

**Roller Follower Wear Test  
Report Packet Version No.**

**Conducted For**

	<b>V = Valid</b>
	<b>I = Invalid</b>

<b>Test Number</b>			
<b>Test Stand:</b>	<b>Stand Run Number:</b>	<b>Engine Number:</b>	<b>Engine Run Number:</b>
<b>Date Completed:</b>		<b>Time Completed:</b>	
<b>Oil Code <sup>A</sup>:</b>			
<b>Formulation/Stand Code:</b>			
<b>Alternate Codes:</b>			

<sup>A</sup> CMIR or Non-Reference Oil Code

**Submitted By:**

	<b>Testing Laboratory</b>
	<b>Signature</b>
	<b>Typed Name</b>
	<b>Title</b>

**FIG. A5.1 Final Report Cover Sheet**

### Roller Follower Wear Test

Reference Oil Test					Non-Reference Oil Test					
Lab	Stand	Stand Run No.	Engine	Engine Run No.	Lab	Stand	Stand Run No.	Engine	Engine Run No.	
Start Date	Date Completed	End of Test Time		Test Length	Start Date	Date Completed	End of Test Time		Test Length	
CMIR	TMC Oil Code		Viscosity Grade		Oil Code				Viscosity Grade	
Laboratory Oil Code					Laboratory Oil Code					
Engine Displacement					Formulation Stand Code					
Average Wear (mils)					Average Wear (mils)	Severity Adjustment	Adjusted Average Wear			

FIG. A5.2 Test Lab Affidavit

## Roller Follower Wear Test

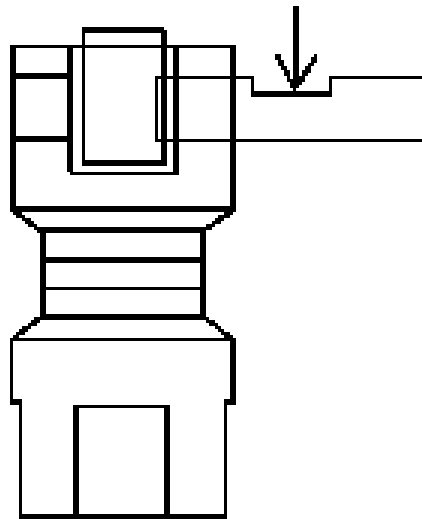
<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

<b>Lifter Part Number:</b>

### Profilometer Wear Measurements in Mils

Lifter Number	Wear (Mils)	Lifter Number	Wear (Mils)
1L		1R	
2L		2R	
3L		3R	
4L		4R	
5L		5R	
6L		6R	
7L		7R	
8L		8R	
<b>Wear Statistics</b>			
Minimum	Maximum	Average	Std. Deviation

Wear is measured at location shown by arrow



**FIG. A5.3 Summary of Roller Follower Wear**

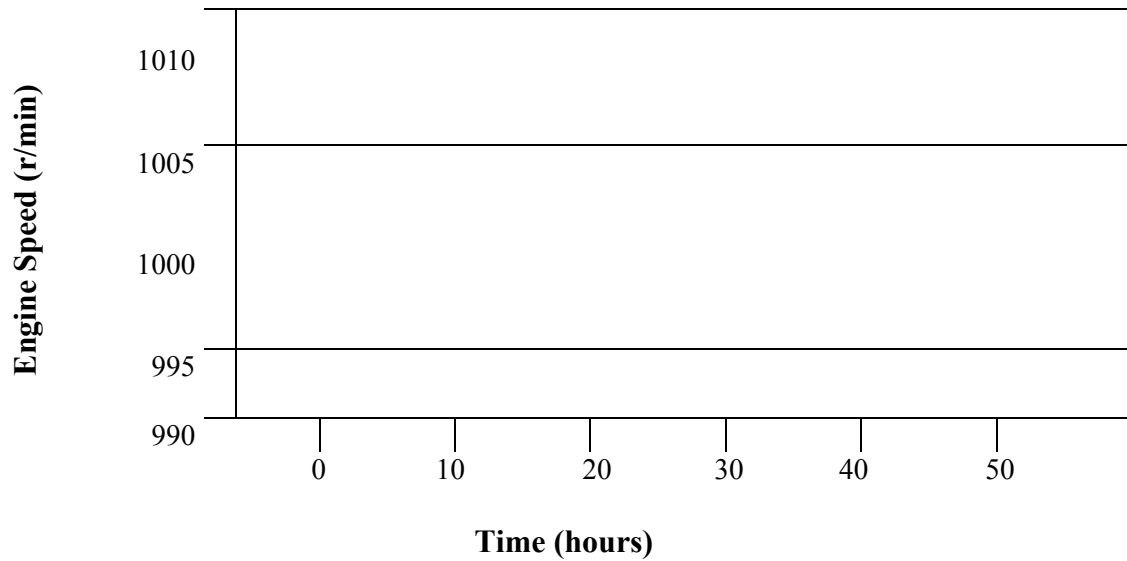
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Engine Speed (r/min)

Process Mean

$\bar{X}_{av} =$



Process Variability (s)

$S_{av} =$

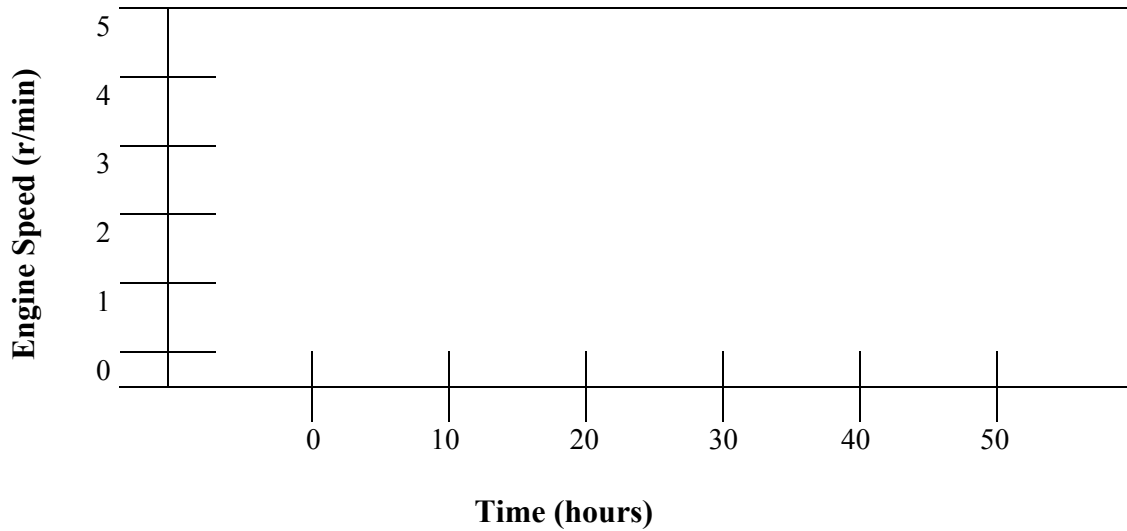


FIG. A5.4 Operational Data Summary - Engine Speed

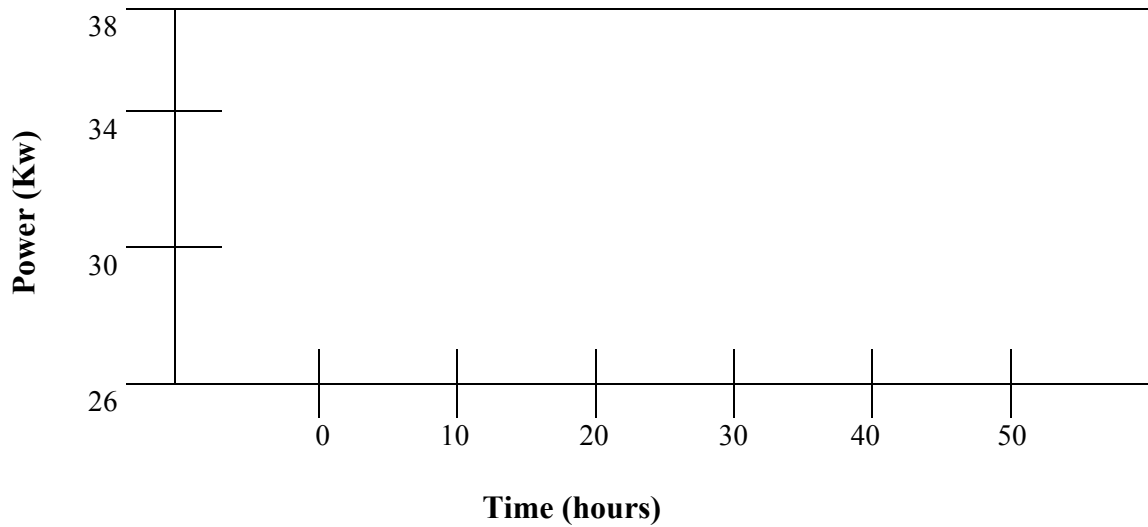
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Power (kW)

