

**DN15 to DN100**  
**LE31 and LE33 Control Valves**  
**Installation and Maintenance Instructions**

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- 1. Installation and  
Commissioning*
- 2. Maintenance*
- 3. Technical details*
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# — 1. *Installation and commissioning* —

**1.** Valves should be installed in a horizontal pipeline so that flow is in the direction indicated by the arrow cast on the body. Valves should be mounted in the pipeline in accordance with the actuator Installation and Maintenance Instructions.

A suitable strainer should always be fitted before the control valve. Additionally on steam installations a separator should be fitted before the valve, plus a steam trap set on applications where condensate may accumulate upstream of the valve.

## **2. Bypass arrangements**

It is recommended that isolating valves be fitted upstream and downstream of the control valve together with a manual regulating valve to bypass the group. The process may then be controlled by the bypass valve while the control valve is isolated for maintenance purposes.

## **3. Commissioning**

For commissioning instructions refer to the Operation, Installation and Maintenance Instructions, covering Spirax Sarco actuators.

## 2. Maintenance

### Routine maintenance procedures

#### 24 hours operation

After 24 hours service check pipework connections and flange bolts for tightness. With valves having high temperature graphite packed gland seals the gland nut should be tightened by approximately ¼ of a turn taking care not to overtighten as this may cause excessive friction on the valve stem.

#### 3 months operating intervals

After every 3 months normal service visually check gland seals for signs of leakage and if necessary take the following corrective action.

Valves having chevron gland seals remove and replace the PTFE chevron seals (refer to paragraph 4).

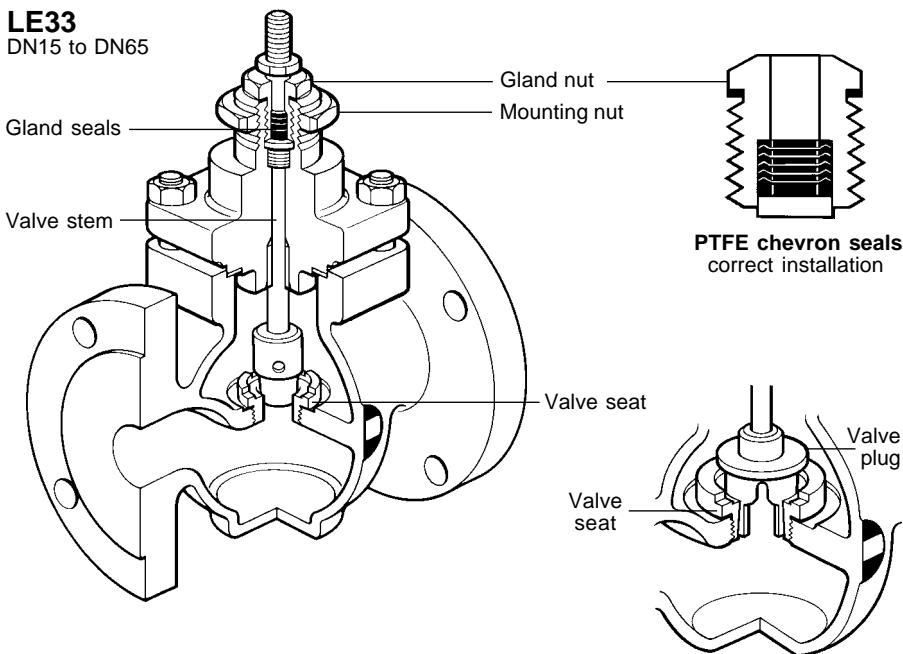
Valves having high temperature graphite packed gland seals tighten gland nut approximately ¼ of a turn taking care not to overtighten as this may cause excessive friction on the valve stem. If no adjustment remaining, replace the graphite gland seal as described in paragraph 5.

