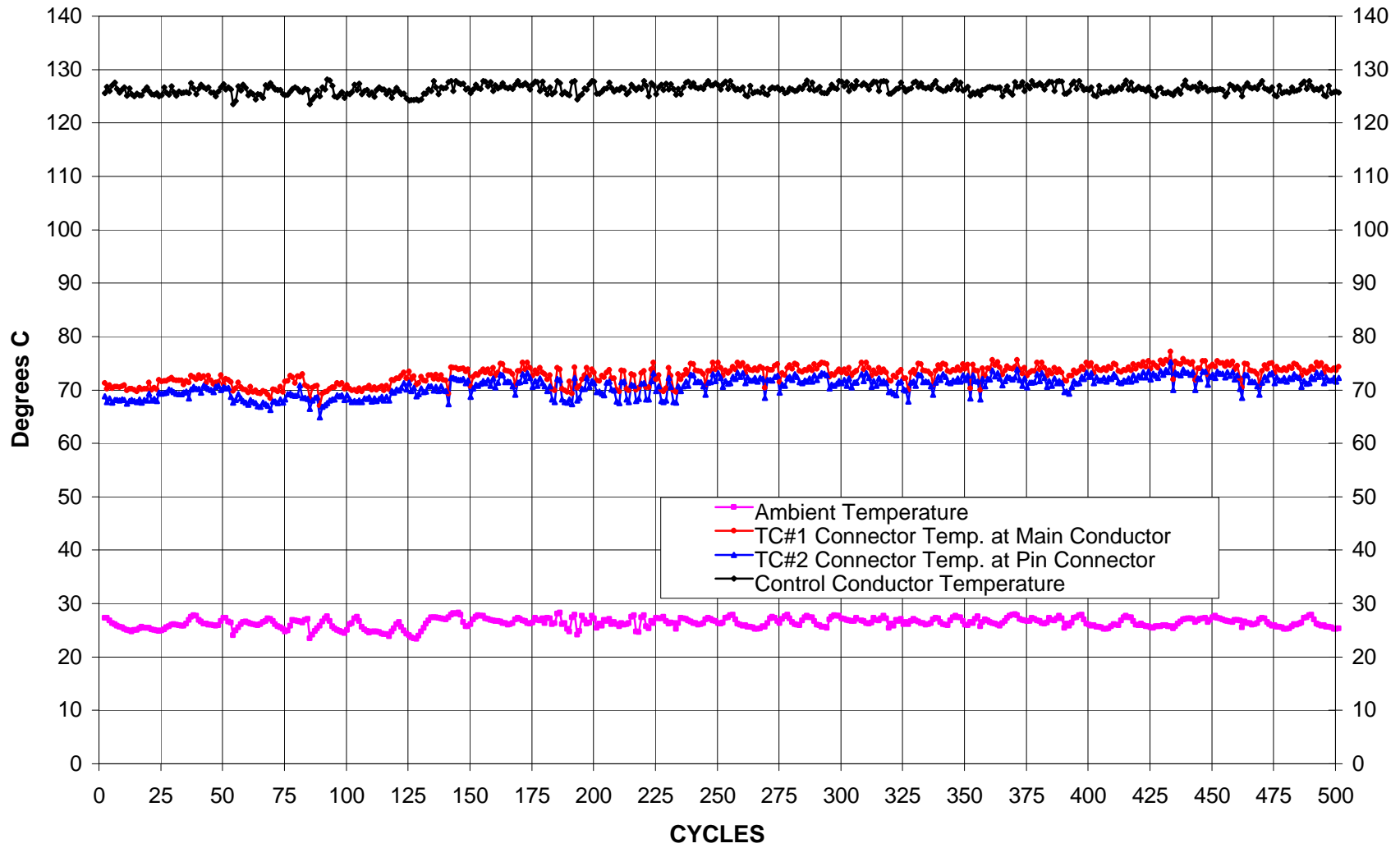
Data recorded during the 500-cycle test are presented graphically in Figures 1 through 16 of the attachment. The graphs show connector performance versus the acceptance criteria of ANSI C119.4. In order to pass the test, the connector must meet the following requirements:

- 1) **Maximum temperature:** the highest temperature anywhere on the connector must not exceed the temperature of the control conductor. The control conductor represents the free span remote from thermal influence of connectors. Figures 1 through 4 show performance of the four samples against this criterion. The graphs show the ambient temperature (bottom curve), control temperature (top curve), and the connector temperatures (middle curves). Note that there are two connector temperature curves. One curve shows the connector temperature at the run conductor. The other curve shows connector temperature at the pin connection. Temperatures are measured using calibrated thermocouples inserted into small holes drilled into the connectors and into the control conductor. The All samples met this requirement with temperature between 70° C and 80° C with the control conductor at approximately 125° C.
- 2) **Resistance:** electrical resistance must be stable within +/- 5% of the average of all resistance readings. Resistance is measured by passing a 10-Ampere DC current through the test loop, and measuring the voltage drop across each connector. The resistance terminals are at equalizers compressed onto the conductors to make an equipotential (equal voltage) location in the test loop. The measurement includes the resistance of the free conductor required by the ANSI standard. Figures 5 through 8 show the resistance readings for the four connector samples, along with the stability criteria. Note on Figure 5 that two of the required resistance readings are missing. This was caused by a corrosion failure of an instrument cable. All instrument cables inside the chamber suffered corrosion damage. The cable was repaired for the reading near cycle 150, and there is no reason to think resistance stability was out of limits for the readings at cycle 100 and cycle 125. All samples met the resistance stability requirement.
- 3) **Temperature difference:** temperature difference is defined as the difference between the connector temperature and the control conductor temperature. The requirement is that temperature difference never falls more than 10° C below the average temperature difference recorded during the test. This requirement is similar to the resistance stability requirement. There are two graphs for each connector showing performance against this criterion. Location 1 is on the connector attachment to the run conductor. Location 2 is at the connector attachment to the pin connector. For this test, the connectors were inside the salt fog chamber, while the control conductor was outside the box. The variation in “temperature difference” readings is caused by changes in ambient temperature outside the chamber, while the samples were inside the chamber. Thermal lag between the outside and inside environments is believed to be the cause for jagged temperature difference graphs. Figures 9 through 16 show the connector performance for the temperature difference criterion. All samples meet the temperature difference requirement.

