

SCOPE

- I 1.1 This practice covers the protection of equipment, piping and instruments against the effects of ambient temperature including hydrate formation, condensation, viscosity change, pour point suppression and icing. Fire water systems are excluded.
- I 1.2 **An asterisk (*)** indicates that either a decision by the Owner's Engineer is required, that additional information is to be furnished by the Owner's Engineer, or that information for the Owner's Engineer approval is to be supplied by the vendor or contractor.
- I ↕ 1.3 The following are synonymous: BP and IP.

SUMMARY OF ADDITIONAL REQUIREMENTS

- I ↕ 2.1 **Table 1** lists the practices which shall be used with this practice:

TABLE 1

PRACTICES	
IP 0-0-1	Explanation and Use of International Practices
IP 3-2-4	Pressure Relieving Systems
IP 3-2-6	Emergency Shower and Eyewash Facilities
IP 4-3-3	Shelters for Process Analyzers

DEFINITIONS

- I ↕ 3.1 **Winterizing and protection against ambient temperatures** includes such procedures as:
 - a. Protective external heating by: steam, electric, or hot water tracing, steam, hot water or hot oil jacketing.
 - b. Application of insulation.
 - c. Elimination of dormant sections of piping.
 - d. Maintaining a partial flow in dormant sections of piping.
 - e. Draining and flushing.
 - f. Agitation.
 - g. Providing suitable housing
 - h. Anti-freeze solutions
- I 3.2 **Climatic zone classifications** shall be specified and are defined in this Practice as follows:

CLIMATIC ZONE CLASSIFICATION	TEMPERATURE CONDITION
A	24 hour average hourly temperature not below 30°F (-1°C) (1) (3)
B	24 hour average hourly temperature below 30°F (-1°C), but for periods not exceeding 24 hrs duration (3)
C	24 hour average hourly temperature below 30°F (-1°C) for periods exceeding 24 hrs duration, but lowest average ambient temperature not below 0°F (-18°C) (2) (3)
D	Lowest average ambient temperature below 0°F (-18°C) (2) (3)

Notes:

- (1) Where daily changes of about 30°F (17°C) are common, and where a daily mean temperature is not far above 30°F (-1°C), classification as Zone A should be reviewed to assure satisfactory unit safety and operability.
- (2) Where the ambient temperature is the atmospheric temperature, the "lowest average ambient temperature" shall be taken as the lowest average temperature for the four coldest days (nonconsecutive) which occurred in any year.
- (3) 24 hour average hourly temperature is defined as the average of atmospheric temperatures taken hourly for 24 consecutive hours.

IP 3-9-1	Winterizing and Protection Against Ambient Temperatures	 INTERNATIONAL PRACTICE
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APPLICATION AND METHODS

- O 4.1 **Equipment shall be protected** to prevent interruption of plant operation or failure due to the effects of varying ambient temperature conditions.
- C 4.2 **Winterizing with heating** should not be used where other means can be used such as installing a winterizing cabinet and utilizing the heat of the pipe.
- C 4.3 **Insulation alone** may be used to prevent solidification or increase in viscosity where the liquid in the equipment has sufficient sensible heat for normal operating flow rates and will be drained during shutdown.
- R 4.4 **Process, utility, and other equipment**, shall be protected when any of the following conditions apply to fluids contained:
 - a. Viscosity at the lowest ambient temperature is so high that one-half the normal flow rate cannot be obtained with the pressure available for starting circulation.
 - b. Ice or hydrate formation occurs due to pressure reduction of moisture-bearing gases.
 - c. Corrosive compounds form if condensation occurs.
 - d. Undesirable separation or freezing occurs at lowest ambient temperatures.
 - e. Pour point or freezing point is above lowest ambient temperature.
 - f. Condensation will render an instrument inaccurate or inoperative from condensate head or freezing.

REQUIREMENTS FOR ALL CLIMATIC ZONES

- O,R 5.1 **Closed drain headers** shall be protected where piping may become plugged due to:
 - a. Wax or other process deposits.
 - b. Congealing viscous fluids.
 - c. Autorefrigerated releases to the system, such as flashing propane, which may cause freezing in the line.
- O,R 5.2 **Instruments and instrument piping** shall be protected in accordance with [Table 2](#). The instrument mechanism and indicator portions (i.e., electronic capsule) of the transmitters shall be kept within the manufacturer's recommended temperature rating.
- R * 5.3 **Instrument piping** shall **not** be winterized with an antifreeze solution, unless approved by the Owner. When specified, protective heating of lead lines shall be installed in a manner which will prevent the liquid from overheating and boiling away.
- O 5.4 **Locally mounted pressure gauges and instruments**, with seals required for corrosion protection, shall be winterized if the seal or process fluid would freeze, congeal, or be damaged at low temperature.
- O 5.5 **When parallel and adjacent lead lines for differential pressure instruments** are heat traced, they shall have common heating and insulation to maintain the same temperature in both lines.
- O 5.6 **Process vessels** and heat exchangers containing **fluids** which may freeze or congeal during dormant periods shall be protected.
- O 5.7 **Evaporators in chlorine service** shall be housed in a heated, forced ventilated building, if the ambient temperature can drop below 55°F (13°C).
- O 5.8 **Pumps and associated piping** shall be protected as required by the nature of fluids handled and duration of anticipated non-operating periods.
- O,R 5.9 **Seal and flushing oil piping** shall be traced whenever cooling to the ambient temperature would diminish the quantity or pressure of seal oil at the point of consumption below the equipment manufacturer's recommended minimum.
- S [5.10](#) **Except for centrifugal compressors**, compressor suction lines between the knockout drum and the compressor shall be heat traced and insulated if ambient temperature is below the dew point of the gas at compressor suction or if handling hydrocarbon gas components heavier than ethane.
- C,R * 5.11 **Centrifugal compressor suction lines** shall be protected when required to maintain liquid precipitation within manufacturers acceptable levels.

