GRAPHTRADE

Quality under control



GREFSEAL Flange gaskets

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About Company

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Company name: Limited Liability Company 'Graphtrade';

E-mail: grefseal.office@gmail.com;

Web: www.grefseal.com;

Company Chief Executive Officer: Director General Anna Mikhailovna Naumenko;

Brief history of the Company:

'Graphtrade' LLC started its operations on 9 December 2003. In accordance with the current legislation of Ukraine, business activity of 'Graphtrade' LLC is not subject to compulsory licensing.

The enterprise manufactures sealing products with its own trademark: Grefseal.

Trade mark of the manufacturing enterprise has been certified by State Intellectual Property Service of Ukraine, Certificate No. 64151 of 17.07.2006.

Products manufactured by 'Graphtrade' LLC are mainly consumed by enterprises of energy industry, chemical and oil refining industry, coal mining industry, metallurgical industry as well as mining and processing integrated plants. Our enterprises manufactures sealing products in accordance with the following specially developed and formally approved technical specifications:

1.TU U 26.8-32786757-001:2008 - 'Grefseal Graphite Packings' (for nuclear power stations);

2.TU U 26.8-32786757-002:2011 - 'Grefseal Flanged Sealing Gaskets':

3.TU U 28.1-32786757-002:2012 - 'Grefseal Sealing Rings and Sealing Ring Sets';

4.TU U 29.1-32786757-001:2004 - 'Grefseal Asbestos-Free Packings:

5.TU U 28.1-32786757-003:2012 - 'Grefseal Asbestos-Free Sealing Sheets and Gaskets from Asbestos-Free Sealing Sheets';

6.TU U 26.8-25323997-001;2007 - 'Foil and Pressboard from Thermally Expanded Graphite';

7.TU U 28.2-32786757-004:2013 - 'Grefseal Double Jacketed and Waved Flanged Gaskets'.

In March 2006 'Graphtrade' LLC received Russian Maritime Register of Shipping Certificate of Type Approval No. 06.61049.184 of 03.03.2006 for graphite packing that was later prolonged under No. 11.61039.184 of 25.02.2011. This Certificate permitted manufacture and installation of packing for stern gears of all types of navigation ships. In November 2006 the enterprise was awarded with International IQNet System Certificate and Certificate of Russian Register Certification System for compliance of the effective enterprise quality management system with ISO 001:2000 International Standard.

Certificate No. 06.527.026 of 2 November 2006: in November 2009 года the enterprise quality management system was re-certified by Russian Register for compliance with ISO 9001:2008 International Standard.

In 2008 NNEGC 'Energoatom' and State Nuclear Regulatory Inspectorate of Ukraine approved the enterprise's technical specifications for manufacture and delivery of sealing products for nuclear power stations and in April 2009 'Graphtrade' LLC was confirmed as manufacturer and supplier of sealing products for nuclear power stations (Resolution on Approval No. 3III-II. 1.21.08-09).

In December 2008 'Graphtrade' LLC also obtained expert findings No. 63.2-03-4959.08 'Conclusion report on possibility to use Grefseal flanged gaskets from thermally expanded graphite manufactured under TU U 26.8-32786757-002:2005, foil and pressboard from thermally expanded graphite manufactured under TU U 26,8-25323997-001:2007 and asbestos-free packings manufactured under TU U 29.1-32786757-001-2004 in the environment of chemical and oil refining industry of Ukraine' issued by 'UkrNIIkhimmash' OJSC Ukrainian Scientific Research Institute.

In 2016 Certificate of compliance with ISO 9001:2009 Quality Management System was obtained.

Flanged Gaskets made of Thermally Expanded Graphite



There are two types of flanged gaskets that are manufactured: flanged gaskets reinforced with steel tape and flange gaskets without steel tape reinforcement.

The main fields of application are nuclear and thermal power engineering, chemical, oil refining, metallurgy, pharmaceutical, food and other industries.



