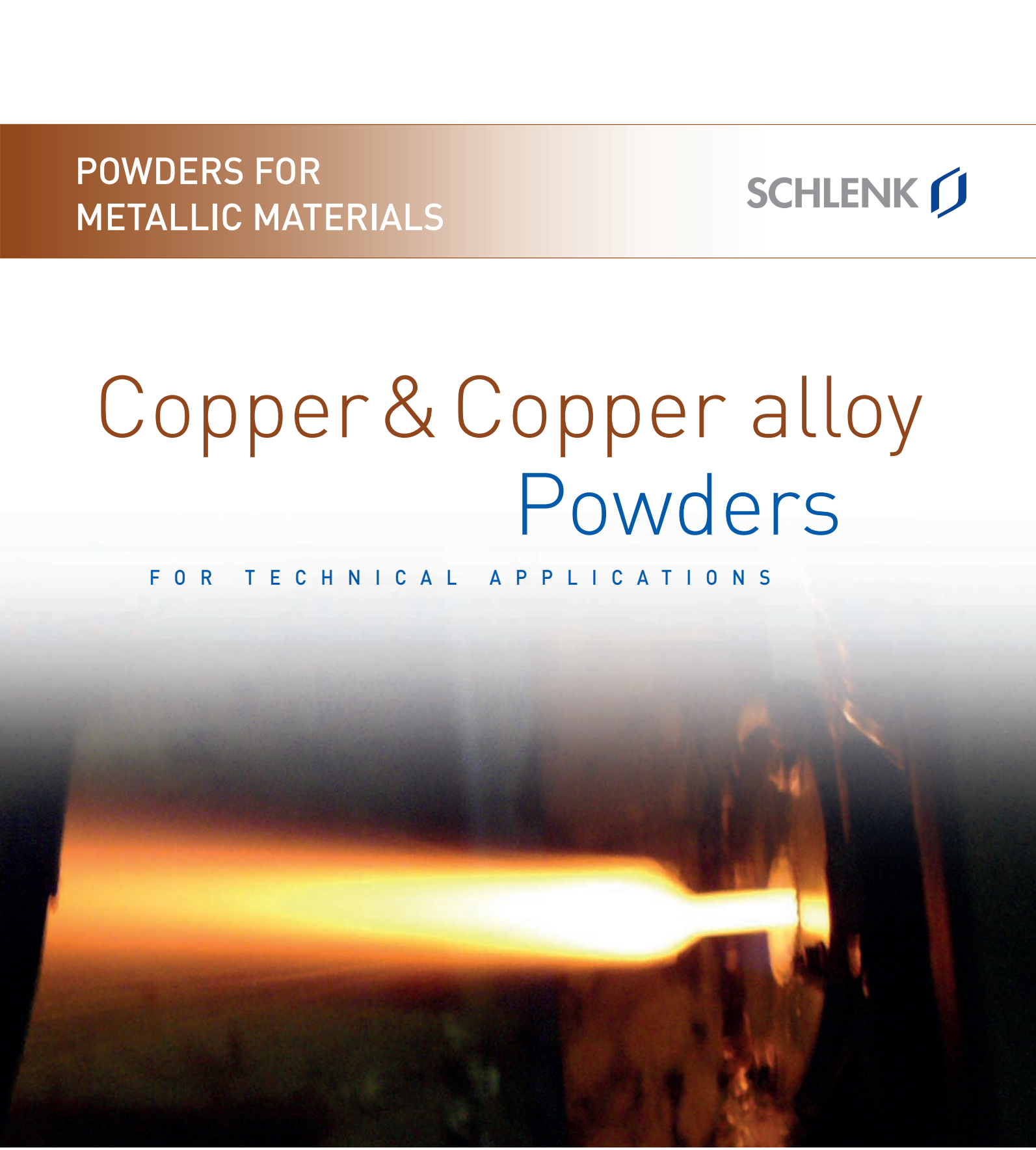
POWDERS FOR
METALLIC MATERIALS

SCHLENK

Copper & Copper alloy Powders

FOR TECHNICAL APPLICATIONS



POWDERS FOR METALLIC MATERIALS

Content

General Introduction

Ever since there has been metallurgy, a wide range of metals and alloys have been applied by many different techniques.

