



## Iford ISO400 film: The same but different

*Iford claims to have improved its high technology ISO400 film*

*Article by Geoffrey Crawley*

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Whether ASA, ANSI, ISO, EI or whatever, the number 400 has marked a pivotal point in the film speed hierarchy in both b&w and colour. Below it and you are in the safe high quality zone. Above it is the outer region of the super speeds. It is fifty years since the first true ISO400 materials, Kodak Tri-X and Iford's (uprated) HP3, appeared.



*The film results*

So in basic sensitivity, advances over the past half century, in b&w at least, have not been that spectacular. The ultra fast 3200 emulsions of today use EI rather than the stricter ISO standards to substantiate their claims. What has indeed improved is image quality, notably fineness of grain and, with it, resolving power. As regards tonal quality, the granularity improvements mean that this is retained at much higher degrees of enlargement before obvious image break-up by the grain pattern.

Much is made in promotional material of the advanced silver halide crystal technologies such as Iford Delta, Kodak T-grain, and the like. Their greater efficiency in trapping incident photons arriving through the camera lens is now well-known. But it appears that many photographers still prefer the more traditional emulsions made up of a span of mainly hexagonal halide crystal sizes. The result, with Kodak and Iford, is the provision of two lines of b&w materials: Plus X Pan and Tri-X Pan, and Pan F , FP4 and HP5 , respectively.

In a traditional emulsion, latitude is given by a mix of halide crystal sizes. Each crystal is a photo-conductive unit. So the larger ones are 'faster' and the smaller ones, presenting a smaller area to the imaging light are 'slower'. Sometimes the slower emulsion is coated separately from the faster, making a double-coated or bi-pack emulsion.

### Uniform in size

In a modern high-tech emulsion, the halide crystals are much more uniform in size, and present a larger surface area to the light, upping the speed/grain size efficiency. But since the speed mix is more restricted, the tendency had been for these films to have less latitude, most noticeably in the under-exposure region, than traditional films, despite their more even image grain. Photographers accustomed to the long curve toes of films such as

Tri-X and HP5, giving under-exposure latitude and push process possibilities, complained that the high-tech equivalents, T-Max 400 and 400 Delta, were over-rated in speed.

With the launch of Delta 3200 last year, Ilford came up with a solution to the problem, evolved from 100 Delta. The same principle is applied in the new Delta 400 reviewed here. In fact it harks back to traditional know-how but in an updated guise. Delta 3200 is a bi-pack, and each of the two layers is made up of two emulsions, four in all, of which three are new. The high-tech halide crystals have a silver iodide rich core around which is the bromide shell and sensitisers. The interfacing of the iodide rich core with the bromide shell creates a larger number of possible latent image centres in the shell to trap the incident light. So there is enhanced sensitivity and pushability.

The new Delta 400 is also a twin-layer or bi-pack, but with only one emulsion in each layer. The top layer has the medium speed emulsion from Delta 3200 and the bottom layer has its slow component – itself in fact the fast component emulsion from 100 Delta. Light that over-exposes the faster top layer is accurately recorded by the slower bottom layer. The result, as with bi-packs of long, long ago, is exposure latitude and pushability.

#### Nomenclature

A word about the nomenclature over which some confusion could arise. The existing Ilford 400 speed Delta film carries the name 400 Delta Professional on the box. The new, much improved film carries the name Delta 400 Professional, in line with Delta 3200 Professional. This leaves the 100 material as 100 Delta Professional. Is that clear?

The new material's performance was checked in comparison with 400 Delta and HP5 Plus. The developer used was the standard ID-11, D-76 type. Other developers will give their own particular bias to speed, sharpness and grain, but the materials will maintain the same relationship in such properties as shown in these results.

The sensitometric tests at once showed the lie of the land. The earlier Delta material could be rated 200, 400, 800 or 1600. The new allows 400, 800, 1600, and 3200 using Ilfotec DD. The sensitometry confirmed that Delta 400 is faster than 400 Delta, and also marginally so than HP5. The increase is very much in the characteristic curve's toe contrast, higher shadow or dark tone reproduction densities for the same overall negative contrast or G-bar.

The improvement is quite dramatic and comparison with HP5, which has much the same toe rendition, shows how far behind the earlier 400 Delta comes, finer grained though its structure may be. The new film has a noticeably lower base/fog level than its ancestor. Processed to 400, 800, and 1600 gave Dmins of 0.38, 0.4 and 0.42, compared to 0.45, 0.48, and 0.54. HP5 gave 0.4, 0.42, and 0.44 – again proving the quality of the popular traditional material. As always, push-processing did not elicit deeper tone detail with any of the three, only increased the density, and so the printability of existing detail.

The speeds achieved by push-processing a film are given EI,

Exposure Index ratings, not ISO ratings. A film has one ISO speed and only one, arrived at by a rigorous standard exposure/processing procedure. In practice, with suitable developers and/or extended (non-standard) development procedures a film may be exposed as if it were of a higher rating. It is those ratings that are known as EIs.

