



# TESCOR

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## SURFACE CALORIMETER & LINEARITY TEST BENCH



Tescor's Surface Calorimeters are designed to provide the customer with extreme accuracy, repeatability and flexibility in the determination of heat exchanger thermal capacities in accordance with *ASHRAE Standard 33*. We offer a complete line of surface calorimeters for automotive air conditioning applications. Surface Calorimeters are used to determine the capacities of such components as: *Radiators, Condensers, Evaporators, Heater Cores, and Oil Coolers, Charge Air Coolers, Tube Surfaces, Chilled Water Coils, etc.* This surface calorimeter utilizes a Conditioned Air Supply Blow through System to control air temperature, Humidity and Air Flow or Pressure over the bare heat exchangers or complete HEB (heater, evaporator & blower) Modules. These air supply conditions are precisely controlled and recorded. Tescor uses a Code Tester to determine UUT air-flow and the psychrometric conditions of the air as it enters the test piece. The code tester includes AMCA nozzles with a bypass system to allow a wide range of system air-flows without sacrificing system accuracy. The calorimeter offers control over such parameters as inlet air temperature and humidity, test piece air flow, refrigerant discharge pressure, TXV inlet pressure, expansion device inlet temperature, suction pressure, heater core inlet temperature, pressures and flows, etc. The calorimeter is supplied with a fully automated computer data acquisition and control system and is designed for heat balances of  $\pm 3\%$  with a repeatability of  $\pm 1\%$ .

When operated as a Linearity Test Bench all temperature data for each vent outlet is collected automatically for each damper position and plotted at the end of the test. Damper position changes are performed manually by the operator or by remote computer control and at the end of the test the computer will plot the temperature vs. door opening position for each HEB Module vent outlet.

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## Surface Calorimeter & Linearity Test Bench Specifications

| PARAMETER                                  | CONTROL RANGE                  | STABILITY  |
|--|--------------------------------|------------|
| Air Supply Temperature                     | -20 to 60 °C                   | ± 0.25°C   |
| Air Supply RH (within 4 to 40°C dew point) | 10 to 90%                      | ± 2%       |
| Air Flow (with controlled T & RH)          | 90 to 900 m <sup>3</sup> /hr   | ± 0.5%     |
| Air Flow (with uncontrolled T & RH)        | 901 to 1400 m <sup>3</sup> /hr |            |
| Maximum Pressure Drop of UUT               | 600 Pa                         |            |
| Liquid Temperature at TXV                  | 32 to 71°C                     | ± 0.3°C    |
| Liquid Pressure before TXV                 | 690 to 1896 kPaA               | ± 20 kPaA  |
| Evaporator Outlet Pressure                 | 159 to 345 kPaA                | ± 3.5 kPaA |
| Evaporator Maximum Capacity                | 10 kW                          |            |
| Water/Glycol 50% Mix Flow                  | .1 to 1.5 m <sup>3</sup> /hr   | ± 0.2 LPM  |
| Water/Glycol 50% Mix Temperature           | 50 to 100°C                    | ± 0.2°C    |
| Heater Core Maximum Capacity               | 12 kW                          |            |
| Blower Motor Power Supply                  | 0 to 50 VDC & 0 to 50 A        | ± 0.2 VDC  |
| Air Flap Actuator #1                       | 0 to 30 VDC & 0 to 10 A        | ± 0.2 VDC  |
| Air Flap Actuator #2                       | 0 to 30 VDC & 0 to 10 A        | ± 0.2 VDC  |
| Air Flap Actuator #3                       | 0 to 30 VDC & 0 to 10 A        | ± 0.2 VDC  |
| Air Flap Actuator #4                       | 0 to 30 VDC & 0 to 10 A        | ± 0.2 VDC  |

| SENSOR LIST                     | TYPE        | QUANTITY |
|---------------------------------|-------------|----------|
| Temperature Thermocouple        | TTT         | 12       |
| DAS spare Thermocouple Channels | TTT         | 50       |
| RH                              | VAISALA     | 2        |
| Barometric Pressure             | Rosemount   | 1        |
| Air Side Pressure Drop of UUT   | Rosemount   | 4        |
| HEB Inlet Pressure              | Rosemount   | 1        |
| Fluid Pressure                  | Rosemount   | 5        |
| DC Volt                         |             | 5        |
| DC Amps                         |             | 5        |
| Fan Speed                       |             | 1        |
| Mass Flow Rate                  | Micromotion | 2        |

### □ LabVIEW Software

- Create Tests And Sequences for Automatic Operation
- User configurable data acquisition channels
- User configurable calculation channels
- Loop Calibration Utility
- Dedicated hardware checkout routine
- Color coded stability status indicators
- Stability tolerance adjustment
- Real Time graphing capability up to 8 variables, dual scale
- All temperature data for each vent outlet is collected automatically for each damper position and plotted at the end of the test. Damper position changes are performed manually by the operator or by remote computer control and at the end of the test the computer will plot the temperature vs. door opening position for each HEB Module vent outlet.

