

**The British Gaskets Group**

*Best Under Pressure*

# BGNASB Materials

**Product Catalogue**



ISO9001:2000  
Cert No: Q05299



ISO/TS16949:2002  
Cert No: FM87398

## **British Gaskets Limited**

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Sudbury

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CO10 7HJ

Tel: 01787 881188 Fax: 01787 880595

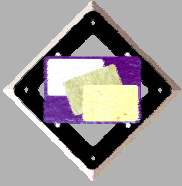
[www.british-gaskets.co.uk](http://www.british-gaskets.co.uk)



BS/ISO 9001:2000 Approved



ISO/TS 16949 Approved



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# ***SECTION 1***

*Specification sheets and MSDS*





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## NASB5 (DIN28091)

### COMPRESSED SHEET FOR A WIDE RANGE OF INDUSTRIAL SEALING APPLICATIONS

#### TECHNICAL DATA SHEET

##### □ COMPOSITION

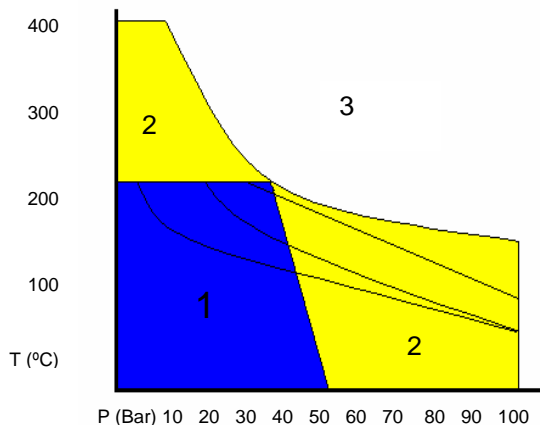
Compressed sheets for gaskets, **NASB5** is manufactured by comprising a matrix of elastomers and inert fillers reinforced with aramid and inorganic fibres which confer temperature and pressure resistance to the material, making it suitable for a wide range of industrial sealing applications. Gasket joint material used in serving of industrial plants and in special water, gas, oils and hydrocarbon (up to a moderated temperature) pipes. Other variations – **NASB5G** (Graphited both sides). **NASB5W** (Wire Insert). **NASBWG** (Wire Insert Graphited both sides)

##### □ TECHNICAL DATA

COLOUR	Green
Standard sizes (mm) Other upon request	2000 x 1500
Standard thickness (mm). Other upon request	0,5, 0.8, 1, 1,5, 2, 3
Density ( $\pm 10\%$ )	1.65 g/cm <sup>3</sup>
Compressibility ASTM F-36 A	7% - 15%
Recovery ASTM F-36 A	>45%
Transverse tensile strength ASTM F-152	9 MPa
Gas permeability DIN 3535/6	<0,5 cm <sup>3</sup> /min
THICKNESS INCREASE ASTM F-146	
ASTM oil N <sup>o</sup> 1 5h 150°C	<4%
ASTM oil N <sup>o</sup> 3 5h 150°C	<8%
ASTM fuel B 5h RT	<8%

Typical properties for 2 mm thickness. DATA CERTIFICATED BY LLOYD'S REGISTER 'S TYPE APPROVAL SYSTEM

#### PRESSURE-TEMPERATURE DIAGRAM



#### P-T OPERATING GUIDELINES

1- Usually satisfactory to use without reference to British Gaskets Ltd. Technical examination is normally unnecessary.

2- Must refer to British Gaskets Ltd for advice. A technical examination is recommended

3- Area not recommended.

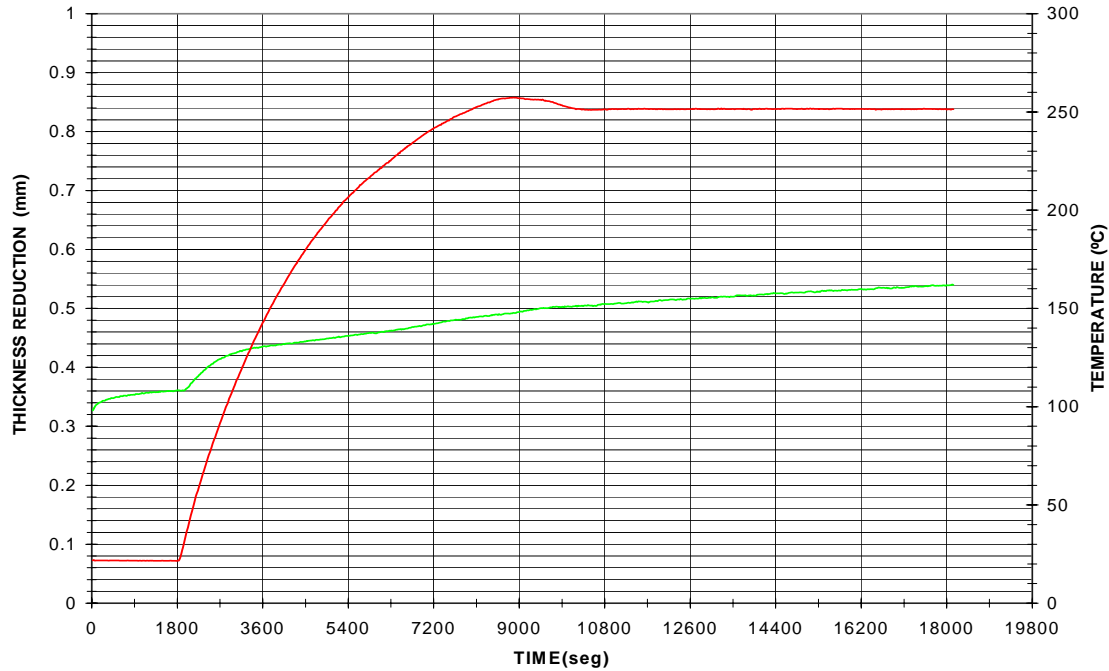
The P-T diagram helps the user or designer who often knows the operating temperature and pressure to carry out an initial selection of a suitable material. The P-T diagram cannot guarantee the suitability of a material for an application

#### CERTIFICATIONS: DvGW, HTB, KTW

Good performance and long service life of gaskets depend in large measure on fitting and operation conditions, over which the manufacturer has no control. The data given on this technical sheet should not be used as application limits, but as guidance for an appropriate choice. We can offer guarantees only for the quality of our products.

# CREEP DEFORMATION HOT CREEP TEST

**NASB5 - 2 mm - 50 MPa - 250 °C**



----- TEMPERATURE INCREASE  
----- THICKNESS DECREASE

FYESA' LABORATORY  
 SEPTEMBER 2005

CREEP DEFORMATION: percentage loss of thickness over a specified time under constant load, applied at a specified rate, at a specified temperature.

$$\text{Creep (\%)} = (\text{loss of thickness under load at a specified time} / \text{initial thickness of the sample}) \times 100$$

Creep deformation gives an indication of the effect of time and temperature on deformation behaviour of gaskets materials.

This parameter also gives an indication about the trend of a gasket material to leak in combination with the variables that also affect to a flanged union.

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## NASB6 (DIN28091)

### Compressed Gasket Sheets with controlled Swell

#### TECHNICAL DATA SHEET

##### □ COMPOSITION

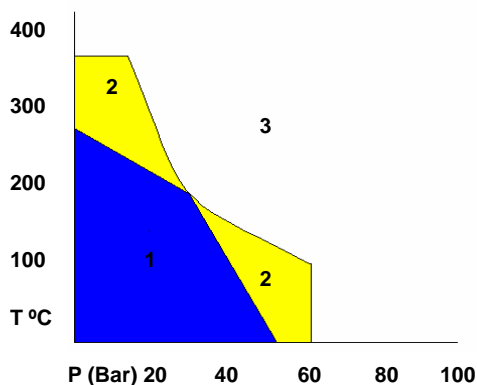
Compressed sheets for gaskets, **NASB6** is manufactured with aramide and high quality mineral fibers mixed in a synthetic rubber matrix. This material has exceptional flexibility and behaviour on cutting added to its characteristic of controlled swell in oils, making a material with good suitability for the automotive, machinery construction industry. For general use. It has good resistance to compression, excellent adaptability and low gas permeability. Other variations – **NASB6G** (Graphited both sides). **NASB6W** (Wire Insert). **NASB6WG** (Wire Insert Graphited both sides)

##### □ TECHNICAL DATA

COLOUR	Orange
Standard sizes (mm) Other upon request	1500 x 1500
Standard thickness (mm). Other upon request	0,5, 0,8, 1, 1,5, 2, 3
Density ( $\pm 10\%$ )	1.6 g/cm <sup>3</sup>
Compressibility ASTM F-36 A	7% - 15%
Recovery ASTM F-36 A	>40%
Transverse tensile strength ASTM F-152	7 Mpa
Gas permeability DIN 3535/4	<1cm <sup>3</sup> /min
THICKNESS INCREASE ASTM F-146	
ASTM oil N <sup>o</sup> 1 5h 150°C	<8 - 12%
ASTM oil N <sup>o</sup> 3 5h 150°C	<20 - 25%
ASTM fuel B 5h RT	<10%

Typical properties for 2 mm thickness.

