

Ceramic bodies: new raw materials and preparation technologies



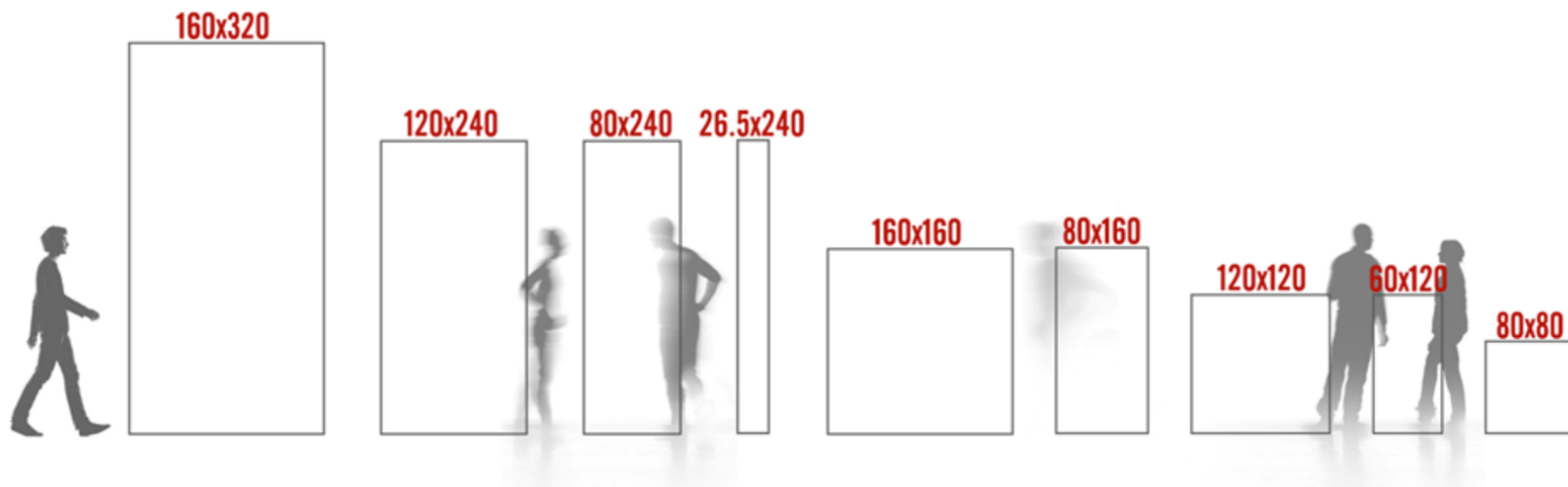
ULTRABLACK AND ULTRAWHITE BODIES: YIN AND YANG OF LARGE CERAMIC SLABS

Alfredo Orlandi

esmalglass.itaca
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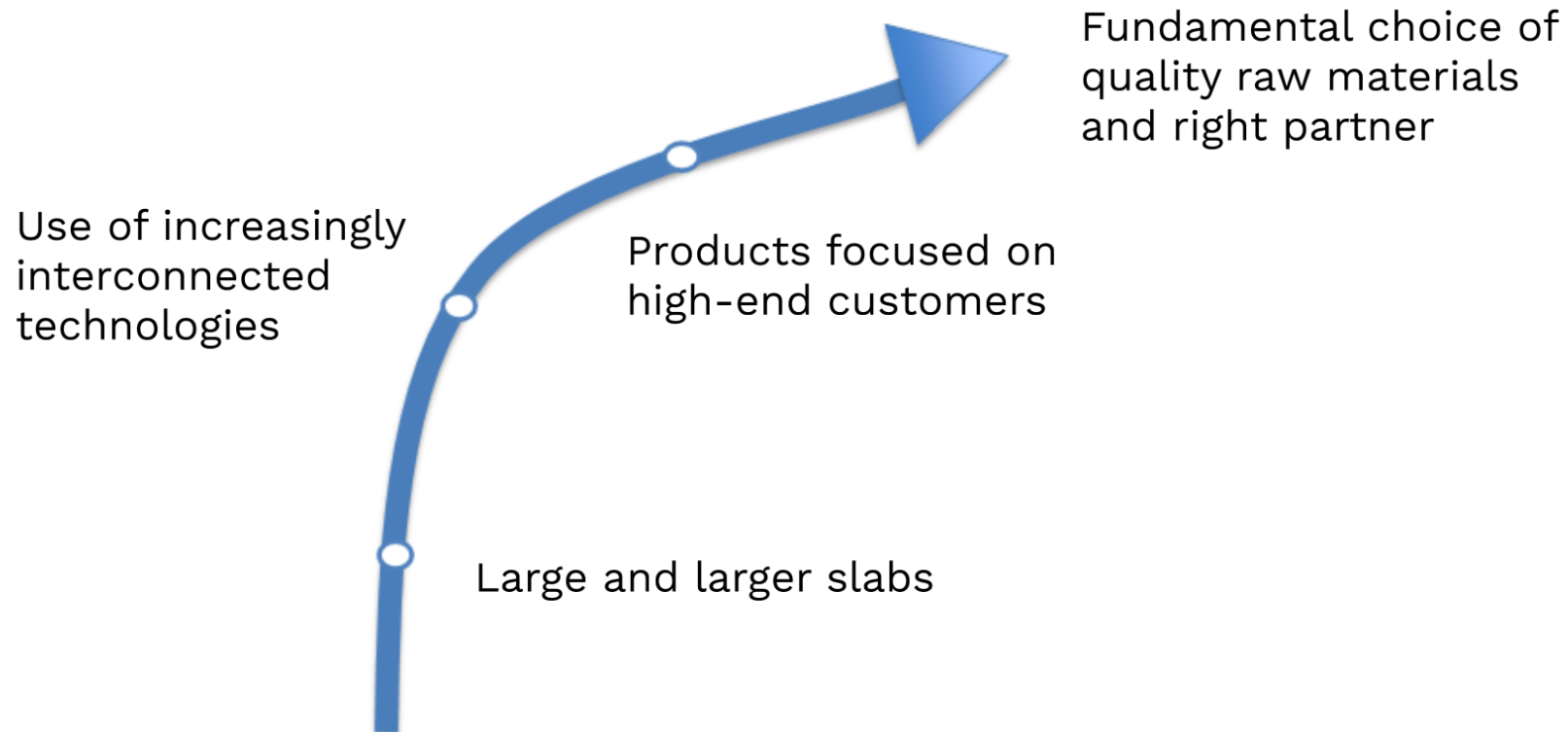
DEVELOPMENT OF LARGE CERAMIC SLABS