Schlenk Metallic Pigments GmbH, a member of Carl Schlenk AG, offers perfect solutions through its portfolio of atomized copper and copper alloy powders.

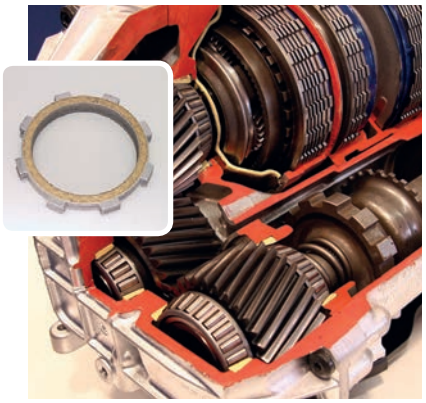
SCHLENK works in close cooperation with customers to provide the best product quality and service.

As one of the leading powdered metal suppliers we support the following markets:

- bearings
- friction and brake linings
- contact materials
- compounds
- soldering and joining materials
- blasting abrasive materials
- lubricants
- powder metallurgy
- sintering materials
- chemical-technical applications
- and other similar niche applications

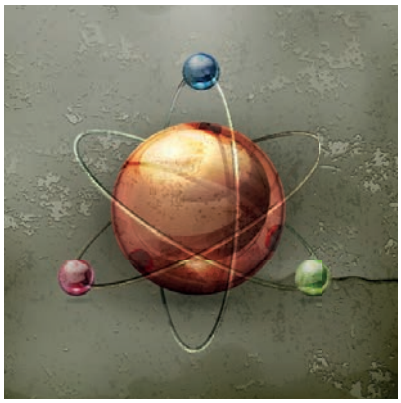
Applications

frictions



contact materials

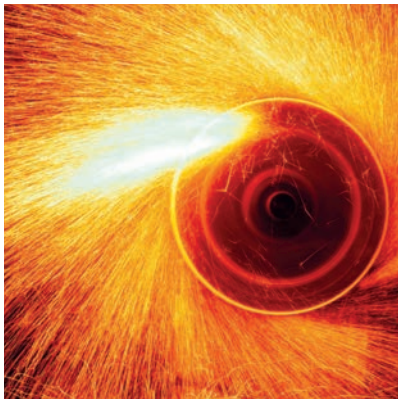
chemical applications



brake linings

bearings

diamond tools



Metal powders

SCHLENK metal powders are based on copper & copper alloys. The powder production process includes the following steps: smelting, alloying (bronze and brass), classification, homogenization and packaging.

Copper powder

In the area of metallic materials, SCHLENK copper powders are produced from high purity electrolytic copper or refined copper (minimum purity of 99.99%).

Spherical copper powders are produced through melting with the addition of small amounts of phosphorus (max. 0.4%) and by air atomization. They are available as Rogal® Copper Powder GK* in various particle size distributions.

Further grinding in a ball mill generates lamellar copper powder, known as Cubrotec. This product is used in carbon brushes and various technical processes.

Bronze powder

Bronze is an alloy composed of copper and tin. In powder metallurgy, in addition to the standard alloy CuSn10, bronzes with copper contents of approx. 85 - 95% are used.

Using air atomization, irregularly shaped bronze powder is produced from the molten metal. This is available in various particle size distributions as Rogal® Bronze Powder GS*.

When small amounts of phosphorus are added (max. 0.4%), spherical bronze powder is produced. This material is also used in powder metallurgy and is known as Rogal® Bronze Powder GK*.

