8 PROCESS CONTROL

Monitoring the Process with KODACHROME 64 Control Film

Introduction

In process monitoring a systematic evaluation of sensitometrically exposed control film (control strips) is used as a guide in maintaining a controlled process. Careful correlation between pictorial quality and control strip evaluation is needed to define the standard process and also to arrive at realistic limits of control. Then, as long as the plots of the control strip fall within the established control limits the process is said to be in control. However, when the control limits are exceeded, the processing is considered to be out of control and unable to produce acceptable quality processed customer film. The monitoring procedure allows you to detect an out-of-control process and to take corrective action in order to maintain optimum customer film quality.

Making Density Measurements

Equip the work area with tables having smooth, easily cleaned, top surfaces. Include several drawers or storage cabinets. Provide ample work space for recording and plotting the density measurements.

Provide a color transmission densitometer that gives Status A densitometric response. Include spare densitometer lamps, and an illuminator for visual inspection of processed control strips and customer film. The illuminator may be built into a worktable or mounted on the wall. This room should be large enough to accommodate equipment for evaluating the physical quality of processed film and for storing other control equipment.

Color Densitometers

Overview

Densitometers with an RS232 data transmission capability are able to directly input density readings to the K-LAB Process and Production Monitoring System (PPMS) Software. The densitometer to be used for K-LAB is supplied with the system. It can be ordered separately.

Densitometric Response

Each densitometer differs somewhat in the characteristics of the photoreceptor, the spectral cutoff of the filters used, the amplifier linearity and sensitivity, and the degree to which they approximate standard diffuse density readings. Because of these differences, a given control strip may not yield the same density values when read on different types of instruments. This factor is minimized in Process K-14M because densitometer correlation strips allow you to adjust for these densitometer differences.

Densitometer Stability

The densitometer must have good operational stability and provide the required precision. For any color densitometer, adopt a rigid instrument maintenance and control program* to make sure that the results obtained from the control strips represent the photographic condition of the process. Often, poor measurements may be worse than none at all, because false interpretation may lead to inappropriate corrective action. Check the densitometer calibration at least once per day to make sure that it does not change during use.

* W.L. Brewer, CI Goddard, and S.A. Powers, "The Evaluation and Control of Direct Reading Color Densitometers," Jour. SMPTE, 64: 561-565, October, 1955. S.A. Powers and O.E. Miller, "Pitfalls of Color Densitometry," Jour. SMPTE, 72: 97-103, February, 1963.

Control Strips

Description

Using the technique of sensitometry for evaluation and control of the process requires a general understanding of sensitometry. Certain assumptions are made, and each of these assumptions have a limiting effect on the method.

Control Strip Exposure

All sensitometrically exposed control strips are assumed to have identical exposure. This requires a sensitometer in which the light intensity and color quality can be held extremely constant. It also requires that the sensitometer give precise and repeatable exposures. The sensitometer at Kodak is carefully designed to provide this necessary precision, and is carefully maintained.

Control Strip Film

The film used for making control strips is assumed to be of uniform quality throughout. This is a valid assumption for a single full-length roll of film from one specific emulsion. When the supply of strips from a specific emulsion number and unit number have been depleted, different sensitometric standards are required for strips from the next emulsion number.

Control Strip Stability

Under ordinary conditions of temperature and humidity, film characteristics of unexposed film do not remain constant. Furthermore, the latent image of exposed film also changes with time. With high heat or humidity, the film changes are accelerated, causing unpredictable sensitometric effects. These changes are greatly minimized by storing the film in taped cans at temperatures of –18˚C (0˚F) or lower. With proper storage, you can purchase several rolls of control strips (with the same code number) at one time and use as needed.

KODACHROME 64 Control Film

Introduction

KODACHROME 64 Control Film is available for Process K-14M in 35 mm x 100 ft rolls CAT #8472151.

Standard Aim Values

Standard Aim Values for each unit of a particular batch of KODACHROME 64 Control Film are provided with each box of control strips. These standards are supplied in the form of red, green, and blue density values for the D-min, LD, HD and D-max Steps (Steps 1, 7, 13 and 21) and the color patches of the control film.

Densitometer Correlation Strip

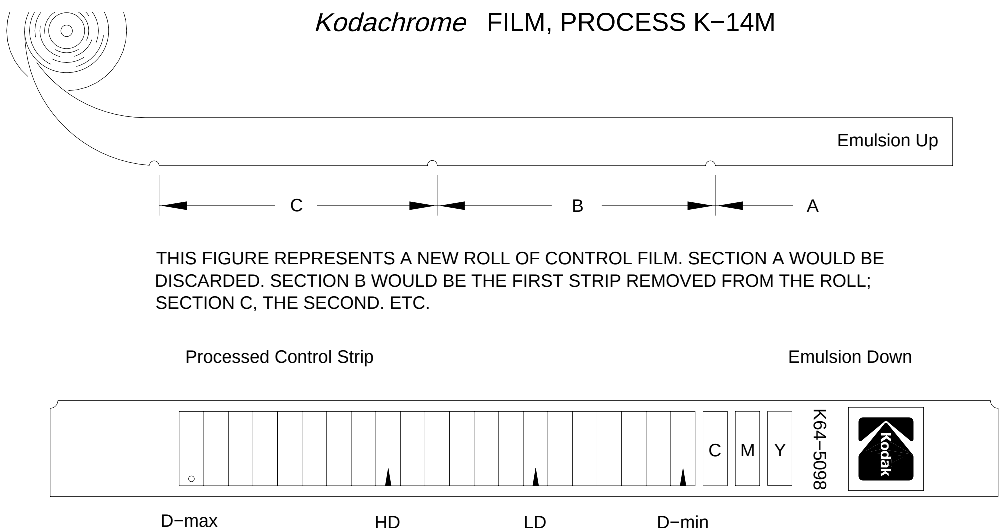
Each time a new control film code is released, you receive densitometer correlation strips, each with their own Status A density readings for that batch. These strips and their densities enable you to correlate your densitometer to the instrument on which the standard aim values were derived. Each strip is labeled “Densitometer Correlation” and is identified by a four-digit number. Each strip comes with pertinent information such as film width, code number, and process date.

Using 35 mm x 100 ft Roll Film

Overview

The control film is pre-exposed and unprocessed in 100-ft continuous rolls, notched every 15 inches to yield approximately 80 control strips. The illustration below shows the control film. Each strip has the same pre-exposed identifying code number, unique for each batch of control film. The strips are exposed to a 21-step gray (neutral) scale, and to cyan, magenta, and yellow patches. Successive steps in the gray scale are exposed to give an increment of $\frac{1}{2}$ camera stop, the equivalent of 0.15 log E exposure. Each roll is wound on a core, emulsion in, wrapped in a black plastic bag, and packaged in a metal can which is taped with white tape imprinted with the identifying code number for the emulsion. Each can is packaged in an individual box. Rolls of KODACHROME 64 Control Film can be purchased directly from Kodak Regional Marketing and Distribution Centers.

Each box of control strips is labeled with a unit number, in addition to the usual identifying code number. If possible, orders from individual photofinishers are filled with film from the same unit number; more than one unit may be needed to fill large orders.



G128_9007BA

Storing and Handling Control Strips

To guard against erroneous process monitoring actions caused by spoiled control strips, follow these recommendations for storage and handling.

- Estimate your control strip usage rate, and order a supply of strips to last one year or less.
- The box of control strips is shipped to you in a sealed can under refrigerated conditions. Immediately after you receive the control strips (and whenever they are not being used for monitoring the process), store them in a freezer at –18˚C (0˚F) or lower, in order to minimize latent image changes.
- The first time you are ready to use the control strips for the day, remove the taped can containing the supply roll from the freezer. Before removing the tape, allow it to warm up to room temperature (no moisture appears on the can); otherwise, moisture may collect on the strips and cause undesirable sensitometric effects.

Note: *Do not use an oven, drying cabinet, or any heat to warm up the can. Do not leave a supply roll of control strips out of the freezer for an entire shift or work day.*

- In total darkness, remove the tape from the can, and remove only enough strips from the supply roll for the day’s operation. Place these strips in a second can and tape the can. Put the remainder of the supply roll back into the original plastic bag, put the bag in the can, and re-tape the can with black tape. Immediately return the can to the freezer and take the day’s supply of strips to the location where they are spliced onto reels for processing. Discard any control strips that are not used by the end of the day. Repeat this procedure if more strips are needed than were anticipated. Place this supply roll near the front of the freezer and use up before removing any strips from a new supply roll.
- Handle control strips by the edges to avoid fingerprints or other handling damage.
- Do not use control strips that have been improperly stored, mishandled, or light fogged.
- Discard control strips that have exceeded the expiration date.

Processing and Evaluating Control Strips

Frequency of Processing Control Strips

Refer to your "Daily Start-Up Procedure" before processing any control strips. Check all mechanical and chemical parameters and adjust them to standard. These checks identify any improper operating conditions and simplify monitoring of the process.

Process Monitoring Procedure

Follow these steps when monitoring the Process:

Warning

Make sure your process is in control before processing any customer film by processing and evaluating a control strip.

1. Process and evaluate at least one control strip at the beginning of the process, one strip after each full reel or at one-hour intervals during an extended run, and one strip at the end of each work shift. By processing a control strip near the end of a work shift, you are able to make any necessary corrections, and avoid delays, making sure the process is in control for the next shift.
2. Process and evaluate a control strip whenever you suspect trouble in the process.
3. Always process and evaluate a control strip after any chemical or mechanical change in the process. This verifies the effect of the corrective action.
4. When using a fresh solution in the process (especially developer), process and evaluate a control strip to verify the solution's photographic quality.

Processing Control Strips

Using Continuous Rolls

- In total darkness (a darkroom or inside the Splicer), remove a control strip from the can containing the day's supply.
- Splice the control strip to the leader with the emulsion side up, so the minimum density end feeds first. The notch, retained about one inch from the lead end, serves as a guide to help the machine operator feed the strip properly.

Note: *Process control strips only through normal (not push or pull) processes unless a specific test is underway.*

Identifying Control Strips

As soon as the control strip has been processed, identify it with the date and hour of processing. A control number, and machine number may be added if there is more than one K-LAB Processor at your site. Use either a stick-on label or a grease pencil.

Note: *Do not write on or affix a label to the back or front of the color or density patches. Otherwise, this affects the densitometer readings.*

For example, the first strip through Processor A might be A-1, the second strip A-2, etc. The first strip through Processor B would be B-1, the second strip B-2, and so on.

Evaluating Processed Control Strips

Evaluate each strip by visual inspection and by density measurement.

1. Inspect the processed control strip visually using an illuminator. Look at the neutral scale, color contamination in the color patches, stain, unbleaching, incomplete fixing, light fog, and streaks. Also physical defects such as dirt, scratches, digs, and emulsion reticulation. Physical problems on the control strip indicate the process is producing unsatisfactory results in the customer's film.
2. Evaluate the processed control strips as described below.
   a. Use a densitometer that is calibrated, operating properly, and has been correlated with a densitometer correlation strip. This correlation procedure is explained in the following section.
   b. Use appropriate red, green, and blue filters in the densitometer.
   c. Compare control strip readings and process aim values from film having the same code number and same unit number.
   d. Read control strip densities in the center of the step or color patch. If the center of the step or color patch is scratched or streaked, select an area that is suitable for measurement. If there is no suitable area, process and read another control strip.
3. Process K-14M forms cyan, yellow and magenta dyes in the film as it proceeds through the process.

   In general:

   - red density measurements provide an indication of the amount of cyan dye present
   - green density measurements reflect the amount of magenta dye present
   - blue density measurements reflect the amount of yellow dye present

Note: *Increases in the density values indicate more dye, and decreases in the density values indicate less dye.*

Determining Densitometer Correlation Values

Each photofinisher receives three densitometer correlation strips from the current batch of KODACHROME 64 Control Film along with "Kodak-Supplied Density Values" (Status A) for those strips. These Kodak-Supplied Density Values are only valid for the batch of control strips with the same code number.

1. Read the Status A densities of your densitometer correlation strip through the appropriate red, green, and blue filters for the following:
   a. D-min, LD, HD and D-max steps
   b. Yellow color patch
   c. Magenta color patch
   d. Cyan color patch
2. Read these "plant density values" on the same densitometer you use for measurements of your processed control strip. If you must manually enter these readings into the computer, round each reading off to two decimal places.
3. The difference between the Kodak-Supplied Density Values (Status A) and the plant density values are the densitometer correlation values. They represent the correlation between your densitometer and the Kodak densitometer used to obtain the process aim values for control strips of this code number.

Note: *Use the densitometer correlation strip for the densitometer correlation value determination. Do not use the strip as a visual process standard (for example when your densitometer is inoperative).*

Process Control Software Programs

Overview

Each K-LAB Processor has Process and Production Monitoring System (PPMS) preloaded in its control computer. You may connect a densitometer to the host computer to create a self-contained Process K-14M control center where all mechanical and process control data is in one computer.

Determining Process Aim Values

1. From the main menu, select "Set Aims."
   a. At the next screen, select your control film code. If you are converting to a new control code, you may need to load the unit standards and the Kodak readings for the densitometer correlation strips from the values diskette before proceeding. Select "Values Diskette" and follow the screen instructions to load the diskette.
   b. At the next screen, identify the unit number for this control code.

Note: *Process aim values are valid only for control strips of the same code and unit number read on the same densitometer. You must establish aims each time you receive control film having a different unit number.*

2. Select the identification numbers for the three densitometer correlation strips for your control code from the menu.

Note: *Use densitometer correlation strips to set aims only for control film having the same code number. Since densitometer correlation strips are not unit specific, use them with any unit of that code.*

3. You will then proceed through a series of three screens. You are asked to select the identification number of the strip you are reading and enter the values for that strip.
4. After reading the third strip, the PPMS program calculates your aims. If an error was made (e.g., the wrong step was read), the program asks you to check data before it calculates the aims.

Tolerance Limits

Variations in film manufacturing, exposure, storage, processing, and densitometry are inevitable. You must take them into consideration when designing a process monitoring scheme. An effective monitoring procedure for sensitometric process control must have tolerance limits broad enough to include inherent variability of the monitoring process. However, the procedure must also have limits tight enough to accurately detect an out of control process that produces unsatisfactory picture quality. The two control parameters used are density and color balance spread.

The Table below provides the "density" (speed) limits and the "color-balance spread" (CBS) limits for the control of Process K-14M.

Action Limits—Action limits are the boundaries of the desired operating range of the process. As long as the density values remain between the upper and lower action limits, your process is operating correctly. If a density value exceeds the action limit, it is an "early warning." You can process customer film, but you should check for the cause of the shift and correct it.

Control Limits—The control limits define the acceptable maximum tolerances for processing customer film. If any density value of your process plots beyond the control limit, the process is out of control, and results are unsatisfactory for color, density, and/or contrast. Stop processing customer film until you find the cause and correct it.

Color-Balance Spread Limits—A color spread is the density difference between the two most widely separated color plots of the LD and HD steps. If your process exceeds the color-balance spread limit, stop processing customer film and take corrective action. The color-balance spread limits for LD and HD are given in the table below.

These tolerance limits for densitometric evaluation correlate well with pictorial quality.

From a practical standpoint, the action and control limits for Process K-14M correlate well with pictorial quality of the processed KODACHROME Film. Based on subjective evaluations, as long as the control values plot randomly about the process aim and within the action limits, the picture quality of film processed in that time interval is satisfactory. When control values plot between the action and control limits, processed film is of acceptable, but marginal, quality. If the control values plot beyond the control limits, the quality of the processed film is unacceptable.