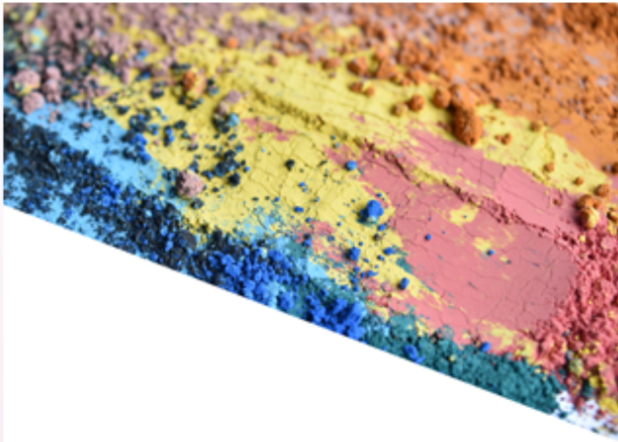


DEVELOPMENT OF LARGE CERAMIC SLABS



DEVELOPMENT OF LARGE CERAMIC SLABS





Presses Materials:

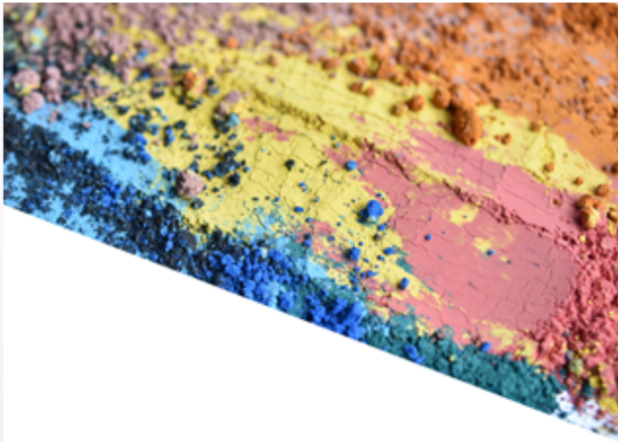
- CP Series: wet body stains
- CPD Series: dry body stains
- JQ Series: special spray dried powders
- JS Series: body inclusions

Digital Decoration:

- CIK Series: digital inks
- CIE Series: digital effects
- GIK Series: water base

Frits & glazes:

- Frits
- Glazes
- Grits
- Diamond Glass



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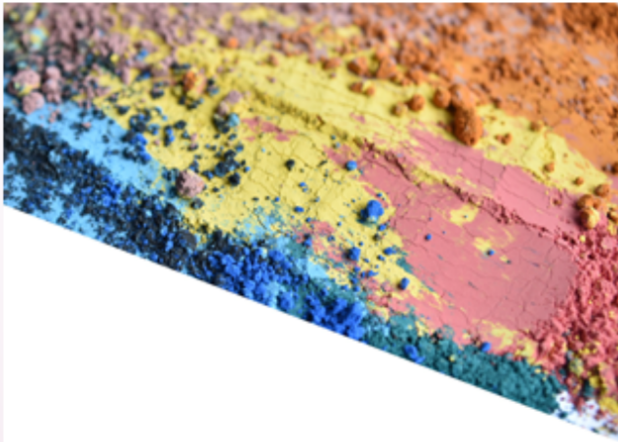
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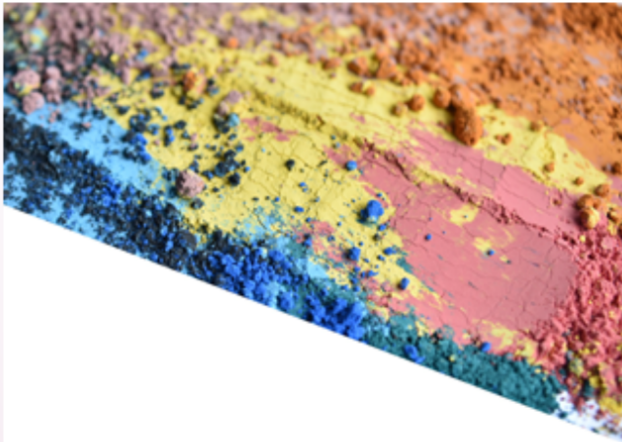
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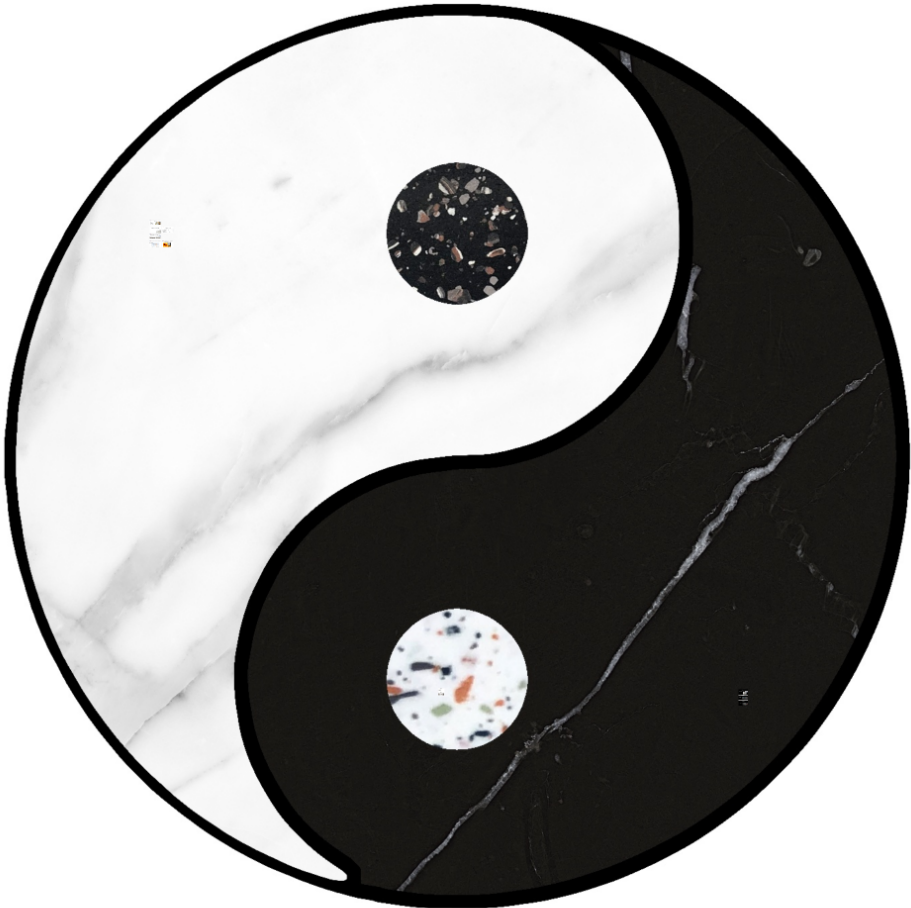
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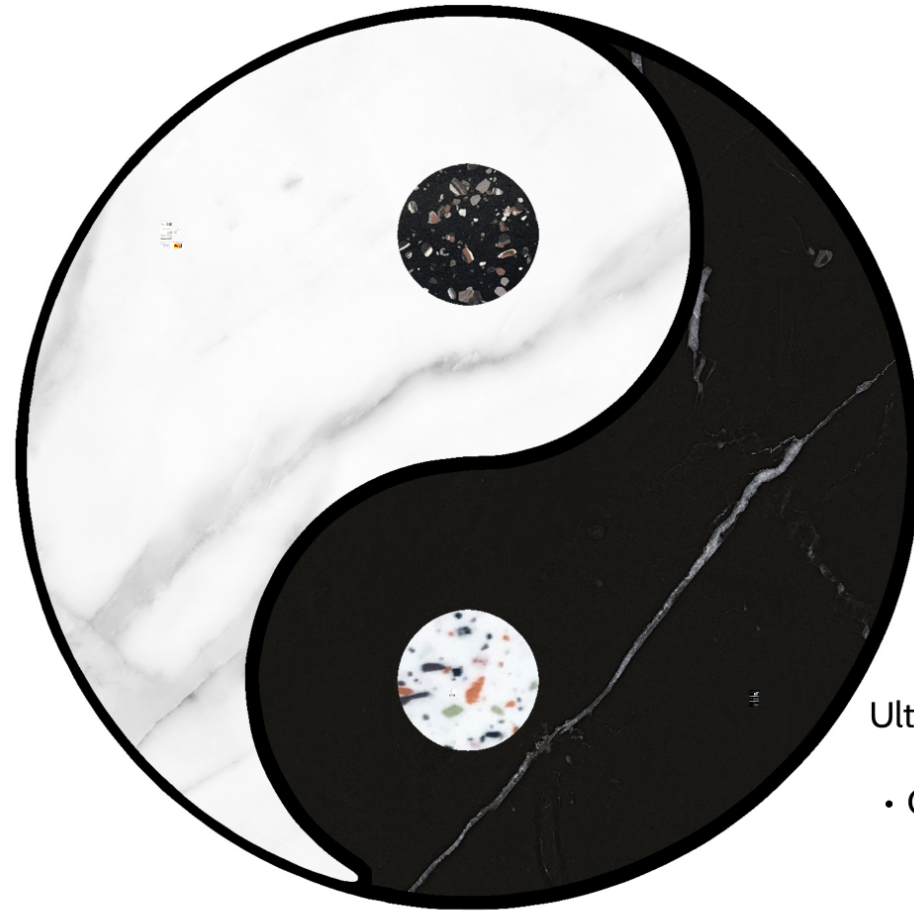
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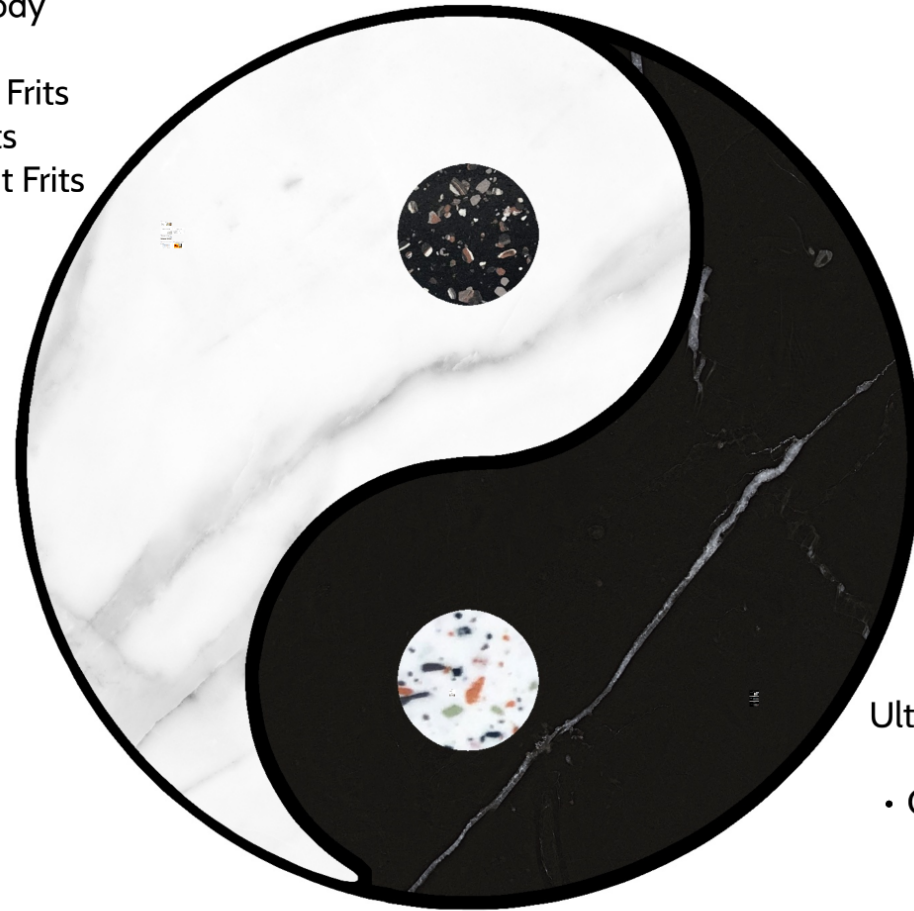


