NOTES FOR
A HISTORY OF "CALDER RED" COLOR AND ITS PAINTS IN THE UNITED STATES IN RELATION TO THE RECOATINGS OF ALEXANDER CALDER'S *FLAMINGO* (1973) AND *LA GRANDE VITESSE* (1969) AND OTHER CALDER STABILES

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Pigments extracted from a 1989 quart of Keeler& Long "Calder Red"

Introduction

This document is incomplete and is not intended to offer a comprehensively researched study of the orange-red color and its paints either specified, intended by, or applied by Alexander Calder on his various outdoor sculpture stabiles (the mobiles are excluded entirely). The document contains some unsubstantiated information based on recollection (oral history), opinions, and some conjectures.

Nevertheless, the limited information presented here may be timely, *and timely is its purpose*, having received several inquiries about the correct color or paint for refinishing Calder stabiles, and also having received complaints that the Calder Foundation has not been helpfully communicative, timely, or revealing to inquirers, the most recent received on January 2, 2013.[1] Furthermore, several Alexander Calder stabiles the authors have seen bearing glossy coatings,

[1] An inquiry to the Foundation should *still* always be made inquiring about any records of original colors.

both black and red and in red colors alone, seemingly "out of character" in color and gloss[2] that were repainted within the last 10 or so years encouraged the making of the information in this document promptly available to those who may be in a position to perform or to guide any necessary repaintings of Alexander Calder stabiles.

Calder Red

The color widely known as "Calder Red" is the characteristic matte orange red color (somewhat similar to vermilion or "Chinese Red") used and specified by the artist for parts or the whole of his stabiles, many of which are monumental and outdoors, of the period 1963 to 1976. Earlier use of this color, or variants the artist may have used, was not researched by the authors. The artist also used the darker, standard red color "Signcraft Red" (and other colors) produced by the Ronan paint company located in the Bronx, New York, for components of his mobiles. The Ronan paints are flat, quick drying decorative paints known as "Japan Colors" not suitable for enduring outdoor exposure. The information in this document does not necessarily imply that there were *not* variants in the red color of paints used and/or approved by the artist for the stabiles.[3] But clearly one color predominated.

The Color of FLAMINGO and LA GRANDE VITESSE

The two long-term paint sources for the artist's signature orange-red color known as "Calder Red" used on his stabiles in the United States as well as shipped to Europe for use on stabiles there were (1) the Keeler & Long Company, who produced the artist's red color in a matte, long-oil alkyd paint for the 1973[4] FLAMINGO in Chicago, and (2) Guardsman Chemical Company, who matched Calder's same preferred red color, also in a matte alkyd, for the earlier commissioned 1969 LA GRANDE VITESSE in Grand Rapids, Michigan.[5]

When Guardsman Chemical Company closed its business, the established Calder Red color formula was preserved and alkyd Calder Red paints were thereafter provided by Pro Coating Inc. of Sparta, Michigan from the Guardsman color formula[6].

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[2] On inquiry, some explanations were "we matched the color of the maquette;" "it happened before my time;" "the conservator claimed to have the original paint;" "the painters provided the products;" "we could not find a matte paint after the alkyd was no longer available."

[3] A copy of a letter once in the possession of Robert Lodge (misplaced or lost) from Klaus Perls (Perls Gallery, NY) has Mr. Perls stating exactly or in effect in regard to Calder Red: "he was not too particular about an exact color." However, Mr. Perls has been criticized for not being particular about many matters himself.

[4] Dedicated October 25, 1974.

[5] Subject to historical complications described later.

[6] Told to Robert Lodge over 15 years ago by a former executive of Guardsman Chemical Company whose name has been forgotten.

To be fully accurate, the first coating of Calder Red for LA GRANDE VITESSE was paint that shipped with the sculpture from the foundry in France and was applied to the shop-primed steel after its erection by brushing. The paint was referred to as "the definitive color" in an English translation provided with the French original letter.[7]

> "We have noted your agreement with regard to the colour of the ground and the definitive colour which you will apply on the premises.
>
> "To that purpose we are informing you that you will find in the cases not only the quantity of paint necessary for the definite (red) but also a certain number of jugs containing the ground paint permitting you to make some retouches which you believe to be necessary on the primary coats."

The first paint for overpainting the sculpture matching this French paint in color was provided by Ford Paint and Varnish Company, founded by former U.S. President Gerald Ford's stepfather in 1929.[8] Presumably, having no evidence, the Ford Paint and Varnish Company matched the color of the paint shipped with the sculpture and may even have had the shipped supply of dry pigments. This color formula was passed from Ford to Guardsman Chemical Company and accurately so, according to a Guardsman company spokesperson interviewed by Robert Lodge.[9]

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[7] Letter from the Biemont, Tours fabricator dated March 5, 1969 preserved in the Nancy Mulnix Archives, Grand Rapids Public Library.

[8] Told to Robert Lodge over 15 years ago by a former executive of Guardsman Chemical Company whose name has been forgotten.

[9] Ibid.

Alexander Calder, LA GRANDE VITESSE, 1969, Grand Rapids, Michigan (Photographed in 2011)

The Calder Red colors provided by these early sources (Ford/Guardsman/Pro Coatings and Keeler & Long's color) matched one another from the earliest or first layers through repeated overcoatings of both outdoor sculptures, based on visual and cross-sectional microscopic examinations[10] of lowest observable (and presumably original) layers on the two sculptures and by a comparison/tracking of the later companies products over time.

Over the years, these two monumental and historically significant Calder outdoor sculptures, FLAMINGO and LA GRANDE VITESSE, have been overpainted[11] many times. LA GRANDE VITESSE has been overpainted every year until fairly recently. It was last overpainted in the Spring of 2012 with matte alkyd paint produced by Pro Coatings of Sparta, Michigan and the accumulations are afterwards exceeding a phenomenal 70 mil[12] in many places[13] (approximately

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[10] By Robert Lodge.

[11] FLAMINGO had been both "overpainted" at times and also "repainted"- meaning a stripping away of existing coatings for a new coating system.

[12] One mil = 1 1/1000 inch. The unit of measure is nowadays mostly confined to the coatings industry and film manufacturing. For aid in envisioning, a common "strong" plastic trash bag has a thickness of 3-4 mil.

[13] Due to the heavy accumulations, the surface of the LA GRANDE VITESSE is quite rough, resembling an old iron bridge after many over-coatings. It is the personal opinion of Robert Lodge that this is not

30 mil is generally considered the maximum accumulated thickness of coatings before failure of the accumulations from stress and strain)[14]. And over the years, right up to the present, both outdoor sculptures have maintained the same standard in Calder Red color and in a matte finish as they were originally painted. And over the years, right up to the present, the color of each sculpture has matched the other. The artist saw and approved the first color of each[15] and the Alexander Calder Foundation specified this same color for necessary repaintings of Calder sculptures, referencing the Keeler & Long product[16], until just a few years ago when the Keeler & Long company product was discontinued. Thus, the color of LA GRANDE VITESSE and of FLAMINGO should be considered historical, well documented reference standards for "Calder Red" and it is important that both today, even after new coatings in 2012, show no deviation from the first, artist-approved colors, nor from each other.