#### Annually

The valve should be inspected for wear and tear replacing any worn or damaged parts such as valve plug and stem, valve seat and gland seals. Refer to 'Spares' Section 4 for 'available spares'. High temperature graphite packed gland seals are subject to wear during normal operation. It is therefore recommended that the graphite packing is replaced during this routine inspection to prevent premature failure of the gland seals during normal operation.

#### LE33

DN15 to DN65



PTFE chevron seals  
correct installation

LE  
DN80 and DN100  
plug and seat

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## 4. Procedure for renewing chevron gland seals (see page 5)

- a) Isolate valve on both sides.
- b) Remove actuator from valve. Refer to Installation and Maintenance Instructions covering Spirax Sarco actuators.
- c) Unscrew the four nuts (15) securing the bonnet to the body and remove the bonnet (2) complete with stem and plug (3 + 5).

**Caution:** Care should be taken in removing the bonnet since fluid under pressure may be trapped between the isolating valves.

- d) Remove lock-nut (8).
- e) Unscrew gland nut (9), withdraw valve stem and plug, remove and discard the gland ring set (11 + 12 + 17) and gland nut gasket (7).
- f) Examine parts for signs of damage or deterioration and renew as necessary. Note that score marks or scaly deposits on valve stem (5) will lead to early failure of the seals.
- g) Clean parts taking care to avoid scratching stem or bore of gland nut. Refit valve gland and plug.
- h) Using new bonnet gasket (13) refit the bonnet (2) on the valve body, leaving the stem protruding.  
Replace the four nuts (15) and tighten to the correct torque (see Table 1, page 7), ensuring valve plug is on its seat.
- i) To replace new gland seal assembly, firstly fit gland spring (12) over valve stem (5) and replace gland nut gasket (7). New Chevron gland seals should be firmly inserted into the gland nut (9), care being taken to avoid damage to the sealing edges. Fit new guide bush (17). Refit gland nut (9) over the valve stem (5), screwing down to ensure the gasket is bedded down onto the bonnet (2).  
Chevron seals should be fitted into gland nut (9) as shown on page 5.
- j) Ensure that the stem (5) moves freely.
- k) Refit valve lock-nut (8).
- l) Refit actuator, clamping nut (10) and connect actuator to valve stem.
- m) Bring valve back into service.
- n) Check for leakage at gland.

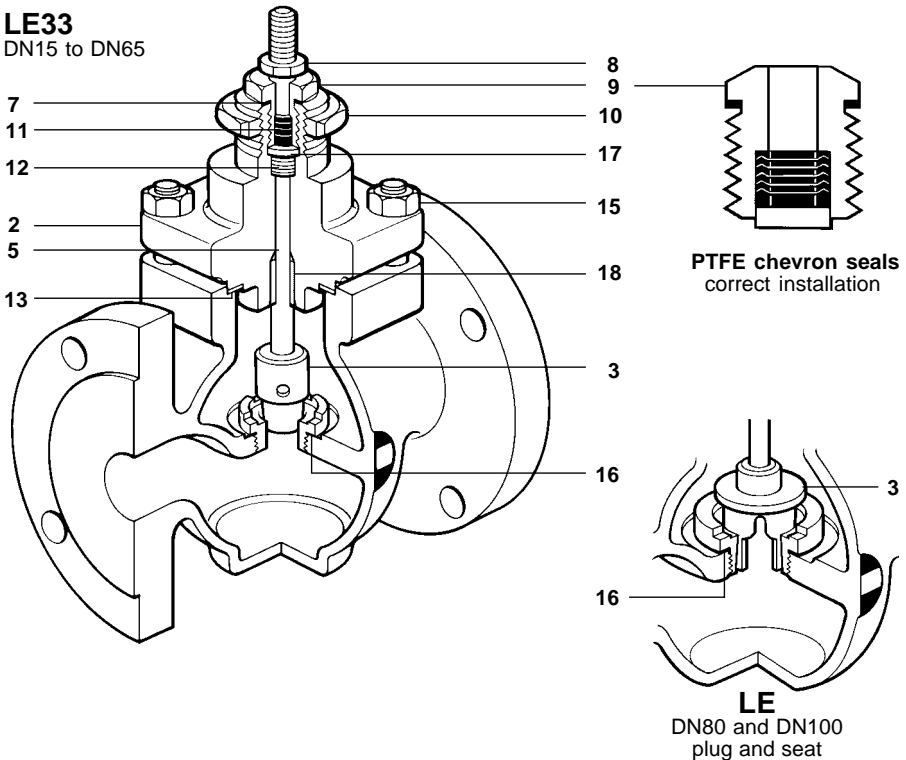
## 5. Procedure for renewing graphite gland seals

