

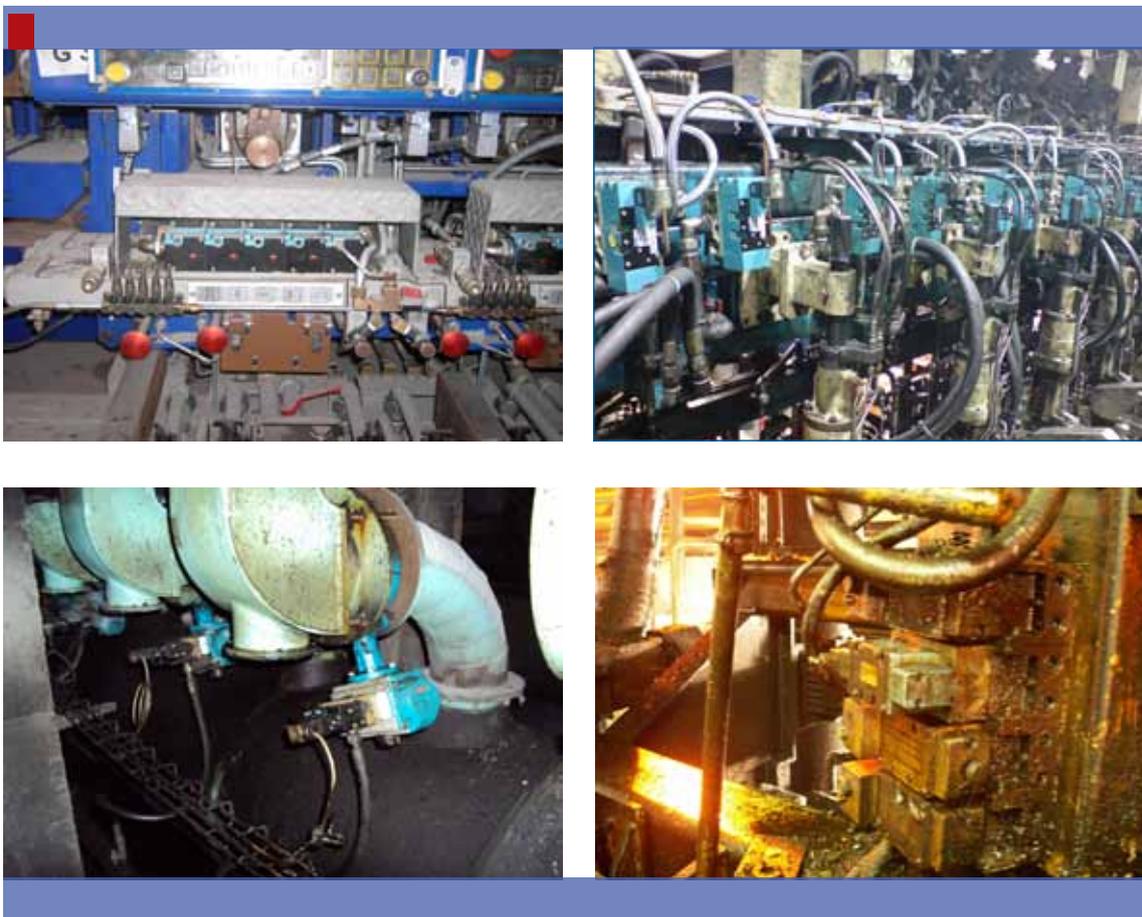


Technical Bulletin

Liège, October 13th, 2014

Introduction

MAC Valves, Inc. is pleased to bring to your attention its ISO valve range designed and manufactured to meet the stringent requirements of the glass industry. MAC Valves ISO valves are suitable for installation on all IS glass forming equipment.