Keeler & Long's Calder Red became a standard for the Calder Red color and flat alkyd paint in the U.S. because it was long specified by the Calder Foundation, and was even shipped to Europe for restorations there (e.g. Calder's CARMEN, restored at the Museum Nacional Centro de Arte Reina Sofia) and likely for the 2008 repainting of HOMAGE TO JERUSALEM in Israel just before the K&L product was discontinued.

There was the one exception of a darker red-orange color produced around 2002 as "Calder Red" (but with its own color reference number: EA23[17]) by the Keeler & Long company, perhaps produced for a specific Calder sculpture at someone's request. The existence of this other Keeler & Long Calder Red became known to Robert Lodge after a purchaser in Portugal received this color in paint ordered from Keeler & Long and complained[18] it was "the wrong color."

In a photograph taken of Calder stabiles in front of the shop of the artist's main fabricator, Segre's Iron Works (Stephen Segretario, proprietor), the small version of STEGOSAUROS

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visually undesirable as it lends to the sculpture the "industrial character" of the artist's long-used materials. However, even today, with heavily caked paint, its appearance is bold and uniform at a normal viewing distance. The sculpture is remarkable for having maintained its original paint color throughout 44 years of overpaintings due to exterior exposure.

[14] Robert Lodge has inspected the sculpture from the point where accumulations had reached approximately 30 mil. At 40 mil the accumulations were breaking away in varying groups of layers. In 2011, near 70 mil, the thick accumulations were breaking away, with all their layers intact, from the steel.

[15] Subject to qualification statements elsewhere in this document for FLAMINGO. Since the first paint or a sample to be matched for LA GRANDE VITESSE was shipped with the sculpture, since the artist saw the painted sculpture at its dedication and left no recorded objection, and since it has been partially observed and stated by informed individuals that the color formula never changed, the color of LA GRANDE VITESSE may rightfully be held to be THE well documented standard for "Calder Red."

[16] Other coatings products were also specified, such as "Tnemec Endura-Shield Series 175" (with a matte clear coat) and "Rust-Oleum Industrial Enamel High-Performance Acrylic no. 5269 (red)". Earlier (noted in 1997), inquirers were directed to obtain "authorized" paints from the fulfillment center Nucifera in New York.

[17] The color number for this color was obtained by Robert Lodge after an inquiry around 2002 to Keeler & Long if there were more than one "Calder Red" color available from the company.

[18] In a communication to Robert Lodge.

(owned by the Toledo Museum of Art, Ohio) is seen in a color seemingly darker than that maintained on FLAMINGO and LA GRANDE VITESSE while the adjacent FLAMINGO FOR THER BLIND is shown in the characteristic color of a red lead primer, a color close to the final Calder Red coating on FLAMINGO in Chicago.

Photograph by Bob Hicks taken in 1973.

Clearly, judging fine differences in color from old photographs has to be done with acceptance of uncertainty.

When fabrication for the outdoor sculpture FLAMINGO took place at Stephen Segre's shop, Segre's Iron Works, in Waterbury, Connecticut, Segre (Stephen Segretario) received the artist's specification of a matte and red color that Keeler & Long then produced to match this artist's requested color[19]. The choice of Keeler & Long was obviously due to its plant's location in Watertown - a 10 minute drive from Segre's workshop in Waterbury. Later, Keeler & Long continued to produce the same Calder Red color but in its silicone modified alkyd which had greater weathering resistance (product KLP39877, KL=Keeler & Long, P=PolySilicone Alkyd, 3=flat, 9877=the color).[20]

Robert Lodge interviewed Stephen Segre about the Calder Red paint around 1997, and also around that time he interviewed Mr. Long of Keeler & Long company at an SSPC (Society for Protective Coatings, formerly the Steel Structures Painting Council) meeting in San

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[19] According to a telephone communication between Robert Lodge and Stephen "Segre" around 1997. In that conversation, Segre offered to provide Lodge with left-over cans of the original batch of Keeler & Long paint he had ordered for FLAMINGO. The delivery never happened. The old paint was probably solidified by then.

[20] Shortly before Keeler and Long discontinued production of their Polysilicone Alkyd and any Calder Red, their product code for Calder Red changed to KLV39877 with the "V" indicating a substitution with VOC compliant solvents.

Diego.[21] Long said that he was aware that his company had been a long-time provider of Calder paints and was proud of that, and he offered to be personally involved in any matters of quality. Segre said he personally favored and argued for a glossier paint than what the artist always requested because he knew it would endure longer but accepted the artist's request for a matte red "like was used on the Grand Rapids sculpture."[22]

John Debara , an employee of the Keeler & Long company since, 1973, and one who took paint orders from Mr. Segre, recalled how insistent Segre was on obtaining the "maximum flatness" (matte) for the paints he was using in producing Calder's sculptures, including the red, an off-white, and black paints.[23] Note that the whites supplied were referred to as "off-white." According to Mr. Debara, Segre was seeking matte of between 1-3 gloss units (as measured at 60 deg.)[24] Presumably, Segre's insistence on extremely matte paint was a reflection of Alexander Calder's wishes.

[21] Mr. Long sold his company to PPG shortly after that time.

[22] According to a telephone communication between Robert Lodge and Stephen Segre around 1997.

[23] From a telephone conservation between John Debara and Robert Lodge in 2013.

[24] Simply put, the gloss unit is a measurement of the amount of diffused light reflecting from a surface illuminated by light incident on the surface at a certain angle, here 60 degrees incident (measurements are taken at 20, 60 and 85 degrees). While matte surfaces are much more accurately measured with light incident at 85 degrees, it is fairly common to provide gloss unit readings of all surfaces, matte to gloss, using 60 degrees incidence so that the readings are more easily comparable across the full range of surfaces.

FLAMINGO under construction and in red lead primer at Segre's Iron Works (Photograph by Bob Hicks taken in 1973).

When FLAMINGO arrived in red lead primer and was erected and painted, Alexander Calder (who was present for its dedication on October 25, 1974) remarked that the paint was "too glossy." This was a comment by the artist overheard and reported in a newspaper article on the dedication of the outdoor sculpture and its associated celebration.[25]

Then, Mrs. Nancy Mulnix, the head of the committee that commissioned Calder's LA GRANDE VITESSE for Grand Rapids, brought to the attention of GSA's [26] project architect that FLAMINGO's paint was the wrong color (a little too dark).[27] How this color error happened is

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[25] A photocopy of the newspaper article from GSA records lacks a banner (presumably that of the *Chicago Tribune*), and lacks a date. The reporter was Carol Oppenheim.

[26] GSA: U.S. General Services Administration, commissioner of the sculpture for its Art-in-Architecture Program.

