



Pneumatic Systems for the Primary Aluminum Industry

Bulletin AU03-ALUM/NA



Parker Hannifin

The No.1 Supplier of Pneumatics to the World's Aluminum Smelters



Parker Hannifin has more than 80,000 cylinders in operation in the world's leading smelters. Our experience in the aluminum industry goes back to 1968.

Parker equips machinery in all phases of aluminum production, including smelters, casters and extruders, grinders, rolling mills, processing lines, and a broad array of fabrication equipment.

We understand the special demands of the primary aluminum industry—high temperatures, strong magnetic fields, electrical arcing, abrasive environments—and we have the answers.

Our pneumatic and electromechanical technologies deliver repeatability, accuracy, and rugged dependability for high volume production requirements.

Worldwide Organization of Application Specialists



Wherever you are, you're close to a Parker Application Specialist with a technical background not only in pneumatics but also in the specific demands of the Aluminum Industry, ready to assist you in finding the optimal solution.

Specialized Product Development



Our product development is matched to the harsh environment found in reduction cells.

Special attention has been paid to:

- High-temperature environments
- Heavy, dust-laden atmospheres
- Abrasive environments
- Strong magnetic fields
- Mechanical damage

Parker Fulfills the Demands of the Market

With our continuous development in close cooperation with the world's leading technology suppliers, we offer the market the most up-to-date, specially designed products with the following basic features:

- Standard High Temperatures
 - Continuously +150° C (300° F)
 - Intermittent +200° C (390° F)
- No additional lubrication
- Effectively sealed against dust (alumina)
- Maintenance free operation > five years
- Service life of 20 years



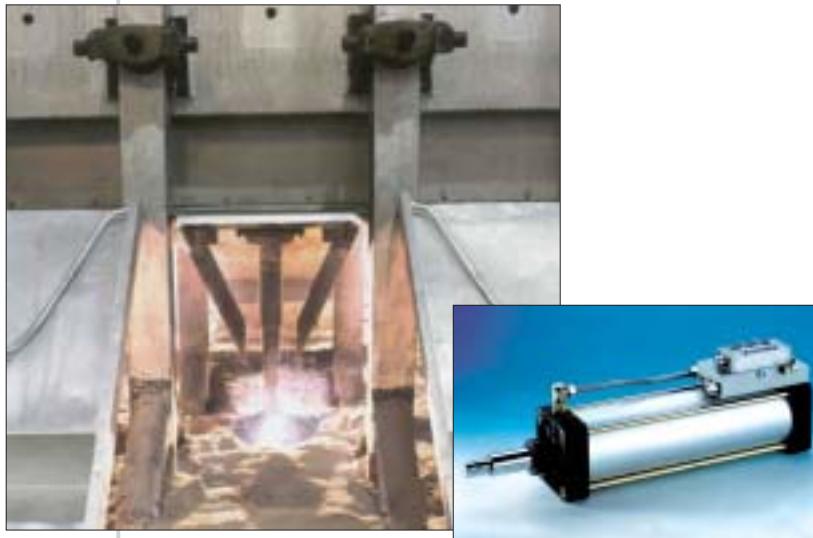
One-Stop Shopping

Parker Hannifin is the world's leading manufacturer of motion and control components and systems such as pneumatic cylinders, valves, air-preparation units, pneumatic fittings, and hoses. Parker Pneumatic also provides unrivalled expertise and experience in the design, manufacture and supply of high quality products to the Primary Aluminum Industry.

Operating from over 210 locations worldwide and with 800 product lines for pneumatic, hydraulic, and electro-mechanical applications, Parker serves more than 1200 markets. No single competitor presents as broad a product range, or offers such a diversity of application experience.

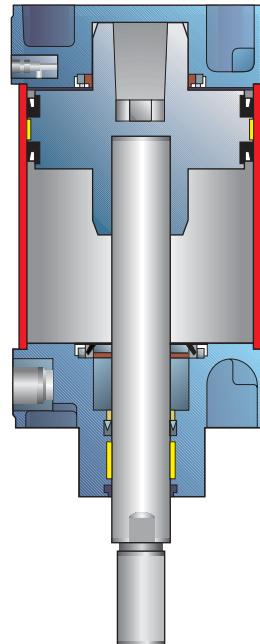
Crust Breaker Cylinder

The C40 Crust Breaker cylinder is designed to meet the harsh environment in an aluminum reduction pot, with normal working temperatures up to +150°C (300°F) and intermittent temperatures up to +200°C (390°F) that may occur by anode effects or during the start up of a pot.



Options available for Breaker Cylinder:

- Built-on valves
- Mechanical latch
- End position indication
 - Pneumatic
 - Electrical
- Electrical sensing of the bath
- Electrical insulation
- Energy-saving function



Bearings on the piston rod and the piston are made of self-lubricating PTFE reinforced material with graphite (piston) and bronze (piston rod) for side-load performance. All bearing materials are electrically non-conductive.

