BellSouth
Transport Network Element Environmental Certification Requirements

Issue 2

January 11, 2001

Environmental Requirements

- Controlled Environments

  (Central Office, Hut, CEV & Walk-in cabinets, etc.)

  – NEBS - Level 3 (GR-63 & GR-1089)

    (Exception: Earthquake Zone 2 *Required*, Zone 4 *Objective*)

- Uncontrolled Environments

  (Remote Electronic Equipment Cabinets, ONUs, etc.)

  – Requirements for Controlled Environments, plus:

  – Attachment A: Hostile Environment Certification Requirements

Attachment A
BellSouth Certification Requirements for Products Used in Uncontrolled (Hostile) Environments

1.0 General Requirements

2.0 Test Requirements

3.0 Test Configuration

4.0 Temperature Cycles

Attachment A
1.0 General Requirements

- In addition to requirements stated herein, equipment must meet all environmental requirements specified in:
  - GR-63-CORE
  - equipment-specific generic requirements (e.g.GR499, TA909,etc.)
  - documents referenced in above (e.g. GR1089, etc.)
- Supplier to specify critical component(s) operating temperature limits
- Supplier to provide required equipment and data to BellSouth cabinet supplier(s) as required for GR487 compliance testing

Attachment A
1.0 General Requirements - continued

- Supplier to specify required air-flow rates through equipment and shelf entrance/exit temperature limits
- Equipment to be subjected to three temperature cycles
  - Temperature cycling - under power
  - Temperature cycling - hot/cold power outages
  - Temperature cycling - hot/cold thermal shocks
- Equipment to meet all supplier's and generic specifications through full temperature range and as specified in temperature cycles.
  - Objective: meet specifications without fan shelf active
  - Requirement: meet specifications with fan shelf active