[27] GSA database memo. This letter or a copy was not found in the archives of Nancy Mulnix contained in 4 cubic feet (OCLC No. 17599176) at the Grand Rapids Public Library. The memo field states: "Nancy Mulnix of the Vandenberg Center in Grand Rapids contacted an architect who contacted Chicago's branch of the GSA on November 6, 1974, to say that the color of 'Flamingo' was slightly off, and not the

not clear. But the sculpture was erected in primer and was painted on-site by a painting contractor perhaps without Stephen Segre's involvement. The government's record (a letter by Karol Yasko, then GSA Commissioner for Fine Arts) indicates that the artist's and GSA's approval of the fabrication was made at Segre's shop before the final paint coating was applied, when the steel was only primed with a lead red primer. There seems to be no document that GSA had approved that first coating applied to the sculpture after its erection.

Alexander Calder, FLAMINGO, 1973 shown in its first coat of paint considered to be too dark a red and too glossy.

Whatever the cause of the mishap, GSA had FLAMINGO repainted to match LA GRANDE VITESSE in color and matte surface character, though the date for this has not been found, setting the color standard for both sculptures and for repaintings of these and other Calder sculptures over decades and worldwide.

As far as Robert Lodge knows, there is no document evidencing that Alexander Calder actually did select the very same color for FLAMINGO that he approved earlier for the nearby LA

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exact shade of Calder Red which the artist has been known to use for his other pieces. Mulnix provided a contact at the Guardsman Chemical Coatings, Inc., Mr. Neil Weemhof … who would be able to mix the proper color for 'Flamingo." The architect agreed with Mulnix, and suggested to the GSA that when the time for repainting does arrive, one might consider layering the graffiti-proof Calder Red over the other standard coats of orange."

GRANDE VITESSE, only a verbal remark by the fabricator Stephen Segre that this was so.[28] The eventually permanent color for FLAMINGO appears to have been caused by the remark made by Nancy Mulnix that FLAMINGO was the wrong color (based entirely, it seems, on her knowledge of the color of the relatively recent LA GRANDE VITESSE). Alexander Calder, it seems, saw at the dedication the coating that was applied to FLAMINGO but the only recorded remark of his, which a reporter overheard and was printed in a newspaper, was his observation that it was "too glossy."[29] The absence of a recorded remark by the artist on the color is not necessarily an acceptance of the color. In the absence of a recorded specific remark by the artist, and in the absence of a color sample submitted by the artist or by Stephen Segre for FLAMINGO (which does not survive apparently), it seems reasonable to rely on (1) the use of the better documented color choice for the somewhat earlier and nearby LA GRANDE VITESSE and (2) the unwavering persistence and acceptance of the color of FLAMINGO from the time when it was repainted after he saw it at the dedication.

When Keeler & Long completely discontinued production of their silicone alkyd, and thus their 35 year production of the authorized Calder Red, as all large manufacturers have discontinued large production alkyd coatings, Keeler & Long gave Robert Lodge their reference color swatch for safe-keeping - the only reference the Watertown, Connecticut plant used to confirm batch consistency among its orders for its Calder Red. According to Keeler & Long told to Robert Lodge by the color lab, the plant kept two such cards coated with the red color and batch colors were mixed manually until the color was made to match these two physical standards. At one point in time, one of the two cards was lost at the plant. Keeler & Long gave Robert Lodge the only remaining reference standard card for the Calder red standard as they felt they would have no further use for it and Lodge expressed interest that it be preserved.

An examination of the plastic coated paperboard card shows that its color may have darkened slightly over time. There is certainly an unevenness, with the perimeter being lighter in color and still matching the color of past paints ordered for this color. Nevertheless, the aged color is generally a good match to what has always been on LA GRANDE VITESSE and on FLAMINGO.

In addition, for whatever purposes it may serve in the future, the pigments have been filtered from a 1989 quart of Keeler & Long Calder Red KLP39877 by Robert Lodge and kept by him[30]. This color formulation contains chromium pigments which have been replaced by compliant substitutes in current formulations of Calder Red.

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[28] See note 20: telephone conversation between Robert Lodge and fabricator Stephen Segree.

[29] See note 4: letter from Mr. Perls stating exactly or in effect in regard to Calder Red: "he was not too particular about an exact color." Mr. Perls is known to be not too particular as well when advising on repaintings Calder sculptures. The copy of this letter held by Robert Lodge has been misplaced or lost. Lodge recalls it was addressed to the then GSA Commissioner of Fine Arts who was inquiring to Mr. Perls about the matter of a wrong color on FLAMINGO.

[30] Qualified analysts are welcome to request a portion of this original Calder Red pigments composition for analysis if some value can be seen in such work.

The outdoor monumental sculpture FLAMINGO was painted again in 2012. The color standard for the 2012 repainting of FLAMINGO was based on the seemingly unwavering color history of LA GRANDE VITESSE using as a color reference a gallon of Pro Coating's new acrylic Calder Red instead of the aged Keeler & Long color reference card. Pro Coating's acrylic remains a faithful match to heritage colors of LA GRANDE VITESSE and of FLAMINGO. The Pro Coating's Calder Red was matched exactly for the 2012 repainting of FLAMINGO in a custom matte 2-part acrylic aliphatic urethane by Precision Coatings of Springfield, Missouri. Precision Coatings company now maintains that historic Calder red color in non-chromate substitute automotive grade pigments for other's use in repainting Alexander Calder sculptures.

The 2012 Stripping and Recoating of FLAMINGO

Over a three-month period ending in August 2012, all existing coatings were removed from the steel of FLAMINGO and the sculpture received a new coating system consisting of an organic zinc primer, epoxy intermediate primer, and a conventional 2-part matte urethane in the Calder Red color historic for this sculpture, a matte urethane custom produced specifically for this project by Precision Coatings company of Springfield, Missouri. The existing coatings that needed to be removed were from a previous complete recoating and consisted of an epoxy primer and the then standard Calder Red produced by the Keeler & Long company in a matte silicone alkyd. Removing these coatings required abrasive blasting.

Surface preparation for recoating Alexander Calder sculptures using abrasive blasting has been discouraged by the Alexander Calder Foundation in the past and remains a discouragement on the Calder Foundation's website. Thus, surface preparation of FLAMINGO by abrasive blasting calls for both explanation and defense and these may be relevant to the necessary recoating of other steel monumental stabiles of the period 1963-1976.

Comments on Past and Current Steel Surface Preparation

In the past, industrial steel used in bridges and other structural applications needing a protective finish would receive a first application of a protective coating in the form of a "primer." The primer would be applied directly on the steel with, in most cases, no significant further preparation of the steel's surfaces. These surfaces would contain some corrosion and mill scale. In some cases, such steel was purposely left to corrode before priming to remove the mill scale by the forces of corrosive undercutting, as normal ferrous corrosion is much easier to remove or reduce by hand tool work then removing or reducing the mill scale by such old methods.

Alexander Calder's FLAMINGO originally was marginally prepared steel bearing mill scale that was primed with the red lead primer described below. LA GRANDE VITESSSE may also have primed at the foundry in Tours using red lead primer. However, a color photograph of the structure being erected in Grand Rapids shows the steel in a light brown color. This could be a tinted zinc oxide primer. France, having few deposits of lead but large deposits of zinc,

widely used zinc oxides since the early 1800's for priming steel. But this is more likely a variation on red lead primer system which used iron oxide paint as a second primer layer. There were two common coating systems for many years in major industrial areas of the world for steel structures intended for outdoors. One used two coats of red lead oxide in oil and long oil alkyd binder followed by two coats of alkyd paint in the desired finish color. The second was a variation in which the second primer layer's binder was pigmented with iron oxide.