Ultrablack body

• CP-NE825

Ultrawhite body

- Ultrawhite Frits
- Fusible Frits
- Translucent Frits

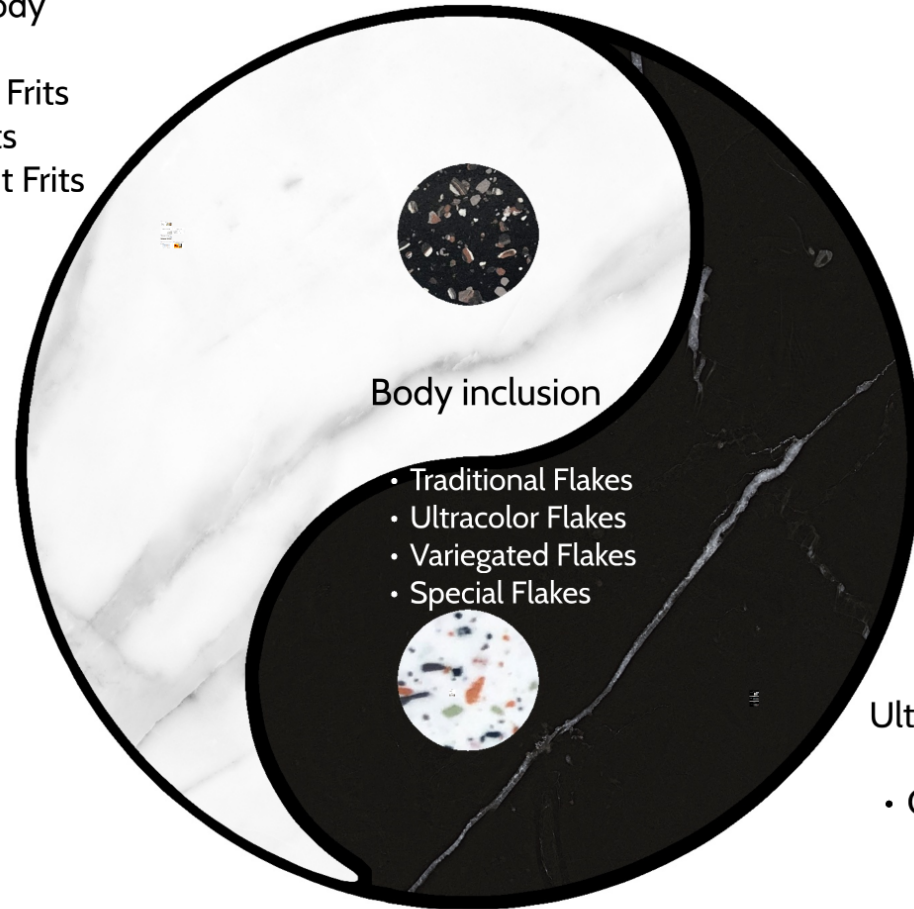


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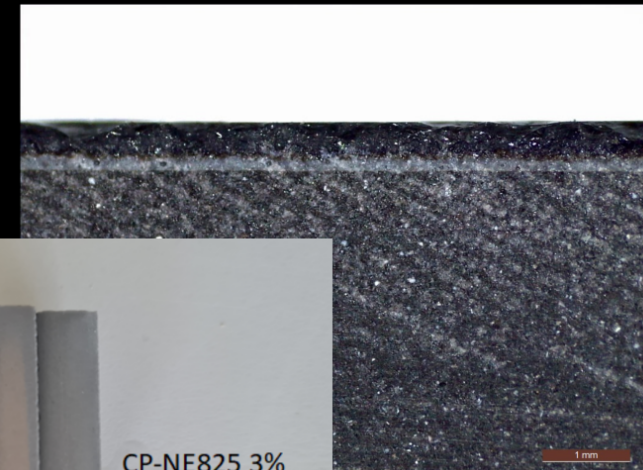
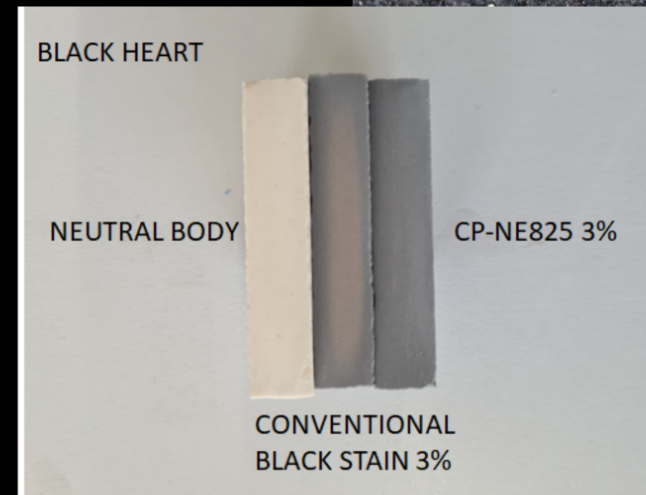
Ultrablack body

- CP-NE825

CP-NE825

Some features:

- High performance wet stain
- Optimal for Ultrablack bodies - L^* below 35 a^* & b^* neutral
- Linear contraction close to the neutral body
- Reduce black heart
- Reduce pinholes
- Competitive price