With the three films, it was found that the EI800 and EI1600 extended development recommendations were most effective with Delta 400 and HP5, 400 Delta lagging behind. This was only to be expected as extending development only brings up further what is already there with standard development and 400 Delta, as noted earlier, was already behind the other two.

#### Comparative prints

Looking at the comparative prints illustrating this review, the term 'dramatic improvement' for the new Delta 400 may seem overstated. The reason is this. A film with inherent high toe contrast will, when pushed, also give higher mid-tone and highlight contrast. As a result, its negatives may often require a softer grade of printing paper. In its turn that means that some – but not all – of the shadow contrast increase is lost. The test scene was deliberately chosen to introduce this factor. On a low contrast or diffusely lit subject, the shadow density improvement on pushing would appear much greater in a print.

This is why a good 'speed-increasing' developer restrains the highlights while bringing up the shadow detail. A similar effect can be obtained by diluting a normal developer, so tending to exhaust it in the highlights, restraining their growth, while the shadow detail grows.

Nevertheless, the new 400 certainly outclasses the previous both in basic effective speed and in pushability and the quality then obtainable. But HP5 runs it very close. What other advantages are there then to justify using Delta 400 over HP5? The grain of 400 Delta is just finer than HP5 and that of the new Delta 400 is finer than both of them when developed to its basic ISO400.

When pushed the advantage is reduced, as might be expected, though Delta 400 remains just that little smoother than HP5, with 400 Delta noticeably grainier. However, it should be emphasised that granularity is hardly likely to be a problem with any of the three. The same applies to sharpness and resolution. The compact, even and sharp grain of the Deltas just wins out over HP5 and in this respect there is little to choose between them. The better toe, shadow contrast of new Delta 400 at the same overall contrast as 400 Delta will give a better lit feel to the image, which may translate subjectively to better sharpness.

Similarly the best method perhaps to characterise the improvement in Delta 400, used at its basic speed, is a general qualitative one. This is coupled to a much enhanced push capability. Those who have played hard to get with the former Delta film at the 400 speed, staying with HP5, may well now find themselves tempted to change over to the new version. Aficionados of 400 Delta will certainly want to transpose, with the brand name, to Delta 400.

This speed of film has become the work-horse of b&w photography. With modern high-speed shutters it can deal with bright light and still give hand-held exposures in poor light – and for adverse lighting it can be push-processed. The new Delta 400 fulfils those job specifications admirably and better than the earlier film.

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## The 400 Club

*We take a look at the 400 films available*

*Article by Geoffrey Crawley*

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The results of tests on the new Ilford Delta 400 Pro compared with its predecessor 400 Delta Pro and the worthy and still popular HP5 were published in BJP recently (20 September). The conclusion was that the new bi-pack emulsion was

superior in speed to the previous 400 Delta by 0.5EV, showed marginally finer grain and better pushability. Its gain in speed and pushability over HP5 was marginal but detectable, though the latter showed up as slightly grainier.



*A scene using 400 film*

The tests of Delta 400 were run in parallel with identical ones on the other ISO400 rated Fujifilm on the UK market. These are: Agfapan APX400 Pro, Fujifilm Neopan 400 Pro, Kodak Tri-X 400 Pro and T-Max 400 Pro. Ilford's 3200 Delta was included as a wild card. Since all these b&w films have the 'pro' suffix, there could be an agreement to drop it and simplify matters.

So how does one go about comparing the properties of one film with another? Firstly it is essential that they are developed to the same contrast. Manufacturers give times in various developers which should give negatives of normal enlarging quality, as it is known. These are start points for the worker, intended to be adjusted in the light of experience with particular cameras, exposure techniques, and enlarger types.

A practical average contrast, using the Kodak method of assessing the contrast to which a film has been developed, is a Contrast Index (CI) of 0.58. Ilford has a slightly different method, though its G bar indices are close to CIs in value. It is only when films are processed to the same or a very near contrast, that true assessments of relative speed, grain and sharpness can be made.

To ensure such contrast parallelism, identical contact exposures are made on the films using a step wedge. These are processed to a range of times, the densities read on a densitometer, characteristic curves plotted and the contrast indices calculated. This enables the films under test to be developed to the common index necessary for a strict comparison. Step wedges or grey scales could be photographed by loading the films into a camera, but this obviously brings in other variables. As done here, the exposures are best contact printed in a highly accurate instrument

(a sensitometer) that is consistent to one-tenth of a stop or better.

#### Relative speeds

As soon as the curves at the standardised contrast are plotted, the relative speeds of the films under test are shown beyond debate, as are their general responses to the imaging light. When the toe of a curve is placed further to the left or right in the graph, this shows higher or lower speed respectively by an amount read off on the horizontal axis – the logarithm of relative exposure – on the graph. Films of the same speed can have different curve shapes, even though their overall contrast is the same. That can be the reason for individual user preference for a film related to the particular equipment used, the kind of work mostly carried out, and personal darkroom techniques. It is what keeps the film makers in business.

The developer used, for convenience, may be one common to the recommendations for the different makes of films. That usually means the Metol/Hydroquinone and Borax medium fine-grain formula proposed by Henn and Capstaff of Kodak in 1926 to ensure accurate processing of motion picture film. Marketed as D-76, the published formula has been adapted by many firms, notably in the UK by Ilford as ID-11, and has become an industry standard.

