X9 REGISTRY FOR CHECK IMAGE TESTS

FSTC Image Too Light #008.00

Check Image Test Status: A

Where:
A = Active (approved for use)
W = Withdrawn (not for use)
S = Superseded (not for use - replaced by specified test)

Check Image Test Summary:

Field/ Element	Defined Values	Recommended Value	Data Units
Image Test Name	FSTC Image Too Light		
Image Test Number	008.00		
Image Test Version	00		
Image Test Results (Ref. #):			
Percentage of Black Pixels (R1)	'0' through '1000'		Tenths of a Percent
Percentage of Average Brightness (R2)	'0' through '1000'		Tenths of a Percent
Percentage of Average Contrast (R3)	'0' through '1000'		Tenths of a Percent
Image Test Parameters (Ref #):			
Minimum Percentage of Black Pixels Threshold (P1)	'0' through '1000'	Front: 21 Rear: Not Available	Tenths of a Percent
Maximum Percent Brightness Threshold (P2)	'0' through '1000'	Font: 610 – 649 Rear: Not Available	Tenths of a Percent
Minimum Percent Contrast Threshold (P3)	'0' through '1000'	Font: 230 – 259 Rear: Not Available	Tenths of a Percent
Percentage of Lightest Pixels (P_N) (P4)	0' through '100'	75% - 90%	Percent
Percentage of Darkest Pixels (P_M) (P5)	0' through '100'	10% - 25%	Percent

1.0	**Applicant Information**	
1.1	Organization Name:	**Financial Service Technology Consortium**
1.2	Organization Address:	**44 Wall St. 12th Floor New York, NY 10005**
1.3	Organization Web Site URL:	www.fstc.org

2.0	**Image Test Description**	
2.1	**Image Test Name:**	FSTC Image Too Light
2.2	**Image Test XML Name:**	ImageTooLight
2.3	**Image Test Definition:**	A defect due to the image not having a sufficient number of “black” pixels.
2.4	**Image Test Applicability:**	☒*Front Image* ☒ *Rear Image* ☒*B/W Image* ☒*Grayscale Image* ☒ *Color Image*
2.5	**Intended Use:** Intended business use/ application, business context, and business impact when test fails.	FSTC recommends this metric for use as part of a general system-health monitoring and image quality assurance program. At extreme values, for front images, FSTC recommends this metric for use in image exchange. The Image Too Light metric for bitonal images is designed to detect occurrences of images where there is a high probability that the check data is missing or not readable. The impact of this may be: • Inability to create legible substitute checks • Financial losses due to information being eliminated in one or more fields • Information missing in customer statements, CD ROM delivery, or online viewing. • General customer service issues and complaints.
2.6	**Possible Causes for Condition Being Tested:**	This defect may be due to one or more of the following problems: • Poor printing or writing contrast when completing the source document. • Improper thresholding of the document during imaging. • Illumination problems with the image capture system. • Image capture system calibration problems.

2.7	**Additional (or Repetitive) Information:**	**XML Names**: FSTC defined XML names as needed for its project. FSTC is not submitting these XML names, and instead requests that the RMG or X9B assign appropriate XML names and data structures for the metrics. **Border Rule**: Metric measurements and computations for both bi-tonal and gray/color image renditions shall **exclude** the image pixels that are located in a perimeter region of the document image. The size of the excluded bottom, left, top, and right perimeter is defined to be .25 inches from the edge of the image for all four edges. **Rounding Rule**: All fractional values shall be rounded to the nearest whole unit of measure when rounding is required. Fractional values of exactly ½ unit shall be rounded up. **Data Ranges**: FSTC did not establish a formal data range for individual metrics. However, for this metric the data range is logically between 0% - 100%. **Data Range Exception Handling:** If a result exceeds the defined data range, the preferred handling is to truncate the result at the maximum (or minimum) value. If truncation is not implemented, then the test should fail and a result of indeterminate should be returned. **Margin of Error**: FSTC established a margin of error for use during the FSTC Image Quality and Usability Phase 2 project. This margin of error is included in the recommendations below. It was established based on the expertise of the project's membership, the potential for various algorithms to produce slightly different results for a given metric, and the observed precision of the results submitted during accuracy testing of metric implementations. **Value Reporting**: The value of the image metric(s) for this defect will be reported under all image quality flag conditions. If the defect condition is "not tested", the value of the image metric(s) reported for this defect will be set to zero. For bitonal images the value for contrast and brightness reported shall be zero (0). For grayscale or color images, the value for percentage of black pixels shall be reported as zero (0).