Process Mean

$X_{av} =$



Process Variability (s)

$S_{av} =$

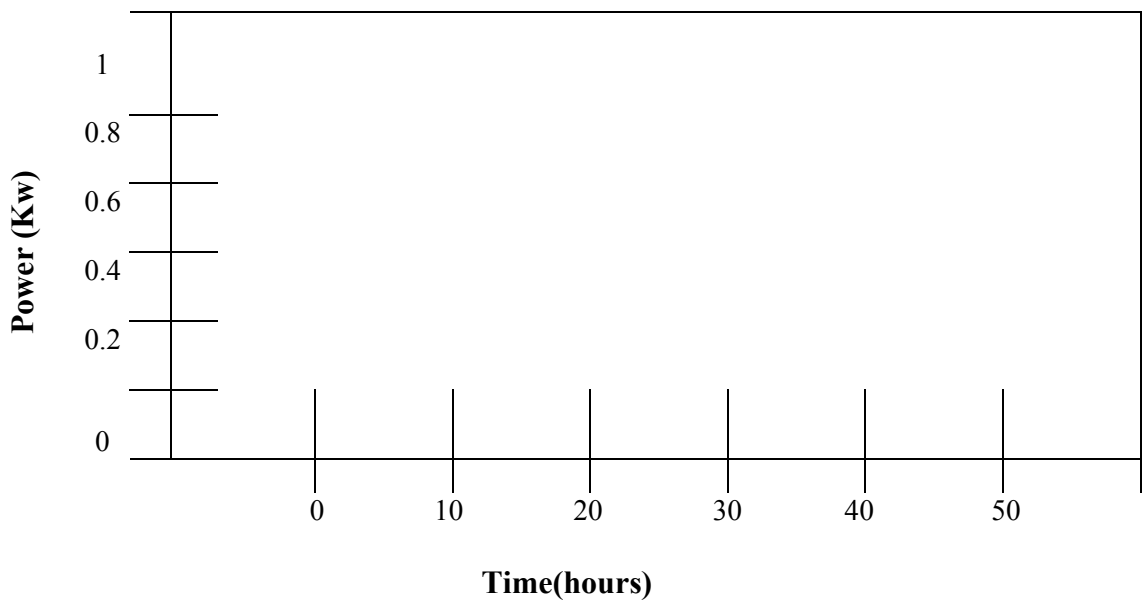


FIG. A5.5 Operational Data Summary – Power

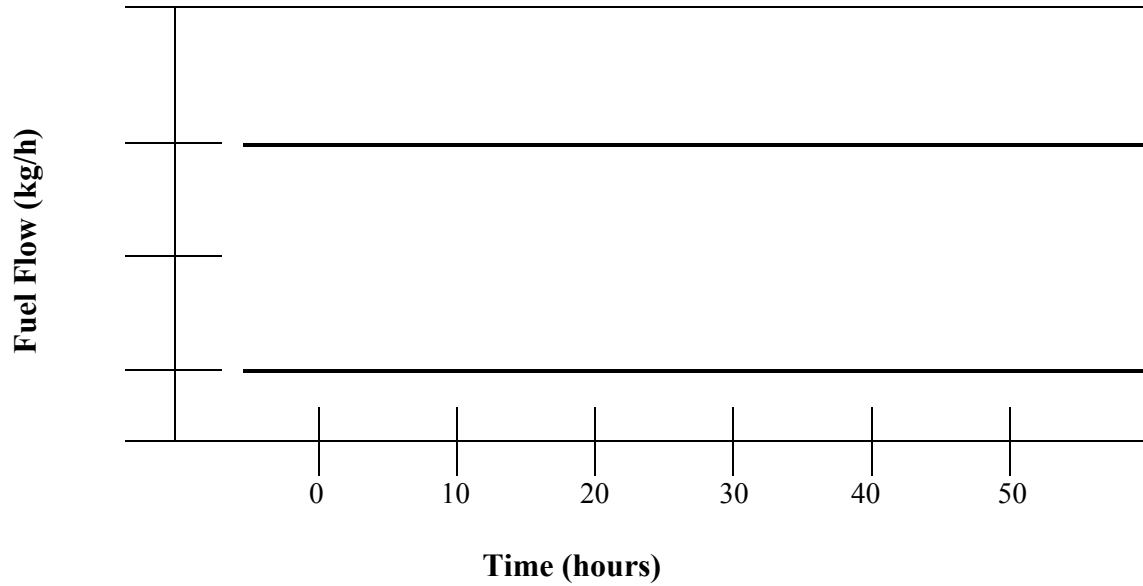
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Fuel Flow (kg/h)

Process Mean

$X_{av} =$



Process Variability (s)