Operating pressure: up to 20 MPa; Operating temperature: -200 °C to + 650 °C; Ph. 0.14



To avoid contacts of graphite gasket material or at high temperature, it is necessary to use gaskets equipped with protective devices (obturators).

If the flange gasket is properly installed on the unit, it can ensure a long service life, which in turn will reduce the amount of time consumed to replace the sealing item, reduce the cost of purchasing gasket materials and increase the period between repairs. When choosing a gasket, a large number of factors such as operating pressure, hydrotesting pressure, flange condition, operating temperature, flange design and others shall be taken into account. 'Graphtrade' flanged gaskets of different shapes and sizes can be manufactured according to OST, GOST, ASME, API, ANSI and other standards. Flange gaskets can also be made according to customer's drawings.



GASKET PGF - GF-X-XXX-XxXxX TU U 26.8-32786757-002:2011 Flanged graphite gasket Graphite foil grade Gasket design Geometrical dimensions, mm Designation of the regulatory documents

Standard design of flanged gaskets

Flanged gasket design	Mark	Draw	
Non-reinforced graphite gasket without obturator	001		
Non-reinforced graphite gasket with obturator in the inner diameter	011		
Non-reinforced graphite gasket with obturator in the outer diameter	021		
Non-reinforced graphite gasket with obturator in the inner and outer diameter	031		
Reinforced graphite gasket without obturator	103		
Reinforced graphite gasket with obturator in the inner diameter	113		
Reinforced graphite gasket with obturator in the outer diameter	123		(
Reinforced graphite gasket with obturator in the inner and outer diameter	133		(

Graphite foil grades

Grade	Component parts	Part by weight, %
	Carbon	Not less that 99.9
GF-1	Ash	Not less that 0.10
Gr-1	Sulfur	Not less that 0.05
	Chlorine	Not less that 0.002
	Carbon	Not less that 99.5
GF-2	Ash	Not less that 0.45
	Sulfur	Not less that 0.10
	Chlorine	Not less that 0.004
	Carbon	Not less than 99.0
	Ash	Not less that 1.00
GF-3	Sulfur	Not less that 0.15
	Chlorine	Not less that 0.004

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PTFE Flanged Gaskets



Fluoroplast-4 (F-4) (also known as PTFE) is a unique material obtained chemically. It has an exceptional chemical inertness in relation to almost all aggressive substances, it does not change even when boiled in chlorazotic acid.

The chemical resistance of PTFE is used in the operation of pipelines for transporting highly aggressive substances, reactor lining, shut-off valves, pumps, storage tanks for chemically active media, gasket-sealing parts in contact with aggressive substances, etc.

It is affected only by the melts of alkali metals, their solutions in ammonia, chlorine trifluoride and elemental fluorine at high temperatures.

Operating pressure: up to 16 MPa; Operating temperature: -200 to +240°C; Ph: 0-14

Flanged gasket design	Index	Image
PTFE gasket without obturator	001	
PTFE gasket with obturator in the inner diameter	011	
PTFE gasket with obturator in the outer diameter	021	
PTFE gasket with obturators in the inner and outer diameter	031	

GASKET $\Pi\Phi\Phi$ -XXX-XxXxX TU U 26.8-32786757-002:2011

PTFE flanged gasket

Gasket design

Geometrical dimensions, mm

Designation of the regulatory documents

Flanged Gaskets on a Steel Waved Base



Flanged gaskets on a steel waved base (PVF) represent a flat ring with concentrically arranged undulating projections and valleys. The base profile as well as the thickness and density of the coatings are matched to each other in such a way as to ensure that the crests of the waves overlap by 0.1-0.2 mm in a compressed state at the usual specific pressure.

These gaskets are designed to seal fixed connections of shut-off, regulating, protective and safety valves, vessels, pumps, pipelines, heat exchangers, reactors, compressors and other equipment of petrochemical, gas, heat plants in various industries.

The field of application is thermal power engineering, chemical, oil refining, metallurgy, gas and other industries.

