

**UG SERIES LEAD FREE UNDERGLAZE COLOURS  
FOR TABLEWARE, EARTHENWARE, STONEWARE,  
PORCELAIN, BONE CHINA & TILE**

The Colour Chart shows an approximate impression of the basic colours for a first selection of colours. For exact reproduction of a colour tone it is absolutely necessary to test a sample under original conditions.



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### TECHNICAL DATA SHEET AND USAGE

The UG Series are manufactured Technically Lead Free and provide a compact range of colours for underglaze application. The colours can also be used under Low Solubility Glazes and provide a compact intense range of colours designed for maximum miscibility.

#### MAIN PROPERTIES

##### High color intensity

The highest intensity is obtained by printing the colours without flux addition. Gloss and intensity can be fine-tuned by adding a higher or lower amount of mixing fluxes.

##### Excellent particle size powder distribution

The particle size of the colours will vary depending on the composition, in this series the Typical Diameter particle D50=3-5 microns and D90=15-20 microns.

##### Very good resistance

Mechanical and chemical resistance is generally determined by the glaze used and for tableware coming into contact with food therefore we would recommend Lead Free glazes to optimize performance.

##### Low thermal expansion coefficient

The Coefficient of thermal expansion is suitable for different materials.

#### MISCIBILITY AND COMPATIBILITY

All colours are designed for maximum intermixing. We recommend the use of UG-8001-T WHITE for creating pastel colours between 10-90% and specific Fluxes for dilution of strength are detailed below:

UG-8000-C MIXING FLUX	Suitable for dilution of all colours between 10% - 20% (*except Colours UG-8011-M, UG-8012-M, UG-8014-M, UG-8015-M and UG-8016-M)
UG-8024-C SPECIAL FLUX DILUENT	Suitable for dilution of colours up to 10% for UG-8011-M, UG-8012-M, UG-8014-M, UG-8015-M and UG-8016-M. Avoid Glazes high in zinc for best results, generally not to exceed 1200°C.

Other specific recommendations are for:

UG-8002-E BLACK	Good Universal mixing Black, thermally stable and ideal for back stamping and fine line work.
UG-8013-L ROYAL BLUE	Recommend using UG-8024-C up to 10% for dilution.
UG-8019-R BROWN	Avoid diluting. Compatible with most colours but especially UG-8002-E, UG-8017-H, and UG-8018-M, where it is greatest at 90% of the blend.

Cadmium Group Colours are stable and especially compatible with each other.

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### APPLICATION

#### DIRECT SCREEN PRINTING

For screen printing directly or for decal transfers we recommend using either a 73T or 90T Mesh or 230/200 GP Stainless Steel Mesh

120T can be used for most UG colours to achieve halftone effects, however we do not recommend colours UG-8011-H to UG-8016-M and UG-8019-R without trialling in the customers conditions as these colours require an optimum deposit to ensure stability.

As a guide, recommended mixing ratios and mediums below:

Reference	Description	Parts medium per 10 parts of colour	Water Media	Oil-based Media
L427	WATER MISCIBLE MEDIUM	3,5	✓	
W172	WATERBASED PRINT MEDIUM	3,5	✓	
M279	PAD PRINT MEDIUM	5		✓
M279W	TP MEDIUM	5		✓
M286D	SEMI-THIXO S/PRINT MEDIUM	6		✓
M286T	THIXOTROPIC S/P MEDIUM	8		✓
M51D	SCREEN TRANSFER MEDIUM	5		✓
M6	DIRECT PRINT MEDIUM	3,5		✓

#### HANDPAINTING-MACHINE BANDING AND LINING & SPRAYING OR AEROGRAPHING

The colours can be supplied as dry powder for painting directly onto clay. We recommend the addition of around 6% Ball clay to improve application if needed.

The colours can also be supplied with or in the following mediums:

Reference	Description	Parts medium per 10 parts of colour	Water Media	Oil-based Media
W107	WATERBASED PAINTING MEDIUM	10	✓	
W108	WATERBASED HAND PAINT MEDIUM	6	✓	
W157/B	WATERBASED HAND PAINT MEDIUM	8,5	✓	
M162N	GELLED BANDING MEDIUM	6		✓
M9	HAND PAINTING MEDIUM	3,5		✓

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THERMOPLASTIC DIRECT PRINT

Reference	Description	Parts medium per 10 parts of colour	Water Media	Oil-based Media
M279	PAD PRINT MEDIUM	5		✓
M279W	TP MEDIUM	5		✓

**FIRING RECOMMENDATIONS**

Dependant on the substrate, glaze type and application we generally recommend the colours are fired between 1020-1200°C. Firing stability is significantly influenced by firing cycle times and kiln density as well as by the types of substrates, glaze, and thickness of application.