#### PRESSURE-TEMPERATURE DIAGRAM



#### P-T OPERATING GUIDELINES

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3- Area not recommended.

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## NASB7Y

### BS7531 GRADE Y (DIN28091 FA-AM1-0)

#### UNIVERSAL GASKET MATERIAL FOR GENERAL INDUSTRY & OEM

### TECHNICAL DATA SHEET

#### □ COMPOSITION

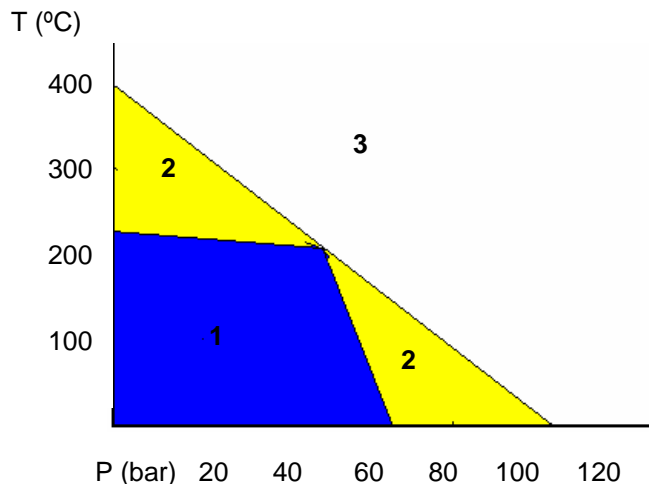
High quality compressed non asbestos fibre jointing sheets based on aramide and special mineral fibers mixed in a NBR rubber matrix. This material offers high stress relaxation (BS7531 Grade Y, DIN28091 FA-AM1-0), high compressibility and low gas permeability, excellent characteristics for universal services. Material suitable for use with air, water, oils, hydrocarbons, gases and common uses. Particularly suitable for use in compressors, pumps, valves and OEM equipment.

#### □ TECHNICAL DATA

COLOUR	Blue
Standard sizes (mm) Other upon request	1500 x 1500
Standard thickness (mm). Other upon request	0.5; 0.8;1; 1,5 ; 2; 3
Density ( $\pm 10\%$ )	1.65 g/cm <sup>3</sup>
Compressibility ASTM F-36 A	7%-15%
Recovery ASTM F-36 A	>55%
Transverse tensile strength ASTM F-152	12 MPa
Stress relaxation (BS 7531 1.5mm 300°C/16H) (Mpa)	22
Gas permeability DIN 3535/6	<0.5cm <sup>3</sup> /min
Hot creep at 200°C $\xi_{wsW/200}$ (%)	10-12
Cold compressibility $\xi_{KSW}$ (%)	11
Cold recovery $\xi_{KRW}$ (%)	3.5
Hot recovery at 200°C $\xi_{wsR/200}$ (%)	1.0
THICKNESS INCREASE ASTM F-146	
ASTM oil N°1 5h 150°C	<3%
ASTM oil N°3 5h 150°C	<5%
ASTM fuel B 5h RT	<7%

Typical properties for 2 mm thickness.

#### PRESSURE-TEMPERATURE DIAGRAM



#### P-T OPERATING GUIDELINES

1- Usually satisfactory to use without reference to British Gaskets Ltd. Technical examination is normally unnecessary.

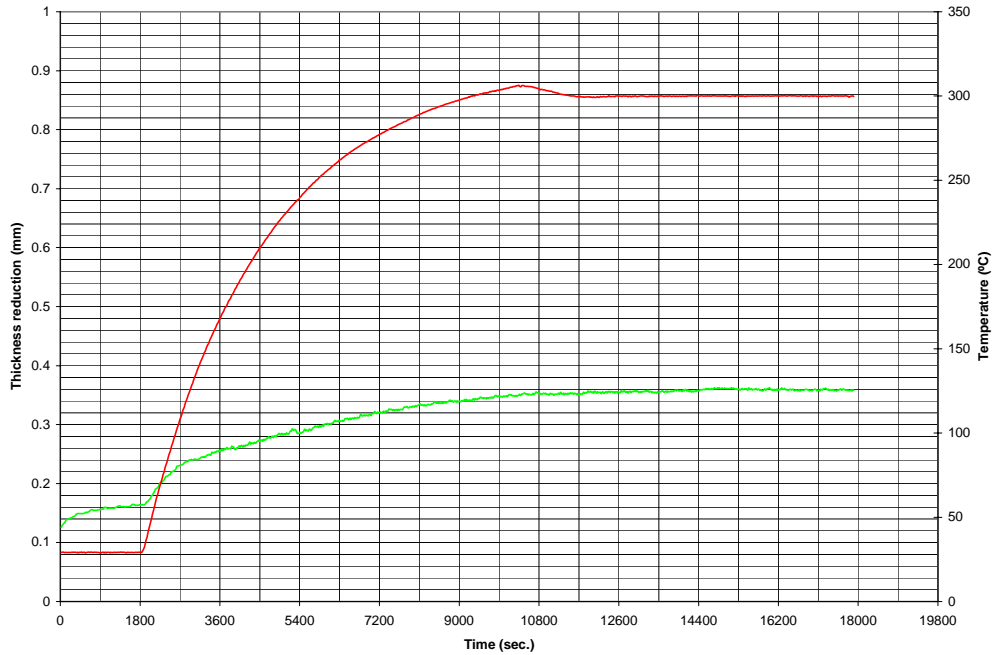
2- Must refer to British Gaskets Ltd for advice. A technical examination is recommended

3- Area not recommended.

The P-T diagram helps the user or designer who often knows the operating temperature and pressure to carry out an initial selection of a suitable material. The P-T diagram cannot guarantee the suitability of a material for an application

# CREEP DEFORMATION HOT CREEP TEST

NASB7Y 2mm 50MPa y 300°C



----- TEMPERATURE INCREASE  
----- THICKNESS DECREASE

FYESA' LABORATORY  
SEPTEMBER 2005

CREEP DEFORMATION: percentage loss of thickness over a specified time under constant load, applied at a specified rate, at a specified temperature.

Creep (%) = (loss of thickness under load at a specified time / initial thickness of the sample) x 100

Creep deformation gives an indication of the effect of time and temperature on deformation behaviour of gaskets materials.

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## NASB8X

### BS7531 GRADE X (DIN28091 FA-AM1-0)

#### PREMIUM QUALITY GASKET MATERIAL FOR INDUSTRY

#### TECHNICAL DATA SHEET

##### □ COMPOSITION

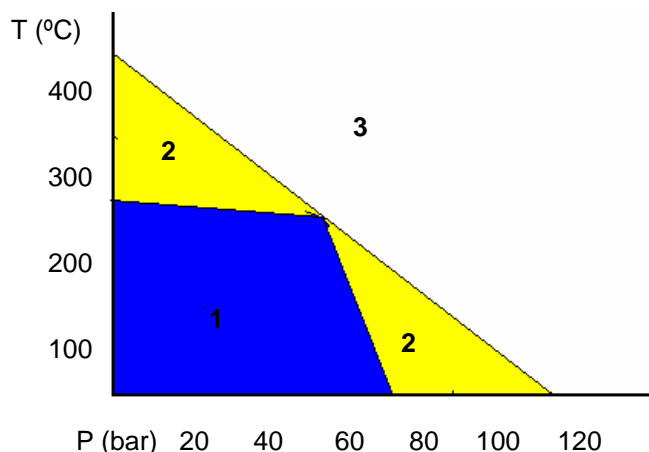
High quality compressed non asbestos fibre jointing sheet made with aramide and high quality mineral fibres in a NBR rubber matrix. NASB8X has the lowest gas permeability value, with the highest tensile strength and the best flexibility. NASB8X is a high-tech product with the highest stress relaxation value (BS7531 Grade X, DIN28091 FA-AM1-0) in the market. Material suitable for many uses and with most of the fluids. Universal gasket material for every equipment and service.