$S_{av} =$

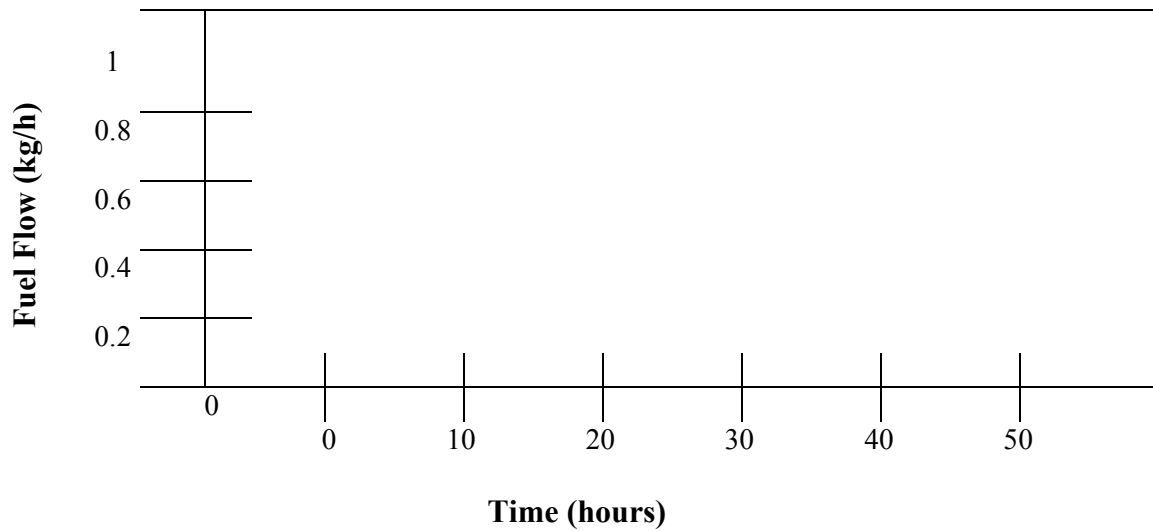


FIG. A5.6 Operational Data Summary – Fuel Flow

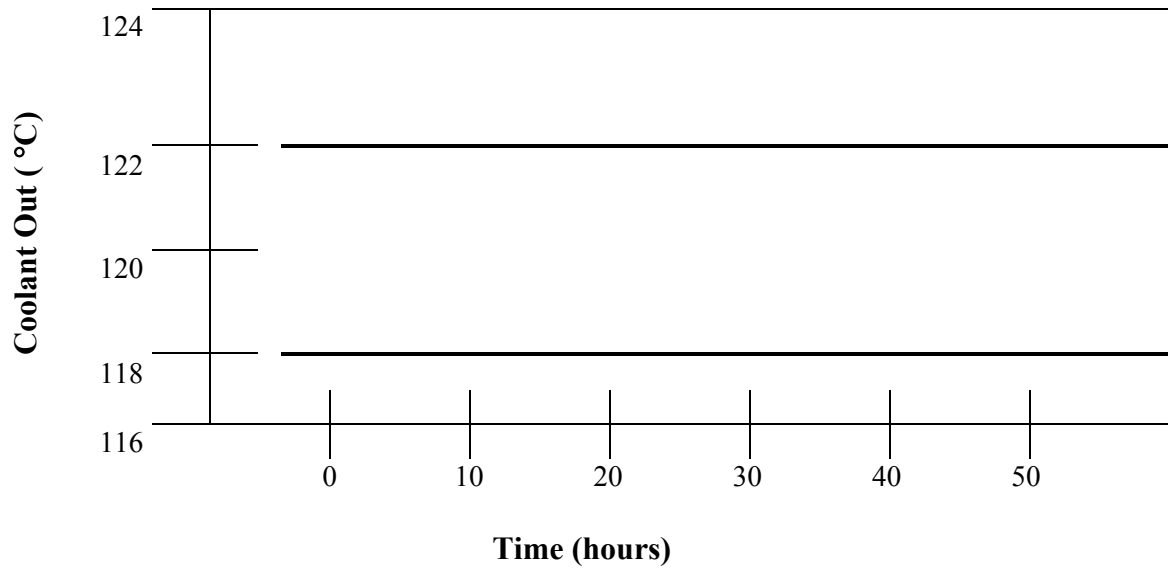
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Coolant Out Temperature

Process Mean

$\bar{X}_{av} =$



Process Variability (s)

$\bar{S}_{av} =$

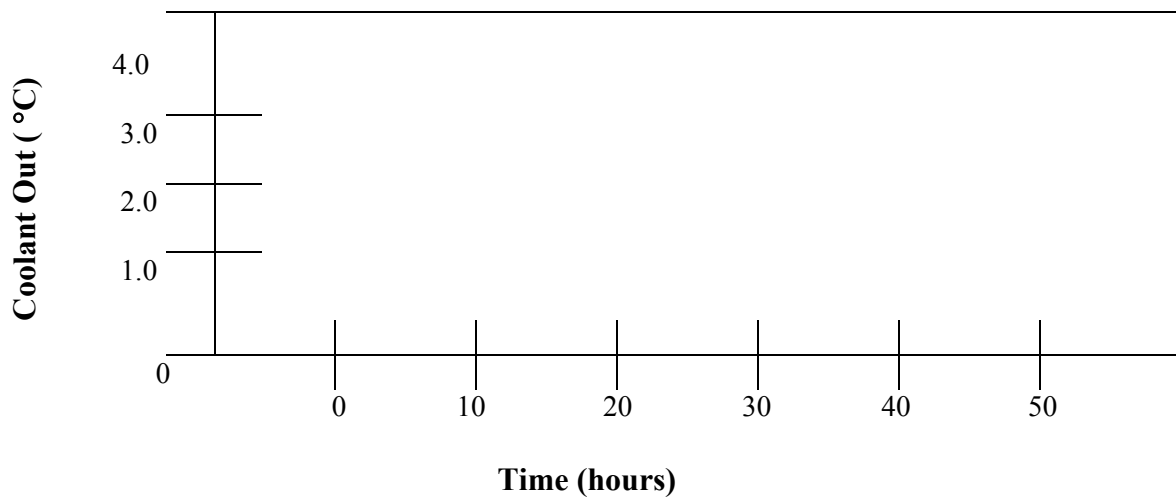


FIG. A5.7 Operational Data Summary – Coolant Output Temperature

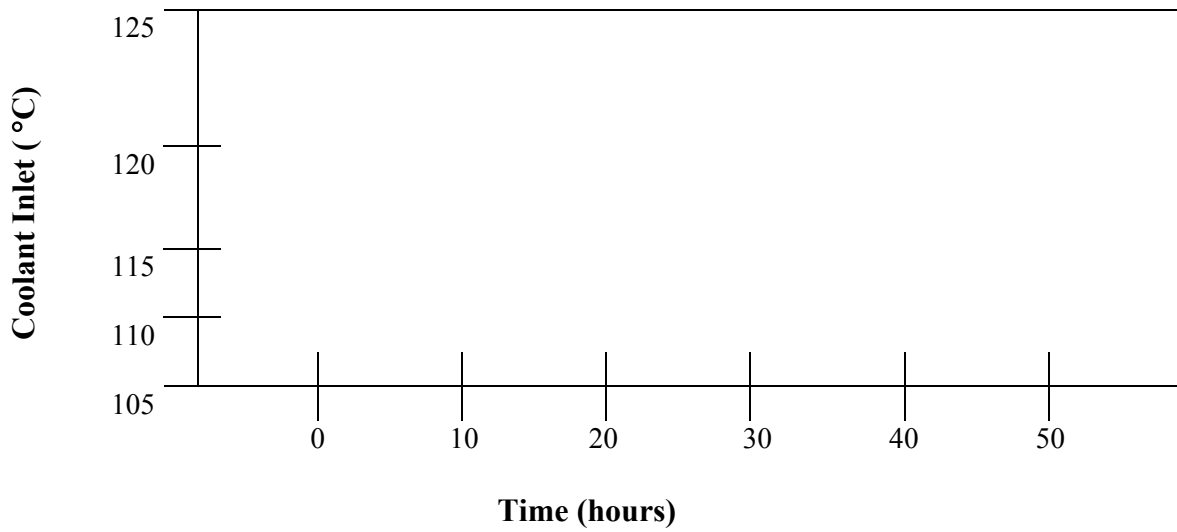
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Coolant Inlet Temperature

Process Mean

$X_{av} =$



Process Variability (s)