Table 8-1 Tolerance Limits for Process K-14M

Step Number of the Control Strip	Density		Color-Balance Spread (CBS)	
	Action Limits	Control Limits	Action Limits	Control Limits
D-min (Step 1)	None	± 0.03	None	None
LD (Step 7)	± 0.05	± 0.10	0.04	0.07
HD (Step 13)	± 0.10	± 0.15	0.07	0.13
D-max (Step 21)				
Red and Blue	–0.19	–0.25	None	None
–0.23	Green	–0.35	None	None
Color Patch	± 0.07	± 0.10	None	None

Using Tolerance Limits for Process K-14M

Limits can significantly improve control of the process and contribute to better and more consistent processing quality. Following are recommended responses to processes which are within or beyond the action limits, or beyond the control limits:

1. If one or more of the control values plot beyond the action limits, but within the control limits, process another control strip and evaluate it immediately to confirm the data of the first control strip. You will need some confirmation of the results, because 5 percent of the data could plot between the action and control limits even when nothing is wrong with the process. However, if data from the second control strip confirm the data from the first control strip, then the process shift away from the process aim is real. Two consecutive control strips seldom provide similar false information concerning the condition of the process.

   When valid data show the control values are plotting between the action and control limits, take some corrective action to bring the process back toward the process aim, i.e., between the action limits. Base this corrective action on the available mechanical information as well as on previous experience with the process. You may process customer film during this procedure.

2. When control values plot within the action limits, do not make any major adjustments. Process customer work. Make minor adjustments if the mechanical control data indicate nonstandard mechanical conditions. However, in each situation, carefully consider any corrective measures: the reported mechanical data may be unreliable; over control of the process may cause excessive variability; and film-process interactions may be introduced.

3. If one or more of the control values plot beyond the control limits, the process is out of control. Splice a leader into the machine and do not process any customer film until the process is back within the control limits. You need to take action to bring the process within the action limits. Call Kodak for assistance.

4. Processing trends and tendencies are not as well defined as control values, but they are equally important. These conditions in the process indicate bias or drifts away from the process aim as well as a degradation in processing quality. For example, if successive plots of control values show an increasing number of densities are moving away from standard in a given direction, take corrective action to stop or reverse the trend before the plots move beyond the action limit. Also, processing conditions that cause the control values to consistently plot within, but near, an upper or lower action limit are undesirable. If you do not correct these processing tendencies, they use up part of the operating tolerance.

Process Record Form Preparation

Process Control Software

The process control software provides differences from aim and plots of your data on the computer screen or through an attached printer or plotter. The PPMS software program retains data for 90 calendar days. Once this limit is reached, the data at the end of the queue begins to disappear. If you wish to retain a long-term record of your process control levels, you need to periodically print or plot a record from the computer onto paper. Some labs may elect to maintain a hand-generated plot of the data in addition to that in the computer.

Control Strip Interpretation

Evaluating the control strip both visually and densitometrically may seem to be a duplication of effort; however, each has its purpose. The visual inspection of the control strip can reveal specific process problems such as streaks, unbleaching, or stain that might otherwise be overlooked. You can also detect dirt, digs, and scratches by visual inspection. Physical defects on the control strip are an indication of poor or unsatisfactory process quality.

Densitometric measurements provide data that are permanent and reliable. You can maintain graphic records in your process control computer or on a hand-generated process record form. When comparative control values from several control strips have been plotted, the plots indicate the degree of processing uniformity from run to run and day to day. Additional interpretation of the plotted points provides information concerning the direction and magnitude of any density or color balance shift in the process. Also, any corrective action taken is based on the plotted data and recorded.

Color Patches

The cyan, magenta, and yellow color patches are useful tools for monitoring process control. The relative amount of unwanted dye formed in the color patches indicates out of tolerance conditions in the developer solutions or in the re-exposure printers. The color patches are also useful tools for analyzing problems occurring in the process.

It is necessary to look at more than the gray scale when controlling Process K-14M. For example, it is possible to have dye contamination (image dye in the wrong layer of the film) even when the gray scale is visually satisfactory. When this occurs, color patches are the most important control tool. However, the color patches cannot replace any of the standard evaluation techniques.

Densities

Proper processing produces the right amount of dye in the correct layers. Measuring the gray scale density on a control strip gives an indication of how much dye is being formed. The color patches on a control strip indicate where the dyes are forming in the film structure, and indicate any dye contamination occurring.

Color patch densities are read to measure the amount of unwanted dye. For example, the magenta color patch has a high green density because magenta dye absorbs green light. However, it is the red and blue densities of the magenta patch that are most useful for determining contamination levels. Use the red density of the magenta patch to monitor the amount of unwanted cyan dye formed in the magenta layer. Similarly, use the blue density of the magenta patch to monitor the amount of unwanted yellow dye in the magenta layer.

You can apply the reasoning above for the magenta patch to the yellow and cyan patches. Read the color patch densities for the following:

- Red density of the magenta patch
- Blue density of the magenta patch
- Red density of the yellow patch
- Green density of the yellow patch
- Green density of the cyan patch
- Blue density of the cyan patch

Standard Aim Values

The Status A density reading of a color patch is actually the sum of three components: density from unwanted absorption, density from normal amounts of dye contamination, and density from unwanted dye contamination. These components are explained below using the magenta color patch as an example:

Density from unwanted absorption

An ideal dye would absorb only one color of light. Because dyes are not perfect, they have some unwanted absorption of other colors. Therefore, the magenta patch, even if it were 100% magenta dye, would have some density to blue and red light.

Density from normal amount of dye contamination

Even though a patch is called a “magenta” patch, there is a small amount of yellow and cyan dye that forms in the film. This is because the filters used to expose the film are not perfect. Therefore, the magenta patch has some density to blue and red light caused by the normal small amounts of yellow and cyan dye present in the respective layers of the film.

Density from unwanted dye

Non-standard processing conditions can produce dye in the wrong layer of the film. For example, if unwanted yellow dye is deposited in the magenta layer, the blue density of the magenta patch increases above the level expected from the unwanted absorption and normal “acceptable” dye.

To summarize, we will use the blue density of the magenta patch as an example, in the following equation:

Blue density of magenta patch =

(Blue density from magenta dye)

\+

(Blue density from normal amount of yellow dye)

\+

(Blue density from unwanted contamination of magenta patch with yellow dye)

The standard for the blue density of the magenta patch takes into account the first two sources of blue density in the equation. The amount that a color patch density is above its standard is a measure of the third component in the equation: the amount of dye contamination.

What Do the Color Contaminations Mean?

A person familiar with Process K-14M can determine the effect of non-standard processing conditions on color patch contaminations by following the expected result of the non-standard condition through the rest of the processing steps. However, there are important exceptions where "expected" results do not occur. It is important to know the following two "exceptions" when evaluating color patches:

Red density of the magenta patch and/or red density of the yellow patch—A high red density of the magenta patch would seem to indicate cyan dye formed in the middle (magenta) layer of the film because of chemical fog or excessive red print. However, this is not usually true. A high red print level does not cause a high red density of the magenta patch. A high red density of the magenta patch is usually caused by cyan dye that is deposited in the top layer of the film. This condition is usually coupled with a similar increase in red density of the yellow patch and a high red D-min. This condition is caused by a cyan developer that has become oxidized, possibly by leaky pumps or developer age.

Blue density of the magenta patch—Magenta dye has a relatively large amount of unwanted absorption of blue light. That is why the standard aim value for the blue density of the magenta patch is relatively high; the standard aim value contains a large contribution of unwanted absorption by magenta dye. Therefore, the blue density of magenta patch can be influenced not only by yellow dye contamination but also by fluctuations of the amount of magenta dye.

If the green density of the gray scale is significantly different from standard aim value at either HD or D-max, use the blue density of the magenta patch with caution. If the green density of the gray scale at HD or D-max moves beyond the control limits, it is not unusual for the blue density of the magenta patch to move 0.05 density units because of the change in unwanted blue-absorption (from magenta dye).

To help you understand color patches, a table listing possible causes of color patch contamination follows. It is important to remember that only possible causes are given. Any of the color contaminations could have other more complicated explanations. Therefore, color contamination can only provide clues to processing problems, and do not take the place of chemical and mechanical information, and other traditional evaluation techniques.

It is also important to not interpret individual contaminations without looking at all of the data. For example, as shown on the chart, a high green density of yellow patch could be interpreted differently, depending on whether there are other color contaminations and also depending on the chemical levels in the yellow developer.

Table 8-2 Interpretation of Process K-14M Color Contaminations

Observation	Possible Causes*
High green density of cyan patch	Inadequate red re-exposure
High green density of yellow patch	Weak yellow development (because of either chemical of mechanical conditions) OR Inadequate blue re-exposure
High blue density of magenta patch	Foggy yellow developer (because of chemical or mechanical conditions) OR Excessive blue re-exposure print
High blue density of cyan patch	Weak cyan development (because of either chemical or mechanical conditions)
High red density of yellow patch and high red density of magenta patch	Accompanied by high red D-min. Can be caused by cyan developer aeration (due to leaky pumps, low weirs, too little film, or old developer)

* In all cases, the list contains only possible causes. Use this chart along with other information to determine non-standard processing conditions.

CONTROL CHART EXAMPLES

Introduction

The following charts are examples of how various conditions will affect your control plots. They are intended *only as a guide*; your plot may not look exactly like these examples. Your plot may be different because of processor and control-strip differences, and your processing conditions. More than one problem may also be affecting your process.

These plots are typical for a particular problem; if they do not exactly match your plot, find the one that most closely matches the predominant trend. Use these charts, and the information in "Control Strip Interpretation" on page 8-8, to analyze process problems.

Chart	Condition	Page
1	*First Developer Part A (Tank) Used in Place of First Developer Part A (Replenisher)*	8-12
2	*No First Developer Part A Replenishment*	8-13
3	*First Developer Part B (Tank) Used in Place of First Developer Part B (Replenisher)*	8-14
4	*No First Developer Part B Replenishment*	8-15
5	*No First Developer Part C Replenishment*	8-16
6	*First Developer Diluted With Water*	8-17
7	*Cyan Developer (Tank) Used in Place of Cyan Developer (Replenisher)*	8-18
8	*No Cyan Developer Replenishment*	8-19
9	*Cyan Developer Diluted With Water*	8-20
10	*Yellow Developer Part A (Tank) Used in Place of Yellow Developer Part A (Replenisher)*	8-21
11	*No Yellow Developer Part A Replenishment*	8-22
12	*Yellow Developer Part B (Tank) Used in Place of Yellow Developer Part B (Replenisher)*	8-23
13	*No Yellow Developer Part B Replenishment*	8-24
14	*Yellow Developer Diluted With Water*	8-25
15	*Yellow Developer Tank Made With Two Yellow Developer Part B (Tank) Kits*	8-26
16	*Magenta Developer (Tank) Used in Place of Magenta Developer (Replenisher)*	8-27
17	*No Magenta Developer Replenishment*	8-28
18	*Magenta Developer Diluted with Water*	8-29
19	*Diluted Conditioner*	8-30
20	*Processor Run Without Bleach Replenisher*	8-31
21	*Processor Run Without Any Chemical Replenishment*	8-32
22	*Rem-Jet Rinse and First Developer Wash Temperature*	8-33
23	*Processor Run With Rem-Jet Rinse and First Developer Wash Waters Off*	8-34
24	*Processor Run With All Wash Waters Off*	8-35
25	*Developer Wash Recirculation Pumps Off*	8-36
26	*First Developer Part C Used in Place of Rem-Jet*	8-37

First Developer Part A (Tank) Used in Place of First Developer Part A (Replenisher)

