



NATIONAL PETROCHEMICAL COMPANY STANDARDS

MATERIAL STANDARD FOR PACKAGE INSTRUMENTATION

NPCS—MS—IN—39

RE . 0

AUGUST 1993

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APPENDIX

1 PROJECT STANDARD INSTRUMENT SUPPLIERS

2 VENDOR DOCUMENTATION REQUIREMENTS

3 INTERSUMMARY ON

NOTE:

All choices shall be selected based on the following documents and with indicated priorities :

- Project requirements
- NPCS-ES-IN-01
Engineering Standard for Instrumentation
- NPCS-MS-IN-38
Material Standard for Local Control Panel and Accessories.

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1 GENERAL

1.1 SCOPE

This standard covers the minimum requirements for instrumentation and controls for packaged equipment.

1.2 RESPONSIBILITY

Vendor shall:

Define all instrumentation and controls required to ensure satisfactory continuous operation for the conditions stated on the equipment data sheet(s). This shall include all instrumentation required for satisfactory start-up and shut-down of the equipment.

Confirm that the instrumentation defined in the equipment data sheets provides for satisfactory continuous operation for the conditions stated and that it includes all instrumentation required for satisfactory start-up and shut-down of the equipment .

- Supply instrumentation strictly as defined in the equipment data sheets.
- Ensure that adequate instrumentation is provided for demonstrating the guaranteed performance of the packaged equipment.
- Ensure that all instrumentation within this scope is suitable for the service conditions.

1.3 LIMITS OF SUPPLY

The vendor shall supply:

- Process connections only for installation of instrumentation furnished by purchaser.

Process block valves shall be:

Included

Excluded

Instruments specified by:

Vendor

Purchaser

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- All instruments directly connected to vendor supplied equipment.
- Instruments as specified on the equipment data sheets.
- Other instruments such as speed controllers that will be located by others in the central control room.
- Local panel
- Remote panel
- Local gauge board
- Mounting by:
Vendor

- Piping and wiring by:
Vendor

* Note: Terminations to be made at local panel and Junction boxes with clearly identified bulkheads and terminals.

All multicore cable cores shall be terminated at terminals.

1.4

STANDARDISATION OF INSTRUMENT SUPPLIERS

Instrument suppliers shall be:

- Vendor standard, subject to compliance with this standard
- Vendor standard, subject to compliance with this standard and purchaser's agreement
- Project standard to ensure plant-wide compatibility
- Nominated by purchaser after purchase order;

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1.5 INSTRUMENT LABELLING

All instrument items including junction boxes, terminals, cables and covers shall be clearly identified by a permanent marker/lable bearing the appropriate identification/tag number:

Traffolyte white/black/white fixed with screws

Lable to include tag No. and service description

2 DOCUMENTATION

2.1 VENDOR DOCUMENTS REQUIRED

Vendor shall be responsible for ensuring that the scope of instrumentation and interconnections with equipment supplied by the purchaser are fully defined by the dates specified.

Note: Instrument documentation shall be submitted in accordance with the descriptions, quantities and dates shown in Appendix 1.

Documentation shall be prepared on:

- Purchaser's standard drawing sheets
- Vendor standard drawing sheets

2.2 PIPING & INSTRUMENTATION DIAGRAMS (P & I DIAGRAMS)

2.2.1 All instrumentation shall be shown on the P & I diagrams. This requirement includes instrumentation forming part of a sub-vendor's supply.

2.2.2 Basic symbol:

- Vendor standard
- Purchaser standard (Appendix 1)
- -----

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- 2.2.3 Instrumentation symbols on P & I Diagrams:
- ISA S5 - 1984
 - Vendor standard
 - -----
- 2.2.4 Instrumentation tag numbers shall be designed by:
- Vendor
 - Purchaser
 - Purchaser for instruments requiring interconnection by Purchaser
 - -----
- 2.2.5 Where Purchaser designates tag numbers these shall correspond to preliminary numbers assigned by vendor and shall:
- Replace vendor numbers
 - Supplement vendor numbers
 - Purchaser will supply a block of numbers for use by vendor
- 2.3 INSTRUMENT LIST
- 2.3.1 Vendor shall supply a list of all instrument equipment items in his scope of supply.
- 2.3.2 Instrument list format:
- Vendor standard format
 - Purchaser's format
 - -----
- 2.3.3 Vendor shall define on the instrument list:
- Tag number
 - Service description
 - Vendor DRG. reference
 - Location of instrument (e.g. local, panel, local panel)

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- Component type
- Manufacturer
- Model No.
- Set point and range
- Materials of construction
- Special remarks

2.4

INTERCONNECTION SUMMARY

Vendor shall supply an interconnection summary defining all instrument interfaces between vendor and purchaser.