##### □ TECHNICAL DATA

COLOUR	Green
Standard sizes (mm) Other upon request	1500 x 1500
Standard thickness (mm). Other upon request	0.5; 0.8; 1; 1,5 ; 2; 3
Density ( $\pm 10\%$ )	1.65 g/cm <sup>3</sup>
Compressibility ASTM F-36 A	7%-15%
Recovery ASTM F-36 A	>55%
Transverse tensile strength ASTM F-152	13 MPa
Stress relaxation (BS 7531 1.5mm 300°C/16H) (Mpa)	25
Gas permeability DIN 3535/6	<0.4cm <sup>3</sup> /min
Hot creep at 200°C $\xi_{wsW/200}$ (%)	10-11
Cold compressibility $\xi_{KSW}$ (%)	10
Cold recovery $\xi_{KRW}$ (%)	3.0
Hot recovery at 200°C $\xi_{wsR/200}$ (%)	0.9
THICKNESS INCREASE ASTM F-146	
ASTM oil N°1 5h 150°C	<2%
ASTM oil N°3 5h 150°C	<4%
ASTM fuel B 5h RT	<6%

Typical properties for 2 mm thickness.

##### PRESSURE-TEMPERATURE DIAGRAM



##### P-T OPERATING GUIDELINES

1- Usually satisfactory to use without reference to British Gaskets Ltd. Technical examination is normally unnecessary.

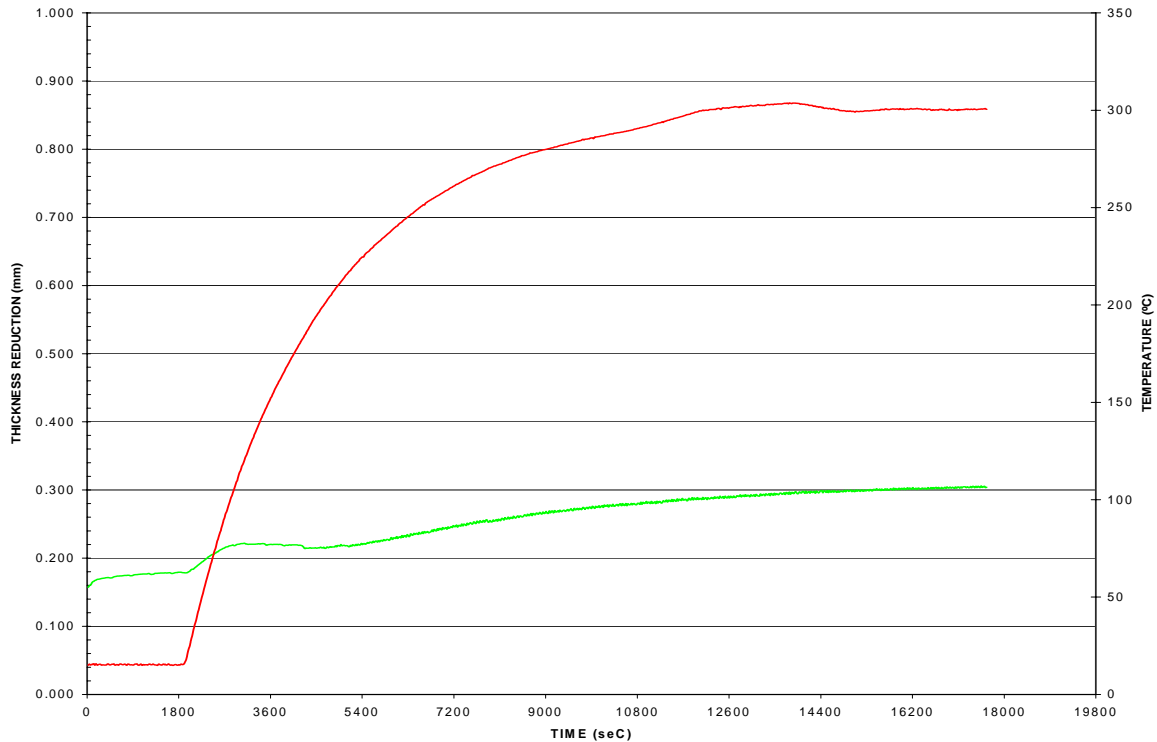
2- Must refer to British Gaskets Ltd for advice. A technical examination is recommended

3- Area not recommended.

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# CREEP DEFORMATION HOT CREEP TEST

NASB8X 2 mm - 50 MPa - 300°C



----- TEMPERATURE INCREASE  
----- THICKNESS DECREASE

FYESA' LABORATORY  
SEPTEMBER 2005

CREEP DEFORMATION: percentage loss of thickness over a specified time under constant load, applied at a specified rate, at a specified temperature.

$$\text{Creep (\%)} = \left( \frac{\text{loss of thickness under load at a specified time}}{\text{initial thickness of the sample}} \right) \times 100$$

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# The British Gaskets Group

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## NASB9 (DIN28091)

### UNIVERSAL COMPRESSED GASKET SHEETS FOR HIGH SERVICES

#### TECHNICAL DATA SHEET

##### □ COMPOSITION

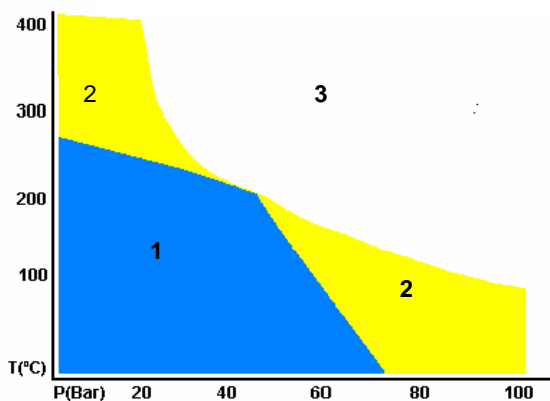
Compressed sheets for gaskets, **NASB9** is manufactured with aramide and high quality mineral fibres mixed in a rubber NBR matrix. This material has high compressibility, good resistance to traction and low gas permeability, excellent characteristics for many industrial services, where the high demand of resistance to temperature and pressure must be combined. Other variations – **NASB9G** (Graphited both sides). **NASB9W** (Wire Insert). **NASB9WG** (Wire Insert Graphited both sides).

##### □ TECHNICAL DATA

COLOUR	Pink
Standard sizes (mm) Other upon request	1500 x 1500
Standard thickness (mm). Other upon request	0.8; 1; 1,5 ; 2; 3
Density ( $\pm 10\%$ )	1.6 g/cm <sup>3</sup>
Compressibility ASTM F-36 A	8%-11%
Recovery ASTM F-36 A	>50%
Transverse tensile strength ASTM F-152	13 MPa
Gas permeability DIN 3535/4	<1cm <sup>3</sup> /min
THICKNESS INCREASE ASTM F-146	
ASTM oil N°1 5h 150°C	<1%
ASTM oil N°3 5h 150°C	<3%
ASTM fuel B 5h RT	<5%

Typical properties for 2 mm thickness. DATA CERTIFICATED BY LLOYD'S REGISTER 'S TYPE APPROVAL SYSTEM

#### PRESSURE-TEMPERATURE DIAGRAM



#### P-T OPERATING GUIDELINES

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2- Must refer to British Gaskets Ltd for advice. A technical examination is recommended

3- Area not recommended.

