

SCOPE

- I * 1.1 This practice covers the **design of control panels to mount instrumentation** including local unit control/shutdown systems and machinery equipment. This standard does not directly apply to the internal wiring of cabinets or racks which are produced by manufacturers of integrated, distributed control system and/or protective logic system, unless required by Owner's Engineer.
- I 1.2 This practice **does not** cover the construction of large-scale local instrument shelters/buildings which are covered by [IP 4-3-1](#) and/or [IP 4-3-2](#), or electrical substation panels which are covered by [IP 16-12-1](#).
- I 1.3 An asterisk (*) indicates that a decision by the Owner's Engineer or purchaser is required, or that **additional information** is to be supplied by the purchaser.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I 2.1 **Table 1** lists the practices and standards which shall be used with this practice.
- I * 2.2 **Table 2** lists the standards which shall be used with this practice as specified by the purchaser.

TABLE 1

PRACTICES	
IP 3-6-1	Piping for Instruments
IP 15-6-1	Electronic and Pneumatic Instruments
IP 15-6-2	Environmental Protection for Instrumentation
IP 15-7-1	Electronic Power Branch Circuit Design for Instrumentation
IP 15-7-3	Alarm Systems
IP 15-10-1	Instrument Transmission Systems
IP 15-12-1	Instrument Wire and Cable
IP 16-3-1	Wiring Methods and Material Selection
IP 20-1-1	Inspection of Equipment and Materials
STANDARDS	
API Standard	
RP 554	Instrumentation and Control Manuals for Refinery Service - RP 554 Process Instrumentation and Control - Section 5.6 Control Consoles and Panels
ANSI / NFPA Standards	
70	National Electric Code (NEC)
496	Standard for Purged and Pressurized Enclosures for Electrical Equipment (National Fire Code, Vol. 7)
ASTM Standards	
A 269	Specifications for Seamless and Welded Austenitic Stainless Steel Tubing for General Service
B 68	Specifications for Seamless Copper Tube, Bright Annealed
B 75 Rev. A	Specifications for Seamless Copper Tubing

TABLE 2

STANDARDS	
ISA Standard	
RP 12.4	Pressurized Enclosures
IEC / CENELEC	
EN 50016	Purged and Pressurized Enclosures for Electrical Equipment in Hazardous Locations
IEC 668	Dimensions of Panel Areas and Cut-outs for Panel and Rack-Mounted Industrial-Process Measurement and Control Instruments
CSA Standard	
C22.1	Canadian Electrical Code (CEC) - Part 1

IP 15-11-1		Instrument Control Panels	
Page 2 of 4			
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(This practice is appropriate for attachment to Inquiry or Purchase Document)

INSTRUMENT PANELS

LAYOUT AND ARRANGEMENT

- I *3.1 **All control panels and terminal racks** to be installed in existing control buildings or adjacent to existing panels shall be designed to match the existing equipment. Exceptions must be approved by purchaser.
- I 3.2 **Control panel design** shall incorporate spare space as specified **API RP554**, Section 5.6. Spare space shall include, but shall not be limited to: instrument space, window space on annunciators (less relay cards), disconnect switches connected to the instrument power supply, termination points, connection points to the panel ground bar, and valved take-off points from the air supply header.
- C 3.3 **Panels and consoles** shall be purchased completely piped with required piping insulation and wired, requiring only connection to the external piping and wiring circuits.
- O *3.4 **Equipment on vertical panels** which the operator normally uses (indicators, recorders, etc.) shall be arranged so that instruments are readable and operable by the operator in a standing position. Outdoor panel location shall minimize effects of glare from sunlight on operator displays. Glare shall be eliminated by using a sun shield, as required. Instrument panel shall be approved by the Owner's Engineer.
- O *3.5 **Equipment on console type panels** shall be arranged so that all instruments and switches are readable and operable by the operator in both the sitting or standing position. For console type panels, the layout shall be approved by the Owner's Engineer.
- O 3.6 **All display and controller instruments** associated with a given section of a process shall be grouped together, and arranged to the maximum extent possible in the process sequence.
- O 3.7 **Annunciator pushbuttons** shall be located together on the panel within reach of the operator and within readable distance of the respective annunciator window displays.
- R 3.8 **Panel location** and installation shall be such that it is free of vibration.
- M 3.9 Sufficient **spacing** shall be provided between instrument components and terminal strips on panels, consoles, and racks to ensure adequate access for maintenance.
- M 3.10 **Rear of panel wiring** shall not interfere with possible future instrument installation on or within the panel, or with accessibility for maintenance.
- R 3.11 **Switches on the front of the panel for emergency** shall be guarded to prevent accidental operation. Switches for regular process operation shall be a type not prone to accidental operation.
- S 3.12 **Hydrocarbons or others flammable fluids shall not be piped** into control panels. All instrumentation containing hydrocarbons shall be located outside the panel.

Plant stream analyzers are excluded from these limitations provided that all the electrical equipment contained in the panel meets the **Class I, Division** or **Zone 1** classification and the appropriate nationally recognized code in the country where the panel will be installed.

PANEL CONSTRUCTION

- R *3.13 **All instrument panels** shall be constructed of smooth, level, cold rolled carbon or stainless steel. The **thickness shall be consistent with the load requirements**, but in no case shall the thickness be less than 3/16 inches (5 mm) to avoid sagging and warping. **Internal bracing** shall be provided.
Proposals to use other materials and material thickness shall be submitted to the Owner's Engineer for approval. Such proposals shall include test data documenting the fire resistance, corrosion resistance, and mechanical strength of the proposed panels and construction materials.
- R,S 3.14 **Instrument panel access doors** shall be provided with gasketing to seal and support a slight positive pressure inside the panel to prevent moisture and gases from entering the panel. The doors will also be provided with a mechanical stop and panic safety bar for panels large enough to permit operator entry.
- R,S *3.15 Instruments required to meet area classification may do by purging the cabinet. **Purging** shall be in accordance with **NFPA 496** or **CENELEC EN 50016** and must be approved by the Owner's Engineer.
- R 3.16 **The maximum and minimum operating temperatures of the instruments** shall not be exceeded. Low noise fans/blowers, air conditioners, heaters, or solid-state coolers shall be used if necessary to maintain the required range of operating temperatures. If some form of the electrical heating and/or cooling devices are used, the device shall be rated for the electrical area classification in which it is installed. Fans shall also be provided for personnel comfort within panels large enough for operator entry where the average ambient temperature is high, i.e., $\geq 86^{\circ}\text{F}$ (30°C).