Mill scale is generally not well adhered to the steel substrate. Mill scale consists primarily of magnetite, Fe_3O_4, of characteristic blue-gray "steely" color. An extremely thin outer film of hematite, Fe_2O_3, is invisible to the naked eye. The inner portion of the magnetite contains fine metal grains and sometimes, residual black FeO which contribute to the roughness of the metal. Mill scale is found on all hot-rolled steel products unless processed in a protective atmosphere or descaled (e.g., for galvanizing).

Mill scale is harder than the steel but is generally not well bonded to the steel. When coated with modern chemically or moisture cured industrial coatings, which undergo contractions on curing, the coatings can disbond as mill scale disbonds, or its bonds weaken, from the stresses and strains of the curing primer.

The universally used primer of the past very successfully bonded to, and protected, these "unclean" steel surfaces. This past primer bonded to mill scale and did not produce the tensions on curing that common modern epoxy primers do. Hence, the past primer did not tend to pop off weakly bound mill scale.

This primer of the past can no longer be used due to its toxic lead content as it consisted of drying oils and lead pigments, usually "red lead," a particular oxide of lead. It was effective as a bonding and protective layer for two reasons. For one, the long drying (actually "curing" by oxidation) time of the oils provided a long "dwell time" or contact for a prolonged period before hardening. The longer the dwell time of coatings and adhesives the better the penetration into corrosion and other porous surfaces and the more extensive the molecular bonding, some of which is slow to form. Molecular bonding by attraction of opposite charges is the principal factor in adhesion while penetration helps exclude moisture and oxidation and in stopping the corrosion processes. Secondly, these primer's lead pigment content significantly protected the steel from corrosion because of the exceptional corrosion inhibiting properties of lead compounds.

The original red lead primer was removed from FLAMINGO in a past recoating. Its removal was caused by the use of alkaline chemical stripping of all accumulated coatings. Alkaline chemical stripping was effective because all coatings then on FLAMINGO were oil based and these are easily attacked by chemicals such as sodium hydroxide, which was the chemical used

to strip FLAMINGO[31]. The sculpture received an epoxy primer in the recoating as a replacement for the lead red primer.

The current leading primers permitted nowadays for safe environmental and public safety use are epoxies, with the option of a preliminary layer of a zinc-content coating to replace the corrosion control afforded in the past by lead. While in some applications a zinc primer can be a final priming for steel, in most applications and especially those where a durable and attractive final color coating is desired, an epoxy primer is applied.

The principal function of epoxy primers is to serve as a barrier layer. There is no other liquid coating for steel affordably and easily applied in the field with as high an impermeability to oxygen and water vapor – necessary ingredients in the corrosion process – than epoxy[32]. While epoxies may be a final coating inside the dark interiors of municipal water tanks, they are sensitive to ultraviolet light and for outdoor exposure should be coated with a protective layer which also serves as the color and attractive finish coating.

It is a widely understood and accepted practice nowadays in the industrial coatings industry that epoxy primers should certainly not be used on steel still bearing mill scale. This is because mill scale is not always well bound to the steel and epoxy primers build powerful stresses on curing that have the real potential to "pop off" or disbond mill scale, leaving patches of exposed steel to corrode. Therefore it is standard practice in the industrial coatings industry to prepare steel for modern primers such as epoxy by removing all mill scale.

The standard procedure for cleaning steel of mill scale is abrasive blasting because it is the most effective and most cost-effective means of performing this task. There are numerous industry standards for final surface finishes by abrasive blasting as well as hand and power tool work set by the U.S. industry standards-setting organization SSPC (The Society for Protective Coatings, formerly the Steel Structures Painting Council). The most common and usually sufficient degree of blasting is the standard known as a "commercial blast." This will effectively remove mill scale and corrosion with no visual loss of metal. The 2012 surface preparation of FLAMINGO was specified to be a "commercial blast."

In addition, it and other degrees of abrasive blasting also impart a very important surface profile that increases the adhesive bonding of coatings. The surface profile is a dense and uniform distribution of tiny pits that lend a 'frosted" appearance to the surface. The depth of these pits is measurable and should always be measured. The most common depth of the surface pitting imposed is around 2 mil. This surface profile increases the bonding of coatings because it increases the surface area of bonding[33]. Hence any square inch of coating on a 2 mil

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[31] Peel-Away 1, Dumond Chemicals, Inc.

[32] The relatively new micaceous iron oxide coatings (MIO coatings) in which platelets of iron oxide settle and layer in the curing films of urethane resins can be equivalent or superior in function as barrier films.

[33] Any so-called "mechanical" bonding due to the roughness of the surface is negligible. Abrasive blasting also makes polar bonding sites available that may have been "satisfied" by corrosion and pollutants.

surface profile is actually bound to a larger surface area than a square inch and thus has an increased number of polar bonding sites.

Surface profile needs to be measured to assure that it is not excessive because coatings are relatively thin and the peaks of a surface profile, or the distance between peaks and valleys into which coatings settle, should not be so great as to allow the steel to be near the outermost surface of the coating layer. For a coating 6 mil in thickness, the profile should be no more than 2 mil.

Removal of *all* mill scale is critically important for assuring and prolonging the bonding of modern epoxy primers and sustaining the initial bonds through the additional stresses of accumulated catalyzed coatings used in maintenance overcoating. Thus, an industry standard steel surface preparation step is critical to preventing corrosion damage to the steel from loss of the protection of the coating through disbonding.

<u>The Past Surface Preparation of Alexander Calder's FLAMINGO:</u>

In the later 1990's, the accumulation of coatings on Alexander Calder's FLAMINGO were removed, the surfaces of the steel were prepared for new coatings, and the sculpture was recoated. The accumulated coatings that were on FLAMINGO could not be affordably removed by abrasive blasting due to the high cost of containing lead dust from the original primer still on the sculpture. An abrasive blasting procedure was also prohibited by the Alexander Calder Foundation on the basis understood from a verbal conversation between Robert Lodge and the foundation's director, Alexander (Sandy) Rower, that the artist liked the steel to be in an "industrial" condition. Abrasive blasting was also prohibited by cost because it would raise up clouds of lead dust, and the safe containment of such and precautionary environmental monitoring would have not been affordable.

Except for several areas, the original lead primer on FLAMINGO was in good condition, still functioning as a protective layer with effective corrosion control activity. It was the accumulation of alkyd resin top coatings that were failing by fading and disbonding. The only alternative to the prohibited abrasive blasting for removing the coatings was chemical stripping. Because both the alkyd top coatings and the red lead primer were oil based, both would be equally attacked by any available chemical stripper. Thus all coatings had to be removed despite the fact that it is often desirable to leave old red lead primers in place whenever possible because it avoids the human health and environmental risks of working with toxic lead and because these primers remain superior to all others in their bonding to, and protection of steel.