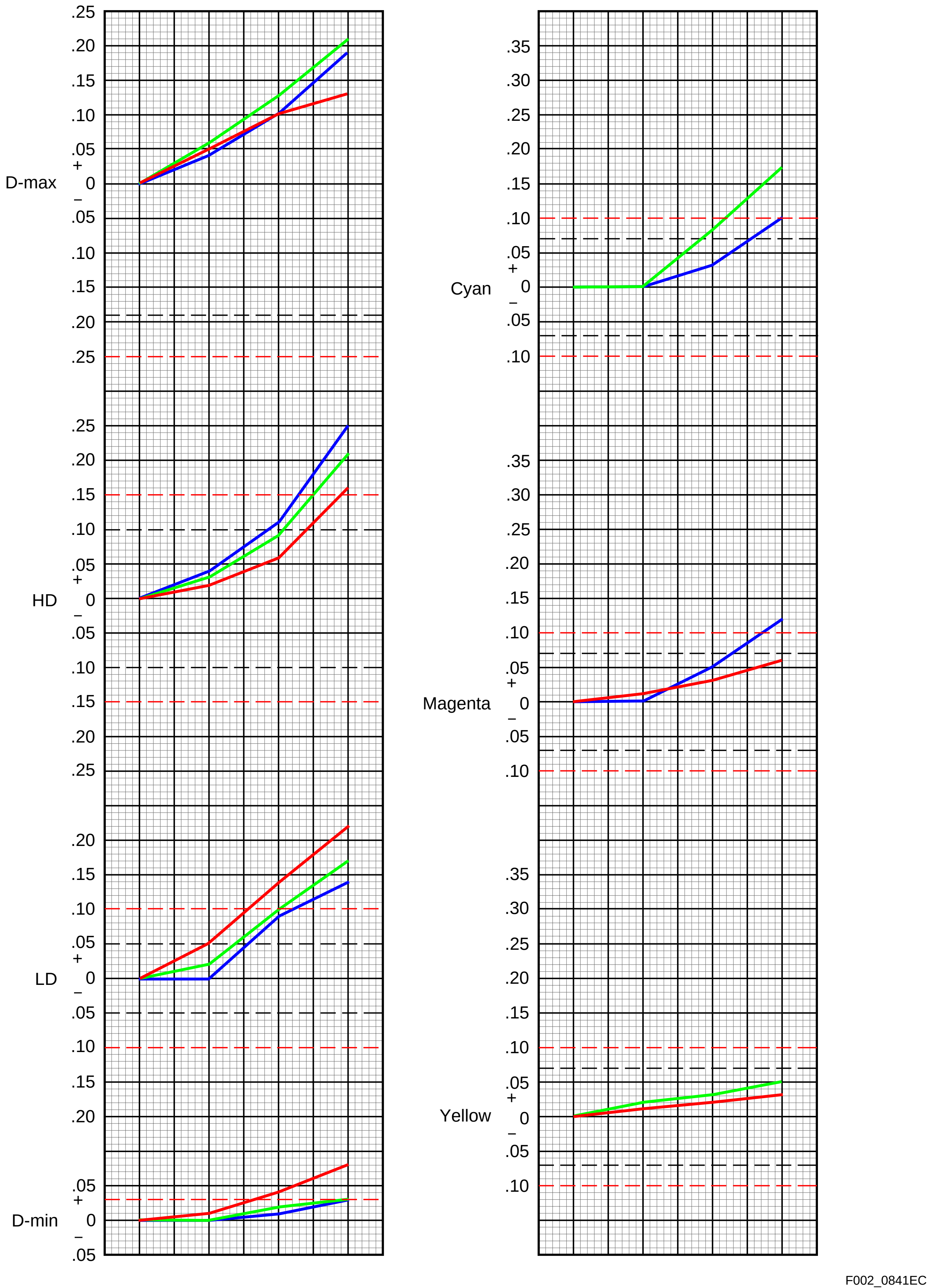


Chart 1

No First Developer Part A Replenishment

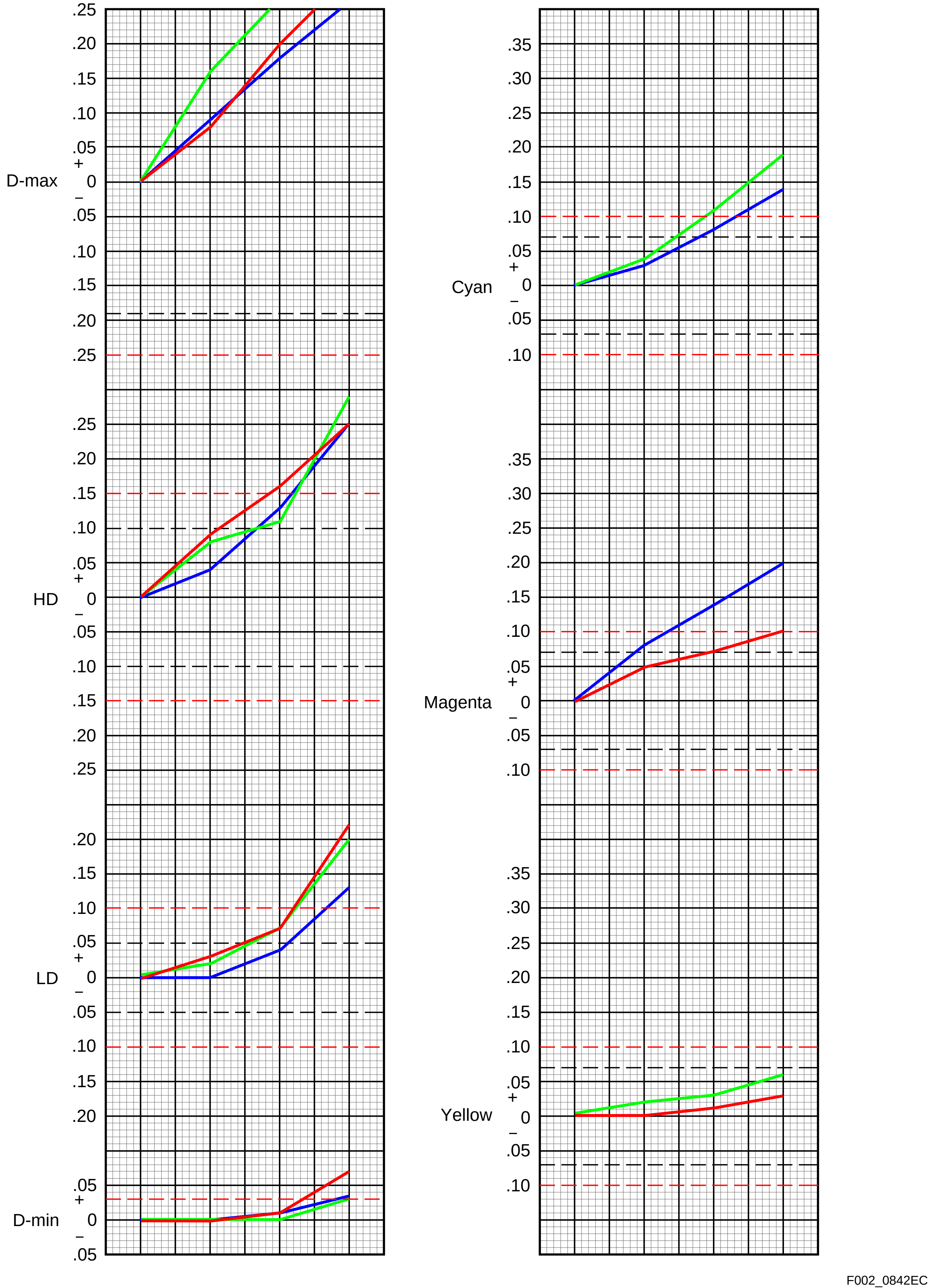


Chart 2

First Developer Part B (Tank) Used in Place of First Developer Part B (Replenisher)

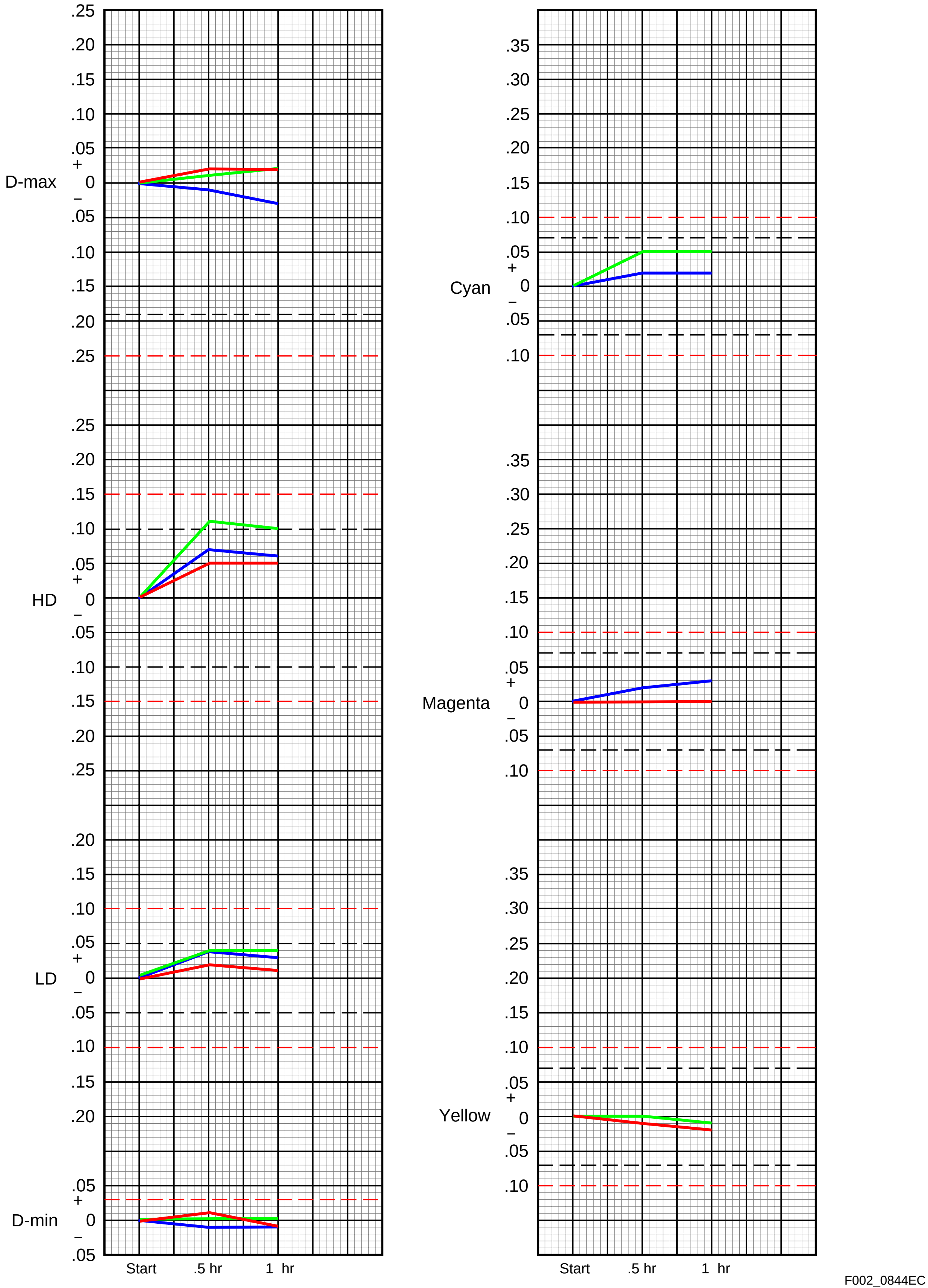


Chart 3

No First Developer Part B Replenishment

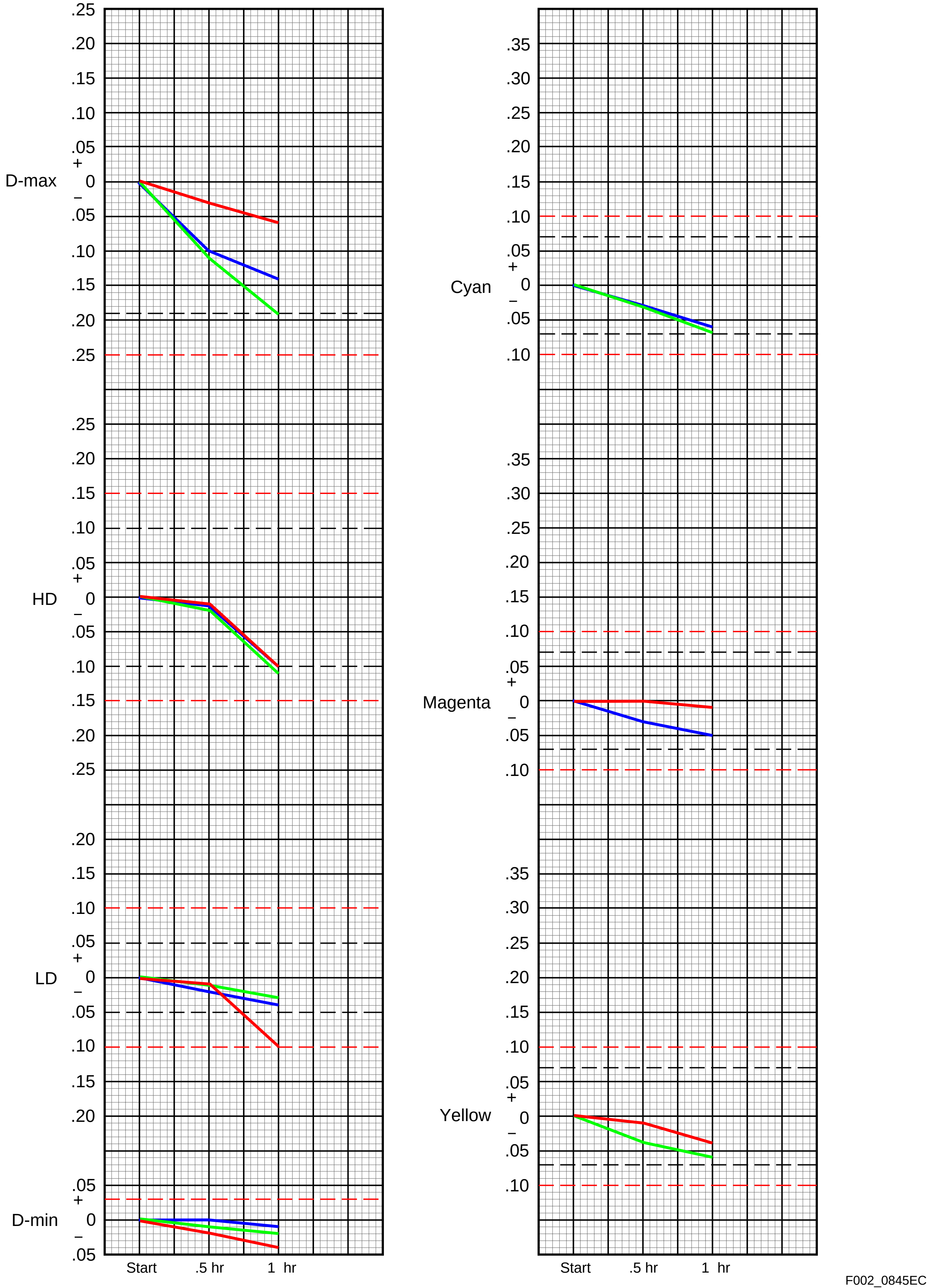
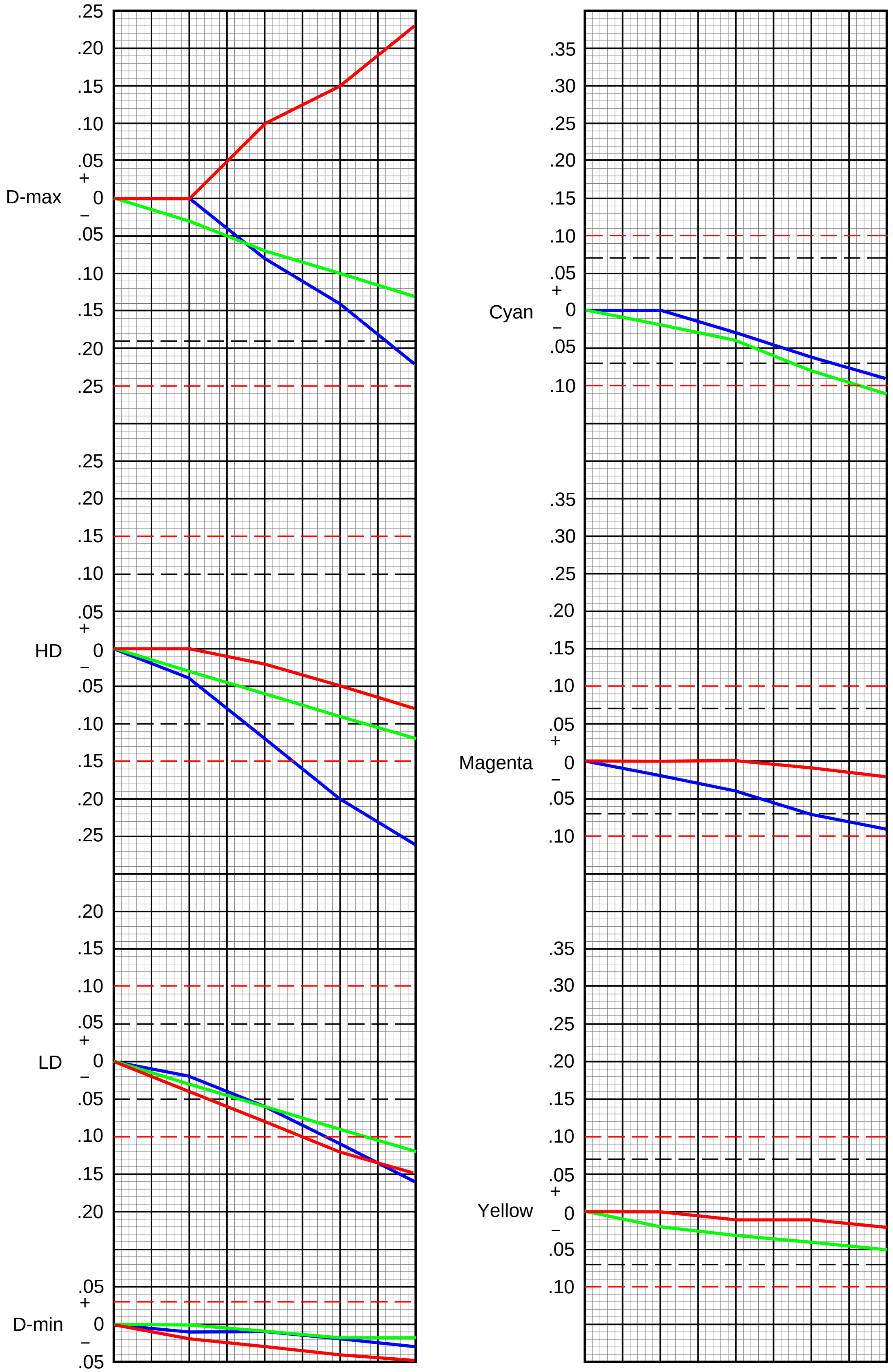