Operating pressure: up to 35 MPa; Operating temperature: -196 to +650°C; pH: 0-14

Type of lining material:

Designation of jacketing material	Name and grade
1	TEG foil, grade: GF-1
2	TEG foil, grade: GF-2
3	TEG foil, grade: GF-3
4	PTFE
5	Ceramic fiber

Naved gasket type	Dodge	Waved gasket type	Design:
21	~~~Z	23	~~~
22	~~~~	24	CXX

GASKET PZF -X-XX-XXxXXXXXX TU U 28.2-32786757-004:2013

Jacketed flanged gasket

Type of lining material

Gasket design

Geometrical dimensions, mm

Designation of the regulatory documents

Steel Kammprofile (Grooved) Flanged Gaskets



less than for flat gaskets. In addition, kammprofile steel gaskets are more practical and convenient for installation and storage (especially these of large diameters). In the case of using a fluoroplastic liner, the scope of application of this

A distinctive feature of the use of kammprofile steel gaskets is the

possibility of reliable sealing of flanged connections in a wider range of

pressures and temperatures, with a specific reduction force of 2-2.5 times

type of gaskets for the temperature range is significantly narrowed.

Operating parameters of PZGF gaskets (thermally expanded graphite (TEG) liner):

Operating pressure: 40 MPa; Operating temperature: -200 to+800 °C; pH: 0-14.

Operating parameters of PZFF gaskets (PTFE liner):

Operating pressure: 40 MPa Operating temperature: -200 to+200 °C; pH: 0-14

GASKET XXXX - XX-X - X - X - XX - XxXxXxXXX TU U 26.8-32786757-002:2011

PZGF- kammprofile flanged gasket with graphite liner: PZFF - kammprofile flanged gasket with PTFE liner.

Lining material grade

Type of steel base

Steel base grade

Process pressure, MPa

Geometrical dimensions, mm

Type of lining material:

Index	Name and grade
1	TEG foil, grade: GF-1
2	TEG foil, grade: GF-2
3	TEG foil, grade: GF-3
4	PTFE

Steel base material:

Designation	Material name	
U	Carbon steel	
N	Stainless steel	

Type of steel base:

Index	Image	Name
1		Grooved base
2		Grooved base with outer distancing ring
3		Grooved base with inner compression limiter ledg
4		Grooved base with outer distancing ring and inner compression limiter
5		Grooved base special



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Double Jacketed Flange Gaskets



Double Jacketed Flange Gaskets (PZF) are intended for sealing of fixed connections of shut-off, regulating, protective and safety valves, vessels, pumps, pipelines, heat exchangers, reactors, compressors and other equipment of various industries. The area of application is thermal power, chemical, oil refining, metallurgical, gas and other industries. The standard fillers of PZF are the following materials: thermally expanded graphite, PTFE, asbestos-free paronite, ceramics.

Operating temperature: $-200 \sim +650$ °C (when PTFE filler is used: $-196 \sim +200$ °C); Operating pressure: 15 MPa;

pH: 0-14

Grefseal PZF - X - X - XX - XXXXX TU U 28.2-32786757-004:2013

Double jacketed flanged gasket

Type of filler

Type of steel jacket material

Type of steel jacket design

Geometrical dimensions, mm

Designation of the regulatory documents

Filler types:

Index	Name and grade
1	TEG foil, grade: GF-1
2	TEG foil, grade: GF-2
3	TEG foil, grade: GF-3
4	PTFE
5	Ceramic fiber
6	Asbestos-free paronite

Steel jacket materials:

Material designation	Material name
U	Carbon steel
N	Stainless steel

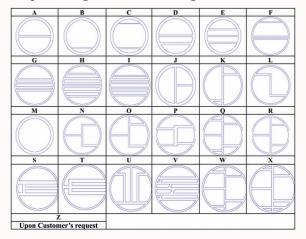
Steel jacket design:

Steer J	acket design:
Type of jacket	Design
01	
62	
03	
04	
05	\
06	
67	
os	
09	
10	
11	
12	Upon Customer's request

Types of jumper links on PZF gasket:

Конструкция	Наименование
	Интегральная
	Приварная

Shapes of PZF gaskets for heat exchangers:



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Spiral Wound Gaskets



Spiral Wound Gaskets (SWG) ensure the tightness of joints, increase the life of the seal, reduce the loss of the working environment, and improve the ecological situation. Due to the combination of the materials used, as well as the special profile of the metal frame, spiral wound gaskets, comparing to other types of gaskets, have an enhanced relaxation ability and are particularly recommended for use when the seal assembly is subjected to large fluctuations in pressures and temperatures of the working medium. Standard SWG thicknesses: 2.5: 3.2: 4.5: 6.5 mm.