MAC Iso valves in situ

The MAC Glass Gazette 5 – Technical Bulletin – October 13th, 2014 - Page 1 of 5
MAC Valves, Inc. Europe, Inc., Rue Marie Curie 12, 4431 Loncin (Liège), Belgium
Tel : +32 4 239 68 68 – Fax : +32 4 263 19 42 – E-Mail : nicolas.mathieu@macvalves.be





Requirements from the field

MAC Valves, Inc. has carefully taken into consideration the requests of glass container forming equipment users and understood their issues to offer on the market ISO valves that give the possibility to modernize existing machinery, improve its reliability, and enhance the quality of the final product. MAC Valves ISO valves integrate all the MAC features and technology resulting from over 60 years of innovation in valves.

The main focus of MAC Valves is to offer an innovative product developed basing on users' experience that provides:

- An increased production due to less downtime, thus a better pack to melt.
- An increased bottle quality due to fast, repeatable response times and higher flow
- A more user friendly solution for the operators and maintenance teams

Most frequent complaints from the users all over the world are the following :

- Skinner pilot extremely sensitive to pressure variations and contamination
- Metal/metal spool sensitive to contamination and creating sticking effect
- High wear on O-Rings - can be easily torn during movements of the spool
- Reduced lifetime on poppet designed valves due to high wear of the poppet
- Lack of flow for some functions like cooling and final blow
- Lack of consistency of response times over the cycles
- Extremely time consuming repair/ maintenance process
- Life time often under 25 million cycles



Examples of ISO valves from competition found on IS glass forming equipment



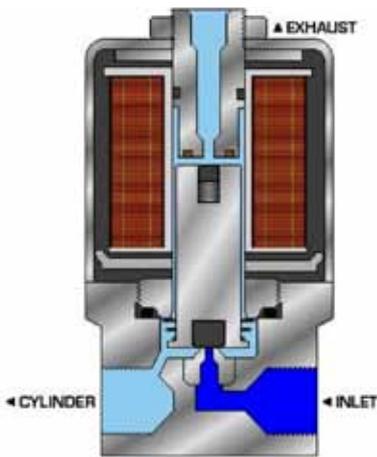


Technical Bulletin

Liège, October 13th, 2014

Typical Skinner design vs. MAC Valves design

Skinner design

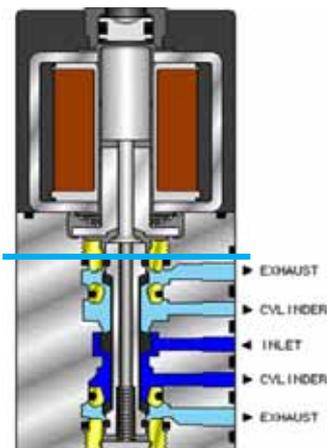


- Spring force (holding poppet on seat) is constant
- Inlet air acts upon a single sealing area
- Inlet pressure X sealing area creates a force that opposes return spring shifting forces
- Force created by inlet air pressure on inlet poppet seal varies as inlet air pressure varies
- Changing inlet pressure therefore affect energizing and de-energizing shifting forces

DISADVANTAGES:

- Normal pressure fluctuations cause inconsistent shifting forces
- Air pressure fights return spring, reducing shifting forces
- Weak return spring force
- Exhaust contaminants pass through operating solenoid parts causing sticking and coil burnout
- Exhaust located in pole piece is restricted due to core iron requirements

Patented MAC Valves design



- High shifting forces (energized) – short stroke
- High shifting forces (de-energized) – strong return spring
- Shifting forces unaffected by changing air pressure (IN/EXH) - balanced design
- Shifting forces virtually unaffected by typically contaminated air
- Wiping action - Low friction minimizes resistance to shifting forces
- Minimal friction

ADVANTAGES

- Short stroke solenoid produces high energization shifting force
- High force return spring due to high force solenoid, maximizes both energization and de-energization shifting forces
- Special D-rings to protect the electrical part from external contamination
- Valve shifting forces are consistent and not affected by pressure variations
- Solenoid isolated from exhaust of contaminants





