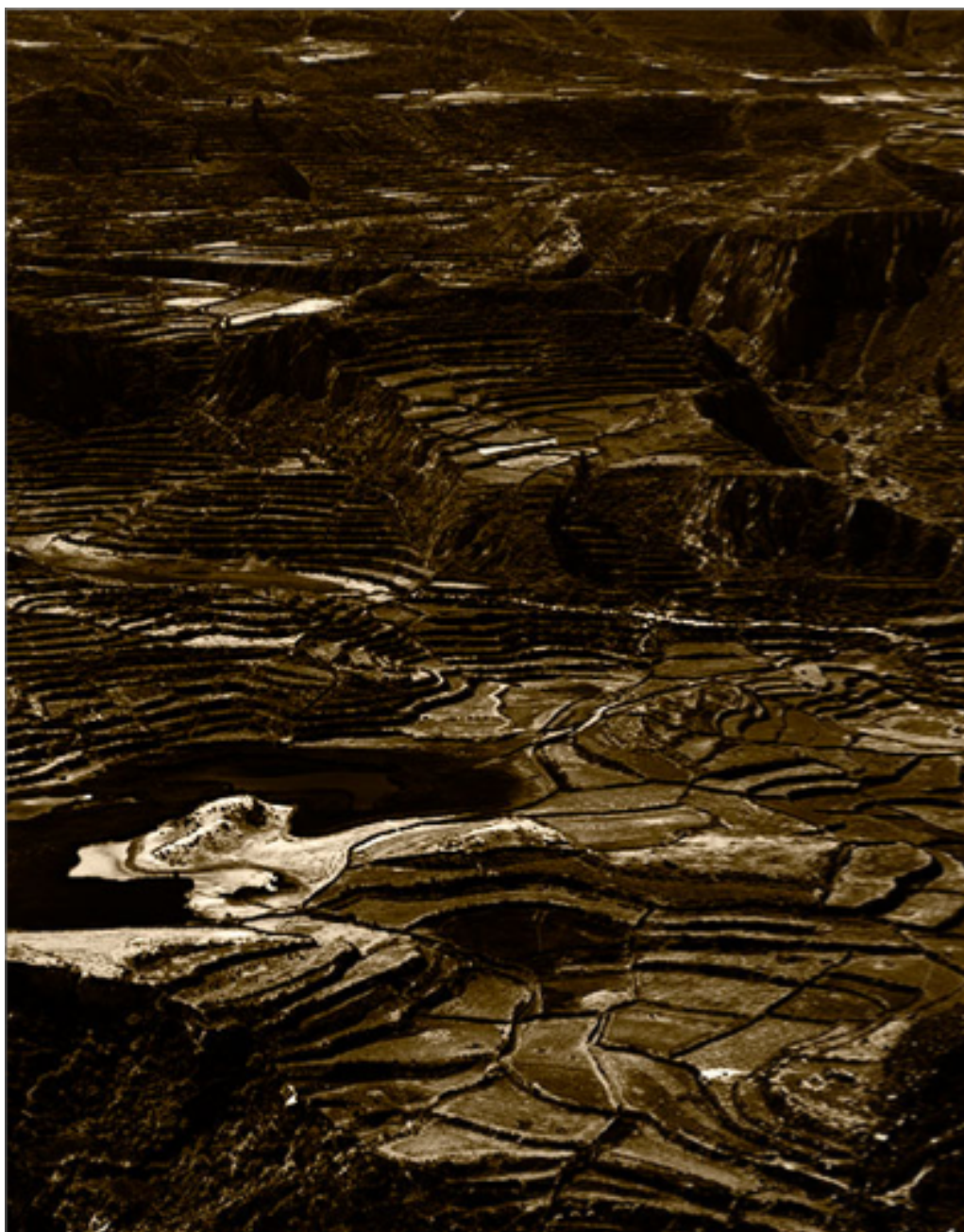

Dry Film Photopolymers for Printmaking & Photogravure

a continuing materials guide for artists preparing their own photopolymer plates

Provided free of charge, this document is the only source of this information, on planet Earth. (*Sadly, that is not an exaggeration!*)



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Workshops

If I have succeeded in my intent, there is nothing you can learn from me about this method of making photogravures that is not already contained in my book. I have held back no secrets. It is all there and you shouldn't need me, at all.

But, we are not all autodidacts. Some people simply do better with personal instruction. It is for this reason that I offer one-on-one workshops at my studio for a flat fee, materials included. You need only arrange for your own expenses, travel, lodging, food, etc., and with me for the dates for your workshop, then show up with your images. Workshops are three full days, holding a fourth day in reserve at no additional charge, if either of us feels it is needed. I will consider a two-student workshop if you desire. With two, it automatically becomes a four day workshop, at twice the standard fee. You must provide your own classmate.

I do not earn my living giving workshops instead of making photographs. The purpose of these workshops is to train practitioners, and especially, teachers of the process, with the idea that you will train others, also for a reasonable fee. University affiliation is not a prerequisite. This new approach needs to be disseminated around the globe now that the secret keeping that held it back for so long, is finished.

During the workshop, I will not be cooking for you or entertaining you. There will be no celebrity photographers to enthrall you and no evening entertainment activities. We will not be following the widespread workshop custom of venturing out to look for photographic low-hanging fruit at nearby National parks. There will be no portfolio reviews and no flattering praise. We will be doing one thing only... teaching you to make photogravures. You will leave prepared. That is the reason for the optional fourth day... just in case you need a little more time.

I photograph the southwest. Therefore, I am likely to move from time to time and may have already moved at some point, if you have an older copy of this paper¹. There are two *constants* about contacting me, my web site address and email always remain the same.

www.davidkachel.com

david@davidkachel.com

The fee for my photogravure workshop is: \$600²

¹ I am currently in Haskell, Texas, having moved from Bisbee, Arizona in 2020. Contact info is on my web site.

² At the time of this writing: 6/22/2023. Email for possible updates to fees and location. Make all arrangements via email. Other forms of communication are often less dependable.

Acknowledgement

Over the space of four years (2013~2017) I tried several times to break open the damn, so to speak, and made very little progress. In fact, I was able to get my hands on only one dry film photopolymer sample which turned out to be a dud for photogravure use. It worked, but it worked rather poorly.

I would not be able to provide you with much of the information initially contained in this document were it not for the indispensable efforts of NY photographer, Greg Brophy...

<http://www.gregbrophy.com>

who had a bigger persuader than I, and was able to procure samples of several DuPont materials for me to test. These pages would definitely be fewer, were it not for his most generous assistance in coaxing the distributor into coughing up samples for testing.

In more recent years, my requests that practitioners send me samples of materials I have not yet tested, should they happen to acquire them, have begun to receive a wider response. The results of testing for those materials sent by others, include mention of the persons who went to the trouble to do so. This is greatly appreciated. Without those persons, we would all have a lot less to choose from.

Foreward

This paper is a continuing effort. As new samples of potentially useful photopolymers become available to me for testing, I will do so and add the results to a new revision of this document. Case in point; this is now the ninth revision, I believe, with more to surely come.

Photographers making use of this document are asked to pitch in and make new materials available to me for testing, if in a position to do so. Photogravure of all types is on the brink of extinction (again, if not, still) and therefore, secret keeping is absolutely intolerable. We all lose, even those trying to keep the secrets. If you want photogravure to survive, you have to help, and most importantly, *share your knowledge*. Join the photogravure group on Facebook where we now number more than 800 members, and growing. Whatever photogravure process you may prefer, you can learn and contribute, there: <https://www.facebook.com/groups/1512580545676342>

Whether your interest is copper plate (aka: Talbot-Klic) photogravure, solar plate photogravure, or photopolymer do-it-yourself plates (aka: dry film or dry resist), made with

materials like those covered in this document; contribute if you don't want to see it all end. The very finest presentation of the photograph is the *photogravure* and it simply must continue to exist.

And of course, a great many traditional printmakers use these identical materials in significant numbers, also relying on them heavily. Every college and university on Earth with printmaking or fine art photography departments needs a current copy.

This document is now split into multiple sections covering suitable materials, non-suitable materials, quasi-suitable materials, *rebranded* (and overpriced) mystery materials, manufacturers, distributors and even lists of suitable exposure units I have tested. And with this revision, it is once again reorganized and expanded. Non-suitable materials are covered to prevent others from wasting time and money investigating or acquiring materials they might think I have not tested when in fact, I have.

The separate *mystery materials* section is there to help put a final end to the secret keepers. That is, *ImagonHD*, the recently (relatively) announced *Skylight* material and any other materials on the market, for which the sellers have chosen to keep the actual source secret. I did not initially plan to include these as I did not want to provide publicity for the secret keepers, but users need to know the characteristics of these materials and whether or not they have any properties that make them *special*. They absolutely do not.

There are also entries for photopolymers sorted by brand that remain to be acquired and tested. If you have access, please get at least 15-20 square feet for testing and send it to me at:

David Kachel
PO Box 393
Haskell, Texas 79521
USA

Let me know you are sending it so that I can avoid allowing it to sit at the post office, baking. There are also sections for contact information for manufacturers, and then contact information for distributors.

Also, please do not believe that I must remain *the only* source for this information, though as of this writing, I still am. If someone else wants to test materials and publish their results, I will not be the slightest bit offended. For me, this is not a contest. It is about making certain that photographers and printmakers can acquire the materials they need, easily and in perpetuity, and about ending the despicable, highly destructive practice of secret keeping.

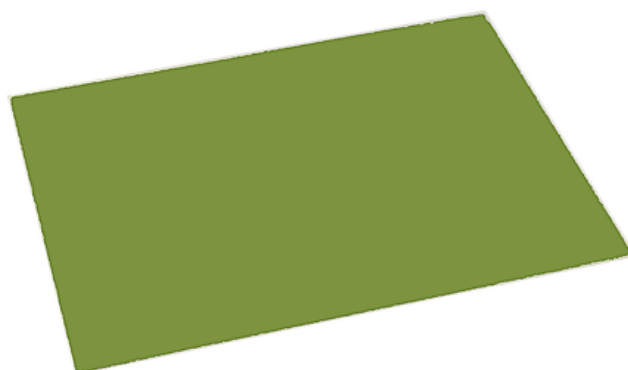
Introduction

At the time of this writing there exist three avenues available to photographers for the pursuit of the photogravure image. They are listed here from most expensive to least:

- Traditional copper plate photogravure (and its variations)
- Factory-made, metal-backed polymer plates (and variations), (there are also transparent plastic backed versions of these plates), all washed out in plain water
- Photopolymer plates prepared by the printmaker, or photographer, using commercial dry photopolymer films made for the computer industry, processed in an easily obtained, mild alkali.



A roll of one of the dry film photopolymers discussed in this paper.



A factory-made plate, with the polymer already on it. (Quite expensive.)

This photographer's experience with making photogravure plates has thus far been limited strictly to the last variety of the three, because I wanted to pursue the relatively new idea of the direct-to-plate approach and also because the other two options were economically prohibitive. For me, it was either roll-your-own dry film polymer plates or, nothing at all. Fortunately, this turned out to be a very good choice, and a great relief, since for an extended period I believed I might be pursuing a dead-end path. For newcomers concerned that dry photopolymer plates might be a poor imitation of traditional photogravure or readymade plates, I can assure you that is most definitely not the case.

For a long time the users of readymade polymer plates were also accused by a few devotees of the copper plate process, of output that was inferior. That was not true either.

I started pursuing photogravures made with DIY polymer plates in 2013 and though the production of images moved somewhat haltingly ahead, there was always a major concern: the photopolymer itself.

The photopolymer required, and absolutely the only one available (to my knowledge) at the time was called *Imagon HD* and sold by a small handful of retailers. (As of this writing, the number of retailers worldwide is down to exactly, one: takachpress.com. Great people to deal with, BTW, despite the things I will shortly say about the very misleading Imagon HD product. Takach is not responsible for that deception.)

In 2013 there was also a thinner, but otherwise identical material. This was intended for use in the process of directly etching metal plates, unlike the above mentioned Imagon HD, where only the polymer carries the image that is destined for intaglio printing. This material was called Z*Acryl.

My immediate concern with pursuing photogravure via this avenue was the continued availability of materials. I was very uncomfortable that there was only a single material available for the purpose, wholesaled by a single person, to less than a half dozen retailers, worldwide. This person did not want to share any information and went so far as to deny to my face, that he was the source of Imagon HD, when I had already confirmed through someone else that he indeed, was.

What made matters much worse was the fact that the sellers of these materials were simply buying them from the real manufacturers, relabeling them, removing all identifying and technical information, then providing either no information, or their own version of that information, to end users. This made it impossible for someone working with the materials to simply go to a manufacturer and request a dry film photopolymer material with characteristics, x, y and z: the characteristics x, y and z being unknown. At the time, ALL the currently available dry photopolymers offered to artists making the various types of photogravure and other print types were in fact, repackaged and relabeled materials made by another, unrelated company, and all sold under fictitious names.