$S_{av} =$

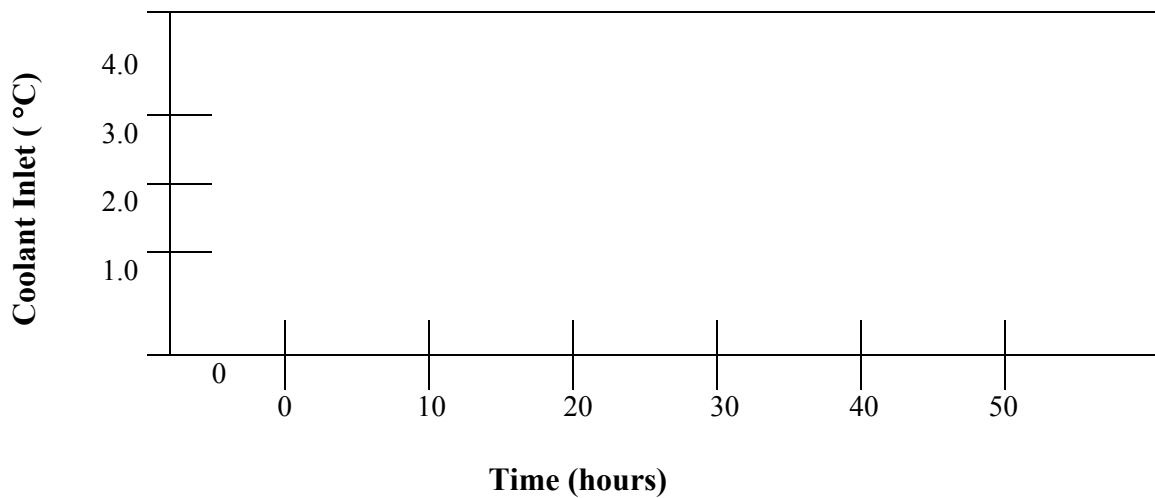


FIG. A5.8 Operational Data Summary – Coolant Inlet Temperature



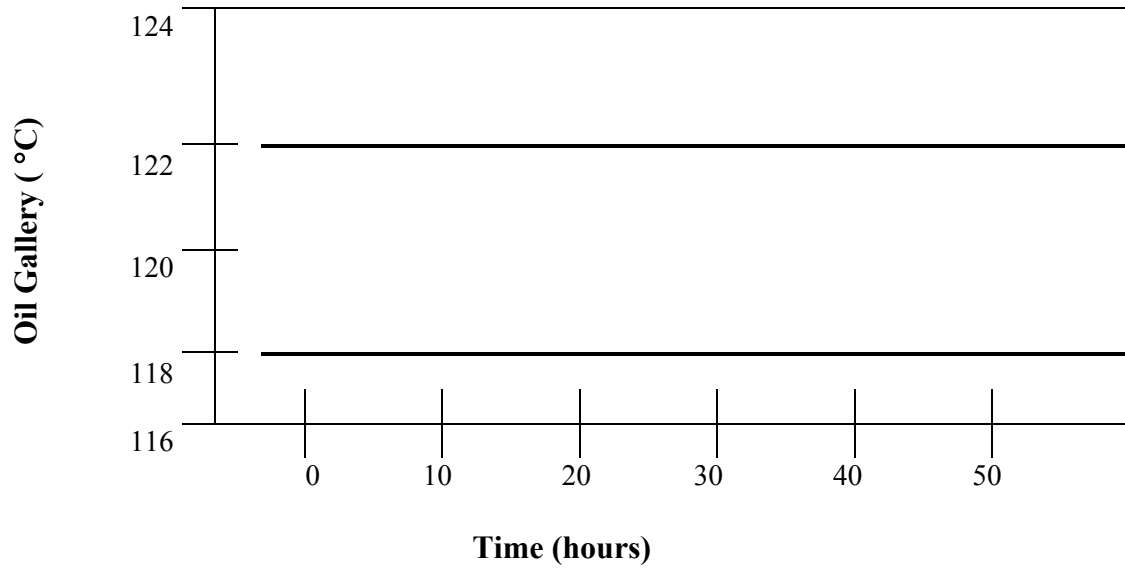
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Oil Gallery Temperature

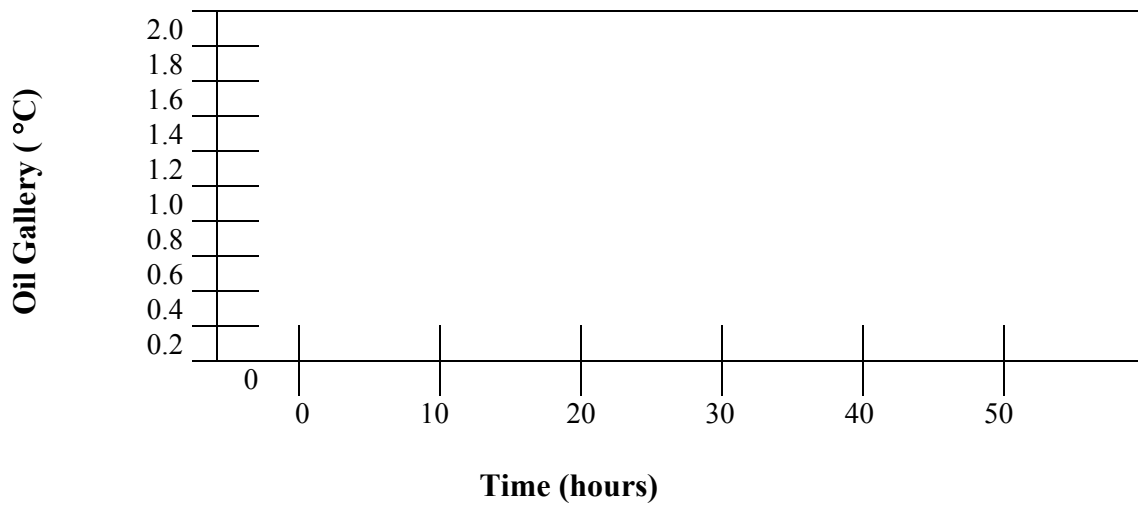
**Process Mean**

$\bar{X}_{av} =$



**Process Variability (s)**

$\bar{S}_{av} =$



**FIG. A5.9 Operational Data Summary – Oil Gallery Temperature**

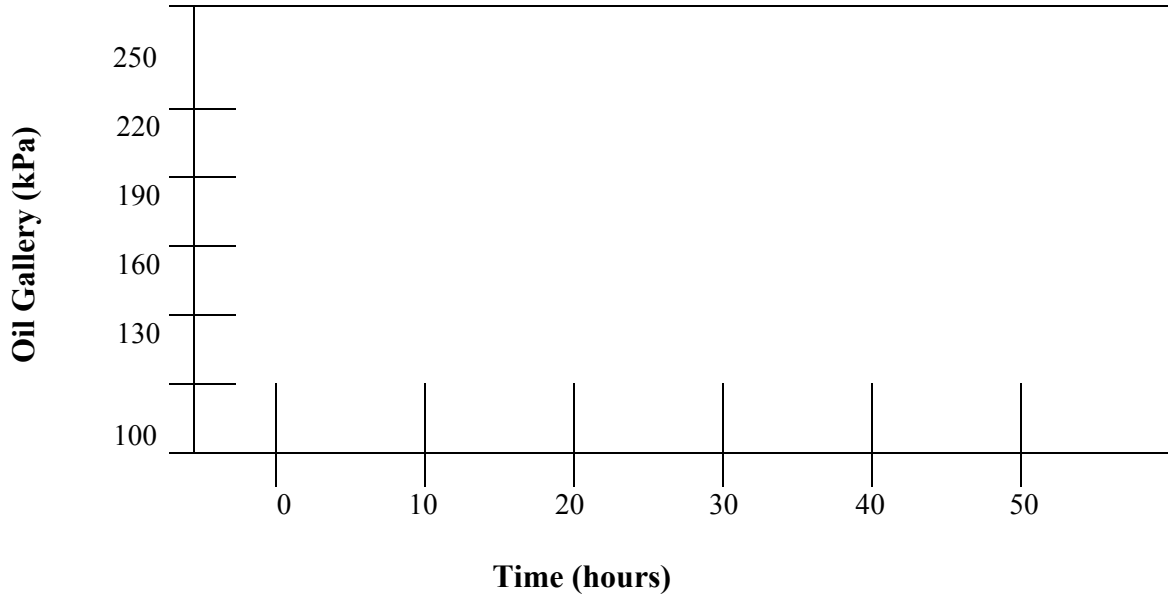
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Oil Gallery Pressure

Process Mean

$\bar{X}_{av} =$



Process Variability (s)