Reaching the age of 75 next year, D-76/ID-11 survives because it gives a good balance of film speed, grain and sharpness. Processing in another developer may improve one of these image properties, though usually at some expense of the others. But the relative merits revealed by D-76/ID-11 will remain proportionately the same: a sharper film will still be the sharper, a faster one the faster, a grainier one the grainier, and so on. Sharpness is assessed visually subjectively, and objectively by a microphotometer trace of detail edge contrast.

#### Common contrast

Once the times to give a common contrast have been established, field tests can be carried out and the processed images compared for their qualities. Field exposures are made over at least three stops at 1/3EV intervals. Enlargements are made to various scales and viewed for sharpness, grain, shadow and highlight detail, and so on. However, truly comparative enlargements are not that simple to make.

There are essentially two methods. Strictly, the negative images to be compared should be printed for the same exposure time on the same grade of paper. That is certainly revealing, but in everyday practice a darkroom worker tries for the best possible print from any one negative. So that is the basis on which the writer makes the comparisons shown, whilst matching the mid-tones as far as possible.

Here, each negative has been printed using a range of times, usually five, and the best comparative match prints from the films under test chosen for publication. It is inevitable that differences are compressed in reproduction, though that itself could be said to add a further dimension to testing, at least for images intended for the printed page.

Field test comparisons are complicated by the need for lighting to be identical, so it is usual to employ a pair of matched cameras. This also enables everyday outdoor subjects and those in motion to be photographed on two materials simultaneously. Otherwise, using a single camera, studio shots may be necessary to ensure identical conditions.

In testing the eight films evaluated here, the camera pair method was obviously out. But since this speed of film may be employed for night shots, outdoor scenes with constant illumination were photographed. And such subjects with deep shadows are anyway the most critical for film speed. Happy snaps, out and about, were also taken at random with the films.

More important

With ISO400 materials, pushability is a more important property in everyday work than with slow and medium speed films. Manufacturers give recommended extended development times for pushing, usually to EI800 and EI1600, occasionally to EI3200. Naturally the contrast index goes up – but the shadow, deep tone, or toe of curve densities (which are weak with normal development) increase too and become more printable. That is the basis for the higher EI meter settings.

The greater the toe density increase for controlled overall contrast the more valuable the boost becomes. But the higher the overall contrast, the softer the grade of printing paper needed to accommodate it – and this will reduce the value of an increase in the toe. The exception is if the subject is of low contrast or diffusely lit at a low level; then toe densities give full value in the print, as Grade 2 or higher may be used.

These tests included the extension of development for the times recommended by the film makers for EI800 and EI1600. For space reasons the EI800 results are omitted here; EI1600 is the acid test. The times recommended showed some disparity in the contrast indices reached, so a compromise based on averaging the makers' suggestions was adopted. The ISO400 CI, as noted earlier, was taken as 0.58: to this were added 0.70 for EI800 and 0.85 for EI1600. A push to EI3200 would be a bit desperate but CI=1.0 could be used. These values give equal increments.

In this way a true basic speed and pushability assessment comparison could be made across the assortment of films tested. For publication, 'best-off' prints were made from the ISO400 and EI1600 contrast balanced negatives at normal (x10) and high (x28) enlargements. The latter, being more critical, are the ones published here.

In terms of basic ISO400 rating, Ilford's new Delta 400 gave just – but only just – better lit shadows than Kodak Tri-X Pan and, close to it, T-Max 400 and Fujifilm Neopan 400. That result, as with HP5 in the first section of this review, proves that the so-termed 'traditional' emulsions remain strong contenders.

APX400 lagged behind the others and was also grainier. No really major grain differences between the Ilford, Fujifilm and Kodak films showed up at ISO400, even in x28 prints. If obliged to decide, Delta 400 gave perhaps the smoothest image – only just. Detail definition too was just marginally crisper on Delta 400. But

if it takes enlargements to the equivalent of a 28x42 inch print from the whole negative to show differences, there is not much to complain about.

The E11600 results at CI=0.85 sorted the films out. In shadow penetration Delta 400 Pro scored very marginally over the Fujifilm and Kodak. APX 400 again lagged behind. However, the grain image in the Delta 400 prints was now noticeably more evident than in the others: both T-Max 400 and Neopan 400 retained grain control with Tri-X close to. With such extended development there may be bi-pack interference occurring with Delta 400, but it retains its speed edge nevertheless.

#### Conclusions

So, what conclusions may be drawn from these tests? The writer was a little surprised not to find a wider demarcation between 'traditional' emulsions, such as HP5 and Tri-X, and the advanced halide grain technology types, such as Delta 400 and T-Max 400, in terms of granularity. The latter have the edge but not by much – and since the former retain good push properties, the continued liking for them is understandable.

Some users maintain also that old-style films seem to yield more attractive pictorial images. It is a quality which, when leafing through prints, seemed to give pause at the Neopan 400 samples. But such aesthetic points offer a question for another day.

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