I did not want to invest a great deal of time (it turned out to be more than four years) learning a process that could be wiped out in the blink of an eye, and at the whim of a single person. As it turned out, I was 100% correct in my concern, except for the whim aspect.

The source of Z*Acryl did in fact die, less than one week after I spoke with him on the phone. He took the secret of Z*Acryl to his grave. His family did not continue distribution and has ignored my pleas to reveal its true nature, if not to me, then to artists in general. It is lost to photographers, permanently: unless one of us discovers it by accident and even then, we could only be certain to have encountered a similar product, not the exact same one. (I am 99.99% certain it was the 30 micron thick version of DuPont's MM500 series, their MM530 product. It seems an exact match. I was fortunate enough to have a small sample of Z*Acryl to test the DuPont product against.)

The source of Imagon HD died about a year and a half after that. That product continues to be retailed by Takach Press, apparently still made available by the family of the deceased.

This sort of behavior is absolutely unacceptable. Because one person decides to keep a secret, (especially one to which he has no rightful claim, because he/she has no ownership of and plays no role in the making or legitimate sale, of the product), artists around the world constantly risk being deprived of an indispensable material, because they do not in fact, know what it really is, or whom to ask for similar products. It is a mystery material.

The purpose of this document and to my book on Photogravure by this method, is to put an end to the secret keepers, permanently. Not only do I intend to test every available and potentially suitable dry photopolymer on the planet and list the results in this document, I will also test the secret keepers' products (when made available) and report on those, if for no other reason than to expose any possible claims of superiority. In addition, I provide a detailed description of the technical characteristics of suitable dry photopolymers in general so that in future, you need only approach a manufacturer or distributor with that description, to be offered a material that is extremely likely to prove suitable. Here it is...

Description of Suitable Photopolymers

Imagon HD and Z*Acryl, along with all the other fake products covered in the section titled *Mystery Materials*, were actually materials made for use in the manufacture of printed circuit boards for computers and all kinds of electronic devices. That is their original reason for existence. The dry film is attached to the surface of the metal-coated circuit board material and exposed to a photograph of the circuit pattern desired. Then the card is immersed in a mild alkaline solution and the areas of photopolymer representing the non-circuit pattern, are eaten away. After that, the plate is etched in acid to remove the metal exposed by the missing photopolymer. These materials were never intended for any other use and are generally sold only in substantial size rolls by distributors that the manufacturers have selected. They can be bought from the distributors, but not generally from the manufacturer. (Some will doubtless sell directly.)

Made by DuPont and others, there exists a significant variety of photopolymers and if one knows what to ask for, they are hardly scarce, or expensive, at all. The trick is to break up the secret keeping... which is going to begin happening right here, and right now.

First, I am going to give you the characteristics that describe a photopolymer suitable for making photogravure plates. This, so that should the materials I describe herein become unavailable at some point, you will be able to speak the language of the photopolymer world and communicate to them the kind of substitute material you need. No one has ever made this information public (to photographers and printmakers) before, so keep the latest version of this paper, handy.

The first thing to know is that contacting the actual manufacturers, may be a waste of time, unless asking for the names of their distributors, or for written data sheets. I tried on more than one occasion to get information from DuPont and they are simply not interested. *"I'll get back to you"* is as helpful as they get. They don't! Apparently, there is a single person in the US assigned to providing information and assistance regarding DuPont photopolymers to members of the public. That person is/was Gus Gustafson in Technical Service, and actually providing information was the very last thing on his mind. If you insist on trying to get information from DuPont directly, you will no doubt be transferred to him. Just hang up. He has no intention of providing information or service of any sort.

DuPont sell their products via distributors who are somewhat more helpful, but not by a lot and are not themselves interested in providing meaningful assistance to anyone they believe doesn't represent an immediate substantial purchase. The only way you can deal with these people is by knowing exactly what you want in advance, and being ready to buy in a quantity they like. Some have minimum purchases of \$500 or more. But, at a small fraction of the price charged for Imagon HD (in the case of some non-DuPont products, their price may only be *one-*

thirteenth the DuPont price!), that is a LOT of photopolymer and will keep you in materials for quite some time.

While you can download PDFs covering the characteristics of the various photopolymers they manufacture from DuPont's web site, these PDFs are generally cut-and-paste, boilerplate time-wasters that provide very little help, save available thicknesses and a naming convention that would make any sadist proud. I have in front of me at this moment, two PDFs from DuPont that describe in exactly the same words, two VERY different photopolymers that I have already tested, save a couple of minor differences not amounting to one percent of the papers' text and definitely not explaining the observed behavior differences in any way, whatsoever. To read both PDFs, you would conclude that the two products were identical, except that one processes a bit more quickly than the other.

Then, there is the terminology. Photopolymers being a light sensitive material (UV), one would think the language of the photographic world might apply. It doesn't. The language employed in this industry is very narrowly focused and largely un-photographic. And, it is not universal. I am looking at one manufacturers web site right now that is total gibberish compared to what DuPont says on theirs. In their defense, these materials are not intended to be used by photographers, so we must adapt to them, not the other way around.

Oddly, the actual scientists who invent this stuff, speak perfect *photography*. Go figure!!

Most important when trying to find these materials, is to refer to them as *dry film* or *dry resist photopolymers*. This is because there are also liquid photopolymers in existence, widely used, and definitely *not* what you want. It would be very difficult to make a layer of liquid photopolymer thin and uniform enough to provide the resolution we require for photogravure. Liquid photopolymers are used in a broad variety of industries and are generally neither designed for, nor expected to provide a degree of resolution compatible with photographic requirements. They are ideal for printing big font lettering on cardboard boxes, for example.

You must also know that there are *negative working* and *positive working* photopolymers. Only negative working photopolymers are suitable for photogravure, unless you wish to pursue making plates with original (or inkjet) negatives, instead of the customary positives. I know of no one taking this approach but in theory, it could work. It might be an interesting route to investigate, but most of the materials available are negative working, so there would be little to choose from and the approach would most likely prove to be unfruitful, or have no advantages.

There is also the question of thickness. I was originally convinced that Imagon HD was 50 microns (2 mil) thick. I don't recall where I got this information, but it seemed reasonable and solid. Some time later I began to suspect that Imagon might in fact be slightly thinner, at

between 38 and 40 microns. I am now back to believing it is in fact 50 microns as originally suspected, but now I have a bit more evidence to go on, as I have found a way to at least compare relative thicknesses to a known thickness. I was using a 40 micron material (at the original time of this writing) and Imagon is definitely thicker, about 50 microns. (If you are puzzled as to why I cannot simply measure the thickness, remember that there are temporary coverings on both sides of these material, coverings of unknown thickness from one material to the next. And also remember that this is not a hard substance so, measuring it without the coverings is akin to measuring Jello™.

The thicker the material, the better blacks you are going to be able to achieve: up to a point. Early on, I thought that anything thinner than 50 microns would not be able to supply sufficient depth to provide good blacks. The 40 micron thick material I used some years ago has thoroughly disproven that.

However, blacks do definitely get weaker as a thinner photopolymer is used. More recently, I tested a material that was only 30 microns thick. To my surprise, it provided a printable plate and was not subject to open bite. I had assumed prior to this that thin material meant guaranteed open bite. Not the case. But the intaglio blacks from this material were weak and unacceptable.

Consider 38 microns to be the absolute thinnest photopolymer serviceable for polymer plates. (Plates made on metal with intent to actually etch the image into the metal itself, can and should employ significantly thinner photopolymers: about 30 microns, or perhaps less.)³

The material you seek should be processable in a mild alkali. This is usually sodium carbonate (NOT bicarbonate-of-soda) and for our purposes is usually employed in a 1% solution, at room temperature (I use 20° C). I have yet to discover any of these materials that are not processed in sodium carbonate, but there is always a possibility that one might exist. (Solar plates, aka readymade plates, are processed in plain water and represent a different class of material. Do not however, assume that a water processed plate means no chance of toxicity. It most definitely does not.) Sodium carbonate can be purchased where swimming pool supplies are sold, and as a laundry additive called *washing soda*, or, you can make your own with an oven and a box of bicarbonate-of-soda. Spread bicarbonate-of-soda on a baking tray, bake at 450 degrees for one hour. Presto! Instant sodium carbonate.

The material should be sensitive to UV light in the mid-300 nanometer range, 340-380. Most of them are.

And, no matter how good a material seems to be on paper, unless I've already done it for you (results reported in this paper), you have to test it. Manufacturer descriptions are

³ The polymer layers on readymade plates are far, far thicker. Actually, much thicker than needed.

absolutely, *not* accurate. Don't buy a roll of something not yet tested and listed in this document, that you have not first tried, unless you are willing to risk having to throw it out. If a distributor refuses to provide a sample (you may be asked to pay for it), don't risk it. There are materials that look great on paper and are also, useless! For example, **stay away from materials designed for exposure by laser.**

Lastly, you need to understand the naming conventions for these materials which are generally decipherable, but not uniform. Names usually consist of a category/class indicator plus a thickness indicator. The thickness indicator can be the most confusing part.

There seem to be some fairly standard thicknesses across the industry but they are measured in at least two different ways, which leads to potential confusion. Thicknesses are measured either in *mils* or *microns*. There are about 25 *microns* to one *mil*. A *mil* is one thousandth of an inch. The materials you want are 2 mils or 50 microns thick.

DuPont's MM550 for example is in the *Multi-Master* 500 series and 50 microns thick. Their MM540 is the same material, but only 40 microns thick. Pretty easy.

But then you get to a company like *Eternal*. Their *Laminar* 9200 series (as opposed to the 9000 series, the 8000 series, etc.) has different thicknesses, 9215, 9220, 9225 and 9230. No, that last is not 30 microns thick. It is 75 microns thick, also known as 3 mil. So, in their case, the last two digits represent the decimal thickness in mils. 1.5 mils (~38 microns), 2.0 mils (50 microns), 2.5 mils (~63 microns) and 3 mils (75 microns), without the decimal point. What fun! Make certain you are reading these names correctly with regard to thickness before you spend your money. And just to throw one last monkey wrench into the works, manufacturers of dry photopolymers are also fond of rounding off. For example, DuPont's MM540 is actually only 38 microns thick. It is highly likely that most materials labeled "40" are actually 38 microns thick.

OK, that wasn't the LAST monkey wrench. There is one more. DuPont randomly switches between BOTH thickness naming conventions, without telling you! Isn't that just about all the fun you can stand?!!

Testing Methods

If you are envisioning a glistening laboratory with racks of test tubes filled with colored liquids, a Jacob's Ladder and a Van de Graaff generator, both threatening electrocution from a dim background, and me in a heavily stained, dingy-white lab coat, emitting maniacal laughter as I seem to delight in depriving something small and helpless of its life, you will be disappointed. I do not believe in measuring and calculating (or torturing) my way to success as an artist and my testing is therefore absurdly simple and well, mostly harmless...

Do I possess the requisite skills and equipment to take up the *yardstick and mathematics* approach to photography? You bet. Not only do I own the equipment, I actually know how to use it. I just don't do so very often. It's just not necessary, most of the time.

When testing a new material, I simply use the same information employed to make a plate I have recently printed with serious intent, and a plate created using a photopolymer material with which I am accustomed to working. I use the same QTR profile as with the aforementioned recently printed plate, the same printer and ink, the same exposure unit, the same exposure time, everything the same. No guesses or measurements, just made exactly the same way as a recent, known quantity. All exposures are exactly 15 minutes, virtually never varying, unless the control exposure was different. This is explained in my book and would not really provide any relevant useful information if elaborated here.

While I began materials testing years ago using a NuArc 26-1K, the last several years I have instead been using six Kingbo UV LED bulbs (see the section on exposure units), almost exclusively. The same 15 minute exposure was used with the NuArc, but the Kingbo lamps have never tried to burn down my building. They also don't cause my electric meter to emit a strong whirring noise, or the other lights in my building (and neighborhood) to dim.

If after the first plate, a new one is needed to bring it more in line with what is expected, I almost never change that 15 minute exposure, but instead either switch to a different QTR profile or change the settings of the curve layer and the Brightness/Contrast layer (Photoshop) I am using, in order to bring the direct-to-plate image into line with the plate I expect to produce... usually thinking of either matching or improving on the image previously achieved with the recently produced and printed control plate, referenced above.

Due to the nature of these polymer materials, longer exposures result in significantly lower contrast and shorter exposures in higher contrast, effectively changing not one, but two variables at once. I do sometimes change the base 15 minute exposure, but only if I also want the other effect. For testing new materials, I virtually never change that base exposure. That base exposure time is a significant portion of what makes the test meaningful.