- Format shall be in accordance with Appendix 3
- -----

2.5

INFORMATION REQUIRED WITH QUOTATIONS

- Instrument list
- P & I diagram
- Interconnection summary
- Electrical certificates of code compliance to the hazardous area classification
- Utility requirements
- List of special calibration procedures, calibration and test equipment required.
- Vendor's typical drawing schedules/format
- List of equipment offered by vendor:
 - For the first time
 - Previously supplied by the vendor in:
 - Less than 10 units
 - Less than 100 units
- Terms of Guarantee relating to equipment in cases where purchaser provides instrumentation.



Functional description of instrument systems, including logic systems and micro-processor based systems.

Specification sheets for microprocessor based systems.

Local panel sized instruments fitted to local panel and gauge board.

3 OPERATION & CONTROL PHILOSOPHY

3.1 Normal operation:

Manned

Unmanned

- - - - -

3.2 start-up:

Local

Remote

3.3 Shut-down:

Local

Remote

3.4 Supervision of Normal Operation:

Completely from local panel

Completely from remote control centre

Dual control from local and remote control centre

Speed control local to machine and from central control room

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3.5

Alarm and shutdown philosophy:

Local annunciation for all vendor alarms with contacts for common alarm at remote control centre

Local annunciation for all vendor alarms with repeat contacts for all alarms at remote control centre

- No local annunciation-all alarms remote
- All shut-downs shall be provided with pre-alarms
- All shut-downs shall be provided with alarms
- For shut-downs which can be caused by more than one input, "first out" feature shall be provided for each:
 - Pre-alarm
 - shut-down

Sensors provided for shut-down shall be separate from sensors provided for measurement of pre-alarm

- Local panel will also need to annunciate pre-alarms and trips from associated equipment not in the scope of vendor

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4 DESIGN CRITERIA

4.1 ENVIRONMENTAL CONDITIONS

4.1.1 Instrumentation supplied shall be suitable for use in the environmental conditions, as follows:

4.1.1.1 Ambient temperature:

Max. _____ °C (sheltered)

Min. _____ °C

Max. _____ °C (Exposed to sunlight)

4.1.1.2 Humidity:

_____ %

4.1.1.3 Barometric pressure:

Max. _____ mbar

Min. _____ mbar

4.1.2 Control building

4.1.2.1 Temperature:

Max. _____ °C

Min. _____ °C

4.1.2.2 Humidity:

-- %

- Instruments shall be tropicalised
- Instrument panels and enclosures shall be provided with anti-condensation heaters.

Instrumentation shall be immune to RF interference

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4.1 3 Instrument tracing/heating shall be achieved by:

Electric

Steam

4.1 4 The following special climate conditions apply:

Saline atmosphere

Sandstorms

4.1 5 Degree of protection (minimum):

IP55 (IEC 529/BS 5490)

NEMA _____

4.2 UNITS OF MEASUREMENT

Units of measurement for instruments and instrument documentation shall be as follows:

4.2 1 Temperature:

°C

4.2 2 Pressure:

a) General

barg

kg/cm²g

b) Low:

mbar

mm H₂O



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c Vacuum:

bar abs.

mm Hg abs

4.2.3

Flow:

a) Process liquids

kg/h

m³/h

at _____ °C

at flowing temp.

b) steam:

kg/h

t/h

c) Gas:

- kg/h

- Nm³/h

d) Air:

Nm³/h

Normal conditions (Nm³/h) are defined at:

0°C and 760 mm Hg



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-1.2.4 Level

General

0 to 100%

4.2.5 Tank Gauges

- m

4.2.6 Viscosity

CP

cS

4.2.7 Density

kg/m³

4.3 CHART AND SCALES

Charts and scales shall be graduated as follows:

4.3.1 Temperature

Direct reading

4.3.2 Pressure

- Direct reading

4.3.3 Flow

0-10 sq.rt. or 0-100 linear

Indication of flow factor



4.3.4

Level

- 0-100 linear

- -----

4.3.5

Others

- Direct reading

- -----

- -----

- -----

- -----

- -----

Combination charts including flow shall have duplex 0 to 10 sq.root and 0 to 100 linear where appropriate.

