

Executive Overview of the Pilot Color Tolerance Exercise

The Pilot Color Tolerance Exercise manufactured by the Graphic Arts Technical Foundation (GATF) is designed to be a fast, simple, accurate way to determine a persons or companies tolerance for an acceptable color match. This compares a persons visual perception of an *acceptable color match* with a known, numeric standard to determine color difference called delta E.

It is designed to be a stand alone exercise, capable of being taken by an individual at any time. The person taking the exercise does not have to know anything about color except knowing what they believe to be an *acceptable match*.

This exercise is designed for any company involved in reproducing color. It is required for any company looking to implement process control procedures, calibration and or Color Profiling tools. Everybody has a different view of what is an acceptable color match. Up until now, it has been very hard to quantify this value. Using a lot of trial and error experiences used to be the only real way to determine what a person's tolerance was, which was often frustrating and lead to unattainable expectations.

This Exercise will allow the user to :

- Determine a Company wide standard for color tolerance with buy in from all parties
- Armed with this value, the company can easily determine:
 - 1) How long it takes certain color devices to drift beyond your Tolerance, Which allows your organization to determine the maintenance schedule for each device
 - 2) Qualify that the quality and repeatability of devices like Color Measurement devices, Scanners, Monitors and Output devices fall within acceptable tolerance standards based on the Tolerance value determined.
 - 3) Qualify what level of color control software is necessary to achieve the desired results, and how many color patches need to be used to achieve the desired results.
 - 4) Qualify your customers tolerance to determine how particular they are before you provide any services for them, because it will allow you to quote the job out more effectively. For instance, you might be able to provide a less expensive proof if the customer tolerance is a higher number.
 - 5) Qualify how many profiles have to be built to represent different paper stocks.
 - 6) Qualify how many film types and what kind of IT-8 targets are required (i.e. batch reference data vs. custom reference data).

We truly believe that in a very short time, companies will charge their customers based on how tight of color tolerance the customer requires. See back side for Interpreting results.

Technical background: The test uses CMC 2:1 to determine the delta E tolerances in the Lightness channel. It is understood that the Lightness channel has the largest perceptible difference in CMC tolerancing so what ever a user chooses will be the maximum value they will experience in CMC delta E which is what we want to determine in an exercise such as this. Like any printed product, this product has a limited life span, (expected to be approximately one year), dependent on use. Protect the product from light and humidity when not in use.

Custom Tolerance exercises can be customized for just about any color or purpose, e-mail david@pilotmarketing.com for more information.

Any questions about this exercise can be forwarded to David Hunter at david@pilotmarketing.com.

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How to Interpret the Results

The amount of perceived Color Difference (results of this exercise) needs to be compared with the actual color differences of the devices being used. You will be surprised how different the color of your devices are to one another- it will generally be more than the number you chose in the exercise. You will want to use color targets and comparison software to actually verify how consistent your devices are to themselves over a given page and over time; as well as compared to your targeted device.

As with any Quality Control project, you do not want to set your tolerance too tight; if you cannot achieve the desired results you will give up the project. Be conservative, evaluate your devices, if they are 5 Delta E Peak of difference, then set your tolerance at least 5 if not 6 Delta E of tolerance. Over time you will learn what variables are affecting your color consistency and will be able to address them one at a time and as you do you will watch your delta E come down if that is your goal.

Below is a listing of different Delta E values. We have attempted to outline what the different tolerances mean from a Graphic Arts perspective. The references are to Peak Delta E.

Difference DE	Description
● ✨ 1 to 2	Textiles, plastics and automotive paints live with in this level of tolerance This type of tolerance lends itself to paint and plastic formulations, scientifically mix once and reproduce many times, Ink and paper formulations maintain this tolerance, and have a cumulative affect so keeping ink to 1 delta E and paper to 1 delta E allows for a tolerance of 2.
★ □ 2	This is an extreme Tolerance for the Graphic Arts Field Most Proofing devices costing \$100K+ will have a peak of 2 delta E out of 500 combinations of CMYK across the imaging area of the device. Most printing presses cannot maintain 2 DE across the sheet. Precision of color measurement instrument needs to be sub .5 delta E. Need very high quality software for this level of tolerance and count on editing the profiles.
✨ ☆ 3 to 4	This is a tough Tolerance for the Graphic Arts Field With great effort (proper optimization of ink jet, excellent calibration procedures, high quality color measurement hardware and high quality color profile software) you can get high quality ink jets to match a target of a press or some other proof. Count on spending at least \$6000 for h/w and s/w.
✨ □ 4	This is a normal quality Tolerance for the Graphic Arts Field With great effort (proper optimization of ink jet, excellent calibration procedures, high quality color measurement hardware and high quality color profile software) you can get high quality ink jets to match a target of a press or some other proof. Count on spending at least \$6000 for h/w and s/w.
✨ ★ 5-6	This is a standard Tolerance for the Graphic Arts Field This is where most shops are without Quality Control software and hardware installed. Can get this level of match with quality color measurement hardware and color profile software. Count on spending at least \$3000 for h/w and s/w. Will get by with calibrated devices a little less often.
● ✨ 6	This is a standard Tolerance for the Graphic Arts Field This is where most shops are without Quality Control software and hardware installed. Can get this level of match with quality color measurement hardware and color profile software. Count on spending at least \$3000 for h/w and s/w. Will get by with calibrated devices a little less often.
✨ ✨ 7-8	This is Pleasing Color for the Graphic Arts Field Very noticeable color differences, this is considered consumer color or pleasing color. Color control software is necessary to maintain this level of compliance in many devices. Can get by with inexpensive hardware and software for color control.