2.8	**Test Results Reported** *A test result is the outcome realized from executing an image test. The outcome will typically be the observed or measured value of some attribute pertaining to the image being tested.* *Any dependency of a test result on an image side (front or rear), image rendition (B/W, Gray, Color), or other condition shall be fully defined in the Additional Information section.* *Data types allowed are as defined in ANS X9.100-180-2006, but are typically alphabetic, numeric, alphanumeric, signed numeric (using "+" and "-" to denote sign), etc.*

2.8.1 First Image Test Result (R1)				
Test Result Name: Percentage of Black Pixels				
Test Result XML Name:	**Data Type:**	**Data Units:**	**Data Range:**	**Margin of Error (in Data Units) (Where Applicable):**
PercentBlackPixels	Numeric	tenths of a percent	0-1000	+/- 0 tenths of a percent
Description:	The percentage of black pixels contained within the image, excluding borders, expressed in units of 0.1 percent.			
Formula and/ or Algorithm:	$\text{Percent Black Pixels} = \frac{\text{(Number of Black Pixels in the Image)}}{\text{(Total Pixels in the Image)}} * 100$			
Additional Information:	See section 2.7. This parameter is used only for bitonal images. Its value should be reported as zero (0) for grayscale or color images.			

2.8.2 Second Image Test Result (R2)				
Test Result Name: Percentage of Average Brightness				
Test Result XML Name:	**Data Type:**	**Data Units:**	**Data Range:**	**Margin of Error (in Data Units) (Where Applicable):**
PercentAvgBrightness	Numeric	tenths of a percent	0-1000	+/- 0 tenths of a percent
Description:	The percentage of image brightness contained within the image, excluding borders, expressed in units of 0.1 percent. Image brightness is defined as the average of the "N" brightest pixels present in the image divided by the whitest gray level pixel value possible (255), times 100.			
Formula and/ or Algorithm:	$\text{Percent Average Brightness} = \frac{\text{(Average of the "N" Whitest Pixels)}}{\text{(Maximum White Value Possible)}} * 100$			
Additional Information:	See section 2.7. This parameter is used only for grayscale or color images. Its value should be reported as zero (0) for bitonal images.			

2.8.3 Third Image Test Result (R3)				
Test Result Name: Percentage of Average Contrast				
Test Result XML Name:	**Data Type:**	**Data Units:**	**Data Range:**	**Margin of Error (in Data Units) (Where Applicable):**
PercentAvgContrast	Numeric	tenths of a percent	0-1000	+/- 0 tenths of a percent
Description:	The percentage of image contrast contained within the image, excluding borders, expressed in units of 0.1 percent. Image contrast is defined as the difference between the average of the "N" brightest pixels present in the image and the average of the "M" darkest pixels in the image, divided by the whitest gray level pixel value possible (255), times 100.			
Formula and/ or Algorithm:	$\text{Percent Average Contrast} = \frac{((\text{Average of the "N" Whitest Pixels}) - \text{Average of the "M" Blackest Pixels}))}{(\text{Maximum White Value Possible})} * 100$			
Additional Information:	See section 2.7. This parameter is used only for grayscale or color images. Its value should be reported as zero (0) for bitonal images.			

2.9	**Test Parameters Reported** *Examples of image test parameters are threshold values used to compute a pass/fail image test flag condition, and constant values used in a formula or algorithm to compute an image test result.* *Any dependency of a test parameter on an image side (front or rear), image rendition (B/W, Gray, Color), or other condition shall be fully defined in the Additional Information section.* *Any dependency of recommended values on an image side (front or rear), image rendition (B/W, Gray, Color), or other condition shall be fully defined in the Recommended Values section.* *Data types allowed are as defined in ANS X9.100-180-2006, but are typically alphabetic, numeric, alphanumeric, signed numeric (using "+" and "-" to denote sign), etc.*

2.9.1 First Image Test Parameter (P1)				
Test Parameter Name: Minimum Percentage of Black Pixels Threshold				
Test Parameter XML Name:	**Data Type:**	**Data Units:**	**Data Range:**	**Recommended Value(s) (Where Applicable):**
MinPercentBlackPixelsThreshold	Numeric	tenths of a percent	0-1000	Front: 21 Rear: Not Available
Description:	This threshold represents the minimum percentage of black pixels which must be present in a bitonal image. Values below this threshold are considered to fail the image quality defect metric as too light..			
Additional Information:	The recommended threshold setting of 21 (2.1%) for the bitonal fronts is based on the analysis work performed during the FSTC Image Quality and Usability Phase 2 study of images in conjunction with Viewpointe. This value identifies a relatively small number of items, but is very precise in finding unusable images.			

