MANUAL SET NO. 75

TEMPERATURE SWITCH CALIBRATION

FOR INFO ONLY

1.0 **PURPOSE**

The purpose of this procedure is to provide
instructions for Calibration of a Temperature Switch.

2.0 **PRECAUTIONS AND LIMITATIONS**

2.1 All steps in this procedure are to be performed in
sequence except as noted. []

2.2 Performance of procedure step, as identified by a
double asterisk (*/*), shall be initialed on
"Checklist" except when recording data on Data Sheet.[]

2.3 The instrument may be located in a radiation area,
service a contaminated process fluid, or be
contaminated. If so, follow instructions on "Radiation
Work Permit". []

2.4 For Safety-Related Systems, an Independent Restoration
Verification shall be performed after completion of
Test/Calibration and initialed in "Restoration
Verification" section of "Checklist". []

2.5 Any calculations necessary for the performance of this
procedure shall be shown on "Calculation Sheet". []

2.6 Ensure that each lead (wire) to be lifted is marked
with a completed and installed jumper and lifted wire
tag. Instead of "Control No.", the "Procedure No."
should be identified on the tag. []

2.7 If this procedure is completed and temporary jumper(s)
must remain installed and/or lifted wire(s) cannot be
reconnected, a Jumper and Lifted Wire Clearance must be
obtained per Procedure 00306-C, "Temporary Jumper And
Lifted Wire Control". []

2.8 Minimize entry of foreign materials or dirt into the
working parts of the instrument. []

2.9 If, during performance of this procedure, any of the
following occur, immediately notify I&C Foreman.

2.9.1 Any personnel error, procedure inadequacy, or
malfunction is identified which could prevent
fulfillment of "Acceptance Criteria". []

2.9.2 Any test exceeds specified limits. []

2.10   This procedure may be performed in any plant
        operational mode.   [ ]

3.0   PREREQUISITES OR INITIAL CONDITIONS

3.1   Notify Shift Supervisor, or designee, of work to be
/   performed and obtain signature authorization.   [ ]

3.2   Notify Reactor Operator (RO) that instruments
/   associated with switch may be erratic or inoperable
        during performance of this procedure and obtain RO
        signature.   [ ]

3.3   TEST EQUIPMENT REQUIRED

3.3.1   Temperature Bath   [ ]

3.3.2   Fluke 2175A Digital Thermometer or equivalent   [ ]

3.3.3   Triplett Model 630 VOM or equivalent   [ ]

3.4   Verify all Prerequisities or Initial Conditions are
/   met.   [ ]

4.0   MAIN BODY

4.1   CALCULATIONS

4.1.1   Obtain instrument setpoint Data from appropriate
/   controlled document(s) and record document number(s) in
        "Comments" section of "Data Sheet".   [ ]

4.1.2   Calculate and record input and expected values in
/   "Input" and "Expected" sections of "Data Sheet".   [ ]

4.1.3   Calculate Hi and Lo Limits and record in "Hi Limit" and
/   "Lo Limit" sections of "Data Sheet".   [ ]

4.2   REMOVAL FROM SERVICE

                            NOTE

                    The length of capillary
                    immersed in temperature bath
                    must be the same as length of
                    capillary immersed in process.

4.2.1   Close isolation valve (if applicable).   [ ]

.2.2   Disconnect lead wires from switch as required.   [ ]
/   (Independent Verification required for safety-related
systems)

4.2.3   Remove temperature sensing element from thermowell   [ ]
and/or holding apparatus as necessary.

4.3   CALIBRATION

4.3.1   Place temperature sensing element and Fluke digital   [ ]
thermometer in temperature bath.

4.3.2   Connect VOM across appropriate terminals to monitor   [ ]
contact action of switch under test.

4.3.3   Adjust temperature bath to a point at which VOM
indicates contacts are in reset condition.   [ ]

NOTE

As setpoint is approached
temperature bath should
be adjusted in smaller
increments, allowing
temperature to stabilize
after each adjustment of
temperature bath and prior
to obtaining data and
switch conditions.

4.3.4   Adjust temperature bath to point at which required trip
/   point is indicated by VOM and record temperature bath
value in "As Found" section of "Data Sheet".   [ ]

4.3.5   Adjust temperature bath to point at which required
/   reset contact action is indicated by VOM and record
temperature bath value in "As Found" section of "Data
Sheet".   [ ]

4.3.6   If required, connect VOM to additional switch contacts
and repeat steps 4.3.3 thru 4.3.5.   [ ]

4.3.7   If As Found readings are within limits specified on
/   "Data Sheet" and more accurate readings are not
desired, record readings in "As Left" section of "Data
Sheet" and proceed to appropriate subsection.   [ ]