Operating pressure: 25 MPa;

Operating temperature: -200 ~ +550°C

(when PTFE filler is used: $-200 \sim +240$ °C);

pH: 0-14

SWG <u>X</u> - <u>X</u> - <u>XX</u> - <u>XX</u> - <u>XX</u> - <u>XX</u>XXXXXXXX TU U 26.8-32786757-002:2011

Type SWG

Type of filler

Material of limit rings

Process pressure, MPa

Geometrical dimensions, mm

Designation of the regulatory documents

Types of SWG gaskets:

skets:				
SWG type	SWG type Index Recommended design of flange		Design	
Without limit rings	A	'Tongue and groove' 'plane and groove'		
Equipped with inner limit ring	v	'Male-female'		
Equipped with outer limit ring	N	'Male-male'		
Equipped with inner and outer limit rings	D	'Male-male'		

Filler types:

Index	Name and grade
1	TEG foil, grade: GF-1
2	TEG foil, grade: GF-2
3	TEG foil, grade: GF-3
4	PTFE
5	Asbestos-free paronite

Materials of outer and inner limit rings:

Material designation	Material name	
U	Carbon steel	
N	Stainless steel	

SWG can be manufactured according to GOST, OST, API, ASME, ANSI, DIN, as well as according to the Customer's drawings.

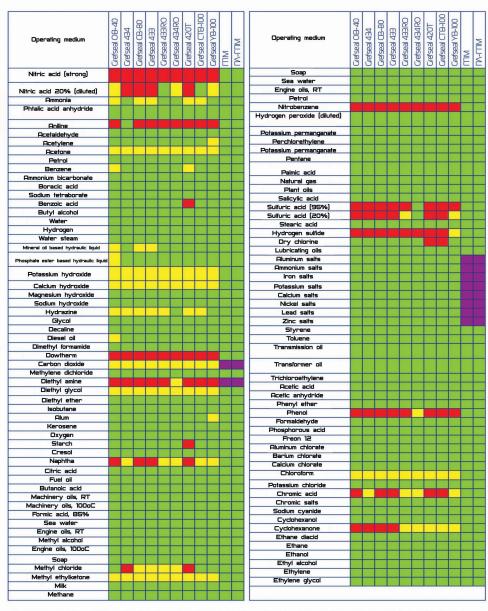
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Sheet gasket materials