- a) Isolate valve on both sides.
- b) Remove actuator from valve. Refer to Installation and Maintenance Instructions covering Spirax Sarco actuators.
- c) Unscrew the four nuts (15) securing the bonnet to the body and remove the bonnet (2) complete with stem and plug (3 + 5).

**Caution:** Care should be taken in removing the bonnet since fluid under pressure may be trapped between the isolating valves.

- d) Remove lock-nut (8).
- e) Unscrew gland nut (9). Withdraw stem and plug (3), remove and discard gland seal set (11 + 12 + 17), and gasket from the bonnet.
- f) Examine parts for signs of damage or deterioration and renew as necessary. Note that score marks or scaly deposits on valve stem (5) will lead to early failure of the seals.
- g) Clean parts taking care to avoid scratching stem or bore of gland nut.

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DN15 to DN65



**h)** The replacement graphite gland seal should now be fitted. Note that the gland seal set contains a top and bottom support ring and a graphite pack. The order of the graphite pack set should be maintained as supplied during fitting (See 'Chevron seals, correct installation', above). Place the bottom support ring into the bonnet. One by one add the graphite rings and each time use the gland nut (9) to drive down into the bonnet. Ensuring the junction of the ring ends are rotated by 90°. Leave the gland nut loosely assembled so that the seals are not compressed.



- i)** Refit the valve stem and plug assembly by carefully sliding the valve stem in order to pass through the seals.
- j)** Using new bonnet gasket (13) refit the bonnet (2) on the valve body, ensuring the plug is on the valve seat, and replace the nuts and tighten to the correct torque (see Table 1, page 7).
- k)** Screw down the gland nut until it just starts to compress the packing. Compress the gland seal packing by tightening the gland nut (9) by 1½ turns.  
Raise and lower the valve stem after each tightening of the gland nut to encourage the seals to bed down correctly.
- l)** Refit the actuator using clamping nut (10) and connect the actuator to the valve gland.
- m)** Allow the new gland seals to bed in by moving the valve stem full travel a minimum of five times.

- n) Tighten the gland nut (9) by  $\frac{1}{3}$  of a turn for DN15 to DN50 valves and  $\frac{1}{2}$  a turn for DN65 to DN100 valves.
- o) Commission the actuator according to the appropriate Installation and Maintenance Instructions.
- p) Bring the valve back into service.
- q) Should there be a small amount of seepage from the valve stem, this may be stopped by carefully tightening the gland nut. Care should be taken not to overtighten as this may cause the spindle to lock-up.

