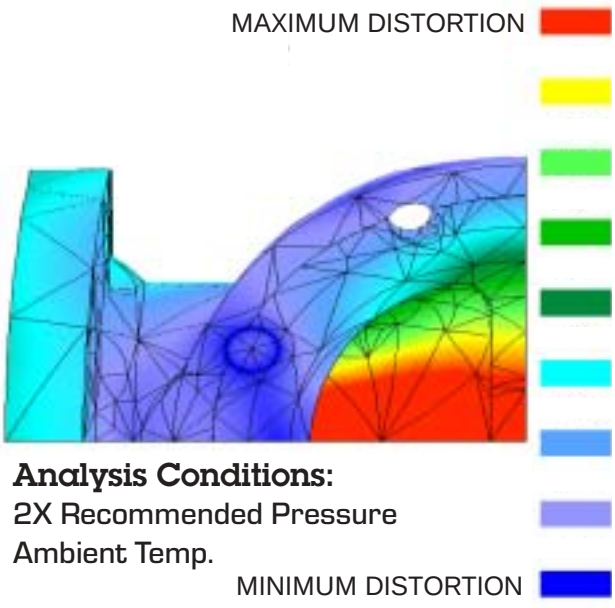
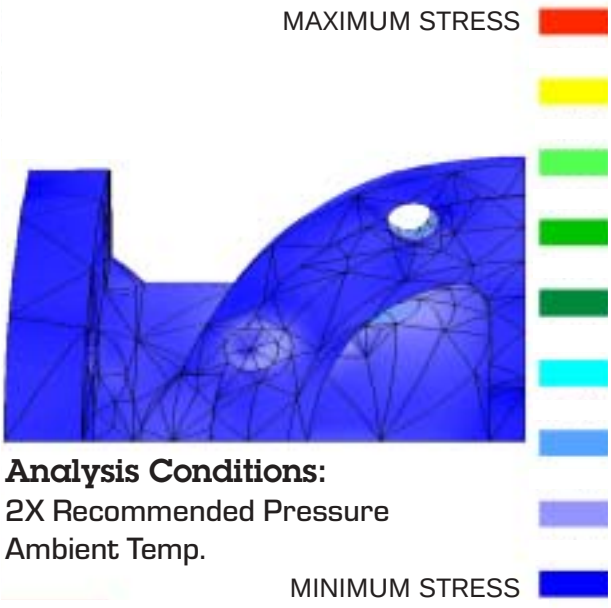
Product Development and CAE Analysis

Fig. A



Analysis Conditions:
2X Recommended Pressure
Ambient Temp.

Fig. B



Analysis Conditions:
2X Recommended Pressure
Ambient Temp.

A Dedication to Product Improvement

Our goal has been to design valves that will last longer than anyone else's, even in the worst kind of corrosive service. We feel we have achieved this, but we are also continuing to improve our design, engineering, and manufacturing processes to go even further.

What you see in the two figures above represents just one small part of the process. It is, however, a very important one. When a new valve is still in the design stage, we employ a very extensive computer modeling procedure that can simulate the effects of pressure, temperature, and mechanical forces that can cause stress and distortion on the valve. This highly sophisticated testing process, called "Computer Aided Engineering" or CAE, was used in the development process of this 3" Type 14 diaphragm valve before the prototype molds were ever made.

Fig. A shows a finite analysis of the expected distortion points in the diaphragm area of the valve under high pressure. Fig. B shows the reaction of this same valve to mechanical stress while still under the same high pressure. What we learn from this test, and many others like it, enables us to produce a product that will perform as we expect.

Ergonomic considerations influence the design: How does the handwheel feel when it is turned? Are there sharp edges anywhere? Even how the valve looks is important to our engineers before it is subjected to extensive prototype testing in the field under the worst possible conditions. And, finally, when we manufacture our valves, 100% are thoroughly tested; in fact, the results of every test are recorded and are available for review at any time. We know that all this effort will pay off for our customers who can purchase products that we know will stand up to the test of time.

