

PRECIOUS METAL PRODUCTS FOR CERAMIC AND GLASS DECORATION

TECHNICAL INFORMATION





Headquarters in
Arezzo, Italy



More than 30 years
of experience with
precious metals
products

Cabro S.p.A - Leading manufacturer of precious metal products

- Cabro S.p.A, founded in 1987, headquartered in Arezzo (Italy) produces high-quality precious metal products for ceramic, porcelain and glass decoration
- The company has decades of experience and is specialized in the entire value added chain, from production and processing to recycling of precious metal products

Ferro - Partner for Cabro ´s precious metal products

- Ferro offers precious metal products by Cabro which are suitable for most application methods in the ceramic-, porcelain- and glass industry.

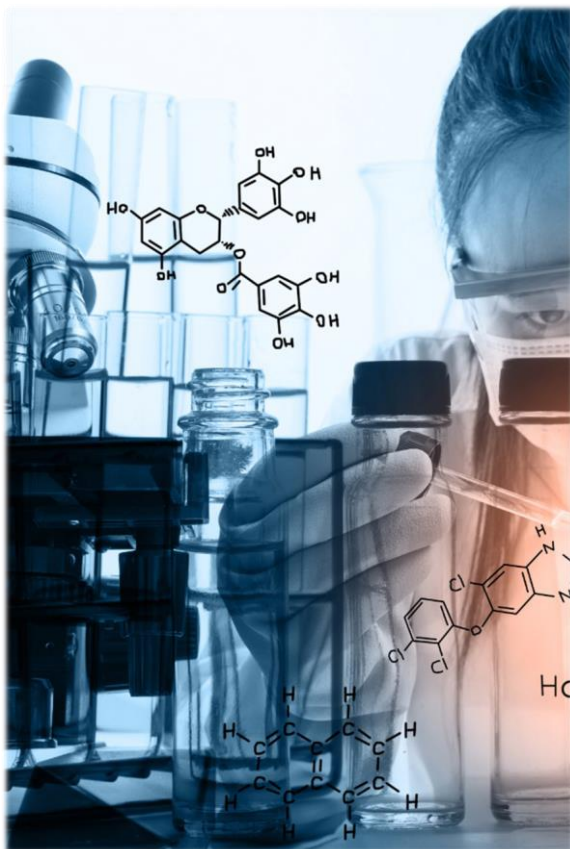


Technical Information

DF79

Performance Colors & Glass

Precious Metal Products for Ceramic and Glass Decoration



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1.0 Cabro Products

CABRO offers a wide range of varnish-like organic compounds. These precious metal preparations (PMP) are containing precious metals, combined with flux components (based on organic metal compounds) as adhesion promoters. They further contain resin solutions as film formers. Applied and fired on a smooth ceramic surface, a highly glossy precious metal film forms. According to all common application methods in use in ceramic industries like brushing, lining, spraying, banding, stamping, screen printing (direct and indirect) products are available and we distinguish: bright gold, bright platinum, semi matt gold, semi matt platinum,

burnish gold, burnish platinum, lustre products, decoration auxiliaries.

This brochure contains selected products from CABRO. More products are available on request.

The information given in the product TDS includes colour shade, precious metal content, important product characteristics as well as the substrate for which each PM preparation is best suited.

1.1 Product Codes

	CABRO PMP Gold	Abbreviation	CABRO Platin	Abbreviation
GLASS				
Liquid Products	Gold Liquid Vetro/Glass Burnish Gold Liquid Vetro	GLV BGLV	Platin Liquid Vetro/Glass Burnish Platinum Liquid Vetro	PLV BPLV
Pastes	Gold Screen Vetro/Glass Gold Banding Machine Vetro Burnish Gold Screen Vetro Thermo Plastic Gold	GSV GBMV BGSV TPG	Platin Screen Vetro/Glass Platinum Banding Machine Vetro Burnish Platinum Screen Vetro Thermo Plastic Platin	PSV PBMV BPSV TPP
CERAMIC				
Liquid Products	Gold Liquid Ceramic Burnish Gold Liquid Ceramic Burnish High Fire Liquid	GLC BGLC BHFL	Platin Liquid Ceramic Burnish Platinum Liquid Ceramic	PLC BPLC
Pastes	Gold Screen Ceramic Gold Screen Ceramic Mat Gold High Fire Mat Burnish Gold Screen Ceramic	GSC GSCM GHFM BGSC	Platin Screen Ceramic Platin Screen Ceramic Mat Platin High Fire Mat	PSC PSCM PHFM

