Parker Hydraulics

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Maintenance Bulletin MMA Series

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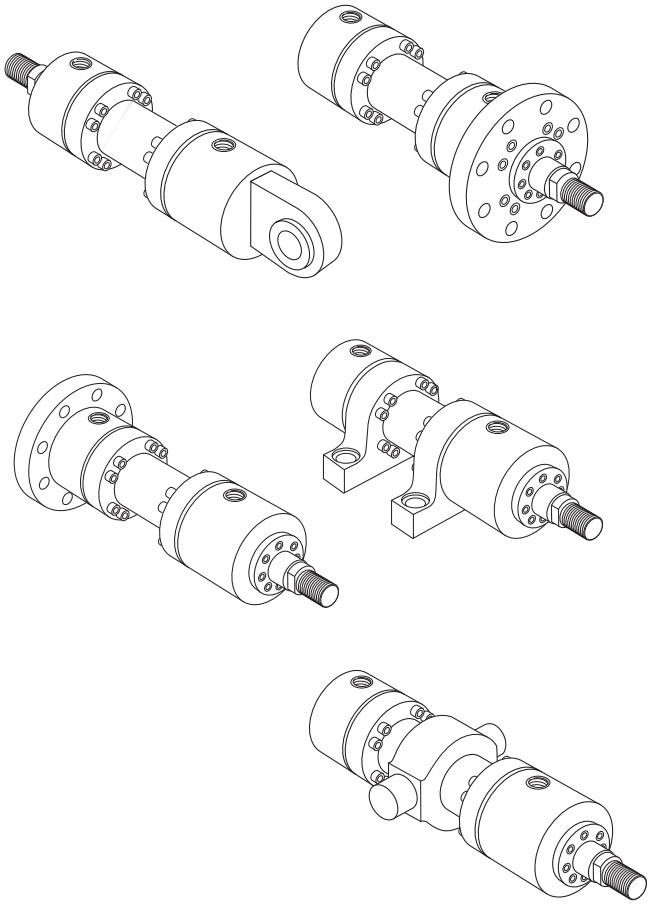


