

# Low-Emission Gland Packing System

## OVERVIEW

Azbil's low-emission gland packing system is environmentally friendly and reduces fluid leakage from control valve packing glands.

In many countries and regions including China, Taiwan, Thailand, and the U.S., regulations limit the emission of volatile organic compound (VOC) air pollutants from industrial facilities. Even in countries without such regulations, many companies impose self-restrictions.

In many countries, VOC emission regulations require the control of even minute leakage from control valve glands. By using control valves with a high-performance seal, companies can reduce the burden related to these regulations.

## Features

- Certified ISO 15848-1 CC3 (highest endurance class)–compliant

Azbil's certified ISO 15848-1–compliant low-emission gland packing has been proved to have performance in the CC3 class (the highest level of endurance) of ISO 15848-1: 2015, which is the only international standard for control valve gland and gasket seal performance. The gland packing was tested by a leading third-party organization that evaluates low-emission packing technologies. To be CC3-compliant, the amount of leakage must be under the specified level after 100,000 cycles, and Azbil's low-emission gland packing meets that requirement.

Certified range: +5 to 350 °C, 0 to 5.1 MPaG

- Compliant with U.S. Clean Air Act Amendment (CAAA)  
The gland seal performance of Azbil's low-emission gland packing (including system varieties not certified for compliance with the ISO standard) achieves VOC leakage in the 500–100 ppmv range at an atmospheric concentration level, as required by the Clean Air Act Amendment and enforced by the U.S. Environmental Protection Agency (EPA).
- Longer maintenance cycle  
The system's live-loaded packing system uses the force from Belleville springs to continually apply the appropriate force to the packing and prevent relaxation of the gland.
- Simpler maintenance  
The system uses grease-free gland packing, so regular greasing is not necessary. In addition, the need for additional tightening to correct relaxation, which causes fluid leakage, is eliminated because of the live-loaded packing system. This simplifies the maintenance of control valves.

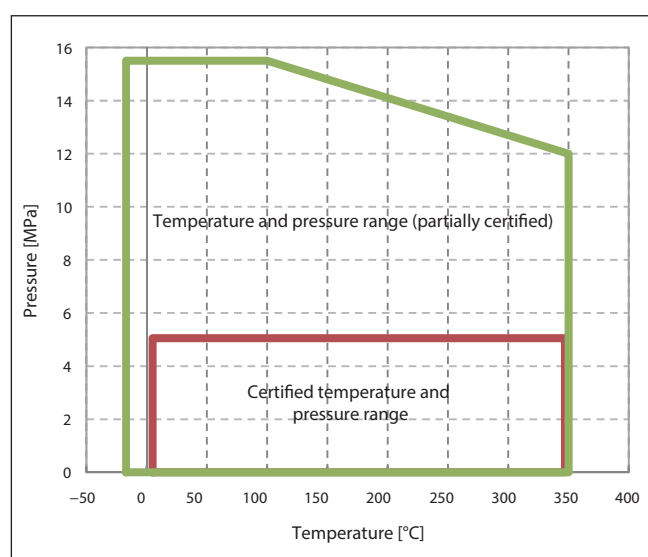
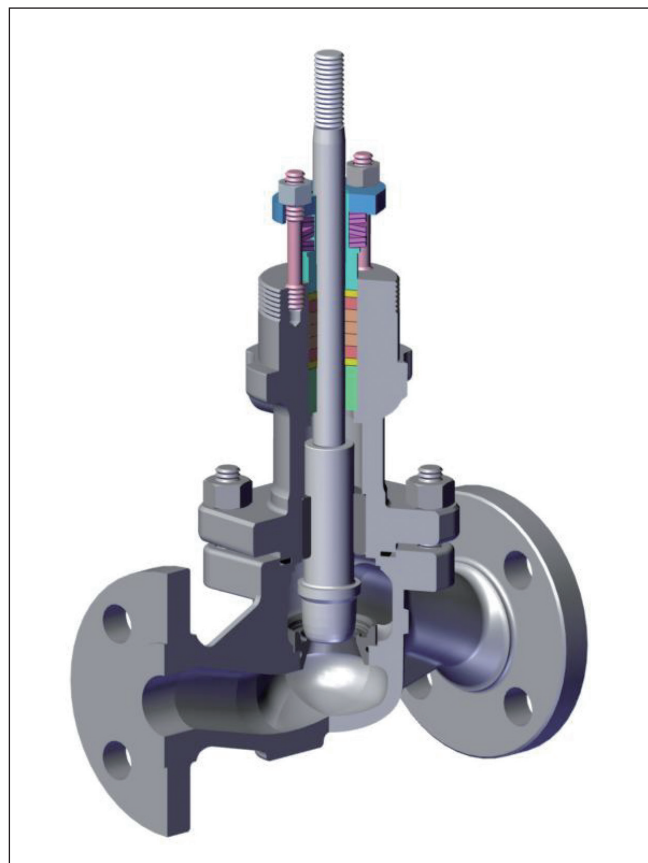


