

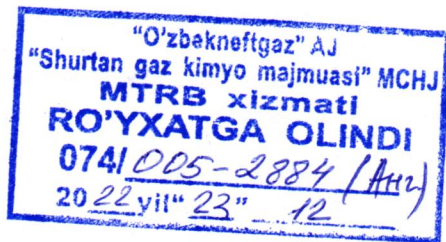
«APPROVED»

Chief Mechanic of

“Shurtan GCC” LLC

Kh. Allayorov

2022 y.



<b>ТЕХНИЧЕСКОЕ ЗАДАНИЕ</b> на закупку Tetrabor Boron Carbide Paste F 400, F 600 для нужд ООО «Шуртанский ГХК»	<b>TECHNICAL ASSIGNMENT</b> for the purchase of Tetrabor Boron Carbide Paste F 400, F 600 for the needs Shurtan gas chemical complex, LLC
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<b>1. ОБЩИЕ СВЕДЕНИЯ</b>	<b>1. GENERAL INFORMATION</b>
<b>1.1 Наименование</b>	<b>1.1 Name</b>
Tetrabor Boron Carbide Paste F 400, F 600.	Tetrabor Boron Carbide Paste F 400, F 600.
<b>1.2 Основание и цель приобретения товара</b>	<b>1.2 Reason and purpose of purchasing the goods</b>
Основание: Внеплановая заявка на 2023 год. Цель: Для проведения притирочных работ во время ремонта запорной арматуры и насосного оборудования.	Reason: An unscheduled application for 2023. Purpose: For carrying out lapping works during the repair of shut-off valves and pumping equipment.
<b>1.3 Сведения о новизне</b>	<b>1.3 Notice of novelty</b>
Товар должен быть новым, пригодным для использования и произведён не позднее чем за 6 месяцев до самой поставки товара.	The goods must be new, usable and produced no later than 6 months before the delivery of the goods.

**2. ТЕХНИЧЕСКИЕ ТРЕБОВАНИЯ / 2. TECHNICAL REQUIREMENTS**

<b>2.1 Основные технические требования / 2.1 Basic technical requirements</b>				
<b>Классификация / Classification</b>	<b>Размер зерна / Grain size</b>	<b>Упаковка / packing</b>	<b>Объём / volume</b>	<b>Количество / Quantity</b>
F 400	32-8 µm	Тара / container	750 мл. / 750 ml	2 шт. / 2 pcs
F 600	19-3 µm	Тара / container	750 мл. / 750 ml	2 шт. / 2 pcs
<b>2.2 Требования к маркировке</b>			<b>2.2 Labeling requirements</b>	
На каждую единицу тары наносят маркировку с указанием: <ul style="list-style-type: none"> <li>• наименование вида товара (условное наименование) и (или) обозначение типа товара;</li> <li>• номинальные значения основных параметров;</li> <li>• дату изготовления; товарный знак или наименование предприятия-изготовителя.</li> <li>• юридический адрес изготовителя или продавца.</li> <li>• масса нетто</li> <li>• дата изготовления (месяц, год)</li> </ul>			Each unit of packaging is marked with the indication: <ul style="list-style-type: none"> <li>• the name of the type of goods (conditional name) and (or) the designation of the type of goods;</li> <li>• nominal values of the main parameters;</li> <li>• date of manufacture; trademark or name of the manufacturer.</li> <li>• the legal address of the manufacturer or seller.</li> <li>• net weight</li> <li>• date of manufacture (month, year)</li> </ul>	

**3. ТРЕБОВАНИЯ ПО ПРАВИЛАМ СДАЧИ И ПРИЕМКИ /**

**3. REQUIREMENTS FOR THE RULES OF DELIVERY AND ACCEPTANCE**

<b>3.1 Порядок сдачи и приемки</b>	<b>3.1 Order of delivery and acceptance</b>
Приемка и входной контроль Продукции на соответствие количеству, качеству выполняется на складе Заказчика. В случае несоответствия поставляемого товара с заказной спецификацией или если товар не прошел входной контроль качества, Поставщик обязан заменить его в течение срока, указанного в договоре на поставку. Транспортные расходы при замене товара берет на себя Поставщик товара.	Acceptance and input control of Products for compliance with quantity and quality is carried out at the Customer's warehouse. In case of non-conformity of the delivered goods with the ordered specification or if the goods have not passed the entrance quality control, the Supplier is obliged to replace it within the period specified in the delivery contract. The transportation costs for the replacement of the goods are borne by the Supplier of the goods.