Roundline Hydraulic Cylinders

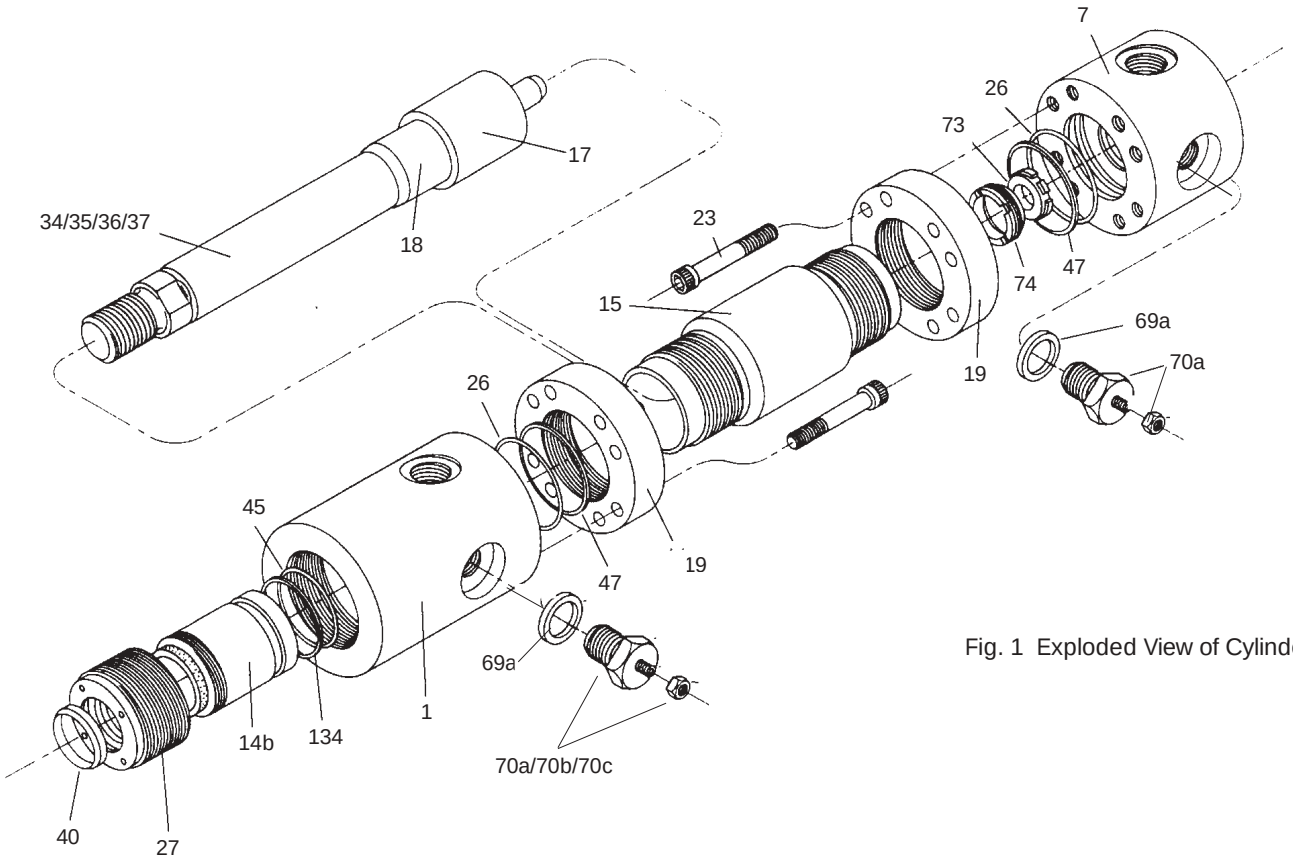


Fig. 1 Exploded View of Cylinder

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

This document and other information from Parker Hannifin Corporation, its subsidiaries and authorized distributors provide product and/or system options for further investigation by users having technical expertise. It is important that all aspects of the application are analysed and the information concerning the product or system in the current product catalogue is reviewed. Due to the variety of operating conditions and applications for these products or systems, the user, through its own analysis and testing, is solely responsible for making the final selection of the products and systems and assuring that all performance, safety and warning requirements of the application are met.

The products described herein, including without limitation, product features, specifications, designs, availability and pricing, are subject to change by Parker Hannifin Corporation and its subsidiaries at any time without notice.

Parker Hydraulics

Parker Hannifin Plc
Cylinder Division
Watford, Herts.

RGN Kits contain a Standard gland cartridge complete with seals – items 14a, 40, 41, 45, 123, 124, 134, 140a, 140b
RGF Kits contain a Low Friction gland cartridge complete with seals – items 14a, 40, 45, 123, 124, 134, 141a, 141b
RGLL Kits contain a Chevron gland cartridge complete with seals – items 14b, 40, 45, 134, 137, 138, 139a, 139b
RKN Kits contain seals for the Standard gland cartridge – items 40, 41, 45, 123, 124, 134, 140a, 140b
RKF Kits contain seals for the Low Friction gland cartridge – items 40, 45, 123, 124, 134, 141a, 141b
RKLL Kits contain seals for the Chevron gland cartridge – items 40, 45, 134, 137, 138, 139a, 139b
CB Kits contain cylinder body end seals and back-up washers – items 26, 47
PN Kits contain Standard piston lipseals and cylinder body end seals – items 26, 47, 125, 126, 127
PF Kits contain Low Friction piston lipseals and cylinder body end seals – items 26, 47, 131, 132, 133
PLL Kits contain Chevron piston lipseals and cylinder body end seals – items 26, 46, 47, 142, 143
Cushion Cartridge Kits – items 69a, 70a