One Source for Total Systems' Solutions

One Company Will Take Responsibility

Asahi/America offers our distributors and their customers ONE complete package; thermoplastic valves, actuators, single and double containment pipe and fittings, flowmeters and the engineering expertise to put everything together. This systems approach gives our clients ONE company to turn to for answers – ONE company that will make things right should anything go wrong. Every component we put together has been engineered to go together. And we even provide complete support, training, and equipment for the many joining methods available.

Asahi has been pioneering the development of corrosion resistant thermoplastic systems for over fifty years. No company has as broad a product line of valve types and size ranges as we do. Add to this our ISO 9001 manufacturing designation, our knowledgeable customer sales and engineering support staffs, our 24/7 web site for ordering and checking on product availability and delivery, and you have ONE company you can depend on.

The Advantages of Thermoplastics

Thermoplastics vs. Metal

Understanding the benefits and limitations of both advanced thermoplastics and metals is essential to making an informed choice in valve materials. For services up to 250°F and pressures up to 230 psi, thermoplastic valves outperform metal with respect to corrosion, abrasion and freeze resistance, and lower installed cost. Over 70% of all industrial valve applications fall within these ranges. In high pressure, high temperature applications, metals are your only choice. For all other process lines, from wet chlorine, plating solutions, and acid wastes to demineralized water, thermoplastic valve and piping materials are your best solution.

Knowing the compatibility of the process material with the valve materials of construction, which include body, seat, seals, gaskets, diaphragms, discs, plugs, balls, packings and trims – non-wetted as well as wetted parts – impacts the valve's life and performance and contributes to its overall cost. In this catalog we have made every attempt to provide you with information which will allow you to make the right selection.

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Thermoplastic Materials

The Benefits of Thermoplastics

The advantages of using thermoplastics are constantly being discovered. Over the past few years, there has been a dramatic increase in the application of thermoplastic valves and piping systems in areas where metal valves were thought to be the only solution. Even the most corrosion resistant metals are still susceptible to galvanic and electrolytic corrosion, resulting in scale build-up which reduces flow rates and increases pressure drop. Asahi/America is actively trying to educate end users to upgrade to thermoplastic systems.

Thermoplastics are the following:

- Dielectric
- Low thermal conductivity
- Smoother than metal for better flow rates and less energy required to move fluids
- Made to last longer than metal, even when in contact with corrosive liquids.
- Pure, so they do not contaminate the fluids they transport.
- Chemically resistant
- Corrosion resistant, much more so than metals, which is why thermoplastics are favored by the EPA
- Lightweight, averaging a weight of 1/16th of comparable metal materials.
- Used in many industries including semi-conductor, mining, pulp and paper, electroplating, printing, landfills, aquaculture, waste water treatment, aquariums, theme parks and cruise ships.
- Lower in total material and installation costs than conventional metal systems
- More efficient than metals, especially in operational efficiencies including chemical inertness, resistance to permeation and impurity absorption, abrasion and freeze resistance.
- Advancing more steadily than their metal counterparts. These advances in thermoplastics have made possible the needed strength and heat/pressure tolerance for the vast majority of fluid flow applications.
- Easier to install than metals, because of lightness in weight, good maneuverability, and compact size.

Materials Used in Asahi Valves

THERMOPLASTICS

PVC (Polyvinyl Chloride)

Cell Classification: 12454A, ASTM D 1784 (Formerly, TYPE I, GRADE I)
Properties: Over-all balanced properties – Excellent chemical resistance, strength, rigidity and modulus of elasticity

Temperature Range: 32˚ – 140˚ F *

CPVC (Chlorinated Polyvinyl Chloride)

Cell Classification: 23567A, ASTM D 1784 (Formerly, TYPE IV, GRADE I)
Properties: Similar to PVC

Temperature Range: 32˚ – 195˚ F

PP (Polypropylene)