## Appendix

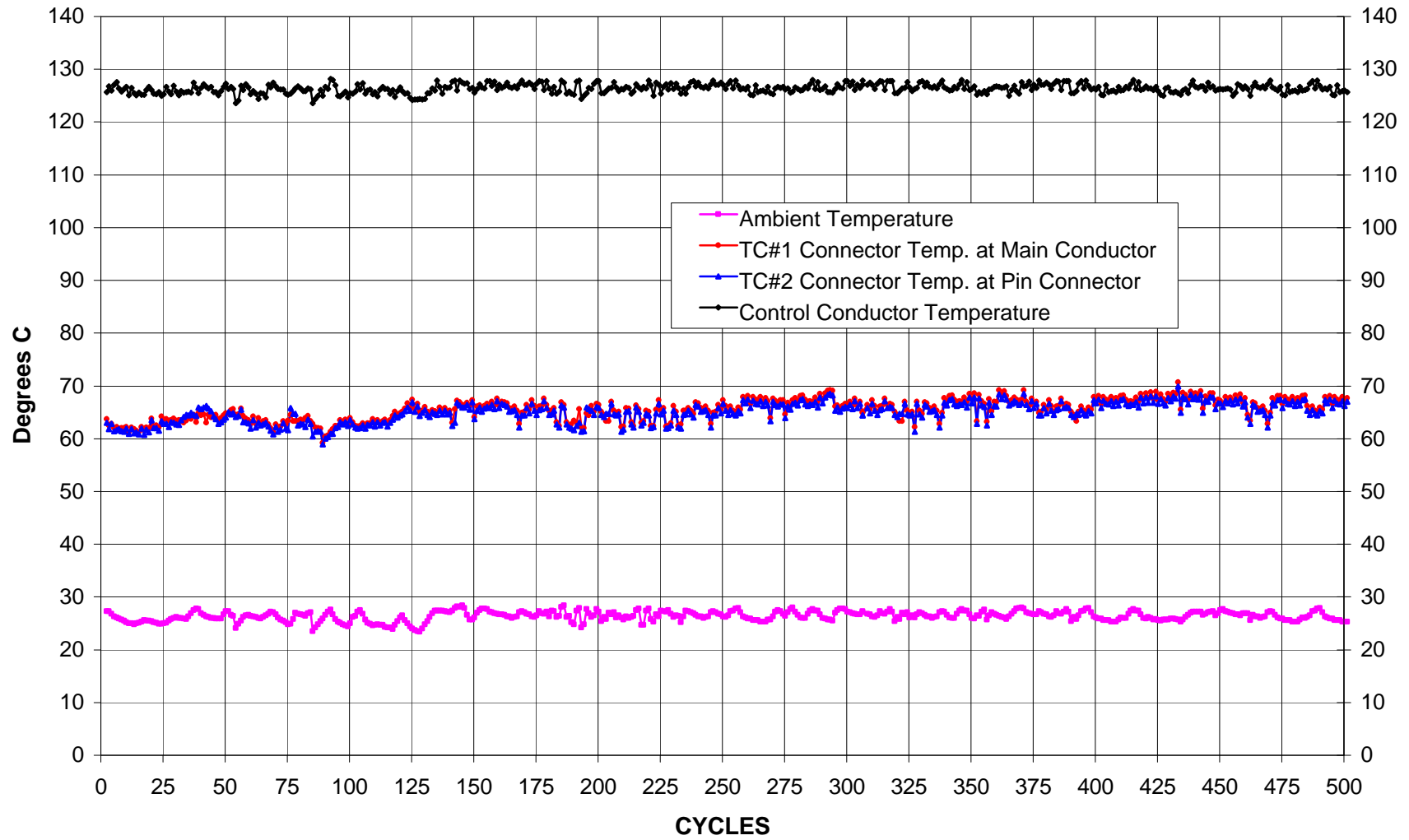
### Connector Data Graphs

**FIGURE 1**  
**CONNECTOR #1 MAXIMUM TEMPERATURE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**

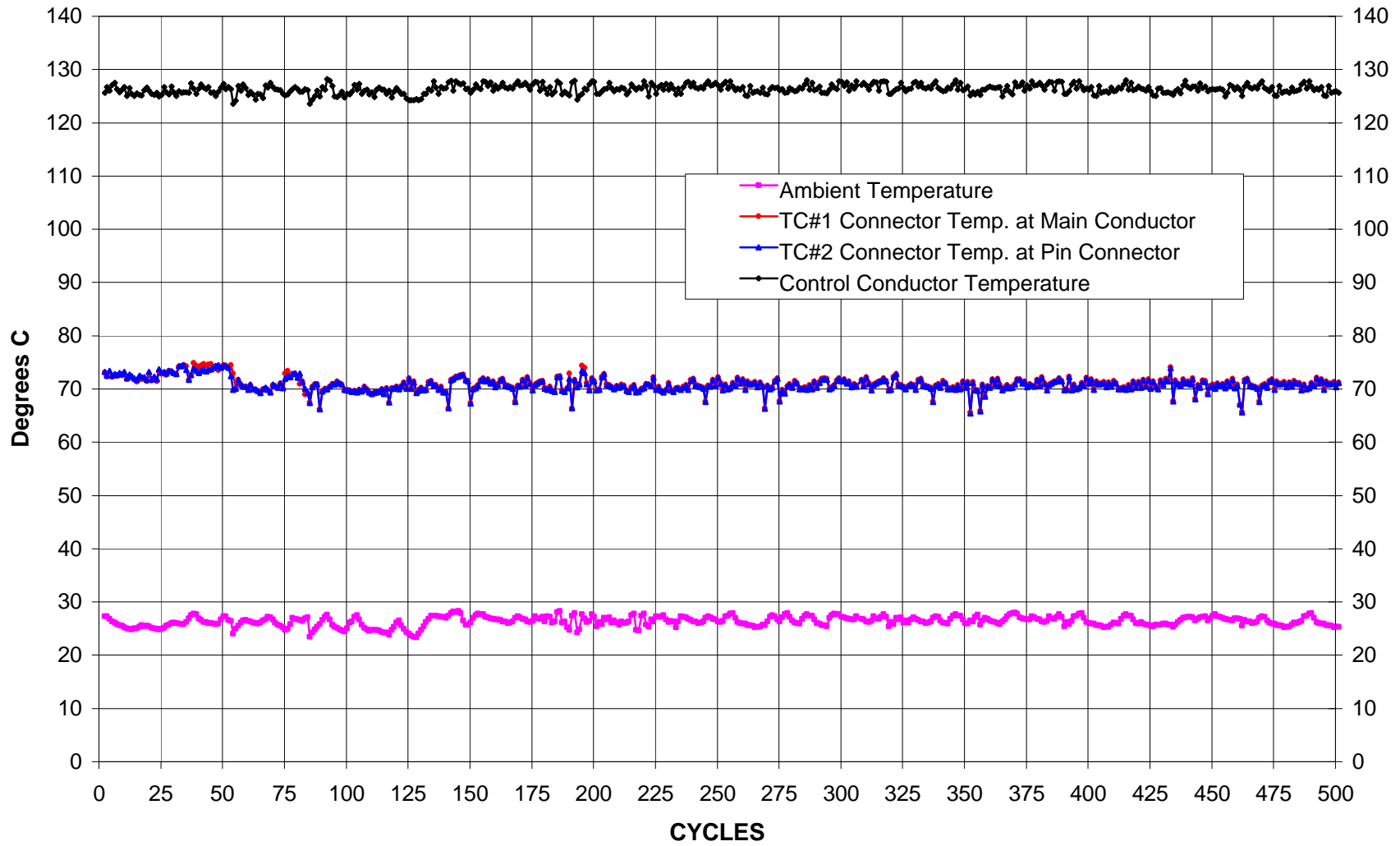




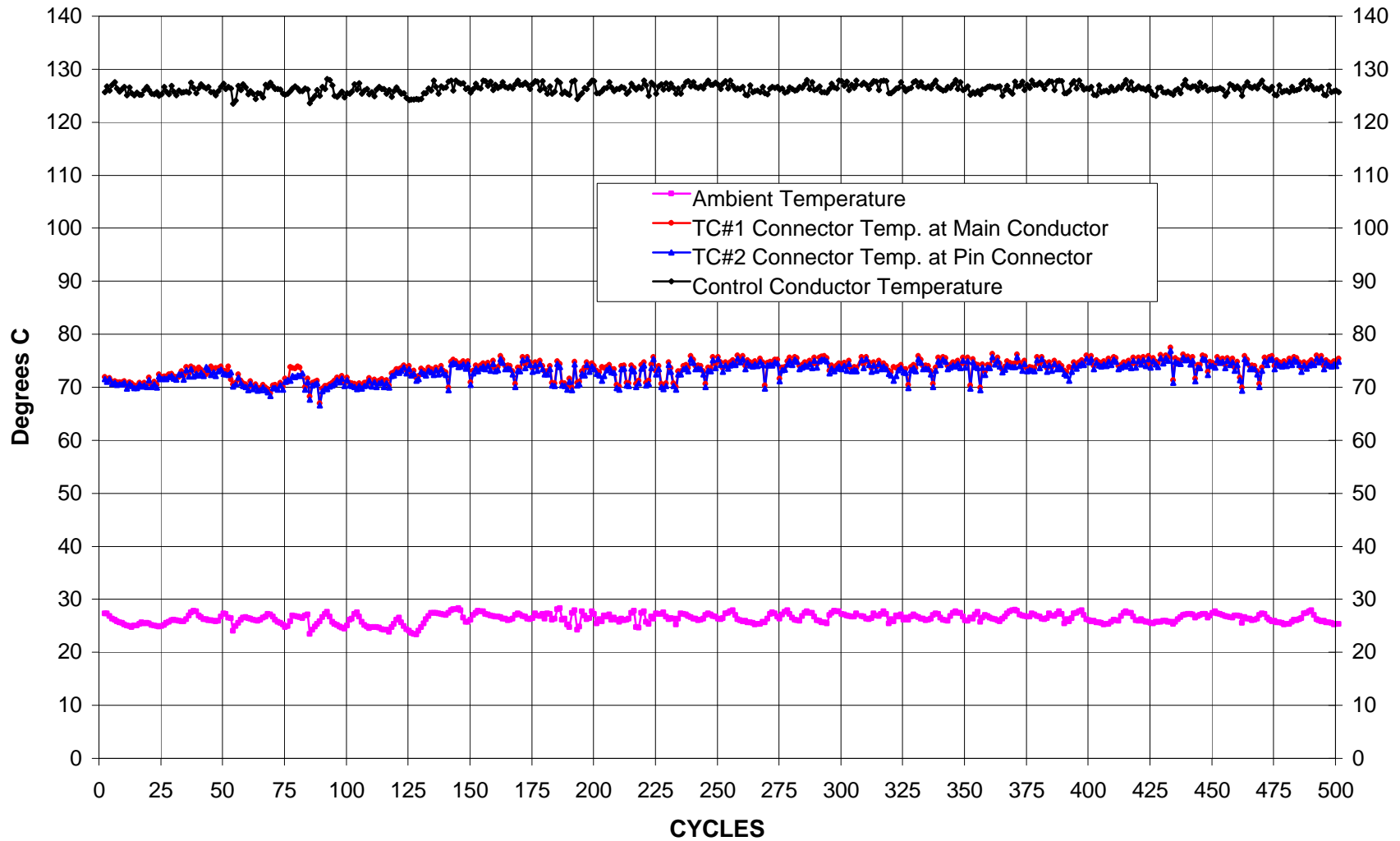