Chart 4

No First Developer Part C Replenishment



F002_0846EC

Chart 5

First Developer Diluted With Water

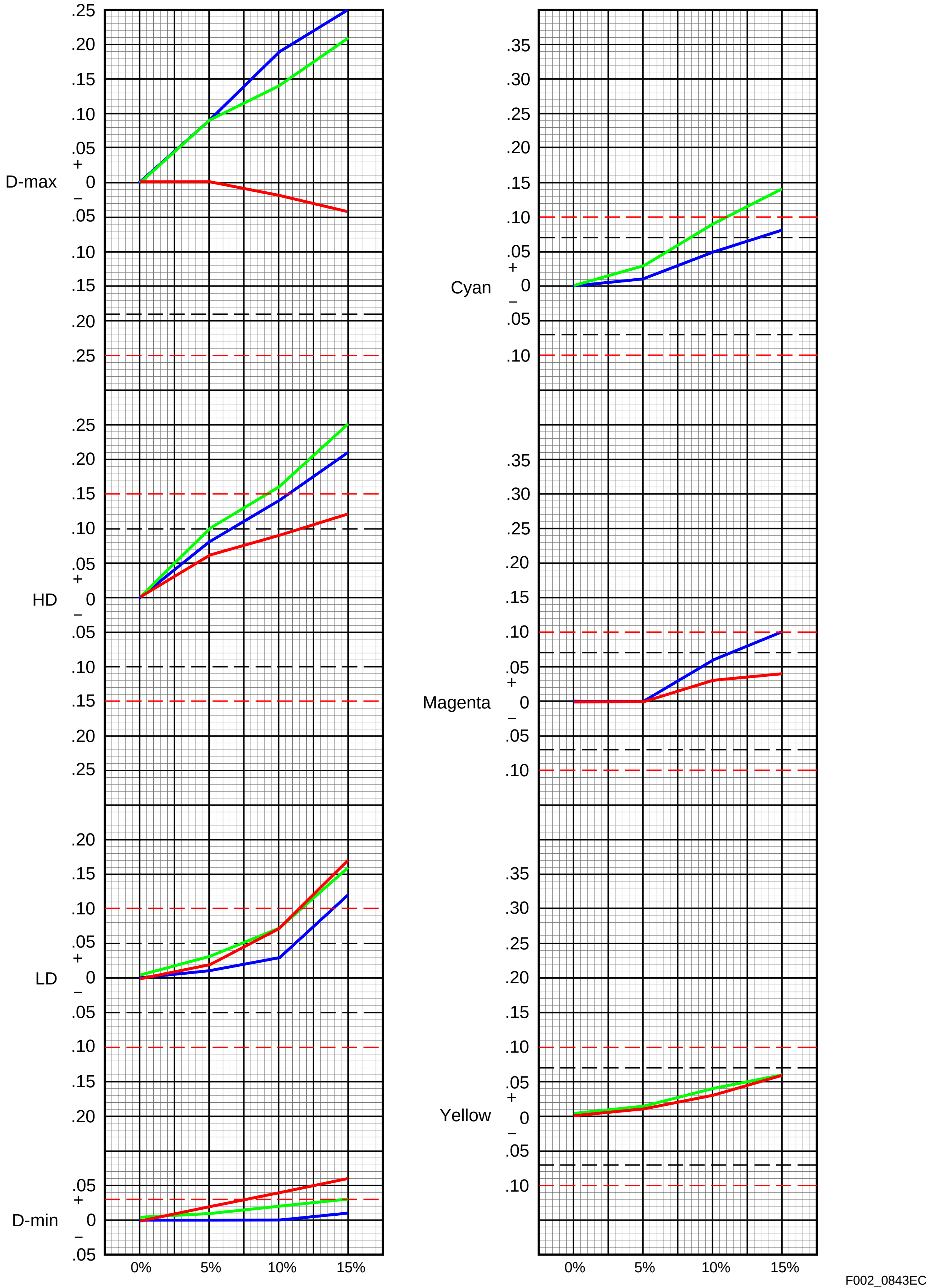


Chart 6

Cyan Developer (Tank) Used in Place of Cyan Developer (Replenisher)

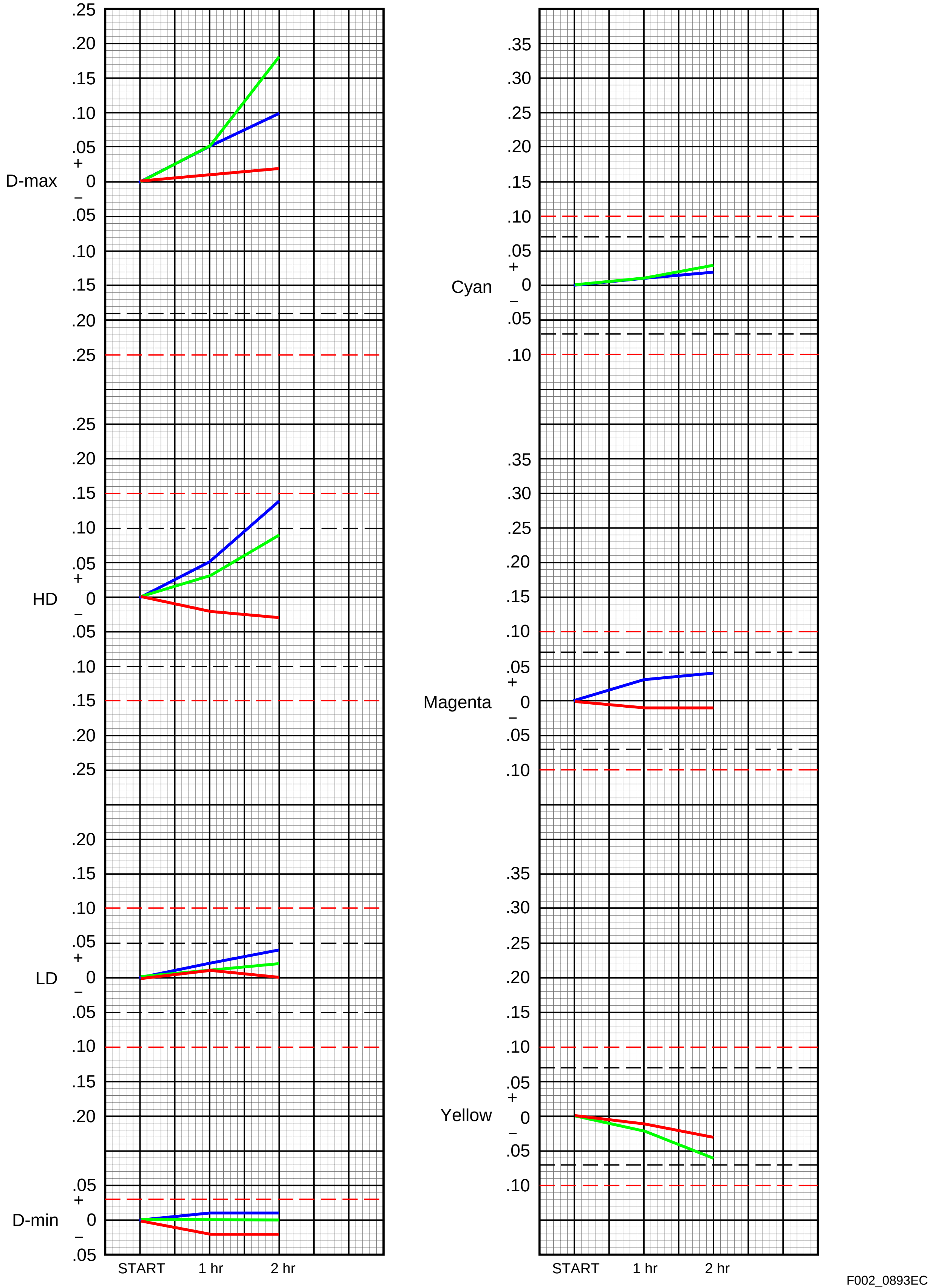


Chart 7

No Cyan Developer Replenishment

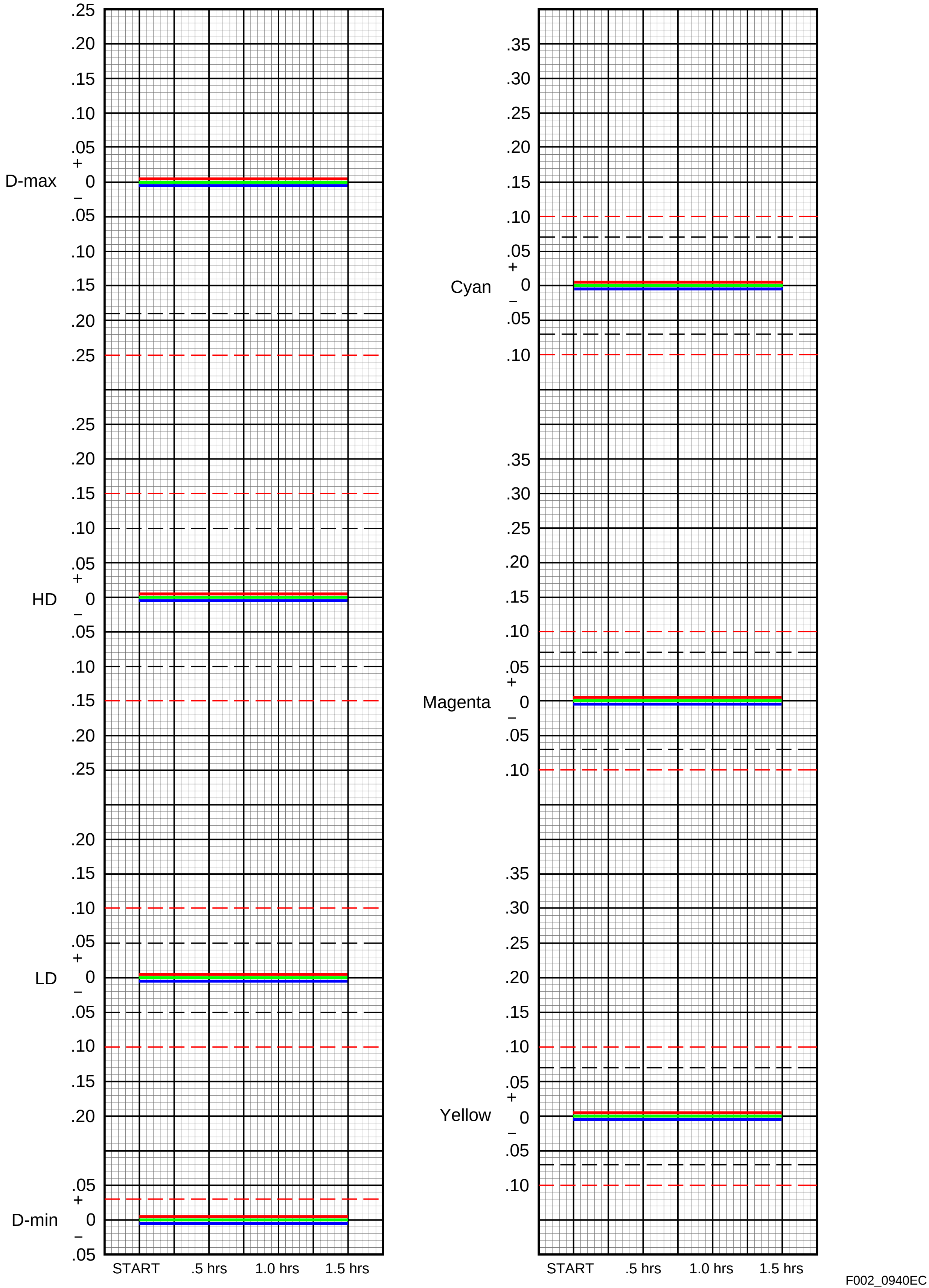


Chart 8

Cyan Developer Diluted With Water

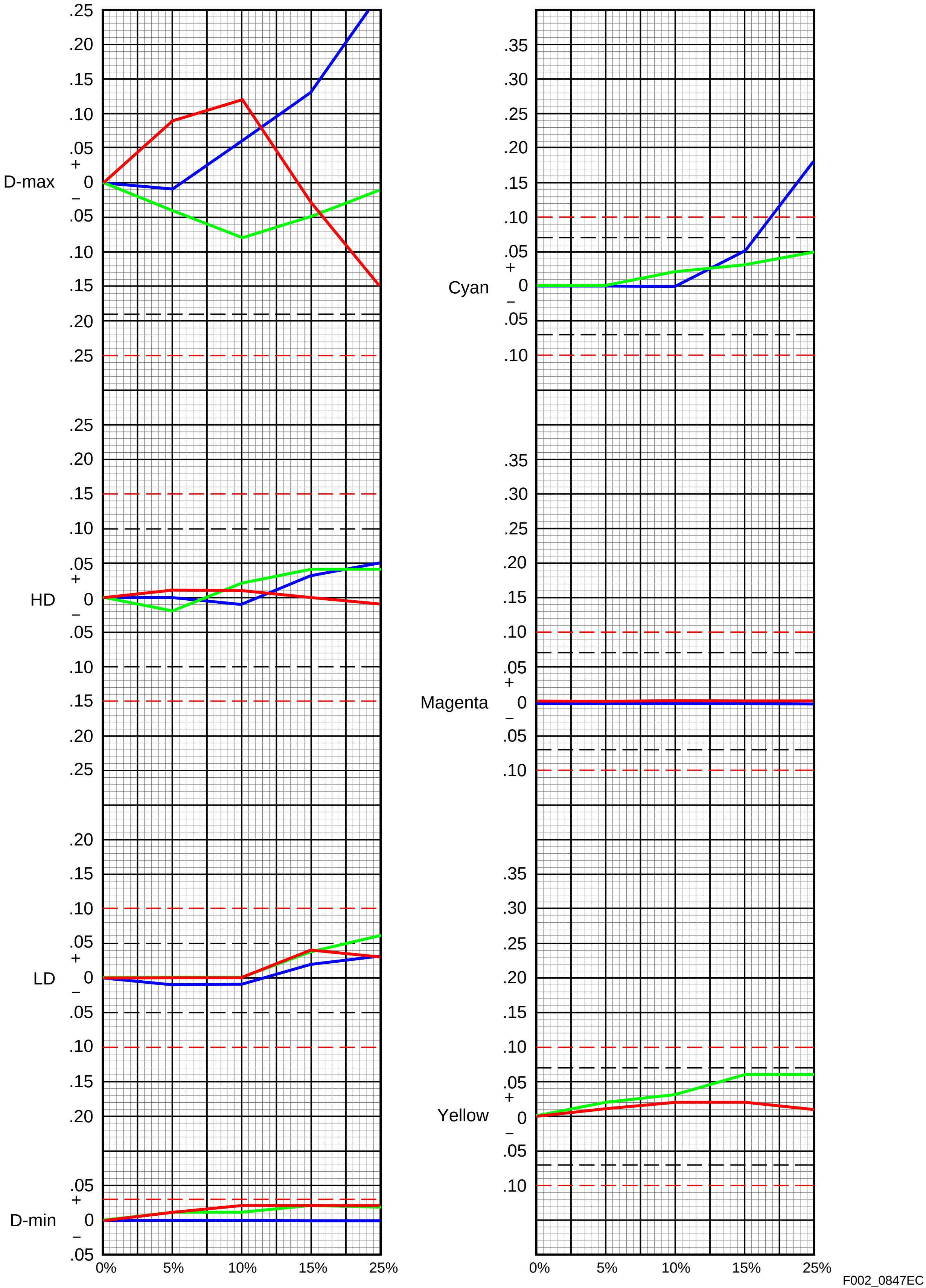


Chart 9

Yellow Developer Part A (Tank) Used in Place of Yellow Developer Part A (Replenisher)

