

Finishes - Oxide colouring pigments in precast concrete and GRC

Introduction

Oxide pigments are commonly used to colour architectural precast concrete and glass reinforced concrete (GRC). Any pigments incorporated into concrete for exterior use must be colourfast. Also they must not harm the durability of the concrete. All references to precast concrete below apply to GRC.

Application

General

Colouring pigments used in precast concrete are predominantly metal oxides. These do not change colour or fade as no chemical change can occur with them at normal temperatures.

Dosage Rates

The dosage rates for precast concrete are typically 0.25% to 1% by weight of cement. Some off-form and other precast concrete finishes may require as much as 8%. The rates best suited to any project will be provided by the precaster and confirmed by architectural samples.

Characteristics of Metal Oxide Pigments

General

Fine solid oxide pigment particles rely for their effectiveness on being adequately

dispersed throughout the mixed concrete. They do not dissolve and stain the concrete as a dye colourant does.

Type and availability

Pigments are available in a wide range of colours from deep to pale pastel hues. The major non-blended standard pigments are green, black, red, brown, yellow, blue and white. These can be obtained in commercially blended form to produce many intermediate colours.

Characteristics

Pigments for use in precast concrete should have the following characteristics:

- be chemically inert and particularly alkaline resistant
- be insoluble
- be chemically inorganic to prevent fading by photochemical degradation.

Mineral (metal) pigments such as oxides or iron (reds, blacks and yellows), chromium (greens), titanium (white) etc, fulfill the above requirements.



Patterned precast retaining wall units on Melbourne Freeway project using 7.6% deep marigold oxide

Pigmented concrete and in-service conditions

Colour stability

The colour stability of precast concrete coloured with mineral oxide pigments can be affected by the degree of durability and weathering of the concrete rather than by any characteristics of the pigments.

The primary cause of colour changes of the concrete are efflorescence, atmospheric etching and staining and any accumulated dirt and grime. These causes can be controlled by producing precast units of high performance quality concrete that have been well detailed.

Just like all material surfaces left in an open-air environment, precast concrete must be occasionally cleaned to remove pollution and restore colour.

Samples

The same rules should apply to pigmented precast concrete sample evaluation as they apply to the assessment of other architectural precast. Small samples give a guide but existing buildings with similar design should be viewed and evaluated if possible. The first panels of a production run, or prototypes if they are specific, must always be inspected by the client or agent to ensure the design requirements are being achieved.

An excellent result is usually achieved through the use of a competent precaster experienced in the manufacture of architectural finishes.

Standards

There is no Australian Standard for the use of mineral oxide pigments in precast concrete. The NPCAA publication *Precast Concrete Handbook* deals with this matter in more detail.