**FIGURE 2**  
**CONNECTOR #2 MAXIMUM TEMPERATURE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



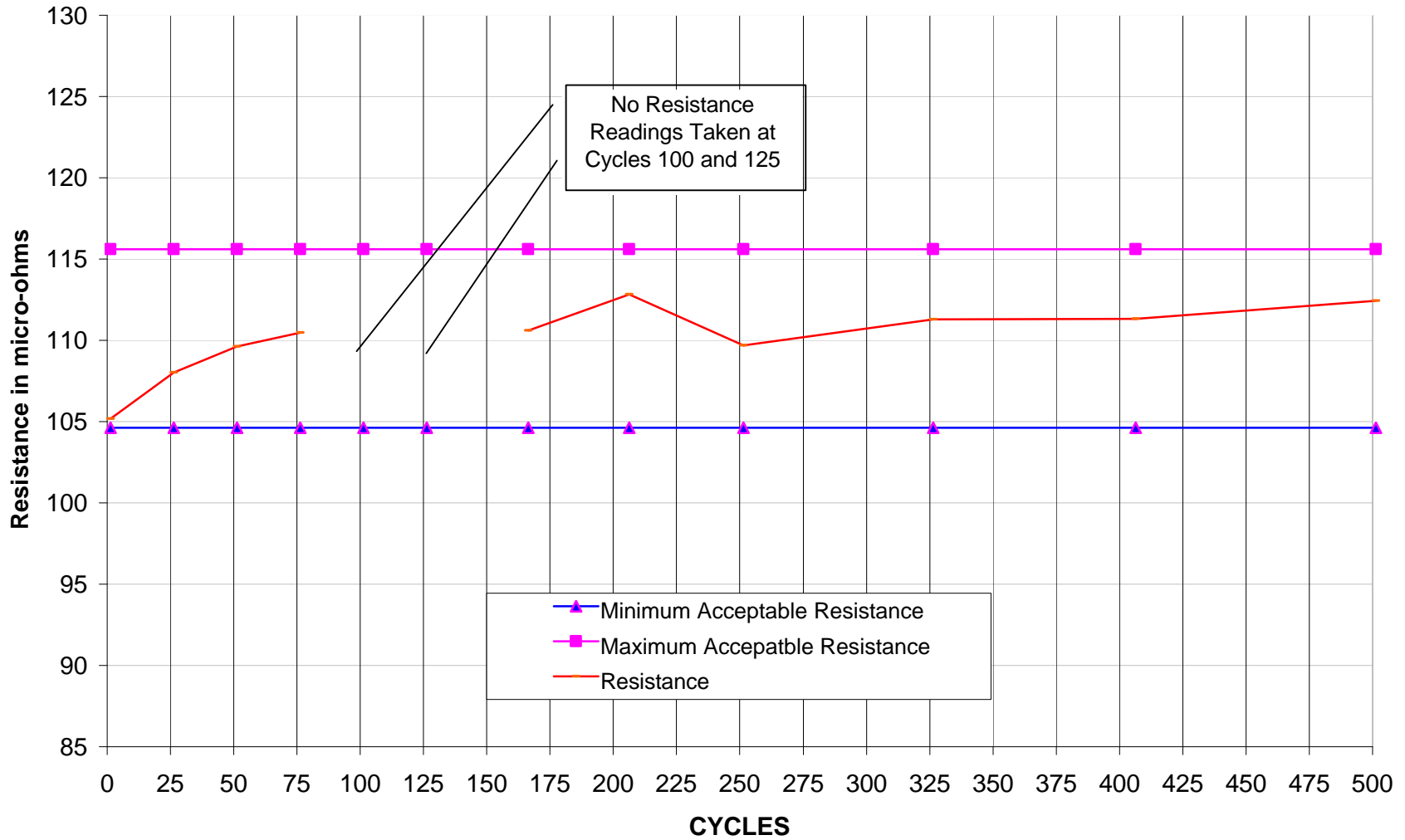
**FIGURE 3**  
**CONNECTOR #3 MAXIMUM TEMPERATURE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