4.3.8   If As Found readings are not within limits specified on "Data Sheet", or more accurate readings are desired, proceed as follows:

    a.   Ensure that VOM is connected across correct switch terminal.   []

    b.   Adjust temperature bath to setpoint value as listed on "Data Sheet".   []

    c.   Adjust switch as required to obtain correct contact action as indicated by VOM.   []

    d.   Adjust temperature bath to point at which VOM indicates contact trip action and note temperature value.   []

    e.   Adjust temperature bath to point at which VOM indicates contact reset action and note temperature value.   []

    f.   Repeat steps 4.3.8b thru 4.3.8e until no further adjustments are necessary.   []

    g.   Record final values obtained in "As Left" section */*   of "Data Sheet".   []

4.3.9   If temperature switch has more than one contact, repeat steps 4.3.8a thru 4.3.8g if appropriate until all contacts have been calibrated.   []

4.4   RESTORE TO SERVICE

4.4.1   Disconnect all test equipment used in performance of
/   this procedure.   []

4.4.2   Reinstall temperature sensing element in thermowell
/   and/or holding apparatus as required.   []

4.4.3   Reconnect switch leads as required.   []
/

4.4.4   Open isolation valve (if applicable).   []
/

4.4.5   Verify instrument reflects current plant conditions
/   after it is returned to service.   []

4.4.6
/
For Safety-Related systems, have an Independent
Restoration Verification performed by designated
personnel.   [ ]

4.4.7   Notify RO that instrument has been returned to
service.   [ ]

4.4.8
/
Notify Shift Supervisor, or designee, of completion of
work including test results and obtain signature on
"Completion Sheet".   [ ]

5.0   ACCEPTANCE CRITERIA

5.1   The Acceptance Criteria for this procedure is that the
temperature switch is within limits specified on "Data
Sheet".

5.2   Satisfactory completion of this procedure has been met
when I&C Foreman has evaluated data obtained per
Acceptance Criteria of this procedure, reviewed, and
signed "Data Sheet" provided.

6.0   REFERENCES

6.1   Instruction Manual for switch under test.

6.2   Procedure 00306-C, "Temporary Jumper And Lifted Wire
Control"

END OF PROCEDURE TEXT

FOR INFO
ONLY

Sheet 1 of 1

DATA SHEET

Inst. No. _____ Location _____ Serial No. _____

Description Temperature Switch Manufacturer _____ Model No. _____

NOTES: N/A

Action	UNITS	EXPECTED	LO LIMIT	HI LIMIT	AS FOUND	AS LEFT
Switch Tripped						
Switch Reset						
Action	UNITS	EXPECTED	LO LIMIT	HI LIMIT	AS FOUND	AS LEFT
Switch Tripped						
Switch Reset						
Action	UNITS	EXPECTED	LO LIMIT	HI LIMIT	AS FOUND	AS LEFT
Switch Tripped						
Switch Reset						

COMMENTS:

TEST EQUIPMENT		
I.D. NO.	MODEL NO.	CALIBRATION DUE DATE

PERFORMED BY: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

APPROVED BY: _____ DATE: _____

Sheet 1 of 1

CALCULATION SHEET

Show all calculations performed during course of this procedure in the space below.

Completed by: _____ Date: _____

Reviewed by: _____ Date: _____

Approved by: _____ Date: _____

Sheet 1 of 1

CHECKLIST

3.1 Shift Supervisor Authorization	Signature	Date
3.2 Reactor Operator (RO) Notified	Signature	Date

STEP VERIFICATION

Step/Substep	Initial	Step/Substep	Initial
3.4 Prerequisites met	_____	4.4.4 Isolation valve open	_____
4.2.2 Leads disconnected	_____	4.4.5 Reflects plant conditions	_____
4.2.2 Independent Verification	_____		
4.4.1 Test equipment removed	_____		
4.4.2 Element installed	_____		
4.4.3 Leads connected	_____		

RESTORATION VERIFICATION

	Initial		Initial
1. Element installed	_____	3. Isolation valve open	_____
2. Leads connected	_____		

Performed by:	Date
Reviewed by:	Date

Sheet 1 of 1

COMPLETION SHEET

PROCEDURE TITLE <u>TEMPERATURE SWITCH CALIBRATION</u>

TIME TEST STARTED_____ BY_____ DATE_____

DEFICIENCIES OCCURRED AND ACTIONS TAKEN

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

TEST RESULTS: ACCEPTABLE [ ]   UNACCEPTABLE [ ]

TEMPERATURE SWITCH RESTORED TO SERVICE [ ]

TEMPERATURE SWITCH COMMITTED TO REPAIR [ ]

TEST COMPLETED BY_____ TIME_____ DATE_____

SHIFT SUPERVISOR NOTIFIED_____
                          Signature   Time   Date

REVIEWED BY:_____ DATE:_____

APPROVED BY:_____ DATE:_____