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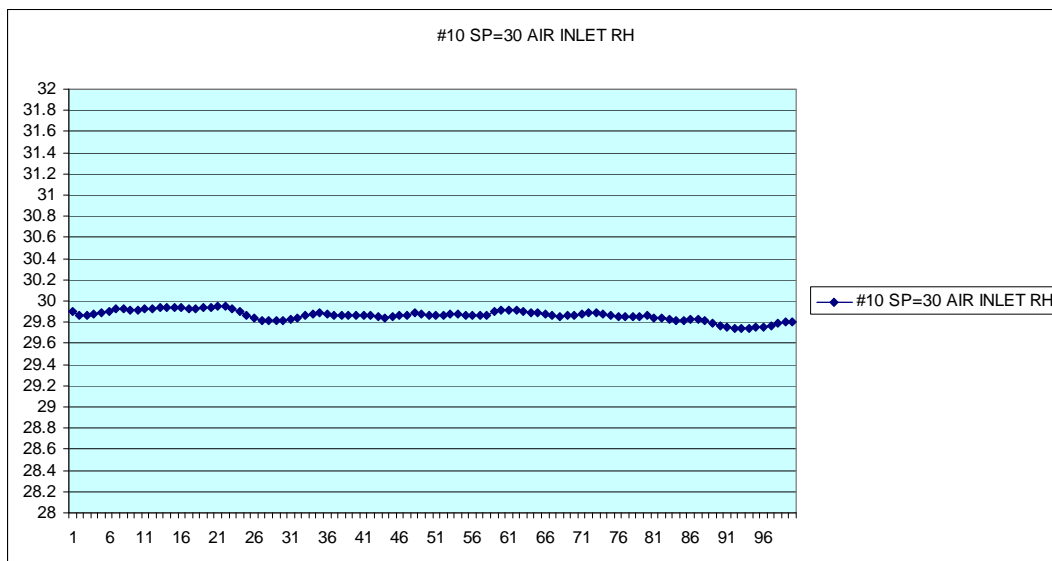
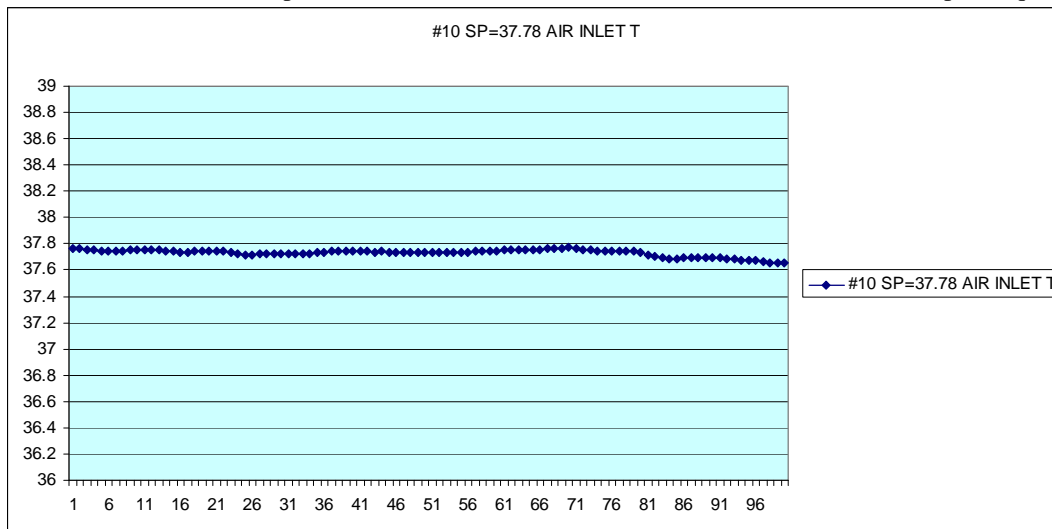
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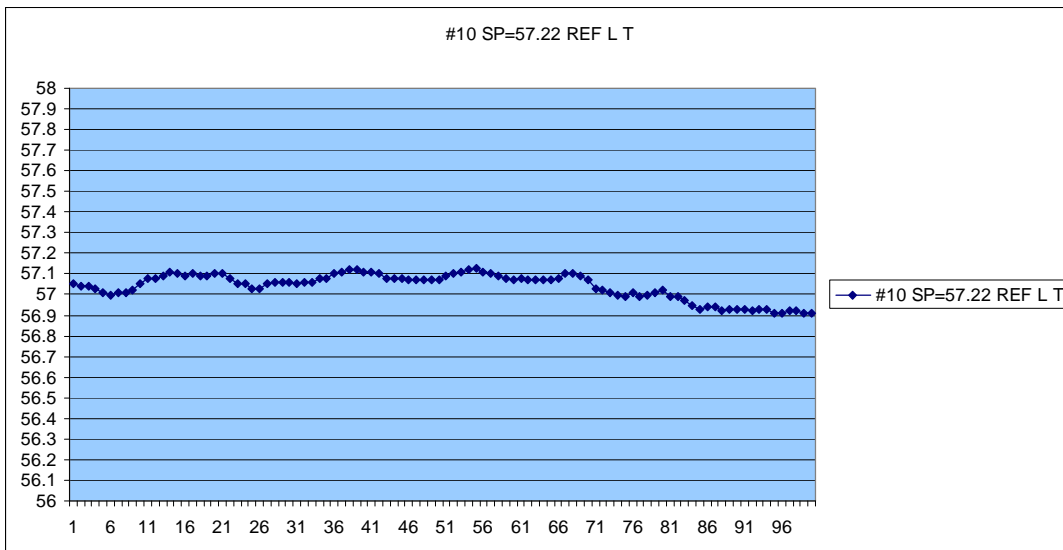
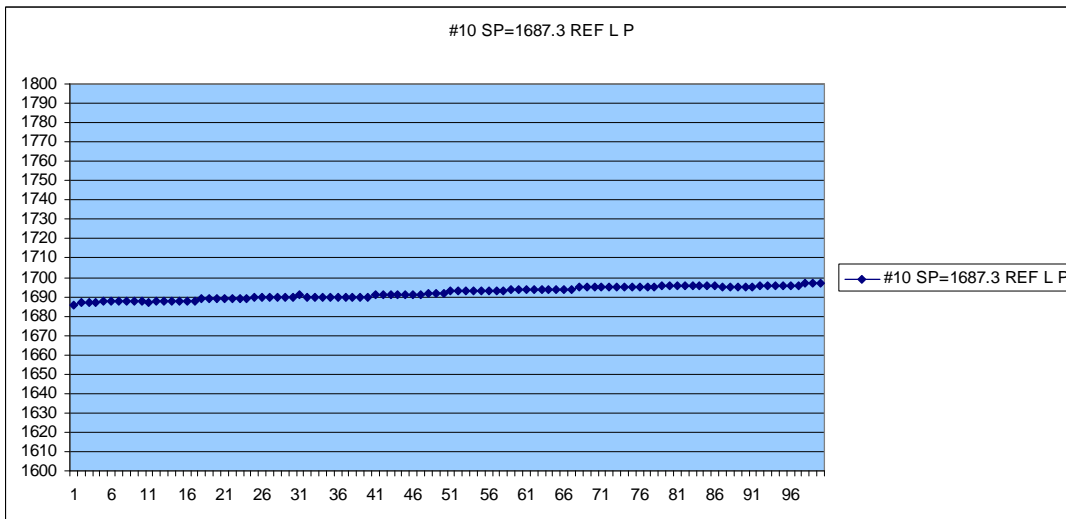