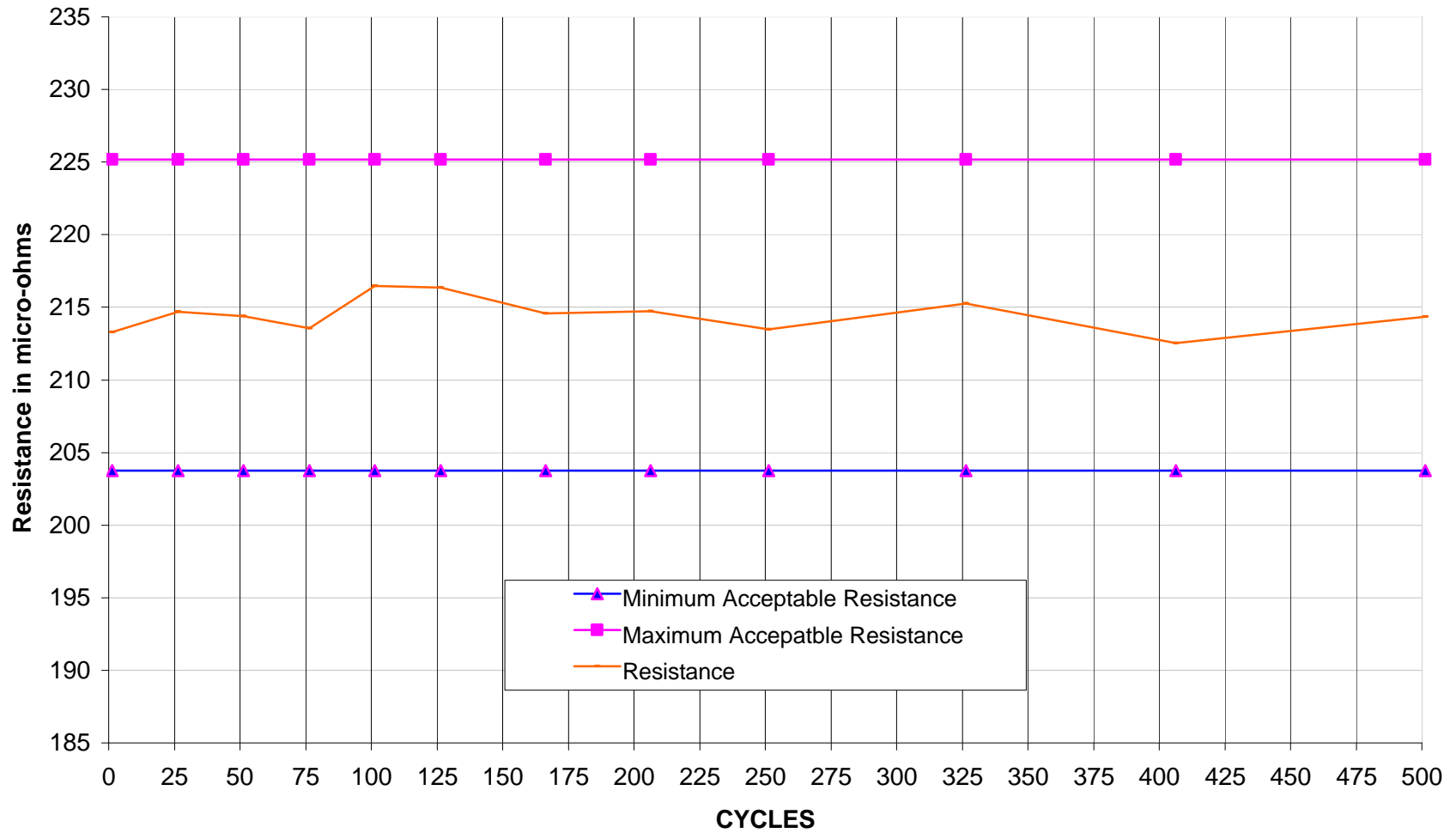
**FIGURE 4**  
**CONNECTOR #4 MAXIMUM TEMPERATURE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