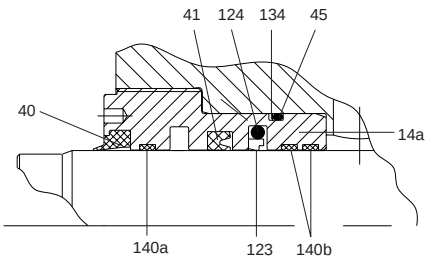


Fig. 2 Standard Gland

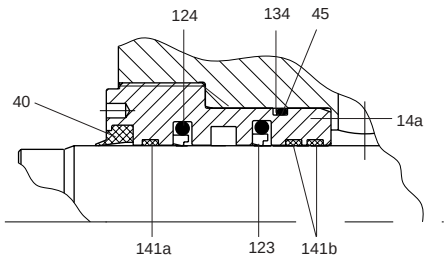


Fig. 3 Low Friction Gland

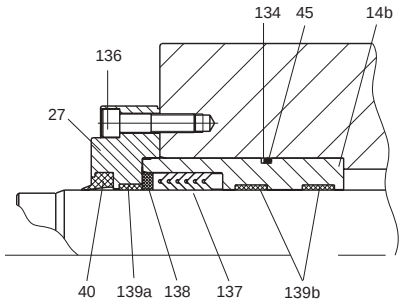


Fig. 4 Chevron Gland

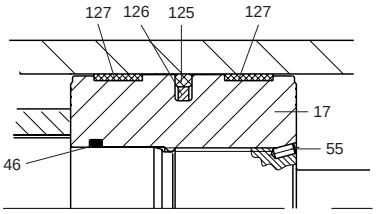


Fig. 5 Standard Piston

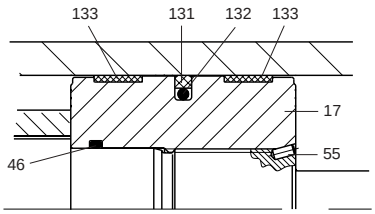


Fig. 6 Low Friction Piston

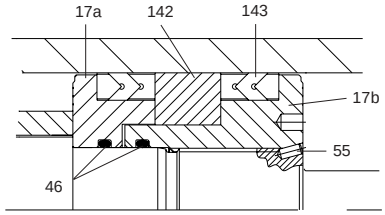


Fig. 7 Chevron Piston

Key (all figures):

1 Head
7 Cap
14a Standard and Low Friction gland
14b Chevron gland
15 Cylinder tube
17 Piston
17a Chevron piston – inner section
17b Chevron piston – outer section
18 Cushion sleeve
19 Front/rear flange
23 Head/cap securing screw
26 O-ring (cylinder body)
27 Gland retainer (secured by screws or threaded)
34 Piston rod – single rod, no cushion
35 Piston rod – single rod, cushion at head end
36 Piston rod – single rod, cushion at cap end
37 Piston rod – single rod, cushion at both ends
40 Gland wiperseal
41 Lipseal
45 O-ring (gland/head)
46 O-ring, piston/rod (2 off – Chevron piston)
47 Back up washer, O-ring (cylinder body)
55 Piston locking pin
69a Cushion needle valve cartridge sealing washer
70a Cushion needle valve cartridge
70b Cushion needle valve adjuster
70c Cushion needle valve adjuster lock nut
73 Floating cushion bush
74 Cushion bush retaining ring
123 Step seal
124 Pre-load ring for stepseal 123
125 Standard piston seal
126 Energising ring for Standard seal 125
127 Wear ring for Standard piston
131 Low Friction piston seal
132 Energising ring for Low Friction piston seal 131
133 Wear ring for Low Friction piston
134 O-ring back up washer (gland/head)
136 Gland securing screw – 125mm bore and above
137 Chevron rod seal assembly
138 Back up washer – Chevron rod seal assembly
139a Wear ring for Chevron gland retainer
139b Wear rings for Chevron gland
140a Wear ring for Standard gland
140b Wear rings for Standard gland
141a Wear ring for Low Friction gland
141b Wear rings for Low Friction gland
142 Chevron piston bearing ring
143 Chevron piston seal assembly