Figure 1. Temperature and pressure range of certified ISO 15848-1-compliant low-emission gland packing

## Certified ISO 15848-1-compliant low-emission gland packing

Azbil's certified ISO 15848-1-compliant low-emission gland packing system boosts the performance of valve seals so that they meet the requirements of ISO 15848-1, which is the international standard that specifies low-emission performance for industrial valves.

The four types of packing system indicated in Table 1 are available for the certified ISO 15848-1-compliant gland packing.

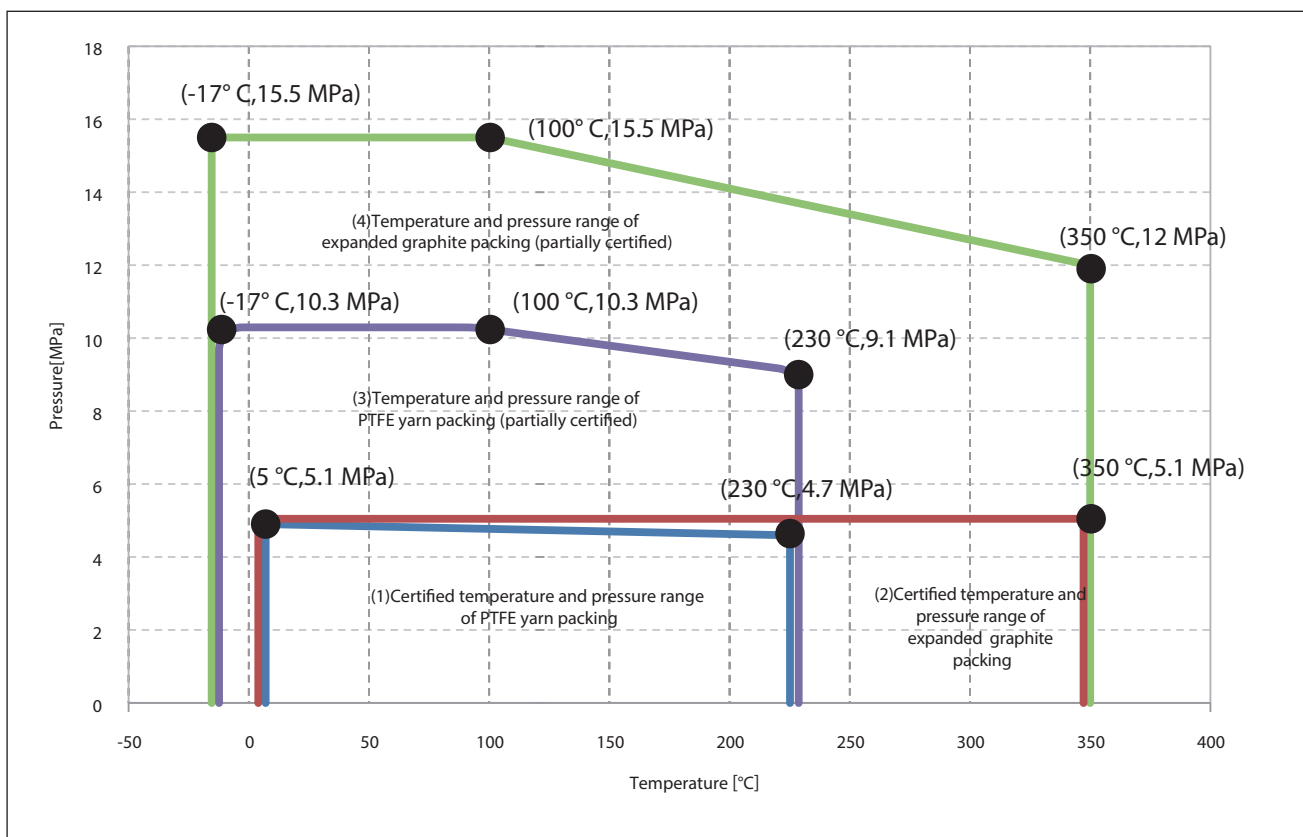
Select a packing system based on your needs for ISO certification, fluid temperature and pressure, and application.