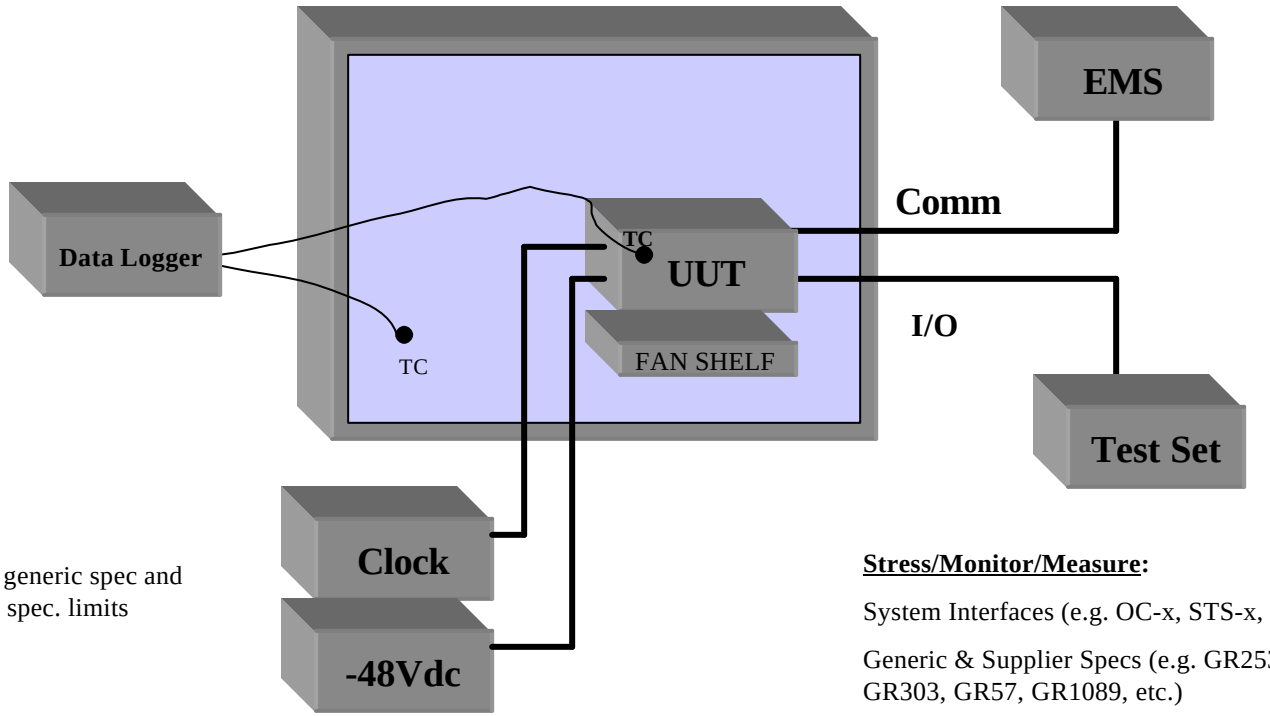
Attachment A
2.0 Test Requirements

- Equipment specific (e.g. SONET, NGDLC, FITL, Video, Data, etc.) test plan to be developed with TAS-T/A SME. Test plan will be used to validate equipment performance.
- Equipment type, quantity and configuration to be as specified by TAS-T/A SME
- Thermocouple(s) will monitor case temperature of manufacturer specified critical component(s)
- Temperature cycling - under power (100-cycle) will be performed without fan shelf active. If any failure occurs then test will be repeated with fan shelf active.