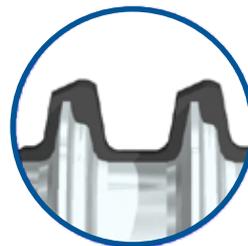
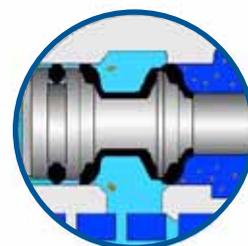
Technical Bulletin

Liège, October 13th, 2014

Benefits

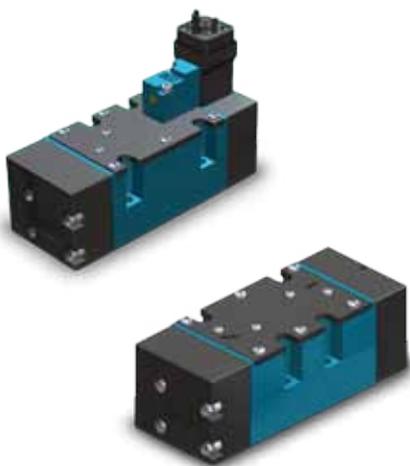
A. General benefits related to the MAC Valves Technology

- The rubber compounds integrated in all MAC valves are engineered and produced in-house.
- Precision ground bonded spool controls compression - wipes contaminants away with minimum friction
- Chemically hardened seals eliminate creep, reduce friction and increase life
- Lubricant in rubber reduces friction - enhances nonlube service
- Two seals each controlling a single orifice provide a short stroke, less wear, minimum friction and high flow in a small package
- Patented centering seals ensure spool alignment for minimum wear
- Bore is machined, roller burnished and polished for hard smooth surface and glasslike finish - minimum friction, minimum wear and long life
- Lightweight aluminium spool allows for fast response
- One piece spool - simple construction and easy maintenance



B. Specific benefits linked to glass industry modifications

- Higher flow for ISO footprint on the market (see data on next slide)
- High resistance to contamination and pressure variation
- Highly durable, accurate switching, increased reliability
- Fast switching with extremely repeatable response times
- High temperature modification with resistance up to 80°C
- Washdown modification
- Robust glass manual override (optional)
- Electrical/remote air option
- All connectors/coils available
- Very easy to repair – repair kit for all parts



The MAC Glass Gazette 5 – Technical Bulletin – October 13th, 2014 - Page 4 of 5
MAC Valves, Inc. Europe, Inc., Rue Marie Curie 12, 4431 Loncin (Liège), Belgium
Tel : +32 4 239 68 68 – Fax : +32 4 263 19 42 – E-Mail : nicolas.mathieu@macvalves.be





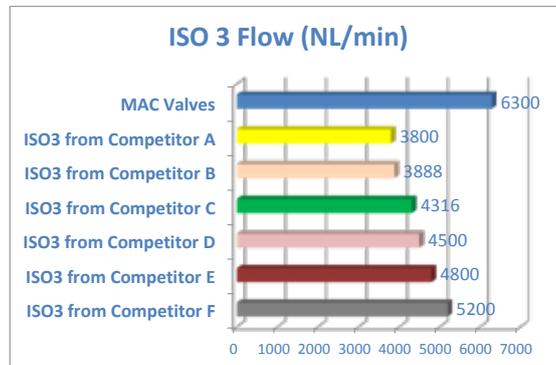
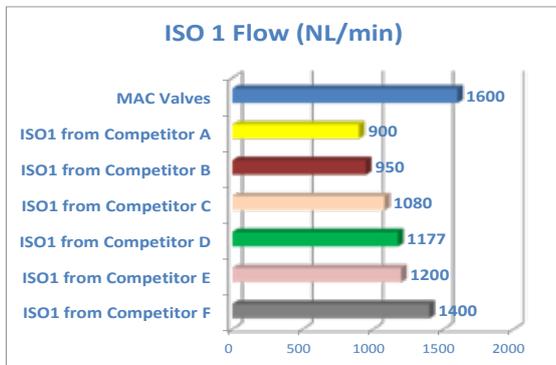
Technical Bulletin

Liège, October 13th, 2014

Flow Comparison of ISO Valves

All ISO valves on the market are not equal. They share a common footprint defined by ISO standards 5599/1 and 5599/2. But in terms of flow, which is the key feature for an air valve, performances of the MAC Valves ISO range are amongst the best in the industry.