Packing systems 1 and 2 are certified by a third party for leakage performance, and the certification is attached.

Packing systems 3 and 4 have the same structure as 1 or 2, but do not include certification because part of the temperature and pressure range has not been certified. However, compared with a common gland packing system, the maintenance cycle is longer and maintenance is simpler, so these systems offer the advantages of the low-emission gland packing.

**Table 1. Temperature and pressure range of certified ISO 15848-1-compliant low-emission gland packing**

	Packing system	Temperature range	Pressure range
1	PTFE yarn, with 3rd-party certification of ISO compliance	+5 to +230 °C	4.7(230 °C) to 5.1(5 °C) MPaG
2	Expanded graphite, with 3rd-party certification of ISO compliance	+5 to +350 °C	5.1 MPaG
3	PTFE yarn	-17 to +230 °C	10.3 MPaG max.
4	Expanded graphite	-17 to +350 °C	15.5 MPaG max.



**Figure 2. Temperature and pressure range of certified ISO 15848-1-compliant low-emission gland packing**

- Applicable control valves

The certified ISO 15848-1-compliant low-emission gland packing can be used with the following valves.

**Table 2. Control valves applicable for certified ISO 15848-1-compliant low-emission gland packing**

Valve type	Control valve model	Main unit pressure rating	Actuator model
Globe control valve	AGVB-AGVM ADVB-ADVM	JIS10K/16K/20K/30K ANSI class 150#/300#/600# *1	PSA2 · PSA3 · PSA4 · PSA6R*2·HA4
	HLS · HLC · HTS HSC · HCB · HCN ACP · ACN · AC2	JPI class150#/300#/600# *1 HG PN 10, 16, 25, 40, 63 bar JB 1.6, 2.5, 4.0 MPa	HA2 · HA3 · HA4 · PSA6R *2 · PSA7R *3 · DAP560 · DAP1000 ·DAP1000X

\*1. Even 600# models must be used within the temperature and pressure range of the certified ISO 15848-1-compliant low-emission gland packing indicated in Figure 2.

\*2. PSA6R is for a connection diameter of 6B and lift of 50 mm max.

\*3. PSA7R is for a connection diameter of 8B.

• Packing type

PTFE yarn: -17 to +230 °C (note that the certified temperature range is +5 to 230 °C)

Expanded graphite: -17 to +350 °C (note that the certified temperature range is +5 to 350 °C)

Neither packing needs greasing.

• Live-loaded packing system

Structure: pressurization by packing followers and Belleville springs

Material: refer to Figure 3 and 4

• Leakage performance evaluation by a third party organization

Applicable standard: ISO15848-1: 2015

Table 3. Certified class

Gland packing type	Endurance class	Tightness class	Measured leak rate* mg·s <sup>-1</sup> ·m <sup>-1</sup> from stem perimeter	Temperature class
PTFE yarn	CC3	BH	≤10 <sup>-4</sup>	200 (230) °C
Expanded graphite	CC3	CH	≤10 <sup>-2</sup>	200 (350) °C

Certification organization: Yarmouth Research and Technology, LLC

Tested fluid: Helium gas

Leakage performance evaluation method: ISO15848-1: 2015 Annex B

\* The allowed amount of external leakage is determined by the evaluation method specified by ISO 15848-1.