Attachment A
3.0 Typical Test Configuration

Monitor/Measure: System Alarms, OS interfaces

Perform: Provisioning, Inventory, Diagnostics, etc.



Vary inputs to generic spec and manufacturers' spec. limits

Stress/Monitor/Measure:

System Interfaces (e.g. OC-x, STS-x, DS-x, VF, etc.)

Generic & Supplier Specs (e.g. GR253, GR499, TA909, GR303, GR57, GR1089, etc.)

UUT = Unit Under Test

EMS = Element Management System

TC = Thermocouples

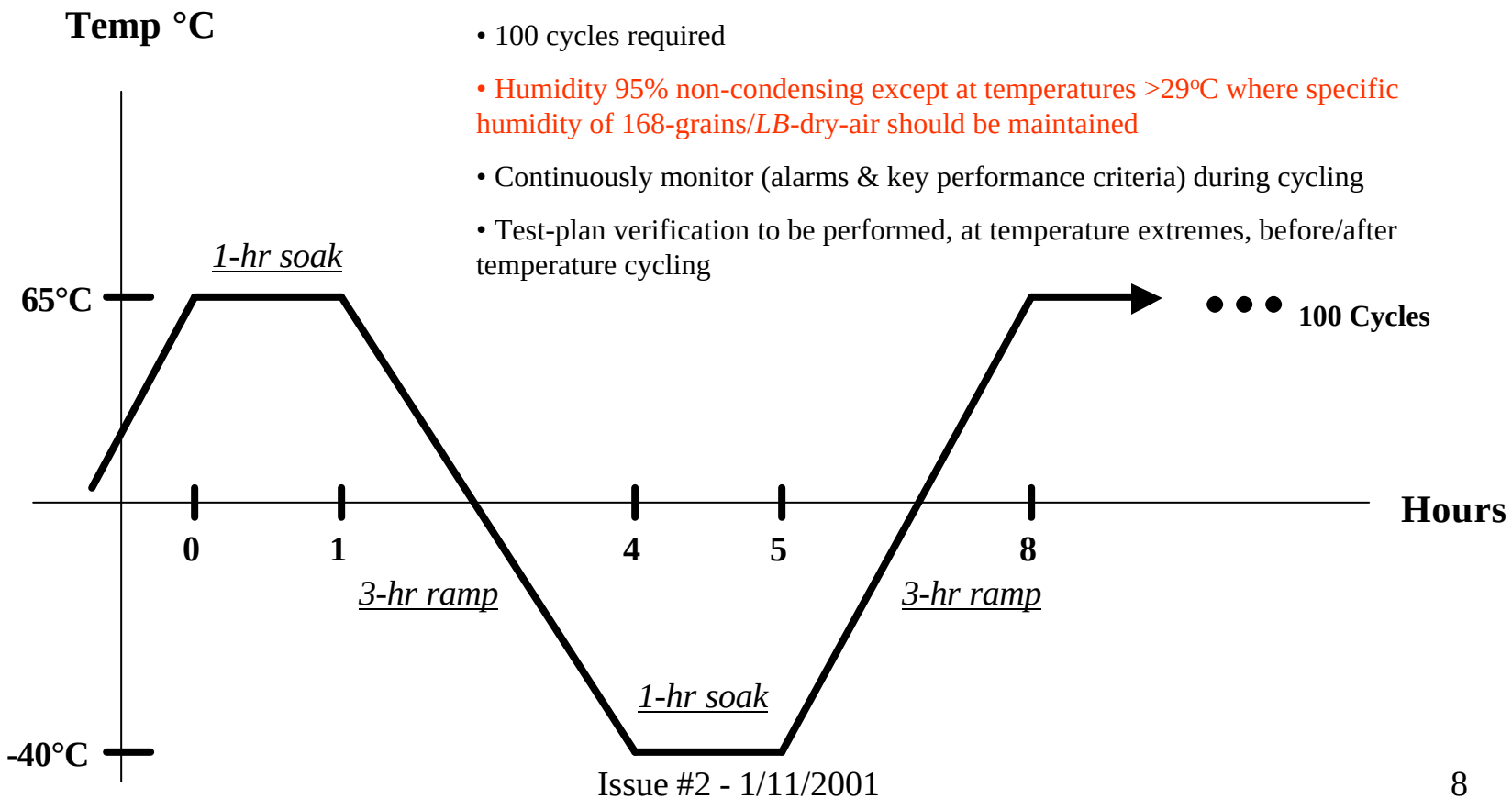
I/O = Input/Output (e.g. Tx/Rx)