Special attention was given to the scraper ring function. Two different options are available:

1. A higher temperature-resistant, self-lubricating PTFE scraper ring provides the optimum solution for the crustbreaking cylinders.
2. For applications where the cylinder is exposed to extreme temperatures or heavy polluted air, the cylinder can be equipped with a metallic rod wiper in combination with a PTFE scraper ring.



The cylinders are designed to operate in a point feeder on an aluminum reduction cell for five years without repair or maintenance.

Specification for materials

| | |
|------------------|---|
| End cover: | Aluminum, black anodized |
| Cylinder barrel: | Aluminum, anodized |
| Piston: | Aluminum, anodized |
| Tie rod: | Steel, zinc-plated |
| Piston rod: | Steel, hard-chromium plated |
| Bearings | |
| Piston: | PTFE reinforced with graphite |
| Piston rod: | PTFE reinforced with bronze |
| Seals: | Fluorocarbon |
| Scraper ring: | PTFE combined with Fluorocarbon, or metallic-rod wiper combined with a PTFE scraper ring. |

Performance Data

Double-acting cylinder according to ISO 6431 with adjustable cushioning at both ends.

| | | | | |
|--------------------------------|--|-------|-------|----------|
| Bore mm: | 100 | 125 | 160 | 200 |
| Piston-rod diameter mm: | 32 | 32/40 | 40/50 | 40/50/70 |
| Stroke: | According to requirement from the client | | | |
| Connection ports BSP or NPT: | 1/2" | 1/2" | 3/4" | 3/4" |
| Maximum working pressure: | 10 Bar (145 PSI) | | | |
| Temperature range | | | | |
| Working temperature: | +150°C (+300°F) | | | |
| Max. intermittent temperature: | +200°C (+390°F) | | | |

Intelligent Crust Breaker



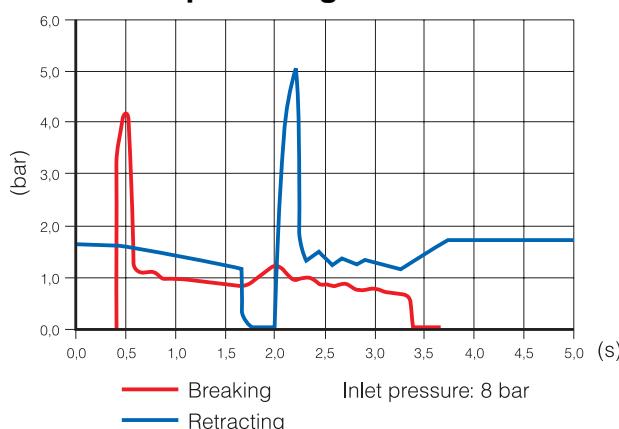
Our Intelligent Crustbreaker cylinder saves up to 70% in compressed air based on proven technology from the C40 series. A complete working unit determines:

- If the crust is broken
- If the chisel has left the bath
- If the cylinder is fully retracted
- If there is air leakage

The maintenance-free service life of an Intelligent Crustbreaker cylinder corresponds to life of the cathode.

More than 10,000 cylinders have been in operation since 1997.

Air consumption diagram



What does this mean for a smelter with 1000 crustbreaker cylinders?

- Bore: 200 mm / 8 inches
- Stroke: 500 mm / 20 inches
- Pressure: 7 bar / 100 psi

Breaking every 2 minutes.

The normal annual air consumption is
66 million m³ / 2.3 billion ft³

With an air saving of 65 - 70%, approx.
45 million m³ / 1.6 billion ft³

can be saved.

What is the potential saving in
YOUR smelter?

Check **YOUR** annual savings at www.parker.com/euro_pneumatic
Click on Applications/Primary Aluminum

Feeder Cylinder

Specification for materials

| | |
|------------------|-------------------------------|
| End cover: | Aluminum, black-anodized |
| Cylinder barrel: | Aluminum, anodized |
| Piston: | Aluminum, anodized |
| Tie rod: | Integrated |
| Piston rod: | Steel, hard-chromium plated |
| Bearings: | PTFE reinforced with graphite |
| Seals: | Fluorocarbon |
| Scraper ring: | Fluorocarbon |

Performance Data

| | | | |
|---|------------------|------|--|
| Double-acting cylinder according to ISO 6431 with adjustable cushioning at both ends. | | | |
| Bore mm: | 40 | 50 | 63 |
| Piston rod diameter mm: | 16 | 20 | 20 |
| Stroke: | | | According to requirement from the client |
| Connection ports BSP or NPT: | 1/4" | 1/4" | 3/8" |
| Maximum working pressure: | 10 Bar (145 PSI) | | |
| Temperature range | | | |
| Working temperature: | +150°C (+300°F) | | |
| Max. intermittent temperature: | +200°C (+390°F) | | |

The C40 Feeder cylinder is designed to operate in a point feeder on an aluminum reduction cell for five years without repair or maintenance.