As a guide:

Hard Paste Porcelain	1180 - 1250 degrees
Soft Paste Porcelain	1180 - 1230 degrees
Bone China	1000 - 1100 degrees
Stoneware	950 - 1050 degrees

Many of the colours are thermally stable so except for UG-8011, UG-8012. UG-8014, UG-8016 and UG-8019, the remaining colours can be fired up to 1200 degrees, but we always recommend to test dependant on their glaze composition and firing cycle.

Some processes with intermediate or pre-firing such as TP (Thermoplastic Inks), Decal Transfer and some Direct Non-water based medium applications require a hardening on fire to fix the ware to the substrate and to remove the organic carriers would generally recommend between 700-850 degrees.

**ACID AND ALKALI RESISTANCE**

The chemical resistance of the fired colour layers is influenced by the colour deposit, the firing conditions, and mainly by the glaze.

**METAL RELEASE CHARACTERISTICS**

Every effort is made to manufacture these colours 'technically' Lead free, however as the colours are applied under the glaze, mechanical and chemical resistance is generally determined by the glaze used and for tableware coming into contact with food therefore we would recommend Lead Free glazes to optimize performance.

Solubility of some colours particularly can impact mechanical resistance and metal release in the case of Cobalt and Cadmium baring colours. Solubility for Cadmium Inclusion Pigments is shown to be very low because of the encapsulation process making them quite less soluble than conventional pigments. It is known that some glazes contain cadmium and that where firing of Lead and Cadmium containing products has taken place such metals are present in the kiln lining and can contribute to detected metal release, therefore we recommend customers validate performance under their own conditions.


























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### REFERENCES

	Colour	Reference		Colour Composition	Pantone
<b>Main Group:</b>		UG-8001-T	White	Zr-Si	
		UG-8002-E	Black	Cr-Fe-Co-Ni	Black C
		UG-8003-H	Yellow	Pr-Zr-Si	101 C
		UG-8004-T	Grey	Pr-Fe-Zr-Si-Co-Al-Sn-Sb	7543 C
		UG-8006-K	Botanic Green	Pr-Zr-Si-Cr-Co-Zn	7731 C
		UG-8007-K	Teal Green	Cr-Co-Zn-Si	3292 C
		UG-8008-L	Blue Green	Co-Cr-Al-Zn-Si	7476 C
		UG-8009-L	Willow Blue	Co-Al	4150 C
		UG-8010-N	Turquoise	V-Zr-Si	2985 C
		UG-8011-M	Violet	Sn-Cr-Co-Al-Zr-Si	2099 C
		UG-8012-M	Lavender	Cr-Sn-Al-Si	7440 C
		UG-8013-L	Royal Blue	Co-Si	6105 C
		UG-8014-M	Pink	Sn-Ca-Cr-Si-Zr	509 C
		UG-8015-M	Dark Pink	Sn-Ca-Cr-Si-Al	2343 C
		UG-8016-M	Maroon	Sn-Ca-Cr-Si-Zr	697 C
		UG-8017-H	Orange	Pr-Cd-S-Se-Fe-Zr-Si	4008 C
		UG-8018-M	Coral	Fe-Zr-Si	4055 C
		UG-8019-R	Brown	Fe-Zr-Si-Al-Co-Cr	1817 C
		UG-8033-L	Navy Blue	Co-Si	6091 C
			UG-8000-C	Mixing Flux	-
		UG-8024-C	Special Flux Diluent	-	
<b>Cadmium Group:</b>		UG-8005-K	Lime Green	Cd-S-Zr-Si-V	2301 C
		UG-8020-H	Bright Orange	Cd-S-Se-Zr-Si	164 C
		UG-8021-M	Bright Red	Cd-S-Se-Zr-Si	186 C
		UG-8022-M	Dark Red	Cd-S-Se-Zr-Si	4060 C
		UG-8023-H	Bright Yellow	Cd-S-Se-Zr-Si	107 C
		UG-8074-H	Strong Yellow	Cd-S-Zr-Si	Yellow 012 C

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