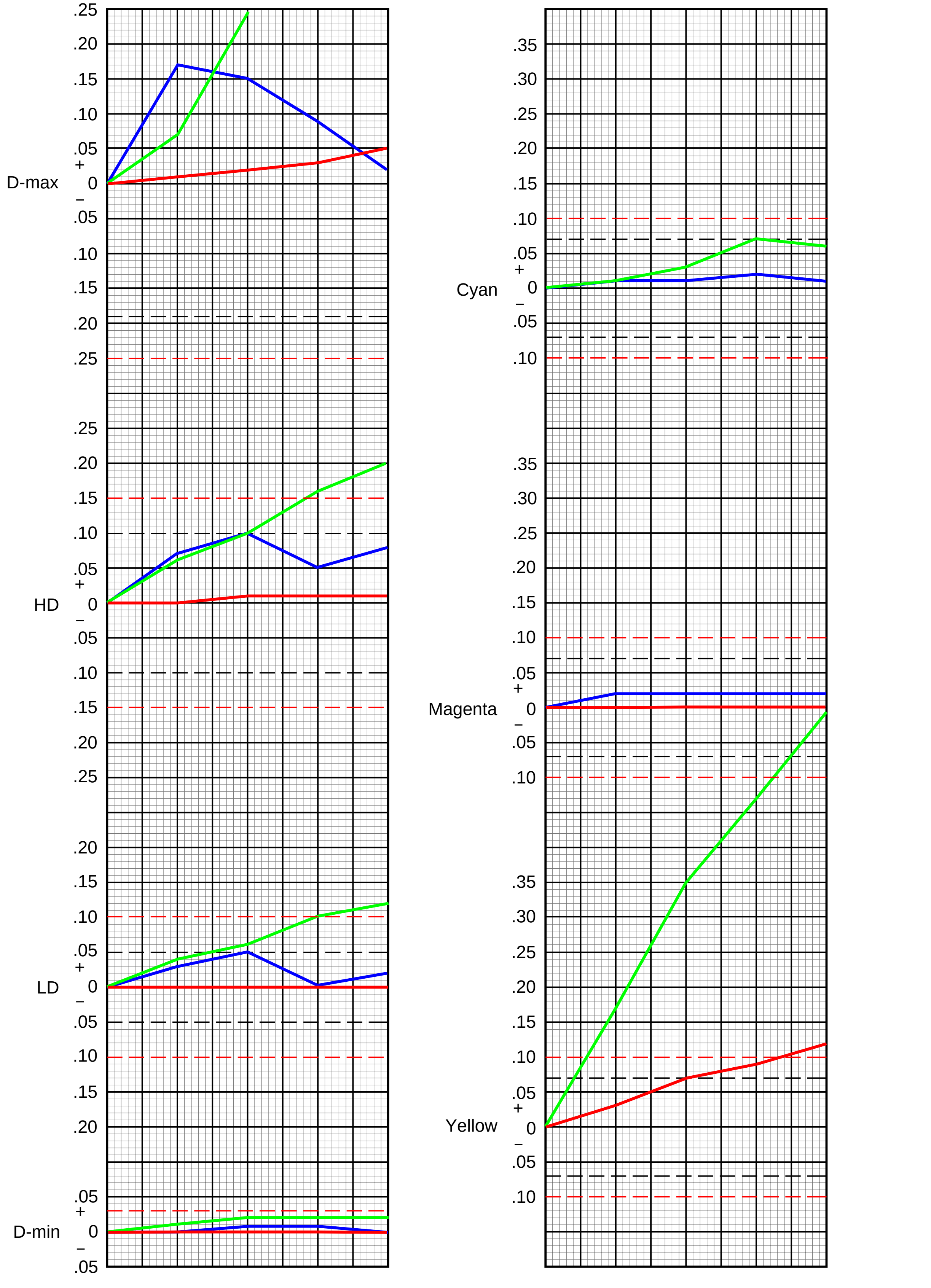


Chart 10

No Yellow Developer Part A Replenishment

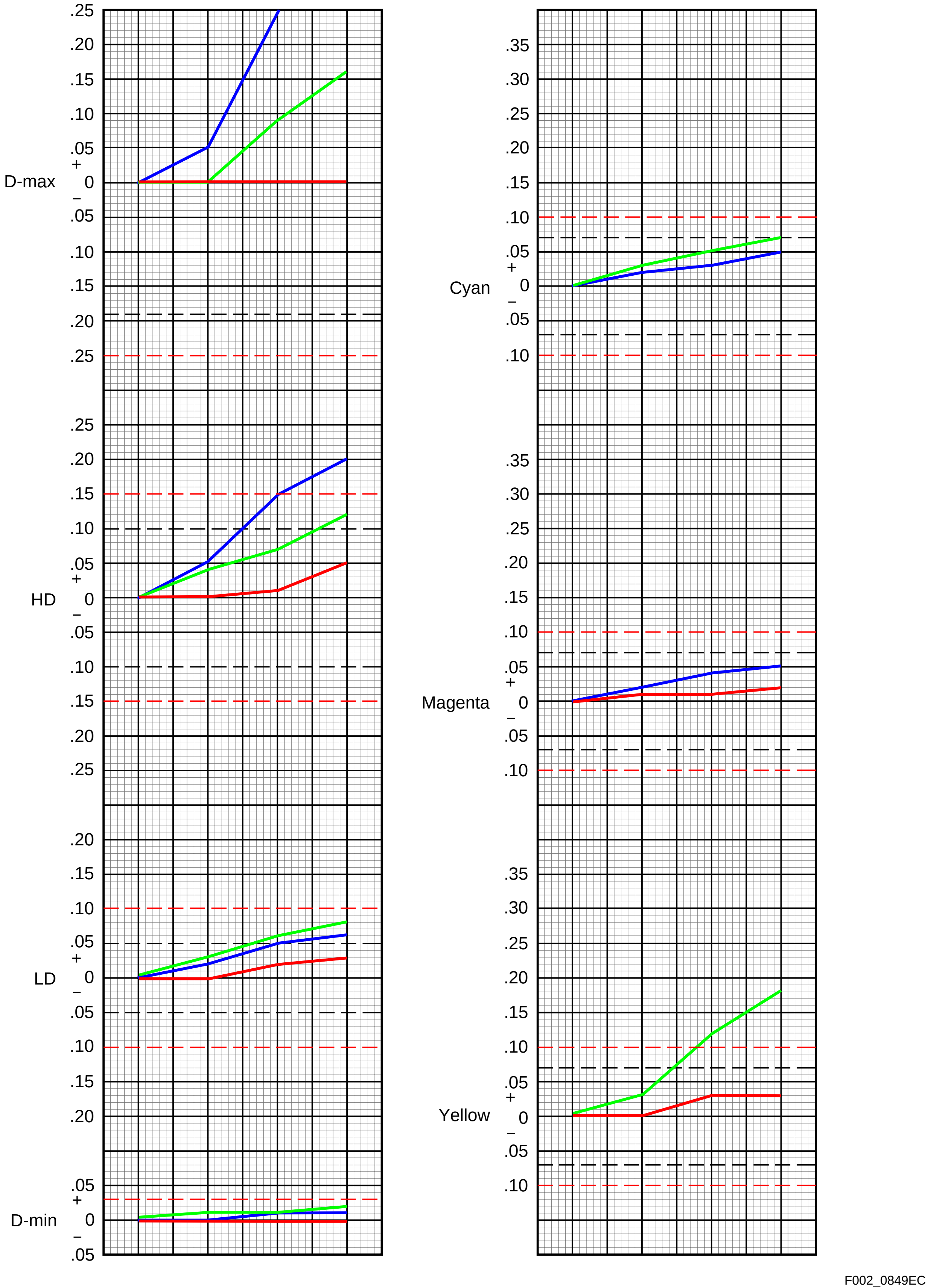


Chart 11

Yellow Developer Part B (Tank) Used in Place of Yellow Developer Part B (Replenisher)