Service Kit Numbers for Group 1 Gland Seals

Bore Ø	Rod No.	Rod Ø	RGN Kit – Standard Gland Cartridge and Seals*	RGF Kit – Low Friction Gland Cartridge and Seals	RGLL Kit – Chevron Gland Cartridge and Seals	RKN Kit – Standard Gland Cartridge Seals*	RKF Kit – Low Friction Gland Cartridge Seals	RKLL Kit – Chevron Gland Cartridge Seals
50	1	32	RGN05MMA0321	RGF205MMA0321	RGLL05MMA0321	RKN05MMA0321	RKF205MMA0321	RKLL05MMA0321
	2	36	RGN05MMA0361	RGF205MMA0361	RGLL05MMA0361	RKN05MMA0361	RKF205MMA0361	RKLL05MMA0361
63	1	40	RGN06MMA0401	RGF206MMA0401	RGLL06MMA0401	RKN06MMA0401	RKF206MMA0401	RKLL06MMA0401
	2	45	RGN06MMA0451	RGF206MMA0451	RGLL06MMA0451	RKN06MMA0451	RKF206MMA0451	RKLL06MMA0451
80	1	50	RGN08MMA0501	RGF208MMA0501	RGLL08MMA0501	RKN08MMA0501	RKF208MMA0501	RKLL08MMA0501
	2	56	RGN08MMA0561	RGF208MMA0561	RGLL08MMA0561	RKN08MMA0561	RKF208MMA0561	RKLL08MMA0561
100	1	63	RGN10MMA0631	RGF210MMA0631	RGLL10MMA0631	RKN10MMA0631	RKF210MMA0631	RKLL10MMA0631
	2	70	RGN10MMA0701	RGF210MMA0701	RGLL10MMA0701	RKN10MMA0701	RKF210MMA0701	RKLL10MMA0701
125	1	80	RGN12MMA0801	RGF212MMA0801	RGLL12MMA0801	RKN12MMA0801	RKF212MMA0801	RKLL12MMA0801
	2	90	RGN12MMA0901	RGF212MMA0901	RGLL12MMA0901	RKN12MMA0901	RKF212MMA0901	RKLL12MMA0901
140	1	90	RGN14MMA0901	RGF214MMA0901	RGLL14MMA0901	RKN14MMA0901	RKF214MMA0901	RKLL14MMA0901
	2	100	RGN14MMA1001	RGF214MMA1001	RGLL14MMA1001	RKN14MMA1001	RKF214MMA1001	RKLL14MMA1001
160	1	100	RGN16MMA1001	RGF216MMA1001	RGLL16MMA1001	RKN16MMA1001	RKF216MMA1001	RKLL16MMA1001
	2	110	RGN16MMA1101	RGF216MMA1101	RGLL16MMA1101	RKN16MMA1101	RKF216MMA1101	RKLL16MMA1101
180	1	110	RGN18MMA1101	RGF218MMA1101	RGLL18MMA1101	RKN18MMA1101	RKF218MMA1101	RKLL18MMA1101
	2	125	RGN18MMA1251	RGF218MMA1251	RGLL18MMA1251	RKN18MMA1251	RKF218MMA1251	RKLL18MMA1251
200	1	125	RGN20MMA1251	RGF220MMA1251	RGLL20MMA1251	RKN20MMA1251	RKF220MMA1251	RKLL20MMA1251
	2	140	RGN20MMA1401	RGF220MMA1401	RGLL20MMA1401	RKN20MMA1401	RKF220MMA1401	RKLL20MMA1401
250	1	160	RGN25MMA1601	RGF225MMA1601	RGLL25MMA1601	RKN25MMA1601	RKF225MMA1601	RKLL25MMA1601
	2	180	RGN25MMA1801	RGF225MMA1801	RGLL25MMA1801	RKN25MMA1801	RKF225MMA1801	RKLL25MMA1801
320	1	200	RGN32MMA2001	RGF232MMA2001	RGLL32MMA2001	RKN32MMA2001	RKF232MMA2001	RKLL32MMA2001
	2	220	RGN32MMA2201	RGF232MMA2201	RGLL32MMA2201	RKN32MMA2201	RKF232MMA2201	RKLL32MMA2201

Service Kit Numbers for Group 1 Piston Seal Kits and Cylinder Body Seals

Bore Ø	CB Kit Body End Seals	PN Kit Standard Piston Seals*	PF Kit Low Friction Piston Seals	PLL Kit Chevron Piston Seals
50	CB2050MMA01	PN050MMA01	PF2050MMA01	PLL050MMA01
63	CB2063MMA01	PN063MMA01	PF2063MMA01	PLL063MMA01
80	CB2080MMA01	PN080MMA01	PF2080MMA01	PLL080MMA01
100	CB2100MMA01	PN100MMA01	PF2100MMA01	PLL100MMA01
125	CB2125MMA01	PN125MMA01	PF2125MMA01	PLL125MMA01
140	CB2140MMA01	PN140MMA01	PF2140MMA01	PLL140MMA01
160	CB2160MMA01	PN160MMA01	PF2160MMA01	PLL160MMA01
180	CB2180MMA01	PN180MMA01	PF2180MMA01	PLL180MMA01
200	CB2200MMA01	PN200MMA01	PF2200MMA01	PLL200MMA01
250	CB2250MMA01	PN250MMA01	PF2250MMA01	PLL250MMA01
320	CB2320MMA01	PN320MMA01	PF2320MMA01	PLL320MMA01

Flange Bolt Torque (Nm)	Gland Screw Torque (Nm)	Gland Bearing Removal Thread
26-28	-	M55x1
51-54	-	M68x1
112-118	-	M80x1
157-165	-	M95x1
247-260	51-54	M115x1
456-480	112-118	M125x1
		M140x1
	247-260	M155x1
		M170x1
1112-1170	247-260	M215x1
	456-480	M265x1

* Only available for use with Group 1 fluids.