This approach immediately provides me with a fairly accurate impression of the sensitivity of the material compared to that single previously employed material... which I would not be using at all if that material were not of similar sensitivity and characteristics to other useful dry film photopolymers. A print made with the material being tested and compared to a previous know-quantity print also provides quite relative information about contrast and tonal distribution. These things are really all that you need to know about a material that is new to you, because you will have to test it yourself, regardless. Your way of working is not likely to match mine and additional information from me is very unlikely to be of any real use to you. (Plus, I am far too lazy to do all that extra work.)

All test plates get printed, regardless, because only a print really matters. Plates can be deceiving. I have pulled awful looking prints from plates that looked decent and wonderful prints from plates that looked suspect. You have to print them to really know. Conclusions I share in this document are based on prints alone, never on the appearance of the plate.

Once I am convinced the new material could / would be useful for other photogravure makers, testing is over. Perfection is not necessary and I usually don't have sufficient material for such pursuits, anyway.

Notes for Traditional Printmakers

Traditional printmakers do not generally make photogravures and therefore, would not be likely to purchase my book on the topic, nor would they benefit much from it, if they did. This section is here to provide those printmakers with some of the information contained in that book that they will need to work with such materials. It also serves as a myth-debunking section.

Though the products described in this document were first used by an artist who was a photographer, their initial popularity with artists was among traditional printmakers. Sadly, the source of most of the information made available to printmakers was via a book by Keith Howard and all of the information about the nature of these materials was withheld, presumably to retain a captive market, and much of the information about using it was wrong. If you are a printmaker using dry film photopolymers, you probably used, and perhaps are still using Howard's, "Imagon HD", the fictitious name given to what was very likely DuPont's MM550 (99.999%). The behavior of MM550 is identical to Imagon HD, but it is impossible to be certain.

This section serves the purpose of correcting all that misinformation for printmakers. Most photographers have never read Howard's book(s), so were spared the misinformation and will not benefit as much from this section.

Preparing Plates

You no doubt already have a method for preparing plates. If it works for you, don't change it. I do strongly suggest using distilled water instead of tap water for attaching the polymer film. It doesn't eliminate all the bits of grit that manage to sneak underneath the polymer, but it does minimize them.

Balancing the pH of Your Local Water

Howard expended considerable effort on an elaborate process supposedly designed to have you test the pH of your local water and then alter the processing procedure to compensate for differences. This was complete nonsense and a huge waste of time. Municipal water supplies in most of the world do not vary in pH enough to effect normal photographic processing, much less the processing of these materials which are far, FAR less sensitive to such differences, should they exist.

Photographic processing chemicals contain what is called a *buffer* chemical, which automatically controls the pH of developing solutions during development, so as to prevent any changes to the pH, that might cause problems. One chemical often used as a buffer in photographic developers is *sodium carbonate*...

There is only one chemical in the solution used to process the type of dry film photopolymers discussed in this document: *SODIUM CARBONATE* !

That solution is all buffer, and differences in the pH of a municipal water supply could simply not have a meaningful effect on the behavior of that processing bath.

Furthermore, photographic developing chemicals engage in what is called an *active chemical process*. Processing dry film photopolymers is a *passive* process, as far as the sodium carbonate solution is concerned. That is, the sodium carbonate does not react with the chemicals in the polymer, it simply creates an environment in which the unexposed materials in the polymer can dissolve away more easily. A warmer solution can make it happen faster, colder - more slowly, which leads us to a probable explanation for Howard's mistaken idea about pH.

Temperature Control

Howard does not tell his readers anything about controlling the temperature of the processing bath. All chemical reactions, active and passive, proceed faster or slower, depending on temperature. When I lived in Arequipa, Peru, the temperature of the tap water was so cold at times, it hurt to put my hands in it. Cold slows down any process and heat, speeds them all up. A roughly *comfortable* room temperature bath is sufficient because of sodium carbonate's passive role, though I like to keep mine around 20° C. Expect processing to last about five minutes, longer if it is colder.

Agitation

Wrong again, Howard tells his readers to put the plate in the processing tray and let it sit there, undisturbed. Uh-uh! This is an all or nothing process. It is not complete until all the unexposed material has been removed. The processed material tends to hang on to the plate a bit, partially blocking the materials underneath from ready access to the alkaline environment they need. Agitate the tray throughout processing, gently, but with conviction, while gently rubbing the entire surface once per minute or so (wear a rubber glove), to encourage the processed material to leave the surface. If you let the plate sit, it will take twice as long to process and parts of the plate will look finished, before the entire plate is done.

When is Processing Finished?

The easiest method for determining this is to make sure that at least a small area of the dry film is outside the image area and totally blocked during the entire exposure. That way, you know you are done when that unexposed area has been completely dissolved away. Barring that, be sure to lift the plate out of the processing solution several times to check on the appearance of the areas of your image that represent dark portions, that is, areas that will

hold a lot of ink when printed. These areas will appear foggy or indistinct until they are near the end of processing. Once you have seen the difference, you will have little trouble recognizing the end of processing in the future. Shadow areas simply look *wrong* until the last minute or so of processing.

Post-Processing

Processing is not quite finished. The sodium carbonate absorbed into the dry film is a bit clingy and needs a little encouragement to leave completely. In case you are tempted to take this part of the process casually, you probably won't see any difference, until you make a print. Then, parts of your print will stick to the plate and when you remove the print, pieces of the paper will remain attached to the plate, ruining both. There will likely be a white, chalky appearance on portions of the plate. Both print and plate are ruined. Just do this...

Rinse the plate off with room temperature tap water, then put a nice blob of liquid dishwashing soap, on the plate and rub it into the entire plate, image and non-image area, alike, front and back. Don't be stingy with the soap. Rinse thoroughly, then spray the surface of the plate with a 1:5 dilution of white vinegar in water⁴. Rub it in thoroughly, also. This neutralizes any remaining alkalinity. Rinse the plate again, thoroughly. Wipe down with paper towels, then use a hair dryer to blow the plate dry... high temperature, on the boost/cool setting (blows harder, but also a bit cooler). Use constant motion or risk melting some polymer. If you don't have a boost/cool button, try a medium or low temperature. The blow dryer part is pretty quick and easy. Let the plate finish drying for a half hour before printing.

Hardening

Howard recommended exposing the plate to more light after processing is finished, in order to *harden* it. Doing so is not necessary with dry film polymer plates. In fact, it is possible it could do some harm by hardening the polymer too much, making it brittle, especially at the edges. I've been using dry film photopolymers for over a decade and have had zero indication that hardening provides any benefit, unlike with readymade plates where it appears to be a necessity.

Flashing

Howard's book also recommends using an old photography technique called *flashing*. This involves exposing the whole of a light sensitive material to a low light level of exposure designed to add an amount of exposure that is below the threshold of the material and adds

⁴ Howard called this a "fixative" agent. No, vinegar is a mild acid and simply neutralizes the remaining alkaline sodium carbonate. Nothing gets "fixed".

to the density of the shadows of a traditional film negative, or the highlights of a traditional darkroom print. It can be effective but is risky with negatives, and is both very effective with prints and not risky at all, because one can simply make another print.

The premise for using flashing with dry film photopolymers is that it can be used to extend the highlights, or so says Howard. The highlights of polymer plates are recorded with the higher amounts of exposure; the greater resulting thicknesses of hardened polymer. Most all dry film photopolymers are *negative working*, that is to say, they create a negative of whatever image they were exposed to: almost always a positive. Just like a traditional film negative, the polymer *negative* is effected by flashing only in the shadow areas. It is insufficient to effect the highlights in any meaningful way.

Exposure

All of these dry film polymer materials are exposed with ultraviolet (UV) light only. When exposed outdoors in daylight, it is the invisible UV light that causes the exposure. The light you can see plays no role.

These dry films are photographic materials, that is, exposure to light (UV) causes them to react. All such materials have a characteristic called *reciprocity*, which means that through a certain range of exposures, doubling the length of time for exposure OR doubling the intensity of the exposing light, will give an identical result, as will halving time or intensity. When results stop being identical, it is called *reciprocity failure*. With traditional photographic film, for example, when exposures reach one second or longer, reciprocity failure sets in and you must instead give a longer exposure to compensate, doubling the time, or more. The action of reciprocity failure also generally results in a need for altered development... usually less development time. Dry film photopolymers also exhibit reciprocity failure but in their case, exposure generally takes place within the reciprocity failure range of exposures.

As a result, the less intense the exposure or the longer the exposure time, the higher the contrast of the resulting *image*. For photogravures this works out quite well. In my own case I have found that a 15 minute exposure is a great standard and I only deviate from that when there is an obvious indication for doing so.

Since I don't practice any form of traditional printmaking, and because as a printmaker you have a very broad choice of substances to choose from for purposes of blocking light exposure to your plates, there is little I can tell you. You must rely on the experience of colleagues and/or testing to determine what you can expect. But there is certain information I can provide that may be of some help.

First, the degree to which an ink or gouache or any substance will block UV is always going to be a mystery until you test it, and that ability has nothing whatsoever to do with what you can see. A very dark substance indeed may in fact block UV very poorly or not at all, and a substance you can easily see right through, may block UV extremely well.

Again, I can only relate information from my own knowledge and that has to do almost exclusively with Epson inkjet inks... the K3 variety. The matte black Epson ink blocks UV very well and their yellow ink is a solid second place winner, but most definitely not a substitute for matte black. All the rest of the inks in the Epson 8 ink K3 or Ultrachrome sets (I have no knowledge of the UV blocking ability of the newer two inks, orange and green), block ink extremely poorly, making them quite useless. Also, the cyan and magenta inks, when applied directly to the surface of the polymer material as is the case with direct-to-plate photogravure, actually affect the plate chemically, partially sensitizing them to visible light, thereby making them even less of an option for traditional printmaking plate preparation. This sensitizing characteristic is very likely to also be true of the orange and green inks.

Howard's book advises that you expose these materials to a very high intensity light source, 1000 Watts or more and preferably, for short periods of time. I disagree and believe you will find that these miniature suns are not really necessary and probably are counterproductive. The longer the exposure (up to a point) the higher the contrast of the resulting image, which in most cases, I am guessing, will be helpful.

If your method of working involves techniques that require a vacuum unit for exposure, then your options for exposure units is going to be limited, and expensive. If no vacuum is required, then far less fusion-like light sources can suffice. See the section titled *Exposure Units* for inexpensive UV exposure light sources that have been tested and found useful. Be careful, the units found not to be useful are included specifically so you know not to be tempted by them.

If you already have a vacuum exposure unit you can perhaps adapt it to work with one of the non-nuclear options referenced above. My NuArc 26-1K has a pair of ZHMA 100W units strapped to the sides of the NuArc exposure head, allowing me to use the NuArc's vacuum table, but expose with a less *end-of-the-world-as-we-know-it* UV light source that the NuArc offers. This is far more quiet and much less prone to incendiary behavior.

Printmakers

Your questions and suggestions for improving/expanding this section will be most appreciated. As stated, I do not possess your skill set or printmaking knowledge base, and therefore cannot adequately anticipate your needs. I am not a printmaker, but sometimes fake it!

Photopolymers by Manufacturer

Nota Bene: Most all of the dry film photopolymers covered in this paper have roughly similar exposure requirements, except where specifically noted. This is because they are designed (originally) to be automatically exposed and processed in the same types of machinery. Materials that require significantly different handling might not work well in the expensive machines already owned by manufacturers of printed circuit boards.

This has been reorganized from previous editions of this document to include all products by the same manufacturer, including those that work for photogravure and other printmaking purposes, those that do not work, but have been tested, and those known/thought to exist, that have yet to be acquired for testing. Prior to this edition, these were all separate sections.

DuPont

... (only some DuPont products have been tested)

DuPont Products That Work for Photogravure

Riston MultiMaster MM500 Series

In this series, there are three materials, identical in every way, except thickness.

- MM530 - 30 microns thick
- MM540 - 38 microns thick
- MM550 - 50 microns thick

Sensitivity range: 350-380

I first tested MM540. It behaved identically to Imagon HD in every way, except, that it was a slightly different color (my stock of Imagon was a bit stale which might account for the difference in color). MM540 requires a slightly shorter processing time, roughly 1/2 to 1 minute less, which makes sense. This is the material that made me believe for a while that Imagon HD might not be a 50 micron thick material, but rather, 38 microns instead. Results were good.

I printed three different images with this material that I had previously printed using plates made with Imagon HD. I exposed, processed and handled MM540 identically to the way I made the Imagon HD plates. Prints from the MM540 plates were identical to those made from Imagon HD plates.