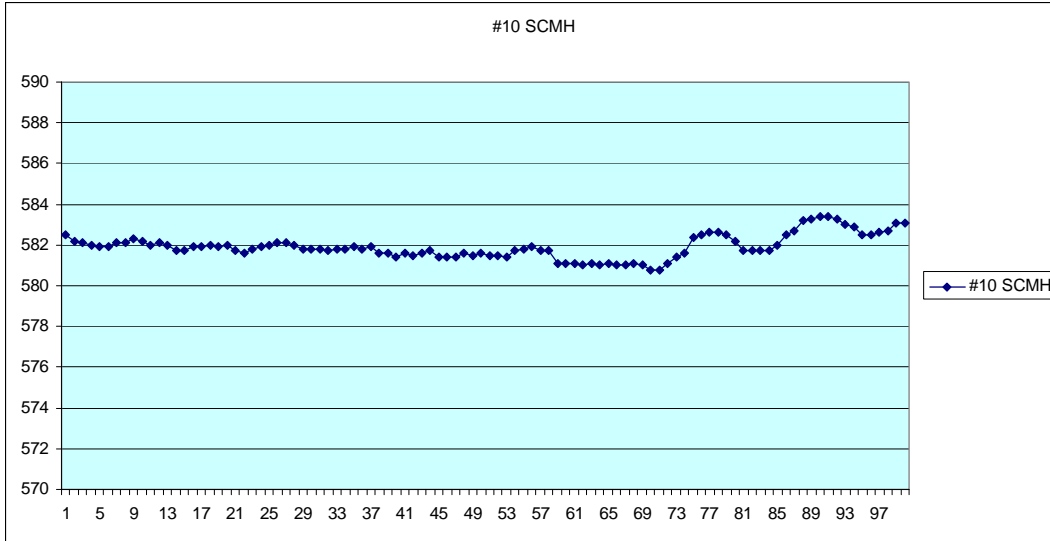
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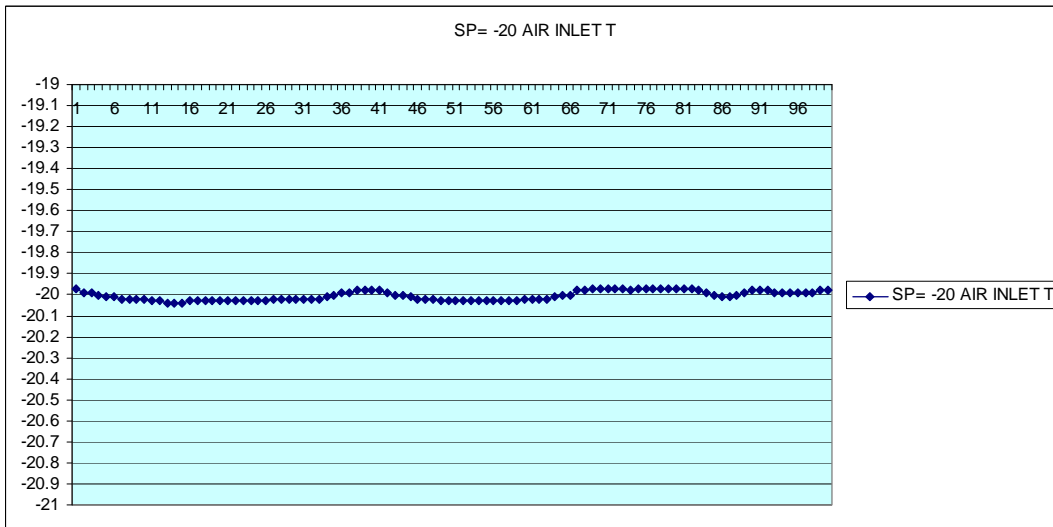
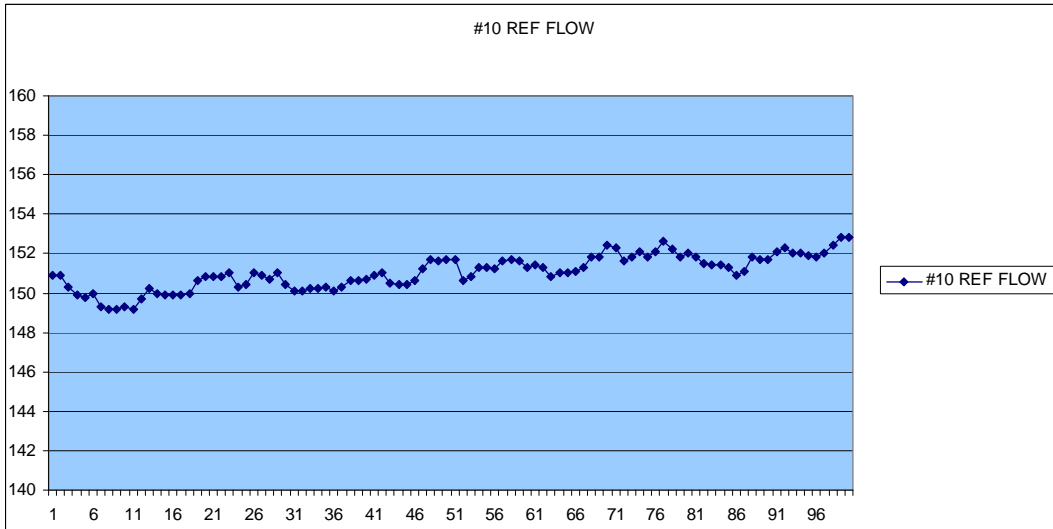
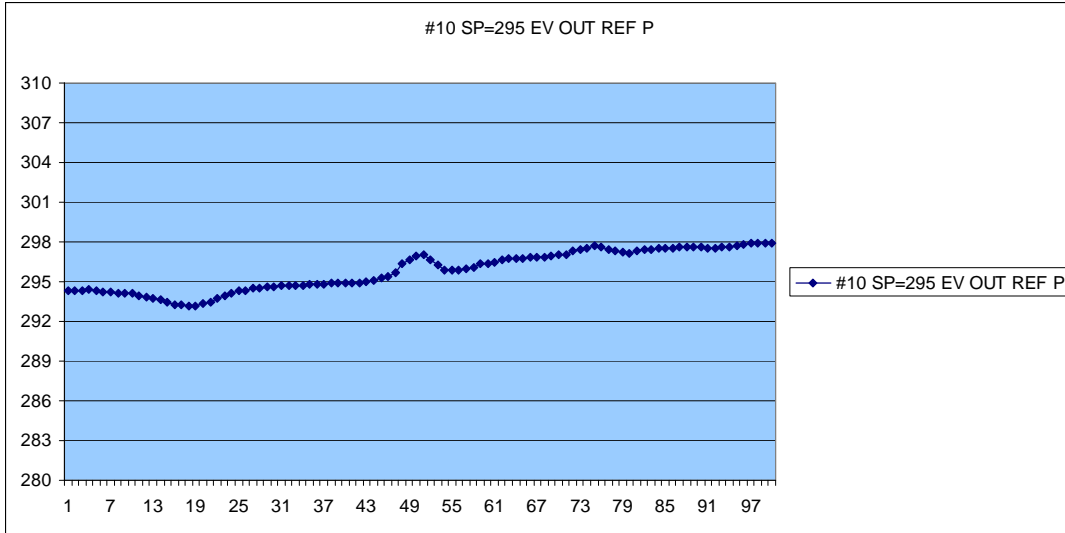


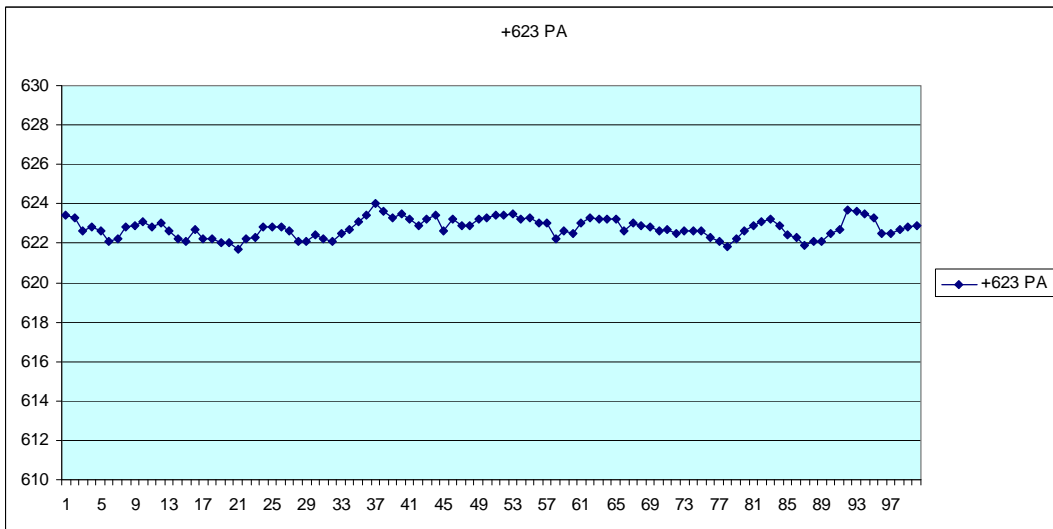