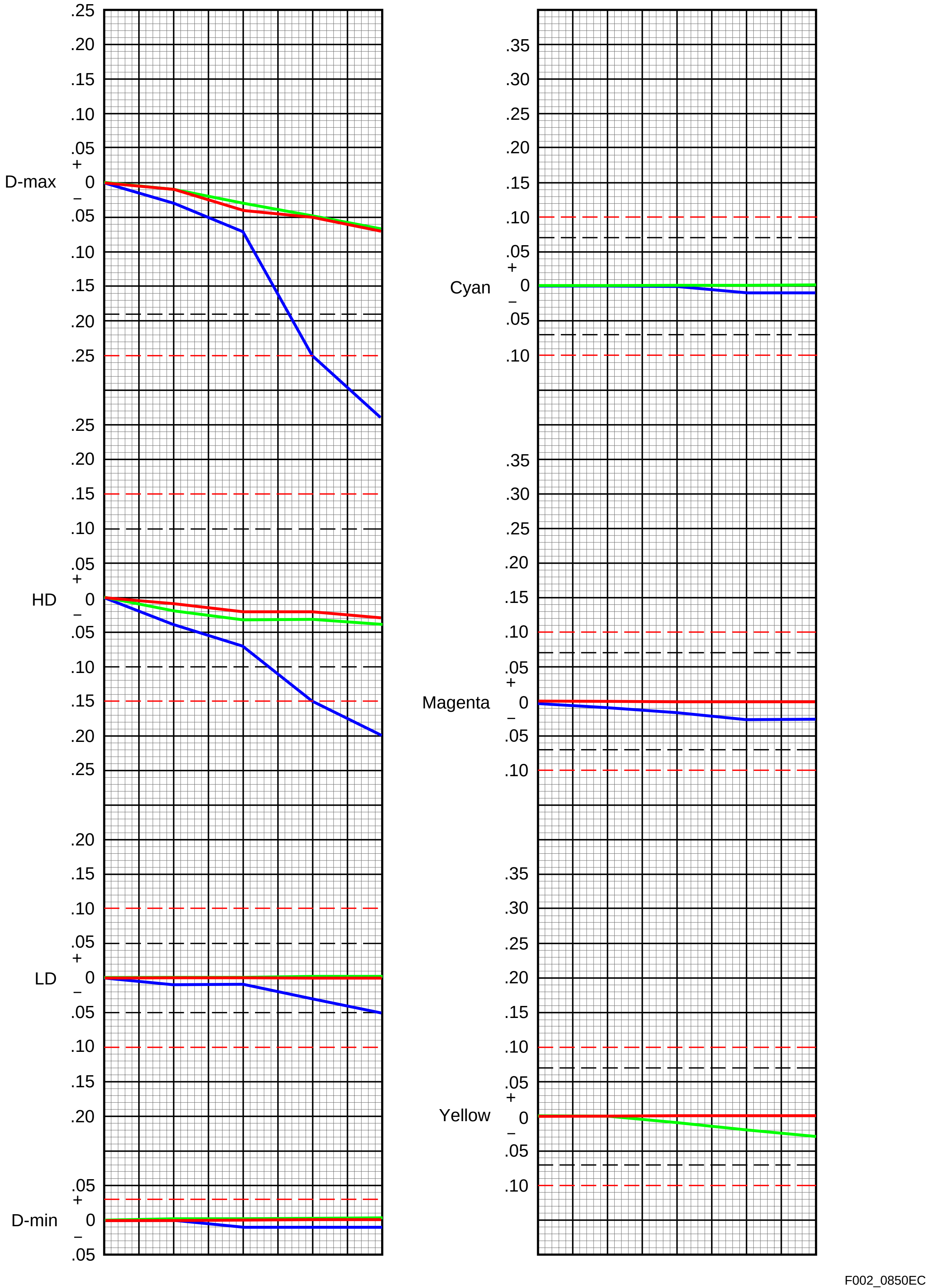


Chart 12

No Yellow Developer Part B Replenishment

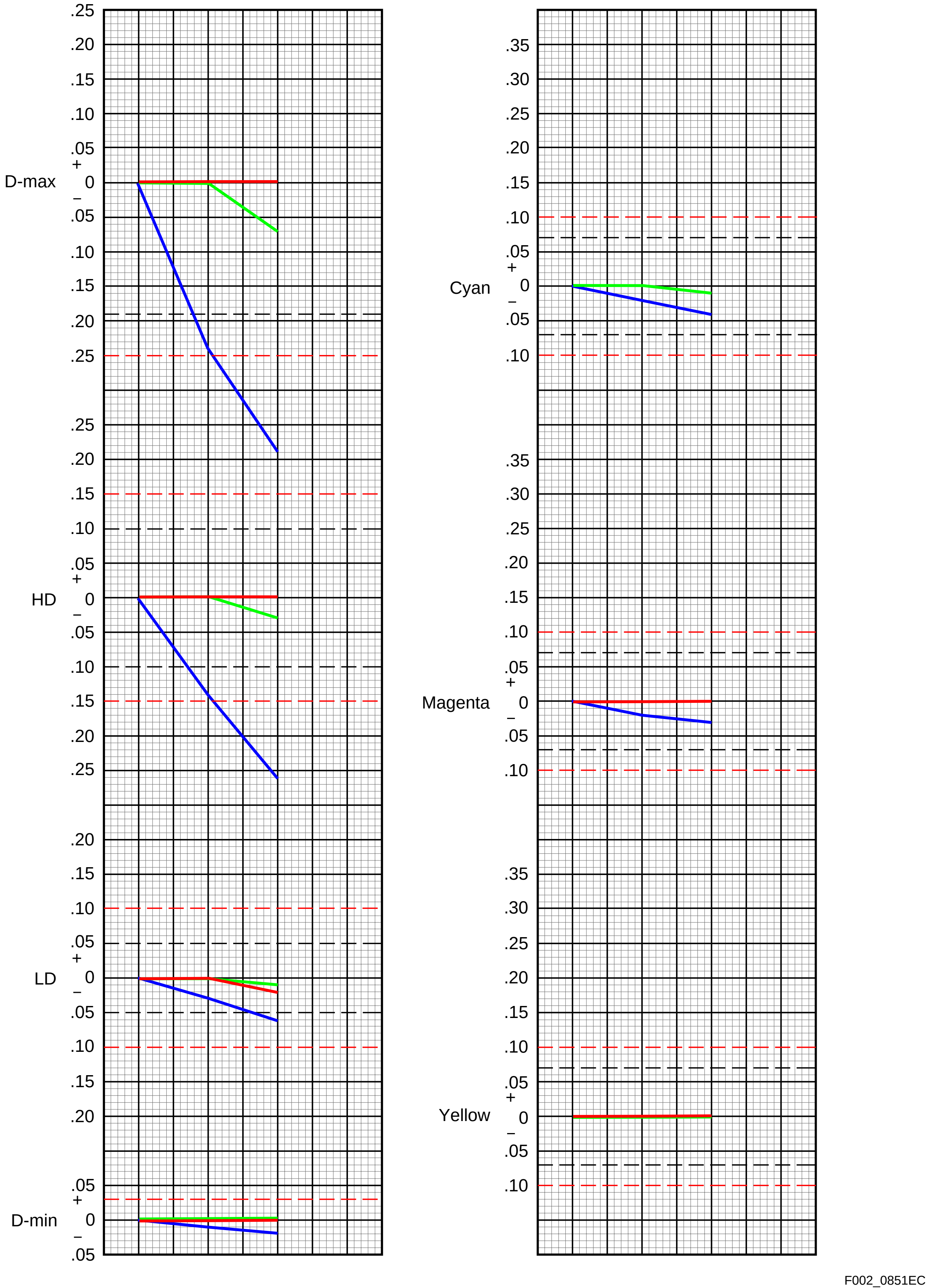


Chart 13

Yellow Developer Diluted With Water

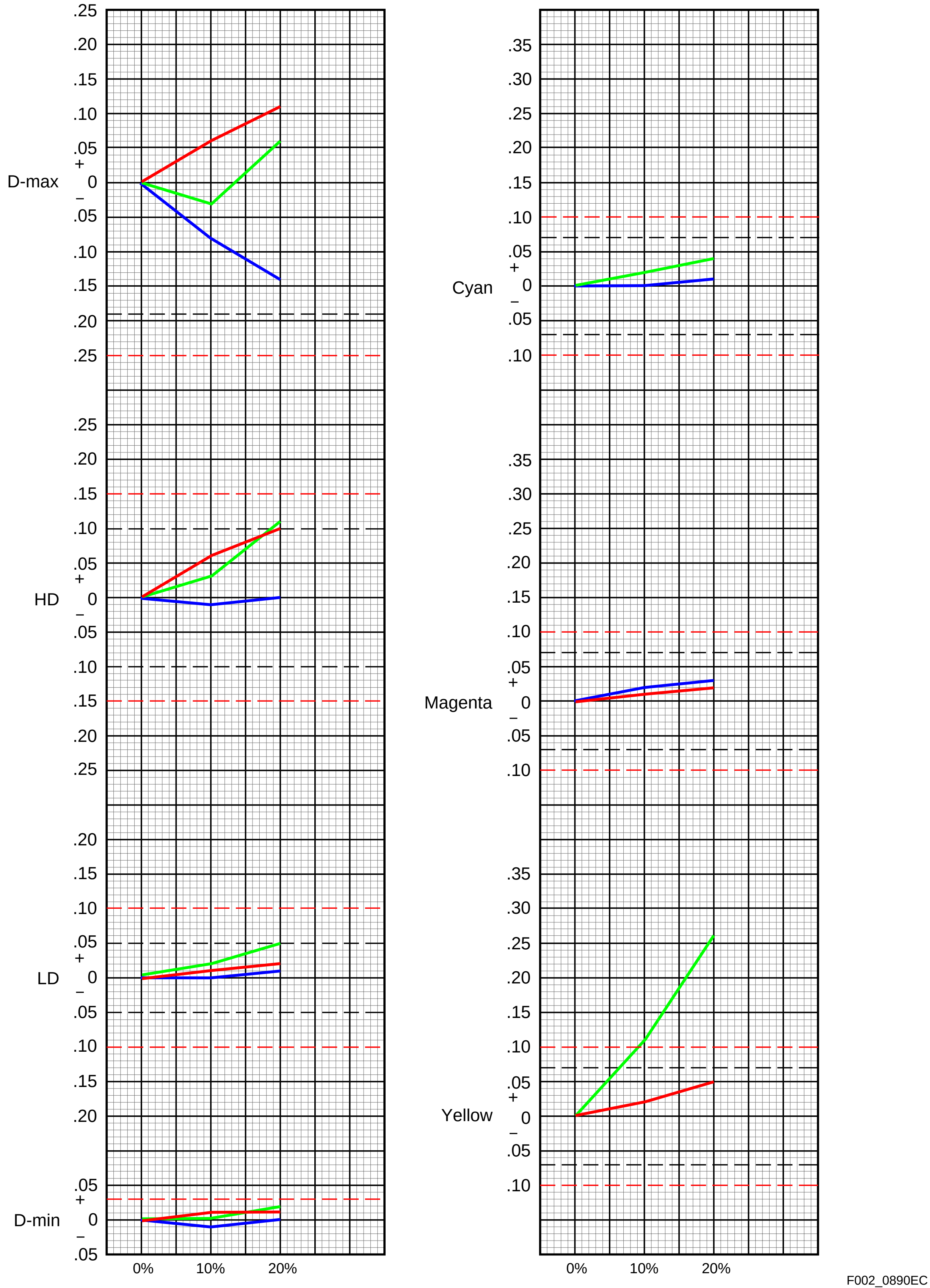


Chart 14

Yellow Developer Tank Made With Two Yellow Developer Part B (Tank) Kits

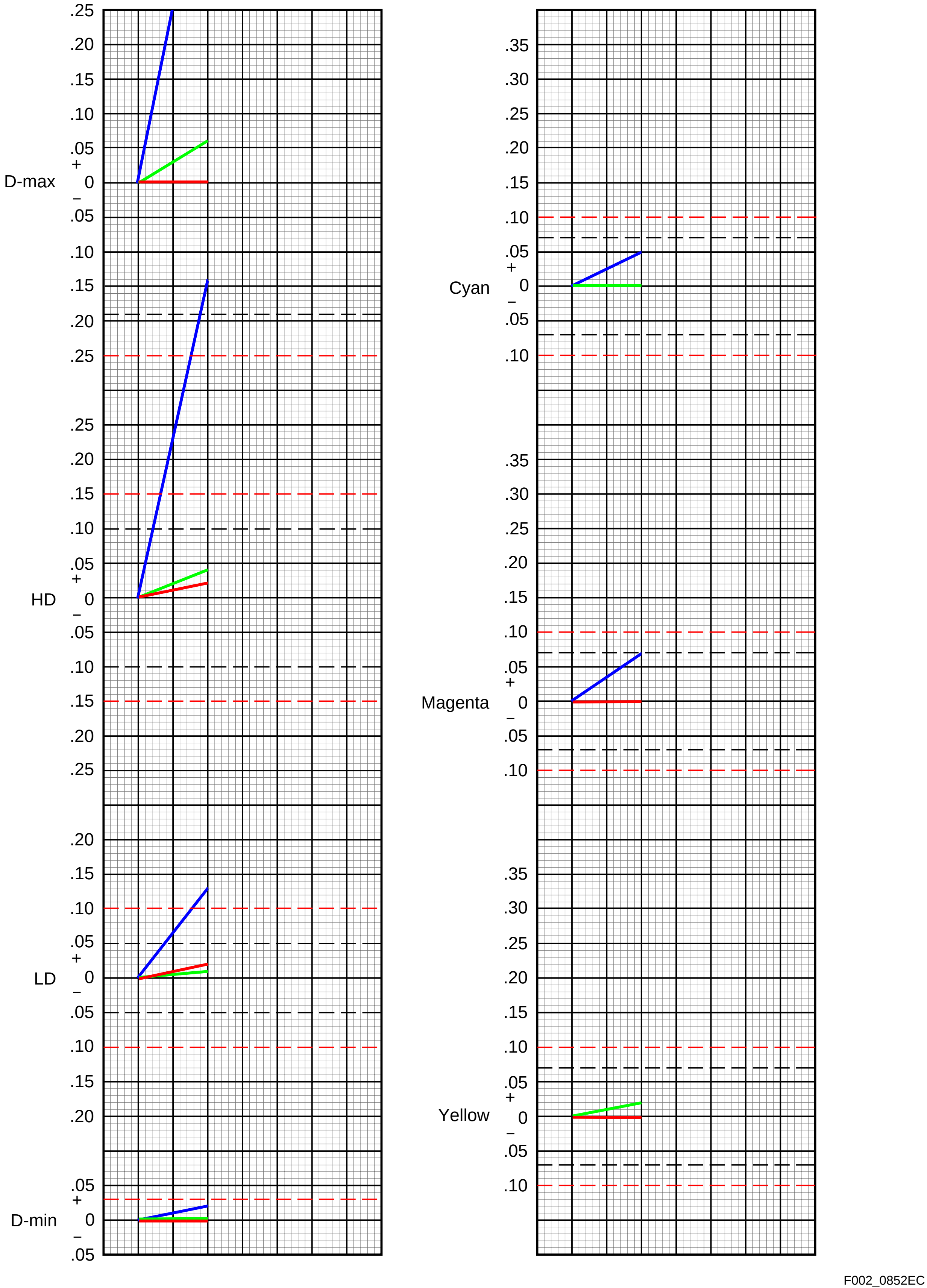


Chart 15

Magenta Developer (Tank) Used in Place of Magenta Developer (Replenisher)

