



Canadus HD-1224 Battery Desulfator Summary of Product Testing

Supplier Name: Canadus Power Systems

Date Prepared January 25th, 2017

Parts Described: Canadus HD-1224 Variants and Associated Components

Prepared by: Dan Biggs

General Test Parameters and Specification:

- T_{max} = +85°C / T_{nom}=+25°C / T_{min}=-40°C
- Operating Voltage 12VDC – 35VDC (12V and 24V vehicle electrical systems)
- Operating Modes: Various

Summary of Product Testing:

- UNECE Regulation 10
 - All tests required for “Type Approval”
 - VCA “E11” marking
 - VCA Conformity of Production Approval
- LEG 1 Requirements: (Done in Series)
 - Functional Measurements (Ambient, Hot and Cold)
 - Rapid Change of Temperature (Thermal Shock) I
 - IEC 60068-2-14 with additional “time to equilibrium”
 - 800 Cycles (T_{max} to T_{min} and back)
 - Temperature Cycling Test
 - IEC 60068-2-14 with additional “time to equilibrium”
 - Transition time: 2-15°C/min
 - 100 Cycles
 - Composite Temperature / Humidity Cyclic Test
 - IEC 60068-2-38 Z/AD for a duration of 10 days
 - Damp Heat Steady State
 - IEC 60068-2-78 for a duration of 10 days
 - Temp +65°C @ 93%rh
 - Cold Wake Up Test
 - 16750-4 5.1.1.1
 - ~25 hours

- Random Vibration (short test)
 - ISO 16750-3
 - 1hr at room temp
- Functional Measurements (Ambient, Hot and Cold)
- Internal and External Inspection
- LEG 2 Requirements: (Done in Series)
 - Functional Measurements (Ambient, Hot and Cold)
 - Immunity To ESD
 - Volvo STD 515-0003.
 - Based on ISO 10605
 - High Temperature Test
 - ISO 16750-4 5.1.2.2
 - 500 Hours
 - Rapid Change of Temperature (thermal Shock) II
 - IEC 60068-2-14 with additional “time to equilibrium”
 - 100 Cycles (Tmax to Tmin and back)
 - Random Vibration
 - ISO 16750-3
 - ISO 16750-4 test 5.3.1
 - Tmin to Tmax ramping
 - Test Period = 48hrs for each of 3 Axis.
 - Sinus Vibration
 - ISO 16750-3
 - ISO 16750-4 test 5.3.1
 - Tmin to Tmax ramping
 - Test Period = 48hrs for each of 3 Axis.
 - Mechanical Shock
 - ISO 16750-3 test 4.2.2.2
 - Moisture Permeability
 - Volvo STD document 515-0004 (SEALED TEMPERATURE/HUMIDITY CYCLIC TEST)
 - 200 Cycles
 - Temps required in cycle: Tmin, Tmedian=+5°C and Tmax
 - 30 min exposure time for each temp
 - Functional Measurements (Ambient, Hot and Cold)
 - Internal and External Inspection
- LEG 3 Requirements: (Done in Series)
 - Functional Measurements (Ambient, Hot and Cold)
 - Electrical Loads
 - Direct current supply voltage and current consumption (measurements)
 - Over voltage
 - 18V for 2hr, 24V 5 min, 36V for 1hr, 48V for 2min



- Superimposed Alternating Voltage
 - ISO 16750-2
- Slow Decrease and Increase of Supply Voltage
 - ISO 16750-2
- Momentary Drop in Supply Voltage
 - ISO 16750-2
- Reset Behavior at Voltage Drop
 - ISO 16750-2
 - Repeat after 2hr at Tmin with additional voltage drops
- Reversed Voltage
 - ISO 16750-2
- Open Circuit Test
 - ISO 16750-2
- Immunity To ESD
 - Volvo STD 515-0003.
 - Based on ISO 10605
- EMC Test I
 - Volvo STD 515-0003.
 - Based on ISO 7637 (1-3), CISPR 25, ISO 11451 (1-3), and ISO 11452 (1-8)
- Functional Measurements (Ambient, Hot and Cold)
- Internal and External Inspection
- LEG 5 Requirements: (Done in Series)
 - Functional Measurements Ambient
 - Temp Steps
 - ISO 16750-4 5.2
 - After test include steps back down to +20°C
 - EMC Test II
 - Volvo STD 515-0003.
 - Based on ISO 7637 (1-3), CISPR 25, ISO 11451 (1-3), and ISO 11452 (1-8)
 - Functional Measurements Ambient
- LEG 6 Requirements: (individual Tests/Done in Parallel)
 - Functional Measurements (Ambient, Hot and Cold)
 - Free Fall
 - ISO 16750-3 4.3
 - 1 meter drop to Concrete at Tnom
 - Ice Water Shock Test
 - ISO 16750-4 5.4 (Splash Test)
 - 100, 1hr cycles with Tmax air temp
 - 0°C water splash with (3 l to 4 l)/3 s (splash duration)



- Chemical Loads
 - ISO 16750-5 chemical loads according to Table 1
 - Numerous automotive chemicals
- Salt Spray Test
 - IEC 60068-2-52
- Mechanical Life
 - Mount/Dismount 30 times
- Corrosive Test with mixed flow gasses
 - IEC 60068-2-60, Test Ke, Method 4
 - +40°C @ 75%rh
 - 504 hours / 1hr on and 1 hr off cycles
- Functional Measurements (Ambient, Hot and Cold)
- Internal and External Inspection
- LEG 7 Requirements:
 - Painted Metal Parts Test (Corrosion)
 - Volvo STD 121-0001
 - Adhesion
 - Chemical resistance
 - Moisture resistance
 - Wet adhesion
 - Corrosion resistance
 - Internal and External Inspection
- LEG 8 Requirements: (individual Tests/Done in parallel)
 - Water and Dust Intrusion
 - IP6K7
 - IP6K9K
 - Internal and External Inspection
- LEG 9 Requirements:
 - Fire Resistance
 - UL94V-0
 - Internal and External Inspection