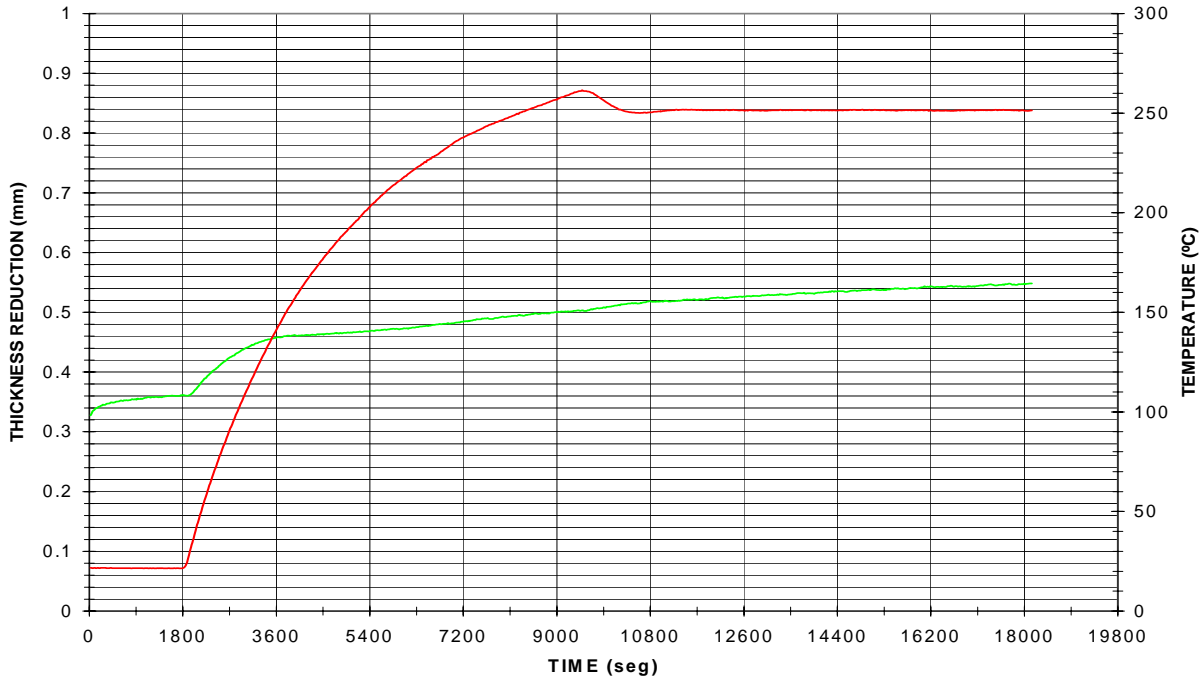
The P-T diagram helps the user or designer who often knows the operating temperature and pressure to carry out an initial selection of a suitable material. The P-T diagram cannot guarantee the suitability of a material for an application.

CERTIFICATIONS: DVGW, WRC (without anti-stick treatment), DIN 1092-I ,  
LLOYD'S REGISTER OF SHIPPING

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# CREEP DEFORMATION HOT CREEP TEST

**NASB9 - 2 mm - 50 MPa - 250 °C**



----- TEMPERATURE INCREASE  
----- THICKNESS DECREASE

FYESA' LABORATORY  
SEPTEMBER 2005

CREEP DEFORMATION: percentage loss of thickness over a specified time under constant load, applied at a specified rate, at a specified temperature.

$$\text{Creep (\%)} = \left( \frac{\text{loss of thickness under load at a specified time}}{\text{initial thickness of the sample}} \right) \times 100$$

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## NASB12 (DIN28091)

### COMPRESSED GASKETING SHEETS FOR STEAM

#### TECHNICAL DATA SHEET

##### □ COMPOSITION

Gasket sheeting, **NASB12** is manufactured with a mix of carbon and aramid fibers in a matrix of high quality synthetic rubbers. This material has a very good mechanical resistance and an acceptable resistance to steam. This material is suitable for a wide range of industrial services.

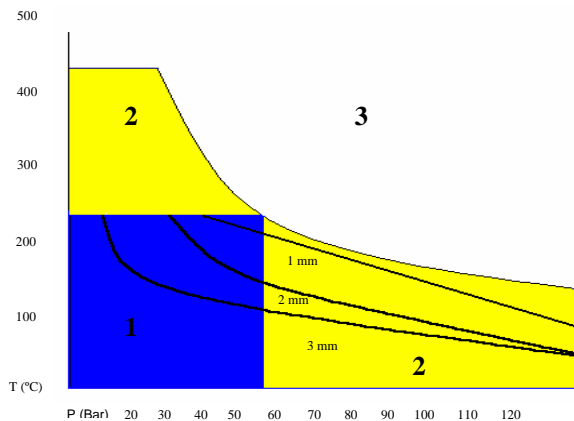
Other variations – **NASB12W** (Wire Insert).

##### □ TECHNICAL DATA

COLOUR	Black
Standard sizes (mm) Other upon request	1500 x 1500
Standard thickness (mm). Other upon request	0,5, 0,8, 1, 1,5, 2, 3
Density ( $\pm 10\%$ )	1,6 g/cm <sup>3</sup>
Compressibility ASTM F-36 A	7% - 15%
Recovery ASTM F-36 A	>45%
Transverse tensile strength ASTM F-152	13 MPa
Gas permeability DIN 3535/6	<1cm <sup>3</sup> /min
THICKNESS INCREASE ASTM F-146	
ASTM oil N°1 5h 150°C	<4%
ASTM oil N°3 5h 150°C	<8%
ASTM fuel B 5h RT	<8%

Typical properties for 2 mm thickness. DATA CERTIFICATED BY LLOYD'S REGISTER 'S TYPE APPROVAL SYSTEM

#### PRESSURE-TEMPERATURE DIAGRAM



#### P-T OPERATING GUIDELINES

1- Usually satisfactory to use without reference to British Gaskets Ltd. Technical examination is normally unnecessary.

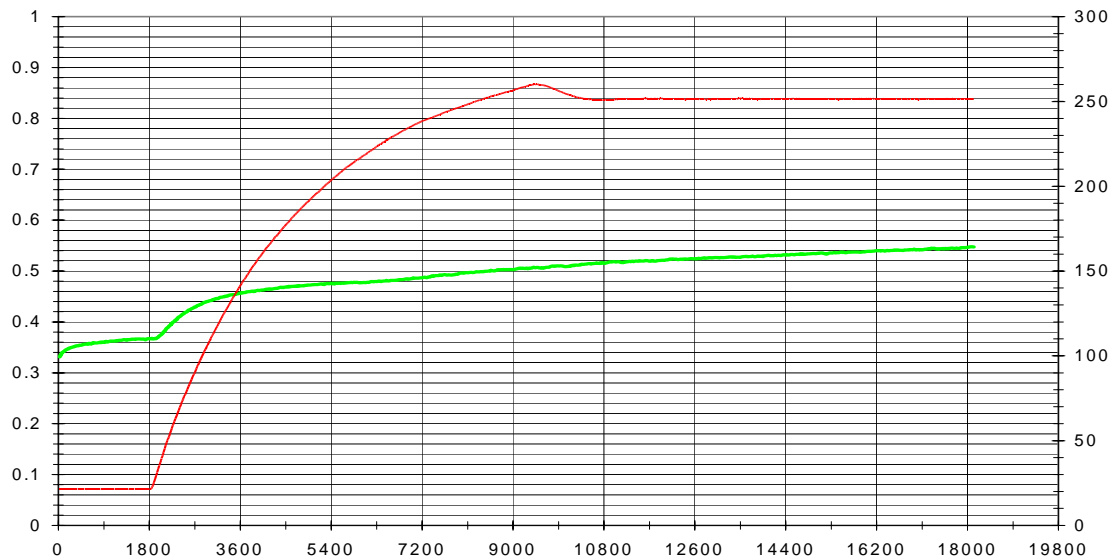
2- Must refer to British Gaskets Ltd for advice. A technical examination is recommended

3- Area not recommended.

The P-T diagram helps the user or designer who often knows the operating temperature and pressure to carry out an initial selection of a suitable material. The P-T diagram cannot guarantee the suitability of a material for an application

# CREEP DEFORMATION / HOT CREEP TEST

NASB12 - 2 m m - 50 MPa - 250 °C



----- TEMPERATURE INCREASE  
----- THICKNESS DECREASE

FYESA' LABORATORY  
SEPTEMBER 2005

CREEP DEFORMATION: percentage loss of thickness over a specified time under constant load, applied at a specified rate, at a specified temperature.

Creep (%) = (loss of thickness under load at a specified time / initial thickness of the sample) x 100

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[http:// www.british-gaskets.co.uk](http://www.british-gaskets.co.uk)



## **Material Safety Data Sheet in accordance with. 91/155 EWG**

Company: **The British Gaskets Group**  
Trade name: **NASB (NonASBestos)**  
Revised on: 23 November 2005  
Authorised by: Mr C K Bickham

### **1. Identification**

1.1 Products: **NASB 5, 6, 7Y, 8X, 9, 12**  
1.2 Manufacturer: The British Gaskets Group  
Bulmer Road Industrial Estate  
Sudbury  
Suffolk, CO10 7HJ  
Tel: 01787 881188 Fax: 01787 880595  
1.3 Emergency Contact: Mr C K Bickham

### **2. Information on ingredients**

Product description: Composite materials based on fibres, fillers and elastomeric binders.

#### **CAS-Nr**

9003-18-3  
001332-58-7  
26125-61-1  
n.a  
7782-42-5  
112926-008

#### **Description**

Elastomers: NBR, SBR and natural rubber.  
Clay.  
Aramid Fibre.  
Mineral wool.  
Carbon Fibre.  
Precipitated silica.

### **3. Hazards identification**

In its form as supplied, the product has no known hazards.