As of the second variation of this paper, I have now tested MM550. It seems to provide a somewhat deeper potential black because of its greater thickness. It is also somewhat more heat sensitive than the 38 micron version. I don't know why but, just be careful with the hair dryer. The thicker version is slightly prone to blistering from heat when preparing plates.

If I were to return to using this material, I would use MM550 instead of MM540 in order to provide a little more elbow room, though both worked extremely well.

If you wish to use this material to act as a resist for etching directly into metal plates, the MM530 would be a better choice.

Riston PrintMaster PM200 Series

In this series, there are four materials, identical in every way, except thickness.

- PM240 - 38/40 microns thick
- PM250 - 50 microns thick
- PM275 - 75 microns thick
- PM299 - 100 microns thick

Sensitivity range: 350-380

Nota Bene: PM299 may no longer exist. Documentation is a bit unclear. But, we don't really need that much thickness, anyway.

This material works beautifully, though its behavior will disturb you if you are accustomed to using most any other material.

This is a material that is somewhat more contrasty than the MM500 series. Think of it in darkroom terms as about 1 paper grade higher in contrast. I got best results by adding a correction curve that raised the low end about 5-10 points and lowered the high end of the curve a few points too. If your images are consistently flat, this might be a better choice than the MM500 series, though the higher contrast should not be a deterrent.

Exposure sensitivity is about the same as the MM500 series.

Plates made with this seem to be a bit easier to wipe than some other materials. (Can't explain it.)

PM200 series plates also seem a bit less prone to open bite at the edges when too much agitation is applied in processing. In fact, it seems as though it might be difficult to apply too much agitation.

Initially, a disturbing milkiness in the process bath makes it more difficult to see what is going on, while at the same time, the obviously milky look of the plate itself on inspection leaves no doubt that processing is not yet complete.

Also, while some very gentle finger rubbing of the surface toward the end of processing, to encourage the dissolved materials to come free, seems helpful with other materials, with PM200, it seems more of a necessary step.

Thirty seconds to about a minute of increased processing time is likely.

If you need to wash off the direct-to-plate printed image because of defects, like skid marks, the PM200 series seems to respond a bit better to this than some other materials. It washes off more easily and can be repeated one or two times more often, if required.

Prone to staining white trays, blue. If compulsive, rinse out trays more frequently. I easily made a plate I intend to print for public consumption with this material.

Absolutely recommended.

(I may be trying the 75 micron thickness at a future date.)

Riston MultiMaster MM100i Series

In this series, there are two materials, identical in every way, except thickness.

- MM115i - 50 microns thick
- MM120i - 75 microns thick

Sensitivity range: 350-380

Nota Bene: Apparently, there is also an MM100 series (no “i”). that is identical to this series, except that it is made on a different machine. We were told that some government agency required this.

Roughly two full stops slower than the MM500 and PM200 series, this material, though quite capable of producing excellent images, is perhaps a bit impractical for most plate burners, unless you have one that is a lot brighter than my nuArc 26-1K, or any of my LED based units.

However, for those who prefer their plates be exposed in the sun, this is *your* polymer. Quite at home with one to eight or more minutes of direct sunlight exposure, this somewhat higher-in-contrast material reduces in contrast as exposure intensity increases. (Shadows gain ground more quickly than highlights.) Think of it as a slightly, variable-contrast photopolymer!

I made an excellent plate from my test image exposing MM115i to direct, noon time Southern Arizona sunlight for eight full minutes.

This is another material you will find disturbing at first, if you are accustomed to most any other dry film photopolymer. Though it too changes color when exposed, it doesn't get very much darker, at all. It will make you think there is not much of an image there when in fact, there is plenty. It just won't look right until you get accustomed to it. And with those long exposures in the sun, the blue color may actually get lighter instead of darker. Don't worry, your image has not solarized. You'll just think it did.

Processing is very fast. Because the blue doesn't get significantly darker, it is quite difficult to judge or even see the image while processing. Only a psychological problem. It is a bit easier to see and judge wiping if you wipe on a light box, because of the lack of heavy blue coloration.

The MM100i series might be suitable for use with a plate burner if a substantial lower-contrast correction curve is applied along with a longer direct-to-plate exposure. I found significant reciprocity failure with exposure using my plate burner and so didn't pursue it further.

DuPont Products That Do Not Work for Photogravure

Riston MultiMaster LDI7300 Series

In this series, there are two materials, identical in every way, except thickness.

LDI7330 - 30 microns thick

LDI7340 - 38 microns thick

Sensitivity range: 355-405*

While this material might be compatible with an approach other than direct-to-plate, which is all I do, it is a disaster with direct-to-plate. I tested the LDI7340 material. The matte black Epson ink puddles on the surface, somehow creating a double image in the more heavily ink-laden portions of the plate.

The 30 micron thickness would be inadequate regardless, unless making actual etched metal plates, but in either case, the only approach that might work (emphasis on might), would be the more traditional, screen and positive film exposure method, not direct-to-plate. If you have the inclination to test this for that class of use, please apprise me of the results.

If this material were to work with a screen and printed-positive approach, you might expect its behavior with regard to exposure, development, etc., to be similar to Riston MM540.

The stated sensitivity range might explain the double image. Sensitivity to both UV and some ambient blue light might have created exposures from essentially two different light sources. That is a wild guess. Treat it accordingly.

Riston PrintMaster PM300 Series

In this series, there are two materials, identical in every way, except thickness.

- PM338 - 38 microns thick
- PM350 - 50 microns thick

Sensitivity range: 350-380

Resolution too poor to consider using for anything photographic. If this were the last photopolymer available on the planet, you could make some quite attractive images with it, having characteristics quite similar to PM250, but the poor resolution would, while probably acceptable to the eyes of the public, keep you awake all night, every night. Not subtle!

DuPont Products Remaining To Be Acquired & Tested

(If you know of materials not yet tested and not listed here, please contact me with that information.)

Riston 9020 (50 microns)

Riston FX250 (50 microns)

Riston FX500 (38 microns)
Riston GM120 (50 microns)

Riston FX950 (50 microns)
Riston TM200i (38 microns)

ElgaEurope

(Web site: <https://www.elgaeurope.it/ENG/Default.aspx>)

ElgaEurope Products That Work for Photogravure

Ordyl Alpha 300 Series

Grateful thanks to Marek Wesołowski (Jan Sgawski on the Facebook Photogravure Group) from Poland for submitting a sample of the Ordyl Alpha 350 material for testing.

In this series, there are five materials, identical in every way, except thickness.

- Alpha 330 - 30 microns thick
- Alpha 340 - 40 microns thick
- Alpha 350 - 50 microns thick
- Alpha 375 - 75 microns thick

Sensitivity range: 360-380

At first, I thought this might be an Eternal product with a different label, since Eternal now owns ElgaEurope. I don't think so. It would appear that Eternal decided to keep manufacturing Elga's products. At least, the Ordyl Alpha 300 series seems significantly different from the Eternal products I have tested thus far.

Ordyl Alpha 350 is significantly higher in contrast than other dry resist products, perhaps closer to Eternal's Laminar E8020, but not quite as much as Hitachi Chemical's Photec H-6238. It also employs a different *Leuco* dye (used in dry film photopolymers as a very *rough* indication of exposure. The darker the image in the polymer, the more exposure it has received). Ordyl's Leuco dye is quite blue after processing, and doesn't change much, if at all, with shifts in ambient illumination or the color temperature of same. Eternal 9220 shifts from quite purple to much more blue, the color changing with the color of illumination (this sort of behavior is more common).

The speed of this material seems to be on a par with other recommended materials, producing similar prints, except for contrast, when I exposed and processed the same image, identically, on plates made with both Ordyl 350 and Eternal E9220.

Exposure was 15 minutes with my setup of six Kimbo UV lamps set at 21.5 inches from the exposure platform. (Remember that longer exposure with lower UV output results in higher contrast with these materials, and vice versa.)

Processing is very quick, but ink does seem to cling a bit more to this material than to some others. Not to any detriment, but your processing tray may cloud with ink a little more quickly than with other materials. (This may be due to the inks in my new Epson P6000 printer, rather than the Ordyl plates. The Eternal plates seemed to hold onto ink longer, too. Not sure.)

Plates were easy to prepare with Ordyl, much easier than with E9220 which seems to like to fight with you a bit. I would be tempted to use Ordyl Alpha 350, but I don't believe it is available in the US. Too bad. But, European workers sure needed another source for materials and now they have it!

Elga's Ordyl products seem to be widely available across most of Europe, and in Egypt, Jordan and Argentina! Good news for many people.

ElgaEurope Products That Do Not Work for Photogravure

None at this time

ElgaEurope Products Remaining To Be Acquired & Tested

(If you know of materials not yet tested and not listed here, please contact me with that information.)

Ordyl AM150 (50 microns)
Ordyl AM175 (75 microns)
Ordyl AR250S (50 microns)
Ordyl Alpha850 (50 microns)
Ordyl Alpha950 (50 microns)
Ordyl Alpha960 (60 microns)

Eternal Materials Co., Ltd. (aka: Etertec)...

Based in Taiwan and operating throughout Asia and the world. Their main web site is:

www.eternal-group.com

Eternal is now a group of companies which currently includes Elga in Italy (covered elsewhere in this document), Dynachem in the USA (no dry film products, as I understand it) and Nikko in Japan. Eternal in the US does not sell any of the Elga products here due to a lack of demand, but they do sell one excellent Nikko dry film, NIT250, tested just in time to be included in the 12/01/2023 version of this document. Though Nikko is sold by Eternal in the US, their products are covered under the section for Nikko in this document.

Throughout the US and Canada, Eternal and Nikko films are distributed by IEC (International Electronic Components, Inc.), which is owned by Eternal. IEC would also sell Elga products, if there were a demand, which there is not at the moment. But, Elga does sell Eternals products throughout Europe, while Eternal sells their products directly (without a middleman) throughout Asia. I understand that Eternal also manufactures some products here in the US..... Confused yet?!

A word of caution: DOW chemical used to sell Eternal dry photopolymers. DOW chemical is no more. They have merged with DuPont. If you see "DOW" on a web page offering Eternal dry photopolymers, it is possible that seller is no longer a valid Eternal retailer. Check prices, which should be in the neighborhood of twenty-five cents per square foot (in 2019). If much higher than that, the seller is possibly buying from a legitimate Eternal retailer and raising the price to you.

Eternal Products That Work for Photogravure

Laminar E9200 Series

In this series, there are four materials, identical in every way, except thickness.

- Laminar E9215 - 38 microns thick
- Laminar E9220 - 50 microns thick
- Laminar E9225 - 63 microns thick
- Laminar E9230 - 75 microns thick

Sensitivity range: 350-380

Available in various widths up to 24 inches, this material can be purchased only in boxes containing two identical rolls, of the same, variable length⁵. It is comparatively inexpensive, though a group purchase might be more convenient. Remember, in such quantities, refrigeration will be paramount to keep the material fresh over extended periods while it slowly gets used.

Eternal in the US has definitely been the most cooperative and helpful company so far, though it took me a number of tries to get through to a live human being. That's just one of the pitfalls to expect when dealing with companies not accustomed to dealing with the general public.

I tested Laminar 9220. Exposure was in the same range as most of the other materials reported on positively here. For me, that is 15 minutes exposure under my NuArc 26-1K. The same as DuPont's MM 550 and PM250, Kolon's PK 1540. Right in the middle of the correct ballpark.

I only had to make and print three plates to zero in on this material. It is more contrasty than MM550, less contrasty than Kolon PK1540 and DuPont PM250. Again, in the middle and a pleasant compromise for those unsure whether to follow the low road or the high. Like DuPont's PM 250, these plates seem a little easier to wipe than others. Go figure.

Local contrast was exquisite and blacks luscious. If this were the only such material you could have for the rest of your life, I can't imagine you ever having any complaints.

I have a small handful of images that try my patience and therefore make good test images for trying out new photopolymers. Laminar 9220 gave me the best image so far from the test image selected, which of course is annoying since I may now have to print it, AGAIN!!!

Laminar E8000 Series

Grateful thanks to Luc Van Quickenborne of Belgium for submitting a sample of the E8020 material for testing.

Possibly discontinued. Eternal in the US informs me that they do not sell all their dry film products in all countries. It may very well still be available outside the US. I know it was fairly recently available in Europe and have heard no reports to the contrary from European users.

In this series, there are three materials, identical in every way, except thickness.

⁵ It seems there has been a recent policy change. Eternal now permits purchases of single rolls, as short as 250 feet, in the US.

-
- Laminar E8013 - 33 microns thick
 - Laminar E8015 - 38 microns thick
 - Laminar E8020 - 50 microns thick

Sensitivity range: 350-380

Available in various widths up to 24 inches, this material can be purchased only in boxes containing two identical rolls, of the same, variable length. It is comparatively inexpensive, though a group purchase might be more convenient. Remember, in such quantities, refrigeration will be paramount to keep the material fresh over extended periods while it slowly gets used.