Brass powder

Brass is an alloy composed of copper and zinc. The following alloys are commonly used:

- CuZn8 (Rogal® Brass Powder I GS*)
- CuZn18 (Rogal® Brass Powder II GS*)
- CuZn30 (Rogal® Brass Powder III GS*)

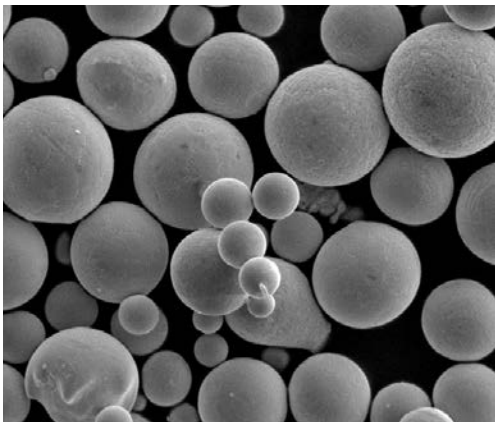
Other compositions are available with individual, agreed upon specifications. Air atomization of molten brass produces irregularly shaped metal powders.

Brass alloy powders of various compositions also serve as the starting material for production of „gold bronze pigments" for the printing ink, paint and plastics industries.

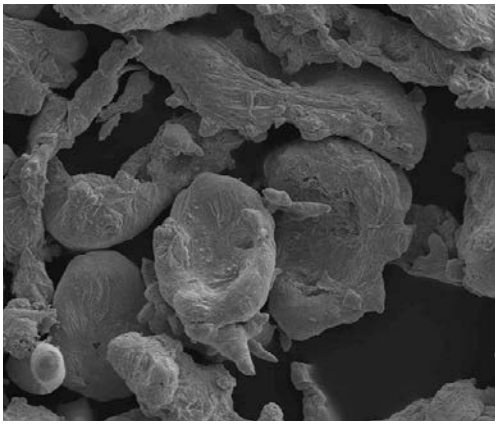
* GK = spherical powders GS = irregular powders

Morphology

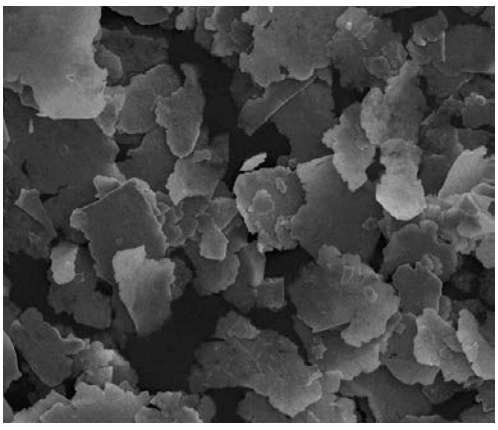
Spherical shape
The particle shape depends on process parameters such as composititon, spray medium, surface tension of the molten material. If air atomization is used, copper is generally spherical. The spherical shape of Rogal® Bronze Powder GK is achieved with the addition of small amounts of phosphorus (max. 0,4%) which has a deoxidizing effect.



Irregular shape
The irregular shape of Rogal® Bronze Powder GS and Rogal® Brass Powder GS is achieved with the addition of alloyed zinc.

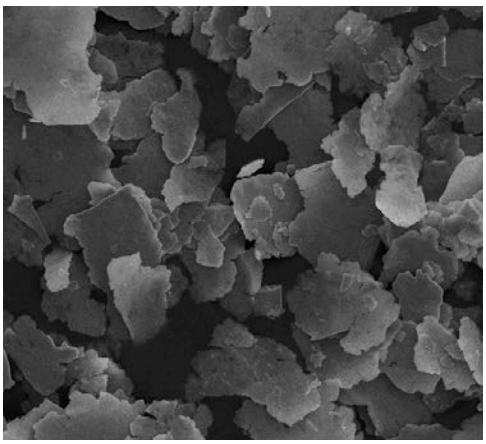


Lamellar shape
The grinding process gives metal powders in a ball mill a lamellar form.



