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RPV SAFETY AND INSTALLATION INSTRUCTIONS

Incorporated in England Registered Number 2887836
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INTRODUCTION

Effective May 29, 2002, Compliance with the EC Pressure Equipment Directive (PED Below) 97/23 is mandatory for PED listed pressure equipment (including valves) used in countries of the European Union. Manufacturers, prior to supplying their products to EC Countries, are subject to a notified bodies quality system audit and product assessment, as a condition of certification and authorisation for manufacture and sale of CE marked products.

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CONFORMITY TO PED ON SERVICE CONDITIONS

1. Service Fluid Characteristics

1.1 Application to Dangerous and Harmful Fluid

For servicing the following kinds of fluid, as specified in PED Article 9 Section 2.1, use of products shall be limited to only those marked **Fluid Group 1** on affixed CE labels/nameplates.

(a) Explosive fluid (b) Flammable fluid (c) Toxic fluid

(d) Penetrating fluid (e) Oxidizing fluid (f) Harmful Fluid

WARNING	For any of the above kinds of fluid, do not use products which are marked **Fluid Group 2**

CAUTION	Also select products in accordance with applicable laws, regulations and engineering standards, where legally or contractually required to do so.

1.2 Fluid Characteristics Not Recommended for General Purpose Valves

For the following kinds of fluid, standard trim and sealing materials of general purpose valves are not suitable, and resultant fluid leakage may cause danger or harm to servicing personnel and contaminate the environment.

(1) Fluid which chemically reacts with air or water (e.g. ammonia)
(2) Fluid which chemically reacts with oil or grease (e.g. oxygen)

CAUTION	Valves shall not be used for the fluid which chemically reacts with pure oxygen or oil cause spontaneous combustion. Oil free treated products marked **Fluid Group 1** must be used instead for such applications.

(3) Inherently high leaking fluid (e.g. hydrogen)
(4) Wet H_2S
(5) High Pressure, high temperature gaseous fluid

Ensure, at all times, that the valve shell, trim and seating materials are properly selected for the specific service conditions. Shell and Trim materials of industrial valves are indicated on the nameplates. Improper selection of these materials may cause corrosion of the valve internals or deterioration of the material strength and result in fluid leakage, functional failure and a reduced product life cycle.

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2. Pressure, Temperature and Flow Conditions of Line Fluid

2.1 General

The mechanical strength of pressure parts of valves are designed and manufactured for safe application to the maximum pressure allowable under the service temperature specified in the pressure temperature rating of a relevant valve design standard. One problem for these valves is that structural design and selection of sealing components are intended for use in the service conditions, which are rather common, universal and typical in the field. This may limit application of these valves to some specific service pressures, temperatures and fluid flow conditions. Users of general purpose valves are thus recommended to pay a careful attention to the following remarks.

2.2 Selection of valves provided with non-metallic components

Regardless of the nominal design pressure indicated often on the valve bodies, application of valves using non-metallic components such as seats, packing rings and gaskets is often restricted, depending on actual service conditions, because of the inherent properties of such component materials. Typical examples are:

(1) Ball Valves with PTFE seats and sealing materials
(2) Butterfly valves with rubber seats and sealing materials
(3) Stainless and high alloy steel valves, with PTFE sealing materials

Ensure that on-site process service pressure and temperature is never exceeded. The maximum service pressure and temperature are also indicated on CE labels/nameplates.

2.3 Care of Extraordinary Pressure Rise

Ensure selection and use of valves of an appropriate pressure class for services where the valve internal pressure may extraordinarily rise due to the following causes:

(a) Heating (b) Exothermic reaction (c) Endothermic reaction (d) Explosion

(e) Fire (f) Supply Fault (g) Plugged discharge

2.4 Vacuum and Underground Service

(1) Vacuum Service

Stem seals of general purpose valves are designed only to resist the valve internal pressure and leakage is likely to occur through stem seals in case of vacuum service. We recommend used of the valves specifically designed for vacuum service for this application.