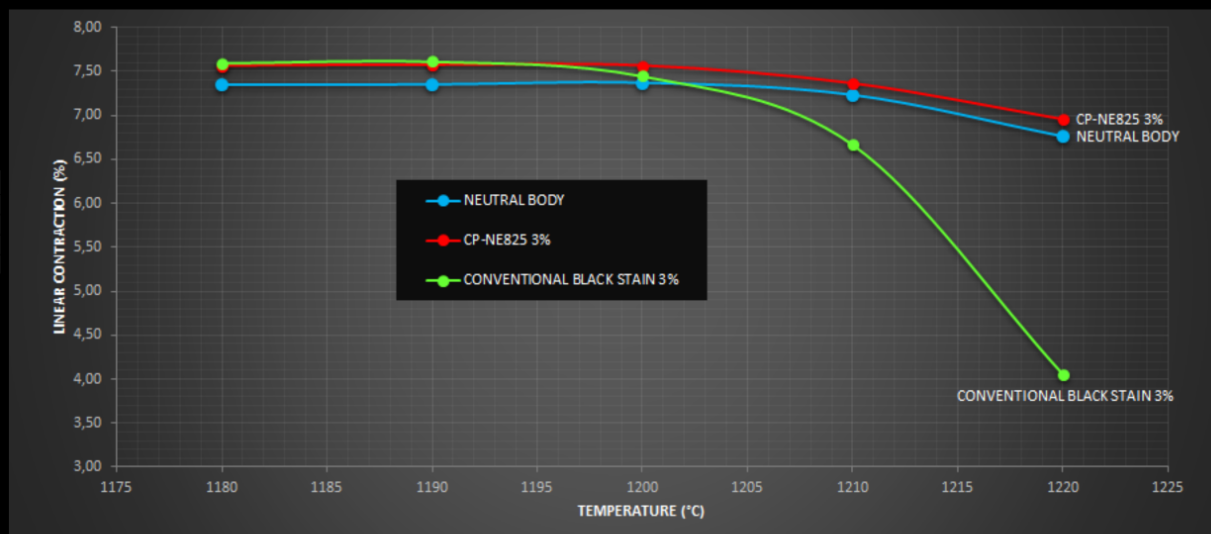


CP-NE825

Linear contraction close to the neutral body

Linear contraction (%) vs Temperature (°C)					
	1180 °C	1190 °C	1200 °C	1210 °C	1220 °C
NEUTRAL BODY	7,35	7,35	7,37	7,23	6,76
CP-NE825 3%	7,56	7,57	7,56	7,36	6,95
CONVENTIONAL BLACK STAIN 3%	7,60	7,61	7,45	6,67	4,05

Linear contraction (%) vs Temperature (°C)



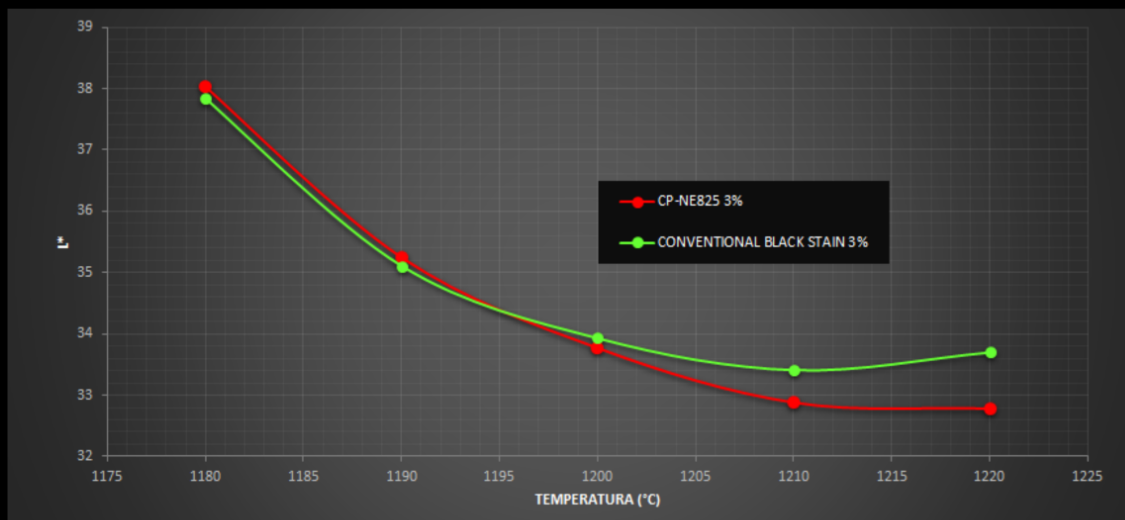
CP-NE825

L* Trend vs Temperature (°C)

Optimal for Ultrablack bodies
L* below 35 a & b neutral

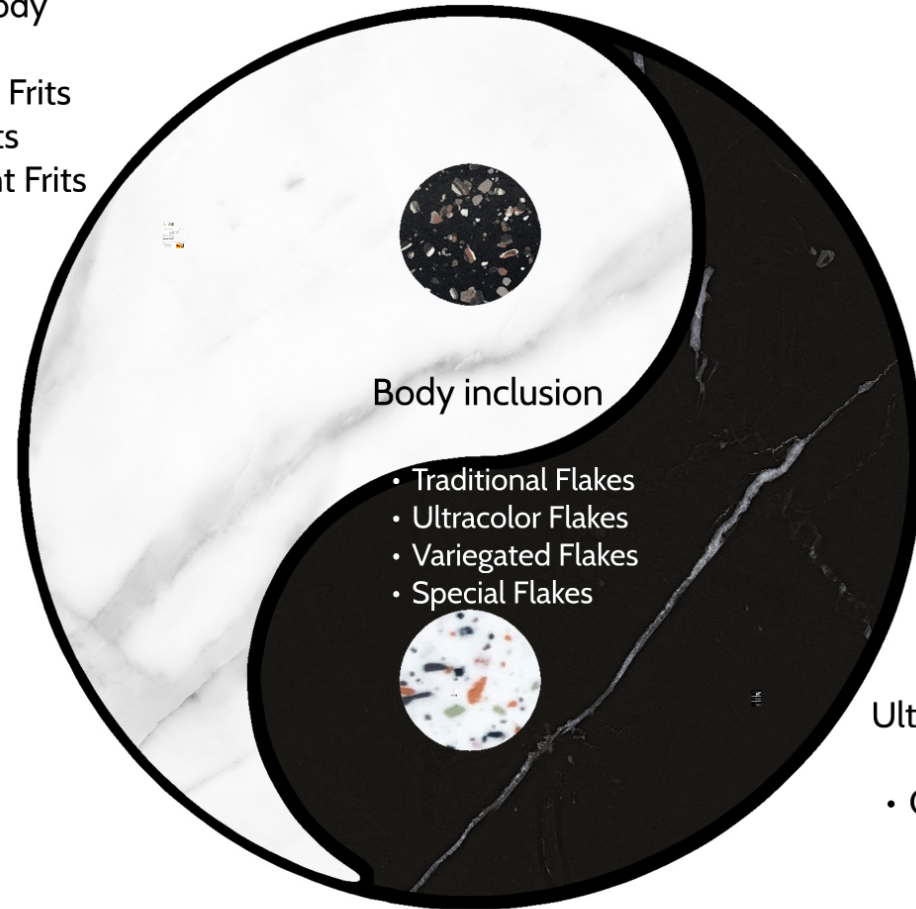
L* Trend vs Temperature (°C)

