Tech Sheet #S 602

Development and Design Principles of Sanitary Safety Relief Valves

1. SCOPE

An overview of the design requirements and certification process of Sanitary Safety Relief Valves established by the National Board of Boiler and Pressure Vessel Inspectors, as well as the industry standard for Sanitary applications in Bioprocessing Equipment and Food and Beverage markets.

2. PURPOSE

This document is intended to provide necessary background information as well as an overview for the development and design principles for Sanitary Safety Relief Valves. Its objective is to inform and aid the user community.

3. INTRODUCTION

The procedure for certifying pressure relief valves involves both the American Society of Mechanical Engineers (ASME) and the National Board. The National Board is recognized as the designated organization regarding ASME approval of Safety Relief Valves. The stamp for Pressure Vessel Safety Relief Valves is designated by "UV". ASME code sections define the design, construction, marking and certification of capacity requirements for pressure relief valves. The National Board is the organization who facilitates this process. The National Board's "NB" mark accredits manufacturers and assemblers of pressure relief valves that successfully comply with the required ASME codes. The National Board also has accreditation programs for Testing Only ("T/O") and Valve Repair ("VR").

The National Board deals strictly with relief devices and not with any sanitary requirements. The American Society of Mechanical Engineers, Bioprocessing Equipment (ASME BPE), establishes and aids in the design and construction of fluid processing equipment used in the manufacture of biopharmaceuticals.

4. CERTIFICATION PROCEDURE OVERVIEW

Two applications must be filed for the certification process. One application to the accreditation department of ASME and another application, NB-502, is to be completed and submitted to the National Board. Once the NB-502 application is submitted and deemed acceptable, scheduling of the Initial Certification Testing will take place.

4.1 NB-502 APPLICATION REQUIREMENTS

Detailed engineering drawings are required in conjunction with the NB-502 application. The drawings should clearly show the inner workings of the valve as well as a bill of materials which states the full material designation. Spring design calculations are required within accordance to UG-136, Minimum Requirements for Pressure Relief Valves, ASME Boiler Pressure Vessel Code, Section VIII, Division I. Valves options such as Lifting Aids shall also be shown. Critical

path parts and/or components shall be submitted with their respective manufacturing drawing (fully dimensioned).

4.2 CERTIFICATION TESTING FOR MANUFACTUERES

Certification testing will take place at the National Board Testing Laboratory or at an alternative laboratory accepted by the National Board. The testing is performed to verify proper valve function and to establish the rating factor which is used to determine the certified capacity of the valve.

4.3 NATIONAL BOARD FACILITY REVIEW

For post certification testing, applicants must schedule a visit by a National Board representative to audit the applicant's facilities. This shop audit is intended to review the written description of the quality system manual and to verify implementation. Prior to the shop audit, the National Board will request certain valves and valve options that fall within your NB-502 application. During the audit, the National Board will witness assembly and setting of the valves to specified set pressures. These valve samples will then be re-tested at a National Board Testing Laboratory to verify they meet or exceed their respective flow ratings that were established during the certification testing.

4.4 CERTIFICATIONS AND CERTIFICATES

Once the above steps have been completed and accepted, the National Board will advise ASME and recommend issuance of the relevant code stamp. In concurrence, the National Board will post capacity certification(s) in the National Board Publication, Pressure Relief Device Certifications, NB-18 and grant permission to use the "NB" mark.

5. SANITARY DESIGN CONSIDERATIONS AND RECOMMENDATIONS

Designing a safety relief valve that will be used on a clean service application requires certain design features such as eliminating traps for bacteria and contamination. To achieve this, ensure that internal components are crevice-free and self-draining. Parts that are difficult to clean should be protected by an elastomer bellows to avoid further contamination and corrosion. Elastomers that will be exposed to process shall be FDA and USP Class VI compliant.

All metal parts and components should be constructed of a highly corrosive resistant material such as ASME SA-479 Type 316 or 316L. Surfaces that are always in contact with media shall be designed within accordance to Part SD and their respective surface finishes shall be compliant with Part SF of the ASME BPE standard. Surfaces that are in contact with media only during a valve lifting operation or in the event of the valve opening due to a system over-pressurization, shall have part surface finishes in compliance with Part SF of the ASME BPE code.

It is recommended to offer a lifting aid option for relief valves. A lifting aid overcomes the force of the spring acting on the seat to open the valve. This can be done manually or pneumatically. Use of the lifting aid is usually required during clean in place (CIP) or steam in place (SIP) processes.

6. CONCLUSION

All manufacturers of sanitary safety relief valves require certification granted by the National Board. In conjunction, the devices design shall be compliant with the necessary code sections of ASME BPE. Based on the requirements described, users of sanitary safety valves can be assured these products have passed rigid design test requirements for the safe use of these products.

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