<p><b>3.2 Требования по передаче заказчику технических и иных документов при поставке товара</b></p>	<p><b>3.2 Requirements for the transfer to the customer of technical and other documents upon delivery of goods</b></p>
<ul style="list-style-type: none"> <li>- Руководство по эксплуатации (паспорт) на русском языке,</li> <li>- сертификат на материалы;</li> <li>- сертификаты качества и соответствия, выписанного производителем.</li> <li>- сертификат о стране происхождения товара;</li> <li>- паспорт безопасности товара.</li> </ul>	<ul style="list-style-type: none"> <li>- Operating manual (passport) in Russian,</li> <li>- certificate for materials;</li> <li>- certificates of quality and conformity issued by the manufacturer.</li> <li>- certificate of the country of origin of the goods;</li> <li>- product safety data sheet.</li> </ul>

**4. ТРЕБОВАНИЯ К КАЧЕСТВУ И КЛАССИФИКАЦИИ /  
4. REQUIREMENTS FOR QUALITY AND CLASSIFICATION**

<p>Качество товара должно соответствовать установленным стандартам и техническим условиям завода-изготовителя и подтверждаться сертификатом заводских испытаний, выдаваемых заводом-изготовителем. Срок гарантии качества не менее 3 лет.</p>	<p>The quality of the goods must comply with the established standards and specifications of the manufacturer and be confirmed by a certificate of factory tests issued by the manufacturer. The quality guarantee period is at least 3 years.</p>
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**5. ТРЕБОВАНИЯ К КОЛИЧЕСТВУ, КОМПЛЕКТАЦИИ, МЕСТУ И СРОКУ (ПЕРИОДИЧНОСТИ) ПОСТАВКИ  
5. REQUIREMENTS FOR QUANTITY, CONFIGURATION, PLACE AND TIME (PERIODICITY) OF DELIVERY**

<p>Количество согласно пункту 2.1 данного технического задания. Время и место доставки определяется предложением поставщика и договором.</p>	<p>Quantity according to paragraph 2.1 of this technical specification. The time and place of delivery is determined by the supplier's offer and the contract</p>
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*Примечание: За правильность заполнения и незаполненные пункты ответственность несёт разработчик*  
\*Note: The developer is responsible for the correctness of filling and unfilled items.

Разработчики: / **Designed by:**

Заместитель главного механика:  
**Deputy Chief Mechanical engineer**




**E. Karagadaev**

Инженер ОГМ:  
**ChMD Engineer:**



**F. Botirov**

Ведущий инженер СУМТР:  
**Lead engineer of MTRMS:**



**U. Khidirov**

Начальник РМЦ:  
**Head of the Mechanical Repair Shop:**



**S. Quvatov**

Начальник участка РМЦ:  
**Head of the section of the Repair and mechanical shop:**



**A. Muqimov**



*Настоящее техническое задание составлено на русском и английском языках.  
При наличии разногласий между русским и английским языками, текст на русском языке будет превалировать.*

***This technical assignment is drafted in Russian and English languages. In case of discrepancies between the Russian and English languages, the Russian language shall prevail.***



# TETRABOR® BORON CARBIDE GRAINS AND POWDERS

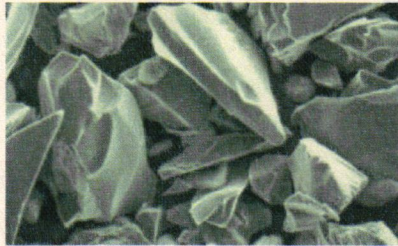
## Grains and powders for various applications in