	Base	Properties	Application area		
GREFSEAL OB-40	Organic fiber, NBR	Good water resistance, gas resistance, oil resistance and fuel resistance	This material is suitable for low load applications of packing, for different branches of industry	Density g/cm2 Tensile strength MPA Compressibility % Restorability % Max. temp.* oC Max. pressure* MPA	1.5~2.0 3 12±5 40 200 1.5
GREFSEAL 434	Synthetic fiber; NBR	Good thermal properties. Good steam resistance, resistance to chemical agents. Scientific and technical docum	Chemical and petrochemical industries, machine building industry and other branches	Density g/cm2 Tensile strength MPA Compressibility % Restorability % Max. temp.* oC Max. pressure* MPA	1.6~2.0 6 12±5 45 400 5
GREFSEAL CB-80	Synthetic fiber, NBR	Good resistance to chemical agents.	This material is suitable for heavy loads. Gas, chemical and petrochemical industries. entation TU U 283-32786757-0032012	Density g/cm2 Tensile strength MPA Compressibility % Restorability % Max. temp.* oC Max. pressure* MPA	1.5~2.0 4 12±5 45 300
GREFSEAL 433	Aramid fiber, NBR	Good water resistance, gas resistance, oil resistance and fuel resistance. Scientific and technical docum	This material is suitable for mean load applications of packing. Gas, chemical and petrochemical industries. entation TU U 281-32786757-0032012	Density g/cm2 Tensile strength MPA Compressibility % Restorability % Max. temp.* oC Max. pressure* MPA	1.6~2.0 4 12±5 45 300
GREFSEAL 433RO	Aramid fiber; graphite, NBR	Good chemical, thermal and mechanical properties.	Chemical and petrochemical industries, electric-power industry, machine building industry. **machine building industry.** **	Density g/cm2 Tensile strength MPQ Compressibility % Restorability % Max. temp.* oC Max. pressure* MPQ	1.5~2.0 4 12±5 45 300
GREFSEAL 434RO	Aramid fiber, graphite, (high-temperature) NBR		Chemical and petrochemical industries, electric-power industry, machine building industry. Behalion TU U 283-32786757-0032012	Density g/cm2 Tensile strength MPA Compressibility % Restorability % Max. temp.* oC Max. pressure* MPA	1.6~2.0 6 12±5 45 400
GREFSEAL 420T	Synthetic fiber, NBR + (perforated) sheet of carbon (stainless) steel	Good strength owning to reinforcement. Good expansion and pressurization characteristics. Scientific and technical docum	This material is applied at dynamic loads. Machine building industry, electric-power industry, chemical and petrochemical industries.	Density g/cm2 Tensile strength MPA Compressibility % Restorability % Max. temp.* oC Max. pressure* MPA	1.3~1.7 6 10±5 40 300 14
GREFSEAL CTB-100	Glass fiber; NBR	Good resistance to heat and steam. Scientific and technical docum	To be applied with water, oil, gas, fuel, acids. Used in chemical and petrochemical industries, electric-power industry, gas industry entaion TU U 281-32786757-003-2012	Density g/cm2 Tensile strength MPA Compressibility % Restorability % Max. temp.* oC Max. pressure* MPA	1.6~2.0 6 8 50 350
GREFSEAL YB-100	Carbon fiber, NBR	Good thermal and mechani- cal resistance. High resistance to chemical agents.	Chemical and petrochemical industries, electric-power industry. Mentalion TU U 281-32786767-003:2012	Density g/cm2 Tensile strength MPA Compressibility % Restorability % Max. temp.* oC Max. pressure* MPA	1.6~2.0 6 9 55 300
Графитовый Прокладочный Материал	Thermally expanded graphite	Good thermal resistance and resistance to chemical agents. Scientific and technical docume	Chemical and petrochemical industries, electric-power industry.	Density g/cm2 Tensile strength MPQ Compressibility % Restorability % Max. pressure* MPQ	0.9~1.2 14 0 450
Армированный Графитовый Прокладочный Материал	Thermally expanded graphite + stainless steel	Good thermal resistance and resistance to chemical agents.	Chemical and petrochemical industries, electric-power industry.	Tensity g/cm2 Tensite strength MPA Compressibility % Restorability % Max. temp.* oC Max. pressure* MPA	0.9~1.2 12 0 450 25

^{*} Temperature and pressure are maximum values and they should not be used together. These figures are given as recommended values due to the fact that there are such important factors as material thickness, service conditions, flange type and condition and surface pressure.

Recommendations for use



These recommendations will be useful when choosing packing material. As packing material service life depends on many factors, this information cannot be used with the purpose of making warranty liabilities.

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Flanged Gaskets from Asbestos-Free Paronite



Flanged gaskets from asbestos-free paronite (PFB) are designed for sealing flanges and connecting parts of pipelines, connecting flanges of fittings, machines, instruments, apparatus and tanks. The field of application is gas, petrochemical, chemical, oil refining industry, machine building and other branches of industry. To improve the working parameters, the obturators can be installed on the PFB gaskets made from non-asbestos gasket sheets.