**FIGURE 5**  
**CONNECTOR #1 RESISTANCE STABILITY, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**

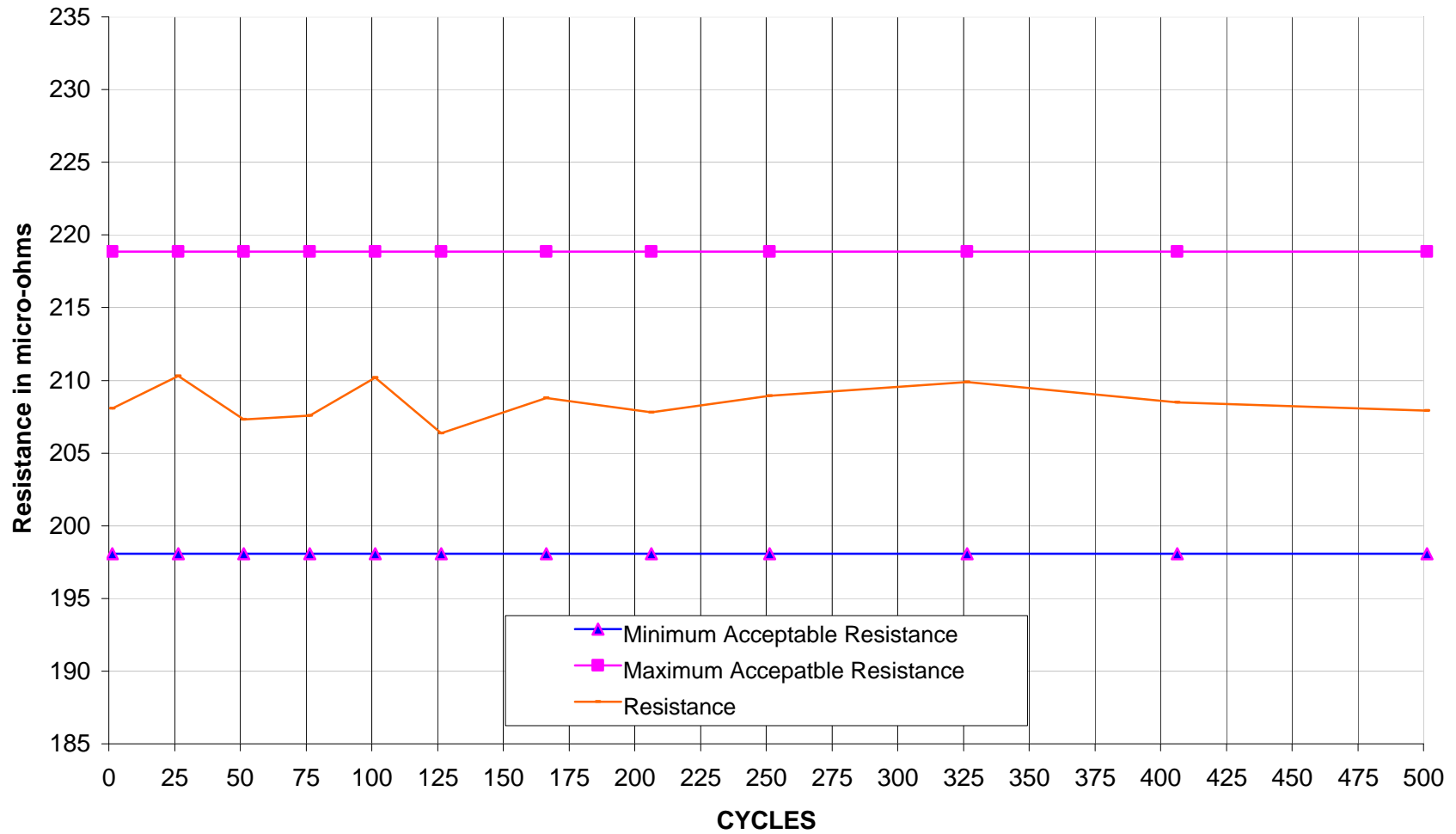


**FIGURE 6**  
**CONNECTOR #2 RESISTANCE STABILITY, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**

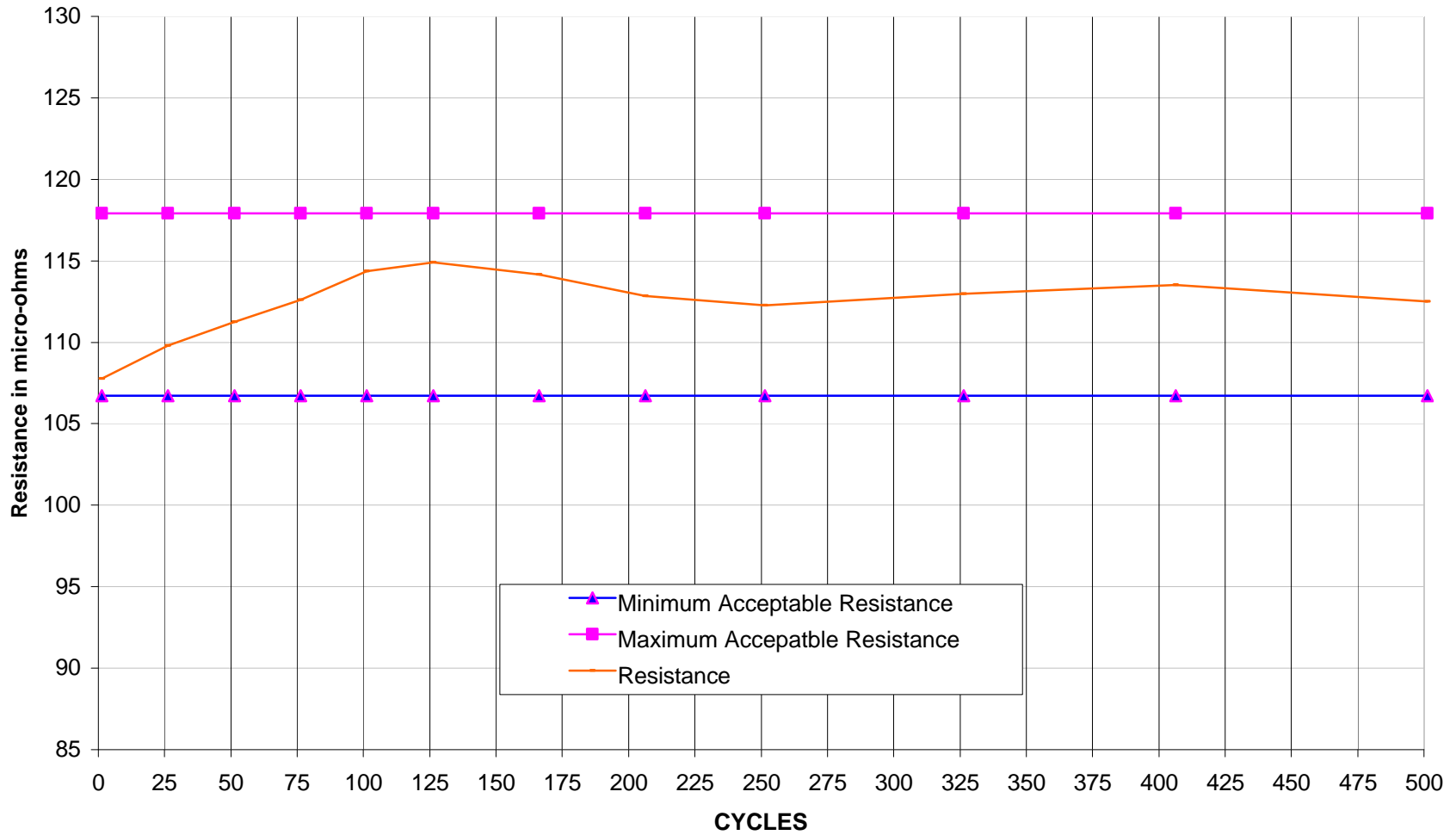




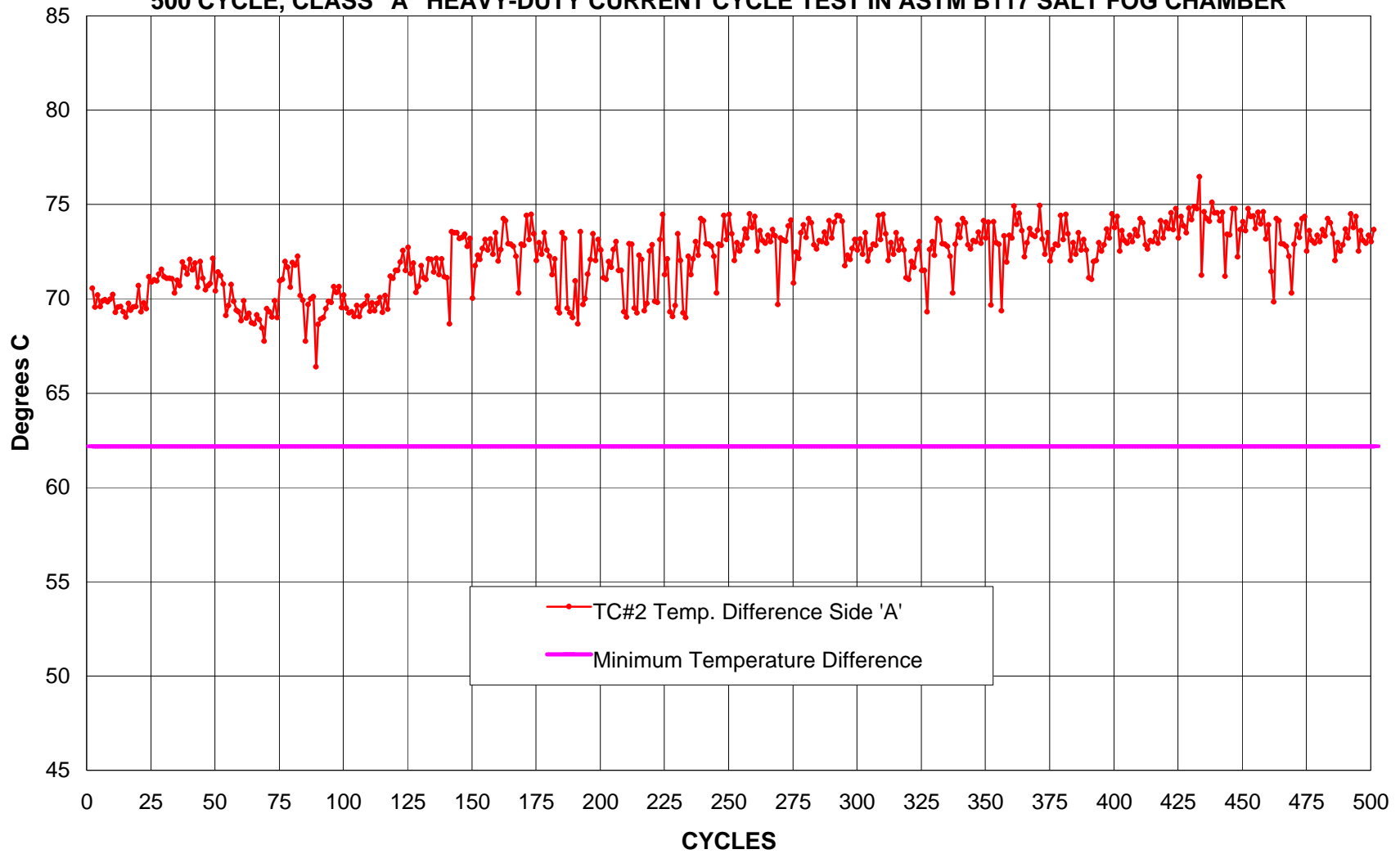
**FIGURE 7**  
**CONNECTOR #2 RESISTANCE STABILITY, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