LUSTER		THINNER & CLEANER	
Luster Liquid Universal	LLU	Thinner for Liquids	L
Luster Liquid Vitrum	LLV	Thinner for Paste Cleaner	X X

2.0 Application Methods

Before decoration, make sure that the substrate is clean and completely dry. Usually it is sufficient to rub the article with a water- or alcohol-dampened cloth or chamois leather and allow it to dry. In order to prevent moisture on the surface of the objects to be decorated caused by condensation (for example during transfer from a cool stockroom into a warm decoration room), we recommend allowing the ware to reach the temperature of the decoration room, and also give it time for evaporation of any condensation.

Different consistencies of PM products are required for different application techniques, as well as by the type of substrate to be decorated, in order to obtain optimum processing and firing results. If desired, suitable thinning oils are available to adjust the viscosity: e.g. for **spray application** or for **screen cleaning**, rapid evaporating oils and solvents are required, whereas for the application of **brush preparations**, semi-fat oils are needed, whilst for **printing application**, fat oils with low volatility are desired. The Decoration Auxiliaries mentioned in this brochure have especially been developed to perfectly suit **FERRO** PM preparations.

Brush

The products are ready for use. If necessary thinner can be added max. 5%. If the layer of product is too thick or too thin it will have a negative effect on the appearance after firing.



Spraying

Liquid products for brush with thinner (1: 1) can be used for spray application.



Screen Printing

The screen printing pastes are ready for printing. If a dilution is necessary, caused by evaporation of solvents, we recommend a dilution with max. 5% of our thinners. Too much thinning oil will reduce the precious metal content of the layer, impair the appearance and the stability of decoration.



Thermoplastic Screen Printing

Thermoplastic screen printing pastes are printable by heating them to 60-70° C. The preparation is combined with a wax, which affects the viscosity of the paste - it is solid at room temperature and becomes liquid-pasty, due to heating.

A big advantage is that the print has an immediately grip on the cold object. In case of multi-color printing the next print can follow within a few seconds. This generates a time saving.

Decals

The decoration of ceramic and glass is also applied by means of decals, which are produced by screen printing (indirect printing). The selection of a suitable screen is important for excellent printing results.

Banding Machine

This machine type is used for application of viscous gold by means of a **Neopren Roller System**. Ready-to-use preparations for this application are available by request.

2.1 Brush Application and Spraying

Liquid Gold for decoration on Glass

Product number	Color shade	Thinner
GLV 3400/3 (10%)	Lemon	L 16
GLV 3400/5 (8%)	Lemon	L 16
GLV 8201/4 (9%)	Lemon	L 16
GLV 8201/5 (8%)	Lemon	L 16

Liquid Platinum for decoration on Glass

Product number	Color shade	Thinner
PLV 7921	Standard	L 16



Liquid Gold for decoration on Porcelain/Bone China

Product number	Color shade	Thinner
BLGC 0101 18%	Burnish, Lemon	L 16 or L 24

Liquid Gold for decoration on Porcelain/Ceramic

Product number	Color shade	Thinner
GLC 1213/3 (10%)	Yellow	L 16

Liquid Platinum for decoration on Porcelain/Ceramic

Product number	Color shade	Thinner
PLC 2860	Standard	L 16

Liquid Lustres

	Product number	Color shade	Thinner
Precious Metal containing	LLU 6059	Copper	L 16
	LLU 7000 E	Copper	L 16
	LLU 5472	Gold	L 16
	LLU 5419	Dark Purple	L 16
	LLU 5470	Magenta	L 16
	LLU 6050	Dark Green	L 16
	LLU 5406	Dark Blue	L 16
	LLU 6095	Brown	L 16
	LLU 5415	Violet	L 16
	LLU 5402	Pink	L 16
	LLU 5403	Cobalt Blue	L 16
	LLU 7003 E	Light Blue	L 16
	LLU 5405	Orange	L 16
Without Precious Metal	LLU 6090	Yellow	L 16
	LLU 5407	Orange Brown	L 16
	LLU 5489	Amber	L 16
	LLU 5455	Light Green	L 16
	LLU 6096	M.o.P. Grey	L 16
	LLU 6097	M.o.P. Turquoise	L 16
	LLU 6030	M.o.P. Iris	L 16