- Metal-matrix composites
- Sintering technology
- Packed grid applications

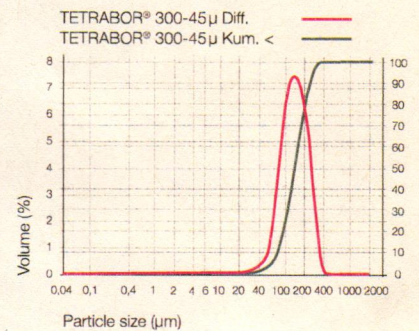
TETRABOR® boron carbide is available as controlled particle size powders and closely sized, graded grits in the range 1 micron to 20-30 mm. Very coarse material is available in different particle sizes and purity levels. All grits conform to the specification of FEPA (Federation of European Producers of Abrasive Products). For particle size and chemical analysis values see tables.

Further grits, special grades and high-purity B<sub>4</sub>C grits on request.

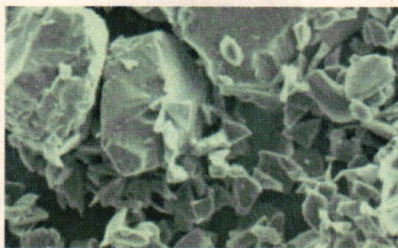
## TETRABOR® 300-45μ



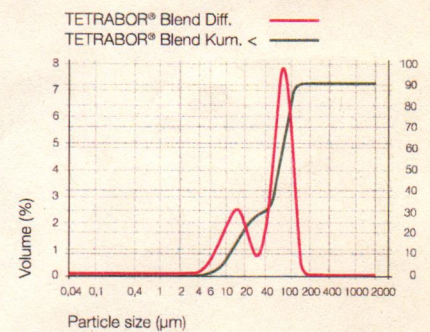
50.0 μm



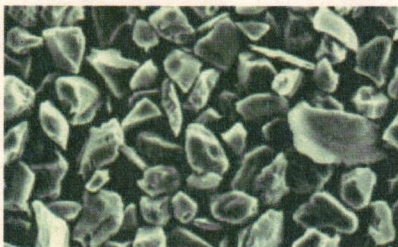
## TETRABOR® Blend



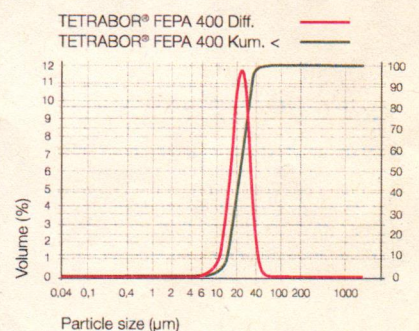
50.0 μm



## TETRABOR® FEPA 400

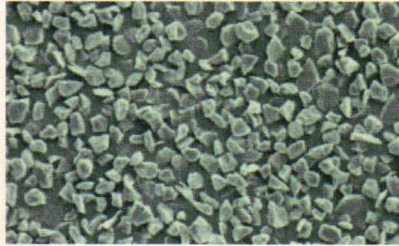


20.0 μm

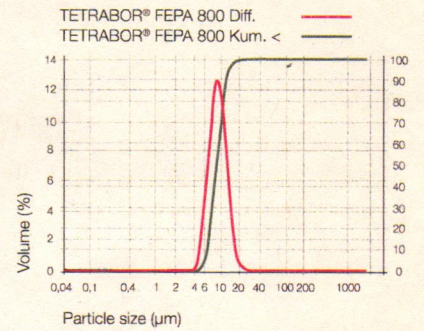




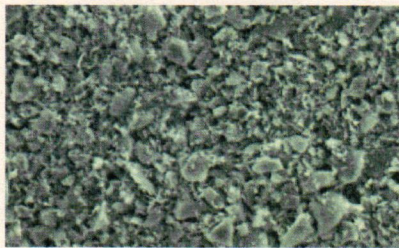
### TETRABOR® FEPA 800



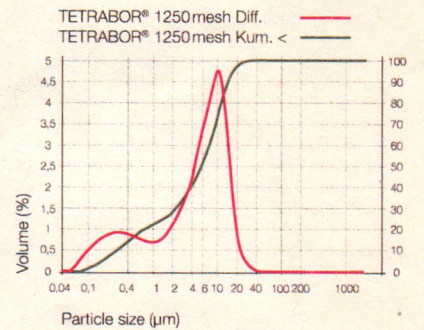
20.0 µm



### TETRABOR® 1250 mesh



20.0 µm



### ESK Standard FEPA program

Grain-No	Particle size indication	macro grains
FEPA 10	2360 - 1700 µm	
FEPA 20	1180 - 850 µm	
FEPA 40	500 - 355 µm	
FEPA 60	300 - 212 µm	