$\bar{S}_{av} =$

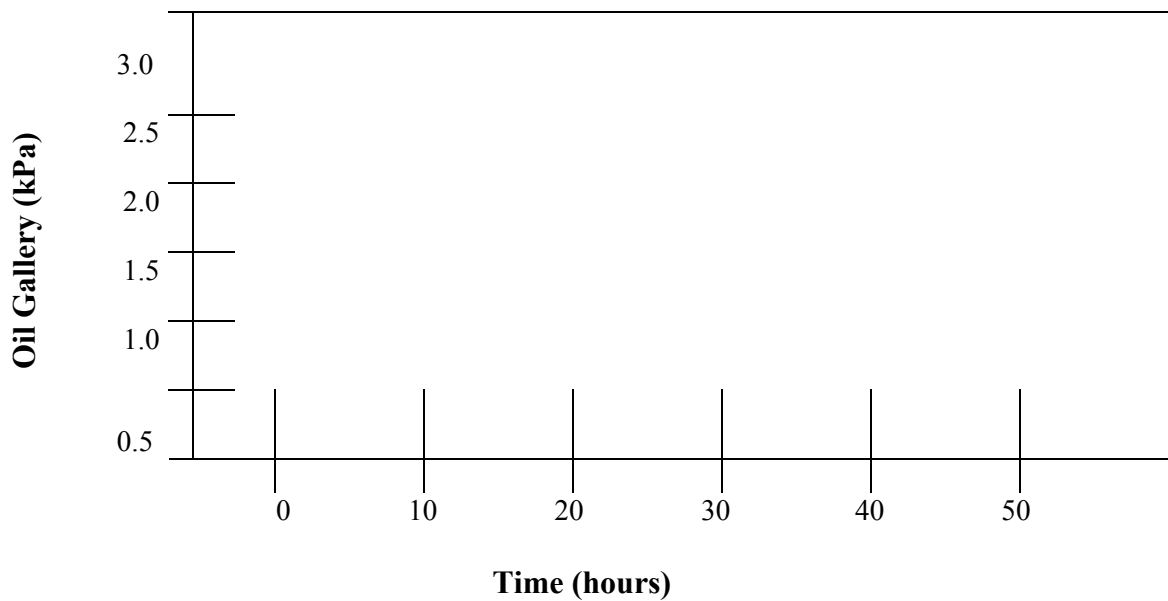


FIG. A5.10 Operational Data Summary – Oil Gallery Pressure

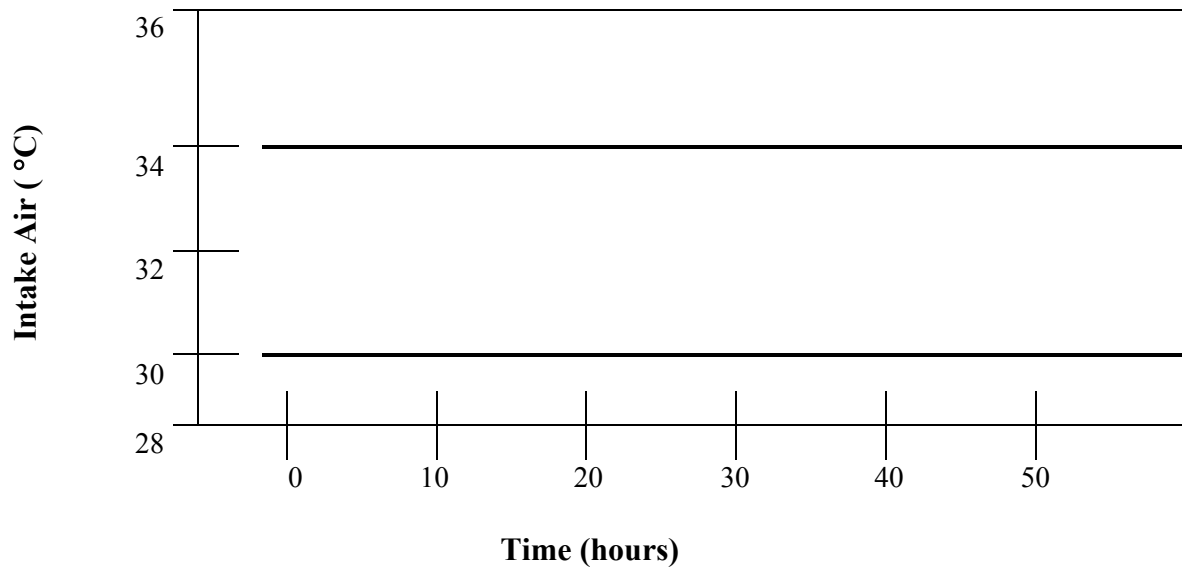
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Intake Air Temperature

Process Mean

$\bar{X}_{av} =$



Process Variability (s)

$\bar{S}_{av} =$

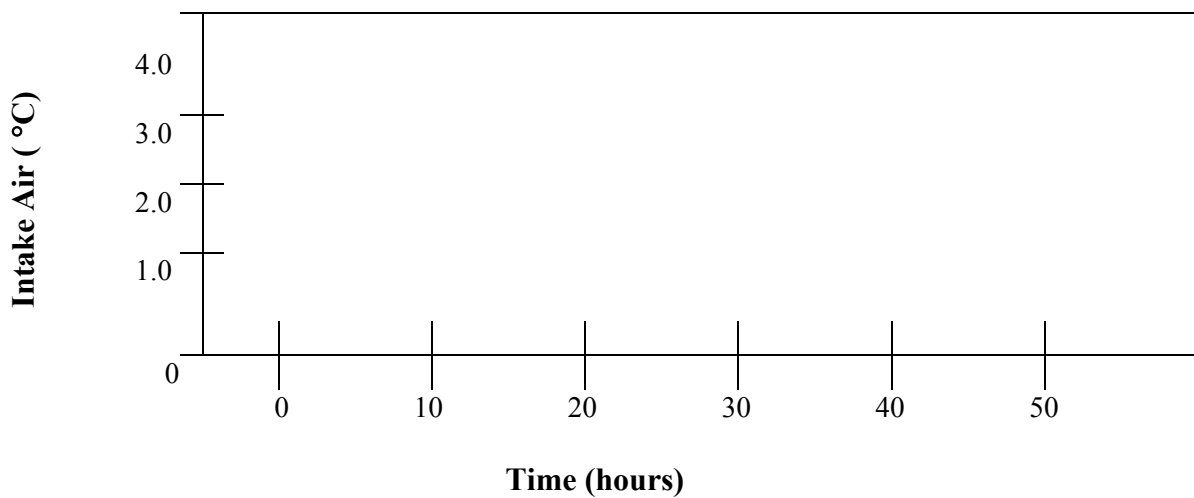


FIG. A5.11 Operational Data Summary – Intake Air Temperature

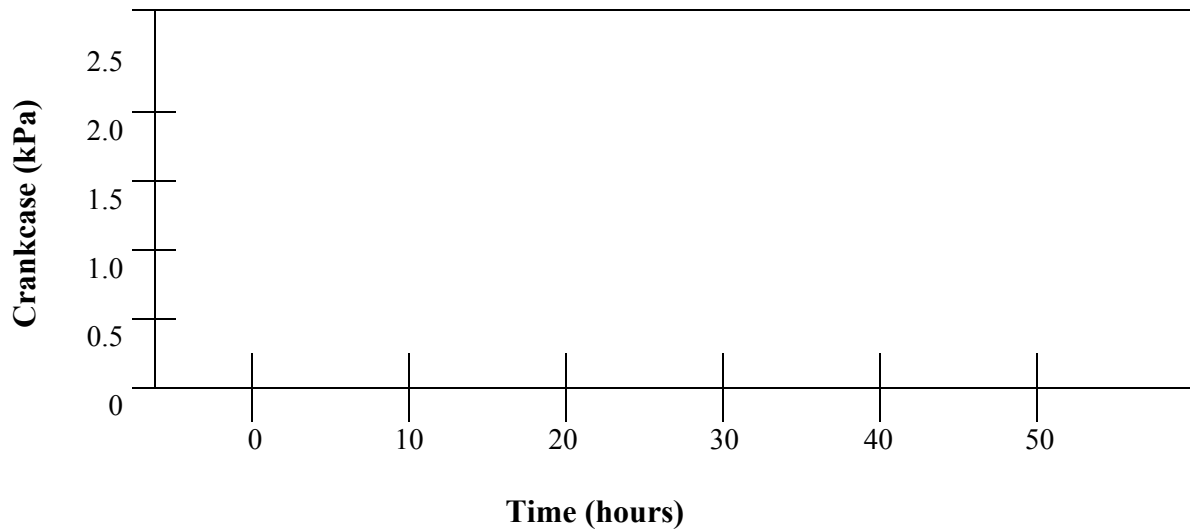
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Crankcase Pressure

Process Mean

$\bar{X}_{av} =$



Process Variability (s)