*Mixing ratio with thinner max. 1:1

2.2 Direct Screen Printing

Paste Gold for decoration on Glass

Product number	Color shade	Thinner
GSV 4602 9%	Yellow	L 19
GSV 4602 10%	Yellow	L 19
GSV 4602 12%	Yellow	L 19
GSV 4100/6D(7%)	Lemon	L 19

Paste Platinum for decoration on Glass

Product number	Color shade	Thinner
PSV 4800	Standard	X 13



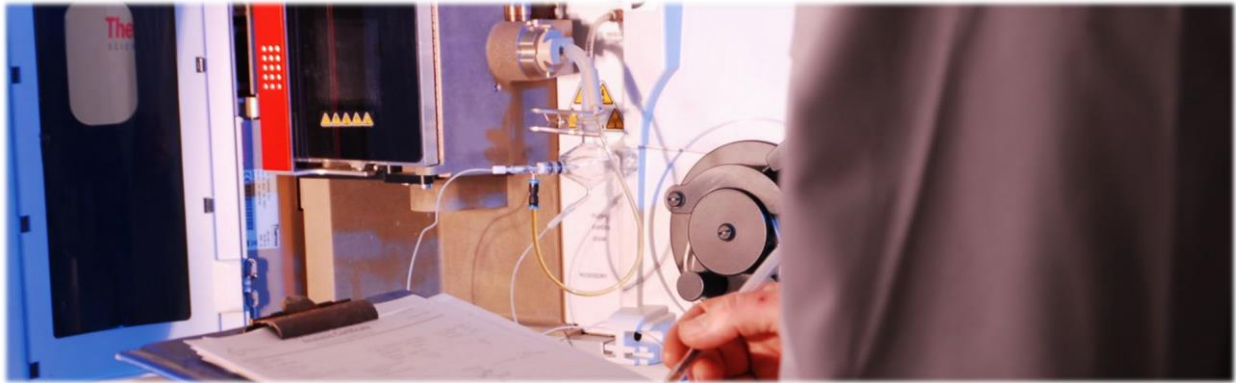
2.3 Indirect Printing and Production of Decals

Paste Gold for decoration on Glass

Product number	Color shade	Thinner
GSV 9250/3	Yellow	X 13
GSV 9401/5 (8%)	Bronze	X 13

Paste Platinum for decoration on Glass

Product number	Color shade	Thinner
PSV 1705	Standard	X 13



Paste Gold for decoration on Porcelain/Bone China

Product number	Color shade	Thinner
GSC 350 (available with 8, 10 & 12%)	Yellow	X 13
GSCM 351/1 (12%)	Semi-mat, Yellow	X 13
GSCM 351/3 (10%)	Semi-mat, Yellow	X 13

Paste Bright Platinum for decoration on Porcelain/Bone China

Product number	Color shade	Thinner
PSC 153/5	Standard	X 13

Lustre Pastes

	Product number		Color shade	Thinner
	Bright	Matt		
Precious Metal containing	LSC 5759	-	Copper	X 13
	LSC 5700 E	LSCM 5700 E	Copper	X 13
	LSC 5772	-	Gold	X 13
	LSC 5719	LSCM 5719	Dark Purple	X 13
	LSC 5770	-	Magenta	X 13
	LSC 5750	LSCM 5750	Dark Green	X 13
	LSC 5706	LSCM 5706	Dark Blue	X 13
	LSC 5795	LSCM 5795	Brown	X 13
	LSC 5715	LSCM 5715	Violet	X 13
	LSC 5702	LSCM 5702	Pink	X 13
	LSC 5703	LSCM 5703	Cobalt Blue	X 13
	LSC 5703 E	LSCM 5703 E	Light Blue	X 13
	Without Precious Metal	LSC 5705	-	Orange
LSC 5790		-	Yellow	X 13
LSC 5707		LSCM 5707	Orange Brown	X 13
LSC 5789		LSCM 5789	Amber	X 13
LSC 5755		-	Light Green	X 13
LSC 5796		LSCM 5796	M.o.P. Grey	X 13
LSC 5797		-	M.o.P. Turquoise	X 13