Performance under actual operating conditions in the field is not guaranteed.

**Structure of certified ISO 15848-1-compliant low-emission gland packing**

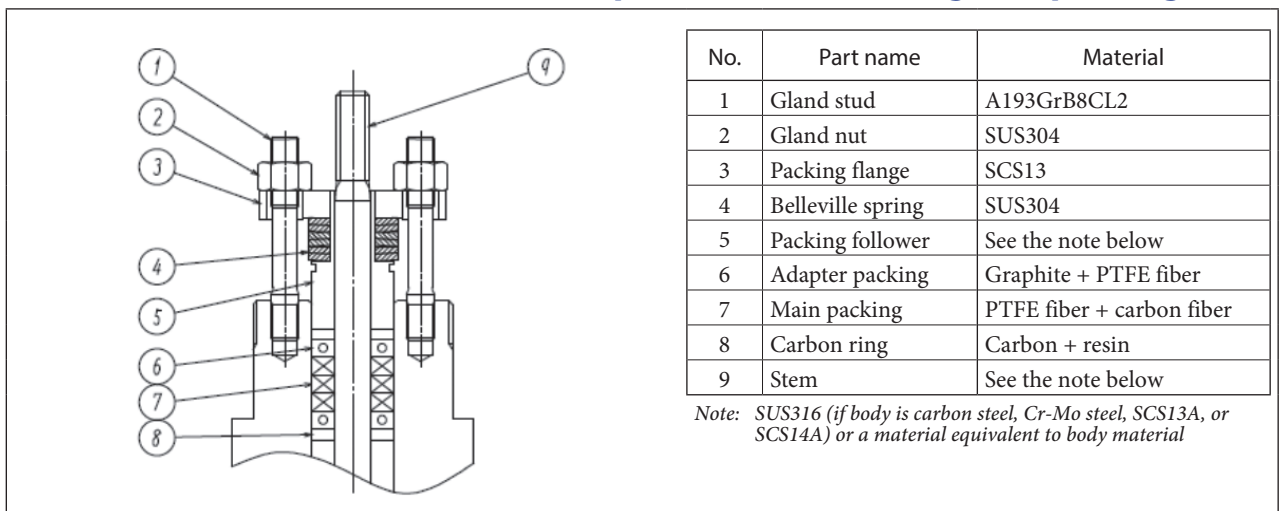


Figure 3. Structure of PTFE yarn gland packing

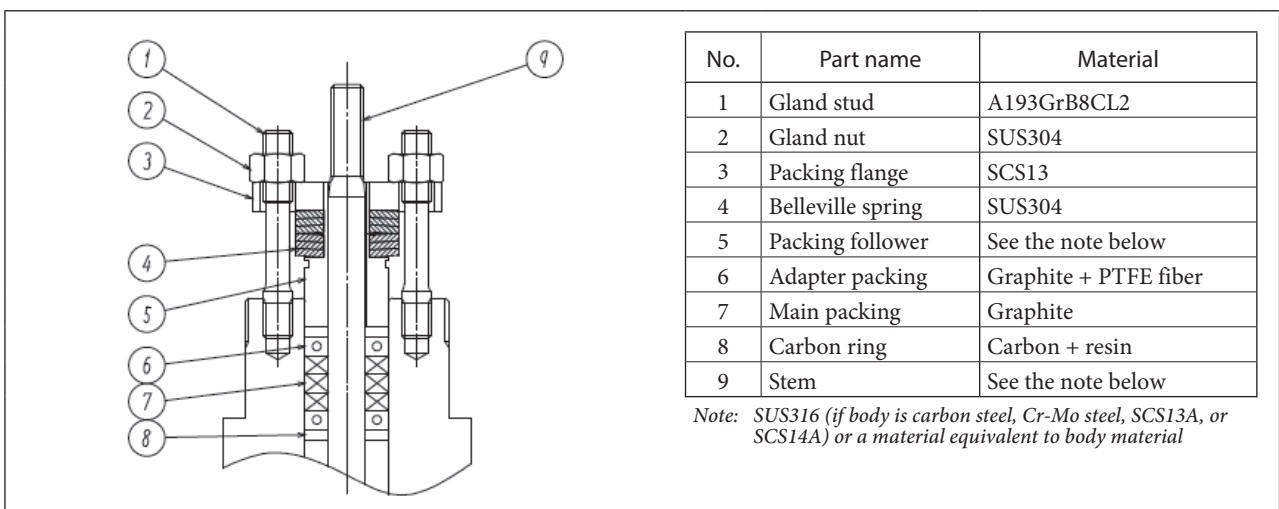


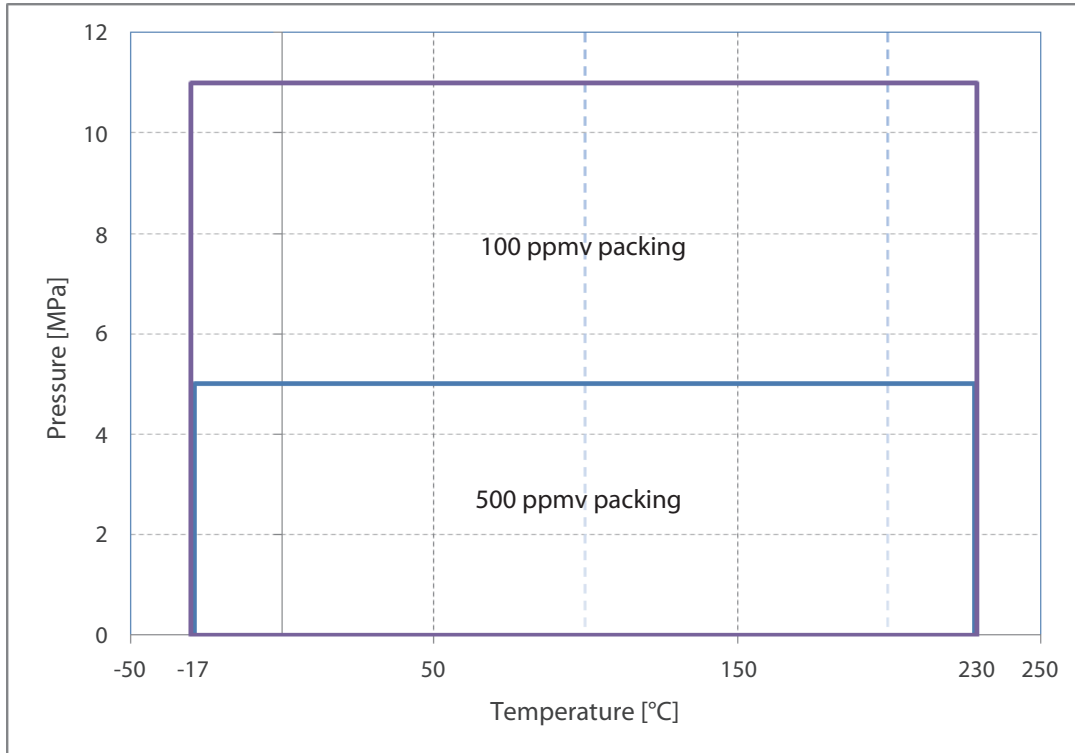
Figure 4. Structure of expanded graphite gland packing

## Azbil LE standard-compliant gland packing

The Azbil LE standard-compliant gland packing system enables valve seals to satisfy Azbil-defined low-emission performance standards, which are based on “Method 21—Determination of Volatile Organic Compound Leaks,” which is enforced by the U.S. Environmental Protection Agency. Please select from the following two types of packing systems.

**Table 4. Azbil LE standard-compliant packing system temperature & pressure ranges**

	Packing system	Gland packing	Temperature range	Pressure range
1	100 ppmv packing	PTFE yarn	-17 to +230 °C	11 MPaG max.
2	500 ppmv packing			5.1 MPaG max.