	1180 °C	1190 °C	1200 °C	1210 °C	1220 °C
CP-NE825 3%	38,04	35,25	33,77	32,88	32,78
CONVENTIONAL BLACK STAIN 3%	37,84	35,11	33,93	33,41	33,70



Ultrawhite body

- Ultrawhite Frits
- Fusible Frits
- Translucent Frits



- Traditional Flakes
- Ultracolor Flakes
- Variegated Flakes
- Special Flakes

Ultrablack body

- CP-NE825

FRITS

Body Frits:

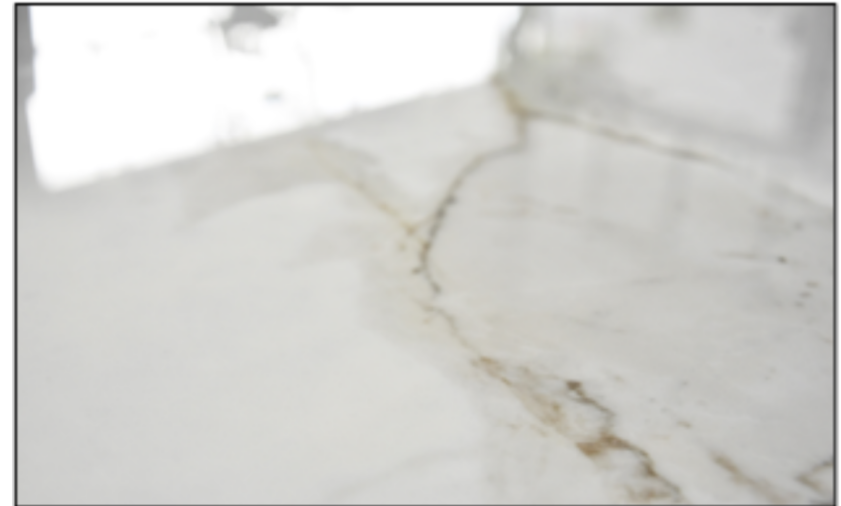
- Ultrawhite Frits
- Fusible Frits
- Translucent Frits



ULTRAWHITE FRITS

Some features:

- Optimal for Ultrawhite bodies - L^* over 93 a^* neutral and $+b^*$ below 4
- Translucent effect
- Low piroplasticity index - Newly development conception
- Low radioactivity index - Zr with low radioactivity level



ULTRAWHITE FRITS

Piroplasticity

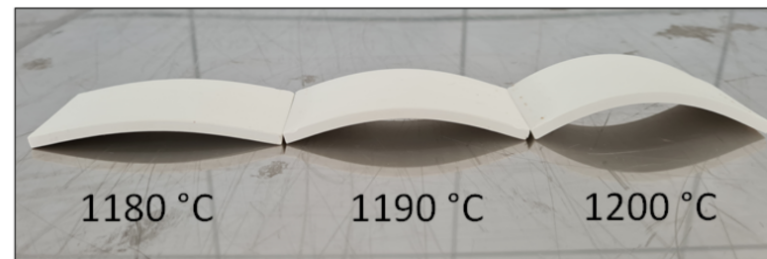
Frits change also the composition of amorphous phase (decrease the viscosity of the vitrum during the melting process) and this increase the pyroplasticity index