Service Kit Numbers for Cushion Needle Valves

Bore Ø	Thread Size	Torque Nm	Cushion Needle Valve Kit
50	M14x1.5	51-54	70C-1MMA-02 (-05 FPM)
63			
80			
100	M18x1.5	95-105	70C-2MMA-02 (-05 FPM)
125			
140			
160	M27x2	300-330	70C-3MMA-02 (-05 FPM)
180			
200			
250	M36x2	456-480	70C-4MMA-02 (-05 FPM)
320			

Service Kit Numbers – Non-Group 1 Seals

The part numbers shown in the tables for piston and gland seals are for Group 1 seals, denoted by the last character of each part number. For Group 2, 5, 6 or 7 seals, substitute a '2', '5', '6' or '7' for the '1' at the end of the number sequence.

How to Order Service Kits

Service kits for Parker cylinders are stocked in all major industrial countries throughout the world. Please contact your nearest Parker office for information and prompt delivery.

Group	Seal Materials – a combination of:	Fluid Medium to ISO 6743/4-1982	Piston & Gland	Temperature Range
1	Nitrile (NBR), PTFE, enhanced polyurethane (AU)	Mineral Oil HH, HL, HLP, HLP-D, HM, HV, MIL-H 5606 oil, air, nitrogen	All	-20°C to +80°C
2	Nitrile (NBR), PTFE	Water glycol (HFC)	Chevron, Low Friction	-20°C to +60°C
5	Fluorocarbon elastomer (FPM), PTFE	Fire resistant fluids based on phosphate esters (HFD-R). Also suitable for hydraulic oil at high temperatures or in hot environments. **Not suitable for use with Skydrol.** See fluid manufacturer's recommendations.	Chevron, Low Friction	-15°C to +150°C
6	Various compounds including nitrile, enhanced polyurethane, fluorocarbon elastomers and PTFE	Water Oil in water emulsion 95/5 (HFA)	Chevron, Low Friction	+5°C to +50°C
7		Water in oil emulsion 60/40 (HFB)	Chevron, Low Friction	+5°C to +50°C

Operating Fluids and Temperature Ranges

The table shows the main types of fluid used with hydraulic cylinders. If the operating conditions of the particular application cannot be met by the groups described, please consult the factory and supply complete application details.

Servicing Cylinder Gland Seals

Fluid leakage from the piston rod at the gland normally indicates worn gland seals. The cylinder should, if possible, be removed for overhaul, or the piston rod disconnected.

Removal

Standard and Low Friction Glands Figs. 1, 2 & 3

The Standard or Low Friction gland seals are housed within a Parker rod gland. On bore sizes up to 100mm the gland is screwed to the head. On larger bore sizes the gland is bolted.

1 Inspect the piston rod to make sure it is free from burrs or damage which would prevent the gland sliding off the rod.

2 Unscrew or unbolt the gland using a gland wrench and spanner, and slide the gland off the piston rod.

3 Remove the seals and wear rings, taking care not to damage the gland.

4 Clean and inspect the gland bore and seal grooves. If any wear is present, replace with an RGN or RGF rod seals and gland kit containing seals of the correct group for the conditions – see table. If the gland shows no signs of wear, an RKN or RKF rod seal kit may be fitted.

Chevron Glands Figs. 1 & 4

The gland seals and wear rings are housed within a two-piece removable gland, whose retainer (27) is threaded or secured by screws to the head of the cylinder, clamping the gland (14b) in place as shown. The wiper seal and a wear ring are housed in the retainer, while the gland houses two further wear rings and the chevron seals and their back-up washer.

Cylinders with bore sizes up to 100mm diameter are fitted with a threaded gland retainer, while bore sizes of 125mm diameter and above employ a retainer secured by screws (136).

1 Inspect the piston rod to make sure it is free from burrs or damage which would prevent the gland sliding off the rod.

2 Unscrew or unbolt the gland retainer (27) and slide it off the piston rod. The gland (14b) will remain on the piston rod and must be removed separately. The gland has an external thread, as shown in the table opposite, which can be used in conjunction with a suitable puller to remove the gland complete with back-up washers and chevron seals. Alternatively, the head port may be pressurized using fluid from a hand pump, forcing the gland bearing forward sufficiently to enable it to be withdrawn.
Never try to remove the gland by applying compressed air to the opposite end.

3 Taking care not to damage the gland retainer, remove the wiperseal and wear ring from the retainer. Noting the order in which they are removed to assist in reassembly, remove the chevron seal components and wear rings from the gland. Clean and inspect the gland bore and grooves. If any wear is present, replace with an RGLL rod seals and gland kit containing seals of the correct group for the conditions – see table. If the gland shows no signs of wear, an RKLL rod seal kit may be fitted.

Installation Figs. 1, 2 & 3

Inspect the surface of the piston rod for damage which could cause early seal failure.

