Compressed Gas Association
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POSITION STATEMENT

SELECTION OF PRESSURE RELIEF DEVICES FOR TUBES

Introduction

Tubes transported in the United States may be stamped with U.S. Department of Transportation (DOT) stamp markings, United Nations (UN) stamp markings, or a combination thereof. Numerous questions arise as to the requirements for the selection of pressure relief devices (PRDs) that are to be installed on tubes when required.

Scope

This position statement provides guidance to assist in the selection of a PRD for DOT-3AX, DOT-3AAX, DOT-3T, and UN 11120 tubes. This publication applies to the determination of the setting of the rupture disk in CG-1, CG-4, and CG-5 type PRDs on comparable DOT specification and UN marked tubes. It also details the proper stamp marking that is required to be on the PRD.

Background

Requirements for PRDs on DOT and UN stamped tubes are found in Title 49 of the U.S. *Code of Federal Regulations* (49 CFR) [1]. 49 CFR 173.301(f) and 173.301b(a)(b) states that PRDs shall be in accordance with CGA S-1.1, *Pressure Relief Device Standards—Part 1—Cylinders for Compressed Gases* [2].

The selection of the burst pressure rating of PRDs for DOT cylinders is straightforward as DOT cylinders have common service pressures, for example, 1800 psi and 2400 psi. This allows for the availability of common PRDs with burst pressures set at the respective test pressures of the cylinders. Cylinder designs are such that a minimum wall thickness shall be met. If the cylinder manufacturing process yields a thicker wall, the pressure rating is still marked to the common industry accepted rating regardless of its capability of holding higher pressures. The amount of volume that can be added to a slightly higher individual cylinder pressure rating is not significant.

However, the selection of PRDs for DOT tubes is not as straightforward when compared to cylinders. Service pressures have not been standardized on common pressures as is the case with DOT cylinders. The pipe available from steel mills for the manufacture of tubes has more variation in wall thickness over its long length, which yields varying service pressures for each tube manufactured. Each tube is tested and marked with its individual service pressure allowing each tube to be supplied with its maximum volume. Due to this, the burst pressure ratings for PRDs on DOT tubes have not been standardized as they have with DOT cylinders. Therefore, the CGA position is that it is acceptable to select and use a commonly available PRD that is closest to, but does not exceed, the test pressure of the tube.

Tubes are often shipped in bundles with a common manifold. From 49 CFR 173.301(g), PRDs may be based on the DOT tube with the lowest marked service pressure. From 49 CFR 173.301b(a)(b), PRDs shall have a set to discharge pressure that is based on the UN tube with the lowest marked pressure. For bundled or manifolded tubes, the CGA position is that it is acceptable to select and use a commonly available PRD that is closest to, but does not exceed, the test pressure of the lowest marked tube.

For tubes containing Division 2.2 materials, it is implied that the PRD burst pressure may not exceed the test pressure per 49 CFR 173.301(f). CGA believes that a lower value may be used provided that the developed pressure during filling, as a result of the heat of compression, does not exceed the minimum rated burst pressure of the PRD.

For tubes containing Division 2.1 and 2.3 materials, as per current requirements, the PRD burst pressure shall be set at the test pressure with a burst tolerance of plus zero to minus 10% of the tube test pressure. However, for bundles of tubes with a common manifold, CGA believes that the PRD burst pressure may also be set at a