Paste Gold for Decals on Porcelain (High Temperature)

Product number	Color shade	Thinner
GHFM 02 38%	Burnish, Yellow	X 25
GHFM 02 26%	Burnish, Yellow	X 25

Paste Platinum for Decals on Porcelain (High Temperature)

Product number	Color shade	Thinner
PHFM 11	Burnish	X 25

2.4 Neopren Roller System

High Viscosity

Paste Gold for decoration on Glass

Product number	Color shade	Thinner
GBMV 9181/4 (9%)	Yellow	X 13

Paste Platinum for decoration on Glass

Product number	Color shade	Thinner
PBMV 4881	Standard	X 13

2.5 Thermoplastic Screen Printing

Paste Gold for decoration on Glass

Product number	Color shade	Thinner
TPG 3220/6 (7%)	Yellow	-
TPG 3220/3 (10%)	Lemon	-
TPG 3222/6 (7%)	Lemon/Yellow	-
TPG 3116/5 (8%)	Lemon	-
TPG 3401/5 (8%)	Bronze	-

Paste Platinum for decoration on Glass

Product number	Color shade	Thinner
TPP 4201/5	Thermoplastic	-

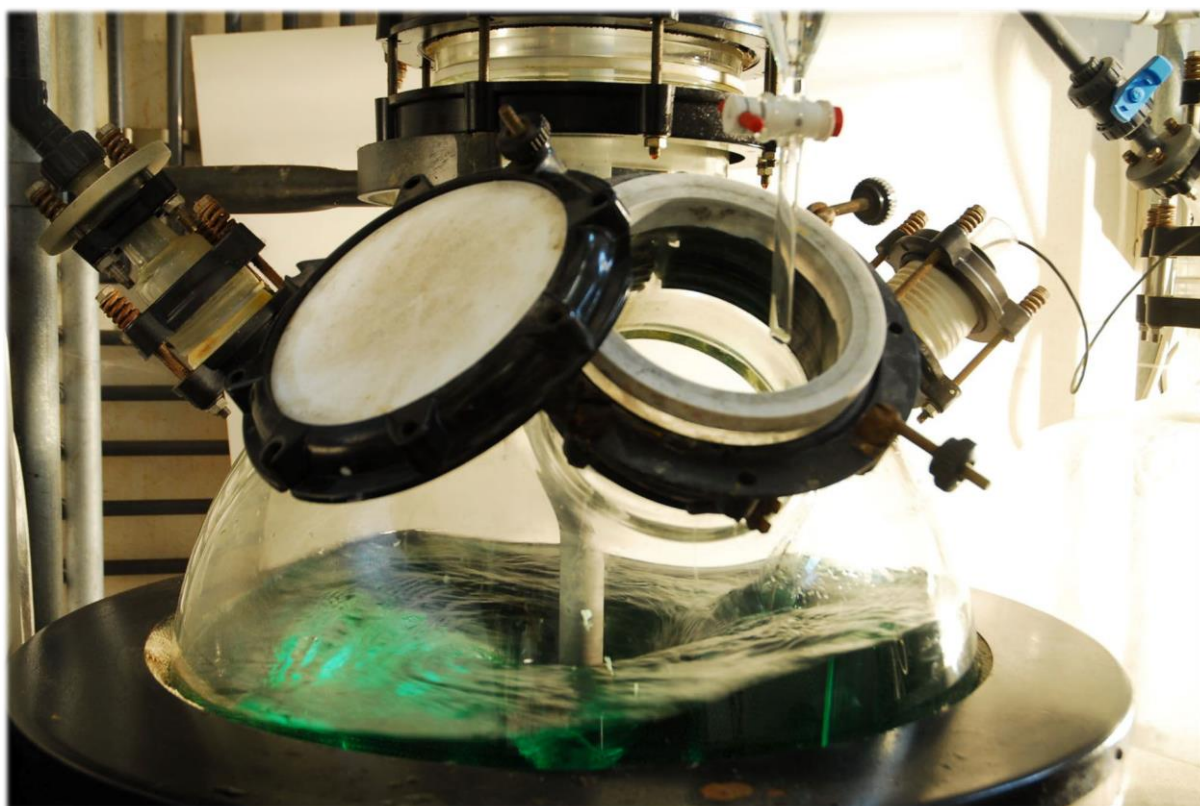


2.6 Thinners

Solvent based thinners for precious metal preparations

Product number	Viscosity and Drying	Application
Thinner L16	Low visc., fast	Liquid Products + Spraying
Thinner L19	High visc., slow	Lustres + direct printing pastes
Thinner L24	Slow	Liquid Products
Thinner X13*	Slow	Decal Pastes
Thinner X25	Slow	Burnish Paste
Cleaner X28	Fast	Screen and Brush