Cubrotec

Lamellar copper powders for use in contact materials, lubricants and in the chemical industry are produced when air atomized copper powder is processed using ball milling procedures.



Product name	Copper content *1 (%)	D50 value *2 (µm)	Grease content *3 (%)	Sieve analysis *4 (%)	Apparent density *5 (g/cm³)	Flow time *6	Applications
Cubrotec 5000	min. 98	approx. 38	max. 0.3	>45µm: max. 6	approx. 1	not flowable	
Cubrotec 6000	min. 98	approx. 34	max. 0.15	>45µm: max. 5	approx. 1	not flowable	
Cubrotec 7001	approx. 96	approx. 12	approx. 1.4	>45µm: max. 1 >75µm: traces	approx. 0.6	not flowable	
Cubrotec 7002	min. 97	approx. 20	approx. 0.5	>45µm: max. 1 >75µm: traces	approx. 1	not flowable	
Cubrotec 8000	approx. 97	approx. 5	approx. 0.5	>45µm: traces	approx. 1	not flowable	

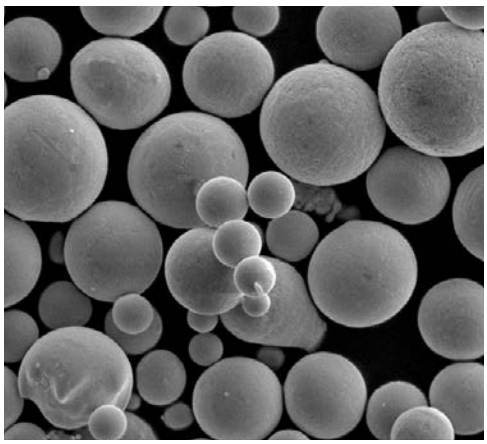
Test methods: *1 – chem. analysis, *2 – laser granulometry, SympatecHelos, *3 – chem. analysis, *4 – acc. to DIN 66165, *5 – acc. to DIN EN ISO 3923 part 1, *6 – acc. to DIN EN ISO 4490

carbon brushes

lubricants

Rogal® Copper GK

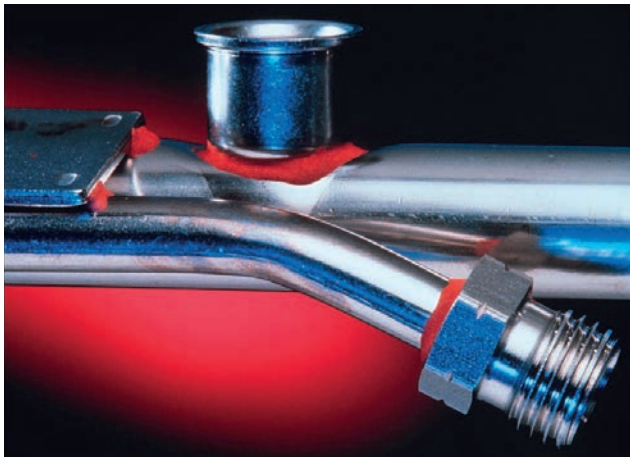
Smelting and atomization are used to produce copper powders from highly pure refined or electrolytic copper. In the air atomization process used by SCHLENK spherical particles are formed. Then they are classified into the required particle size distributions.



Product name	Copper content *1 (%)	Phosphorus content *1 (%)	Sieve analysis *2 (%)	Apparent density *3 (g/cm³)	Flow time *4	Applications
Rogal Copper GK 0/50	min. 99	max. 0.4	>50µm: max. 5	approx. 5	flowable	
Rogal Copper GK 0/63	min. 99	max. 0.4	>63µm: max. 5	approx. 5	flowable	
Rogal Copper GK 50/100	min. 99	max. 0.4	>100µm: max. 5 <50µm: max. 10	approx. 5	flowable	
Rogal Copper GK 0/250	min. 99	max. 0.4	>250µm: max. 5	approx. 5	flowable	
Rogal Copper GK 0/315	min. 99	max. 0.4	>315µm: max. 5	approx. 5	flowable	