During the removal of all coatings from FLAMINGO, the amount of mill scale revealed was unexpected for steel prepared for a major art work as late as 1973. It was clear at the time that this mill scale would certainly not withstand the stresses of the intended epoxy primer.

Negotiations with the Calder Foundation directly from the jobsite led to permissible removal of the potentially loose mill scale by powered hand grinders. During the course of this work, chasing loose mill scale, every bit that remained came to appear to be "potentially" loose and so it was that nearly 100% of the mill scale was removed. The profile left on the surface of the steel by abrasive disks averaged the desirable 2 mil. A thin, tightly adhered black oxide remained on the steel as was evident as a black layer under the epoxy primer in the exposed layers of the 2012 surface preparation. Certainly some mill scale was left behind as well.

The Current Surface Preparation of Alexander Calder's FLAMINGO:

Since that past complete recoating of FLAMINGO approximately 15 years ago, the surface coatings (epoxy primer with silicone alkyd top coating) had held up with some degree of expected fading and with a population of disbonding and similar failures well within the expected range, according to a hired industrial coatings consultant[34]. The sporadic disbonds were thought to have been potentially caused by remaining bits of mill scale[35].

This situation confirms the necessity for aggressive surface preparation of a sculpture's steel for its optimal protection with epoxy primers. Industry standard surface preparation of steel by abrasive blasting, in this case a "commercial blast," has now been performed on FLAMINGO despite the admonition against this procedure currently published by the Alexander Foundation on its website. The treatment of the steel of FLAMINGO conforms to all modern coatings industry recommendations based on long accumulated evidence for the necessity of such procedures.

It must be understood that the thorough surface preparation procedures of abrasive blasting were not necessary at the time of the creation of FLAMINGO or other and earlier sculptures by the artist entirely due to the availability and use of red lead oil primers. The necessity of abrasive blasting is entirely for adequate bonding of the prevalent and desirable epoxy barrier primers and the removal of mill scale that the stresses in these epoxy primers on curing can disbond.

Current Calder Red Coating Materials and Finish of FLAMINGO

There have been a number of recoatings of Calder's sculptures with new paints having a sheen higher than the matte finish the artist desired. The reason for using satin and semi-gloss paint (in contrast to matte) for these recoatings may have been be due to the diminishing availability of matte industrial and architectural coatings over the past several years as well as the loss of alkyd paints from the market (widely available in matte finishes in the past). Alkyd paints are still in production by smaller manufacturer's such as Pro Coatings of Sparta, Michigan which produces the alkyd CALDER RED for LA GRANE VITESSE, at least for a short while longer.

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[34] Tim Race (now retired), KAKED LLC, Elmhurst, IL.

[35] Ibid.

The high solids content of current industrial coatings has until recently made semi-gloss the lowest common level of gloss because there is no room for flattening agents in the high solids formulas. Also, the architectural market for matte and low gloss coatings was small to begin with and seems to have diminished over years past. There are some productions of "satin" finish in urethanes. The military has remained the savior for the technology of matte coatings but the future trends in research pressure on manufacturers for the military will likely eliminate liquid matte coatings altogether for military craft in favor of powder coatings.

The terms "semi-gloss" and "satin" have over time become more uniformly matched to ranges of instrumentally measured gloss. As an example of known gloss ranges for a specific line of products, the TNEMEC Company's Series 1072 Fluoronar ranges 15-30 gloss units or "GU" (measured at 60 deg. incident light) and is marketed as "satin." Its Series 1071 Fluoronar "semi-gloss" ranges 40-60 gloss units. A matte coating is usually considered to be one that measures no more than 5 gloss units at 60 degrees[36], and some put the higher limit at 10 gloss units. The aged "Calder Red" on LA GRANDE VITESSE and on FLAMINGO have measured up to 3 gloss units, measured over the years by Robert Lodge. When fresh and dried, the Keeler & Long Calder Red measured in the vicinity of 5 GU. Thus, common industrial coatings available in even the lowest gloss levels have been way off from producing a suitably matte finish for Calder's red sculptures.

A new Calder Red coating was needed for refinishing the artist's sculptures since the beautiful matte alkyd coatings used originally and also in the past for recoatings were no longer available. Moreover, with the superior durability of current industrial coatings, it is desirable to use coatings that will extend the schedule for recoating to longer maintain the good appearance of these sculptures.

With the loss of alkyd coatings to high solids content modern coatings that *can* meet current volatile organic compound (VOC) restrictions, there have been no matte alternatives in the recent past (other than some matte clear coatings) and this has perhaps been the cause of some recoatings of Calder sculptures with paints having a gloss level that seems well beyond appropriate. There was just not room in these VOC compliant, high-solids products for the additional solids of matting agents to achieve the matte finish the artist desired.

This has changed recently with the ability to reduce the high solids products further thickened with matting agent by using VOC-compliant solvents and also by the ability to produce matte surfaces with the newer moisture cure urethane coatings and water based acrylic urethanes.

About a year ago we started working with the industrial coatings manufacturer Wasser Corporation of Auburn, Washington to create what we hoped would be a good match to a

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[36] It is understood that measuring near matte finishes at 60 degrees incidence is not very accurate but was done to maintain comparable scale of numbers with mid gloss surface readings that are best read at 60 degrees. See note 24.

"dead matte" Calder Red in a durable, 2-part moisture cure urethane that is still VOC compliant for most of the United States. The company could produce a lower matte formulation in a moisture cure urethane than it could in a conventional two part urethane. The coating in development at its most recent stage contained 100 grams/liter (or 0.8 pounds/gallon) of volatile organic compounds.

In trials with this coating we were disappointed with surface hardness after curing that may have been caused by variables in ambient moisture to effect the cures. A full, hard cure comparable to what a 2 part conventional urethane achieves in 24 hours took several days. This was a qualitative observation of a few tests without the documentation of instrumental measurements and documented environmental conditions. From these experiences we decided to abandon moisture cure urethane coatings and search for a quality matte conventional solvent-borne 2-part urethane by another manufacturer. The desirable ambient conditions during coatings applications cannot always be predicted for use of moisture-cure urethanes and so we felt that the long success of conventional 2-part urethanes and predictable surface hardness would be the better route to explore given the decades of exceptional outdoor performances of these products.

There are alternative coatings and the available products are changing rapidly with intense competition among the manufacturers and the drive of environmental and worker safety. In addition to conventional 2 component (same as "2 part") solvent based urethanes, there are 2 component water based urethanes, 1 component moisture cure urethanes and 1 component self-crosslinked acrylic urethanes, as well as acrylic resin dispersions. And then there are the polysiloxanes and fluoropolymers. This range of technology is too vast to discuss here and the matter of various primers and DTM (Direct to Metal) coatings would remain to be discussed. Appropriate color seems to be a simpler matter in comparison.

For experienced painters and where the most colorfast and durable surfaces are desired, the recommendations for outdoor steel sculpture may remain with conventional 2-part solvent based urethanes, moisture cure urethanes and certainly the polysiloxanes.

