

## Enamel sampling - tests and outcomes

Development of record keeping for enamel samples

In the early stages of the project a format was developed for the recording experimentation with enamel surfaces. The system was trialed and revised in response to the trial outcomes. Each sample was allocated a number which included the year in which it was created and a sequential number starting with 001. It was decided that no number would be repeated, for instance the last sample of 2008 was 2008-045 and the first sample of 2009 would be 2009-046. This unique number was placed on the back of each sample, using a permanent method (such as cutting with a diamond burr). The number also appeared on each page of the sample record. It was decided not to make individual photographic records of the samples, as a photograph could not adequately represent the enamel surface. Instead the samples themselves form a physical record of this aspect of the research to be accessed in conjunction with the written record.

As an illustration of the enamel surface research, three distinct trials are included here.

### ENAMEL SURFACE SAMPLES

The first of these trials show the effect that increasing the firing time has on a single colour, in this case an opaque red. Red was chosen because it is an enamel colour that is particularly sensitive to over-firing. See fig. 1 - enamel process record sheet 1

The second trial illustrated investigates methods for achieving a matt black surface by a variety of methods. See fig. 2 - enamel process record sheet 2

The third trial illustrated investigates methods for achieving a matt white surface by a variety of methods. See See fig. 3- enamel process record sheet 3

A standardized set for the terms was established with an appendix where the common names or variations could be listed i.e. *copper oxide*, commonly referred to as *firescale*. See table below -

Standardized term	Refers to:
Copper oxide	Fire-scale Scale Copper scale
Sifting Enamel	Jewellery enamel Powdered enamel Powder enamel Enamel powder Sifted enamel
Liquid enamel	Wet Process enamel Porcelain enamel Industrial enamel
Mesh size	Grain size Grade
Sift	Sieve
Counter-enamel	Backing enamel

## Enamel Process Record Sheet: 2007-001

Sample number 2007-001	Created by Jessica Turrell	Date 17.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Signal Red (LJE 0110) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation:	
Application 2	Enamel used: as above	Application method: Sifting
	Application Thickness: Medium	Mesh size: 80
	Additional information:	
Firing 2	Initial temperature: 770 degrees c	Length of Firing: 1 minutes 45 seconds (approx)
	Additional information: Under-fired	

Surface Finish: None	Surface appearance: Matt, grainy under-fired surface
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## Enamel Process Record Sheet: 2007-002

Sample number 2007-002	Created by Jessica Turrell	Date 17.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Signal Red (LJE 0110) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: as above	Application method: Sifting
	Application Thickness: Medium	Mesh size: 80
	Additional information: Medium	
Firing 2	Initial temperature: 770 degrees c	Length of Firing: 1 minutes 45
	Additional information: Slightly under-fired	

Surface Finish: None	Surface appearance: Semi-matt under-fired surface-
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## Enamel Process Record Sheet: 2007-003

Sample number 2007-003	Created by Jessica Turrell	Date 17.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Signal Red (LJE 0110) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)

	Additional information: Fired to maturation	
Application 2	Enamel used: as above	Application method: Sifting
	Application Thickness: Medium	Mesh size: 80
	Additional information:	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 2
	Additional information: Fired to maturation	

Surface Finish: None	Surface appearance: Shiny, smooth, even colouration
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### Enamel Process Record Sheet: 2007-004

Sample number 2007-004	Created by Jessica Turrell	Date 17.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Signal Red (LJE 0110) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: as above	Application method: Sifting
	Application Thickness: Medium	Mesh size: 80
	Additional information:	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 3 minutes (approx)
	Additional information: Slightly over-fired	

Surface Finish: None	Surface appearance: Shiny, smooth, uneven colouration, blacken at edges
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### Enamel Process Record Sheet: 2007-005

Sample number 2007-005	Created by Jessica Turrell	Date 17.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Signal Red (LJE 0110) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: as above	Application method: Sifting
	Application Thickness: Medium	Mesh size: 80
	Additional information:	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 3 minutes (approx)
	Additional information: Over-fired	

Surface Finish: Matted with Diapad	Surface appearance: Matt, smooth, uneven colouration, blacken at edges
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## Enamel Process Record Sheet: 2007-011

Sample number 2007-011	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Black (LJE 0101) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information: Finer gain size to prevent 'bounce'	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation:	
Application 2	Enamel used: 50% Black (LJE 0101) opaque 50% Pumice powder	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information:	

Surface Finish: None	Surface appearance: Matt, smooth, slightly gritty
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## Enamel Process Record Sheet: 2007-012

Sample number 2007-012	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Black (LJE 0101) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information: Finer gain size to prevent 'bounce'	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: 50% Black (LJE 0101) opaque 50% copper oxide (fire-scale)	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information: copper oxide broken down in pestle and mortar before sifting	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Matt, slightly sparkly, gritty	