Cell Classification: 0210B67272, ASTM D 4101-92b
Properties: Excellent chemical resistance, highly crystalline, lightest of plastics

Temperature Range: - 4˚ – 195˚ F

PVDF (Polyvinylidene Fluoride)

Cell Classification: TYPE II, ASTM D 3222-91A
Properties: Superior chemical and abrasion resistance, high mechanical strength, dielectric properties

Temperature Range: - 40˚ – 250˚ F

ELASTOMERIC AND OTHER MATERIALS

PTFE (Polytetrafluoroethylene)

Properties: Nearly insoluble and chemically inert, thermal stability, non-flammable, dielectric, naturally lubricant

Temperature Range: - 40˚ – 302˚ F

EPDM (Ethylene Propylene Diene Terpolymer)

Properties: Good for acids, many aggressive chemicals, alcohol, ozone/weathering

Temperature Range: - 40˚ – 195˚ F

VITON® * (FPM = Fluorocarbon Rubbers)

Properties: Most chemically resistant, balanced and excellent over-all properties

Temperature Range: - 20˚ – 302˚ F

NITRILE (NBR = Nitrile-Butadiene Rubbers)

Properties: Excellent for oil, alcohol, abrasion resistant

Temperature Range: - 5˚ – 212˚ F

Materials Used in Asahi Valves

ELASTOMERIC AND OTHER MATERIALS (CONT.)

HYPALON®* (CSM = Chlorosulphonyl Polyethylene)

Properties: Excellent for oxidizing acids, alkalis, abrasion resistant

Temperature Range: - 5˚ – 175˚ F

NEOPRENE® * (CR = Chloroprene Rubbers)

Properties: Good for acids, alkalis, lower gas permeability, impact resilient

Temperature Range: - 5˚ – 175˚ F

AFLAS ® ** (TFE Elastomer = Tetrafluoroethylene/propylene dipolymer)

Properties: Wide varieties of Chemicals, Bleaches, Pulp and Paper Liquids

Temperature Range: Up to 450˚ F

BUTYL (IIR = Isobutene-isoprene rubbers)

Properties: Acids and alkalis, weathering less gas-permeability, good flexing strength

Temperature Range: - 22˚ – 195˚ F

UHMWPE (Ultra High Molecular Weight Polyethylene)

Properties: Abrasion and chemically resistant

* Trade mark of E. I. du Pont de Nemours and Company
** Trade mark of Asahi Glass Co., Ltd.

Caution:

1. Actual temperature that any particular valves can be used is often different from the above, since individual valve structure is different and a variety of materials is used in the same product. Refer to tables of "Working Pressure vs. Temperature".
2. For details of chemical compatibility, consult factory for recommendation.
3. Asahi/America valves are not recommended for use in compressed gas services.
4. Only hydrostatic pressure is recommended when testing, with a gradual increase in pressure.
5. Recommended fluid velocity is 5 ft/sec to minimize water hammer and premature wearing.

Product Discussion and Overview

Asahi/America thermoplastic valves provide a dependable and economical way to handle corrosive chemicals, including sulfuric and hydrofluoric acid, nitric acid, oxidizing chemicals, caustics, solvents, halogens, and various other hostile fluids. They perform at temperatures up to 250°F, pressures up to 230 psi, and flows up to 18,500 gpm. All valves meet or exceed ANSI Class 6 shut-off.
What follows are brief descriptions of the valve types offered by Asahi/America. For further details, see the individual valve sections contained herein.

BALL VALVES

This valve performs an on/off or modulating function. Its name is derived from the flow-controlling ball located within the body of the valve. A hole through the center of the ball along one axis connects the inlet and outlet ports of the body. The ball itself is held in place by, and rotates 90° within, PTFE seats. These provide permanent lubrication and keep the valve "bubble-tight." They are backed by elastomeric cushions, which provide pressure against the ball and at the same time compensate for wear. Elastomer O-rings are used for stem and carrier seals to prevent leakage to the atmosphere. In the open position, the flow is straight-through, and there is minimal pressure drop when the porting through the ball is the same size as the inside diameter of the pipe.