$S_{av} =$

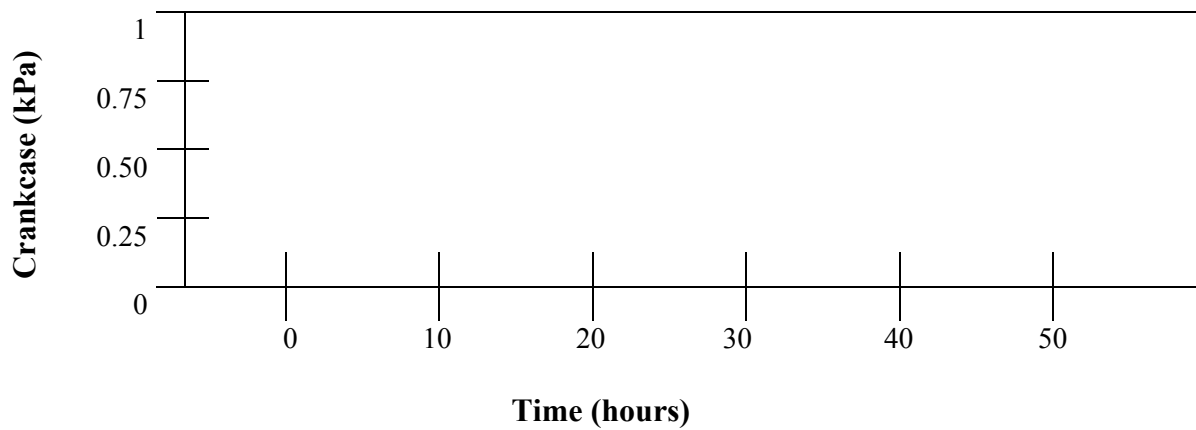


FIG. A5.12 Operational Data Summary – Crankcase Pressure

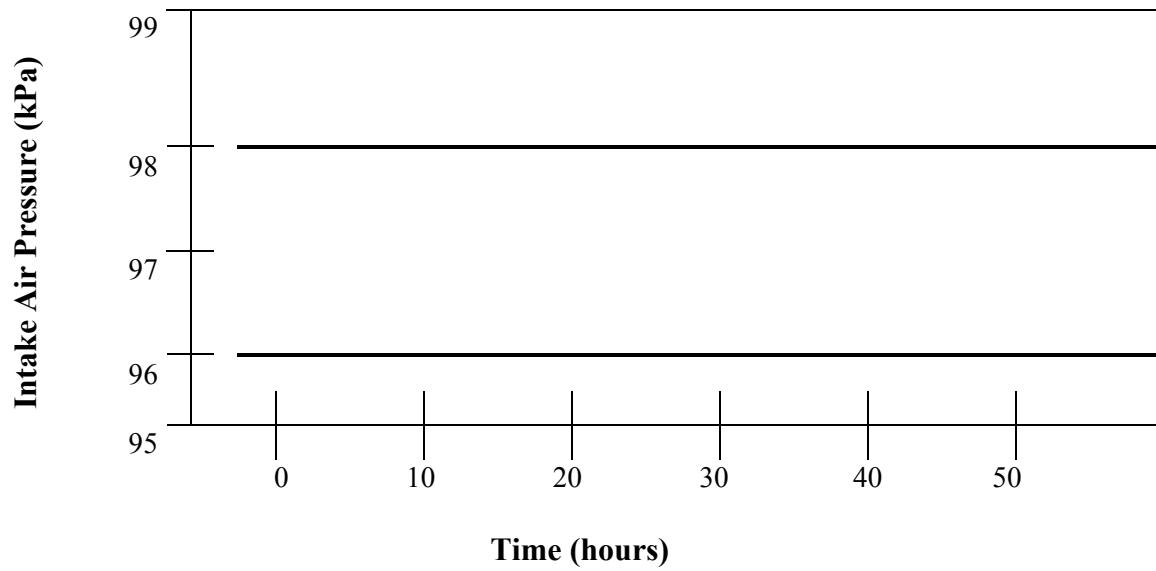
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Intake Air Pressure

Process Mean

$\bar{X}_{av} =$



Process Variability (s)

$\bar{S}_{av} =$

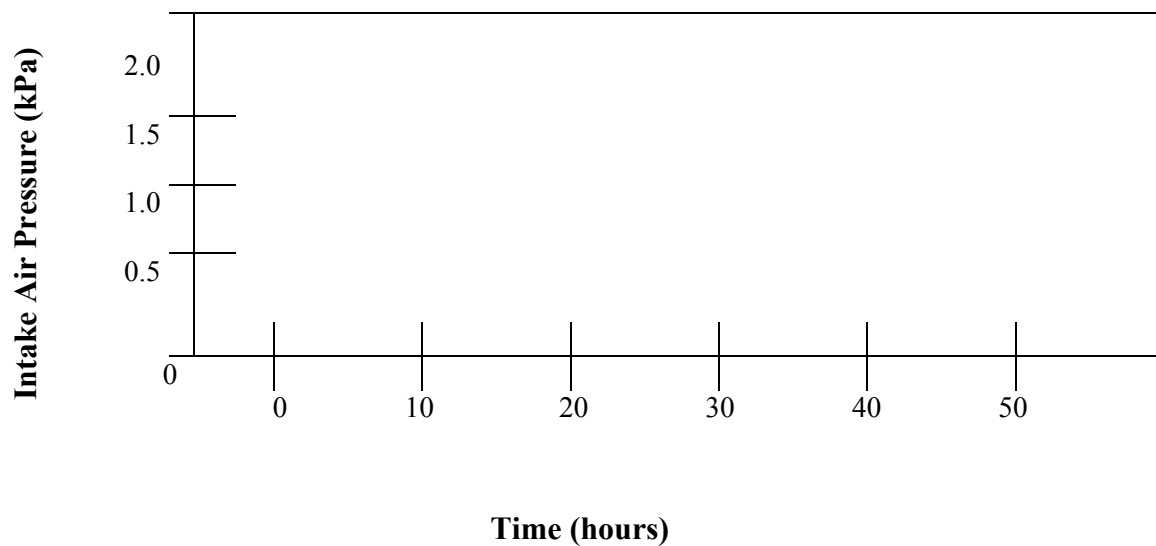


FIG. A5.13 Operational Data Summary – Intake Air Pressure

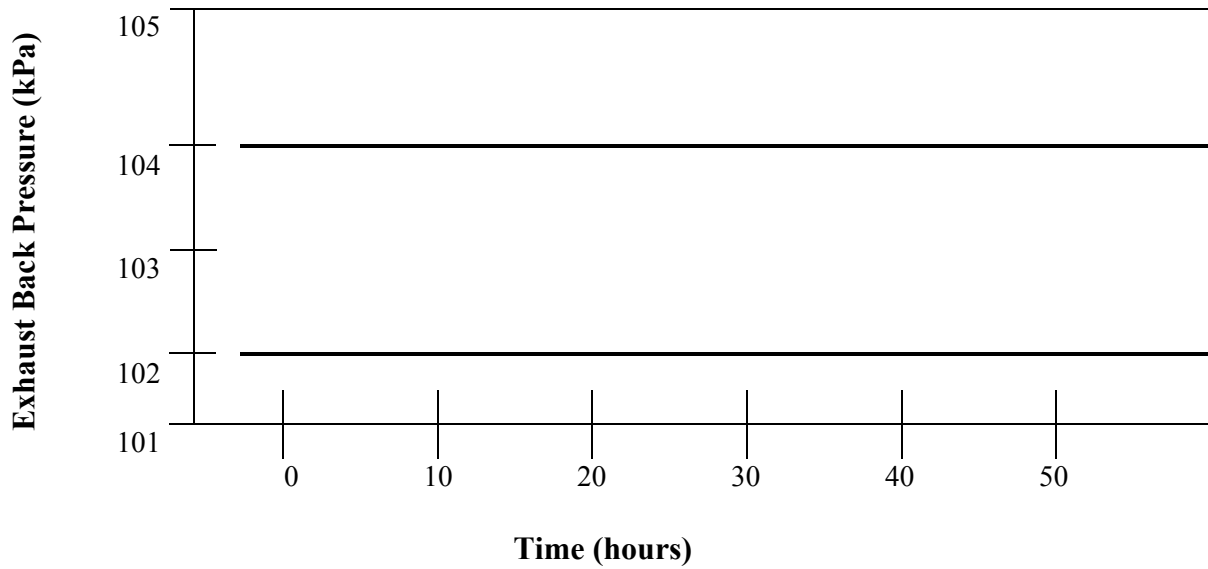
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Exhaust Back Pressure

Process Mean

$X_{av} =$



Process Variability (s)

