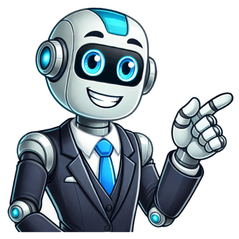
I'm not a robot



This document covers the requirements for the determination of design pressure and design temperature of the equipment like pressure vessels and piping that are used in petroleum refineries, petrochemical plants, and other similar plants.The following summary of input data needs to be prepared prior to the determination of design conditions.-Service for identification-Operating temperature & pressure under normal operation-Density of the fluid–Pressure drop of internals-Static head for vessel & lines-Differential pressure of pump at shut-off or design condition-Operating conditions other than normal operation such as start-up, upsets, shut-down, etc.-Line class or general pressure-temperature rating of flanges-Elevation at the inlet and outlet of the piping system-Location of valves that cause shut-off conditions-Design Pressure & Temperature for the vessels-Design Pressure & Temperature for the pump discharge lines-Short-term design condition, if required–Minimum design temperatureThe design pressure for the pressure vessel is determined in the following way,-Unless otherwise specified, this indicates gauge pressure. If design pressure1000105% of M.O.P105% of M.O.P105% of M.O.PTable-2 Design Pressure for Vessel/Columns/ReactorsThe below table (Table 3) can be used to determine the design pressure of the casing & discharge piping of a compressor (ref API RP 617).READ What are Choked Flow, Cavitation, and Flashing in Control Valves?Maximum Operating Pressure (PSIG) Standard Design Pressure (PSIG)Fit-for-purpose Design Pressure (PSIG) Revamp Design Pressure (PSIG)For centrifugal compressor125% of the maximum discharge pressure125% of the maximum discharge pressure125% of the maximum discharge pressureReciprocating Compressor0-150M.O.P+15M.O.P+15M.O.P+15151-2500110% of M.O.P110% of M.O.P110% of M.O.P2501-3500108% of M.O.P108% of M.O.P108% of M.O.P3501-5000106% of M.O.P106% of M.O.P106% of M.O.P>500Note 1Note 1Note 1Table-3 Design Pressure for piping & casing of the compressorNote 1: As per API RP 617, for a reciprocating compressor with a rated discharge pressure above 5000 PSIG, the relief valve setting shall be as agreed to by the purchaser and the vendor.The below table (Table 4) can be used to determine the design pressure of the heat exchanger.Maximum Operating Pressure (PSIG) StandardFit-for-purpose RevampFull or partial vacuum-0.2-0.3-0.30-3575505036-5075M.O.P+15M.O.P+1551-150M.O.P+25-–151-250M.O.P+25110% of M.O.P110% of M.O.P251-500110% of M.O.P110% of M.O.P105% of M.O.P105% of M.O.PTable-4 Design Pressure for heat exchangerThe below table (Table 5) can be used to determine the design pressure of the fire heaterMaximum Operating Pressure (PSIG) StandardFit-for-purpose RevampFull or partial vacuum-0.1-0.1-0.30-135150150110% of M.O.P136-1000110% of M.O.P110% of M.O.P105% of M.O.P>1000M.O.P+100M.O.P+100105% of M.O.PTable-5 Design Pressure for fire heaterThe below table (Table 6) can be used to determine the design pressure for the Relief and Flare systemMaximum Operating Pressure (PSIG)Design pressure (PSIG)Design pressure (PSIG)Design pressure (PSIG) StandardFit-for-purposeRevampPSV discharge piping to Flare K.O.DMin.100Min.100Min.100Flare K.O.D & downstream pipingMin.50Min.50Min.50Table-6: Design Pressure for Relief & Flare systemDesign temperature is determined based on the maximum normal operating temperature and the addition of a design margin. If temperature fluctuation is expected during normal operation, the maximum value of the fluctuating temperature must be considered. If the design temperature at the bottom of a pressure vessel is significantly different from that at the top, both temperatures should be specified. The design temperature shall be calculated as follows,A minimum design metal temperature is the lowest temperature caused by depressurization. It should also be specified in the vessel data sheet. For most of the vessels, heat exchangers, pumps, and compressors, the ASME Boiler & Pressure Vessel Code, Section VIII, Division 1, or Division 2 is used. The division 2 code is normally used only for vessels of heavy wall construction, such as the reactors in hydro-treating plants.The MDT in Division 1 is called the “Minimum Design Metal Temperature” (MDMT), while the term “Minimum Permissible Temperature” (MPT) is used for Division 2.It is recommended that a minimum design temperature of 120°C accommodate the steam out temperature.Equipment Standard Design TemperatureFit-for-purpose Design TemperatureRevamp Design TemperatureVessels/Columns/ReactorsMOT+50MOT+25MOTCompressorsMOT+50MOT+25MOTHeat ExchangerMOT+50MOT+25MOTFired HeatersMOT+50MOT+25MOTAtmospheric TankageMOT+50MOT+25MOTPressurized TankMOT+50MOT+25MOTRefrigerated TankMOT+50MOT+25MOT-10°F to Ambient TemperatureMOT-25MOT-10MOT-80°F to -10°FMOT-10MOT-5MOT500Note 1Note 1Note 1Table-3 Design Pressure for piping & casing of the compressorNote 1: As per API RP 617, for a reciprocating compressor with a rated discharge pressure above 5000 PSIG, the relief valve setting shall be as agreed to by the purchaser and the vendor.The below table (Table 4) can be used to determine the design pressure of the heat exchanger.Maximum Operating Pressure (PSIG) StandardFit-for-purpose RevampFull or partial vacuum-0.2-0.3-0.30-3575505036-5075M.O.P+15M.O.P+1551-150M.O.P+25-–151-250M.O.P+25110% of M.O.P110% of M.O.P251-500110% of M.O.P110% of M.O.P110% of M.O.P501-1000M.O.P+50M.O.P+50M.O.P+50>1000105% of M.O.P105% of M.O.P105% of M.O.PTable-4 Design Pressure for heat exchangerThe below table (Table 5) can be used to determine the design pressure of the fire heaterMaximum Operating Pressure (PSIG) StandardFit-for-purpose RevampFull or partial vacuum-0.1-0.1-0.30-135150150110% of M.O.P136-1000110% of M.O.P110% of M.O.P105% of M.O.P>1000M.O.P+100M.O.P+100105% of M.O.PTable-5 Design Pressure for fire heaterThe below table (Table 6) can be used to determine the design pressure for the Relief and Flare systemMaximum Operating Pressure (PSIG)Design pressure (PSIG)Design pressure (PSIG)Design pressure (PSIG) StandardFit-for-purposeRevampPSV discharge piping to Flare K.O.DMin.100Min.100Min.100Flare K.O.D & downstream pipingMin.50Min.50Min.50Table-6: Design Pressure for Relief & Flare systemDesign temperature is determined based on the maximum normal operating temperature and the addition of a design margin. 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