*Please note that X13 is a special thinner for decal pastes. The usage of other thinners might cause problems in production



3.0 Technical Information

Precious Metal Preparations for Application on Porcelain, Ceramic and Glass

Precious metal preparations are varnish-like organic compounds containing precious metals, combined with flux components (based on organic metal compounds) as adhesion promoters. They further contain resin solutions as film formers. Applied and fired on a smooth ceramic surface, a highly glossy precious metal film forms. According to the colour shade of the fired product we distinguish:

- **Gold**, which develops a typical yellow gold shade after firing, and contains a small proportion of silver and lemon-yellow shade, achieved by formation of a gold/silver alloy.
- **Platinum**, which fire to a white-gold shade, achieved by formation of an Au/Pt or Au/Pd alloy.

Product Range

Cabro's product range contains bright precious metal preparations for all common application methods in use in ceramic industries. Listed in the following tables are standard and special products arranged according to:

- **Type of preparation** (bright gold, bright platinum, semi matt gold, semi matt platinum, burnish gold, burnish platinum, lustre products, decoration auxiliaries)
- **Application** (brushing, spraying, lining, banding, stamping, indirect screen printing, direct screen printing).

The information given in the product TDS include colour shade, precious metal content, important product characteristics as well as the substrate for which each PM preparation is best suited.

Precious Metal Content

Cabro gold preparations have a fine gold content till 38 %. Preparations with a fine gold content of less than 5 % are designated as lustres.

Cabro platinum preparations have a combined precious metal content (gold, platinum and/or palladium) till 26 %. The data given in the tables refer to the total content of Au-, Pt-, and/or Pd.

Consistency

Preparations to be applied by **brush, spraying or printing** are fluids with low viscosity (500 mPas), while those processed by **screen-printing** or other **mechanical application methods** are pastes with high viscosity (approx. 2,000 - 40,000 mPas).

Cabro PM preparations are generally supplied ready for use. If desired, suitable thinning oils are available to adjust viscosity to meet individual requirements.

Quality

In accordance with the quality management system of Ferro's Color and Glass Performance Materials Division, which is certified according to the **DIN EN ISO 9001, ISO 14001 and OHSAS 18001** certificates, precious metal preparations have to pass stringent quality control after production. Each production lot is carefully checked and compared with our production standard. Only those batches that meet Ferro's stringent standards are released for sale.

Dishwasher Resistance

Cabro PM preparations have been developed to deliver high value to the consumer. This includes mechanical resistance during daily use, as well as dishwasher durability.

Ferro classifies **ceramic decorations** (porcelain, bone china, etc.) as **dishwasher-resistant**, when they withstand more than 1000 washing cycles, and as **dishwasher-proof /-safe** when they withstand more than 500 washing cycles largely undamaged. Tests are conducted in a household dishwasher following the **EN test standard 50275, part 1**.

The data in the tables are based on dishwasher tests conducted in the R&D laboratories of Ferro GmbH.

Printing of Precious Metal Preparations

Work should always take place in well-ventilated workshops at room temperatures between 20-25 °C.

Squeegees should be made of a solvent-resistant material such as polyurethane (hardness 60-75 °Shore). For good results it is important to use squeegees with a clean, well sharpened edge.

Tab. 1: Recommended meshes for screen printing precious metal preparations

Preparation	Screen	
	Polyester [threads/cm]	Steel (VA 160-25) [mesh/inch]
Bright gold, bright platinum	120 – 140 T	350 – 400
Semi	120 – 140 T	350 – 400
Matt/Burnish	90 – 100 T	350 – 400

Firing Process

The firing conditions depend on the type of substrate to be decorated and further individual processing parameters. Please bear in mind that precious metal preparations contain organic compounds that decompose during firing. It is therefore essential to assure sufficient kiln ventilation during the entire process, but especially during the heating up phase up to about 500 °C.