$S_{av} =$

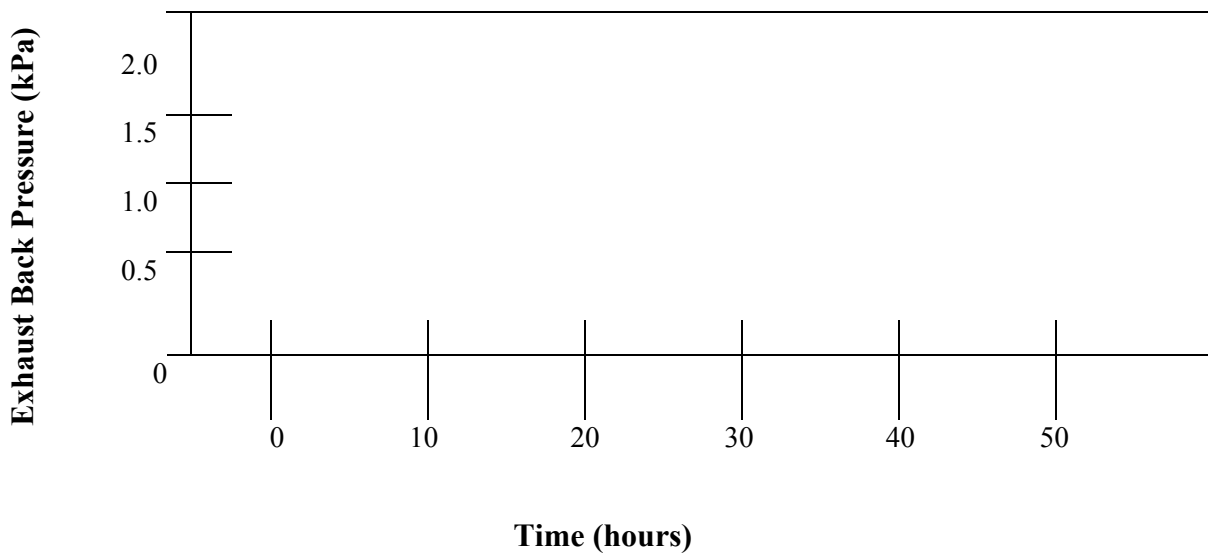


FIG. A5.14 Operational Data Summary – Exhaust Back Pressure

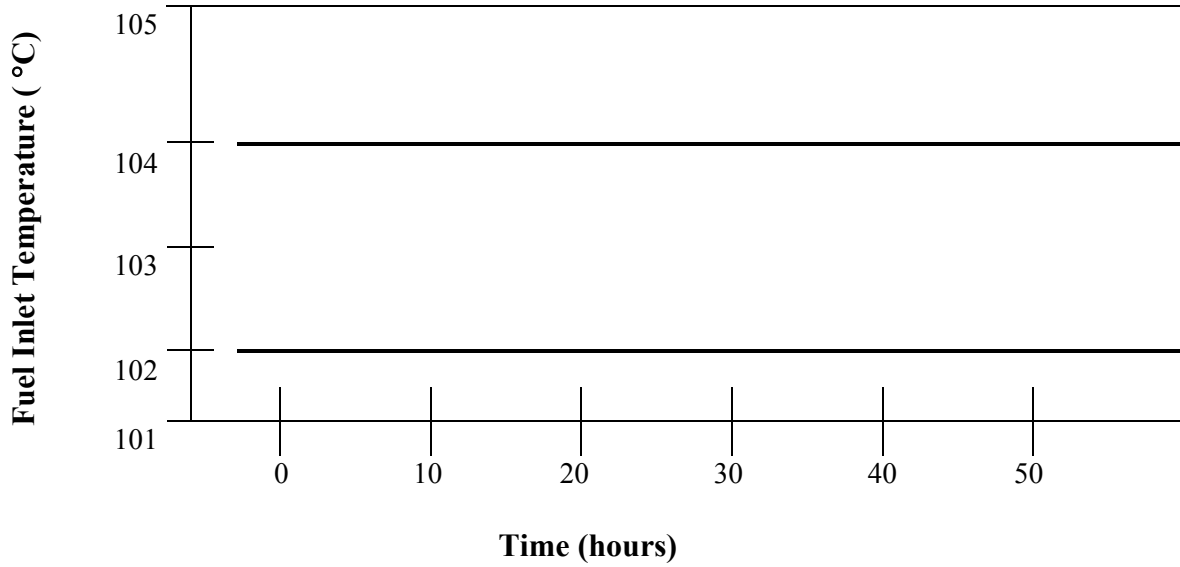
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Fuel Inlet Temperature

Process Mean

$\bar{X}_{av} =$



Process Variability (s)

$\bar{S}_{av} =$

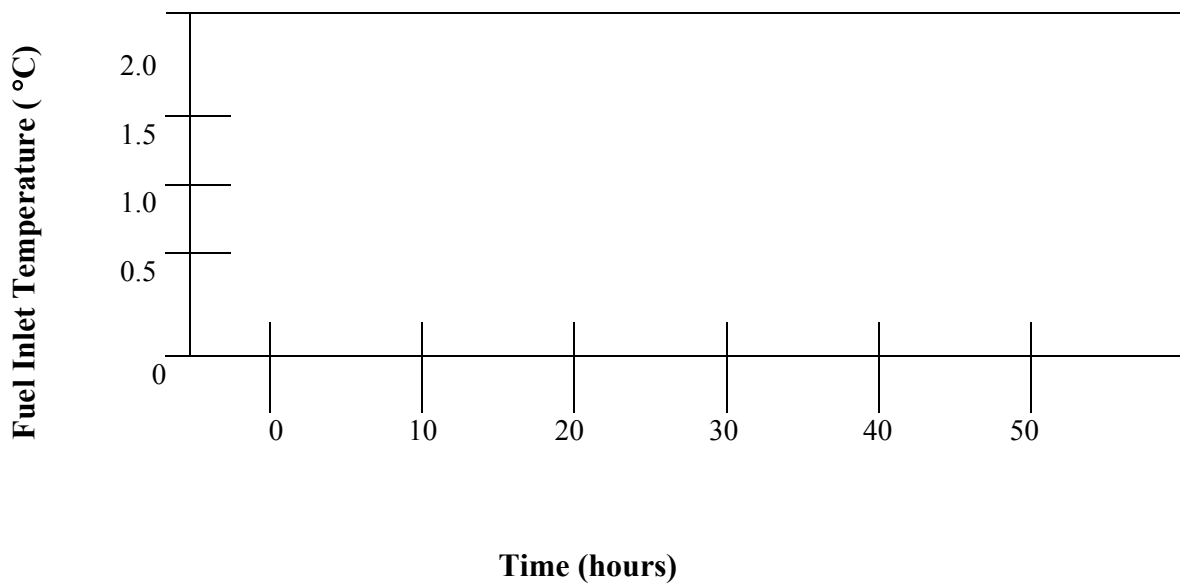


FIG. A5.15 Operational Data Summary – Fuel Inlet Temperature

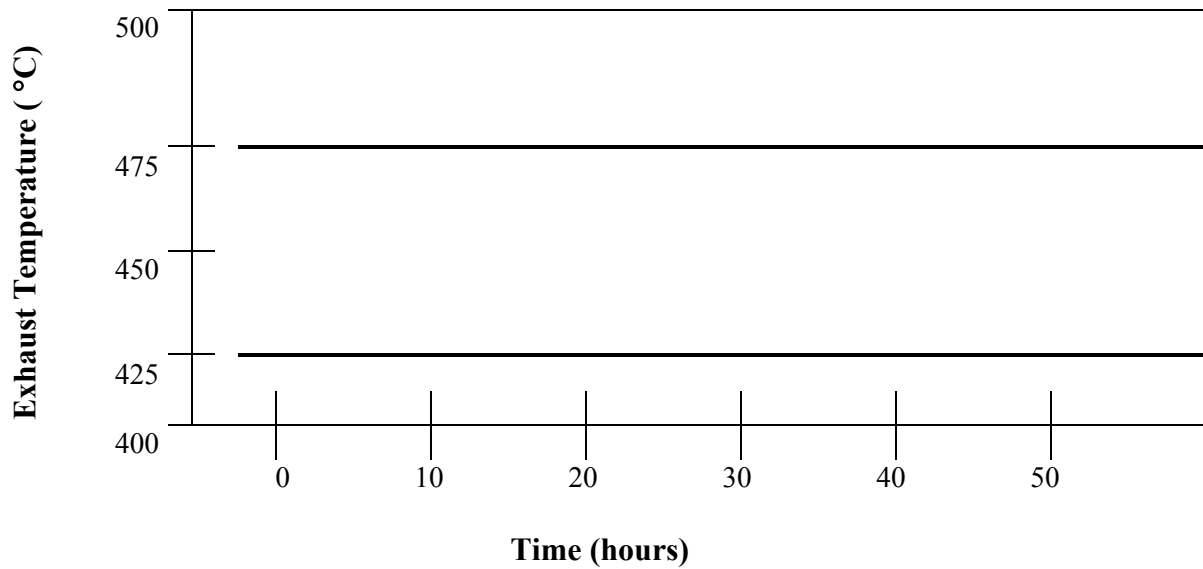
# Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