FEPA 80	212 - 160 µm	
FEPA 100	150 - 106 µm	
FEPA 150	106 - 63 µm	
FEPA 180	90 - 53 µm	
FEPA 220	75 - 45 µm	

Grain-No	Particle size indication	micro grains
FEPA 240	70 - 28 µm	
FEPA 280	59 - 22 µm	
FEPA 320	49 - 16,5 µm	
FEPA 360	40 - 12 µm	
FEPA 400	32 - 8 µm	
FEPA F500	25 - 5 µm	
FEPA 600	19 - 3 µm	
FEPA 800	14 - 2 µm	
FEPA 1000	10 - 1 µm	
FEPA 1200	7 - 1 µm	
1500 F	ca 5 µm and finer	
3000 F	ca. 0,8 µm	

TETRABOR® / e - 0906

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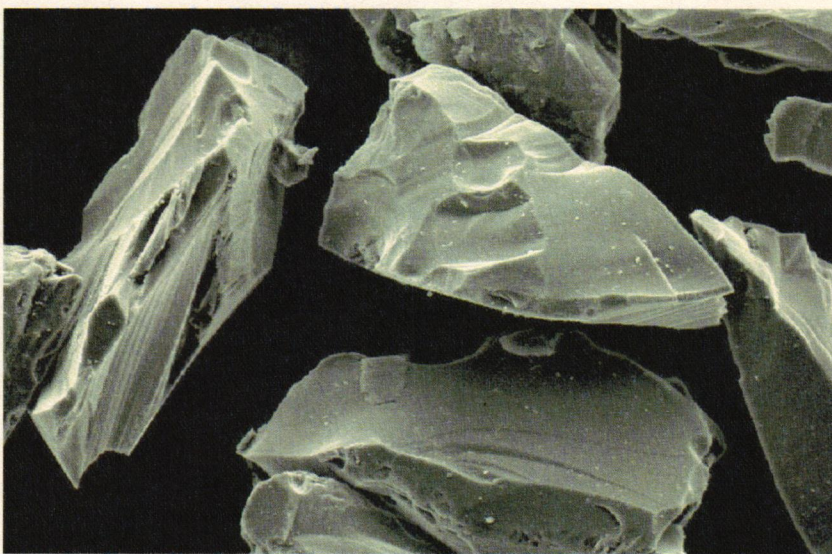


# TETRABOR® BORON CARBIDE GRAINS AS ABRASIVES AND LAPPING AGENTS

ESK has been a manufacturer of boron carbide since 1940, and is now the biggest producer in the western world.

Our many years of experience have made us your expert partner for grains, R&D and laboratory testing. TETRABOR® from ESK has a constant high purity thanks to the way it is manufactured. It contains almost the exact theoretical boron to carbon ratio of 4.3.

TETRABOR® boron carbide is a high-performance abrasive with a hardness and chemical resistance comparable to that of diamond. Thanks to its extreme hardness, TETRABOR® is often known as “black diamond,” and is ideal for machining hard materials by lapping, sawing or ultrasonic drilling.