The ingredients are normally firmly bound within this product. When handling the product in an inappropriate way or not in accordance with the intended use, (see 7.1), small quantities of respirable fibrous dust (WHO definition) may be released from the product. The mineral wool contained within this product is classified according to Directive 97/ 69/ EC of the EU-Commission dated 5 December 1997 as carcinogenic-category 3 (substances which cause concern for man owing to possible carcinogenic effects). They are also classified by Directive 97/ 69/ EC as irritant to skin.

#### **4. First-aid measures**

General:	Intensive machining of the product may release coarse and fine dust (see point three).
On aspiration:	n.a
On skin irritation:	Wash with water and soap. If irritation persists, seek medical advice.
On contact with eyes:	Treat particles in the same way as other foreign bodies, rinse thoroughly with water and seek medical advice.
On swallowing:	n.a
Information for the physician:	n.a

#### **5. Fire-fighting measures**

Suitable extinguishing media:	Water, foam, carbon dioxide or dry powder.
Extinguishing media which must not be used for safety reasons:	Not Known.
Combustion products:	Fine dust and usual combustion products of burning rubber.
Special protective equipment For fire-fighters:	Observe normal fire fighting procedure.
Additional information:	Danger of re-ignition after extinguishing.

#### **6. Accidental release measures**

Humans:	See point 8.
Environment:	n.a
Cleaning:	n.a

#### **7. Handling and storage**

##### 7.1 Safe handling

General:	Local regulations may apply. Keep work areas clean.
Good working practice:	Die cutting, water-jet cutting
The following practices may generate higher levels of dust and should be avoided unless additional technical measures are installed:	Grinding, milling, turning, drilling, sawing & sanding.
Technical measures:	In case dust is released, extract ventilation with micro particle filter.
Fire and explosion protection:	Product burns only if intensive fire is applied.
For cleaning:	Use vacuum cleaner equipped with micro particle filter.

##### 7.2 Storage

Ideal storage condition: 25 °C, 50 – 60 % humidity, no direct sunlight.

## **8. Exposure controls/ personal protection**

General dust limit: Local regulations may apply.  
Limit values for respirable mineral fibre dust: Local regulations may apply (see point 3).

### 8.3 Personal protection

Under good working practice (see 7.1) No specific personal protection is needed.

When higher levels of dust may be generated:

Respiratory protection: With dust development and in confined spaces, use disposable facemasks complying with EN 149 FFP1 or FFP2.  
Hand protection: Use suitable gloves.  
Eye protection: With heavy dust development, wear safety goggles.  
Skin protection: Wear loose fitting, long-sleeved, long-legged, closed work clothes (e.g. overalls). Change clothes and wash on completing work.  
Hygiene measures: On completion of work rinse off dust. Never use compressed air.

## **9. Physical and chemical properties**

Appearance: Solid material in sheet form.  
Odour: Slight rubber odour possible.  
pH value: n.a.  
Boiling point: n.a.  
Melting point: n.a.  
Flash point: n.a.  
Decomposition: Release of small fume quantities, starting at about 150 °C.  
Flammability: product burns only if intensive fire is applied.  
Explosive properties: n.a.  
Vapour pressure: n.a.  
Density: 1.5 – 1.7 g/ cm<sup>3</sup> (adapt as necessary).  
Solubility in water: Not soluble.

## **10. Stability and reactivity**

Conditions to be avoided: Use the materials only within the limits specified in the technical data sheets.

Degradation products:

At high temperatures, release of the organic components  
Typical for rubber. (see also point 5).

### **11. Toxicological information**

See point 3.

### **12. Ecological information**

Stable product with no known adverse environmental effects.

### **13. Disposal considerations**

13.1 Product: Local regulations may apply.

13.2 Packing material: Local regulations may apply.

### **14. Transport information**

No special precautions required.

### **15. Regulatory information**

EU classification: This product is not classified.

Labelling: This product is not classified and hence needs no labelling.

### **16. Further information**

The information contained herein is based upon current data considered to be accurate. However, warranty is expressed or implied regarding the accuracy of this data, the results to be obtained from the use thereof, or that at any such use will not infringe upon any patent. This information is furnished as a guide only and upon the conditions that the person receiving it shall make tests to determine the accuracy and suitability for his or her own purpose.

# ***SECTION 2***

*Specialist material specification sheets  
and MSDS*





# The British Gaskets Group

*Best Under Pressure*

## Specification Sheet

An asbestos free sealing material. The raw material is exceptionally heat-resistant. Natural mica reinforced with stainless steel 316.

### Properties:

- Reliable temperature stability at over 800 °C.
- Low minimum compressive load.
- Self adjusting to enlarging gaps.
- No burning or sticking to flanges.

### Typical Applications:

- Burner flanges in heating systems.
- High temperature heat exchangers.
- Gas turbine housings.
- Flange joints of turbochargers and other exhaust gas superchargers.
- Industrial ceramic components.
- Aerospace-turbines and heat exchangers.
- Motor vehicle engines – for fitting between the cylinder head and manifold and in the downstream flange joints of controlled catalytic convection systems.

Colour:	Light Brown/ Gold
Thickness:	1.3, 2.0 & 3.0mm
Tolerance of thickness	+0.2/ -0.1
Standard Sheet Dimensions:	1200mm x 1000mm
Excellent behavior on cutting	

Density of mica layer	(DIN28090-2)	2.0 +0.1 g/cm <sup>3</sup>
Compressibility	(ASTM F-36)	25 - 40 %
Recovery	(ASTM F-36)	10 - 20 %
Thermal conductivity of mica		0.35 W/mK
Maximum Temperature		800 °C

Maximum Pressure		5 Bar
Stress Relaxation	(DIN 429 13)	40 N/mm <sup>2</sup>
Anti Stick Finish	(ASTM F-36A)	Excellent

NASB Gold

## The British Gaskets Group

British Gaskets Limited

Bulmer Road Industrial Estate, Sudbury, Suffolk

Tel: 01787 881188

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Email: [sales@british-gaskets.co.uk](mailto:sales@british-gaskets.co.uk)





# The British Gaskets Group

*Best Under Pressure*

## Material Safety Data Sheet – Mastite Gold

**Issue #1. Dated: 27 November 2002.**

### 1. Identification of the Substance/Preparation and the Company/Undertaking

Substance or preparation trade name: Mastite Gold

British Gaskets Ltd,  
Bulmer Road Industrial Estate,  
Sudbury, Suffolk, CO10 7HJ

Tel number: +44 (0)1787 881188  
Fax number: +44 (0)1787 880595  
E-mail: [sales@british-gaskets.co.uk](mailto:sales@british-gaskets.co.uk)  
[www.british-gaskets.co.uk](http://www.british-gaskets.co.uk)

### 2. Composition

Substance: Mica Metallic insert  
% content:  
CAS Number: 12001-26.2

### 3. Hazards Identification

Most important hazards: As dust, OES is 10mg/3 AIR 8hr. TWA total inhalable dust excessive exposure to dust levels above OES could cause respiratory irritation and deterioration of lung function.  
Specific hazards:

### 4. First aid measures

Skin contact: Wash with soap  
Eye contact: Remove small solid particles and rinse with water for approx. 10 min.  
Ingestion: Not Hazardous - Drink plenty of fluid to assist passage through system.

### 5. Fire fighting measures

Suitable extinguishing media: N.A. Will not support combustion  
Unsuitable extinguishing media: Not known.  
Special hazards in fire: Not known  
Required special protective equipment for fire fighters: None

### 6. Accidental release measures

Personal precautions: Use personal protection equipment  
Environmental precautions: No dangers known  
Methods for cleaning: Use of approved vacuum cleaners with fine dust filters.  
Additional note: In the case of improper use and use which is not in compliance with Stipulations, e.g. grinding, fine dust can result. The appropriate suction and Filtering of the exhaust air should be ensured.

## 7. Handling and storage

Handling: Wear overalls and gloves against cuts and abrasions from protruding metal insert material

Storage: Dry storage rooms.

## 8. Exposure Controls

Engineering measures:

Control Parameters: As dust, OES is 10mg/3 AIR 8hr. TWA total inhalable dust excessive  
Exposure to dust levels above OES could cause respiratory irritation and  
Deterioration of lung function.