When fitting the gland over the rod thread, a slight rotary motion will help prevent damage to the seals. In addition, shim stock or similar thin, tough material can be wrapped around the threads to protect the seal lips.

Standard Glands Figs. 1 & 2

1 Ensure that the kit contains seals of the correct group. Lubricate the gland and seals, and fit the wiperseal (40) into the first groove, closest to the outside face of the gland.

2 Install the lipseal (41) in the fourth groove, **with the lips facing the pressure (cylinder) side of the gland.**

3 Fit a pre-load ring (124) into the fifth groove, followed by a step seal (123), with its step facing away from the wiperseal as shown in Fig. 2.

4 Fit the wear rings 140a and 140b to the second, sixth and seventh grooves, as shown.

Low Friction Glands Figs. 1 & 3

1 Ensure that the kit contains seals of the correct group. Lubricate the gland and seals, and fit the wiperseal (40) into the first groove, closest to the outside face of the gland.

2 Fit a pre-load ring (124) into the third groove, followed by a step seal (123), with its step facing away from the wiperseal as shown in Fig. 3. Repeat for the second pre-load ring and step seal, in the fifth groove.

3 Fit the wear rings 141a and 141b to the second, sixth and seventh grooves, as shown.

Standard and Low Friction Glands Figs. 1, 2 & 3

4 Each gland service kit contains an O-ring (45) which acts as a seal and torque prevailing lock between the gland and head. This is a static seal, and may be left in place unless faulty. If damaged, the old O-ring and back-up washer (134) – if fitted – should be removed from the gland, and the groove thoroughly cleaned. Lubricate the replacement parts, and fit the back-up washer, followed by the O-ring.

5 Lubricate the gland, seals and wear rings, and slide the gland onto the piston rod.

6 **50mm – 100mm bore cylinders:** tighten the gland using a gland wrench and spanner.
125mm – 320mm bore cylinders: refit the retainer and secure with the hex-headed socket screws (136). Torque tighten the gland screws to the figures shown on page 4.

Chevron Glands Figs. 1, 4 & 8

Ensure that the kit contains seals of the correct group for the application. Note that the chevron seal assembly comprises a header ring (137a), several chevrons (137b) and a back-up ring (137c), as shown.

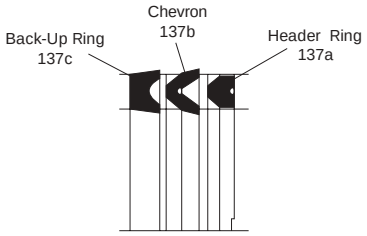


Fig. 8 Assembly Sequence of Chevron Seal Components

1 RGLL and RKLL gland service kits contain an O-ring (45) which acts as a static seal between the inner gland and head. This O-ring may be left in place unless it is faulty. If damaged, the old O-ring and its back-up washer (134) should be removed from the gland bearing, and the groove thoroughly cleaned. Lubricate the replacement parts, and fit the back-up washer into the groove, followed by the O-ring.

2 Lubricate the gland components, seals, back-up washer and wear rings using clean system fluid.

3 Fit the wear rings 139b into the gland, and slide the gland (14b), closed end first, onto the piston rod and press fully into the head (1).

4 Referring to figure 8, identify the header ring (137a) from the set of chevron seals and slide it, closed end first, onto the piston rod and into the gland, as shown in figure 4. Insert all the chevrons (137b) in the same manner, **with the lips of the seals facing the inner (cylinder) end of the gland.** When all the chevrons have been fitted, install the back-up ring (137c) with its angled face against the last chevron, as shown. Install the back-up washer (138) as shown in figure 4.

5 Fit the wiperseal (40) into the outer groove of the gland retainer (27), **with the lip facing outwards.** Lightly compress and insert the wear ring into the recess in the inner face of the retainer. Lubricate the retainer, seal and wear ring.

6 Fit the retainer assembly over the end of the piston rod, and slide along the rod until it contacts the head.

7 **50mm – 100mm bore cylinders:** screw the retainer assembly into the head and tighten securely using a face-type pin wrench.
125mm – 320mm bore cylinders: secure using the hex-headed socket screws (136) and torque tighten to the figures shown on page 4.

Servicing Cushion Needle Valves Fig. 9

MMA cylinders are fitted with a cartridge-type cushion needle valve adjuster. Leakage from cushion needle valves indicates that the assembly must be replaced. The replacement assembly includes a new O-ring.

Removal

Unscrew the needle valve assembly and clean the mounting hole, paying close attention to the surface on which the O-ring seals.