## 6. Procedure for renewing valve plug and seat

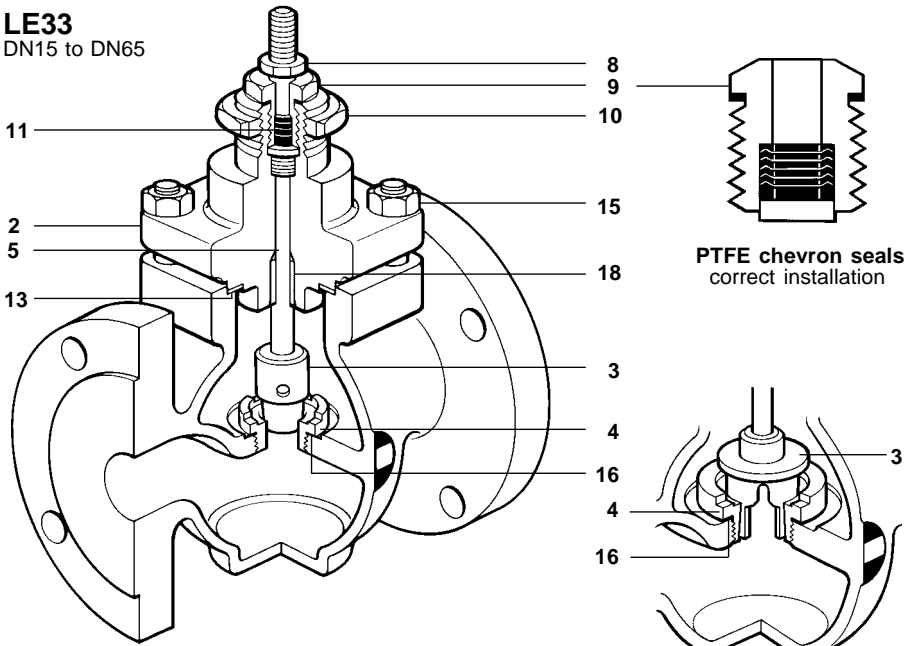
- a) Isolate valve on both sides.
- b) Remove actuator from valve. Refer to Installation and Maintenance Instructions covering Spirax Sarco actuators.
- c) Unscrew the four nuts (15) securing the bonnet to the body and remove the bonnet (2) complete with stem and plug (3 + 5).

**Caution:** Care should be taken in removing the bonnet since fluid under pressure may be trapped between the isolating valves.

- d) Remove lock-nut (8).
- e) Unscrew gland nut (9), withdraw stem and plug (3+5) and remove and discard the gland seal set (11) and gasket from the bonnet. Clean bonnet then replace new stem and plug.

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DN15 to DN65



**PTFE chevron seals**  
correct installation

**LE**  
DN80 and DN100  
plug and seat

- f) Unscrew and remove valve seat (4). Remove seat gasket (16) and replace with new seat gasket.

**Note:** to remove and replace the valve seat a special tool is required which can be obtained from Spirax Sarco by quoting the valve size and type.

- g) Lightly smear the threads of the new seat (4) with silicon grease and screw it into the body. Tighten to the correct torque (see Table 1, below) ensuring valve plug is on its seat.
- h) Using a new gasket (13) refit the bonnet (2) on the valve body. Replace the four nuts (15) and tighten to the correct torque (see Table 1, below).
- i) Fit new chevron gland seal assembly and gasket (See 'Chevron seals, correct installation; opposite) as described in paragraph 4 (see page 4). If graphite seals are used refer to paragraph 5 (page 4). Ensure the valve stem (5) moves freely after assembly.
- j) Refit actuator, clamping nut (10) and connect actuator to valve stem.
- k) Bring valve back into service.
- L) Check for leakage at gland.

**Table 1 Recommended tightening torques (N m)**

Size	Seat (4)	Bonnet nuts (15)	Gland nut (chevron seals) (9)
DN15	40 ± 5	15 - 20	25 - 30
DN20	53 ± 3	20 - 25	25 - 30
DN25	80 ± 5	25 - 30	25 - 30
DN32	130 ± 5	40 - 45	25 - 30
DN40	220 ± 5	40 - 45	25 - 30
DN50	150 ± 5	60 - 65	25 - 30
DN65	300 ± 12	47 - 53	32 - 38
DN80	400 ± 16	55 - 61	32 - 38
DN100	600 ± 24	45 - 51	32 - 38

**Attention** should be given to leaking glands immediately. If left, the valve spindle may be damaged by scoring.

**Note:** To avoid damage to gland seals the valve stem (5) should be correctly fitted within the bonnet before replacing gland nut (9) chevron seal assembly.