**Figure 5. Temperature and pressure range of Azbil LE standard-compliant gland packing**

- Applicable valves

The product can be used with the following types of valves. For the relationship between the pressure rating and applicable packing system, please refer to Table 5.

**Table 5. Control valves suitable for Azbil LE standard-compliant gland packing**

Valve type	Control valve model	Main unit pressure rating	Actuator type	Packing system
Globe control valve	AGVB·AGVM ADVB·ADVM	JIS10K/16K/20K/30K ANSIclass150#/300#/600# *1 JPIclass150#/300#	PSA1 · PSA2 PSA3 · PSA4	100 ppmv packing 500 ppmv packing
	HLS · HLC · HTS · HSC · ACP · ACN · HCB · HCN ·		HA2 · HA3 · HA4 PSA6R *2 DAP560	
Eccentric rotary control valve	VFR*3		RSA1, RSA2, VR3	500 ppmv packing

\*1. Even 600# models must be used within the temperature and pressure range of Azbil LE standard-compliant gland packing indicated in Figure 5.

\*2. PSA6R is for a connection diameter of 6B and lift of 50 mm max.

\*3. Up to 8-inch VFR is supported.

Note: The operating temperature range of the packing may differ depending on the control valve that it is used with.

- Packing type: PTFE yarn

Grease: Not needed for globe control valve  
Necessary for eccentric rotary control valve.

- Live-loaded packing system

Structure: pressurization by packing followers and Belleville springs  
Material: refer to Figure 6 and 7

- Evaluation conditions for Azbil LE standard-compliant gland packing

Table 6. Evaluation conditions for Azbil LE standard-compliant gland packing

Airtightness class*	Gland packing	Valve type	Machine cycles	Temperature cycles	Pressure
100ppmv	PTFE yarn	• Globe control valve	100,000	None	Fixed at 11 MPa
500ppmv	PTFE yarn	• Globe control valve • Eccentric rotary control valve	44,000	2 cycles, at room temperature to 230 °C	5.1 MPa max.

\* Tested fluid: helium gas

Leakage performance: indicated by the amount converted to methane (compliant with ANSI/ISA-93.00.01-100)

Leak measuring method: compliant with 40CFR 60 Method 21, which is issued by U.S. EPA