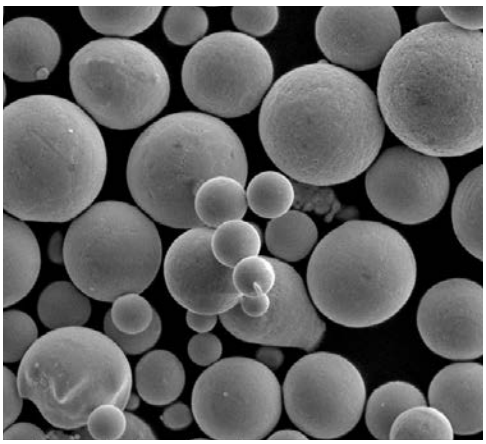
Test methods: *1 – chem. analysis, *2 – acc. to DIN 66165, *3 – acc. to DIN EN ISO 3923 part 1, *4 – acc. to DIN EN ISO 4490
Different fractions out of a particle size range 0/315 µm can be produced. Phosphorus contents up to 0.4 % on demand.

soldering & joining techniques



chemical technical applications

Rogal® Bronze GK



Alloying and atomization of copper, tin and phosphorus in air produces sphericaly shaped bronze powder.
The standard alloy contains approx. 90% copper, 10% tin and small amounts of phosphorus. Special alloys and their respective particle size distributions are available with customer specific specifications, and are ensured through effective process and quality control.

Product name	Copper content *1 (%)	Tin content *1 (%)	Phosphorus content *1 (%)	Sieve analysis *2 (%)	Apparent density *3 (g/cm³)	Flow time *4	Applications
Rogal Bronze GK 0/25	approx. 90	approx. 10	max. 0.4	>25µm: max. 5	approx. 5	not flowable	
Rogal Bronze GK 0/80	approx. 90	approx. 10	max. 0.4	>80µm: max. 5	approx. 5	flowable	
Rogal Bronze GK 0/125	approx. 90	approx. 10	max. 0.4	>125µm: max. 5	approx. 5	flowable	
Rogal Bronze GK 80/180	approx. 90	approx. 10	max. 0.4	>180µm: max. 5 <80µm: max. 10	approx. 5	flowable	
Rogal Bronze GK 0/250	approx. 90	approx. 10	max. 0.4	>250µm: max. 5	approx. 5	flowable	
Rogal Bronze GK 0/180-01	approx. 89	approx. 11	max. 0.4	>180µm: max. 5	approx. 5	flowable	
Rogal Bronze GK 0/63-03	approx. 96	approx. 4	max. 0.4	>63µm: max. 5	approx. 5	flowable	

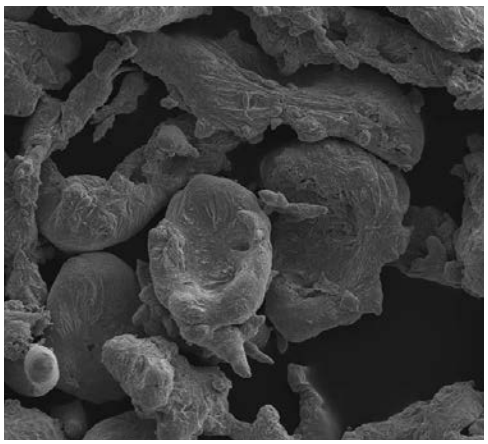
Test methods: *1 – chem. analysis, *2 – acc. to DIN 66165, *3 – acc. to DIN EN ISO 3923 part 1, *4 – acc. to DIN EN ISO 4490
Different fractions out of a particle size range 0/315 µm can be produced. Further variations of alloys are possible.
Phosphorus contents up to 0.4 % on demand.

bearings

brake linings

Rogal® Bronze GS

Alloying and atomization of copper, tin and zinc in air produces irregularly shaped bronze powder.
The standard alloy contains approx. 88% copper, 10% tin and 2% zinc. Special alloys and their respective particle size distributions are available with customer specific specifications, and are ensured through effective process and quality control.