I tested Laminar E8020. Exposure was in the same range as most of the other materials reported on positively in this document. Contrast seems a bit higher than E9220 and speed may be a bit slower but the bulb in my NuArc was aging at the time of testing, so that may well be the reason for the discrepancy. Exposure is still 15 minutes, but I had to slightly (5 points) reduce contrast and increase brightness substantially (from 45 to 180) in a Brightness/Contrast layer in Photoshop. Again, this material is well within the ballpark considering my aging bulb. So, don't take the difference too seriously.

Again, it took just three plates to zero in on this material. It is more contrasty than Imagon HD (DuPont MM550), slightly more contrasty than Kolon PK1540, Laminar E9220 and DuPont PM250. An easy, pleasure to wipe.

Just like E9220 local contrast was exquisite and blacks as rich as they can be. Another winner for Eternal.

Second time Eternal has done this to me, I have to scrap my former plate of this test image and use the new E8020 plate instead... AGAIN!!! These guys make some great stuff. Additional materials may exist. Not listed in preferential order.

Eternal Products That Do Not Work for Photogravure

None at this time

Eternal Products Remaining To Be Acquired & Tested

(If you know of materials not yet tested and not listed here, please contact me with that information.)

| | |
|--------------|--------------|
| Laminar 7620 | (50 microns) |
| Laminar 7720 | (50 microns) |
| Laminar 9020 | (50 microns) |

Hitachi Chemical

A Japanese manufacturer

These materials are available in most any country in the world, except the United States, where its import has been banned since the 1990s. The documents I have say Hitachi was caught dumping product and has been prohibited from selling in the US, ever since. I have been trying to acquire a sample of any of their dry film photopolymer products for years and been totally ignored by Hitachi. Not even polite enough to return a simple, “no”.

Hitachi Chemical Products That Work for Photogravure

Photec H-6200 Series

After a very long time trying to find a source, I am most grateful to Mr. Michael Taylor of Belfast, Ireland for having sent a sample of this material for testing. Without his help it could easily have taken a number of years additional waiting.)

- H-6230 - 30 microns thick
- H-6238 - 40 microns thick
- H-6250 - 50 microns thick

Sensitivity range: 350-380 (assumption based only on subjective testing)

Hitachi makes four dry film photopolymer series. See the section describing materials yet to be obtained for testing below, for other products that may or may not still be available.

As you may have surmised from the name, this is a 40 micron thick material (the number “40” is an often used indicator for 38 micron products). I generally suggest that 50 (H-6250) microns is preferable for extra latitude, but it is not absolutely necessary. A 40 micron thick film will work for most images. The extra thin, H-6230, 30 micron thick material, is only suitable for metal plate etching through the dry film and into the copper / steel / etc., itself. It is too thin for photogravure printing where the image is contained only in the polymer, unless you use two layers.

I have no idea of cost or widths available, but they will certainly vary by region and country. I presume cost will be comparable to other materials in your area. Available lengths

are quite limited compared to other manufacturers, apparently, you can buy in 150 meter, or 300 meter lengths, only.

When I test materials, I like to use an image from which I have recently created a successful plate using another material, preferably the one I am using most at the time. In this case, that would be Eternal's 9220.

Compared to E9220, Photec H6 238 is significantly higher in contrast, and therefore higher in contrast than most/all other dry film photopolymers listed in this document, to date. I used Photoshop and QTR settings and profiles, identical to those used for E9220 for the same image. The difference in contrast I achieved was quite substantial, but certainly not in any way objectionable. Simple changes to settings in Photoshop when using this material would be easy to make and for some workers, especially those whose images may be prone to lower contrast, this might be your preferred general use material.

Products That Do Not Work for Photogravure

None at this time

Products Remaining To Be Acquired & Tested

(If you know of materials not yet tested and not listed here, please contact me with that information.)

Additional materials may exist. Some materials may be obsolete. Not listed in preferential order. It remains impossible for me to attain materials from this manufacturer, directly. All products are categorized under the product group, "Photec"

| | |
|----------|---------------|
| HM 4056 | (56 microns) |
| HM 4075 | (75 microns) |
| HM 40112 | (112 microns) |
| HM 6050 | (50 microns) |
| SL 1938 | (38 microns) |

If you know of materials not yet tested and not listed here, please contact me with that information.

Kolon Industries

(a South Korean manufacturer since 1957, materials widely available, especially where others may not be)

Products That Work for Photogravure

Accuimage PK 1500 Series

This product is reported to have been discontinued. Some stocks may remain.

IMPORTANT WARNING: *A few years back I decided to reprint some plates made with Kolon PK1540. This was approximately two years after printing them initially. Somehow the stored plates lost depth and could no longer provide quality prints. I have not been able to determine if this is a defect in the material (from the point of view of the makers of printed circuit boards, this would not be a defect, at all... they dissolve and discard these polymers immediately after use), or if I had somehow processed, treated or stored them improperly. I then printed some significantly older plates made on DuPont MM550 for comparison. They had not deteriorated at all. So, be forewarned, you may find plates made with Kolon PH1540-1550 to be unprintable after a year or two of storage. This shouldn't be a big problem for most, as after that much time it is likely one would want to improve/alter the image, and would therefore want to make a new plate, regardless.*

In this series, there are two materials (possibly more), identical in every way, except thickness.

- PK1540 - 40 microns thick
- PK1550 - 50 microns thick

Sensitivity range: 350-380

Available in various widths, this material can be purchased only in boxes containing two identical rolls, almost 600(?) feet in length, each. On the upside, it is comparatively inexpensive, though a group purchase might be more convenient. Remember, in such quantities, refrigeration will be paramount to keep the material fresh over extended periods.

The people at Kolon's factory in Korea kindly provided me with a more than ample quantity for testing. They sent me their PK 1540 in a 13.5 inch width, a size that proved excellent for the way I work. Kolon apparently make/made only this one type of dry resist photopolymer, though it is difficult to make these companies/distributors understand that

their products are vital to artists and are not something that can simply be acquired from another source, since they all seem to want to sell only in quantity and are all generally reluctant to provide material for testing or adequate information about what is available. Kolon was the first and until recently, the only manufacturer to provide me with a free sample for testing, and quite a substantial quantity of it, at that.

Exposure and contrast are good middle of the road characteristics for this material, on a par with Dupont's MM500 and PM200 series, and others. I found no difficulty working with PK 1540, at all. Preparing plates was easy. Processing was perhaps a bit shorter than some, about 4-5 minutes with gentle agitation, but then, the thinner material I had, would be faster to process.

Image quality was excellent, at least on a par with DuPont's MM500 and PM200 series. I would not hesitate to make this my go-to material. And I may do so anyway, since PK1540 gave me the very best print I had made at the time, of a particularly difficult image with which I have previously not been satisfied. (Kolon PK1540 was tested *before* many of the materials now covered in this paper. This is why my conclusions may appear contradictory.)

I have not tested the PK1550 but expect it would be no different in performance, save a slightly longer processing time and a potential for deeper blacks. The PK1540 provided more than adequate blacks, as good as any other photopolymer tested thus far, making me think that I might prefer PK1550, if only for the sake of a little extra elbow room with difficult images.

I don't know about other countries but, PK1500 photopolymers are distributed in the US by Toryon Technologies, Inc. (toryon.com). Kolon Industries did inform me that they have distributors in Europe, North and South America and of course, Asia, so it should not be difficult to track this product down in most any country.

This material is available in 6" to 24" widths in increments of .25 inches. 500 to 600 feet on a 6" core. A 3" inch core is also available. Always get the 3" core, if possible. Six inch cores are hard to get into even a full size refrigerator. Their Korean web site is not very informative. You may have better luck with your local distributor's web site, but don't bet the farm.

Accuimage PK 2300 Series

This product apparently replaces the PK1500 series and has similar characteristics, changes having been reported by their representatives in the US as being minor, by comparison. Presumably it will be offered in similar sizes and thicknesses to the 1500 and the 50 micron thickness version will likely be designated "PK 2350". I have requested a sample for testing but have yet to receive it.

Kolon Products That Do Not Work for Photogravure

None at this time

Kolon Products Remaining To Be Acquired & Tested

None at this time

Mitsubishi

Everyone has heard of Mitsubishi, (based in Japan), but I only became aware they manufactured and sold dry film photopolymer products just recently. Had it not been for an email received from André Shizen in October of 2023, it might have taken years more to learn of this manufacturer of photopolymers. Originally from Portugal but now living in Japan with his Japanese wife, André was kind enough to offer to send me not one, but two different samples of dry film polymers made by Mitsubishi, to test. Mitsubishi supplies materials both in traditional rolls, but on request, will also send sheets cut to size. I never thought to ask any other manufacturers, so don't know if this service is offered by other companies. However, it would seem their cutting tool for this job is less than sharp, so you will probably end up having to cut finer edges anyway, somewhat negating the convenience. Better off with rolls.

Mitsubishi Products That Work for Photogravure

MS9000 Series

In this series, there are two materials, identical in every way, save thickness.

MS9025 - 25 microns thick

MS9050 - 50 microns thick

Sensitivity range: 350-380 (assumption based only on subjective testing)

A nice middle-of-the-road, slightly lower-than-average contrast material. MS9050 exposed for 15 minutes under my half-dozen Kenbo UV lamp setup, produced beautiful results on the very first try. I was quite surprised when Mr. Shizen informed me that he had trouble finding materials in Japan, where I would have thought such products to be available practically in every corner store. But, if this Mitsubishi product were the only one available to Japanese artists, they would probably not feel significantly under-equipped.

My tests resulted in images that were a little bit less sharp and a bit more grainy than I would like, but not so much as to make this material unusable. Only the user would be likely to notice the difference and only in direct comparison to another material.

Mitsubishi Products That Do Not Work for Photogravure

MS7000

In this series, there are two materials, identical in every way, save thickness.

MS7050 - 50 microns thick

MS7100 - 100 microns thick

Sensitivity range: 350-380 (assumption based on nothing)

Intended for use in sandblasting, this somewhat peculiar product could conceivably be usable for photogravure, but has some quirks that would probably prove to make it unattractive, at best.

Most disqualifying is that the outer covering layer is effectively impossible to remove (a *feature* I have never encountered before), ruling it out for direct to plate. I could easily assemble a plate for use, but could not get that covering off in order to print an image on it.

After some back-and-forth with the manufacturer, it was suggested that it might be easier to remove if it were exposed first. That did in fact work. After exposing the plate, the covering peeled off with comparative ease, though still not quite so easily as other materials. I can see where a user might ruin plates with some regularity, by working this way. Like all dry film materials, that covering blocks a lot of UV light so the image that finally resulted from exposing through the covering was at least two full stops underexposed, producing a useless plate.

Mitsubishi Products Remaining To Be Acquired & Tested

(If you know of materials not yet tested and not listed here, please contact me with that information.)

Caution: Below are the only other dry film products I could find on Mitsubishi's web site and they were grouped as also being products for sandblasting. Most likely, it would be pointless to test them, unless more information first comes to light.

MS8050

MS8100

Nikko

Until its merger with Eternal, Nikko was a standalone Japanese manufacturer of dry film resists. Today, they continue to make their own products but those products are distributed by Eternal and their other umbrella companies (see Eternal section).

Nikko's web site in Japan says this: *On July 1, 2023, in accordance with the management policy of the Eternal Group, our company, Nikko Materials Corporation, transferred its dry film business to CHOU-KOU Materials Co., Ltd..* The foregoing, along with the rest of the announcement, seems to say that the new company is just another part of the Eternal Group, that will continue to supply the same materials under the new company, CHOU-KOU Materials.

Throughout the US and Canada, Eternal and Nikko films are distributed by IEC (International Electronic Components, Inc.), which is owned by Eternal. IEC would also sell Elga products, if there were a demand, which there is not at the moment. But, Elga does sell Eternals products throughout Europe, while Eternal sells their products directly (without a middleman) throughout Asia. I understand that Eternal also manufactures some products here in the US..... Confused yet?!

Nikko Products That Work for Photogravure

ALPHO NIT200 Series

This product was offered to me, and a free sample for testing provided by, the outlet for Eternal dry films in the US, but does not follow the naming convention for Eternal dry film products prior to this.

- NIT215 - 15 microns thick
- NIT250 - 50 microns thick

Sensitivity range: 350-380 (assumption based only on subjective testing)

I used one of my standard images to test this material, one of my favorites, and the results were very good. Using a standard 15 minute exposure time under six Kingbo UV lamps at about 21 inches above the exposure platform, a QTR profile using Matte Black ink at a K setting of 16 and a Boost of 18.5, gave results very reminiscent of what I got using Eternal's E8020 with another favorite image. The 8020 gave me the best results I had seen at that time. I will definitely be experimenting further with this material for my own work.