### Structure of Azbil LE standard-compliant gland packing

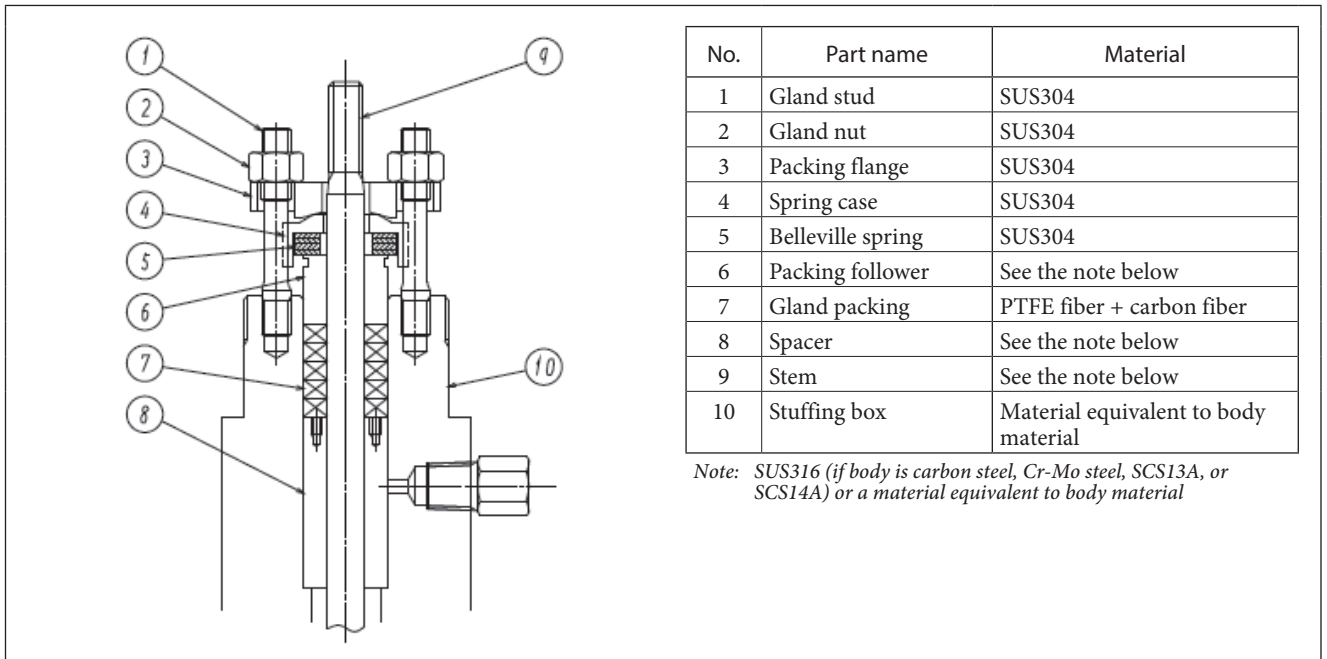


Figure 6. Structure of Azbil LE standard-compliant gland packing for globe valves and eccentric rotary control valves (for 2-inch and smaller sizes)

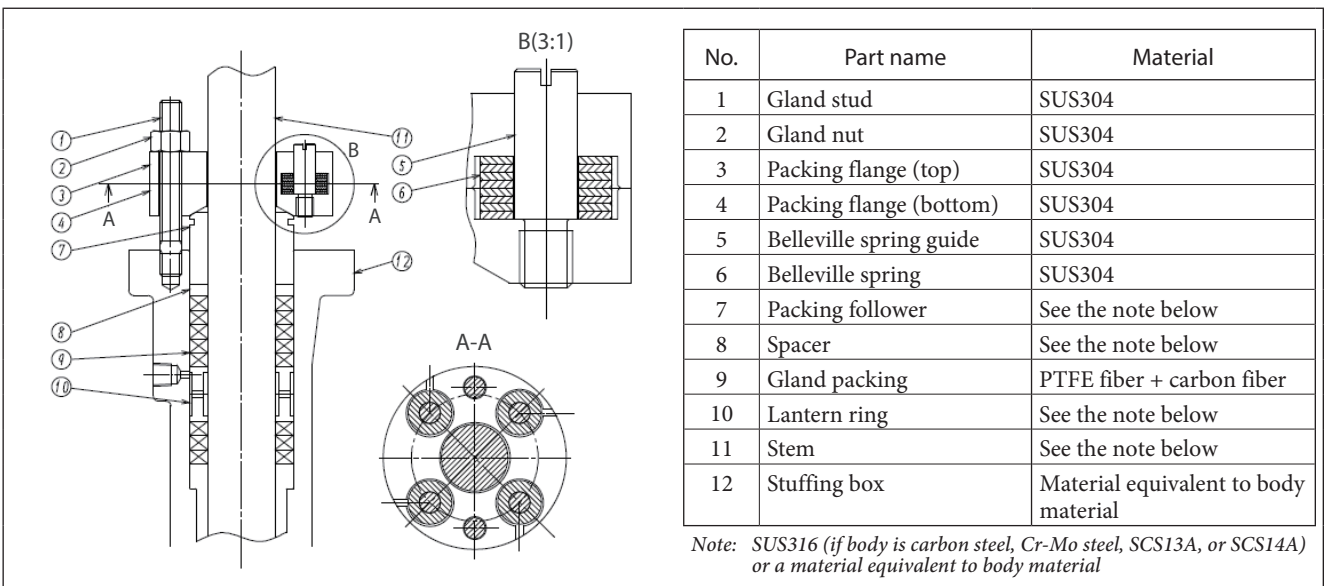


Figure 7. Structure of Azbil LE standard-compliant gland packing for eccentric rotary valves (for size 3 to 8 inches)





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