## Advantages

- Rapid machining thanks to extreme hardness
- Constant quality

## Typical Assay

Product data	
B	min. 76
C	min. 19.5
B <sub>2</sub> O <sub>3</sub>	max. 0.5
Fe	max. 0.2
O	max. 1.0
N	max. 1.0
Si	max. 0.3



## Application

### Lapping

Lapping is the most common final machining method for flat and plane surfaces. TETRABOR® has a much higher hardness (Mohs 9.5+) than tungsten carbide (WC), titanium carbide (TiC), aluminum oxide (Al<sub>2</sub>O<sub>3</sub>), zirconium oxide (ZrO) and silicon carbide (SiC), thus ensuring fast and problem-free machining of wear-resistant hard metal and ceramic grades.

### Ultrasonic Boring of Glass, Semi-Precious Stones and Ceramics

Ultrasonic boring is suitable for boring almost any desired profile of hard and brittle materials. As abrasive, TETRABOR® achieves, in a single machining operation, dimensional stability, contour fidelity and sharp angles at all corners, as well as at the inlet and outlet. At the same time, outstanding surface quality is achieved without the slightest change of the structure of the machined surfaces.

### Wire Sawing of Ceramics with Boron Carbide

TETRABOR® is ideally suited for wire sawing of oxidic and non-oxidic ceramics, and especially sapphire.

TETRABOR® makes the sawing of ceramics easy, since it has a higher hardness than aluminum oxide (Al<sub>2</sub>O<sub>3</sub>), zirconium oxide (ZrO), silicon carbide (SiC) and synthetic sapphire.

Thanks to the use of TETRABOR®, the cut surfaces have excellent quality with a planarity of  $\pm 5 \mu\text{m}$ , which makes lapping much easier and more cost effective.

## Delivery Program

TETRABOR® boron carbide can be supplied either as grain mixtures and in narrow grain size ranges according to the FEPA standard. Grain size range 0.8  $\mu\text{m}$  to over 20 mm. For grain sizes and typical assay values, see the table.

### Standard Delivery Program acc. to FEPA

Grain designation	Mean diameter	
F10	2360 - 1700 $\mu\text{m}$	Macrogrit
F20	1180 - 850 $\mu\text{m}$	
F40	500 - 355 $\mu\text{m}$	
F60	300 - 212 $\mu\text{m}$	
F80	212 - 160 $\mu\text{m}$	
F100	150 - 106 $\mu\text{m}$	
F150	106 - 63 $\mu\text{m}$	
F180	90 - 53 $\mu\text{m}$	
F220	75 - 45 $\mu\text{m}$	
F240	70 - 28 $\mu\text{m}$	
F280	59 - 22 $\mu\text{m}$	
F320	49 - 16,5 $\mu\text{m}$	
F360	40 - 12 $\mu\text{m}$	
F400	32 - 8 $\mu\text{m}$	
F500	25 - 5 $\mu\text{m}$	
F600	19 - 3 $\mu\text{m}$	
F800	14 - 2 $\mu\text{m}$	
F1000	10 - 1 $\mu\text{m}$	
F1200	7 - 1 $\mu\text{m}$	

### Outside the FEPA Standard

Grain designation	Mean diameter	
1500 F	approx 5 $\mu\text{m}$ and finer	
3000 F	approx. 0.8 $\mu\text{m}$	

Other grains, special grades and high-purity B4C grains are available on demand

### Storage

TETRABOR® should be properly stored.

PL/TETRABOR® grains as abrasives and lapping agents / e - 10-2007

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# TETRABOR® BORON CARBIDE TECHNICAL DATA