Surface Finish:	Surface appearance:
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## Enamel Process Record Sheet: 2007-013

Sample number 2007-013	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Black (LJE 0101) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100

	Additional information: Finer gain size to prevent 'bounce'	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: 75% Black (LJE 0101) opaque 25% Pumice	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information:	

Surface Finish: Stoned using Diapad, then waxed	Surface appearance: Smooth, flat, satin/matt surface, breaks in surface that reveal shiner underlying layer
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### Enamel Process Record Sheet: 2007-014

Sample number 2007-014	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Black (LJE 0101) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information: Finer gain size to prevent 'bounce'	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: 50% Black (LJE 0101) opaque 50% copper oxide (fire-scale)	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 2 minutes (30 seconds (approx)
	Additional information:	
Application 3	Enamel used: Black (LJE 0101) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information: repeat pattern created across surface using 'wet pen' then black with the 'fines' sifted over surface where it adheres only to pen line. Exces knocked off prior to enamelling	
Firing 3	Initial temperature: 800 degrees c	Length of Firing: 2 minutes (approx)
	Additional information: Fired to maturation	

Surface Finish: None	Surface appearance: Matt, slightly sparkly under surface, patterned with a shiny black line.
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### Enamel Process Record Sheet: 2007-015

Sample number 2007-015	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Black (LJE 0101) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information: Finer gain size to prevent 'bounce'	

Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: None 100% copper oxide	Application method: Sifting
	Application Thickness: Thin	Mesh size: 100
	Additional information:	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information:	

Surface Finish: None	Surface appearance: matt, slightly glittery, small amount of crazing in surface
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### Enamel Process Record Sheet: 2007-016

Sample number 2007-016	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Black (LJE 0101) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information: Finer gain size to prevent 'bounce'	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: as above	Application method: Sifting
	Application Thickness: Medium	Mesh size: 80
	Additional information:	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information:	

Surface Finish: Chemical matting	Surface appearance: Flat, matt, even surface, rather easily marked
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### Enamel Process Record Sheet: 2007-017

Sample number 2007-017	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Low
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Black (LJE 0101) opaque	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information: Finer gain size to prevent 'bounce'	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: as above	Application method: Sifting
	Application Thickness: Medium	Mesh size: 80
	Additional information: Underfired	
Firing 2	Initial temperature: 770 degrees c	Length of Firing: 2 minutes (approx)
	Additional information:	

Surface Finish:  
None

Surface appearance:  
Flat, gritty, matt under-fired surface

## Enamel Process Record Sheet: 2007-031

Sample number 2007-031	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Medium
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Soft white (LJE 0100)	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: Soft white (LJE 0100)	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 2	Initial temperature: degrees 770 degrees c	Length of Firing: 2 minutes (approx)
	Additional information: Underfired	

Surface Finish: None	Surface appearance: Even, matt, gritty, slightly glittery surface
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## Enamel Process Record Sheet: 2007-032

Sample number 2007-032	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Medium
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Soft white (LJE 0100)	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: Soft white (LJE 0100)	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 2	Initial temperature: degrees 800 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	

Surface Finish: Matted with Diapad	Surface appearance: Even, matt, smooth surface
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## Enamel Process Record Sheet: 2007-033

Sample number 2007-033	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Medium
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: White wet-process	Application method: painted on
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	Application Thickness: thin	Mesh size: N/A
	Additional information:	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: 75% White wet-process Mixed with 25% porcelain slip	Application method: painted on
	Application Thickness: thin	Mesh size: N/A
	Additional information:	
Firing 2	Initial temperature: 800 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information:	

Surface Finish: None	Surface appearance: Matt, slightly creamy white, slightly crazed surface, obvious brush-strokes
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### Enamel Process Record Sheet: 2007-034

Sample number 2007-034	Created by Jessica Turrell	Date 22.11.07	Kiln used No. 3	Soak of kiln Medium
Base material Copper	Thickness 1.0mm	Cleaned Pumice	Counter enamelled Yes	Sheet number: 1 of: 1

Application 1	Enamel used: Soft white (LJE 0100)	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 1	Initial temperature: 820 degrees c	Length of Firing: 2 minutes 30 seconds (approx)
	Additional information: Fired to maturation	
Application 2	Enamel used: Soft white (LJE 0100)	Application method: Sifting
	Application Thickness: Medium	Mesh size: 100
	Additional information:	
Firing 2	Initial temperature: 820 degrees c	Length of Firing: 4 minutes (approx)
	Additional information: overfired	

Surface Finish: None	Surface appearance: smooth, shiny, patches of green across surface particularly around edges
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