See below charts comparing the flows of ISO 1, ISO2 and ISO3 valves (tests carried out in the MAC Valves laboratories):



How To Order

	ISO1	ISO2	ISO3
Electrical version:	MV-B1A-AAAX-DP-DEWJ-1XX / EQ36	MV-B2A-AAAX-DP-DEWJ-1XX / EQ36	MV-B3A-AAAX-DP-DEWJ-1XX / EQ36
Repair kit - Electrical version:	DP-DEWJ-1XX / EQ36 K-P1001 / GL01	DP-DEWJ-1XX / EQ36 K-P2001 / 446K	DP-DEWJ-1XX / EQ36 K-P3001 / 446K
Remote air version:	MV-A1C-B1X1 / 446D	MV-R2A-BACX / 446D	MV-R3A-BACX / 446D
Repair kit - Remote version:	K-A1001C / 446K	K-P2001 / 446K	K-P3001 / 446K

Note: Please consult factory for all available options

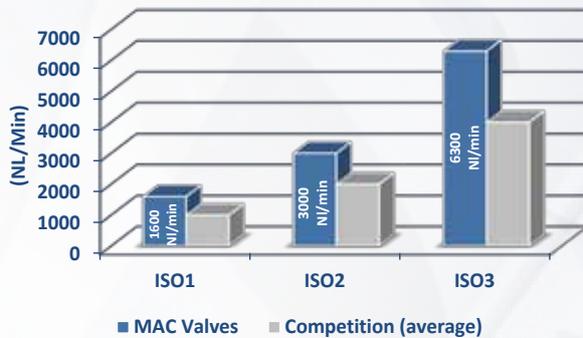
The MAC Glass Gazette 5 – Technical Bulletin – October 13th, 2014 - Page 5 of 5
 MAC Valves, Inc. Europe, Inc., Rue Marie Curie 12, 4431 Loncin (Liège), Belgium
 Tel : +32 4 239 68 68 – Fax : +32 4 263 19 42 – E-Mail : nicolas.mathieu@macvalves.be





NEW GENERATION ISO VALVES for IS Glass Forming Machines

- Higher flow for ISO footprint:



- Conform to ISO standard 5599/1 and 5599/2
- ISO footprint = 100% drop-in solution
- High resistance to contamination and pressure variation
- Designed to work in harsh environments
- Highly durable, accurate switching, increased reliability
- Fast switching with extremely repeatable response times
- High temperature modification with resistance up to 80°C (176°F) for valve body and coil
- Less downtime – Increased production



CUSTOMER BENEFITS

- ✓ 5/2-way valve with the new technology patented 5-way pilot develops maximum shifting forces both ways.
- ✓ 100% interchangeable with existing solution.
- ✓ Balanced design for high flow, high speed and high consistency (not sensitive to pressure variations).
- ✓ Short stroke with high flow – MAC proprietary design increases significantly flow with ISO footprint.
- ✓ Bonded spool with minimum friction, shifting in a glass-like finished bore.
- ✓ No lubrication required.
- ✓ Wiping effect eliminates sticking.
- ✓ Proprietary high temperature seals for long life time, resistance to high temperature and aggressive lubrication.
- ✓ Glass industry designed modification for high temperature resistance for valve body and solenoid (max 80°C / 176°F).
- ✓ Burn-out proof MAC solenoid, life time guarantee on coils.
- ✓ Optional robust glass industry designed manual override (locking or non-locking).
- ✓ 100 million cycles (est.) MTBF life time.
- ✓ LED indicator on valve optional.
- ✓ Electrical or remote air versions available.
- ✓ Wide range of coils and electrical connectors available.
- ✓ Pressure regulators and flow controls available.
- ✓ 3-way CNOMO pilot (optional).
- ✓ Repair kit available for the complete valve.