			Boron Carbide
Material properties	Norm	Symbol/Unit	TETRABOR®
Density	DIN EN 623-2	$\rho$ [g/cm <sup>3</sup> ]	> 2,48
Porosity	DIN EN 623-2	P [%]	< 0,5
Mean grain size		[ $\mu$ m]	< 15
Aspect ratio (L/D)			-
Phase composition			B <sub>4</sub> C, C
Vickers hardness	DIN EN 843-4	HV 1 [GPa]	31
Knoop hardness	DIN EN 843-4	HK 0.1 [GPa]	29
Young's modulus	DIN EN 843-2	E [GPa]	420
Weibull modulus	DIN EN 843-5	m	15
Flexural strength, 4-pt bending	DIN EN 843-1	$\sigma_b$ [MPa]	450
Compressive strength		$\sigma_c$ [MPa]	> 2800
Poisson ratio		$\nu$	0,15
Fracture toughness (SENB)		$K_{Ic}$ [MPa·m <sup>0.5</sup> ]	5
Coefficient of thermal expansion	DIN EN 821-1		
20 °C - 500 °C		$\alpha$ [10 <sup>-6</sup> /K]	4,5
500 °C - 1000 °C		$\alpha$ [10 <sup>-6</sup> /K]	7,2
Specific heat at 20 °C	DIN EN 821-3	$c_p$ [J/g K]	1
Thermal conductivity at 20 °C	DIN EN 821-2	$\lambda$ [W/m K]	40
Thermal stress parameters	calculated		
$R_1 = \sigma_b \cdot (1 - \nu) / (\alpha \cdot E)$		[K]	202
$R_2 = R_1 \cdot \lambda$		[W/mm]	8
Specific electrical resistance at 20 °C	DIN EN 50359	$\rho$ [ $\Omega$ cm]	1

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# TETRABOR® PASTES AS ABRASIVES AND LAPPING AGENTS

TETRABOR® boron carbide pastes are general-purpose abrasives and lapping agents. The high material-removal rates and the surface qualities that can be achieved permit cost-effective lapping and fine grinding of precision parts of all kinds from a diverse range of materials. This is the result of the extreme hardness of boron carbide at 9.5+ Mohs.



TETRABOR® oil and water-based pastes

## Application

TETRABOR® is used in mechanical engineering and all areas where cost-effective lapping and fine grinding are required. From plastics (e.g. Teflon), non-ferrous metals, steels, through titanium to hard metals, TETRABOR® pastes are ideal for machining all materials. Even with very rough surfaces, a metal sealing surface (less than 1.4  $\mu\text{m}$ ) can be achieved in two operations, e.g. by coarse pre-grinding with a grain of F220 and final grinding with a grain of F400. Applications for TETRABOR® include the machining of drawing dies, molds and dies of all kinds, wire guides, valves, valve seats, cylinder bushes, cylinder faces, injection pumps, hardened bearing surfaces, gauges, cutting and blanking tools, reamers, mill cutters, optical lenses, natural and synthetic gemstones and all ceramics.

## Advantages

- Short machining times thanks to high material-removal rates
- High surface quality thanks to the narrow grain-size distribution
- Heat resistance up to 350 °C
- Uniform grinding even at high temperatures
- Low environmental impact





# TETRABOR® PASTES AS ABRASIVES AND LAPPING AGENTS

## Directions for Use and Processing

TETRABOR® water-based pastes can be used at application temperatures up to 200 °C. The polyalcohols used in the water-soluble pastes are almost completely biodegradable (>90 %), and is therefore rated 0 according to German water hazard classification.

Suitable diluents include water (preferably demineralized) and polyethylene glycol 400 (PEG 400). Only add water drop by drop, since larger amounts of water can dissolve and extract the polyalcohols in the paste base.

At service temperatures from >100 °C up to max. 200 °C, PEG 400 should be used as diluent – which is also a component of the paste base.

The machined surfaces can be cleaned with water. Important: protect against rusting!

TETRABOR® water-based pastes are suitable for use at application temperatures from 200 to 350 °C. For rust protection reasons, this grade of paste can also be used at low temperatures. It can be diluted with oil or kerosene if necessary. We recommend using benzene or kerosene to clean the machined parts.

## Delivery Program

- TETRABOR® oil-based paste
  - TETRABOR® water-based paste
- Standard pastes with the following grain classifications are available. This covers the application range from coarse material removal to extremely fine precision machining

Grain designation	Grain size in µm*
F60	300 -212
F100	150 -106
F220	75 - 45
F320	49 - 17
F400	32 - 8
F600	19 - 3
F800	14 - 2
F1000	10 - 1
F1200	7 - 1

\*Grain-size according to FEPA standard (Eppendorf photosedimentometer)  
\*Other grain sizes on request

## Container Sizes

75 ml tube or 750 ml jar


## Storage

Store tubes and jars in a cool, dry place.

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