

Technical Department Bulletin

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GOODS: See below
(U.S. & Canada)

SUBJECT: THE P&L MACHINE SYSTEM OF CALIBRATED COLORS

The P&L Machine System of Calibrated Colors was adopted at the September 2-3, 1959 Managers' Meeting after six months of intensive laboratory work. The system consists of ten colorants and the same light and deep bases that are part of the P&L Tube System.

COLORANTS

The P&L Machine System Colorants are not the same as P&L Tube System Colorants even though a few colorants in both systems contain the same pigments and are supplied at the same strengths. The colorants in the two systems differ in vehicle composition and in consistency. The table below lists the P&L Machine System Colorants and certain basic data relative to composition, strength, and exterior suitability.

Colorant Designation	Colorant Name	Factory Code	Basic Pigment Type	Strength Compared to Tube Colorant	Suitable Only For Interior
A	Black	B19	Bone Black	Same as 11A	
B	Brown	E53	Iron Oxide	1.5 X 21A	
C	Red No. 1	E54	Organic	Same as 31A	#
D	Green	E55	Phthalocyanine	4 X 52A	
E	Red No. 2	E59	Iron Oxide	1.5 X 33A	
F	Red No. 3	E60	Organic	---	
G	Orange	E61	Organic	1.5 X 63A	#
H	Yellow	E62	Hansa	---	
	No. 1				
J	Yellow	E63	Iron Oxide	2 X 64A	
	No. 2				
K	Blue	E58	Phthalocyanine	Same as 41A	

All P&L Machine System Colorants are free from lead pigments and are legally "safe" (i.e. they contain less than 1% lead as metal, based on total non-volatile). All pigments are alkali-resistant.

The number of colorants was established by trial and error testing. Ten colorants are the fewest that will provide good decorative colors in all color families. Many competing systems consist of 12 colorants; one or two consist of 9 colorants. The 12-colorant systems usually include a few that are made from lead pigments. The 9-colorant systems do not provide full coverage in all color families.

Except for Colorants A, C and K, P&L Machine System Colorants are considerably stronger than the related P&L Tube Colorants. The added strength expands the color possibilities of the Machine System as compared with the Tube System. Colorants F and H contain pigments

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that are not in any P&L Tube System Colorants. Colorant F provides the means for making new lightfast exterior reds. In conjunction with Colorant K, it also provides the means for making colors in the violet family, a family that is represented by only one Tube System Calibrated Color, namely Iris 1106. Colorant G is 1.5 times stronger than P&L Tube Colorant 63A and contains an entirely different pigment. Colorant G utilizes a new organic orange. 63A is made from Molybdate Orange, a lead pigment. Heretofore flesh and peach colors have been obtainable only by using lead chromate or lead molybdate as tinting pigments. The development of a successful lead-free orange colorant was one of the major technical problems that had to be solved before the P&L Machine System was ready for launching.

The vehicle in P&L Machine System Colorants is a chemically treated oil to which wetting and emulsifying agents have been added to gain miscibility with emulsion paint bases. They are equally miscible with all other P&L Bases. The colorants contain no water.

All P&L Machine System Colorants are supplied at medium consistency (about the same as that of New Lyt-all Flowing Flat). They are thinner than P&L Tube System Colorants. They pour easily and work well in the machine ejection valve. They do not skin in full or partly-full closed containers. They do not thicken under normal conditions of use.

USE OF COLORANT IN MACHINE

Before a can of colorant is opened and poured into the Fischer Paint Colorant Dispenser, it should be mixed for five minutes on a paint shaker machine. After the colorant is in the machine, it should be mixed for 15 minutes. It should also be mixed not less than 20 minutes each day, preferably in the early morning. Daily mixing will prevent the colorant from "layering out" and will reduce the possibility of faulty color matches from this cause. P&L Machine System Colorants may separate into layers on prolonged standing, like virtually every other paint.

A machine valve may occasionally clog (for mechanical reasons or because of some accidental contamination of colorant) and deliver less than the required amount of colorant. A malfunctioning valve can be recognized by the way it delivers colorant. Normally, the colorant flows out evenly and in a straight stream. If the valve is clogged, the colorant may spurt or the stream may be angled. When this happens, the valve should be immediately cleaned with a pipe cleaner wet with a little P&L Duosol.