(2) Underground Service

Besides operation and maintenance difficulty, electric or galvanic corrosion and bacterial corrosion are inherent problems. Sufficient and adequate care must be taken beforehand to inhibit or prevent such type corrosions occurring on this kind of installation.

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2.5 Care of Extreme Temperature Conditions

For the following service environments, valves must be selected with an adequate margin for the service temperature ranges, to minimize the problems encountered with:

(a) Overheating, blockage by scale, distortion and creep caused by high temperature fluid
(b) Failure of neighboring accessories or components and distortion caused by high temperature environment
(c) Joule Thompson effect and its resultant leakage and destruction caused by high temperature fluid and environment
(d) Temperature rise caused by heat impact and its resultant material destruction and valve malfunction
(e) Material fatigue and destruction caused by its repetitive heating
(f) Valve operational failure caused by frozen lubricant and/or water in low temperature environment
(g) In case of hydrostatic piping systems, damage of valves and pipe caused by frozen line water under rapidly reduced environmental temperature.

2.6 Cavity Pressure Relief Provision

An extraordinary increase of the fluid pressure trapped with the valve body cavity may be caused by the line fluid temperature or the atmospheric temperature and result in damage of the valve internals. A provision for relief of excessive cavity pressure must be included in customers valve specification, if there is concern.

2.7 Fluid Flow

If types and specifications of valves are not properly selected to satisfy service conditions of line fluid flow, the following troubles may occur. Selection of proper valves by advising service conditions details to manufacturers and distributors in advance is customers responsibility for the ultimate performance of valves. It is also important that the customers take immediate remedial actions to solve problems, if they occur on site.

(a) Pitching, generation of disturbing noise or water-hammering caused by the condition of fluid passage
(b) Chattering, hunting or vibration caused by pulsating flow
(c) Abrasion, damage or overheating caused by excessive or insufficient flow volume or extreme change of flow volume
(d) Abrasion of valves at flow passing or turbulent area caused by extreme pressure drop or cavitation
(e) Erosional Wear
(f) Vibration or fatigue destruction of valve internal parts caused by high flow velocity
(g) Flow obstruction caused by fluid blockage
(h) Operation failure or wear caused by fluid residue stuck within the valve interior

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2.8 Post-pipe Pressure Test

(1) Pneumatic pressure test

Take care of safety issues such as visual inspection of tightened boltings and external leakage at each stage of pressure increment, when air or nitrogen gas is used as testing media.

WARNING	Do not overpressurize valves for testing, thereby exceeding the maximum allowable pressures specified. External leakage of high pressure gas will cause serious harm and damage to the personnel and test equipment.

(2) Hydrostatic pressure test

When testing, ensure use of clean water containing no solids such as sand or other foreign objects which accumulate in piping and may cause trouble to valves and test equipment. Chlorine concentration in the water shall be less than 100 ppm (or less than that legally or contractually specified) when testing austenitic stainless steel valves. A high chlorine content in the test media may cause corrosion.

(3) Valve application for installation as piping ends or pressure gates

Some valve types (generally butterfly, globe and check valves) are not suitable for use as piping ends or pressure gates. Choose proper valve types for this application.

CAUTION	For pneumatic pressure test, ensure that the open end is secured with a blind flange or cover to protect test personnel and equipment from leakage, which may potentially spurt through valve seats during pressurization, if any type of valve should be used at piping end.

CONFORMITY TO PED ON AREAS, FACILITIESD AND THE ENVIRONMENT

1. Facilities and Equipment of Apparatus Where Valves Are Installed

When valves are installed in facilities and equipment or apparatus for any of the following conditions we recommend that proper actions are taken to minimize resultant negative effects such as excessive load stress, reduced mechanical strength of parts or deteration of valve materials.