$$PI = (4 \cdot h^2 \cdot S) / (3 \cdot L^4)$$

UW Body with traditional UW Frit



UW Body with new UW Frit

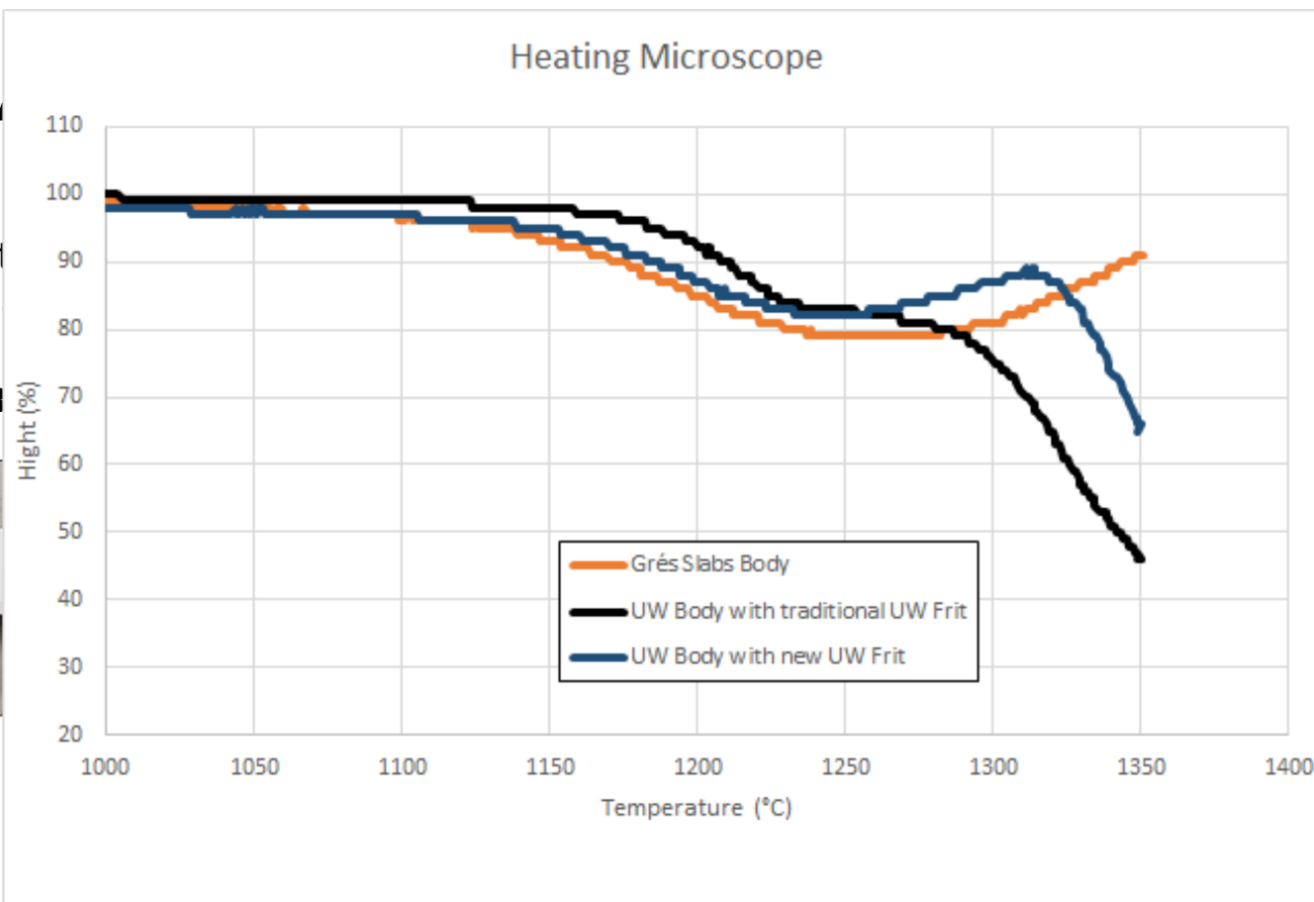


We've developed a new body Frits that helps to be obtained very high L* value with good pyroplasticity index

ULTRA

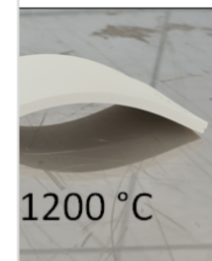
Frits change the viscosity increase the

UW B



$$\frac{1}{3} \cdot h^2 \cdot S / (3 \cdot L^4)$$

Frit



be obtained

ULTRAWHITE FRITS

Radioactivity Index

Radioactivity Exposition Index GB6566 STANDARD (I_{INT} , I_{EXT})			
	UW Body with new UW Frit	UW Body with Zirconium Silicate	Limit
I_{INT}	0,60	0,97	1,00
I_{EXT}	0,60	0,88	1,30

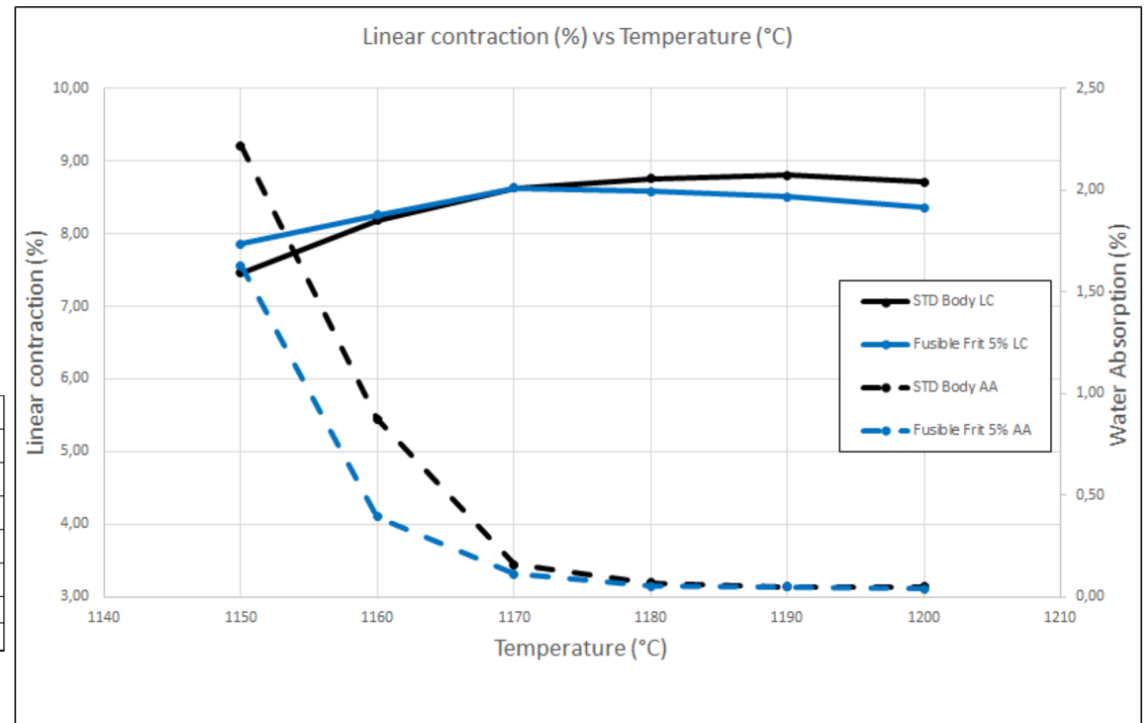
UW Body with new Frit
($L^*=93$ $b^*=3,5$)

Standard UW body with Zirconium Silicate
($L^*=91$ $b^*=4,8$)

FUSIBLE FRITS

- More fusible body
- Linear contraction maximum and water absorption maximum anticipated
- Linear contraction similar to the std body

Linear contraction (%) vs Temperature (°C)						
	1150 °C	1160 °C	1170 °C	1180 °C	1190 °C	1200 °C
STD Body	7,46	8,18	8,63	8,76	8,80	8,71
Fusible Frit 5%	7,86	8,26	8,63	8,58	8,51	8,36
Water Absorption (%) vs Temperature (°C)						
	1150 °C	1160 °C	1170 °C	1180 °C	1190 °C	1200 °C
STD Body	2,22	0,87	0,16	0,07	0,05	0,05
Fusible Frit 5%	1,63	0,39	0,11	0,05	0,05	0,04