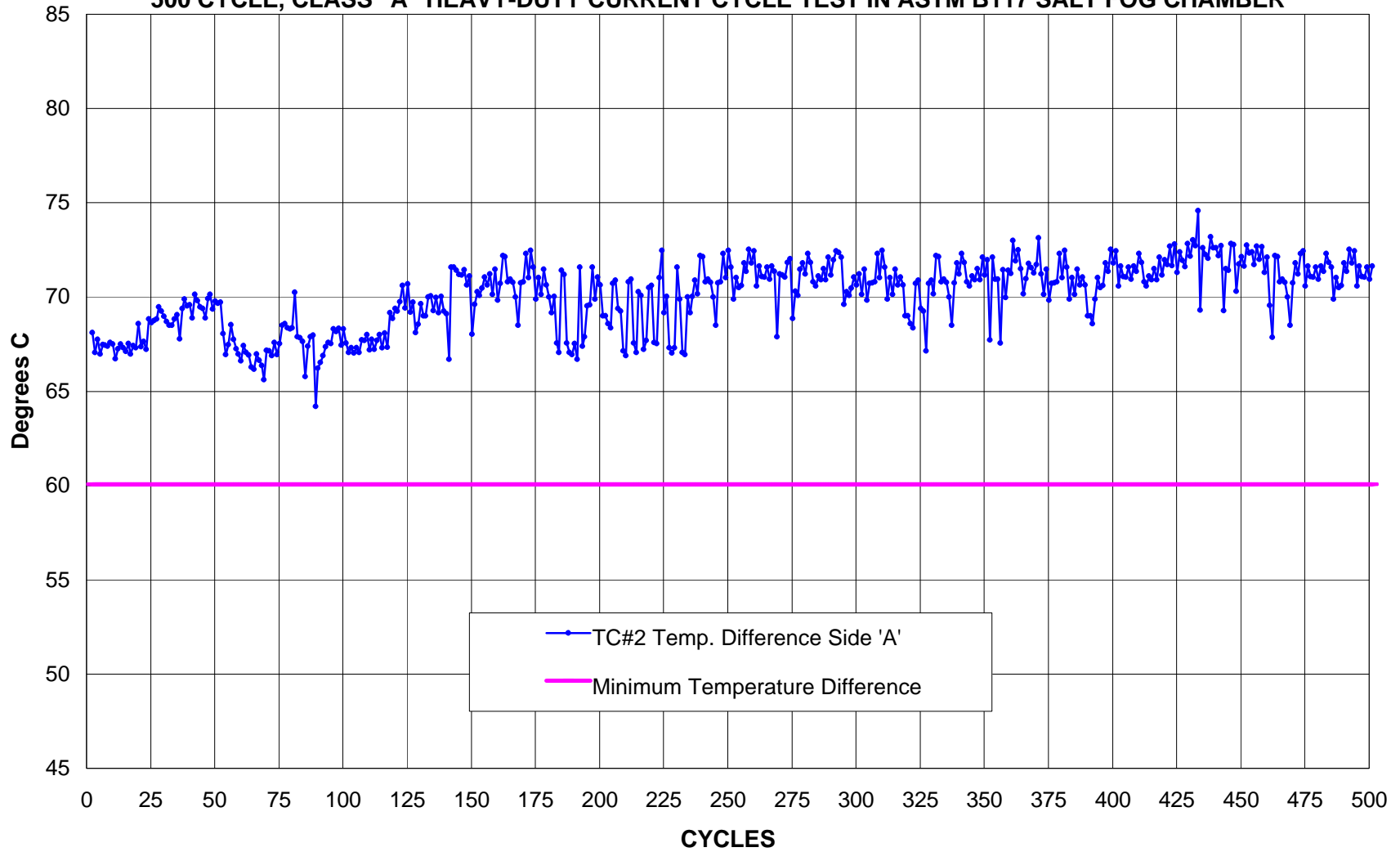
**FIGURE 8**  
**CONNECTOR #4 RESISTANCE STABILITY, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



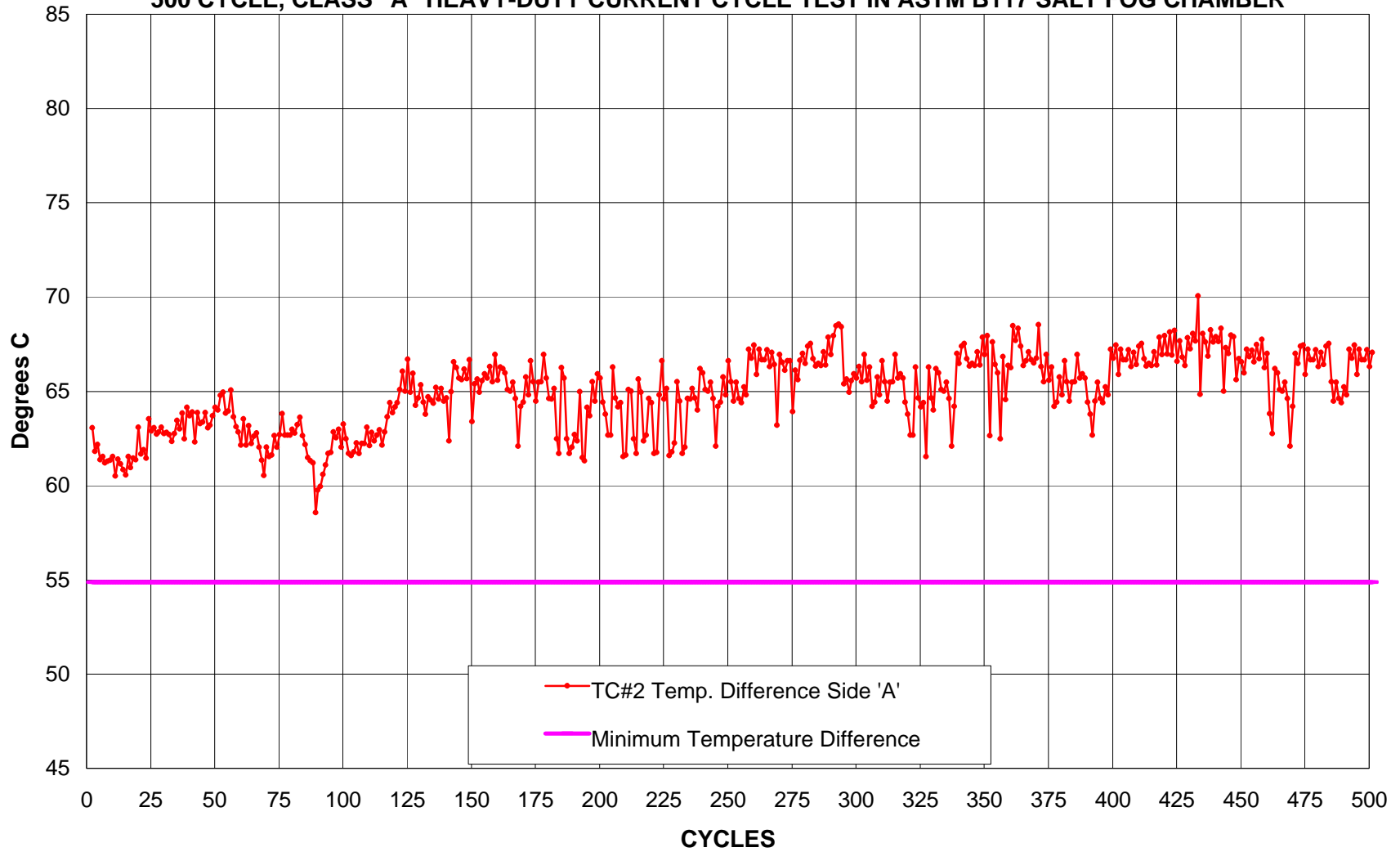
**FIGURE 9**  
**CONNECTOR #1, LOCATION 1, TEMPERATURE DIFFERENCE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



**FIGURE 10**  
**CONNECTOR #1, LOCATION 2, TEMPERATURE DIFFERENCE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**

