"Field Marking Paints:

Characteristics and Composition

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Field Marking has come a long way from the days of lime, chalks and oil based paints used to mark the lines on sports fields. Today, painting with latex based field paints has become the choice method for lining and decorating fields. The use of latex paints has a distinct advantage over its predecessors, being safe for the environment, non-damaging to the turf, having relatively low cost per application, and being easy to clean up.

Today's field marking paints are derived from a mixture of a vehicle, the liquid portion of the paint, and pigments, the solid portion of the paint. Within each of these segments, the paint derives its own characteristics. In field marking paints the vehicle contains three primary ingredients—Included in the vehicle is the solvent (water), the binder (latex resin), and wetting or dispersing agents (the same liquids used in dish soap). The pigments include Titanium Dioxide (the whitest pigment available) used as a primary pigment and filler pigments such as Calcium Carbonates, Silicates, Talc, and Kaolin (clay). All of these materials are combined and ground to form a coating desirable for the decoration or identification of the boundaries.

Latex has become the binder most used in field marking paints due to its unique structure and ability to be reduced with water. Once latex has dried, it forms a complex polymer structure of lattices (hence latex) much like lattice work in construction. However, these lattices build layer upon layer in all directions to produce a paint film. This allows the substrate, in this case the grass, the ability to "breathe". More descriptive, the distance within these lattices allows for oxygen and carbon dioxide interaction. This structure also allows for evaporation of very small water molecules leaving the blade of grass, fueling the grass for continued growth.

Pigments give the paint its color and are generally organic in nature when it comes to field marking paints. Nontoxic organic pigments have been used since man first began drawing on cave walls over 15,000 years ago. Organic pigments or pigment colors, however, have changed significantly in the past 100 years. Only recently have organic pigments been utilized as much as they are today. One reason for the lack of use for organics was its relatively high cost compared with leaded pigments. Today, organic pigments can now be synthetically manufactured, offering the user stronger tint strengths, better lightfastness (ability to keep its color), and in a few cases, new pigment types or color shades allowing for a larger range of colors. With these recent advancements, organics have offered increased value in their use.

Lead based pigments are still used in some field and marking paints even today. You should avoid using lead based pigments in any type of paint due to its toxicity and its ability to be absorbed through the skin. Leaded pigments used in turf paints can also leach from the grass causing ground contamination. Leaded pigments are commonly found in traffic yellows using chrome yellow pigments, greens using chrome green or chromium oxide pigments, reds using red lead, and oranges using chrome orange pigments or "moly orange" (molybdate orange). Be sure to review the material safety data sheets to see whether the paints you are using contain any of these products.

Titanium Dioxide is the choice pigment when it comes to white paints. Titanium Dioxide has the greatest hiding ability and also has the highest level of brightness than any pigment known. Titanium Dioxide is used in everything from plastics to toothpaste. How do you think your teeth get so white? Titanium Dioxide is rarely ever used as the single pigment in a paint coating due to its high cost and very small particle size. Filler pigments are used to reduce the cost and fill in the gaps between the Titanium particles. The use of filler or more commonly known, extender pigments, gives the paint better hiding ability and better reflectance. For example, if you had a jar half full of large marbles (filler or extender pigments) and added smaller marbles (Titanium Dioxide pigments) and mixed them together, the smaller marbles, when properly dispersed, would fill in the gaps to produce tighter grouping – allowing very little light to pass through.

In field marking paints, it is desirable to use larger particle-sized extender pigments in combination with Titanium Dioxide to produce better reflectance and light scatter. This gives the paint coating a flat appearance and allows the light reflecting off the surface to scatter in all directions.

If you were to look at a flat coating under an electron microscope, it would give you and impression of looking down at the snow-covered mountains with its many peaks and valleys. These extender pigments or larger particle sizes form peaks and the smaller Titanium Dioxide particles fill in the valleys, giving the paint its reflectance value and hiding ability. This type of hiding is desirable for both low angle viewing and optimum reflectance under artificial lighting.

Surfactants or "wetting agents" and dispersants are the smallest part of field marking paints. Typically, only 1-2% of the total paint consists of these agents. Surfactants and dispersing agents get their name from how they perform. Surfactants are "surface active agents." Most dry pigments are "hydrophobic" in nature, meaning they fear water. Therefore, these surfactants allow the latex and water to combine with the pigments and stay "wet" in solution. Depending on its nature, surfactants will also aid in the wetting of the substrate or grass. The dispersing agents keep all the ingredients mentioned above in solution and prevent settling out. ▲

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