RECIPROCATING COMPRESSOR
PULSATION BOTTLE SIZING
TECH TRANSFER, INC.
30-JULY-2019

PRELIMINARY BOTTLE SIZING

Pulsation control of a reciprocating gas compressor begins with proper bottle volumes and designs. During the quotation phase of a project, Tech Transfer provides our clients with preliminary bottle sizes for each stage of compression. This enables our client to include accurate vessel costs in the bid package. These recommendations include vessel shell diameters and thicknesses based on the assumed design pressure and corrosion allowance. Vessels that are anticipated to contain internals, such as choke tubes, are noted in the document as well.

Recommended nozzle sizes and schedules are also included on the preliminary vessel sizing document. The nozzle sizes are based on maximum gas velocities, 2500 ft/min on suction systems and 3000 ft/min on discharge systems. The sizes in the document are simply recommendations and the client may alter the sizes to meet the standards for the particular project. The scrubber outlet nozzle and suction bottle inlet nozzle, however, have been sized for acoustical purposes and changing the size or schedule of the nozzles (and associated piping between the vessels) may impact the required suction bottle volume.

Numerous assumptions have to be made at this phase as the detailed design of the package has not been completed. In most cases, the initially recommended bottle sizes result in acceptable acoustical results when the detailed analysis is performed. However, there are instances where bottle sizes need to be adjusted due to unconventional layouts and/or resonances in the system.

Below is a list of assumptions that are made when creating the preliminary vessel sizing document:

1) A suction scrubber or secondary volume is assumed to be just upstream of each suction bottle. If no scrubber is present or is mounted remotely, additional volume may be required in the associated suction bottle.
2) The bottle sizing assumes that the associated piping will be available at the time of analysis. If the actual pipe routing is not available, additional volume may be required as a more conservative analysis approach must be taken.
3) The minimum operating speed and the presence of single-acting cylinders both have a significant impact on the required bottle volume. This information must be present and accurate in order to provide proper vessel sizes.
4) The vessel sizing assumes that the piping on the compressor package and in the vicinity will be well supported. Extremely flexible piping (elevated piping with minimal support) may require larger pulsation bottles if the piping cannot be lowered and/or the necessary support structure cannot be installed due to space restraints or excessive cost.

Our goal is provide our clients with the guidance necessary to build packages that are robust, cost effective, free from harmful vibration, and easy to maintain. Providing accurate bottle sizes early in the project helps make the design process more streamlined as these vessels can be included in the general arrangement models at the beginning of the project rather than after numerous iterations.

Paul N. Selover
Tech Transfer, Inc.
Acoustical Engineering Manager