Colorant should never be thinned or tampered with in any way. The addition of anything, other than more of the same colorant, will alter a colorant's ability to produce matches for the standard Calibrated Colors.

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COLORANT LIMITATIONS

Colorant additions may be made in 1/48 fluid ounce increments up to a maximum of 9 fluid ounces per 120 fluid ounce of base paint (the latter ratio is equivalent to 2 12/48 fluid ounces per 30 fluid ounces of base paint). The upper limit of 9 fluid ounces per 120 fluid ounces of base paint is the same as the one that applies to the P&L Tube System. It restricts our ability to produce a few potentially interesting colors. It is necessary, because the addition of more than 9 fluid ounces of colorant may alter gloss, drying, or some other quality of the base paint to which it is added.

Colorants, other than C and G, are suitable for exterior applications, but not every combination of these Colorants and Bases makes color permanent exterior paint. Very delicate tints may fade outdoors, not because the colored pigment is impermanent by itself, but because the white base chalks too much. For this same reason, there are limitations on the exterior use of certain Tube System Calibrated Colors.

All pigments contained in P&L Machine System Colorants are alkali-resistant and are unharmed by "green" plaster and masonry, but Colorants C and G are not recommended for tinting Vapex Masonry Paint Bases because they lack exterior color permanence.

CODING SYSTEM FOR CALIBRATED COLORS

The coding system adopted for the P&L Machine System of Calibrated Colors provides a tie-in between the color family and code number. The details are outlined below:

<u>Color Family</u>	<u>Calibrated Color Code Numbers</u>	<u>Highest Code Currently Assigned</u>
Neutral	2500 - 2999	2564
Yellow	3000 - 3499	3068
Yellow Green	3500 - 3999	3528
Green	4000 - 4499	4069
Green Blue	4500 - 4999	4577
Blue	5000 - 5499	5070
Yellow Orange	5500 - 5999	5531
Orange	6000 - 6499	6093
Red Orange	6500 - 6999	6575
Red	7000 - 7499	7082
Red Violet	7500 - 7999	7550
Violet	8000 - 8499	8022
Blue Violet	8500 - 8999	8505

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The unassigned numbers in each series are available for coding additional colors, if the system should require future expansion, or if additional colorants are ever adopted. The sequence of color

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families in the above list is the same as that used in the merchandiser books which will display the Calibrated Colors.

FORMULAS

A typical formula for one P&L Machine System Calibrated Color reads as follows:

<u>Calibrated Color</u>	<u>Base</u>	<u>Add Colorants</u>	
		<u>Gallon</u>	<u>Quart</u>
2510	Light	A 24	A 6
		J 8	J 2

The letters in the above formula stand for colorant designation and the numerals stand for the number of 48ths of a fluid ounce that must be added. A 24, for example, means $24/48$ fluid ounce of Colorant A; J8 means $8/48$ fluid ounce of Colorant J. To produce Calibrated Color 2510, $24/48$ fluid ounce Colorant A and $8/48$ fluid ounce Colorant J must be added to each short-filled gallon of Light Base. Some formulas require more than one fluid ounce (i.e. more than $48/48$ fluid ounce) of a given colorant. Such a formula is illustrated below:

<u>Calibrated Color</u>	<u>Base</u>	<u>Add Colorants</u>	
		<u>Gallon</u>	<u>Quart</u>
3510	Light	D 8	D 2
		H 1 oz. 40	H 22

In the above example H 1 ounce 40 means one and $40/48$ fluid ounces Colorant H. To produce Calibrated Color 3510, one must add $8/48$ fluid ounce Colorant D and one and $40/48$ fluid ounces Colorant H to each short-filled gallon of Light Base.

CALIBRATED COLORS

The 747 Calibrated Colors in the Machine System include all but two of the 224 Tube System Calibrated Colors. The two exceptions are Polar Blue 1044 and Holly Green 1272. The Machine System Calibrated Colors also includes 144 of the 207 Intermix Colors.

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