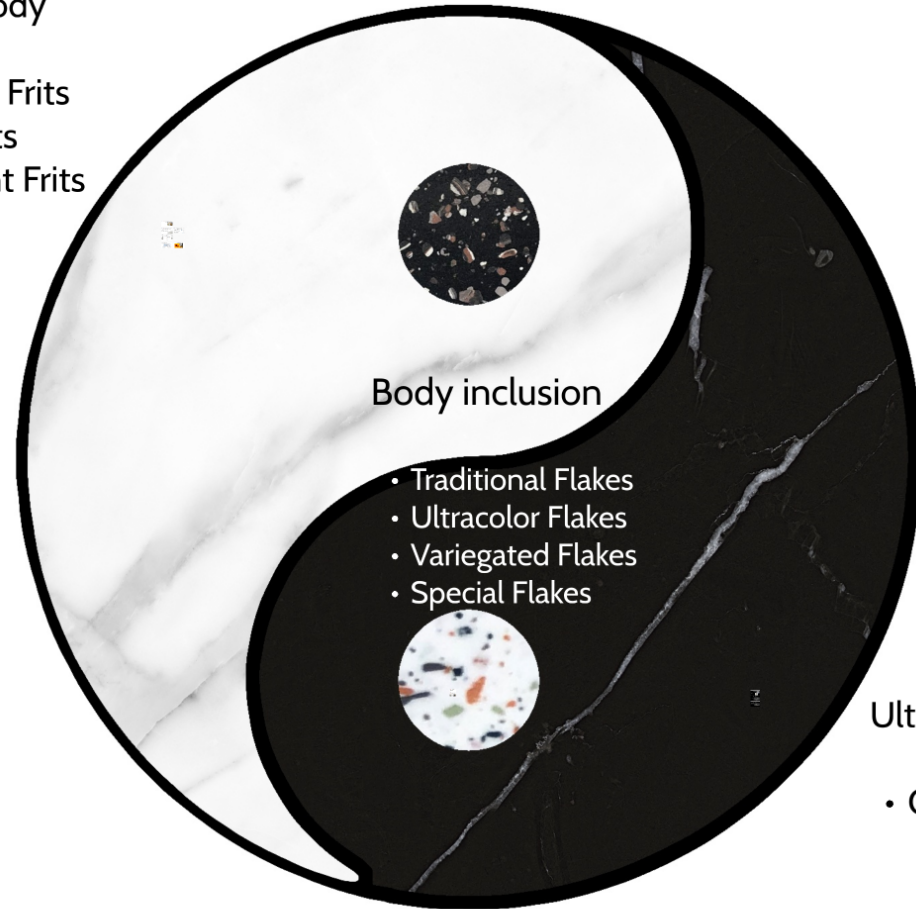


TRANSLUCENT FRITS



Ultrawhite body

- Ultrawhite Frits
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Ultrablack body

- CP-NE825

FLAKES

Some features:

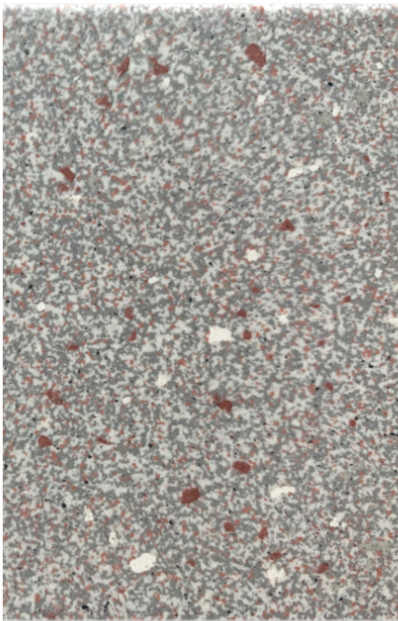
- Suitable both for full body and for double loading
- Good plasticity and adaptation until 10% in the body
- Various size: 1 - 2 mm and 2 - 4 mm
- Wide possibility of customization

Range:

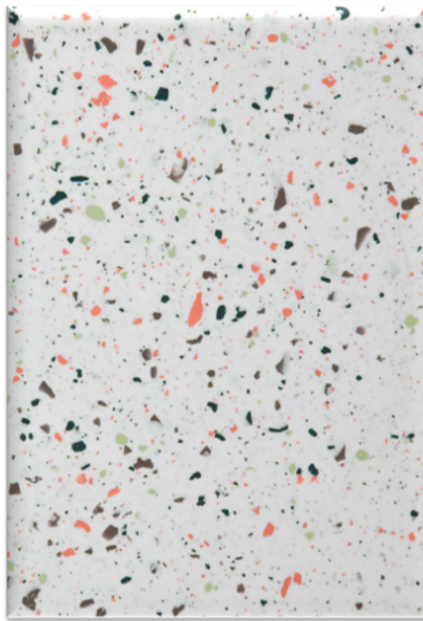
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- Ultracolor Flakes
- Variegated Flakes
- Special Flakes

FLAKES

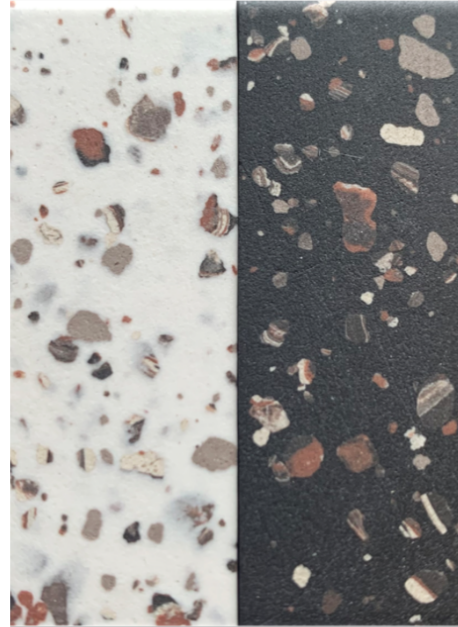
Traditional



Ultracolor



Variegated



Special





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CONCLUSION

- **CP-NE825**

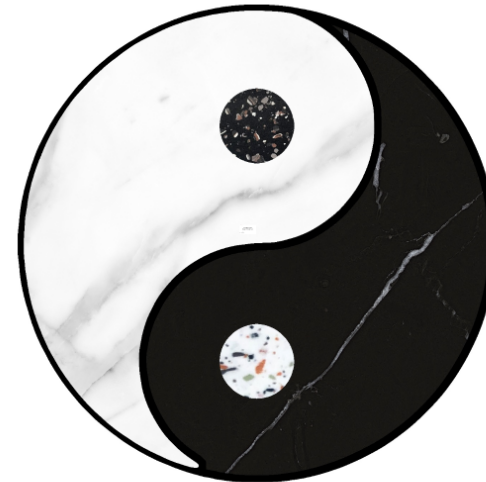
High performance wet stain
Linear contraction close to the neutral body

- **Body Frits**

Ultrawhite Frits - Fusible Frits - Translucent Frits

- **Flakes**

Good plasticity and adaptation until 10% in the body
Wide possibility of customization
Traditional Flakes - Ultracolor Flakes - Variegated Flakes - Special Flakes



THANKS FOR YOUR ATTENTION

*The opposite is beneficial;
from things that differ comes the fairest attunement;
all things are born through strife*

Heraclitus