Installation

Fit the sealing washer (69a) to the cushion needle valve cartridge (70a). Lightly lubricate the screw threads of the cartridge and torque to the figure shown in the table. The hex-headed cushion screw (70b) may be adjusted to provide the required cushioning performance. Note that the lock nut (70c) must be released before adjustment and securely retightened afterwards.

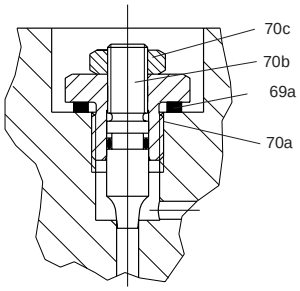


Fig. 9 Cushion Needle Valve

Servicing Piston Seals

When a cylinder is overhauled, a new set of piston seals is required. Cylinders should always be reassembled with new cylinder body O-rings and back-up washers (26 and 47). O-rings and back-up washers are available as a CB kit, and are included in the piston seal kits described below.

Removal Figs. 1, 5, 6 & 7

When piston seals show signs of wear, it is likely that the gland seals will also require replacement. If the gland is to be serviced while the cylinder is disassembled, the gland assembly should be loosened, as described on page 5, but left in place to support the piston rod during disassembly.

The cylinder should be removed for overhaul.

1 Remove the hex socket-headed cap screws (23) which secure the head assembly to the front retaining flange, and slide the head/gland assembly from the piston rod. The gland may now be removed from the head and serviced separately, as described on pages 5 and 6.

2 Taking care not to bruise the piston rod against the edge of the cylinder tube, pull the rod/piston assembly from the tube. Prise the cylinder body O-ring and back-up washer from the groove in the head and clean the groove thoroughly.

3 If the cap needs to be removed, remove the hex socket-headed cap screws (23) which secure the cap to the rear retaining flange, and slide the cap from the cylinder body. Prise the O-ring and washer from the groove in the cap and clean the groove thoroughly.

Standard and Low Friction Piston Seals – PN and PF Kits Figs. 5 and 6

1 Remove the old seals and wear rings from the piston, taking care not to damage the seal grooves. Carefully clean all parts.

2 Examine the cylinder bore and piston for signs of scoring. If either is damaged, it must be replaced.

Chevron Piston Seals – PLL Kits Fig 7

Note: Piston/rod assemblies are accurately trued during manufacture using factory jigs and measuring equipment. Parker Hannifin cannot accept responsibility for any failure or damage that results from reassembly by unauthorised personnel.

1 The chevron-type piston is made in two parts and assembled on the piston rod, with the chevron seals and bearing ring clamped between the two parts. Drill out the locking pin (55) between the piston and rod.

2 During disassembly, the piston rod must be prevented from turning, either by locking the rod end thread or by clamping the piston rod in a soft-jawed vice.

Warning: any damage to the polished surface of the piston rod will lead to early failure of the gland seals.

Unscrew and remove the outer part of the piston (17b) from the piston rod.

3 Noting the quantities and sequence in which the old seals and bearing ring are assembled, remove them from the piston. Remove the rod/piston O-ring. Slide the inner part of the piston from the rod and remove the second rod/piston O-ring.

4 With the piston assembly removed from the piston rod, the cushion sleeve should be examined for signs of damage or wear. Note that the cushion sleeve must be free to move on the piston rod.

5 Thoroughly clean and inspect both parts of the piston, the piston rod and the cylinder bore. If any wear or damage is present, the affected parts must be replaced.

Reassembly – Piston and Seals

Standard Piston Seals – PN Kits Fig. 5

PN kits contain a step-cut, filled polyamide seal (125), an energising ring (126) and two wear rings (127), plus cylinder body O-rings (26), and back up washers (47) where fitted.

1 Install the energising ring (126) followed by the polyamide seal (125). Position the wear rings (127) in their grooves.

2 Lubricate the cylinder body with light oil and insert the piston.

Low Friction Piston Seals – PF Kits Fig. 6

PF kits contain an outer, filled PTFE seal (131), an energising ring (132) and two split wear rings (133), plus cylinder body O-rings (26), and back up washers (47) where fitted.

1 Install a new split wear ring (133) in the shallow groove at one end of the piston.

2 Working from the same end, slide the energising ring (132) over the wear ring and into the central groove.

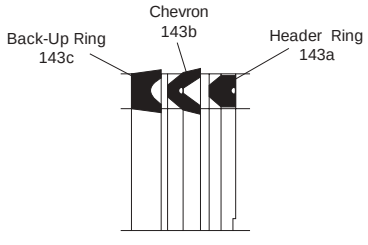
3 From the other end of the piston, install the second wear ring.