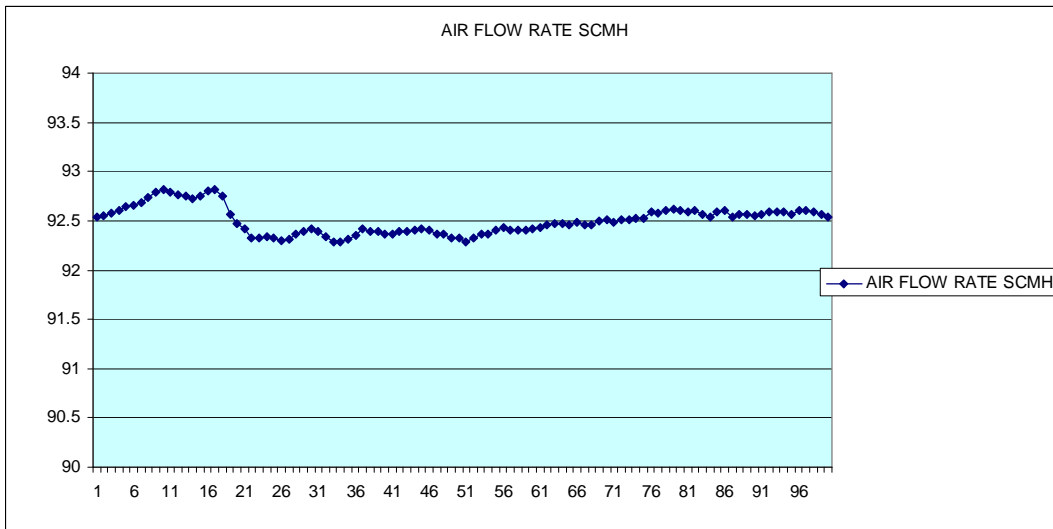
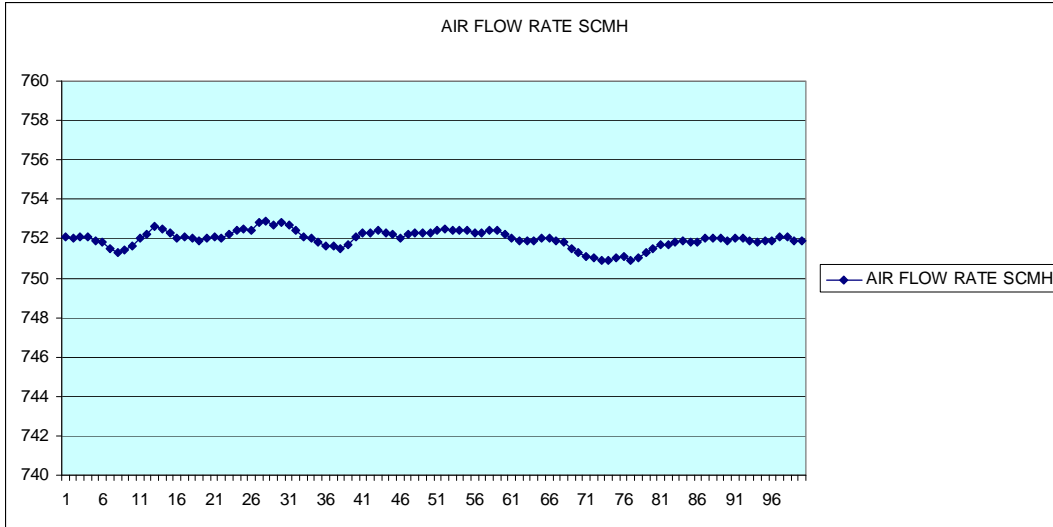
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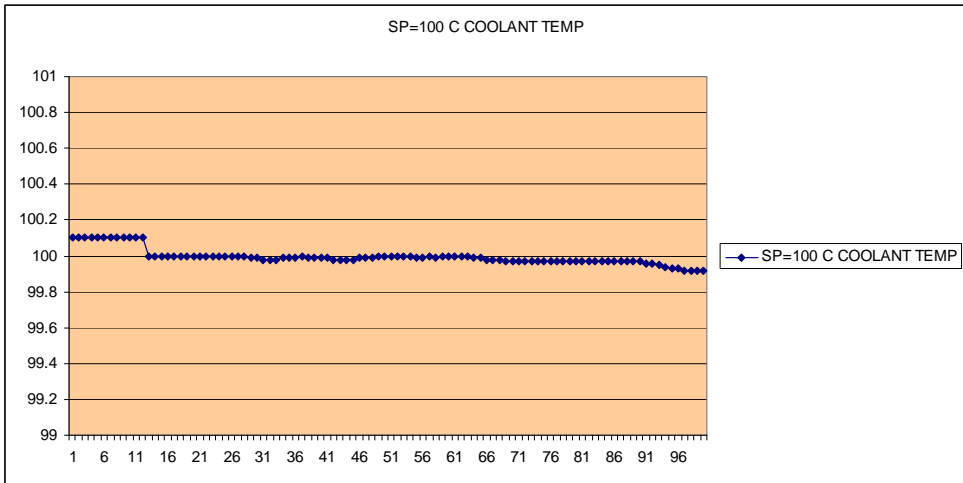
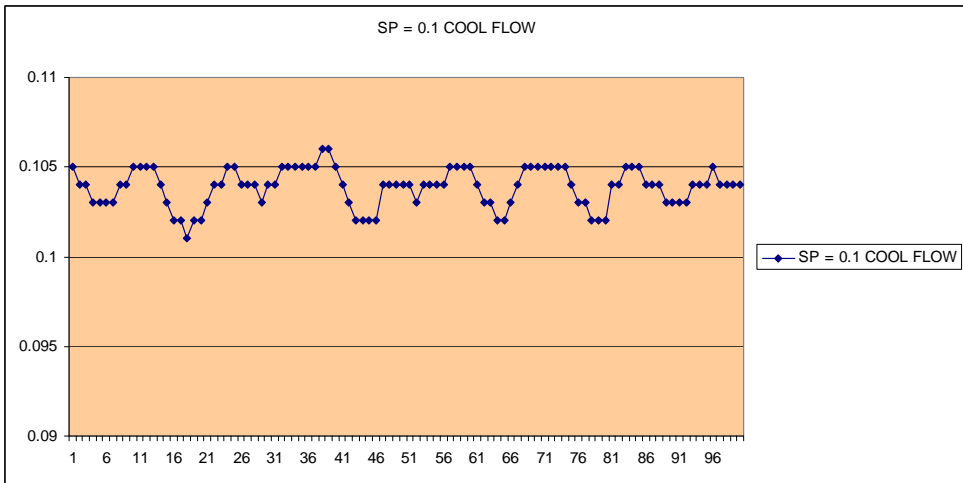
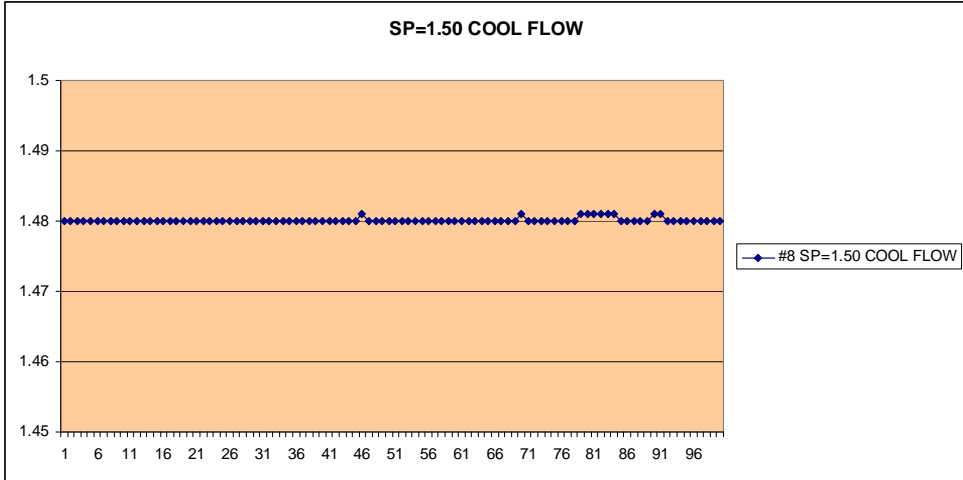
- Automatic Test Report Generation
  - Data File Management and Search Tools
- ❑ Performance Measurement
- 3% agreement or better fluid side to air side
  - 1% repeatability of test results
- ❑ Utilities Requirement
- 460/3/60 @ 200 Amp Service
  - Chilled Water @ 15°C , 120 LPM, 30 PSI
  - Saturated Steam @ 100 lb/hr @ 40 PSI
  - Instrument Air @ 5 CFM, 80 PSIG
  - Floor Drains
- ❑ Performance Measurement: sample data showing system control stability; all data points are taken at 3 seconds intervals and plotted in charts below. Additional data and charts available upon request











Tescor manufactures a full line of Climate Control Test Equipment for the Automotive and HVAC marketplace including the following: *A/C System Calorimeters, Compressor Endurance Test Stands, Compressor Calorimeters, Clutch Test Stands, Compressor Noise Test Benches, Compressor Audit Benches, Psychrometric Test Rooms, Balanced Ambient Calorimeters, Compressor Slug Test Benches, Air Flow Code Testers, and Environmental Test Chambers.*