MAC Valves - Highly engineered solutions for the highest performing applications since 1948



MAC Valves Inc, Wixom, Michigan - MAC Valves Inc, Dundee, Michigan
MAC Valves Europe Inc, Liège, Belgium - MAC Valves Asia Inc, Taiwan

To find your *local* distributor, visit www.macvalves.com





NEW GENERATION ISO VALVES

for IS Glass Forming Machines

TECHNICAL DATA

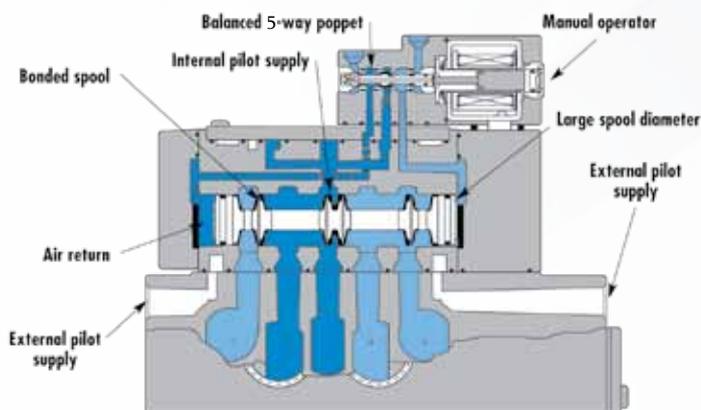
	ISO1 valve	ISO2 valve	ISO3 valve
Fluid:	Compressed air, vacuum, inert gases		
Pressure range:	External pilot 0 to 8 bar / 0 to 120 PSI		
Pilot pressure:	2,5 to 8 bar / 37.5 to 120 PSI		
Lubrication:	Not required if used select a medium aniline point lubricant (between 80°C and 100°C / 176°F and 212°F)		
Filtration:	40 microns		
Temperature:	-18°C to + 80°C / 0°F to 176°F		
Orifice:	7,8 mm / 0.27 in	10,5 mm / 0.39 in	14,9 mm / 0.55 in
Flow (at 6 bar, Δ P=1bar):	1600 NI/min - Cv 1.6	3000 NI/min - Cv 3.0	6300 NI/min - Cv 6.3
Coil:	Epoxy encapsulated - class F wires - long energization		
Voltage range:	-15% to +10% of nominal voltage		
Mod. EQ36:	Viton seals, spool and poppet - High temperature grease		

MAC SOLUTION - HOW TO ORDER

	ISO1	ISO2	ISO3
Electrical version:	MV-B1A-AAAX-DP-DEWJ-1XX / EQ36	MV-B2A-AAAX-DP-DEWJ-1XX / EQ36	MV-B3A-AAAX-DP-DEWJ-1XX / EQ36
Repair kit - Electrical version:	DP-DEWJ-1XX / EQ36 K-P1001 / GL01	DP-DEWJ-1XX / EQ36 K-P2001 / 446K	DP-DEWJ-1XX / EQ36 K-P3001 / 446K
Remote air version:	MV-A1C-B1X1 / 446D	MV-R2A-BACX / 446D	MV-R3A-BACX / 446D
Repair kit - Remote version:	K-A1001C / 446K	K-P2001 / 446K	K-P3001 / 446K

Note: Please consult factory for all available options (X).

MV-XXA SERIES - DESIGN ADVANTAGES



Exhaust
Pressure

MAC SOLUTION IN SITU



3500 factory certified specialists in over 45 countries focused on optimizing customers needs

To find your MDN distributor, visit www.macvalves.com



As we constantly strive to improve production, MAC Valves Inc reserves the right to modify its products. Therefore, this document cannot be considered as contractually binding. All trademarks and product names, including copyright, are reserved by MAC Valves Inc and its associated companies. October, 2014-MAC Valves Europe Inc. All rights reserved.