## Exhaust Temperature

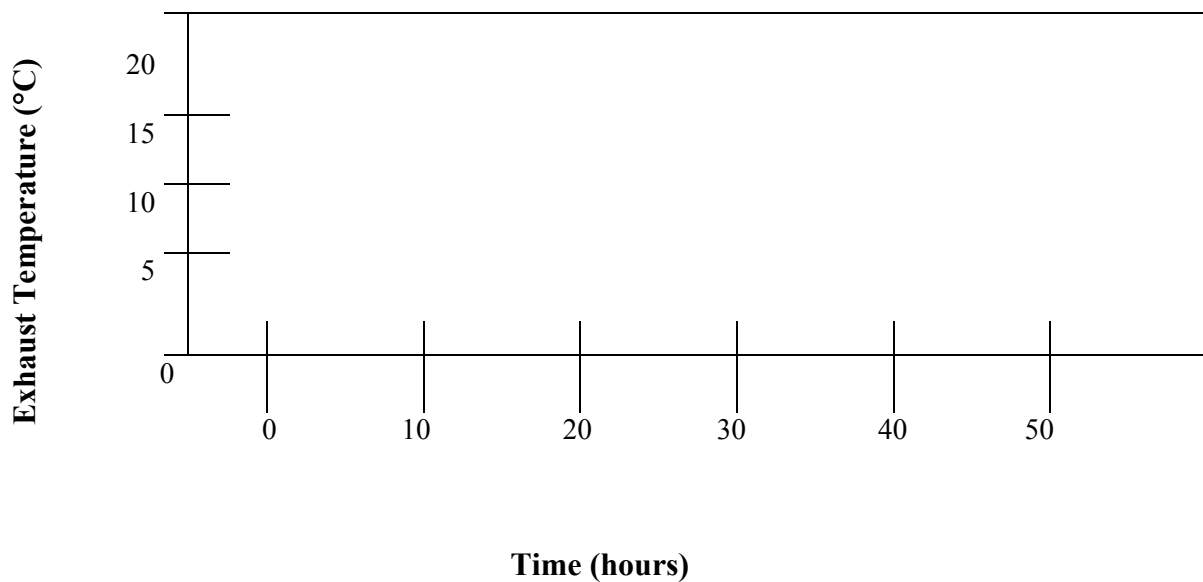
Process Mean

$X_{av} =$



Process Variability (s)

$S_{av} =$



**FIG. A5.16 Operational Data Summary – Exhaust Temperature**



## Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

\* Test Number is: STAND – STAND RUN NO. – ENGINE NO. – ENGINE RUN NUMBER

Specification							
Test Parameter		6.2L Engine	6.5L Engine	Average	Std. Dev.	Minimum	Maximum
Engine Speed	r/min	1000 ± 5	1000 ± 5				
Torque	N-m	Record	Record				
Fuel Flow	kg/h	9.0 ± 0.1	9.4 ± 0.1				
Total Oil Consumption	kg	Record	Record				

Temperatures		Specification	Average	Std. Dev.	Minimum	Maximum
Coolant Out	°C	120 ± 2				
Coolant In	°C	Report Only				
Main Oil Gallery	°C	120 ± 2				
Fuel In	°C	35 ± 2				
Intake Air	°C	32 ± 2				
Oil Sump	°C	Report				
Exhaust	°C	Report				

Pressures		Specification	Average	Std. Dev.	Minimum	Maximum
Crankcase	kPa	Report				
Back Pressure	kPa	103 ± 1				
Intake Air	kPa	97 ± 1				

**FIG. A5.17 Operational Summary**

### Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

<b>Hours</b>	<b>Viscosity, cSt @ 100°C</b>	<b>% Soot</b>

<b>Hours</b>	<b>Elements</b>						
	<b>Al</b>	<b>Cr</b>	<b>Cu</b>	<b>Fe</b>	<b>Pb</b>	<b>Si</b>	<b>Sn</b>

**FIG. A5.18 Oil Analysis**





## Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

Number of Downtime Occurrences			
Test Hours	Date	Downtime	Reasons
			<b>Total Downtime</b>

<b>Other Comments</b>		
<b>Number of Comment Lines</b>		

FIG A5.19B **Unscheduled Downtime & Maintenance Summary**

### Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

<b>Supplier:</b>	<b>Batch Identifiers:</b>
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Measurement	Specs.	Analysis	Test Method
<b>Total Sulfur, % Weight</b>	<b>0.03 - 0.05</b>		<b>D 2622</b>
<b>Gravity, °API</b>	<b>32 - 36</b>		<b>D 287 or D 4052</b>
<b>Hydrocarbon Composition</b>			
<b>Aromatics % Vol.</b>	<b>28 - 35</b>		<b>D 1319</b>
<b>Olefin</b>	<b>Report</b>		<b>D 1319</b>
<b>Saturates</b>	<b>Report</b>		<b>D 1319</b>
<b>Cetane Index</b>	<b>Report</b>		<b>D 4737</b>
<b>Cetane No.</b>	<b>42 - 48</b>		<b>D 613</b>
<b>Copper Strip Corrosion</b>	<b>3 Maximum</b>		<b>D 130</b>
<b>Flash Point, °C</b>	<b>54 Minimum</b>		<b>D 93</b>
<b>Cloud Point, °C</b>	<b>-12 Maximum</b>		<b>D 2500</b>
<b>Pour Point, °C</b>	<b>-18 Maximum</b>		<b>D 97</b>
<b>Carbon Residue on 10% Residium, %</b>	<b>0.35 Maximum</b>		<b>D 524 (10 % Bottoms)</b>
<b>Water &amp; Sediment, % Vol</b>	<b>0.05 Maximum</b>		<b>D 2709</b>
<b>Ash, % Wgt.</b>	<b>0.01 Maximum</b>		<b>D 482</b>
<b>Viscosity, cSt @ 40°C</b>	<b>2.0 - 3.2</b>		<b>D 445</b>
<b>Distillation, °C</b>			
<b>IBP</b>	<b>177 - 199</b>		<b>D 86</b>
<b>10%</b>	<b>210 - 232</b>		<b>D 86</b>
<b>50%</b>	<b>249 - 277</b>		<b>D 86</b>
<b>90%</b>	<b>299 - 327</b>		<b>D 86</b>
<b>EP</b>	<b>327 - 360</b>		<b>D 86</b>

**FIG. A5.20 Test Fuel Analysis (Last batch)**

## Roller Follower Wear Test

<b>Laboratory:</b>	
<b>Test Number:</b>	
<b>Oil Code:</b>	
<b>Formulation/Stand Code:</b>	

Parameter (1)	Sensing Device (2)	Calibration Frequency (3)	Record Device (4)	Observation Frequency (5)	Record Frequency (6)	Log Frequency (7)	System Response (8)
<b>Temperatures</b>							
<b>Main Oil G.</b>							
<b>Fuel In.</b>							
<b>Intake Air</b>							
<b>Oil Sump</b>							
<b>Exhaust</b>							
<b>Cool. Out</b>							
<b>Other</b>							
<b>Fuel Flow</b>							
<b>Engine Rpm</b>							
<b>Load</b>							
<b>Intake Pres.</b>							
<b>Exh. Press.</b>							
<b>Oil Gal Pres</b>							

**Legend:**

- (1) Operating parameter
- (2) The type of device used to measure temperature, pressure, or flow
- (3) Frequency at which the measurement system is calibrated
- (4) The type of device where data is recorded
  - LG – Handlog sheet
  - DL – Automatic data logger
  - SC – Strip chart recorder
  - C/M – Computer, using manual data entry
  - C/D – Computer, using direct I/O entry
- (5) Data are observed but only recorded if off spec.
- (6) Data are recorded but are not retained at eot
- (7) Data are logged as permanent record, note specify if:
  - SS – Snapshot taken at specified frequency
  - AG/X Average of x data points at specified frequency
- (8) Time for the output to reach 63.2% of final value for step change at input

**FIG. A5.21 Characteristics of the Data Acquisition System**