As the firing cycle has a strong influence on the quality of the final decoration, we recommend to determine the optimum conditions by pre-tests.

In contrast to normal firing, fast firing in continuous kilns allows faster firing cycles with a simultaneous increase in maximum temperature. Fast firing conditions impose special requirements on the preparations.

Tab. 2: Firing conditions common in the ceramic industry

Material	Temperature [°C]	Soaking Time [min]
Ceramic	700-780	10
Glass	550 -650°C	1-5
Porcelain		
Normal firing	780-850	10
Fast firing	860-900	-
High Temperature	1150 - 1250	-
Bone China	750-850	1 - 20

Storage

Cabro preparations should be stored in a cool and dry place (preferably in a refrigerator, at approx. 8 °C). Please note that gold and palladium/ platinum preparations have a shelf-life of 6 months, whereas red lustre have a shelf life of 3 months.

We recommend leaving the material a few hours at room temperature prior to use. This will refresh the right viscosity.

Additionally the object to be decorated should acclimate first to the temperature in the workshop. Differences in temperature (e.g. cold warehouse and a warm workshop) can cause pinholes or other claims in the fired precious metal preparation.

Packing

Cabro preparations are supplied in the following packing sizes: 50 g, 100 g, 250 g, 500 g, 1 kg and 5 kg.

Containers are made of glass or plastic and bear a seal certifying their authenticity.

Safety Data Sheets

Data sheets providing health and safety information are available for all **FERRO** and **Cabro** products.

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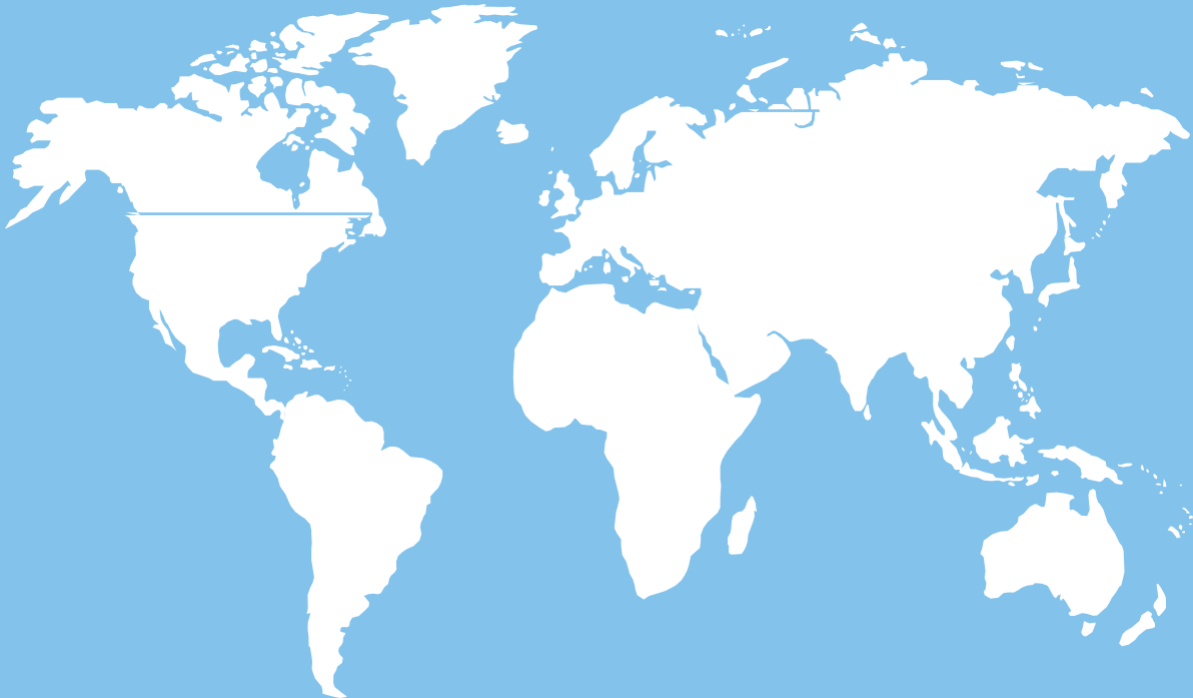
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