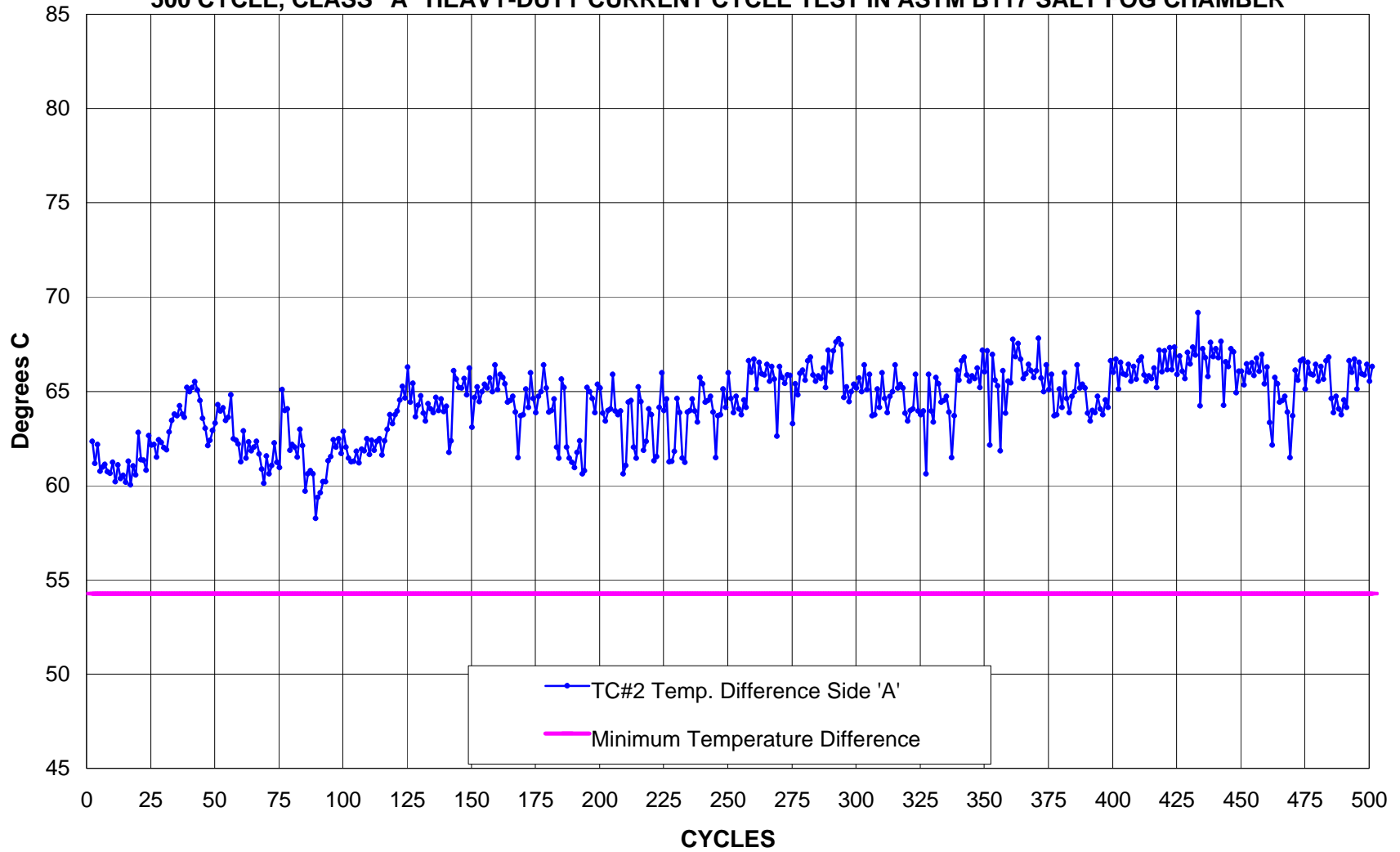


**FIGURE 11**  
**CONNECTOR #2, LOCATION 1, TEMPERATURE DIFFERENCE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**