Asbestos-free flanged gasket

Mark LPB

Obturator

Geometrical dimensions, mm

Designation of the regulatory documents

Operating pressure: up to 14 MPa; Operating temperature: -200 to +400°C; Tensile strength: up to 6.0 MPa; Compressibility: up to 12 ± 5 %; Restorability: up to 55%.

Graphite Corrugated Tape



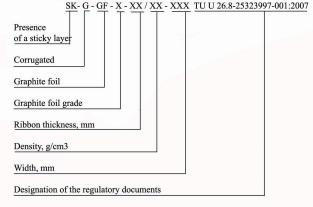
Operating temperature: -200 to +650°C; pH: 0-14

Type graphite foil:

- 1 TEG foil, grade: GF-1;
- 2 TEG foil, grade: GF-2;
- 3 TEG foil, grade: GF-3.

Graphite corrugated tape (G-GF) is used for sealing fixed joints, sealing flanges, connecting parts of pipelines, connecting flanges of valves, non-standard flanges, machines, instruments, apparatuses and tanks.

The field of application is gas, petrochemical, chemical, oil refining industry, machine building and other branches of industry. To simplify the installation, a sticky layer on a paper basis can be additionally applied upon Customer's request.



Braided Sealing Tape



Operating temperature: -200 to +650°C; Operating pressure: 25 MPa; pH: 0-14

Braided sealing tape made of thermally expanded graphite (LG-SI) is used for sealing of flanges and connecting parts of pipelines, connecting flanges of armature, machines, devices, apparatuses and tanks. The field of application is gas, petrochemical, chemical, oil refining industry, machine building and other branches of industry.

The main constituents are thermally expanded graphite fibers, Inconel wire and corrosion inhibitor

Because of this symbiosis of materials it is possible to install this type of seals on areas with high pressure, significantly reduce labor costs for installing this type of packing material, and increase the turnaround time.

LG-SI XXxXX TU U 29.1-32786757-001:2004

Graphite tape

Reinforced with Inconel wire

Geometrical dimensions (width, mm x height, mm)

Designation of the regulatory documents

Microwave PTFE Tape



Operating temperature: -200 to +650°C; Operating pressure: 10 MPa; pH: 0-14 Sealing tape made of microwave PTFE is used for sealing flanges and connecting parts of pipelines, connecting flanges of fittings, machines, instruments, apparatuses and tanks. Field of application: gas, petrochemical, chemical, oil refining industry, engineering, medical, food and other branches of industry.

The main components are fibers of microwave fluoroplastic and a sticky layer on a paper basis. Due to its high chemical resistance the main substances used are: acids, alkalis, steam, drinking water, oxygen, vapour, gas, liquefied gases, solvents.

PTFE tape XXxXX TU U 29.1-32786757-002:2004

Geometrical dimensions, mm

Designation of the regulatory documents

Standart sizes: 3x1,5 mm, 3x2 mm, 5x2 mm, 7x2,5 mm, 7x3 mm, 9x4,5 mm, 10x3 mm, 10x5 mm, 12x4 mm, 12x6 mm, 14x5 mm, 16x5 mm, 17x6 mm, 20x4 mm, 20x5 mm, 20x7 mm, 20x8 mm, 25x8 mm, 25x10 mm, 30x5 mm, 30x7 mm.

PTFE cord



PTFE sealing cord is produced on the basis of microwave expanded fluoroplastic and is intended for sealing of fixed connections, sealing of flanges and connecting parts of pipelines,

pipe fittings, machines, instruments, devices, apparatuses and tonsecting parts of pipelmes, pipelmes, machines, instruments, devices, apparatuses and tanks.

Field of application: gas, petrochemical, chemical, oil refining industry, engineering, medical, food and other branches of industry.

Operating temperature: -200 to +260°C; Operating pressure: 10 MPa; pH: 0-14

PTFE cord X TU U 29.1-32786757-001:2004

Geometrical dimensions, mm

Designation of the regulatory documents

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OTHER PRODUCTS





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