Personal protection equipment: Approved light masks, as required, if fine dust particles result after use these are not in compliance with stipulations (cf. 6)

Eye protection: None

Hand protection: Gloves

Hygiene measures: N/A

## 9. Physical and chemical properties

Appearance: Form: Sheets

Colour: Light brown both sides

Odour: Odourless

pH: N/A

Boiling point: N/A

Melting point: 2000 °C

Flashpoint: N/A

Explosive properties: N/A

Vapour pressure: Not measurable

Relative density: 1.9 g/m<sup>3</sup>

Solubility: Insoluble

## 10. Stability and reactivity

Conditions to avoid: Not known

Materials to avoid: Not known

Hazardous decomposition products: Not known

## 11. Toxicological information

Not Applicable

## 12. Ecological information

12.1 Information on elimination (Persistency and degradability)

Degree of elimination: Not known

Evaluation text: Biologically not degradable (self-classification)

12.2 Behaviour in Environmental Compartments

Components: Biologically not degradable. Mobility and (bio) accumulation potential: (self classification)

## 13 Disposal Considerations

Recommendation: Dumping on industrial depositories, attention is to be paid to local statutory Regulations.

## 14. Transport information

None required other than good materials handling practices, beware of protruding metal insert.

## 15. Regulatory information

Regulations for dangerous materials not applicable.



# The British Gaskets Group

*Best Under Pressure*

Pure expanded mineral graphite laminated. Due to the natural characteristics of graphite this is a high quality material with a universal use in high pressure and temperature services. Furthermore, it has excellent resistance to steam.

## CHARACTERISTICS.

This material meets most refinery, petrochemical and industrial service requirements And has unsurpassed leak tight sealability over extended periods of time and service temperature it is permanently resilient, non-hardening, non- ageing, and has infinite shelf life.

Colour:	Black (Graphite)
Thickness: (1.5 mm an above for Tanged)	0.5,0.8,1.0,1.5,2.0,3.0mm
Tolerance of thickness	±0.03mm to ±0.06mm
Standard sheet dimensions:	1000 mm x 1000mm.
Other dimensions on request.	

High temperature creep and blowout resistance, naturally lubricious, requiring no flange release agent, maximum chemical resistance to a wide range of products and Fire safe

## TECHNICAL DATA.

Carbon content:	(JB/T 9141.6)	99%
Ash content:	(ASTM C561)	≤1.0%
Chloride content:	(ASTM F1277)	≤50ppm
Sulphur content:	(ASTM C 816)	≈1300ppm
Flouride content:		≤30ppm
Density:		1.0g/cm <sup>3</sup>
Compressibility:	(ASTM F-36/A)	35 - 55%
Compression factors:	(DIN28091)	KSW 35-55%    KRW 3-5% WSW <4        WRW 3-4%
Resistance strength:	(DIN52913)	>48 MPa
Recovery:	(ASTM F-36/A)	≥9%
Leakage rate:	(DIN 3535)	≤ 0.1 mg/m.s
Tensile Strength:	(ASTM F152)	≥4.0 mpa
<u>Functional temperature range.</u>		
Non-oxidising environment:		-200 to 3000°C
Air or oxygen environment:		-200 to 400°C
Sublimation point:		3300°C
Max pressure:	Laminated	150 bar
	Tanged	200 bar

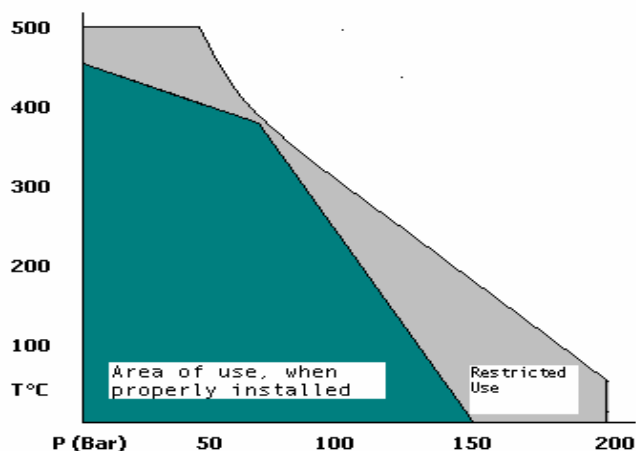
## GRADES

**GRAFTITE LAMINATE:** Laminated with flat 316L stainless steel insert (0.05mm thick) Recommended for steam applications.

**GRAFTITE TANGED:** Laminate mechanically bonded to a 316L stainless steel-tanged insert (0.1 mm thick) – designed for high pressure and temperatures.

GRAFTITE

Temperature v  
Pressure loading of  
typical gasket  
application in Graftite  
materials



## CHEMICAL RESISTANCE

Flexible graphite is resistant to attack by virtually all common organic and inorganic fluids except concentrated, highly oxidizing mineral acids. It is compatible with the entire pH range from 0 to 14 as shown in table 1 below.

Limiting Conditions

FLUID	CONCENTRATION (%)	FLUID TEMPERATURE (°C)
Sulphuric acid	70	170
Nitric acid	10	85
Aqua regia	Any	Any
Chromic	Any	Any

## RESISTANCE TO FLUIDS ASTM-146.

Test fluid immersion Time & temperature	Maximum increase after immersion	
	Thickness (%)	Weight (%)
Fuel B, 70% ISO OCTANO, 30% TOLUENO 5h; room temperature	3	12
ASTM - OIL No. 3 5h. 150 °C	5	-

Good performance and a long service life of gaskets depend in large measures on the fitting and operation conditions, over which The British Gasket Group has no control. The data given on this technical sheet should not be used as application limits, but as guidance for an appropriate choice. We can offer guarantees only for the quality of our products.



# The British Gaskets Group

*Best Under Pressure*

## Material Safety Data Sheet

## Grafitite Tanged & Laminated

Date prepared: 18/06/2000

Date revised: 4/10/2001

### 1. Identification of the Substance/Preparation and the Company/Undertaking

Substance or preparation trade name: Grafitite Tanged and laminated  
Unique reference numbers(s):  
Company/undertaking name & address: British Gaskets Ltd. Bulmer Road Industrial Estate,  
Sudbury, Suffolk, CO10 7HJ  
Telephone number: +44 (0)1787 881188  
Fax number: +44 (0)1787 880595

### 2. Composition

Substance: Expanded graphite                      Metallic insert  
% content:  
CAS Number: 7782-42-5  
Classification:  
EINECS:

### 3. Hazards Identification

Most important hazards: In its form as supplied, has no known hazards  
Specific hazards:

### 4. First aid measures

Skin contact: Wash with soap  
Eye contact: Remove small solid particles and rinse with water for approx. 10 min.  
Ingestion: Not Hazardous - Drink plenty of fluid to assist passage through system.

### 5. Fire fighting measures

Suitable extinguishing media: Water, carbon dioxide, powder extinguishers, foam extinguishers.  
Unsuitable extinguishing media: Not known.  
Special hazards in fire: Not known  
Required special protective equipment for fire-fighters: When Firefighting, breathing apparatus and eye protection have to be worn against dust and fumes and burning rubber.  
Additional note:

## 6. Accidental release measures

Personal precautions:	Use personal protection equipment
Environmental precautions:	No dangers known
Methods for cleaning:	Use of approved vacuum cleaners with fine dust filters.
Additional note:	In the case of improper use and use which is not in compliance with stipulations, e.g. grinding, fine dust can result. The appropriate suction and filtering of the exhaust air should be ensured.

## 7. Handling and storage

Handling:	Wear overalls and gloves against cuts and abrasions from protruding metal insert material
Storage:	Dry storage rooms.

## 8. Exposure Controls

Engineering measures:	
Control Parameters:	
Personal protection equipment:	Approved light masks, as required, if fine dust particles result after use these are not in compliance with stipulations (cf. 6)
Eye protection:	
Hand protection:	Gloves
Hygiene measures:	

## 9. Physical and chemical properties

Appearance:	Form: Sheets Colour: Black both sides Cut Edge: Black
Odour:	Odourless
pH:	
Boiling point:	N/A
Melting point:	N/A
Flashpoint:	N/A
Explosive properties:	N/A
Vapour pressure:	Not measurable
Relative density:	1.0 g/m <sup>3</sup>
Solubility:	Insoluble

## 10. Stability and reactivity

Conditions to avoid:	Not known
Materials to avoid:	Not known
Hazardous decomposition products:	Not known

## **11. Toxicological information**

Not Applicable

## **12. Ecological information**

12.1 Information on elimination (Persistency and degradability)

Degree of elimination: Not known

Evaluation text: Biologically not degradable (self-classification)

12.2 Behaviour in Environmental Compartments

Components: Biologically not degradable. Mobility and (bio) accumulation potential: (self-classification)

Other notes:

## **13 Disposal Considerations**

Recommendation: Dumping on industrial depositories, attention is to be paid to local statutory regulations

## **14. Transport information**

None required other than good materials handling practices, beware of protruding metal insert.