Shortly before the recoating of FLAMINGO, the Alexander Calder Foundation had a small, quality military coatings manufacturer, Spectrum Coatings, Inc. of Providence, RI, produce a Calder Red in a matte water based urethane. Spectrum Coatings, Inc. specializes in matte military coatings and chemical agent resistant coatings (CARC) as well as offering

We ordered a gallon of the product, WA-571, to test. This was a 1 part water based urethane, undoubtedly the easiest coating to spray apply by novices. Perhaps the color of this product may match what Calder specified for some stabiles though we have no knowledge of any, but it was quite different from the Calder Red of FLAMINGO and from that of LA GRANDE VITESSE. The color was darker, less "hot" and closer to Ronan's Signcraft red that was used on Calder mobiles. A representative with the Alexander Calder Foundation could not, or would

not, reveal the source or reason for this seemingly new Calder Red color to Robert Lodge during a phone conversation[37].

We tested a gallon of this product and found it also had a surface hardness less than that of a conventional 2-part urethane after a 24 hour comparative cure and less even after 7 days. But while the ease of use of the product and its eventual cure may be suitable for some (the matter of an under primer would need to be addressed), and while not apparently durable enough for FLAMINGO in its aggressive urban environment and inaccessible scale that prohibits easy overcoating, this product was rejected by FLAMINGO's owner, the U.S. General Services Administration, due to its color alone.

The project coatings consultants also rejected the use of a single component water based urethane due to insufficient lifespan and a surface more prone to scratches and burnishing that a 2-part cured-in-place urethane. Both the Wasser moisture cure matte urethane and Spectrum's 1 part water based urethane were more easily burnished than the conventional 2-part urethane provided by Precision Coatings after months of curing[38]. Burnishing and other marring of the delicate surfaces of matte coatings is a well known problem. Over time, areas receiving frequent handling can increase in gloss.

We eventually selected a matte, conventional 2-part, acrylic aliphatic urethane that we requested be custom formulated for FLAMINGO by Precision Coatings, Inc. of Springfield, Missouri. This company has an excellent reputation for quality architectural finishes and its earlier reputation was built on the very high quality and durability of its fleet vehicle coatings, such as are found on FedEx fleet trucks. They produced a VOC-compliant low solids material (less than 34% solids) that permits introduction of matting agent as well as a viscosity conducive to fine spray finishes. A test gallon of the product in matte Calder Red sprayed well and cured uniformly into hard, matte surfaces. And the color known to be appropriate for FLAMINGO was matched by the company exactly. Precision Coating's acrylic urethane was selected because the company offered the lowest gloss conventional (not moisture-cure) urethane on the market at the time of this project.

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[37] A conservator remarked to Robert Lodge in a telephone conversation the suspicion or knowledge that Alexander (Sandy) Rower was "looking at color cards to pick the color he liked."

[38] Testing for burnishing was performed with fingernails only. The difference between burnish-ability of the moisture cure urethanes and the conventional 2-part urethane from Precision Coatings was significant.

A test gallon of Precision Coatings Calder Red matte urethane sprayed at the McKay Lodge, Inc. facility created a film measuring 5 GU at 60 degrees of light incidence. This matte film of the Precision Coatings conventional urethane was also more resistant to burnishing than either the Wasser moisture cure urethane in matte historical Calder Red or the Spectrum Coatings water based urethane in a the "new" matte Calder Red color.

The varying conditions of spraying and under layers affect final gloss. The final coating of the Precision Coatings product on FLAMINGO resulted in a gloss measuring 9 GU at 60 degrees incidence, a level higher than the test panels. This is due not to a difference in product between the test gallon and the gallons purchased for the actual sculpture recoating but due to the different substrate and heavy wet film applications on FLAMINGO. The industrial painters working on the FLAMINGO project laid out heavy applications as they are accustomed to doing for production work on a large scale. These cured to a slightly higher-then-expected gloss. As a result, Precision Coatings, Inc. stated to Robert Lodge that their 2-part matte Calder Red urethane can be formulated to be even more matte to accommodate heavy wet film applications that tend to cure with some gloss. However, successive thin applications are recommended to achieve the lowest possible gloss.

In 2012, Precision Coatings matte urethane in traditional Calder Red was used for the recoating of Alexander Calder's SHIVA in Kansas City, Missouri. It will also be used for the 2013 recoating of JEDDAH in Saudi Arabia.

Looking Ahead: A Better Coating with Siloxanes

The relatively new epoxy siloxanes and acrylic siloxanes are outperforming both urethanes and fluoropolymers in testing for combined color retention, water immersion, surface resistance and

resistance to solvents needed for graffiti removal. Hence, epoxy siloxanes are now the leading coating specified for U.S. Navy and Coast Guard ship topsides. Siloxane coatings are also now the predominant coatings for all entertainment surfaces at Disney World due to their exceptional color retention and surface durability.

Another advantage of polysiloxanes is that they can be overcoated with minimal surface preparation of the existing coating and achieve a good bond. In contrast, urethanes do not bond well to existing urethanes unless the existing urethane has aged significantly or is scarified to roughen the surface.

Epoxy polysiloxanes may become the optimal coating for outdoor metal sculpture in the future. McKay Lodge Conservation Laboratory, Inc. has already employed these for recoatings of outdoor sculpture where gloss and semi-gloss are appropriate.

The leading manufacturer of epoxy siloxane has been Ameron International/PPG Industries in their PSX700 Engineered Siloxane. Currently, PPG offers only gloss for custom colors and semi-gloss for Federal Standard 595C colors.

There is currently intense development activities among coatings manufacturers to improve the product category. Precision Coatings of Springfield, Missouri has achieved new improvements (according to their spokesperson) and will now produce their Calder Red in a siloxane in a matte finish. We have not yet tested this new product but will do so as soon as possible.

Recommendations on Color and Paint

Whenever an outdoor sculpture by Alexander Calder is in need of repainting, consideration should be given to sufficient surface scarification for the application of a new top coat, leaving in place the original lead primer if still present. This leaves in place an excellent corrosion resistant primer and avoids the cost of hazardous materials removal. Owners of the sculptures should be aware that by United States law, they also own the lead and are ultimately responsible for its safe disposal as a hazardous material. It also avoids the issue of the need for abrasive blasting to remove mill scale in order to obtain optimal bonding of a new primer.

Where a lead primer has been damaged and ferrous corrosion is evident, consideration should be given to using hand and power tool work to prepare these areas for epoxy primer patching ahead of overall top coating.

Whenever a sculpture by Alexander Calder is in need of repainting, an effort should be made by a technically qualified person to determine the first color, as far as feasible and if still present on the metal, by forensic work on the sculpture. In the absence of the original Calder Red color, and in the absence of any documentation of specified color or that actually used initially from the Foundation or elsewhere, then the long accepted and Calder Foundation specified Calder Red preserved on FLAMINGO and LA GRANDE VITESSE should be considered.

For an outdoor sculpture, a conventional solvent-borne urethane or siloxane should be the choice for optimal durability and long-term color retention. Water-borne acrylics or water-borne 1-part urethanes (containing a dispersed pre-crosslinked resin) are poor choices for obtaining resistant surfaces and long-color life.