Special attention is given to the function of Viton scraper ring.



Control Valve VF45

Specification for materials

Control valve

| | |
|------------------------|----------------------------------|
| Valve body: | Aluminum |
| End caps: | Aluminum |
| Internal parts: | Aluminum |
| Seals: | Fluorocarbon |
| Bearings, Glide rings: | Dynamic O-Rings with Glide rings |
| | PTFE reinforced with graphite |
| Spring: | Stainless steel |
| Lubricant: | Graphite powder with silicon oil |

Solenoid valve

| | |
|------------------|--|
| Valve body: | Duroplastic epoxy resin, non-organic reinforcement |
| Coil: | Copper wire coated with W200 acc. to DIN 46416 |
| Plunge: | Stainless steel, low magnetic |
| Cable connector: | Polyamid plastics |
| Base: | Brass |

Subbase, interface ISO 5599/1 size 4

| | |
|---------|----------|
| Subbase | Aluminum |
|---------|----------|

Performance Data

Control valve

Directional control valve 5-port, 2-way valve of poppet type.

| | |
|---|-------------------|
| Maximum working pressure: | 10 Bar (145 PSI) |
| Minimum signal pressure: | 3,5 Bar (50 PSI). |
| For el. actuated valves minimum working pressure: | 3,5 Bar (50 PSI) |
| Temperature range (air actuated valve) | |
| Working temperature: | +150°C (300°F) |
| Max. Intermittent temperature: | +200°C (390°F) |

Temperature range (el. actuated valve)

| | |
|--------------------------------|----------------|
| Working temperature: | +120°C (250°F) |
| Max. Intermittent temperature: | +160°C (320°F) |

Flow capacity:

| | |
|------------------------|--|
| Medium: | 3.000 Lit. / min. at 6 Bar (87 PSI) and 1 Bar (14.5 PSI) pressure drop |
| Operating environment: | Air, non lubricated 15 µ |

Operating environment:

| | |
|------------------------|-------------------------------|
| Medium: | Heavy alumina dust atmosphere |
| Operating environment: | Strong magnetic fields |

Solenoid valve

Protection class:

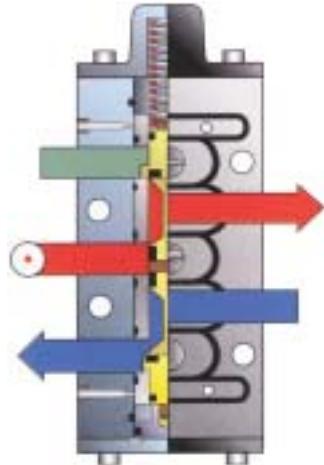
IP 65

Available in all common AC and DC voltages

Subbase, interface ISO 5599/1 size 4

Connection ports:

BSP or NPT 1/2", BSP or NPT 3/4"



The control valve may be simply removed from the ISO Size 4 subbase without disconnecting any pipework to cylinder, air supply or exhaust. The valve is available with air or electrical actuation and spring return.

VF45 valves are designed to operate for five years without additional lubrication or maintenance with an operating frequency for each control valve of a maximum 600 cycles during a 24-hour period.

Air Preparation



Air-preparation plays a central role in pneumatic installations. In fact, it is the key factor for trouble-free operation. Air-preparation units filter out all damaging particles down to the smallest contaminants. Dust, rust particles, and condensation residue are examples of contaminants that might otherwise wear out moving parts prematurely, shortening service life. The air preparation system also ensures correctly regulated air pressure and downstream lubrication when necessary.

The Prep-Air II FRL family of air preparation offers a wide selection of products, port sizes, combinations, and accessories for the efficient control of compressed air. Whether it's units for personal breathing sets, standard combos for machine builders, or sophisticated factory-ring mains, these product ranges can provide the designer or machine builder with the ideal solution to virtually any air-preparation application.

Fluid Connectors & Hoses



The leaders in "dry technology" for the fluid power industry, the Parker Fluid Connectors Group is your single source for high-quality tube fittings, pressure hose and hose fittings, thermoplastic tubing, brass fittings and valves, quick-disconnect couplings, and assembly tools. Products are available for shipment 24 hours a day, and are supported by 49 manufacturing facilities throughout the world, a global distribution network, and 25 company-owned stocking service centers.

We offer a wide range of fittings and non-conductive hoses used in all the major aluminum smelters all over the world.



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