Attachment A

4.0 Temperature Cycle - Under Power

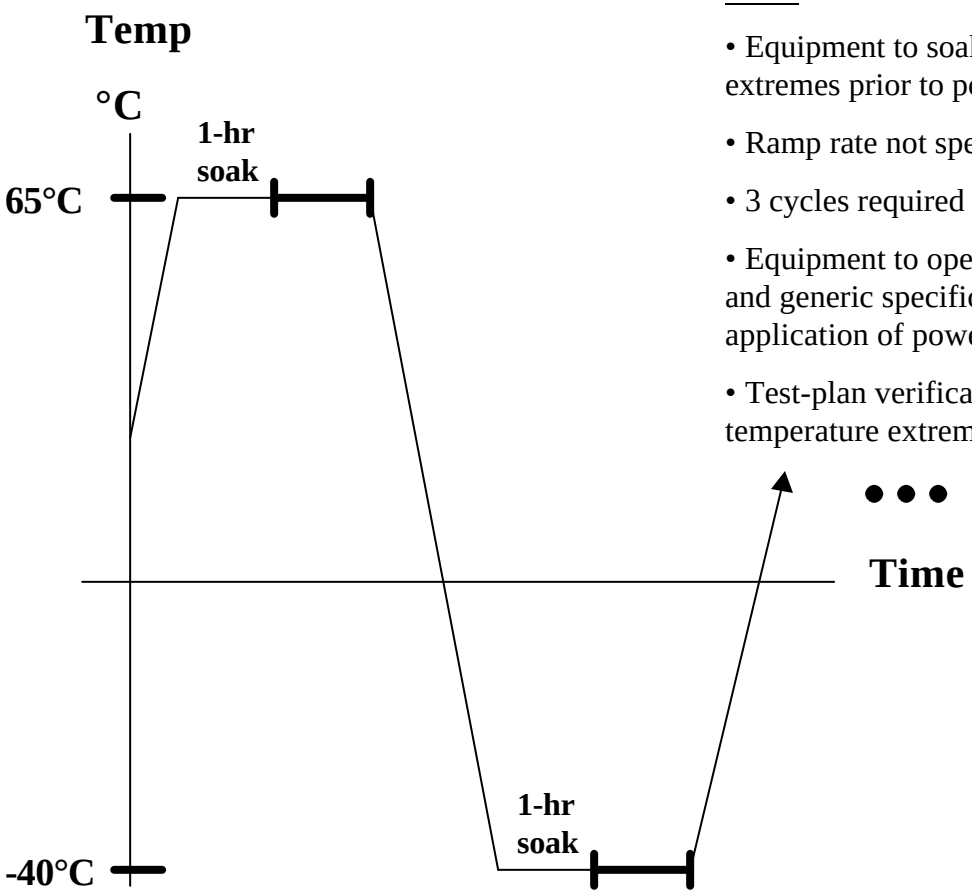
Notes

- Minimum 1-hr soak at extremes. Ramp rates steeper than 3-hrs are acceptable
- 100 cycles required
- Humidity 95% non-condensing except at temperatures >29ºC where specific humidity of 168-grains/*LB*-dry-air should be maintained
- Continuously monitor (alarms & key performance criteria) during cycling
- Test-plan verification to be performed, at temperature extremes, before/after temperature cycling



Attachment A

4.0 Temp. Cycle - Hot/Cold Power Outages



Notes

- Equipment to soak unpowered for 1-hour at extremes prior to power-up
- Ramp rate not specified
- 3 cycles required
- Equipment to operate properly and meet all supplier and generic specifications within one minute of application of power
- Test-plan verification to be performed at temperature extremes of final cycle

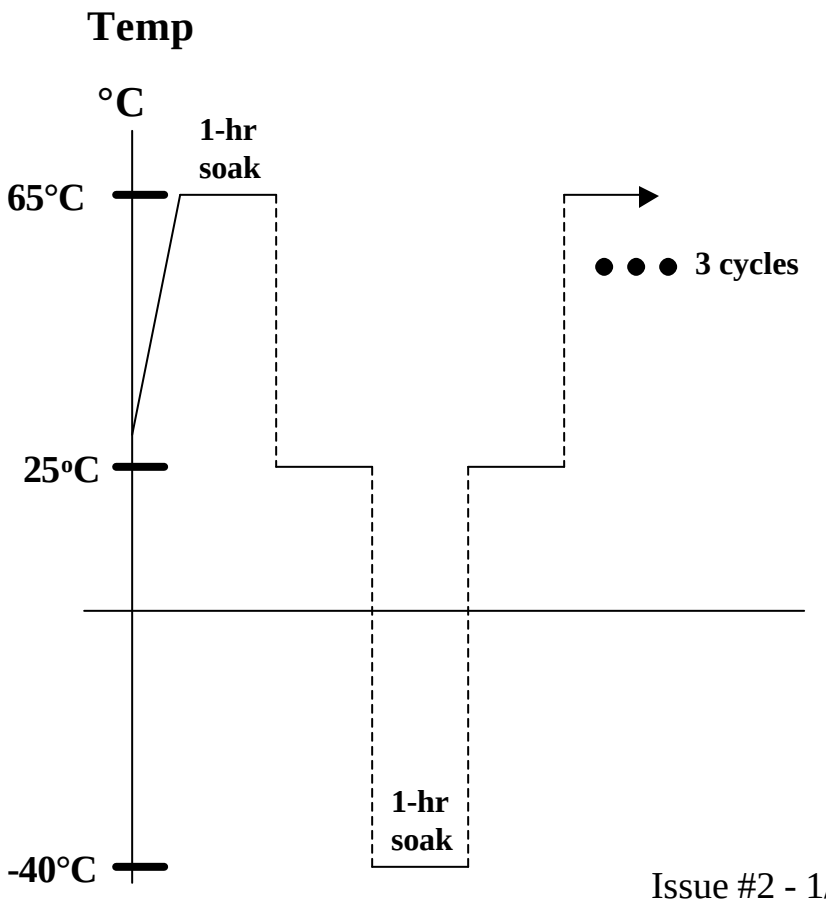
Legend

Unpowered

Powered

Attachment A

4.0 Temp. Cycle - Hot/Cold Thermal Shocks



Notes

•Equipment to soak for 1-hour at extremes. Soak time at room temperature unspecified.

• Ramp rate - instantaneous for small equipment. To be agreed upon for large equipment, but not less than 15°C/min.

•3 cycles required

• Equipment to be unpowered during cycling

• Equipment to operate properly and meet all supplier and generic specifications within one minute of application of power.

• Test-plan verification (at room temperature) to be performed after completion of final cycle.