Calder Red may be produced in conventional 2-part urethane, moisture cure urethane, or a polysiloxane by a coatings manufactures capable of formulating a coating with a cured film gloss of no more than 5 gloss units at 60 degrees. Precision Coatings, Inc. of Springfield, Missouri appears to be a leader in this regard. To our knowledge, no one is producing a matte fluoropolymer.

Beyond these mentioned above, the number of coatings choices is daunting and too large a subject to address in this paper.

At this time, for all outdoor steel sculpture, our recommendation for a coatings system of maximum longevity and optimal color retention remains:

1. Optional inorganic or organic zinc primer[39]

[39] Zinc primers should be applied where impacts or scratching to the steel substrate may occur in aggressive environments. The corrosion control properties of zinc prevents corrosion from spreading under the coatings – a process called "undercutting."

2. Epoxy (intermediate) primer or MIO[40] primer[41] (4-6 mil thick)
3. Color top coat of surface catalyzed[42] acrylic urethane, moisture cure urethane, fluoropolymer, or a polysiloxane (2-4 mil thick). These are especially optimal for providing mar-resistant matte surfaces.

For large scale projects that involve contracting with industrial painters, it is strongly advised that the owner hire a coatings consultant to (1) design the coating system, (2) write industry-standard coatings specifications, and (3) provide third-party inspection services by an experienced industrial coatings inspector or NACE certified inspector to assure compliance with the specifications and to document the work in case of material or workmanship failure.

CURRENT *READY-TO-GO* "CALDER RED" PAINTS

The "Original" Calder Red Color:
Also available in other colors.

Will ship overseas!

(1) Custom matte acrylic aliphatic urethane*
Conventional 2-part system
Product number: 38021.q3.v100.f.s
Product category: PC3v100 Acrylic Urethane
Precision Coatings
1940 E. Trafficway
Springfield, MO 65802
P. 417-862-5738
P. 888-340-8874
www.precisioncoatingsinc.com
Contact:
Jim O'Keefe, V.P. Sales & Marketing
417-655-0021
jokeefe@precisioncoatingsinc.com
Precision Coatings are created with automotive grade pigments to ensure colors that will retain their original appearance long after conventional high performance coatings have faded. The automotive grade pigments are combined with tightly cross-linked resin systems that provide added resistance to ultra-violet radiation, weathering, staining, corrosion, erosion, environmental chemicals and abrasion.

(2) Custom matte polysiloxane*
Product category: Precision PC5 Siloxane

[40] Micaceous Iron Oxide, usually dispersed in a 2- part cure urethane.
[41] This is the critically important barrier
[42] That is, a 2-part system (A+B), not a pre-crosslinked acrylic or urethane resin in a water dispersion.

Precision Coatings
Springfield, MO
Compared to urethanes, polysiloxanes provide superior color stability, more durable surfaces, resistance to solvents needed to remove graffiti, and ability of later overcoatings to adhere well without extensive surface scarification.

*Intended for use over epoxy or urethane MIO primers. Note that a polysiloxane can be self priming – itself performing the function of adhesion and barrier film primer and top coat at once. Consult the manufacturer. These materials require substantial experience in spray applications and safe handling but remain the leaders in optimal, long term surface endurance and prevention of substrate corrosion when used in conventional multi-layer systems.

(3) Matte alkyd (limited time only, ending in 2013)**
Matte water based acrylic (coming soon)
Either paint (minimal 25 gallon batch quantities only)
Pro Coatings, Inc.
233 ½ Prospect Street
Sparta, MI 49345-1459

** Should be applied over barrier primers of epoxy. Consult the manufacturer. Water based acrylics will bond well over existing old alkyd coatings.

The "New" Calder Red Color:

Matte water based urethane ***
Urethane resin pre-crosslinked in aqueous dispersion (interior or exterior use).
Product-Color: WA- 781 water based single component urethane.
(Also offers a two component water based urethane of much greater durability but perhaps not in this color and matte finish).
Spectrum Coatings, Inc.
217 Chapman Street
Providence, RI, 02950
401-781-4847
www.spectrumcoatings.us
Joe Marcoccio, Sales Director

Paintman97@aol.com

*** Resin in water dispersion. Suitable for DTM (Direct to Metal) but for optimal endurance in exterior environments should be applied over barrier primers of epoxy. Consult the manufacturer. As aqueous coatings their spray application is suitable for the less experienced.

WARNING: Our tests of graffiti removing products based on dimethyl Adipate, Dimethyl Gluarate, etc, dissolved our test coatings whereas the conventional 2-part urethane such as Precision Coatings' PC3v100 was not affected by these chemicals at all.

REFERENCED 2012 REPAINTING

FLAMINGO, 1973
(53 feet tall)
Federal One Plaza, Chicago, Illinois,

Owner:	U.S. General Services Administration
General Contractor:	McKay Lodge Fine Arts Conservation Laboratory, Inc.
Project Designer/Manager:	Robert G. Lodge
Design Consultant and Specifications Writer:	Tim Race (retired), KAKED, LLC, Elmhurst, IL
Coatings Inspector 1:	Emmett Lodge (NACE Certified) McKay Lodge Fine Arts Conservation Laboratory, Inc.
Coatings Inspector 2:	Paul D. Kofoed (NACE Certified), Chicago Coatings Group, Skokie, IL
Coatings Applicator:	SEI Coatings/CL Coatings, North American Coatings, LLC, Mokena, IL

Scaffolding Engineer:	Safway Scaffolding
Site Engineer:	Ghafari Associates, LLC, Chicago, IL
Product 1:	Sherwin Williams Zinc Clad 200
Product 2:	Precision Coatings DTM 1300v100 SERAIES High Build Modified Epoxy Primer (white)
Product 3:	Precision Coatings PC3v100 Acrylic Urethane Topcoat (historic Calder Red color)

FLAMINGO in its final finish of durable 2 part conventional urethane in the traditional historic matte Calder Red color (color may not be truly represented in the embedded image).

Shown: final site clean-up, August 2012.

FLAMINGO surrounded with 100,000 pounds of scaffolding and in full containment.

Shown: after coatings removal and surface preparation.

All work of the project was performed at night under artificial illumination.

ADDITIONAL INFORMATION TO

A HISTORY OF "CALDER RED" COLOR AND ITS PAINTS IN THE UNITED STATES IN RELATION TO THE RECOATINGS OF ALEXANDER CALDER'S *FLAMINGO* (1973) AND *LA GRANDE VITESSE* (1969) AND OTHER CALDER STABILES

Robert G. Lodge
Associate, the American Institute of Architects (AIA)
Professional Associate, the American Institute for Conservation of Historic and Artistic Works (AIC)

Emmett W. Lodge
NACE Certified Industrial Coatings Inspector
National Association of Corrosion Engineers (NACE)

You expressed interest in information on Calder Red and we promised to deliver any follow-up information. Here is some additional information.

We tested two Calder Red coatings samples in our lab for the ability to withstand the use of xylene, and also paint strippers and graffiti removers based on dibasic esters (DBE) such as 3M Safest Stripper. These are commonly needed to remove spray paint graffiti from painted sculpture.

The DBE products can be identified by finding in the ingredients on product labels: dimethyl adipate and dimethyl glutarate.