## **15. Regulatory information**

Regulations for dangerous materials not applicable.

## **16. Other Information**

Recommendations/restrictions:

# ***SECTION 3***

*Storage and Shelf Life*



# The British Gaskets Group

*Best Under Pressure*

## Recommendations for the storage and shelf life of Gaskets & Gasket Materials

### General

The British Gaskets Group products are invariably supplied in prime condition and have been specifically manufactured to meet the customer's requirements.

For practical purposes shelf life may be taken to commence from the date the products arrive at your store.

### Storage

Gaskets are precision items of equipment and to maintain their integrity it is necessary to ensure correct storage. We therefore recommend the following storage conditions:

1. **Flat** – gaskets should be stored flat and unstressed, preferably in our original packaging. They should not be rolled, folded, or hung on hooks.
2. **A dry atmosphere** – some materials are hygroscopic and consequently dimensionally unstable in damp conditions.
3. **Temperature** – 20 deg C or below, keep away from radiators and heaters. Lower temperatures will not normally harm gaskets.
4. **Light** – store away from direct sunlight as the ultra-violet content may attack some materials – particularly Polymers.
5. **Ozone** – ensure that within the storage area there is no equipment that is capable of generating ozone, which has a seriously deleterious effect on most Polymers.

### NB

High voltage electrical equipment, electric motors or other equipment, which may give rise to electric sparks or silent electrical discharges.

6. **Clean** – care should be taken to ensure gaskets are not contaminated during storage.
7. **Separation** – gaskets manufactured from different materials should not be stored in the same container or within 150 mm of each other.
8. **Metal** – gaskets should not be stored in direct contact with any metals as this can in some instances adversely affect the gasket material.

# ***SECTION 4***

*Chemical compatibility*





# The British Gaskets Group

Best Under Pressure

## NASB Chemical Resistance Chart

REVISION: 5  
DATE: 03/03/05

		NASB12	NASB5	NASB6	NASB9	NASB7Y	NASB8X
<b>A</b>	Acetaldehyde	CH <sub>3</sub> CHO	B	B	B	B	B
	Acetic acid 100%	CH <sub>3</sub> COOH	B	B	B	A	A
	Acetic Ethyl Ester	CH <sub>3</sub> COOC <sub>2</sub> H <sub>5</sub>	C	C	C	B	B
	Acetone	CH <sub>3</sub> COCH <sub>3</sub>	B	B	B	B	B
	Acetylene	C <sub>2</sub> H <sub>2</sub>	B	B	B	A	A
	Adipic acid	COOH(CH <sub>2</sub> ) <sub>4</sub> COOH	A	A	A	A	A
	Air		A	A	A	A	A
	Alum	KAl(SO <sub>4</sub> ) <sub>2</sub>	A	A	A	A	A
	Aluminium acetate	Al(CH <sub>3</sub> COO) <sub>3</sub>	A	A	B	A	A
	Aluminium chloride	ALCL <sub>3</sub>	A	A	A	A	A
	Ammonia	NH <sub>3</sub>	A	A	A	A	A
	Ammonium bicarbonate	NH <sub>4</sub> HCO <sub>3</sub>	A	A	A	A	A
	Ammonium chloride	(NH <sub>4</sub> )Cl	A	A	A	A	A
	Ammonium hydroxide	NH <sub>4</sub> OH	C	C	C	A	A
	Amyl acetate	CH <sub>3</sub> COOC <sub>5</sub> H <sub>11</sub>	C	C	C	B	B
	Aviation Fuel (kerosene)		B	B	C	A	A
<b>B</b>	Barium chloride	BaCl <sub>2</sub>	A	A	A	A	A
	Benzene (Benzol)	C <sub>6</sub> H <sub>6</sub>	C	C	C	A	A
	Benzoic acid	C <sub>6</sub> H <sub>5</sub> COOH	C	C	C	B	B
	Boiler feed water (alkaline)		A	A	A	A	A
	Borax	Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub> ·10(H <sub>2</sub> O) <sub>10</sub>	B	B	B	A	A
	Boric Acid	H <sub>3</sub> BO <sub>3</sub>	A	A	A	A	A
	Butane	C <sub>4</sub> H <sub>10</sub>	B	B	C	A	A
	Butanone(M.E.K.)		C	C	C	B	B
	Butyl acetate	CH <sub>3</sub> COOC <sub>4</sub> H <sub>9</sub>	C	C	C	B	B
	Butyl alcohol (butanol)	C <sub>4</sub> H <sub>9</sub> OH	A	A	A	A	A
	Butyric acid	C <sub>3</sub> H <sub>7</sub> COOH	A	A	A	A	A
<b>C</b>	Calcium Chloride	CaCl <sub>2</sub>	A	A	A	A	A
	Calcium hydroxide (lime water)	Ca(OH) <sub>2</sub>	A	A	A	A	A
	Calcium hypochlorite	Ca(OCl) <sub>2</sub>	B	B	B	A	A

		NASB12	NASB5	NASB6	NASB9	NASB7Y	NASB8X
	Citric acid	C <sub>6</sub> H <sub>8</sub> O <sub>7</sub>	A	A	A	A	A
	Clophen T 64		C	C	C	B	B
	Copper Sulphate	CuSO <sub>4</sub>	B	B	B	A	A
	Creosote		C	C	C	A	A
	Cresol	C <sub>6</sub> H <sub>4</sub> (OH)CH <sub>3</sub>	C	C	C	B	B
	Cyclohexanol	C <sub>6</sub> H <sub>11</sub> OH	C	C	C	A	A
<b>D</b>	Decalin	C <sub>10</sub> H <sub>18</sub>	C	C	C	A	A
	Di-benzyl ether	(C <sub>6</sub> H <sub>5</sub> CH <sub>2</sub> ) <sub>2</sub> O	C	C	C	C	C
	Di-butyl phthalate	C <sub>6</sub> H <sub>4</sub> (COOC <sub>4</sub> H <sub>9</sub> ) <sub>2</sub>	C	C	C	A	A
	Diesel oil		B	B	C	A	A
	Dimethyl formamide	HCON(CH <sub>3</sub> ) <sub>2</sub>	C	C	C	C	C
	Diphyl (Dowtherm A)		C	C	C	A	A
	Dyeliquor (alkaline, neutral, acidic)		A	A	B	A	A
<b>E</b>	Ethane	C <sub>2</sub> H <sub>6</sub>	B	B	C	A	A
	Ethyl acetate	CH <sub>3</sub> COOC <sub>2</sub> H <sub>5</sub>	C	C	C	B	B
	Ethyl alcohol (ethanol)	C <sub>2</sub> H <sub>5</sub> OH	A	A	A	A	A
	Ethyl chloride	C <sub>2</sub> H <sub>5</sub> Cl	B	B	C	B	B
	Ethylene chloride	(CH <sub>2</sub> Cl) <sub>2</sub>	C	C	C	C	C
	Ethylene glycol	(CH <sub>2</sub> OH) <sub>2</sub>	A	A	A	A	A
	Ethyl ether	C <sub>2</sub> H <sub>5</sub> OC <sub>2</sub> H <sub>5</sub>	C	C	C	A	A
<b>F</b>	Formaldehyde	HCHO	B	B	B	A	A
	Formic acid 10%	HCOOH	B	B	A	A	A
	Formic acid 85%	HCOOH	B	B	A	B	B
	Freon 12	CCl <sub>2</sub> F <sub>2</sub>	B	B	A	A	A
	Freon 22		B	B	A	B	B
<b>G</b>	Glycerine	(CH <sub>2</sub> OH) <sub>2</sub> CHOH	A	A	A	A	A
<b>H</b>	Heating oil		B	B	C	A	A
	Heptane	C <sub>7</sub> H <sub>16</sub>	B	B	C	A	A
	Hydraulic oil (Glycol)		B	B	C	A	A
	Hydraulic oil (mineral)		B	B	C	A	A

A: Suitable B: suitability depends on operating conditions C: not suitable

Carbon dioxide	CO <sub>2</sub>	B	B	B	A	A	A
Carbon disulfide	CS <sub>2</sub>	C	C	C	C	C	C
Carbon tetrachloride	CCl <sub>4</sub>	C	C	C	B	B	B
Castor oil		A	A	A	A	A	A
Chlorine (dry)	Cl <sub>2</sub>	C	C	C	A	A	A
Chlorine (wet)	Cl <sub>2</sub>	C	C	C	A	A	A
Chloroform	CHCl <sub>3</sub>	C	C	C	B	B	B
Chromic acid	H <sub>2</sub> CrO <sub>4</sub>	C	C	C	B	B	B