4 Heat the outer seal (131) in boiling water and stretch it by hand until it will just fit over the wear rings. Push the seal over the wear ring and into the central seal groove, on top of the energising ring.

5 Apply O-ring grease to all rings, compress them with a ring compressor and slide the piston into the cylinder body.

Chevron Piston Seals – PLL Kits Figs. 7 & 8

PLL kits comprise a bearing ring (142), two each of the chevron header rings (143a) and back-up rings (143c), and a number of chevrons (143b). In addition, a pair of rod/piston O-rings (46) and a pair of cylinder body O-rings and back-up washers (26 and 47) are also included. The number of chevrons supplied varies with cylinder bore size.



From the contents of the chevron piston seal kit, identify the chevrons and divide into two equal sets to fit on either side of the central bearing ring (142). Confirm from the notes made during disassembly (step 3 above) that the correct number of chevrons is available.

1 Ensure that the cushion sleeve is correctly positioned on the piston rod, with its tapered face towards the cylinder's head end, and that it is free to move.

2 Lubricate and install a new rod/piston O-ring (46) to the internal groove on the inner piston (17a), and slide the inner piston onto the piston rod until it abuts against the rod shoulder. Lubricate and install the second rod/piston O-ring into the internal groove of the outer piston (17b).

3 During assembly of the piston to the piston rod, the rod must be prevented from turning, either by locking the rod end thread or by clamping the piston rod in a soft-jawed vice.

Warning: any damage to the polished surface of the piston rod will lead to early failure of the gland seals.

4 Lubricate and install the chevron header ring (143a), chevrons (143b) and chevron back-up ring (143c) onto the shoulder of the inner piston, noting from figure 7 that the lips of the chevron seals face outwards from the centre of the piston.

5 Referring to figure 7, repeat step 4 on the outer part of the piston, and slide the bearing ring (142) onto the outer piston until it abuts the back-up ring. Ensuring that the seals and bearing ring do not become dislodged during assembly, slide the outer part of the piston onto the rod and tighten using the face-type pin wrench. Drill a new locking pin hole between the piston and rod, drive the replacement locking pin into the pin hole and peen the end to secure.

6 Lubricate the piston and cylinder bore with light oil. Insert the piston into the bore, ensuring that the forward-facing lips of the chevron seals do not become twisted on entering the tube.

Cylinder Assembly Figs. 1-7

The cylinder should be reassembled as follows:

1 If the cylinder cap/body joint has been removed (see 'Removal', page 7), the body O-ring back-up washer (47), followed by the body O-ring (26), should be lightly oiled and pressed into the groove in the cap, without twisting.

2 Fit the cylinder body, complete with piston and rod, to the cap by 'rocking' it down over the O-ring until the body is in contact with the cap.

3 Insert the hex socket-headed cap screws (23) from the inner side of the retaining flange (19) and tighten in a diagonal sequence to the appropriate torque figure, shown in the table on page 4.

4 When fitting the head/gland assembly over the rod thread, a slight rotary motion will help prevent damage to the seals. In addition, shim stock or similar thin, tough material should be wrapped around the threads to protect the seal lips.

5 Lubricate the cylinder body O-ring (26) and back-up washer (47) and fit the back-up washer, followed by the O-ring, to the head/gland assembly.

6 Lubricate the gland and seals and, taking care not to damage the seal lips, slide the head/gland assembly over the threaded end of the piston rod. Slide the head/gland assembly along the piston rod into contact with the cylinder body and, using a soft-faced hammer, tap around the edge of the head assembly until the body and head are in metal-to-metal contact. Insert the hex socket-headed cap screws (23) from the inner side of the retaining flange (19) and tighten in a diagonal sequence to the appropriate torque figure, shown in the table on page 4.

7 If the gland seals have been serviced, the gland assembly will be hand tight in the head. Tighten the gland cartridge firmly against the head, using the face-type pin wrench. Bolted glands should be tightened to the appropriate torque figure, as shown in the table on page 4.

Storage

If the cylinder is to be stored before use, the following precautions should be taken.

1 Cylinders should be stored in an upright position, with the piston rod end uppermost.

2 A vapour phase inhibitor should be introduced through both ports. The cylinder should be thoroughly flushed with clean system fluid before being put into use.

Before first use, all seals should be replaced if the cylinder has been in storage for more than five years.

Repairs

For further information or repairs, please contact:

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