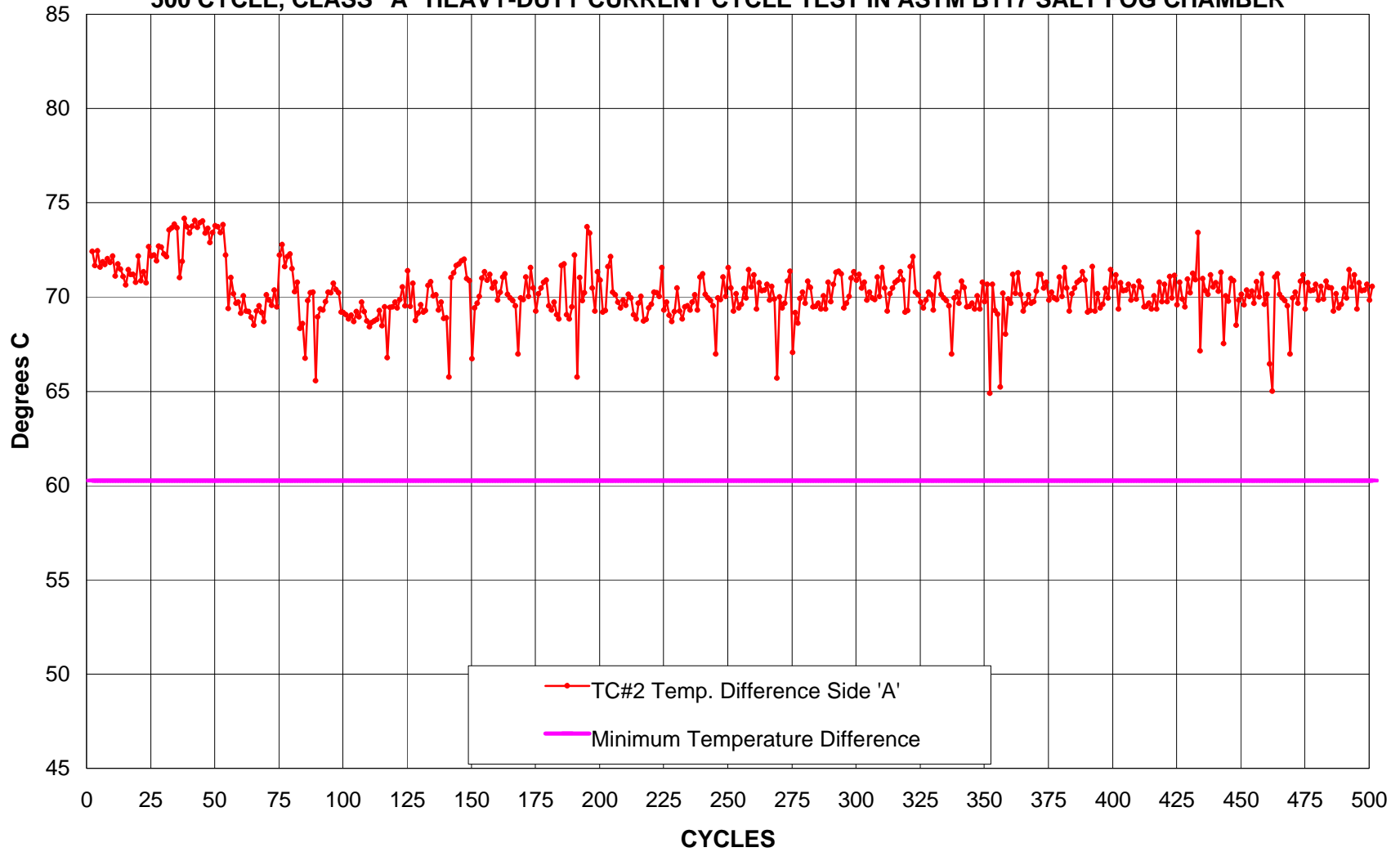




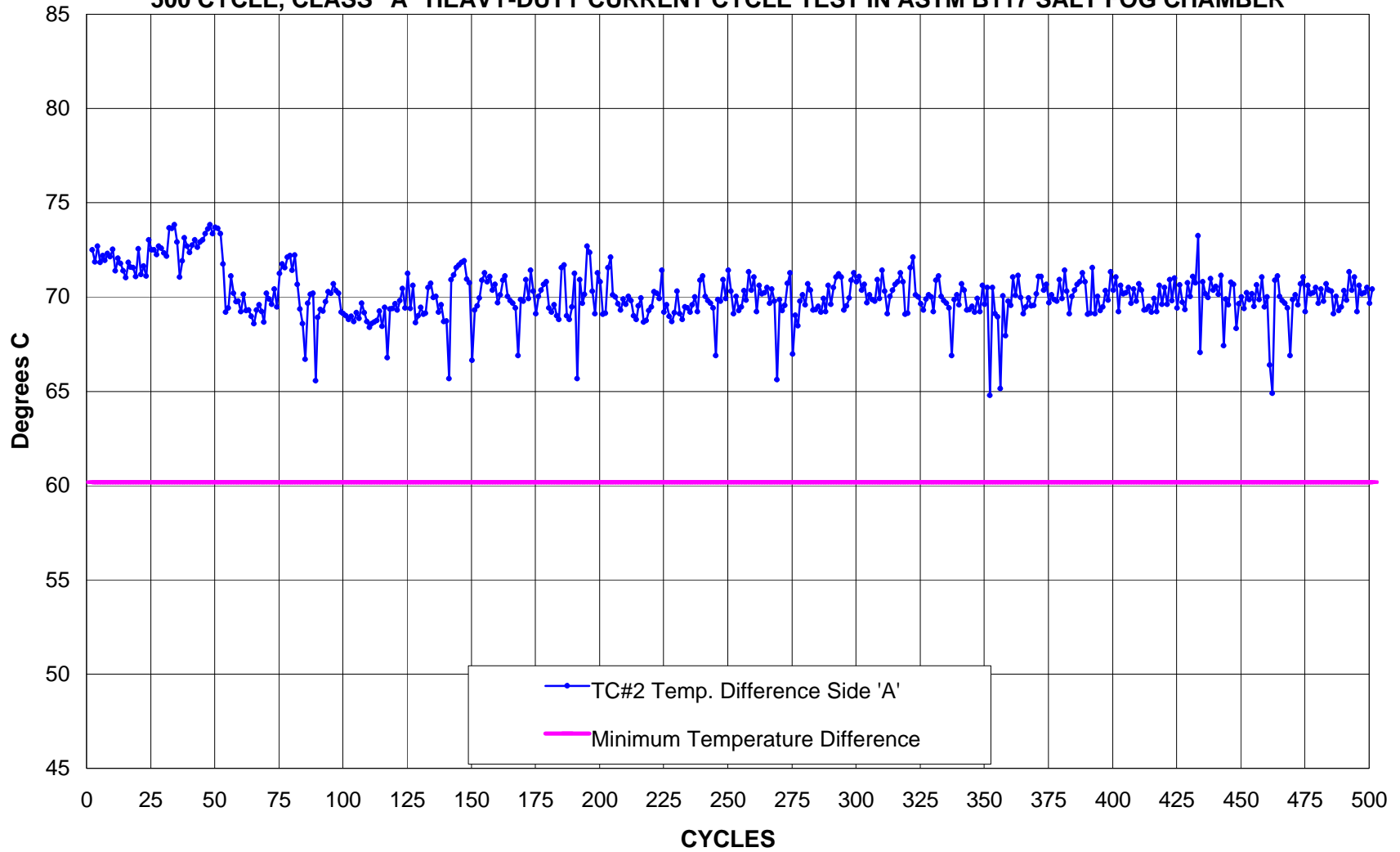
**FIGURE 12**  
**CONNECTOR #2, LOCATION 2, TEMPERATURE DIFFERENCE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



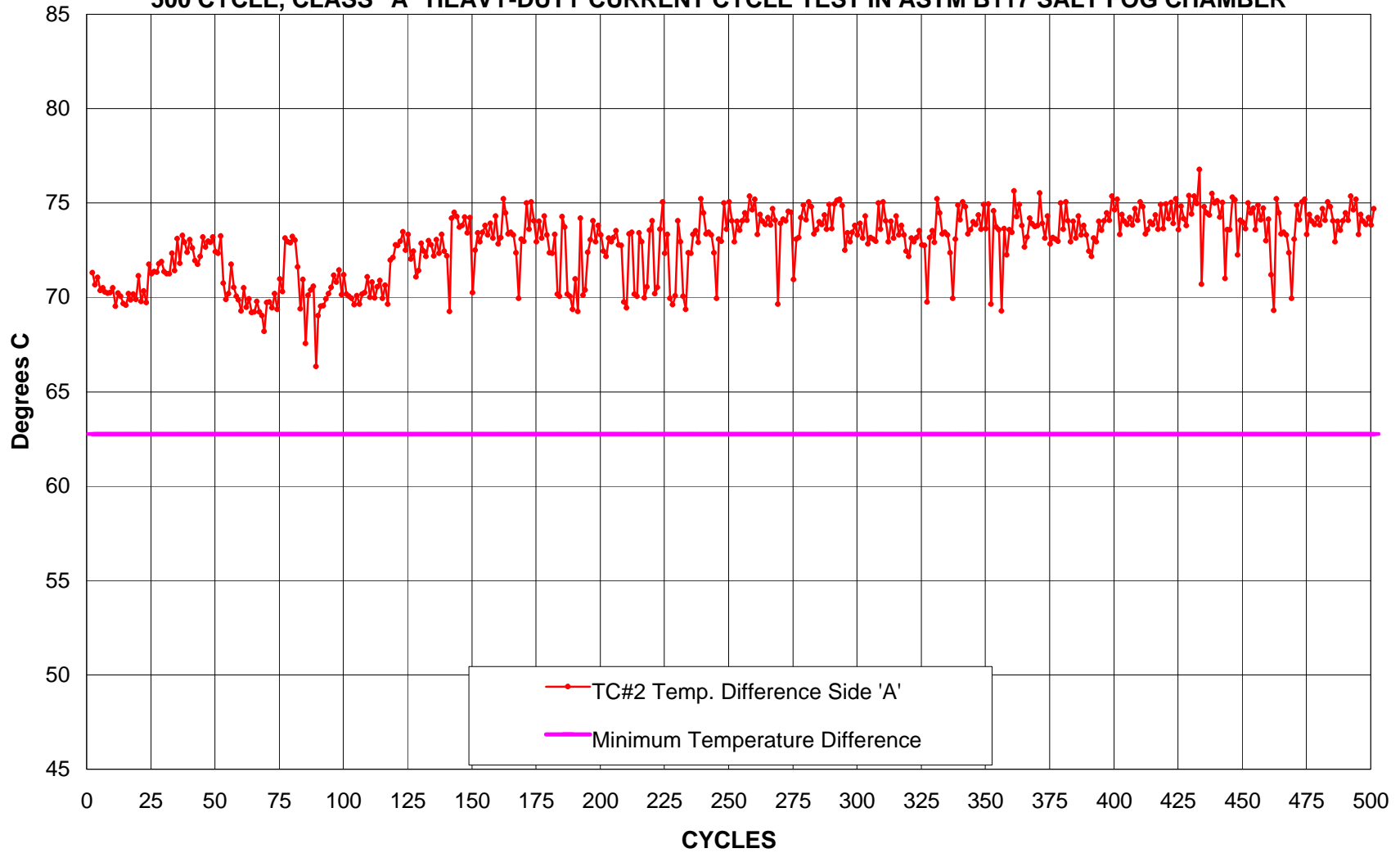
**FIGURE 13**  
**CONNECTOR #3, LOCATION 1, TEMPERATURE DIFFERENCE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



**FIGURE 14**  
**CONNECTOR #3, LOCATION 2, TEMPERATURE DIFFERENCE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



**FIGURE 15**  
**CONNECTOR #4, LOCATION 1, TEMPERATURE DIFFERENCE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**



**FIGURE 16**  
**CONNECTOR #4, LOCATION 2, TEMPERATURE DIFFERENCE, ILSCO CATALOG # SCH-63640**  
**500 CYCLE, CLASS "A" HEAVY-DUTY CURRENT CYCLE TEST IN ASTM B117 SALT FOG CHAMBER**