Hydraulic oil (phosphate ester)		B	B	C	A	A	A
Hydrochloric Acid 20%	HCl	C	C	C	A	A	A
Hydrochloric Acid 37%	HCl	C	C	C	A	A	A
Hydrofluoric Acid 10%	HF	C	C	C	A	A	A
Hydrogen	H <sub>2</sub>	A	A	B	A	A	A
Hydrogen chloride (dry)	HCl	C	C	C	A	A	A
Hydrogen peroxide (up to 6%ww)	H <sub>2</sub> O <sub>2</sub>	C	C	C	A	A	A
Iso-octane	(CH <sub>3</sub> ) <sub>3</sub> CCH <sub>2</sub> (CH <sub>3</sub> ) <sub>2</sub>	B	B	C	A	A	A

Note: The information in this chart should only be used as a general guide to the selection of a suitable material

1/2

REVISION:  
DATE: 03/03/05

5

		NASB12	NASB5	NASB6	NASB9	NASB7Y	NASB8X
	Iso-propyl alcohol (CH <sub>3</sub> ) <sub>2</sub> CHOH	A	A	A	A	A	A
<b>K</b>	Kerosene (Paraffin)	B	B	C	A	A	A
<b>L</b>	Lactic acid 50% CH <sub>3</sub> CHOHCOOH	A	A	A	A	A	A
	Linseed oil	B	B	C	A	A	A
<b>M</b>	Magnesium sulphate MgSO <sub>4</sub>	B	B	B	A	A	A
	Malic acid C <sub>4</sub> H <sub>6</sub> O <sub>5</sub>	B	B	B	A	A	A
	Methane CH <sub>4</sub>	B	B	C	A	A	A
	Methyl alcohol CH <sub>3</sub> OH	A	A	A	A	A	A
	Methyl chloride CH <sub>3</sub> Cl	C	C	C	B	B	B
	Methylene chloride CH <sub>2</sub> Cl <sub>2</sub>	C	C	C	B	B	B
	Methyl ethyl Ketone CH <sub>3</sub> COC <sub>2</sub> H <sub>5</sub>	C	C	C	C	C	C
	Mineral oil- ASTM No. 1	B	B	C	A	A	A
	Mineral oil- ASTM No.3	B	B	C	A	A	A
<b>N</b>	Naphtha	C	C	C	A	A	A
	Nitric acid 20% HNO <sub>3</sub>	C	C	C	C	C	C
	Nitric acid 40% HNO <sub>3</sub>	C	C	C	C	C	C
	Nitric acid 96% HNO <sub>3</sub>	C	C	C	C	C	C
	Nitrogen N <sub>2</sub>	A	A	A	A	A	A

		NASB12	NASB5	NASB6	NASB9	NASB7Y	NASB8X
	Potassium nitrate (saltpetre) KNO <sub>3</sub>	A	A	A	A	A	A
	Potassium permanganate KMnO <sub>4</sub>	B	B	C	A	A	A
	Producer gas (generator gas)	B	B	C	A	A	A
	Propane C <sub>3</sub> H <sub>8</sub>	B	B	C	A	A	A
	Pydrol	C	C	C	A	A	A
	Pyridine C <sub>5</sub> H <sub>5</sub> N	C	C	C	B	B	B
<b>R</b>	Rapeseed oil	C	C	C	A	A	A
<b>S</b>	Sea water	A	A	A	A	A	A
	Silicone oil	A	A	A	A	A	A
	Sodium aluminate Na <sub>2</sub> AlO <sub>3</sub>	A	A	A	A	A	A
	Sodium bicarbonate NaHCO <sub>3</sub>	A	A	A	A	A	A
	Sodium bisulphite NaHSO <sub>3</sub>	A	A	A	A	A	A
	Sodium chloride (salt) NaCl	A	A	A	A	A	A
	Sodium hydroxide NaOH	A	A	A	A	A	A
	Sodium silicate (water glass) Na <sub>4</sub> SiO <sub>4</sub>	A	A	A	A	A	A
	Sodium sulphate Na <sub>2</sub> SO <sub>4</sub>	B	B	B	A	A	A
	Sodium sulphide Na <sub>2</sub> S	B	B	B	B	B	B
	Steam H <sub>2</sub> O	A	A	A	A	A	A

## MEDIUM

<b>O</b>	Octane	$C_8H_{18}$	C	C	C	A	A	A
	Oleic acid	$C_{17}H_{33}COOH$	C	C	C	A	A	A
	Oxalic acid	$(COOH)_2$	B	B	B	B	B	B
<b>P</b>	Palmitic acid	$C_{15}H_{31}COOH$	B	B	C	A	A	A
	Pentane	$C_5H_{12}$	B	B	C	A	A	A
	Perchloroethylene	$C_2Cl_4$	C	C	C	B	B	B
	Petrol		B	B	C	A	A	A
	Petroleum ether		A	A	B	A	A	A
	Phenol	$C_6H_5OH$	C	C	C	C	C	C
	Phosphoric acid (all conc)	$H_3PO_4$	B	B	B	A	A	A
	Phthalic acid	$C_6H_4(COOH)_2$	A	A	A	A	A	A
	Potassium acetate	$CH_3COOK$	A	A	B	A	A	A
	Potassium carbonate	$K_2CO_3$	A	A	A	A	A	A
	Potassium chlorate	$KClO_3$	A	A	A	A	A	A
	Potassium chloride	$KCl$	A	A	A	A	A	A
	Potassium cyanide	$KCN$	A	A	A	A	A	A
	Potassium dichromate	$K_2Cr_2O_7$	B	B	B	A	A	A
	Potassium hydroxide	$KOH$	B	B	B	B	B	B
	Potassium hypochlorite	$KClO$	A	A	A	A	A	A

	Stearic acid	$C_{17}H_{35}COOH$	B	B	B	A	A	A
	Sulphur dioxide	$SO_2$	B	B	B	B	B	B
	Sulphuric acid 30%	$H_2SO_4$	C	C	C	C	C	C
	Sulphuric acid 50%	$H_2SO_4$	C	C	C	C	C	C
	Sulphuric acid 96%	$H_2SO_4$	C	C	C	C	C	C
	Sulphurous acid	$H_2SO_3$	B	B	B	B	B	B
<b>T</b>	Tannic acid	$C_{76}H_{52}O_{46}$	A	A	A	A	A	A
	Tartaric acid	$(CHOHCOOH)_2$	B	B	C	A	A	A
	Tetrachlorethane	$C_2H_2Cl_4$	C	C	C	B	B	B
	Tetralin	$C_{10}H_{12}$	C	C	C	A	A	A
	Toluene	$C_6H_5CH_3$	C	C	C	A	A	A
	Town's gas		A	A	A	A	A	A
	Transformer oil		B	B	C	A	A	A
	Trichloroethylene	$C_2HCl_3$	C	C	C	B	B	B
	Turpentine		B	B	C	A	A	A
<b>V</b>	Vinyl acetate	$CH_3COOC_2H_3$	A	A	A	A	A	A
<b>W</b>	Water	$H_2O$	A	A	A	A	A	A
	White spirit		B	B	B	A	A	A
<b>X</b>	Xylol (Xylene)	$C_6H_4(CH_3)_2$	C	C	C	A	A	A

Note: The information in this chart should only be used as a general guide to the selection of a suitable material

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# The British Gaskets Group

*Best Under Pressure*

## British Gaskets Ltd

### Chemical Compatibility with Refrigerants

<b>BG Ref</b>	<b>NASB9</b>	<b>NASB5</b>	<b>NASB6</b>
Freon 11	yes	no	no
Freon 12	yes	yes	no
Freon 13	yes	yes	yes
Freon 21	no	no	no
Freon 22	no	no	yes
Freon 31	no	no	yes
Freon 32	yes	yes	yes
Freon 112	yes	no	no
Freon 113	yes	yes	no
Freon 114	yes	yes	yes
Freon 115	yes	yes	yes
Freon 142b	yes	yes	yes
Freon 152a	yes	yes	yes
Freon 218	yes	yes	yes
Freon C316	yes	yes	yes
Freon C318	yes	yes	yes
Freon 13B1	yes	yes	yes
Freon 114B2	yes	no	no
Freon 502	yes	yes	yes
Freon TF	yes	no	no
Freon T-WD602	yes	no	no
Freon TMC	yes	no	no
Freon T-P35	yes	yes	yes
Freon TA	yes	no	no
Freon TC	yes	no	no
Freon MF	yes	no	no
Freon BF	yes	no	no