The product sample submitted to us in CALDER RED from Precision Coatings, PC3v100 Acrylic Urethane, a conventional 2-part system (product number: 38021.q3.v100.f.s) was unaffected by a DBE based stripper. It was also unaffected by rigorous rubbing with a rag soaked with xylene.

The product sample supplied to us as their offering of CALDER RED by Spectrum Coatings, a urethane resin pre-crosslinked in aqueous dispersion (product-color: WA- 781), a water based single component urethane, was easily dissolved by the same DBE based paint stripper. It was also dissolved easily by even light wiping with xylene.

Spectrum Coatings may be able to provide their Calder Foundation approved color in a more durable coating product, such as their 2-part water based urethane. However, this product should also be tested for resistance to DBE based products.

Further information on this and alternative company products may be obtained from:

Spectrum Coatings, Inc.
217 Chapman Street

Providence, RI, 02950
401-781-4847
www.spectrumcoatings.us
Joe Marcoccio, Sales Director
Paintman97@gmail.com

In regard to the above tests, Spectrum Coatings provided the following information and clarifications:

Dear Mr. Lodge,

Thank you for your time on the phone today. Per our conversation I am emailing the details of what we spoke about. Initially, the current one component water based urethane was chosen by Ms. Abigail Mack (Conservator) and the Calder Foundation for its environmental acceptance, its weatherability, quick drying, and its ease of use for multiple contractors. It was never a point of discussion or concern about the chemical resistance of this coating concerning harsh solvent resistance for the removal of graffiti, as prior to this the coating of choice was an alkyd material, which will also have very limited resistance to the solvents mentioned. It is no surprise that the single component system does not resist the solvents that you are mentioning, and the performance may be improved by further crosslinking with a polyaziradine material. We can manufacture the approved Calder colors in our two component water based urethane system. There are several Calder pieces already coated with this material as that was the initial coating of choice several years ago. It was soon discovered that the ease of use of that material by numerous contractors proved difficult when it came to controlling gloss levels and film thickness applications. Also, not every painting contractor has the necessary equipment for handling these types of products. The two component materials are available and can be provided using the same coloring pigments and matting agents for consistency. A one time evaluation sample can be provided if you so wish.

Regards,
Earl Faria
President
Spectrum Coatings

ADDITIONAL INFORMATION NO. 2 TO

A HISTORY OF "CALDER RED" COLOR AND ITS PAINTS IN THE UNITED STATES IN RELATION TO THE RECOATINGS OF ALEXANDER CALDER'S *FLAMINGO* (1973) AND *LA GRANDE VITESSE* (1969) AND OTHER CALDER STABILES

Robert G. Lodge
Associate, the American Institute of Architects (AIA)
Professional Associate, the American Institute for Conservation of Historic and Artistic Works (AIC)

Emmett W. Lodge
NACE Certified Industrial Coatings Inspector
National Association of Corrosion Engineers (NACE)

You expressed interest in information on Calder Red and we promised to deliver any follow-up information. Here is some additional information.

Hallmark Art Collection, Kansas City, MO, allows me to announce and image the recent completion of the necessary recoating of Alexander Calder's SHIVA, 1965, in its collection.

The project manager was Joe Houston, curator of the Hallmark Collection.

The coatings contractor was Goens Bros. of Gladstone, Missouri.

The product was Precision Coatings, PC3v100 Acrylic Urethane, a conventional 2-part system (product number: 38021.q3.v100.f.s) in the CALDER RED matching the Calder Foundation approved color once produced by Keeler & Long Co. in an alkyd coating.

The sculpture had been repainted several times in the past with various red colors.

The sculpture was disassembled and shop painted in order to coat all joining surfaces

A video documentary is planned for publication on the internet.

New coating in matte CALDER RED:

ADDITIONAL INFORMATION NO. 3 TO

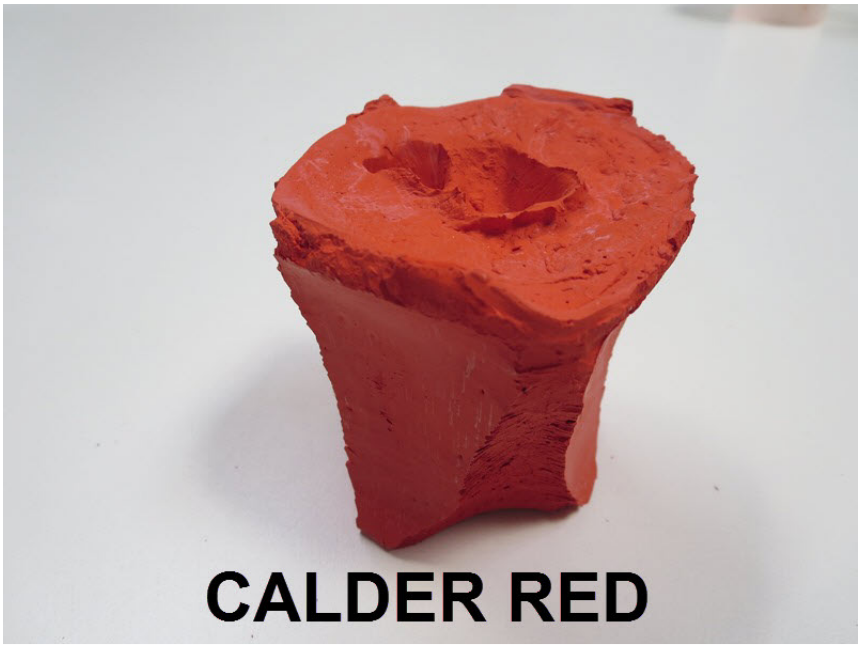
A HISTORY OF "CALDER RED" COLOR AND ITS PAINTS IN THE UNITED STATES IN RELATION TO THE RECOATINGS OF ALEXANDER CALDER'S *FLAMINGO* (1973) AND *LA GRANDE VITESSE* (1969) AND OTHER CALDER STABILES

Alexander Calder, The Red Feather, 1975
The Kentucky Center for the Performing Arts
Gift of The Mary and Barry Bingham, Sr., Fund
The Humana Foundation

The Calder foundation has been specifying a "new" Calder Red. It is distinct from the Calder Red long in use and the "historical" Calder Red having a lineage going back at least to LA GRANDE VITESSE and FLAMINGO as explained in this report. The new color is distinct by being darker and closer to Ronan's Signcraft Red.

This distinction can be seen in the recently repainted THE RED FEATHER, imaged above, in a color specified by a consultant for the Calder Foundation, when compared to images in this report of LA GRANDE VITESSE and FLAMINGO. Furthermore, the author here, Robert Lodge, has known this sculpture well for decades, since it was in the collection of Humana Corporation when Robert Lodge provided conservation services to its chairman Wendell Cherry. The past color of THE RED FEATHER, which was a repainting, maintained the historical Calder Red. The recent repainting has greatly changed its original appearance.

ORIGINAL KEELER & LONG CALDER RED PIGMENTS



A block of the pigments used by Keeler & Long to make the historical Calder Red is available at McKay Lodge Conservation Laboratory, Inc. for providing samples for analysis by others.