Asahi/America ball valves are quick opening and closing; a quarter turn is all that is necessary. They are easy to maintain, and they provide tight sealing with low torque. Asahi/America offers three major types of ball valves: (1) Type 21 True Union ball valves; (2) Omni® ball valves; (3) Multiport ball valves; and Duo-Bloc® ball valves. True Union ball valves can be lifted from the line, without having to move the piping, simply by loosening the two union nuts. The valves can be disassembled, and parts may be replaced. The Omni series are economical, one-piece valves which cannot be taken apart. Multiport ball valves are three-way ball valves with True Union design. The use of a Multiport ball valve simplifies piping and eliminates the need for an additional valve and Tee fitting. An "L" ported ball valve permits flow from the bottom entry to either the left or right ports or to an OFF position. An optional Tee ported ball allows simultaneous left and right flow. The Asahi/America True Union ball valves and Multiport ball valves may be electrically or pneumatically operated.

Valve Types

BUTTERFLY VALVES

The name of this valve comes from the wing-like action of the flow-controlling disc, which operates at right angles to the flow. The disc has about the same diameter as the connecting pipe, and the flow is straight-through, with a low pressure drop. Maintenance is easy due to the small number of moving parts. The Butterfly valve can be used either as an "ON/OFF" or modulating type of valve. Asahi/America has recently developed the advanced Type 56 valve, which has no metal to media or environment contact whatsoever. These valves may be operated manually, electrically, or pneumatically.

DIAPHRAGM VALVES

The diaphragm valve offers many combinations of body materials and elastomeric diaphragm materials. The valve design is abrasion-resistant and non-clogging. When the diaphragm, which is connected to the stem of the valve by a compressor, is pulled away from the bottom of the valve body or weir, the path of the fluid has a smooth, streamlined flow. Slurries at low pressure that would normally clog most other valve designs easily pass through a diaphragm valve. The bonnet and working parts are completely isolated from the line fluid and only the body and diaphragm materials must be considered for service compatibility. The valve is a top-entry design, allowing in-line maintenance. The valve is suitable for throttling and ON/OFF service in applications ranging from water treatment to chemical abrasion processes. Diaphragm valves are operated manually, electrically, or pneumatically.

CHECK VALVES

Check valves are self-contained, automatic valves, which are used to prevent the reversal of flow in a line. When open and under flow pressure, the checking mechanism will move freely in the media, offering very little resistance and minimal pressure drop. Asahi/America provides two basic types of check valves: swing check valves and ball check valves. A swing check valve utilizes a swinging disc, which requires only minimal back pressure to close the valve. This valve can also be modified, with a lever and weight or spring, to assist in seating faster to eliminate shock. The Asahi/America ball check valve employs a free moving ball, which unseats to permit flow in one direction, but seals against a seat to prevent backflow. Both types of valves may be installed vertically or horizontally.

GLOBE VALVES

The flow through a globe valve follows a course that takes nearly two 90° changes in direction. But, because the seating of a globe valve is parallel to the line of flow of the liquid, it can be used to throttle the flow to any required degree or to give positive shut-offs. The economy and dependability of the Asahi/America globe valve make it desirable for many applications where this pressure drop is not critical. These valves are designed for manual operation only.