4.4

TRANSMISSION SIGNALS

4.4.1

Transmission signals to control room:

Electronic

Pneumatic

4.4.2

Transmission signals for local loops and control valves:

Pneumatic

4.4.3

Electronic analog signals:

4-20 mA (2 wire)

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.4.4 Pneumatic signals:

3 to 15 psig

0.2 to 1.0 lie;/cm²g

- 0.2 to 1.0 barg

- -----

Other transmission signals shall be subject to purchaser's review.

.5 ELECTRICAL REQUIREMENTS

Electrical equipment shall be suitable for installation in the hazardous area as defined in the data sheets and specifications.

- -----

The general method of protection for hazardous areas shall be:

- Intrinsic safety

- Flame proof all instrumentation to be certified for gas group (GROUP) gases, TEMP.

Electrical equipment shall be certified by recognised testing authorities for the appropriate area classification, gas group and temperature class.

Certification shall be in accordance with:

- Standards of country of origin subject to Purchaser's approval at quotation stage.

- CENELEC standards (EN 50014-series)

Applicable Codes

- BS5345

- N.E.C.

- -----

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4.6 POWER SUPPLIES AND OTHER UTILITIES

4.6.1 A.C. supply:

a) Frequency:

50 HZ

60 HZ

b) Voltage stability:

$\pm 5\%$

Note: Single phase unless otherwise stated.

c) Analog Instruments:

110 V a. c.

240 V a. c.

115 VAC to local panel

d) Solenoid Valves:

110 V d. c.

2-1 V d. c.

e) Shut down systems (separate from other supplies):

110 V d. c.

24 V d. c.

- - - - -

f) Annunciators:

- Integral

- By others

- 110 V a. c.

- 24 V d. c.

- 115 V AC to local panel

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g) Lighting and heating:

- 110 V a.c.
- 220 V a.c.
- 115 V AC

h) Protective heating supply:

- Electric ----- V a.c.
- Steam @ 3.6 barg 210°C
- -----

4.6.2

Instrument Air:

- Normal 7.0 kg/cm²g
- Minimum for actuator sizing 6.0 kg/cm²g
- Maximum for equipment design 8.0 kg/cm²g
- -----

Instrument air shall be clean and dried to a dewpoint of :

- - 40°C
- -----

4.7

INSTRUMENT PROCESS CONNECTIONS

4.7.1

Temperature

- ----- in threaded
- 1 1/2 in flanged 300 # rating Min
- 1 1/2 in flanged (for connection to vessels) 300 # rating Min
- -----



- 4.7.2 Pressure
1/2 in threaded NPTF.
-- in flanged
1 1/2 in flanged (for connection to vessels) 300 #
rating Min
- 3.7.3 Flow
1/2 in.threaded class 600 & under
3/4 in.threaded class 900 & over
- 4.7.4 Level
2.0 in 300 # rating Min. for standpipe
- 4.7.5 Gauge glasses
----- in. threaded
1.0 in.flanged 300 # rating minimum

- 4.7.6 External displacer
----- in.threaded
2.0 in.flanged 300 # rating minimum

- 4.7.7 External switch
----- in.threaded
1.0 in.flanged 300 # rating minimum

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4 7 8

Vessel Connections

Separate valved *connections* for each instrument.

Minimum vessel connections by use of standpipe
with valved connections for each instrument.

Vendor choice

4.7 9

Standpipes (strongbacks. bridles)

3 in. NB min, for connection and instruments

2 in. connections to vessels 300 # rating Min

Valved connections to vessel

Shutdown switches to be directly on the vessel

4.7.10

Vent Valves/Drain Valves

Stand pipes

All level instruments

-----_-----

4.7.11

Vent/drain Valves

$\frac{1}{2}$ in. min.

Threaded

Flanged

Note:(1) Other connections to be:

Specified by Purchaser

Vendor standard

(2) Seal weld connections for hydrogen service

(3) All connections to comply with piping
specification

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(4) Connection adaptors:

Permissible

Not permissible

(5) Primary isolation valves shall be provided in accordance with piping specification

4.8 FLANGE AND THREAD SPECIFICATIONS

4.8 1 Flanged connections:

ANSI B 16.5

Vendor standard

4.8 2 Electrical Thread - type:

Metric 1.5 mm pitch (BS 3643)

NPT

4.8 3 Threaded connections (pipe,tube):

ANSI B2.1 NPT

Vendor standard

4.8 4 Electrical Thread-Min,size:

20 mm

- -----

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