The data sheet provided with NIT250 stressed a post-exposure curing time of 15 minutes prior to processing, which proved to create a meaningful increase in contrast and density, particularly in the shadow areas of the image. It was worth the extra wait.

NIT250 also seems to (not confirmed, but strongly suggested) be resistant to forming railroad tracks with the direct-to-plate approach. I got no tracks at all on plates made with my two standard smaller

sizes and got only weak tracks which were gone with the second plate in my largest size image. This could be a coincidence, but it was a noticeable one. Further testing is needed, but it is promising.

Nikko Products That Do Not Work for Photogravure

None At This Time

Nikko Products Remaining To Be Acquired & Tested

None At This Time

Mystery Materials

DO NOT BUY ANY OF THE PRODUCTS IN THIS SECTION! These fake products are the reason this document exists. They sell for outrageously high prices that are TEN TO THIRTEEN TIMES the cost of the exact same materials when purchased from legitimate sources under their real names. In addition, they are quite often stale by the time you get them, because of improper storage or other mishandling.

This section will contain only those mystery materials I am able to obtain for testing without actually having to purchase them. Frankly, I don't care enough about what they are, or how well they work, to invest any money in acquiring them. I will test and publish results for any mystery material someone sends to me, but they are not worth the trouble of pursuing samples when we will still never know what materials they actually are. And at this point in time, we already have more than enough known, legitimate materials described in this document to equal or surpass anything the mystery materials could ever conceivably offer.

None of these mystery materials are actually called what their secret keepers have named them. It is exactly the same as if you purchased a roll of Kodak photographic film, stripped off all identifying marks and relabeled it "HappyFilm". There is no such thing as *HappyFilm*, or *Imagon HD*, or *Skylight* or *DK3* or any of the other fake products that are listed here as *Mystery Materials*. These fake names are applied for the sole purpose of obfuscation, disguising the true source of the product so as to prevent you from purchasing them directly from the actual manufacturer/distributor or reading the real manufacturer's data on these products, not to mention, buying them at prices far, FAR lower than the mystery materials.

Imagon HD...

Sold by takachpress.com, repackaged, purportedly, by the Keith Howard family. I believe that Takach has nothing whatever to do with the deceit, so be nice!

I am quite certain this is really DuPont's MM550. One person has reported that Imagon HD was manufactured by a now defunct company (not DuPont), which might explain Imagon's waning availability. There have been two versions of Imagon, the first, was also understood to have been a DuPont product, though I have yet to test any DuPont product that has characteristics ascribed to the first, now discontinued, *Imagon* material.

50 micron thickness. Sensitivity range: 350-380

Until recently, this was the only mystery material offered in the U.S. that was suitable for making polymer plates intended to contain the intaglio image within the polymer itself. Like just about everyone, this is the material I started out with because no other options were known to exist in 2013, nor up until this paper was first published a few years later.

My first take on this material was not good. It turned out, after a couple of wasted years, that I was using poor inks (the popular water washable type) and that Imagon HD was absolutely not at fault. In fact, it proved excellent in performance, after I finally changed over to traditional intaglio inks. The difference was *enormous*. DON'T USE WATER SOLUBLE INKS!!

DuPont's product MM550 has working characteristics identical to Imagon HD such that, a switch to MM550 should cause no changes whatsoever in your working procedures. You can expose and process a plate made with MM550 exactly as you would one made with Imagon HD. It should print identically. Should you encounter, for whatever reasons, any differences, they will be quite small.

Skylight...

Repackaged and sold by www.capefearpress.com, this product was announced in the Spring of 2018.

40 micron thickness. Sensitivity range: 350-380

Skylight seems to provide a contrast similar to products like DuPont PM 250 and MM550 or Kolon's PK 1540. In a mid-range.

The image quality of *Skylight* is very good, easily on a par with any of the best materials I have tested thus far. *It is not however, sufficiently photosensitive for practical use with direct-to-plate and generally available artificial light sources.* In order to get a good image on this material I had to raise the exposure platform of my NuArc 26-1K to the halfway position between the normal platform and the light source. This is as high as you can safely place a plate for exposure without the risk of melting the photopolymer. I also had to retain my standard 15 minute exposure, despite closer proximity to the light source, and also cut back substantially on the amount of ink I allowed to be deposited on the plate surface. These changes together amounted to two stops or more of additional exposure beyond that required by more suitable photopolymers. Normal procedures simply could not penetrate a conventional ink deposit. This reduced ink deposit could potentially cause discontinuity of gray tone transitions since a normal ink deposit is already quite low, though I experienced no such problems with the image I used for testing.

In addition to being a mystery material, Skylight is only 40 microns thick. It works. In fact the material I was using for my own work until several years ago, was also only 40 microns thick, but in both cases, 50 would be better. A 50 micron thickness leaves more elbow room for images with substantial tonal ranges, can potentially contain more ink (important if you use brown or other colors of inks less capable of creating the darkest tones) and may also be less prone to open bite.

If you have a plate burner with at least twice the output of the NuArc 26-1K or plan to expose your plates in direct sunlight, this might be your preferred material, except of course for the fact that its only availability is at the whim of its secret keeper and it is expensive at approximately ten+ times the cost of Eternal's and most other materials.

PURETCH...

Repackaged and sold by www.capefearpress.com

This material has been available for some time and is intended for etching images into copper or other metal plates, not for the purposes sought in this paper. It is therefore much too thin for our requirements. Like all untested mystery materials, its other characteristics are entirely unknown.

DK3...

Repackaged and sold by Henrik Bøegh in Denmark

Web site: <http://www.grafiskeksperimentarium.dk/contact/?lang=en>

48 microns

No other information is available.

Mr. Bøegh has made it plain he wishes to continue to keep his secret.

06/09/2023: A few days prior to this date, it was reported to me that DK3 recently became unavailable. I have thus far found one site with confirmation of this. 11/13/2023: Since the forgoing, Mr. Bøegh has contacted me to confirm the product has been discontinued by the manufacturer and therefore by him, and that he will not be selling any more mystery materials.

stellAprint...

Recently brought to my attention by Jean-pierre de Villartay. Thank you.

Web site: <http://www.joopstooop.fr/> Warning found on the web page: "This product is no longer in stock with those attributes but is available with others."

06/09/2023 No longer found on their web site.

Was, 50 microns

Mungolux...

(for some reason, this name makes me think of the film, *Blazing Saddles*)

Repackaged and sold by Mungolux Photoetching Supplies in Germany.

Web site: <https://mungolux.com>

50 microns

Some boilerplate information on their web site, but this is of course, another mystery material. Nothing else about it is known to me at this time.

Known Manufacturers of Dry Film Photopolymers

Contact these manufacturer locations to ask what distributor(s) are nearest you.
If you know of a manufacturer not listed in this paper, please make me aware of them.

DuPont

[http://www.dupont.com/products-and-services/electronic-electrical-materials/
printed-circuit-board-materials/brands/riston-film-photoresists.html](http://www.dupont.com/products-and-services/electronic-electrical-materials/printed-circuit-board-materials/brands/riston-film-photoresists.html)

Americas

DuPont Electronic Technologies

14 TW Alexander Drive
Research Triangle Park, NC 27709
Tel: 919.248.5000
Fax: 919.248.5132

Europe

DuPont de Nemours (Luxembourg) s.a.r.l.

Rue General Patton
L-2984 Contern
Luxembourg
Tel: +352 3666 5935

Asia

DuPont China Holding Co. Ltd (Shenzhen)

Che Gong Miao Industrial Area
District No. 5
Shenzhen, 518040
Guangdong, China
Tel: +86-755-8330.7867
Fax: +86-755-8330.1651

DuPont China Holding Co. Ltd (Shanghai)

Bldg 11, 399 Keyuan Road,
Zhangjiang Hi-Tech Park
Pudong New District,
Shanghai, P.R. China 201203
General Tel: +86-21-3862 2888

General Fax: +86-21-3862-2889

ET Fax: 86-21-3862 2890

DuPont Korea Inc.

4/5 F, Asia Tower Bldg

#726 Yeoksam-dong

Kangnam-ku, Seoul

Korea 135-082

Tel : +82-2-2222.5396

Fax: +82-2-2222.5476

DuPont Kabushiki Kaisha (Tokyo)

Sanno Park Tower

11-1, Nagata-cho 2-chome

Chiyoda-ku, Tokyo 100-6111

Tel: +81-3-5521-8660

Fax: +81-3-5521.2371

DuPont Company (Singapore) Pte Ltd.

1 HarbourFront Place #11-01,

HarbourFront Tower One

Singapore 098633

Tel : +65-6586.3421

Fax : +65-6586-3640

DuPont Taiwan, Ltd.

No. 45 Hsing-Point Road

Taoyuan

Taiwan

Tel: 866-3-3773635

Fax: 886-3-3770480

ElgaEurope s.r.l. (Italy)

<https://www.elgaeurope.it/ENG/Homepage.aspx>

Italy

Headquarters

Located in Milan (?) No address found (see information for Eternal Europe)

TEL: + 39 0331 586947

FAX: + 39 0331 587751 - 0331 580004

E-mail: [email: info@elgaeurope.it](mailto:info@elgaeurope.it) / elgaeurope@pec.it

Argentina

Please Contact Elga Europe s.r.l.

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Postal code: 11331

Email: fikry@target-me.com

Web: www.target-me.com

France

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Germany

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eg@asteriadis.gr

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Israel

Metalchem LTD

P.O.Box 1097

Lod 71100 Israel

metalchm@netvision.net.il

ph: ++972-8-9202488

fax: ++972-8-9229825 Eternal Materials Co., Ltd. (Etertec) (Taiwan)

Italy

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<http://www.eternal-group.com/Home/EngIndex>

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C.H. Erbslöh Baltic

Taikos pr.141, Kaunas

LT51132, Lithuania

linas@cheb.lt

ph: ++370-37-333.805

fax:++370-69-849.564

Spain

Comercial Electronica Feijoo

Avda Madrid 19 Nave 7-8

28342 Valdemoro Madrid

Spain

cfeijoo@ctv.es

ph: +34-91-80.83.170

Fax: +34-91-80.83.171

Switzerland

CIPEL Distribution SA

route du Rhône, 10

CH-1963 Vétroz - Suisse

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Skype: eurocipel-jean

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Fax +41 27 565 7840

Skype : eurocipel-jean

www.cipeldistribution.com

Russia

Petrocommerz LTD

195027 ST. Petersburg Russia

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bartuli@petrocom.ru

ph: ++7-812-676.5656

fax: ++7-812-676.4944

UK

A-GAS ELECTRONIC MATERIALS LTS

Unit 3, IO centre

Valley Drive

Rugby, Warwickshire CV21 1TW, UK

www.agasem.com

ph.: +44-1788537535

Eternal Materials Co., Ltd. (Etertec) (Taiwan)

<http://www.eternal-group.com/Home/EngIndex>

USA

Eternal Technology Corporation

Main Product: Dry Film Photoresist

1800 Touchstone Road, Colonial Heights, Virginia 23834, U.S.A.

TEL: + 1-804-524-8555/524-8557

FAX: + 1-804-524-8556 E-mail: ch_yang@eternal-group.com

China

Eternal Photoelectric Material Industry (Yingkou) Co., Ltd.

Main Product: Dry Film Photoresist

No.102 Xinhai Street, Coastal Industrial Base, Yingkou, Liaoning, China.

TEL: +86-417-293-5000

FAX: +86-417-292-7938

E-mail: hobo_zhang@eternal-group.com

Japan

Nikko-Materials Co., Ltd.

Main Product: Dry Film Photoresist、Vacuum Laminator、Dry Film Solder Mask、Process Chemicals

Choko-Kan 3rd Floor, 1-16-3 Nakamachi, Machida Shi, Tokyo 194-0021, Japan

TEL: +81-42-722-7310

FAX: +81-42-722-7320

E-mail: Johnny_liao@eternal-group.com

India

Eternal Materials Co.,Ltd. India Office

Main Product: Synthetic Resins for Coatings, Unsaturated Polyester Resins, Specialty Monomer, Specialty Coating

Unit No.514, 5FL, The Summit – Business Bay Andheri Kurla Road, Andheri (E), Mumbai-400093, India

TEL: +91-22-4053-4053

FAX:

E-mail: willis_wu@eternal-group.com

Indonesia

Eternal Materials Co.,Ltd. Indonesia Office

Main Product: Synthetic Resins for Coatings, Unsaturated Polyester Resins, Specialty Monomer, Specialty Coating

Manhattan Square Floor 16 Suite F Jl. TB. Simatupang Kav. 1S Cilandak Timur Jakarta Selatan 12560 Indonesia

TEL: +62-21-2904-9838

FAX: +62-812-9621-6883

E-mail: agus_zheng@eternalmaterials.co.id

Italy

Elga Europe S.R.L.

