## COMMERCIAL RED LEAD FOR PAINTING STRUCTURAL STEEL.

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R ED lead is one of the best-known and most widely used pigments at the present time for painting steel for structural and railway purposes, but very few of the consumers seem to realize the great difference in quality of the red leads sold by the manufacturers and jobbers, nor the effect of the ingredients upon the quality and durability of the paint in service.

Red lead as sold on the market is mainly a mixture of two oxides of lead, true red lead and litharge. It is made by roasting, or oxidizing, pure metallic lead in reverberatory furnaces in two stages. In the first stage the lead is melted down on the flat hearth of the reverberatory while a strong current of air is passing across its surface. Litharge, or the monoxide of lead, is formed under these conditions as a skin or crust upon the surface of the molten metal and is pushed to the back of the furnace, continually exposing fresh metallic lead to the oxidizing action of the air. Finally, all the lead becomes changed into brown-colored scales of litharge, which on grinding produce the reddish-yellow litharge of com-merce. The second stage in the process consists in the further oxidation of the ground litharge in the same or a similar reverberatory furnace to true red lead. The temperature and other conditions have to be carefully controlled or, otherwise, the bright red color will be spoiled and the quality of the pigment impaired. If the oxidation is not carried far enough considerable litharge will still remain and the color will be pale. If carried too far the red lead becomes more dense and crystalline, and hence is more difficult to mix with oil into a paint and is liable to run or streak. If the temperature becomes too high, the red lead is decomposed to litharge again and a partial fusion of the material will result. The final product should contain no grains of metallic lead nor fused particles, but after grinding very fine should be of a bril-

liant red color and with only a small quantity of litharge. The chemical composition of true red lead is considered to be a compound of two parts of lead monoxide and one part of lead dioxide, but the commercial product always contains litharge in varying proportions as the analyses given in Table I. will show.

Red lead containing a large percentage of litharge when mixed with oil sets into a cement in a comparatively short time. This makes it difficult to work and uneven in application. A pure red lead, on the other hand, is more inactive to oil and brushes out more smoothly. This allows the painter to cover more surface with the same quantity of paint with less exertion and in a shorter time, so that the increased cost of a high-grade red lead is more than repaid by the economy in application, as well as in the increased beauty and durability of the paint; not to mention the better protection of the steel work obtained. Fineness of grinding is, of course, an essential characteristic, as otherwise even a high-grade red lead would run and alligator.

In view of the wide variation in the purity and quality of the commercial article now on the market it would, therefore, seem advisable where large contracts are concerned and where durability and uniformity of the painting is necessary, to buy it under specifications and to rigidly inspect and test all shipments received. The following might be suggested as a specification for this purpose :--

Specification for Dry Red Lead.—The dry pigment must be of the best quality, free from all adulterants, and shall contain not less than 85 per cent. by weight of true red lead (Pb<sub>8</sub>O<sub>4</sub>), the balance to be practically pure lead monoxide (PbO). It must contain less than 0.1 per cent. of metallic lead, and is to be of such fineness that not more than 0.75 per cent. remains after washing with water through a No. 19 silk bolting-cloth sieve. It must be of good, bright color, and be equal to the standard sample in freedom from vitrified particles and in other respects.

Samples of one ounce of the dry red lead must be submitted to the.....Company's Chemist for analysis for each new order for the materials. No material shall be shipped until the above sample has been approved by the Chemist. Shipments must be uniformly in accordance with the specification. Further samples may be taken at any time after delivery, and if the material is found not to be in accordance with the specifications, all the materials represented by such samples shall be rejected.

Standard samples of dry red lead will be furnished on application to the.....Company's Chemist.

Wherever possible it should be arranged to have the shipments of red lead sampled before shipment, so that all trouble, delay and possible disputes may be avoided by reason of the shipment being rejected after delivery had been made. The buyer, or his representative, could then get an unbiased average sample of the different barrels of material, seal them with his own private stamp, taking note at the same time of the numbers and marks of the barrels. If the analysis proved satisfactory the latter could then be checked up and identified upon delivery. In this way no further delay nor trouble should result and both buyer and seller would be equally satisfied.

Sei	True rial red lo. lead.*	Litharge.*	Oxide of iron.*	Barytes.*	Whiting.	Zinc Oxide.	Other mineral matter.	Organic color- ing matter (dye).	Total lead.*	Residue on No. 19 silk bolting cloth.*	Color.
л.	63.57	32.03	.36	None	None	None	None			Good	Good
1.	56.00	12.20	None				"	None	91.04	8.17	Pale
4.	50.00	43.39	"	and the second second					90.58	1.55	Excellent
3.	94.05	5.05						"	90.63	2.05	Good
4 .	71.43	27.09						"	00.20	2.03	Good
5.	77.37	21.71							00 56	3.03	Good
6.	52.48	40.30	Carl State State State						90.50	3.4	Good
7.	55.35	42.94	The second second						90.01	4.4	0000
8.	38.71	30.66		27.40				Present			
0	60.45	38.6r	None				None	None	90.63		Paler
9.	71 88	26.01	""	2. minter			66	"	90.15	3.8	Good
10.	87 16	12.72					"	.12	90.84	2.6	Good
11.	07.10	12.75	"	and the second	Same and		66	None	90.70	I.3	Orange
12.	00.01	32.45				inter a statistical	**		00 77	8T	Pale
13.	88.45	11.39							90.11	.01	The second second
	* Percentage	·									

Table I.-Analyses of Dry Red Leads.