(a) Excessive mechanical or thermal load such as compression or tension caused by piping systems
(b) Excessive vibration and dynamic load caused by piping systems
(c) Danger of explosion or fire
(d) Excessive heat caused by conduction and radiation
(e) Excessive heat caused by environmental temperature rise
(f) Gaseuos or corrosive environment which attacks metallic valve materials
(g) Contact with water or high humidity to cause corrosion and damage of valve materials

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2. Areas or the Environment Where Valves Are Installed

Take proper actions to prevent danger when valves are installed where the following conditions exist.

(a) Questioned durability of valve materials against snow load or wind freezing
(b) Mechanical or electrical damage caused by flooding
(c) Valve operation failure or wear caused by dust
(d) Material deterioration caused by radiation
(e) Electrical corrosion
(f) Bacterial corrosion
(g) Accelerated load when valves are installed on mobile equipment or apparatus to affect mechanical strength of valves

3. Valve Installation on Piping

When installing valves, ensure orientation by properly aligning the correct position, according to the mounting position marks of valve bodies or valve operation manuals, understanding the construction mechanism of valves. Improper installation may cause problems such as valve malfunction, mechanical damage or deteriorated seal performance. The following are typical examples of the problem.

(a) Reverse installation of check valves against flow direction
(b) Installation of lift check valves on vertical piping (Note: Lift check valves provided with springs are acceptable for vertical piping)
(c) Reverse installation of globe valves against flow direction
(d) Reverse installation of gate valves provided with bleed holes on the disc against upstream pressure
(e) Installation of gate and globe valves with the stem positioned downwards on the horizontal piping

NOTES FOR HANDLING AND OPERATION OF PRODUCTS

1. Installation, Handling, Transportation and Storage of Products

It is recommended that the users pay a careful attention to all guidelines and work instructions, according to Manufacturers Standardization Society Standard Practice MSS SP-92 Valve user guide, to prevent degradation of product performance and reduction of product life cycle. Care should be taken particularly for prevention of the following :

(a) Damage of valves parts caused by improper wiring of valves when lifting, particularly large, heavy valves
(b) Damage of piping flanges caused by excessive tightening of flange boltings of, particularly, cast iron valves
(c) Functional failure caused by excessive welding heat in case of mounting butt-welding or socket welding end valves
(d) Degrading seating performance caused by post weld heat treatment of, particularly, small to medium sized valves
(e) Damage to valve ends caused by excessive tightening of screwed ends of, particularly, copper, alloy valves
(f) Functional failure caused by excessive welding heat in case of soldered copper alloy valves

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2. Operation of Products

It is recommended to ensure proper operation of valves according to valve operation manuals and MSS PS-92 Valve User Guide, after having checked and confirmed that:

(a) Correct power sources are prepared, if applicable
(b) Valves are facilitated for emergency shut-down, if required
(c) Corrective actions for operational failure are known to valve operation personnel

3. Disassembly, Maintenance and Modification of Products

Disassembly and maintenance of products including replacement of trims and sealing components must be carried out according to the instructions given in RPV valve operations manuals. We recommend that users employ genuine parts or, at a minimum, the parts recommended by us, so that the design and the ultimate product performance intended by our engineers may not be affected.

CAUTION	When CE marked products are disassembled for maintenance, or modified by purchasers or users, the legitimacy for conformity to PED requirements become invalid, and they are not entitled to claim benefits granted by PED and its related laws or regulations. Therefore, when valves are reassembled after maintenance or modified by purchasers or users **for resale** within EC countries, the procedures specified for requalification to PED and its related laws or regulations must be followed. In such a case we recommend purchasers or users to contact the notified bodies concerned for advice and actual requalification works **(see note)**

CAUTION	RPV assumes no liability, nor guarantees, the performance, function and safety of even new products, if purchasers of users disassemble products for maintenance including replacement of parts, or of modification of products **(see note)**

Note: The PED legitimacy of products remains valid for the modifications which are recognized or verified not to disturb the original intended safety of products such as mounting actuators on the mounting pads provided on top of valves according to relevant valve standards. In this example, actuators must have been duly qualified and certified to the relevant EC directives.

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