Product name	Copper content *1 (%)	Tin content *1 (%)	Zinc content *1 (%)	Sieve analysis *2 (%)	Apparent density *3 (g/cm³)	Flow time *4	Applications
Rogal Bronze GS 0/32	approx. 88	approx. 10	approx. 2	>32µm: max. 5	approx. 3	not flowable	
Rogal Bronze GS 0/63	approx. 88	approx. 10	approx. 2	>63µm: max. 5	approx. 3	not flowable	
Rogal Bronze GS 0/160	approx. 88	approx. 10	approx. 2	>160µm: max. 5	approx. 3	flowable	
Rogal Bronze GS 0/200-03	approx. 89	approx. 10	max. 1	>200µm: max. 5	approx. 3.8	flowable	
Rogal Bronze GS 0/160-04	approx. 84	approx. 15	max. 1	>160µm: max. 5	approx. 3.8	flowable	
Rogal Bronze GS 45/100-05	approx. 87	approx. 10	approx. 3	<45µm: max. 15 >100µm: max. 5	approx. 3	flowable	
Rogal Bronze GS 100/200-05	approx. 87	approx. 10	approx. 3	>200µm: max. 5 <100µm: max. 15	approx. 3	flowable	

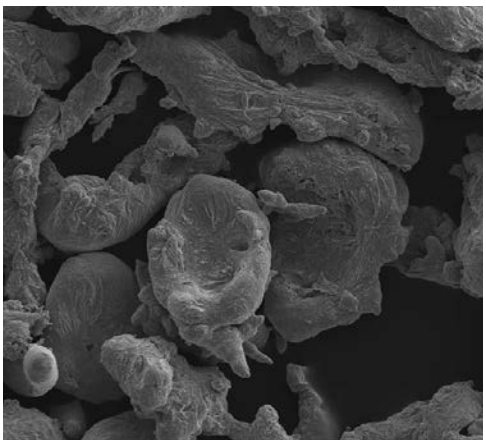
Test methods: *1 – chem. analysis, *2 – acc. to DIN 66165, *3 – acc. to DIN EN ISO 3923 part 1, *4 – acc. to DIN EN ISO 4490
Different fractions out of a particle size range 0/315 µm can be produced. Further variations of alloys are possible.

PFTE compounds

blasting abrasive techniques

Rogal® Brass GS

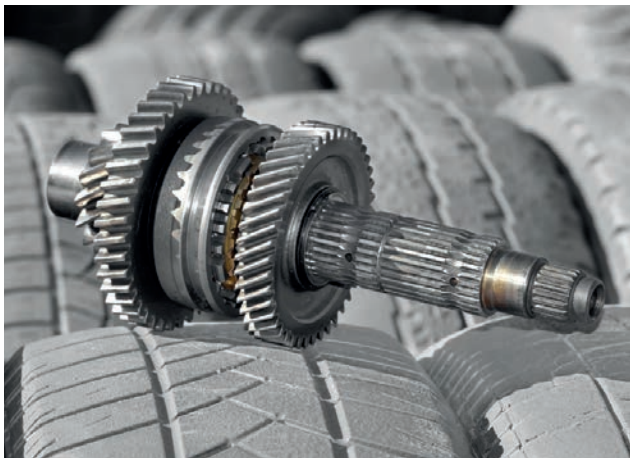
Brass is an alloy made of copper and zinc in various compositions.
Air atomization of the molten material results in irregularly shaped powders. Common compositions are brass I (approx. 92%Cu/8%Zn), brass II (approx. 82%Cu/18% Zn) and brass III (approx. 70%Cu/30%Zn)