Main Product: Dry Film Photoresist、Photoresist、Dry Film Solder Mask、Process Chemicals、HTE Copper Foil

Via della Merlata no.8, Nerviano, Milan, Italy 20014

TEL: +39-0331-586947

FAX: +39-0331-587751

E-mail: g.favini@elgaeurope.it

Korea

Eternal Materials Co.,Ltd. Korea Office

Main Product: Specialty Monomer, Specialty Coating, Dry Film, Optical Material

3-506, 304, Shinwon-Ro, Youngtong-Ku, Suwon-city, Kyungki-do, Korea

TEL: +82-31-8002-2151 ~ 7

FAX: +82-31-8002-2158

E-mail: patrick_song@eternal-kr.com

Malaysia

Eternal Materials (Malaysia) Sdn.Bhd.

Main Product: General Purpose Resins, Synthetic Resins for Coatings, Unsaturated Polyester Resins

PTD 5044, Jalan Rumbia 2, Tanjung Langsat Industrial Estate, Mukim Sungai Tiram, 81700 Pasir Gudang Johor, Malaysia

TEL: +607-277 8600

FAX: +607-277 8609/+607-277 8610

E-mail: miles_tien@eternal-group.com

Taiwan

Eternal Materials Co., Ltd. Kaohsiung, Head Office

Main Product: General Purpose Resins, Synthetic Resins for Coatings, Unsaturated Polyester Resins, Specialty Monomer, Specialty Coating, Copper-Clad Laminates, Dry Film, Optical Material, Specialty Chemical

No. 578, Jiangong Rd., Sanmin Dist., Kaohsiung City 807, Taiwan

TEL: +886-7-383-8181

FAX: +886-7-383-3355

E-mail: diamond_dai@eternal-group.com

Thailand

Eternal Electronic Material (Thailand) Co., Ltd.

Main Product: Dry Film Photoresist

335/8 MOO9, T.BANGCHALONG, A.BANGPLEE, SAMUTPRAKARN 10540

TEL: +662-750-9086/750-9097/750-9147/337-3009

FAX: +66-2750-9096

E-mail: Dean_hsu@eternal-group.com

Vietnam

Eternal Materials Co.,Ltd. Vietnam Office

Main Product: General Purpose Resins, Synthetic Resins for Coatings, Unsaturated Polyester Resins, Specialty Monomer, Specialty Coating

Copper-Clad Laminates Unit 1001, 10th Floor Citilight Tower 45 Vo Thi Sau Street, Dakao Ward, District 1, HCMC Vietnam

TEL: +84-8-3820-7751/3820-7752

FAX: +84-8-3820-7791

E-mail: cobby_chung@eternal-group.com

Hitachi Chemical (Japan)

Nothing is provided here because contacting them is pointless. They simply ignore you. You will wish to reach their distributors, anyway, as they are the source of the materials. There is nothing to be gained from contacting Hitachi directly.

However, it may be that their policy is to ignore just Americans, so if you should be able to get a reaction from them, please let me know and provide the contact information you used, so that I can provide it here, for readers outside the US.

Their European distributors are listed in the next section.

Kolon Industries (S. Korea)

<http://www.kolonindustries.com/Eng/main.asp>

USA

U.S. Subsidiary (Manufacture), Kolon USA
3 Sperry Road, Fairfield, N.J. 07004 U.S.A
Tel:1-973-575-2550 / Fax:1-973-575-1332

Germany

German Subsidiary (Fashion), Kolon USA Corp.
Arabella Center 7A Lyoner str. 44-48, 60528
Frankfurt/Main, Germany
Tel : 49-69-962-21500 / Fax : 49-69-962-21515

China

Beijing Subsidiary, FnC Kolon Beijing Corp.
NO.610 Air China Plaza No.36 Xiaoyun Road, Chaoyang
District Beijing
Tel : 86-10-8447-5684

China

Shanghai Subsidiary, FnC Kolon Shanghai Corp.
Shanghaishi Wuzhonglu 1079 Hao Canhongdasha
4Lou a zuo
Tel : 86-21-5422-3520-3530

China

Shanghai Office, China
20F, Unit E, GEM Building No 487 Tianlin Road,
Shanghai, 200233 China
Tel : 86-21-6481-2616 / Fax : 86-21-6481-2655

China

Suzhou Subsidiary, Kolon GP Chemical Co Ltd.
56, Qing Qiu Road, Suzhou Industrial Park, Suzhou,

215126 P.R. China

Tel: 86-0512-6283-3311 / Fax: 86-0512-6283-3165

China

Beijing Office, China

Room 718, Huapu International Plaza, #19, Chaoyang men
wai Street, Beijing, China

Tel : 86-10-8481-6552 / Fax : 86-10-8447-5694

China

Nanjing Subsidiary, Kolon Nanjing Co Ltd.

210046, Heng Jing Road, Nanjing Economic
& Technological Development Zone, Qixia District, Nanjing
City, Jiangsu Province, China

Tel : 1-86-25-8557-3500 / Fax : 1-86-25-8557-1592

Indonesia

Indonesian Subsidiary, PT Kolon Ina

JL. Raya Jakarta-Serang KM80, SERANG BANTEN 42183,
INDONESIA Desa Keserangan Kabupaten Serang Jawa,
Barat, Indonesia

Tel : 62-254-281-234 / Fax : 62-254-281-555

Japan

Osaka Office

KAL BLDG 10F, 1-9, 3-Chome, Hommachi, Chuo-Ku
Osaka, 5410053 Japan

Tel : 81-6-6265-1008 / Fax : 81-6-6265-1055

Japan

Tokyo Office

Daiichi Hibiya Bldg. 9/F, 18-21, 1-Chome, Shinbashi,
Minato-Ku, Tokyo, Japan

Tel : 81-3-3503-9986~7 / Fax : 81-3-3508-2105

Known Distributors of Dry Film Photopolymers

Contact these distributors locations to ask what distributor(s) are nearest you.
If you know of a manufacturer not listed in this paper, please make me aware of them.

If you learn of any distributors anywhere in the world not already mentioned here, please send me their contact information. Send it to david@davidkachel.com The current information is quite obviously incomplete.

DuPont

USA

Allen Woods Group
2515 Clearbrook Dr.
Arlington Heights, IL 60005
Phone: 1-847-806-4000 Fax: 1-847-806-4010
<http://allenwoodsgroup.com/home/pcb-solutions/dry-film>

Germany

Micro Resist Technology GmbH
Köpenicker Str. 325
12555 Berlin
Telefon: +49 30 64 16 70 100 Telefax: +49 30 64 16 70 200
E-Mail: sales@microresist.de
<https://www.microresist.de/en/products/dupont-dry-film-resists>

Poland

Micro Resist Technology GmbH
Köpenicker Str. 325
12555 Berlin
Telefon: +49 30 64 16 70 100 Telefax: +49 30 64 16 70 200
E-Mail: sales@microresist.de
<https://www.microresist.de/en/products/dupont-dry-film-resists>

Eternal

England

Mark Nicholls
Business Manager Interconnect Technologies (PCB / EIF)
A-Gas Electronic Materials
Unit 3, iO Centre
Valley Drive
Rugby, Warwickshire CV21 1TW, UK
T [+44] (0) 1788 537535
M [+44] (0) 7887544504
mark.nicholls@agas.com
www.AgasEM.com

Switzerland

Cipel Distribution SA
Canton Wallis (Valais)
Route du Rhône 10
CH-1963 VETROZ
Phone +41 27 565 7830
E-mail: info@cipeldistribution.com

France

Chimie Tech Servies
7, rue Marcelin Berthelot
Zone industrielle
92762 Antony cedex
Paris
Phone 01 55 59 55 75
[https://www.chimietech.com/cms/index.php?
option=com_content&view=article&id=117&Itemid=123&lang=fr](https://www.chimietech.com/cms/index.php?option=com_content&view=article&id=117&Itemid=123&lang=fr)

USA + Canada

Jennifer Lewis

International Electronic Components (Sales for Eternal {aka Etertec} for entire USA & Canada)

International Electronic Components USA Inc. (IEC)

480 Lively Blvd.

Elk Grove Village, IL

USA 60007

1-847-262-5182 phone

1-847-258-3422 fax

Email USA Warehouse ??

IEC USA, Inc.

809 Aldo Ave.

Suite 104

Santa Clara, CA 95054

Phone 408-477-2755

Phone 855-225-9333 (Tannie Narcelles – can also take orders)

Jennifer.Lewis@IECUS.com

www.ieccan.com or

www.iecus.com

International Electronic Components USA Inc.

2551 Industry Lane

Norristown, PA

USA 19403

1-302-415-3702 phone

Email USA Warehouse

International Electronic Components USA Inc.

23531 Ridge Route Drive, Unit C

Laguna Hills, CA

USA 92653-1504

408-496-0474

1-855-225-9333 customer service

Email USA Warehouse

Canada Distribution Office (buy from US)

Blaine McLellan

International Electronic Components Inc
352 Signet Drive
Toronto Ontario
M9L 1V2

T- 1-800-363-4794 Ext 221 F- 1-416-293-6312
Email: blaine.mclellan@ieccan.com

Blaine and the phone numbers are in the US office. The warehouse address is obviously Canada.



Hitachi Chemical

Availability information is sketchy at the moment. Please let me know of any sources in your location, or near you, so that I may add it.

Europe

UK

Green Door Printmaking Studio
Studios 0.2, 0.3 & 0.4
Banks Mill Studios
71 Bridge Street
Derby
DE1 3LB
United Kingdom
<https://photopolymerfilm.co.uk/>

Kolon

Kolon has a single representative company in the US called Toryon Technologies
Rather than hire distributors, Toryon has its own regional sales people Contact
this location to determine the sales rep for your part of the US, OR...
Just call this location and order direct.

USA

Toryon Technologies, inc.
1750 Todd Farm Drive
Elgin, IL 60123
Phone 630-540-1800
Phone 877-867-9668
<https://www.toryon.com/index.php?m=47&s=142>

Nikko

Look to IEC (listed under Eternal in this section) in North America, Eternal in Asia and
Elga in Europe.

UV Exposure Units

Options are growing instead of diminishing when it comes to light sources for UV exposure. Until quite recently, the only option for dry film photopolymers, the subject of this paper, was the traditional *plate burner* (such as the Nuarc 26-1k that I have used), or exposure to the sun which is not practical for continuous work. High output mercury vapor lamps or their successors, the metal halide lamps, were / are generally used in *plate burners*. These devices are large, heavy, expensive and quite inefficient for the amount of power they consume. But they do work. If you need a UV exposure unit for anything *but* the *direct-to-plate* approach, then you need either a traditional photographic contact printing frame(s) (inconvenient) plus a UV light source, or a vacuum unit such as those used in these traditional plate burners. Contact printing frames tend to be a bit pricey these days so the plate burner option might make more sense.



For dry film photopolymers *and* direct to plate, you cannot use and do not need the vacuum option of a plate burner, though with a unit that does not force you to use the vacuum option, you can use a plate burner and simply set the plate to be exposed on top of the vacuum platform for exposure. This option however is a senseless waste of money if you do not practice any type of printing method that uses the vacuum.⁶

⁶ Just for the record. For each exposure unit you buy of any kind, I receive a big fat envelope full of nothing! ;-)

Output for such units is generally quite *spikey* with emission confined mostly to:

- 185 nm (UVC)
- 255 nm (UVC)
- 365 nm (UVA)
- 405 nm
- 435 nm
- 545 nm
- 575 nm

185nm, 255nm, 435nm, 545nm and 575nm outputs are useless for exposing just about any alternative photographic materials (though it is possible to sensitize them to such wavelengths). 365 nm output seems to be ideal for cyanotypes, the iron processes and most of the other *alternative* photographic print processes and for readymade polymer plates (350nm, I am told).

The sensitivity range generally given for dry film photopolymers is 350-380 nm but investigations on my part tend to suggest a somewhat broader sensitivity.

In recent months I have been acquiring and experimenting with UV light units that are based on the LED (light emitting diode). The LED bulb represents a substantial advancement in lighting for many different purposes but for us it has opened up a whole new realm of options for UV exposure at dramatically lower cost than the traditional plate burner. These options drastically cut down the cost of equipment for making photogravures with the direct-to-plate approach. One quite efficient and long lasting LED UV bulb in particular costs only \$30 and is big enough to expose images of 5"x7" and perhaps slightly larger. Several of these bulbs can be used at once to accommodate much larger plates.

These LED UV units were of course not intended for exposing photographic materials. Their manufacturers' intent was for entertainment. Music and dance functions. Fortunately for us, they work for photographic purposes, too. But not all.