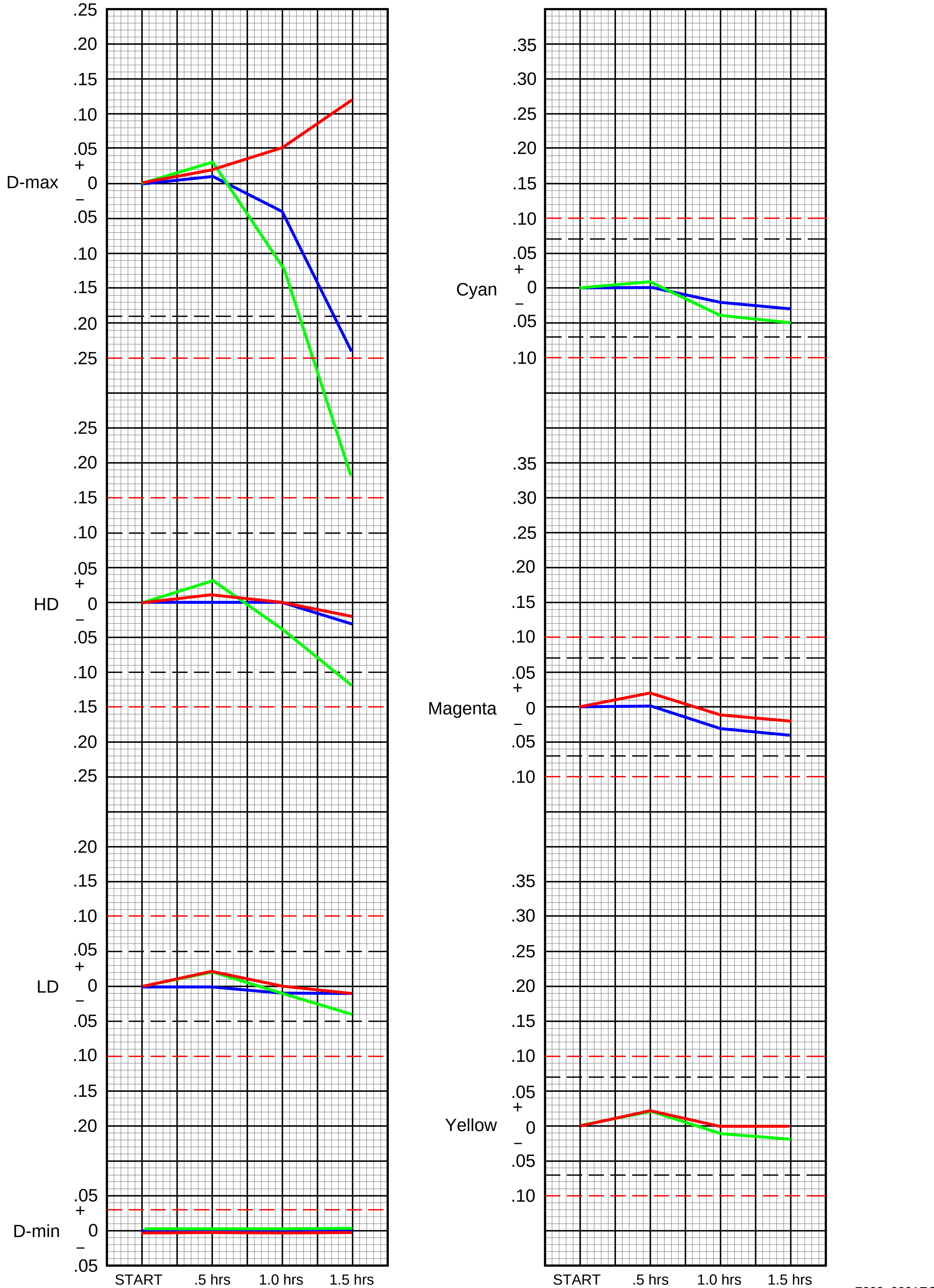


Chart 16

No Magenta Developer Replenishment

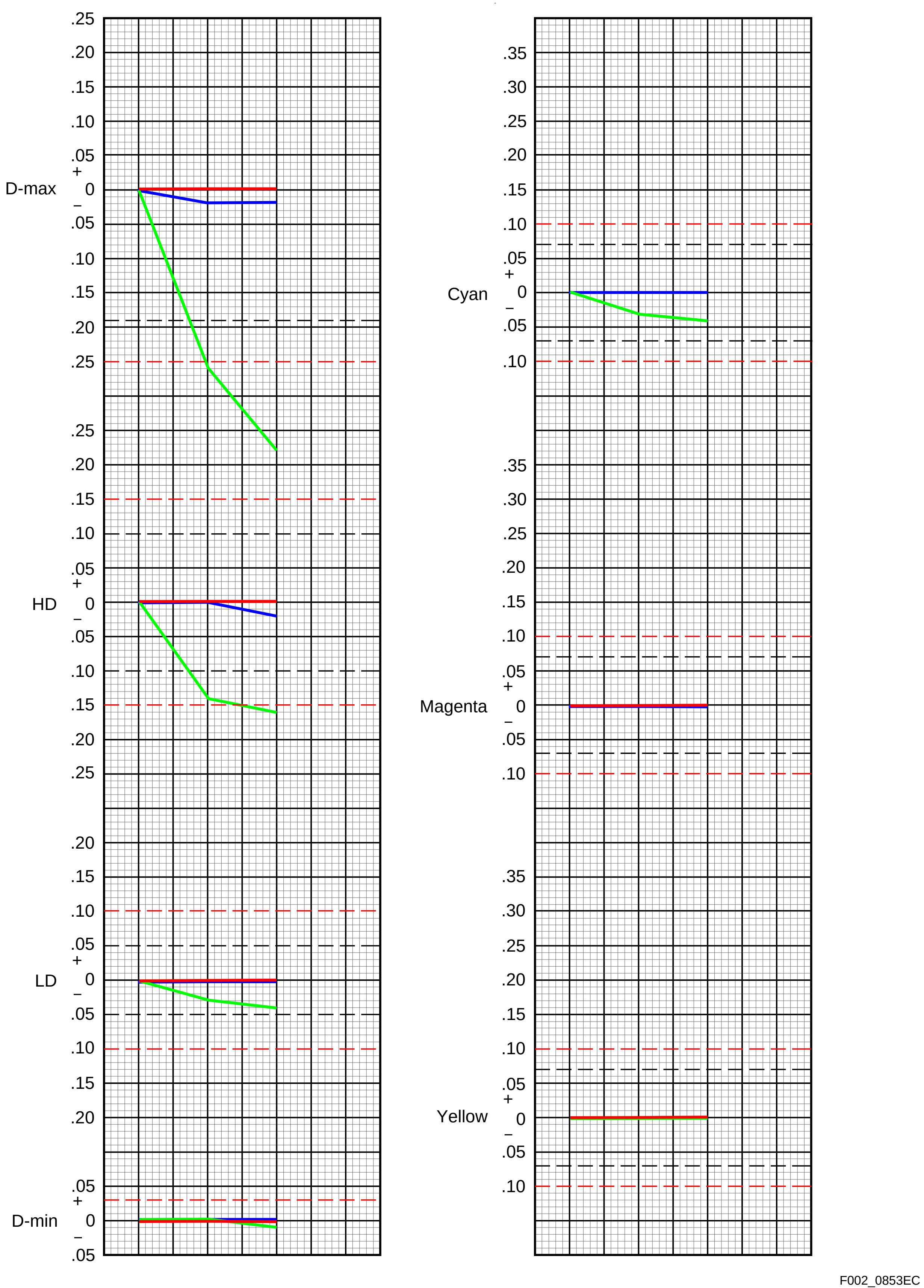


Chart 17

Magenta Developer Diluted with Water

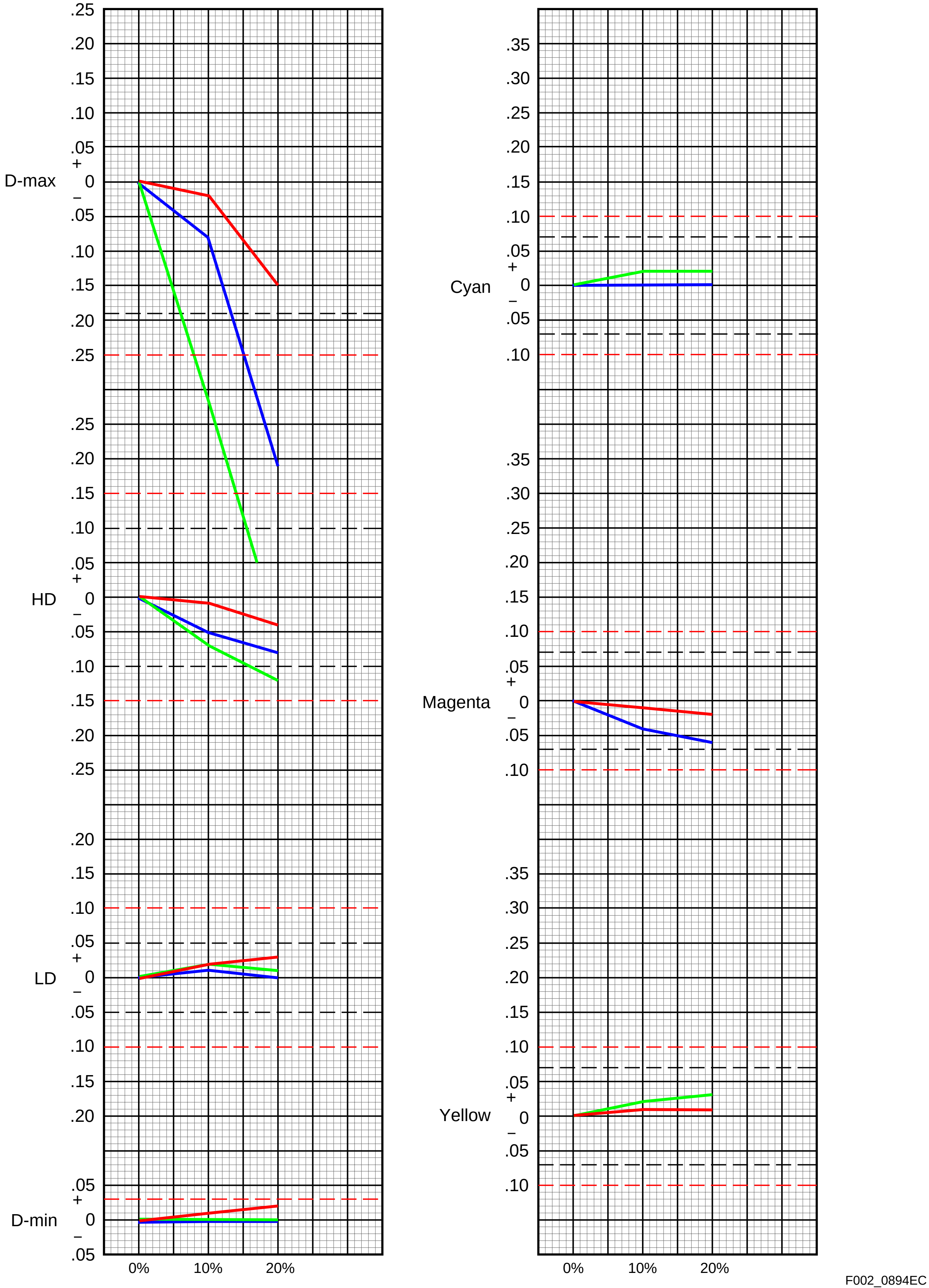
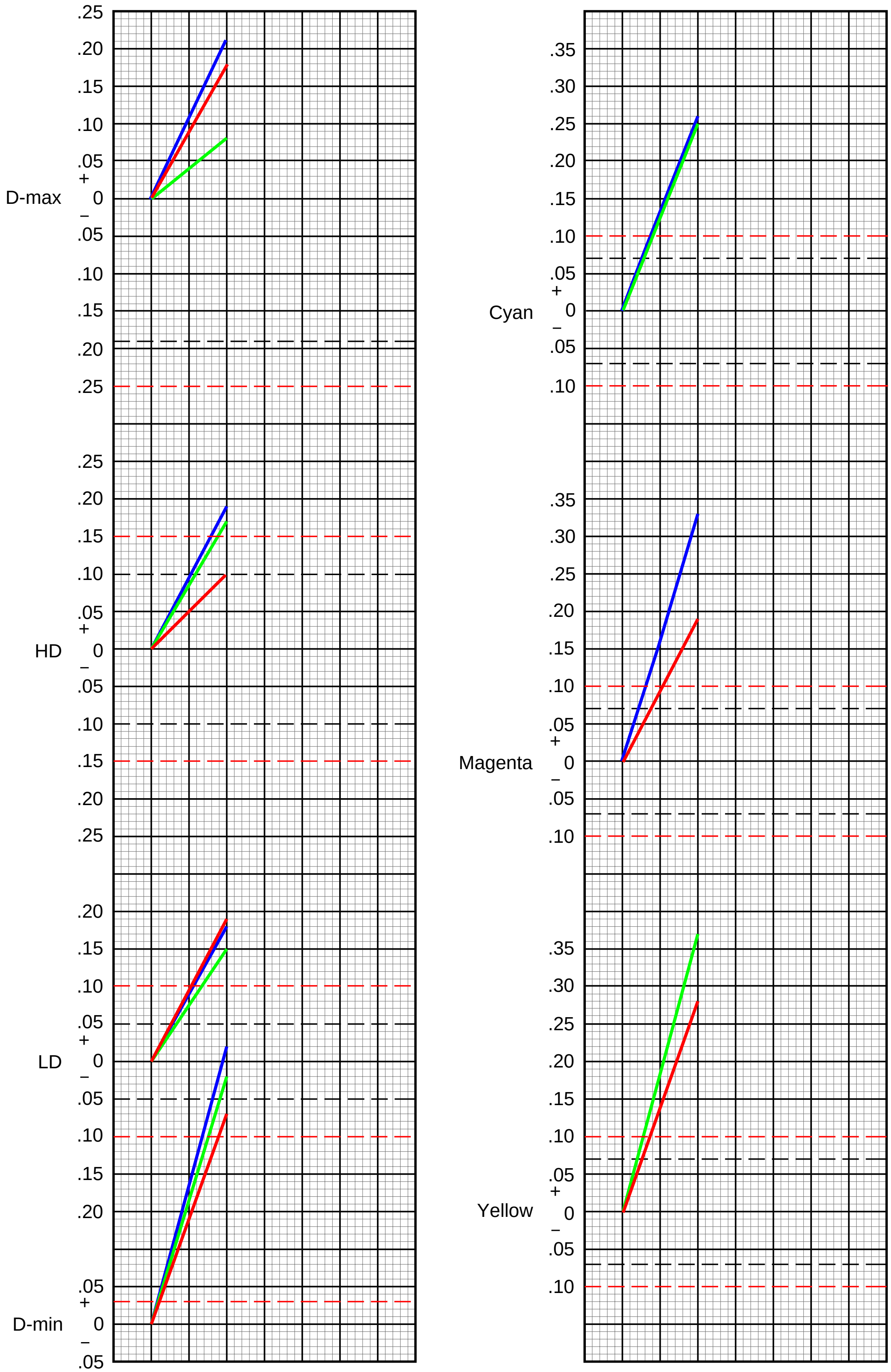