### Safety Note Handling precautions

#### PTFE

Within its working temperature range PTFE is a completely inert material, but when heated to its sintering temperature it gives rise to gaseous decomposition products or fumes which can produce unpleasant effects if inhaled. The inhalation of these fumes is easily prevented by applying local exhaust ventilation to atmosphere as near to their source as possible.

Smoking should be prohibited in workshops where PTFE is handled because tobacco contaminated with PTFE will during burning give rise to polymer fumes. It is therefore important to avoid contamination of clothing, especially the pockets, with PTFE and to maintain a reasonable standard of personal cleanliness by washing hands and removing any PTFE particles lodged under the fingernails.

#### LAMINATED GASKETS

The metal foil sheet used to reinforce gaskets is very thin and sharp. Care should be taken when handling to avoid the possibility of cuts or lacerations to fingers or hands.

# 3. Technical details

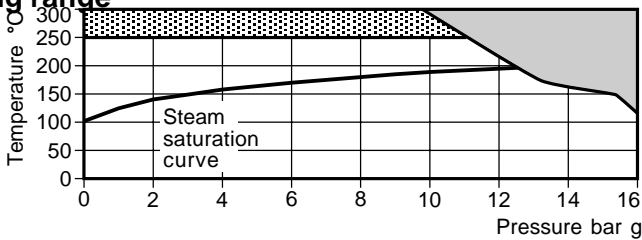
## Technical data

Plug design	DN15 - DN65 (½" to 2½")	Contoured
	DN80 - DN100 (3" and 4")	Vee port
Leakage	Metal-to-metal	IEC 534-4 Class IV (0.01 % of $K_V$ )
	Soft seal	IEC 534-4 Class VI (bubble tight)
Flow characteristics	LE valves	Equal percentage
	LF valves	Fast opening (on/off)
Rangeability		50:1
Travel	DN15 - DN50 (½" to 2")	20 mm
	DN65 - DN100 (2½" to 4")	30 mm

## Limiting conditions

Body design condition		PN16
Maximum design temperature	Standard	250°C
	High temperature packing	300°C
Minimum operating temperature		-10°C
Maximum cold hydraulic test pressure		24 bar g
Maximum differential pressure		See actuator TI.

## Operating range



- The product must not be used in this region.
- High temperature packing required. See option TI-P305-05.

## Weights (kg)

Size	DN15	DN20	DN25	DN32	DN40	DN50	DN65	DN80	DN100
LE31	2.3	2.8	4.0	5.0	7.0	8.6	-	-	-
LE33	3.6	4.2	7.0	9.2	10.2	12.5	19.5	25.3	36.4