That is why this new section has been added to the paper. As I slowly acquire LED UV units, I will test them and report on which are and are not suitable for dry film polymer direct-to-plate photogravure. Unsuitable units are covered so that you will not unwittingly buy them thinking I have not encountered them yet.

Thus far it appears that LED UV units are available in two output levels: 365nm and 395nm. 365nm appears to be suitable for just about everything *but* dry film photopolymers while the 390-405nm range seems ideal for dry film polymers: us!

From one source I received two units, identical in every way except spectral output. Making test plates identically exposed with each of the identical units, the 365nm unit produced a plate, but one too high in contrast. The 395nm unit produced a much better plate with smooth tone transitions throughout.

Suitable & Non-Suitable LED, UV Lamps

KINGBO 36W LED Blacklight Bulb E26 PAR38

This is the unit I mentioned in my book and have also suggested numerous times on the Photogravure group on Facebook. At this time they are only \$30. In my studio I have an exposure platform employing six of these and it works beautifully. For small plates (about 5"x7") just one of these lamps will work. (However, different QTR profiles may be required, depending on the number of lamps used. See my book.)



RECOMMENDED: This is the “KINGBO 36W LED Blacklight Bulb E26 PAR38”. Those are 18 little bulbs of two Watts each, for a total of 36 Watts. Output is at 395-400nm and they are very long-lasting. KINGBO makes a number of very similar

looking lamps. Only this exact lamp will work. Don't accept any substitutions. Also, the price fluctuates on Amazon, where I bought these, and they disappear altogether from time to time, so if you can't find them, be patient. They should come back. In the photogravure group on Facebook I linked this photograph to the Amazon web site but it turns out that if they are out of stock, you get sent to a page for one of those similar looking lamps that doesn't work. Be careful to buy only this exact lamp.

Below is the exposure setup I built with six of the KINGBO units. Easy, versatile, flexible, readily broken down and cheap. Put black cloth on nearby white walls (this was a "before" picture) or you will get double edges. The lamps are quite efficient so reflections matter. They also produce very little heat.



Chauvet Shadow, LED UV

NOT RECOMMENDED: I bought the Chauvet Shadow in the Spring of 2018. They sell for \$160 which is considerably inflated, all things considered. But part of this is due to the fact that the unit contains software made for syncing the light output with music, something that satisfies the entertainment purposes, previously mentioned.

I made test plates at 19" with a 15' exposure, my standard base exposure with the NuArc 26-1K. This light unit produced a plate that was about 1/2 stop underexposed compared to the 26-1K at the same distance and time. One could reduce the distance from exposure unit to plate, to compensate.

Though there was nothing wrong with the plates produced and though this unit is certainly capable of good performance, I have some misgivings.

The LEDs are *focused*. Coverage at 19" is only slightly larger than coverage at one inch. This is much tighter than the Nuarc 26-1K. Light fall off, because of this "focusing" does not follow the inverse square law, but falls off more gradually. This would be great if the light were stronger, but I consider a fifteen minute exposure to be about the practical limit. Covering a larger plate by moving the light source further away might be worth waiting for longer exposures, but the focus of the light source doesn't make moving the light further away practical. The projected light continues to cover about the same area. You'd have to move it back so far to cover a larger plate that exposure times would increase to a point of being impractical.

The problem is that this light isn't really focused. It's 192 tiny lights in a rectangular pattern. Each tiny light is focused narrowly, but the unit as a whole is not "focused" so much as it is, *collimated*.

Also, the LEDs are spaced much too far apart. The projected light has a definite Swiss cheese pattern that is noticeable even out to 19" and beyond. Though substantially softened at about eight inches and beyond, it is still present and may produce noticeable mottling in smooth areas like sky, at any practical exposure distance.

Lastly, the idea of covering bigger plates with multiple units seems unlikely to work well. There is no center of light projection that is more intense than the edges and therefore lights cannot be feathered or centers aimed diagonally to produce even coverage and greater intensity. There is about a one inch border all the way around these lights, so they cannot be butted up against each other, either, not without creating a substantial fall off on the plate to be exposed and you cannot compensate by aiming the lights in a direction not parallel to the plate being exposed because there would be significant fall off at the outside edges.

One of these units could probably be made to work under the right circumstances. Two or more units cannot be made to work together, period. And, they are substantially overpriced. Don't buy this party toy.

Waveform Lighting

NOT RECOMMENDED: Waveform Lighting out of San Francisco, California (www.waveformlighting.com) very kindly sent me two lamps to try out. I mentioned these briefly above. They are identical except for wavelength, one outputting at 365nm, the other at 395nm. Both lamps are 20W⁷ units. Twenty Watts it seems is simply not enough. (The 36W KINGBO units are what I would call the bare minimum for single lamps.) Because of the low wattage I exposed plates when testing these lamps at a distance of one foot, instead of the eighteen to twenty inches I customarily use as a starting point.



At that distance and giving a fifteen minute exposure with each, the 365nm lamp resulted in a plate with far too much contrast and also exhibited a considerable amount of open bite. The presence of open bite means the plate would require either more than fifteen minutes of exposure (impractical) or a weaker QTR profile (also impractical because I used the weakest I can recommend) or multiple lamps with overlapping coverage and a drastically different Brightness/Contrast layer adjustment in Photoshop. This lamp might be forcibly made workable, but I doubt it.

The 395nm version of this lamp produced a plate that was significantly too low in contrast but that is far more easily corrected by altering either a Brightness/Contrast layer in Photoshop or choosing a different profile in QTR, or both. And, this lamp would probably perform nicely in multiples as the local contrast would probably

⁷ Wattage with UV emission is not a reliably consistent indicator of UV effectiveness.

increase simply by virtue of having multiple lamps. (This happens to great benefit with the KINGBO lamps mentioned above.)

Though these lamps (the 395nm version) might well be a good performer in a multiple lamp situation, there is one major drawback... the price! The lamps are (last I checked) \$65 apiece, killing their potential practicality, completely. They need to be half that price to be tempting.

If this company ever comes up with a significantly higher wattage unit at a more reasonable price, such a lamp just might be a tempting possibility. Certainly their quality, customer service and eagerness to please would be a strong draw for such a lamp. You should probably not buy this, but keep an eye out for bigger & better things from them.

ZHMA

RECOMMENDED: ZHMA is not exactly a catchy name for any kind of company, but don't worry, it gets worse. Apparently, the model name is the wattage of the unit. Each similar unit they make is marked, *IP66* in bold letters. You would think that *IP66* is the model name if you saw only one unit, but no, everything is *IP66*. Their PR and marketing guy will no doubt kill this company but in the mean time, we seem to have a winner. At only \$51 this could be exactly the right UV unit for the newcomer to photogravure. It has a 120 degree angle of coverage, outputs at 100 Watts (visible light) and at 380-420nm in the UV range. We don't need the 420 end but it doesn't do any harm, either.



The other four models are in turn, 10W at \$15, 30W at \$26, 40W at \$25 (go figure) and 60W at \$37. All of these units are available from Amazon.

The 100W unit is what I have tested and to my mind, the only reasonable choice from this group of lamps from ZHMA. Just two of them should be sufficient for a fairly large area of even and effective exposure, though I suppose an argument could be made for four 60W units, or possibly even four 40W units. All of these units have the same problem with butting up against each other as the Chauvet Shadow: they don't. There is too much *frame* around the actual light

output area that could get in the way. Getting multiple units to give even coverage could be difficult. But with only two of them, the problem is greatly simplified. Just cross them over each other like copy stand lights and there is no need to butt them up against each other, so the problem disappears. And, with more UV output than needed, these lamps can be raised to an even greater height, thereby providing a larger area of coverage.

These units weigh 3.66 lbs and the outside dimensions are 12.1" x 9.8" x 3". The literature says they can get hot but I had no difficulty with heat in testing. The most the lamp got was *very warm*. Your mileage may vary, so set them up in such a way that unexpected heat won't matter and won't present a fire hazard.

Coverage with this unit is broad and quite uniform with slow falloff, allowing for effective coverage from a single unit of an area of 11" x 16" at an elevation of 16.5", with falloff of only one-third stop. Two of these units with just a couple more inches of elevation should provide all the coverage one is likely to need for most any work, with reasonable exposure times. This unit also has a long power cord with an in-line switch.⁸

A test plate made using a QTR profile of 15-17.5 produced an excellent print that had I been attempting to get the best of out the image, I would have made another plate trying perhaps a QTR profile of 16-18.5 or adding 20 points of brightness in Photoshop. Perhaps a combination of the two. But the plate and print were certainly good enough to know this lamp will most definitely perform well, with ample output, especially with a pair of them. In fact, I ordered unit #2 for myself just before writing this.

Subsequent testing of two lamps at 45° angles gave about 18"x24" coverage, more than I will ever be likely to need. These lamps are of slightly less intensity and coverage than my setup employing six Kingbo lamps, so I recently decided to use the Kingbo products just for direct-to-plate exposure of dry film photopolymer plates and reassign the two ZHMA lights to function as the UV output for exposures of more traditional alternative materials, such as cyanotype and argyrotypes, that require the vacuum unit of my NuArc 26-1K, but not the recently developed propensity of that same machine for self-immolation when using the built-in exposure circuitry. This way, I can also resort to the ZHMA units exactly as-is, for direct-to-plate duty, if needed.

(Don't walk away from your NuArc and keep a fire extinguisher handy, or buy a pair of the ZHMA 100 Watt units, instead of using the NuArc light!)

⁸ Apparently, IP66 is an official, international measurement of enclosure quality, declaring this unit to be highly resistant to dirt, water and possibly speeding bullets, and is not in fact, a model or series name.

SAYHON

RECOMMENDED, with some reservation: Yet another catchy company name, SAYHON, markets an 80W unit with no markings on the actual device, whatsoever. It too is “IP66” and also is available from Amazon, for one dollar less than the ZHMA unit, above. The diodes (LEDs) are fewer and farther apart here and there is no in-line switch on the cord. I plug my UV lamps into a power strip so the switch is really superfluous for me, but might come in handy for some. In fact, they might easily serve for impromptu dodging and burning efforts.



UV output for the SAYHON lamp is rated at 390 - 400nm. At the same height as that used to test the 100W ZHMA lamp, this unit outputs a full 1.3 stops less *visible* light. But remember, the visible light output does not necessarily indicate the amount and effectiveness of UV output. It is at best a vague generalization. But, not in this case.

Coverage for this unit is about 12"x12.5", odd for a decidedly rectangular shape. As with the previous unit, this is calculated to be from brightest in the center to the points on each side where falloff reaches one-third stop. There is of course a much bigger area but falloff is quite rapid, reaching one-half stop in only a couple more inches, at most.

Using the 13-15.5 profile for QTR and the usual basic fifteen minute exposure. (I am using the exact same image for all of these lamp tests with no changes at all in the Photoshop file between plate exposures.)

A single plate was made with this lamp and aside from a test print pulled from that plate being about 40% to 50% too dark (easily fixed with a change to a Brightness/Contrast

layer in Photoshop) the print is perfect. No need to make another plate or another test print. These lamps could absolutely be made to work. The greater distance between LEDs matters not at all. It doesn't show in the print and it was invisible on the exposure plane. These are very nice lamps and would be a great choice, with a little finagling and by using two or more of them, if it weren't for the fact that the ZHMA lamp does a much better job for the same money.

If you live in a corner of the world where you can't get the ZHMA lamps or the KINGBO bulbs, with just a little effort this lamp could be made to render very good plates. It's only real flaw is being too weak by at least 20 Watts. (The wattage claimed on many of these types of devices seems often to be more of a wish than a statement of fact.)



LaMuVii

RECOMMENDED, with reservation: Available in pairs of 30W, 60W and 100W, these are usable only in the 100W version (I paid \$108 for the pair) and even then, marginally.

Today As of 2022, I found them on Amazon where I bought them, but the 100W was at the time, not available.

In order to make the pair of 100W units work, I had to raise the exposure platform to 15.5 inches below the two fixtures. Workable, but perhaps not ideal.

This is a short description because it is a short recommendation. If you can't find anything else, this will work.

KUKUPPO

NOT RECOMMENDED: Available in pairs of 80W, 100W and 150W, these border on fraud. Most, if not all, LED UV units come out of China with no brand name on them, and the eBay or Amazon sellers just slap their own names on them. I bought this in the 150W version for obvious reasons... I wanted more power. I didn't get it. The output of these units didn't remotely match that of the 100W units I already owned. Plus, there are too few UV bulbs, too poorly distributed. Look at the LED distribution of the ZHMA units, above. That is the sort of number and distribution of LED lamps you need. This device is just useless.

Maybe you can use one for your next rave party, but make your guests stand very close!