GATE VALVES

The gate valve is the most widely used ON/OFF valve for large diameter, full port applications. When the valve is fully open, it allows straight-through passage through an opening that is essentially the same size as the inside diameter of the connecting pipe. This is why there is little pressure drop through an Asahi/America gate valve. The valve operates when the handwheel and stem screw (or electric actuator) move a cylindrical plug, the gate, up and down at right angles to the fluid flow. Traditionally, gate valves have been used only for ON/OFF service, but because the unique Asahi/America sliding plug design provides a larger seating area than conventional gate valves, it can be used for throttling. This significantly larger seating area, which runs 360 degrees around the cylindrical plug, has also virtually eliminated the valve chatter normally associated with Gate valves. Asahi/America features two types of gate valves, one with a solid polypropylene plug and the other with a resilient elastomeric plug. Each valve is specifically designed to handle unique corrosive applications. Both style valves are available in "non-rising stem" or in "rising stem" designs.

LABCOCK® VALVES

This is another quarter-turn valve related to the family of ball valves. It has many process control monitoring and fluid sampling uses in the laboratory. These are quarter-turn valves, which come in a variety of configurations: male thread x male thread, male thread x hose, hose x hose, female thread x female thread, and female thread x male thread. They may be used for simple ON/OFF service or for calibrating flow.

Valve Types

PRESSURE RELIEF VALVES

The thermoplastic pressure relief valve protects equipment and systems against overpressures or sudden pressure surges. Able to handle highly corrosive or ultrapure liquids, it prevents pumps from dead-heading due to unexpected shut-offs downstream (also known as a "bypass relief valve".) It maintains back pressure in closed-loop systems to make pumps run more smoothly (also known as a back pressure valve.)

AUTOMATED VALVES

Ball valves, butterfly valves, diaphragm valves, and gate valves are often automated with pneumatic or electric actuators. This allows remote operation for a variety of reasons: savings in labor, plant safety, product quality assurance, and automatic sequencing, to name a few. The choice of actuator type depends on many factors, including availability of air supply, cycling requirements, condition of the environment, compatibility with the type of control operation, and cost. Positioners may be mounted on these valves if flow control is required.

GLOBE CONTROL VALVES

The Asahi/America globe control valve is the most advanced available in design, features, performance, and cost effectiveness. Its design includes superior proportional control characteristics and safety features for a wide variety of applications, ranging from common fluids to the most aggressive chemicals. Accurate fluid control is achieved by positioning the valve plug to vary the aperture between the plug and the seat ring. The valve design allows the use of different plug/seat sets to provide desired flow versus travel characteristics. A wide range of controllable Cv is available, from 0.23 to a maximum of 105. Reduced trim is an option. For greater flow requirements, Asahi/America offers an extensive line of modulating ball and butterfly control valves. Both electric and pneumatic actuators are available for any control mode.

PTFE bellows stem sealing eliminates old-fashioned packing glands, minimizing valve maintenance, and increasing performance, safety, reliability, and useful life. The Asahi/America Globe Control valves provide long, reliable, accurate, and economic life without resorting to highly expensive control valves in exotic materials. Cost is surprisingly low for initial purchase, installation, operation, and maintenance.

SIGHT GLASS GAUGE

The sight glass/gauge valve is the most convenient way to visually monitor the liquid level in tanks. Its thermoplastic construction produces excellent corrosion resistance, and its compact design permits it to be safely located close to the tank.

SEDIMENT STRAINERS

Sediment strainers protect pipeline components such as pumps and meters by removing suspended solids and impurities. Transparent thermoplastic construction permits easy detection of the screen's condition.

GASKETS

Asahi valve gaskets offer a unique double convex ring design that gives optimum sealing with only 1/3 the torque commonly required with flat faced gaskets. Asahi/America offers EPDM gaskets from 1/2" to 12"; PTFE-bonded EPDM gaskets in sizes from 1/2" to 12"; and PVDF-bonded EPDM gaskets from 1/2" to 10".

CONSTANT FLOW VALVES

Using the constant flow valve provides an accurate way of controlling flow without automation (neither electricity nor an air supply is required). Accurate control is achieved by the globe style body and seat-and-plug configuration. This unique design allows the valve to maintain a constant preset flow, even if the differential pressure changes. The all thermoplastic construction makes it ideal for semiconductor, chemical, swimming pool, and salt water applications.