Chart 18

Diluted Conditioner



F002_0854EC

Chart 19

Processor Run Without Bleach Replenisher

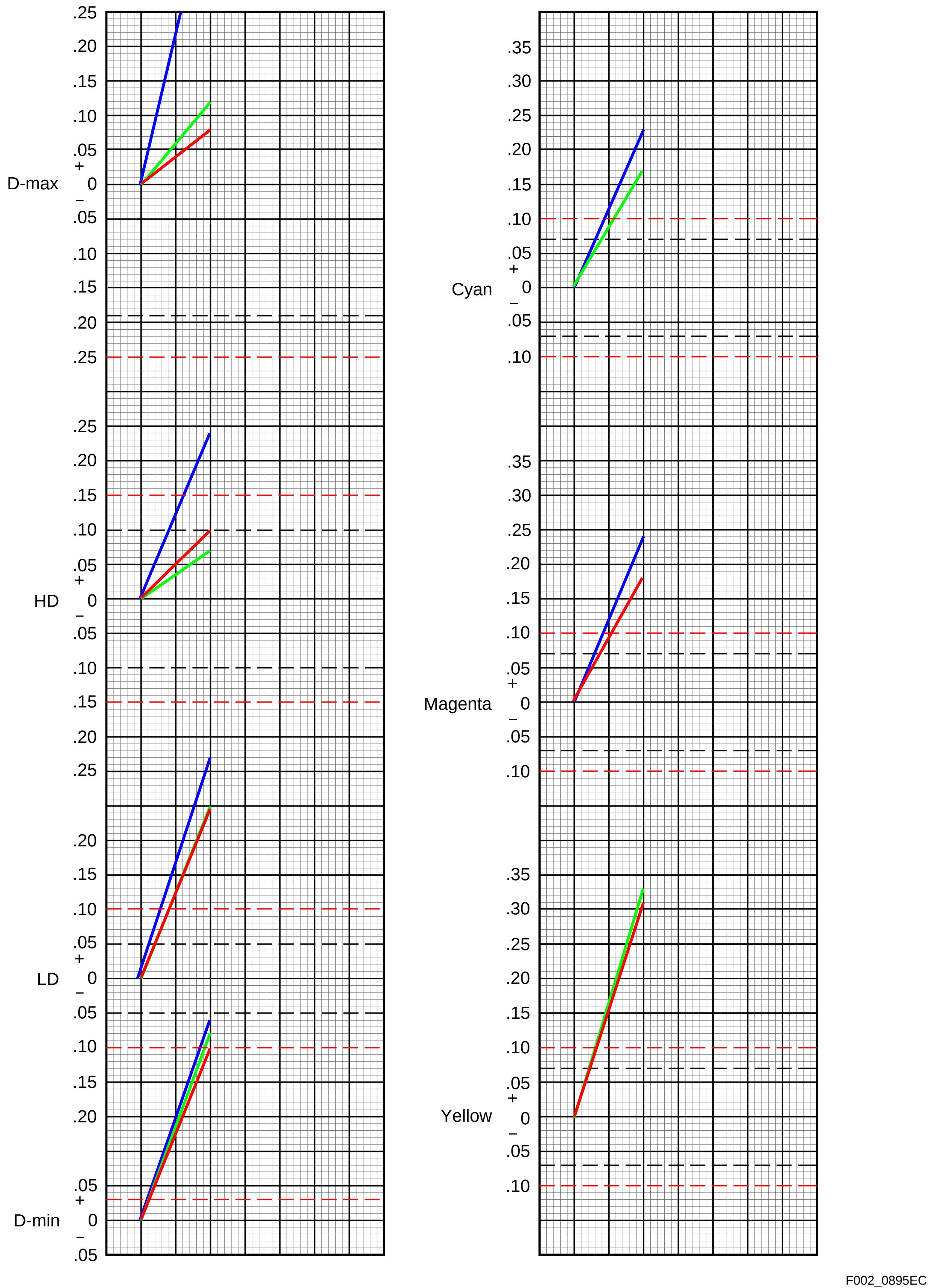


Chart 20

Processor Run Without Any Chemical Replenishment

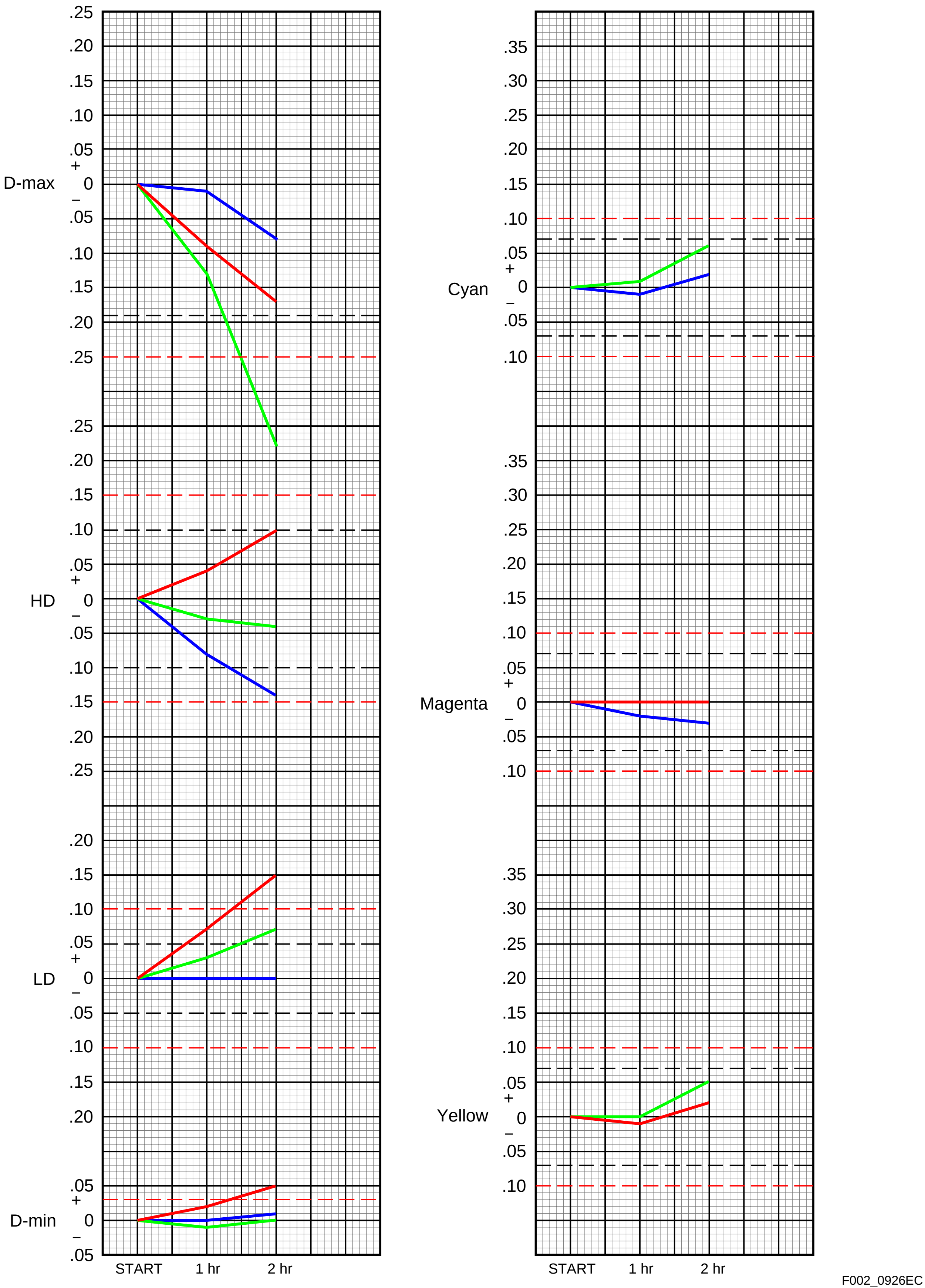


Chart 21

Rem-Jet Rinse and First Developer Wash Temperature

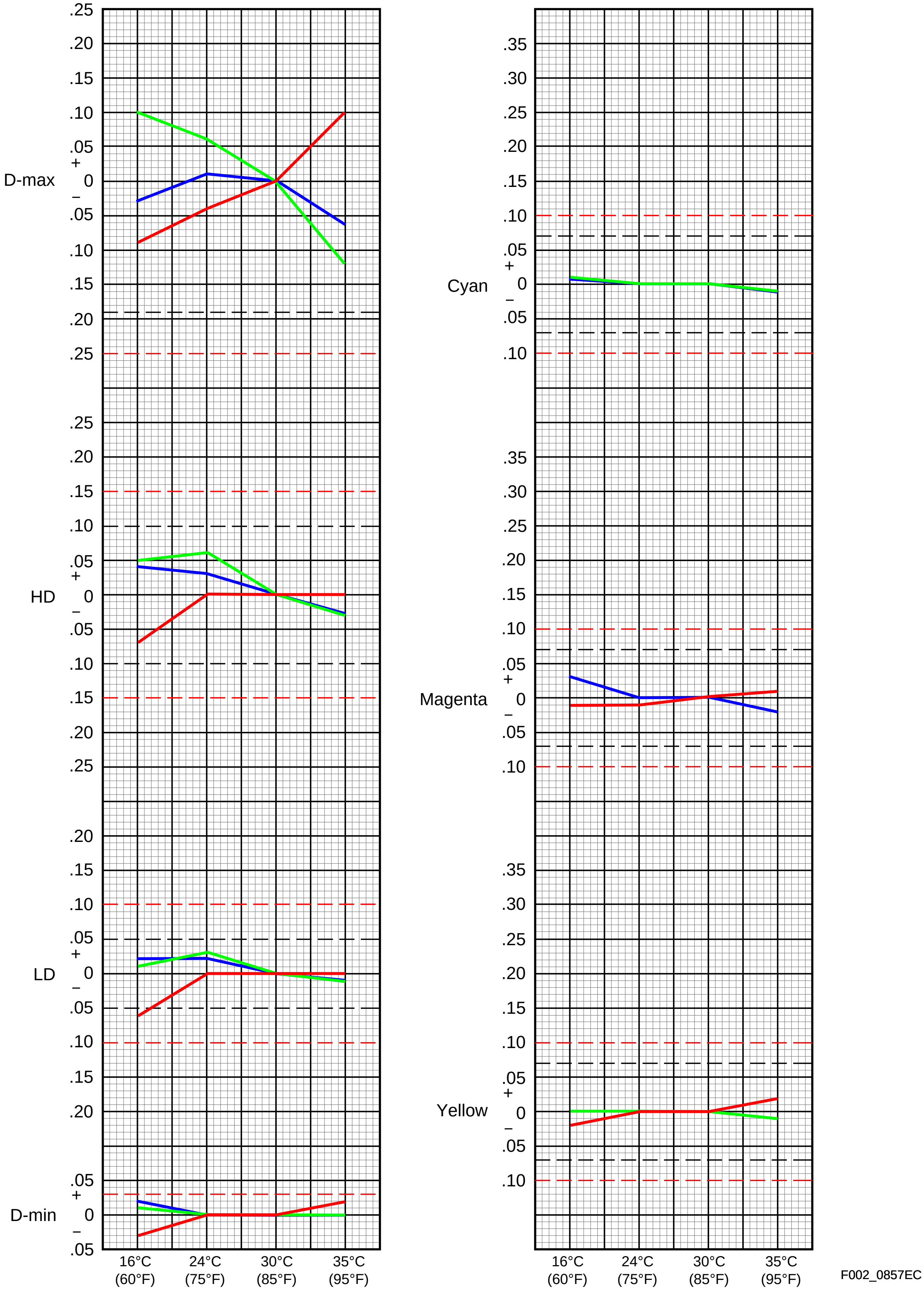
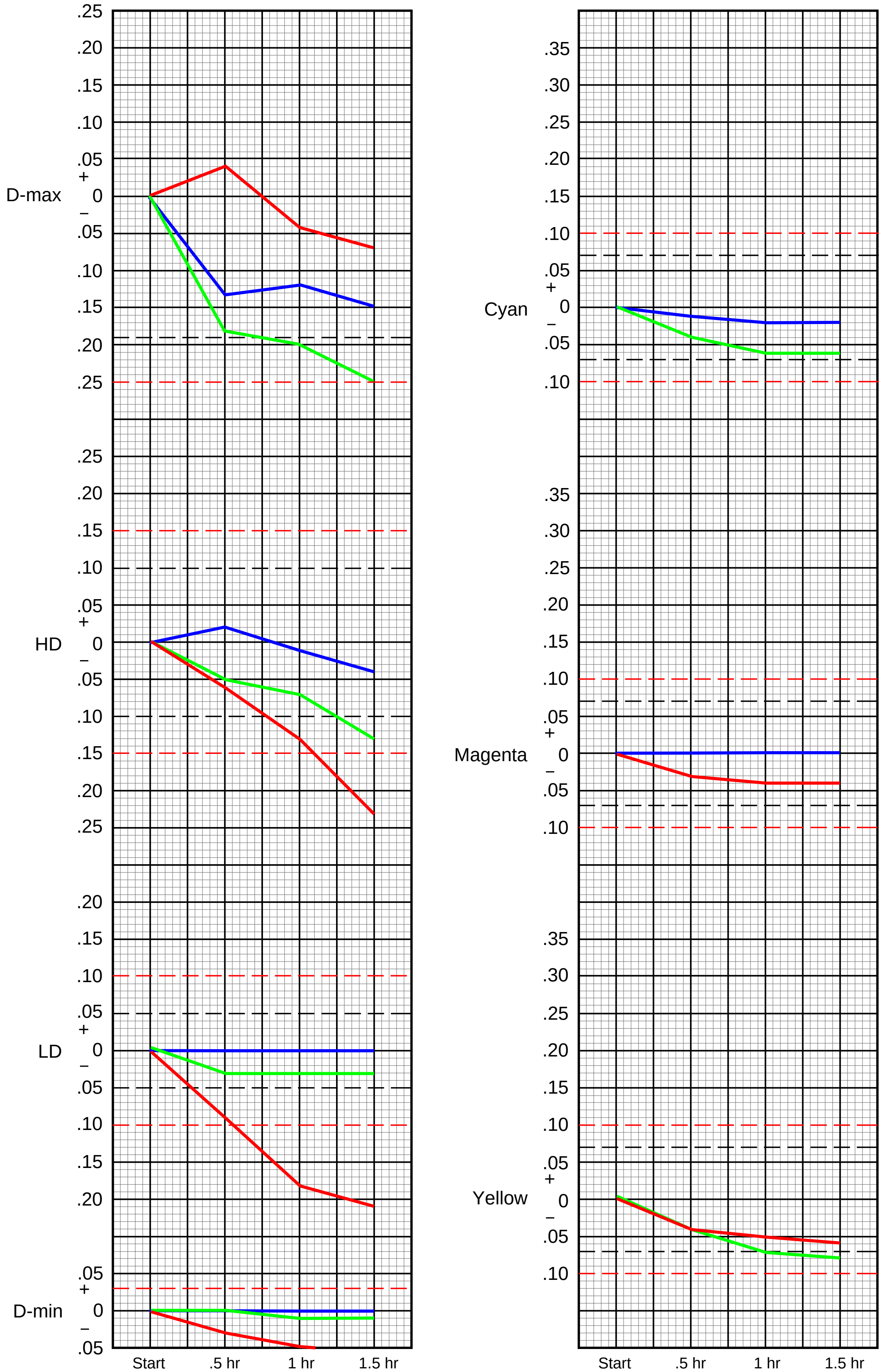


Chart 22

Processor Run With Rem-Jet Rinse and First Developer Wash Waters Off



F002_0856EC

Chart 23

Processor Run With All Wash Waters Off

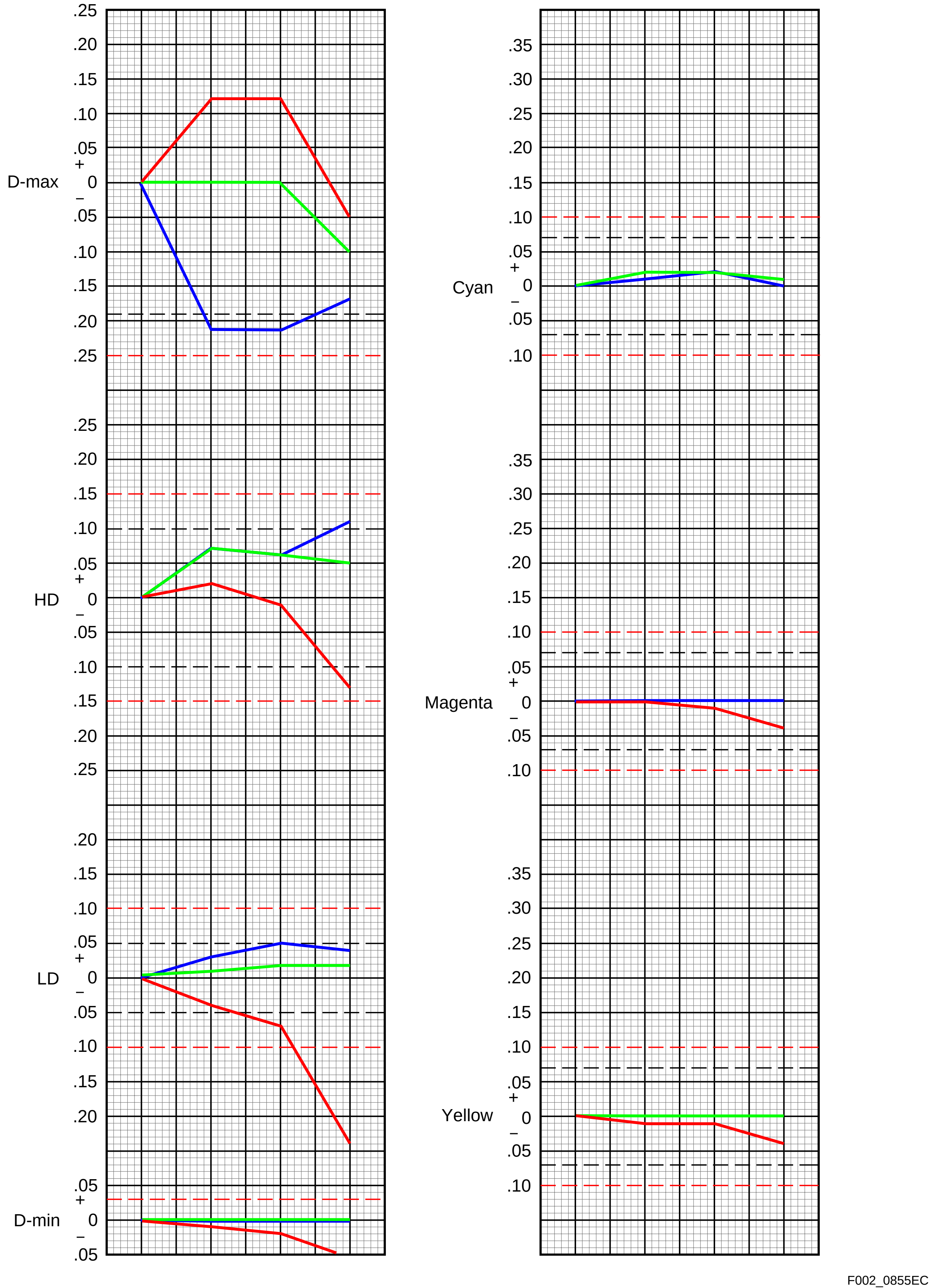


Chart 24

Developer Wash Recirculation Pumps Off

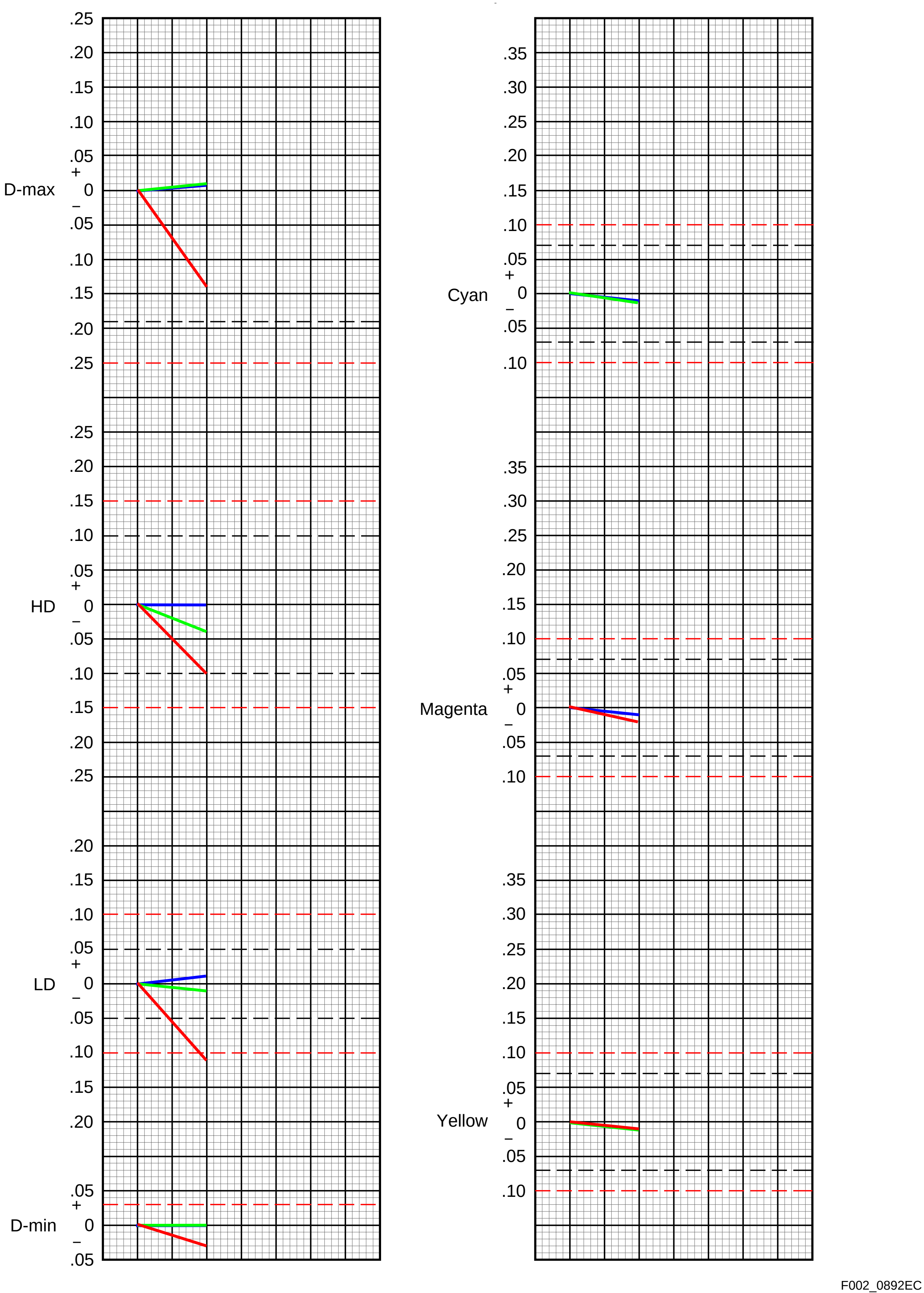


Chart 25

First Developer Part C Used in Place of Rem-Jet

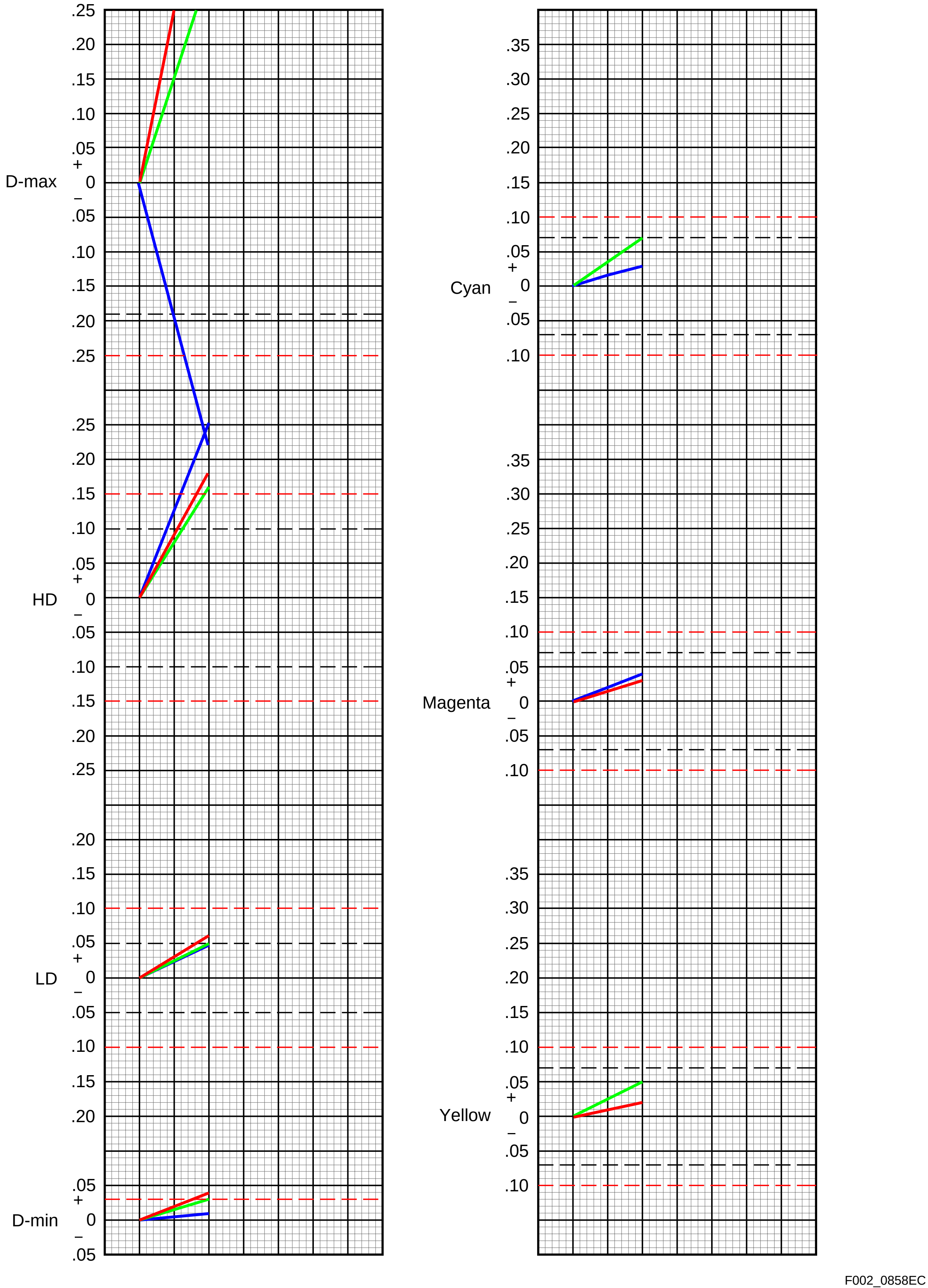


Chart 26