

revisions to the B31.3 rules, as happened with introduction of these curves for carbon steel pressure vessels.

Table 5.14 Guide to Selection of Design Minimum Temperature (DMT)
Based on Location and Ambient Temperature

Piping Location	Location Comments	DMT °C	DMT °F
Outside	Piping exposed directly to ambient winter conditions	-46	-50
Unheated Enclosure	Piping contained within an unheated enclosure, where process heat will maintain the enclosure temperature above design minimum temperature.	-29	-20
Buried	Piping buried below the frost line.	-5	+23
Heated Enclosure	Piping contained within a heated enclosure.	0	+32

Bases of Development for Table 5.14

- (1) The basis for use of -46°C (-50°F) as DMT for outside exposure is that most “low temperature” carbon steel material standards require impact testing at -46°C (-50°F). This temperature is also typical of the coldest winter temperatures for the provinces of western Canada.
- (2) Note that ASTM A 20 impact test temperatures for plate depend upon thickness. Many manufacturers are aware of this dependence; however, it may be advisable to consider this issue during design and pre-award meetings. In some situations, it may be possible to consider an alternative DMT which would allow use of non-impact tested plate or plate impact tested at a higher temperature (e.g., -40°C (-40°F)).
- (3) For unheated enclosures, the availability of process heat and the absence of direct wind chill removing process heat is considered justification for selection of a DMT above that used for direct outdoor exposure. The -29°C (-20°F) DMT is based on ASME B31.3 requirements prior to the 1993(b) addenda, which permitted most common carbon steel piping materials to be used down to -29°C (-20°F) without impact testing. With the current edition of ASME B31.3, users must now refer to Table A-1 and Figure 323.2.2 of the Code, to determine minimum thickness and temperature threshold for impact testing.
- (4) Although unheated enclosures may experience occasional excursions below -29°C (-20°F) due to seasonal or process variations, process heat will normally keep piping and equipment warm. For extended excursions below -29°C (-20°F) (e.g., a winter shut-down/start-up), temporary heat or warm start-up procedures may be necessary and should be planned for during design.
- (5) For buried piping, -5°C (+23°F) was chosen as a commonly applied temperature for prairie and southern foothills pipeline design. For some northern locations and large diameter pipelines, -15°C (+5°F) has been used.
- (6) For heated enclosures, the freezing point of water (0°C (+32°F)) was chosen as the DMT on the basis that permanent heat is usually required for operation of the process and/or utilities (e.g., to prevent freezing of cooling water or drains). The 0°C (+32°F) DMT for heated enclosures may be convenient to avoid impact testing of some pressure vessels and thick pressure piping. A DMT higher than 0°C (+32°F) could be selected if warranted by the quality of enclosure, process variables, or testing and service requirements of the piping or vessel.
- (7) This table does not apply to situations where the need for low temperature impact tested materials is dependent on process design (e.g., Joule Thompson effects on blowdown).
- (8) For some designs, avoidance of low temperature impact tested materials may be justified on the basis of insulation and heat tracing, warm start-up procedures, temporary heat, or low stress as implied by B31.3 Table 323.2.2 Note 3.