**Note:** Weights also apply to LF (fast opening trim) valves.

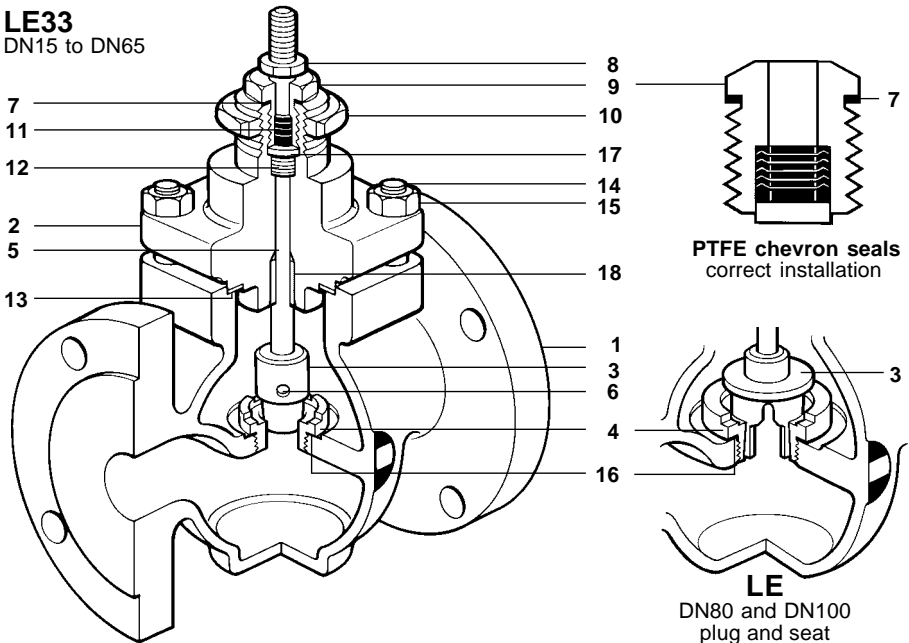


## Materials

No	Part	Material	
1	Body	Cast iron	DIN 1691 GG 25
2	Bonnet	SG iron	DIN 1693 Gr.GGG 40.3
3	Valve plug	Stainless steel	BS 970 431 S29
4	Valve seat	Stainless steel	BS 970 431 S29
5	Valve stem	Stainless steel	BS 970 431 S29
6	Pin	Stainless steel	AISI 304
7	Gland nut gasket	Semi-rigid graphite laminated	
8	Lock-nut	Stainless steel	BS 6105 A4-80
9	Gland nut	Stainless steel	BS 970 431 S29
10	Mounting nut	Mild steel zinc plated	NFA 35553 XC 18S
11	Gland seals	PTFE chevrons	Virgin PTFE
12	Gland spring	Stainless steel	BS 2056 316 S42
13	Bonnet gasket	Semi-rigid graphite laminated	
14	Bonnet studs	Steel	BS 4439 Gr. 8.8
15	Bonnet nuts	Steel	BS 3692 Gr. 8
		DN15 to DN40 (½" to 1½")	M10
		DN50 and DN65 (2" to 2½")	M12
		DN80 and DN100 (3" and 4")	M16
16	Seat gasket	Semi-rigid graphite laminated	
17	Guide bush	Glass reinforced PTFE	
18	Bonnet guide	Stainless steel	AISI 440B Hardened

### LE33

DN15 to DN65



## 4. Spares

**Note:** When placing an order for spares please indicate clearly the product date code (found on the label of the valve body i.e. 612) to ensure that the order is processed quickly, efficiently and correctly.

### Spare parts - DN15 to DN100

The spare parts available are in heavy outline. Parts drawn in broken line are not supplied as spares. These spares are for sizes DN15 to DN100.

#### Available spare

Actuator clamping nut	A
Gland seal kit (spring, chevrons, guide bush and gasket)	B
Stem, plug and bonnet gasket	D, E
Seat, seat gasket and bonnet gasket	E, F, G
Bonnet gasket (packet of 3)	E
Graphite gland seal kit (seal rings, support rings)	C

#### How to order spares

Always order spares by using the description given in the column headed 'Available spare', stating the following information and the date code of the product.

<b>Valve size</b>	DN15, 20, 25, 32, 40, 50, 65, 80, 100	<input type="text" value="DN25"/>
<b>Valve series</b>	L series - 2 port	<input type="text" value="L"/>
<b>Valve characteristic</b>	E = Equal percentage F = Fast opening	<input type="text" value="E"/>
<b>Body material</b>	3 = Cast iron	<input type="text" value="3"/>
<b>Connections</b>	1 = Screwed 3 = Flanged	<input type="text" value="3"/>
<b>Stem sealing option</b>	H = High temperature packing	<input type="text" value="H"/>
<b>Sealing option</b>	G = Soft seal (PTFE)	<input type="text"/>
<b>Kvs</b>	To be specified	<input type="text" value="Kvs10"/>
<b>Connection type</b>	To be specified	<input type="text" value="PN16"/>
<b>Date code</b>	Found on the label of the valve body	<input type="text" value="612"/>

**Example:** 1 - Seat seat gasket and bonnet gasket for DN25 LE33H with Kvs 10 flanged to PN16. Date coded 612.