Product name	Copper content *1 (%)	Zinc content *1 (%)	Sieve analysis *2 (%)	Apparent density *3 (g/cm³)	Flow time *4	Applications
Rogal Brass I GS 0/63	approx. 92	approx. 8	>63µm: max. 5	approx. 3	flowable	
Rogal Brass II GS 0/250	approx. 82	approx. 18	>250µm: max. 5	approx. 3	flowable	
Rogal Brass II GS 0/200-01	approx. 80	approx. 20	>200µm: max. 5	approx. 3	flowable	
Rogal Brass III GS 0/160	approx. 70	approx. 30	>160µm: max. 5	approx. 3	flowable	

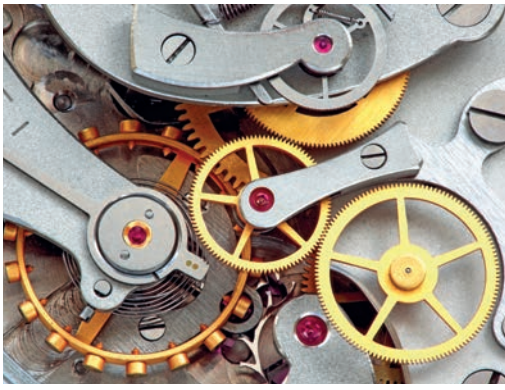
Test methods: *1 – chem. analysis, *2 – acc. to DIN 66165, *3 – acc. to DIN EN ISO 3923 part 1, *4 – acc. to DIN EN ISO 4490
Different fractions out of a particle size range 0/500 µm can be produced. Further variations of alloys are possible.

frictions



diamond tools


250ml



SCHLENK METALLIC PIGMENTS GMBH
BARNSDORFER HAUPTSTR. 5
D-91154 ROTH/GERMANY
www.schlenk.com
TEL.: +49 9171 808 0
FAX: +49 9171 808 200
E-MAIL: pigments@schlenk.de

SALES ORGANISATION

EUROPE

GERMANY:
SCHLENK METALLIC PIGMENTS GMBH
BARNSDORFER HAUPTSTR. 5
D-91154 ROTH/GERMANY
TEL.: + 49 9171 808 0
MOBIL: + 49 175 5839452
E-MAIL: norbert.vogel@schlenk.de

ITALY:
PIGMENTI METALLICI SRL
VIALE LEONARDO DA VINCI, 97
I-20090 TREZZANO SUL NAVIGLIO (MI)
TEL.: + 39 02 48 40 58 43
FAX: + 39 02 48 40 80 21
E-MAIL: p.levaggi@schlenk.it

CZECH REPUBLIC:
ALBO SCHLENK s.r.o.
TOVARNI 532
CZ-68771 BOJKOVICE
TEL.: + 420 572 642121
FAX: + 420 572 641498
E-MAIL: bojkovice@alboschlenk.cz

SLOVENIA:
KAMNIK-SCHLENK D.O.O.
FUZINE 9
SI-1241 KAMNIK
TEL.: + 386 1 830 9440
FAX: + 386 1 830 9443
E-MAIL: info@kamnik-schlenk.si

AMERICA

USA:
SCHLENK METALLIC PIGMENTS
40 NICKERSON ROAD
ASHLAND/MA. 01721-1912
TEL.: + 1 508 881 9147
FAX: + 1 508 881 1278
E-MAIL: thomas.schaller@schlenkusa.com

ASIA

SHANGHAI:
SCHLENK METALLIC PIGMENTS
(SHANGHAI) CO. LTD.
BUILDING NO. 9, NO. 99 HUAJIA ROAD,
HUA BIN INDUSTRIAL PARK,
SONGJIANG INDUSTRIAL ZONE,
SHANGHAI 201600, CHINA
TEL.: + 86 21 5774 9910
FAX: + 86 21 5774 9920
E-MAIL: georg.heissen@schlenk.com.cn

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Headquarters Barnsdorf, Germany


Rothenburg, Germany


Bitterfeld, Germany

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Symbols (inside)