2.9.2 Second Image Test Parameter (P2)				
Test Parameter Name: Maximum Percent Brightness Threshold				
Test Parameter XML Name:	**Data Type:**	**Data Units:**	**Data Range:**	**Recommended Value(s) (Where Applicable):**
MaxPercentBrightnessThreshold	Numeric	tenths of a percent	0-1000	Font: 610 – 649 Rear: Not Available
Description:	This threshold represents the maximum average percent brightness of a grayscale or color image. Values above this threshold are considered to fail the image quality defect metric as too light.			
Additional Information:	The recommended threshold range for grayscale fronts is based on the analysis work performed during the FSTC Image Quality and Usability Phase 2 study of images in conjunction with Viewpointe. This value was based on a limited sampling of grayscale images, and should be regarded as a preliminary or tentative recommendation for use as part of a general image quality monitoring program.			

2.9.3 Third Image Test Parameter (P3)				
Test Parameter Name: Minimum Percent Contrast Threshold				
Test Parameter XML Name:	**Data Type:**	**Data Units:**	**Data Range:**	**Recommended Value(s) (Where Applicable):**
MinPercentContrastThreshold	Numeric	tenths of a percent	0-1000	Front: 230 – 259 Rear: Not Available
Description:	This threshold represents the minimum percent average contrast of a grayscale or color front image. Values below this threshold are considered to fail the image quality defect metric as too light.			
Additional Information:	The recommended threshold range for grayscale fronts is based on the analysis work performed during the FSTC Image Quality and Usability Phase 2 study of images in conjunction with Viewpointe. This value was based on a limited sampling of grayscale images, and should be regarded as a preliminary or tentative recommendation for use as part of a general image quality monitoring program.			

2.9.4 Fourth Test Parameter (P4)				
Test Parameter Name: Percentage of Lightest Pixels (P_N)				
Test Parameter XML Name:	**Data Type:**	**Data Units:**	**Data Range:**	**Recommended Value(s) (Where Applicable):**
PercentLightPixels	Numeric	percent	0-100	75% - 90%
Description:	Percentage of Lightest Pixels (P_N) is a computational parameter controlling the percent of total pixels that are included as the lightest gray level pixels present in the image (computed from the image gray level histogram). The value of N is computed using the formula N= (P_N/100)*Y where "Y" is the number of total pixels.			
Additional Information:	FSTC used a value of 90% in the FSTC Image Quality and Usability Phase 2 study.			

2.9.5 Fifth Test Parameter (P5)
Test Parameter Name: Percentage of Darkest Pixels (P_M)

Test Parameter XML Name:	Data Type:	Data Units:	Data Range:	Recommended Value(s) (Where Applicable):
PercentDarkPixels	Numeric	Percent	0-100	10% - 25%
Description:	Percentage of Darkest Pixels (P_M) is a computational parameter controlling the percent of total pixels that are included as the darkest gray level pixels present in the image (computed from the image gray level histogram). The value of M is computed using the formula M= (P_M/100)*Y where "Y" is the number of total pixels.			
Additional Information:	FSTC used a value of 10% in the FSTC Image Quality and Usability Phase 2 study.			

2.10	**Image Test Flag Pass/Fail Criteria:** *The Image Test Flag (see ANS X9.100-40-1-2006 for details) will convey one of the following four test conditions:* • *Condition not tested* • *Condition tested and result = fail* • *Condition tested and result = pass* • *Condition tested and result=indeterminate*	Results are reported independently for the Front and Rear image renditions. Selection of the threshold value corresponding to the image view (front or rear) is the responsibility of the implementer. The numbers in the parentheses in the formulae below refer to the section of this document where each result and parameter is defined If condition not tested then **flag=not tested** If condition tested then **flag = fail** if any of the following conditions is present: **Bitonal:** Percentage of Black Pixels (2.8.1) **<** Minimum Percentage of Black Pixels Threshold (2.9.1) **Grayscale or Color:** Percentage of Average Brightness (2.8.2) **>** Maximum Percent Brightness Threshold (2.9.2) **AND** Percentage of Average Contrast (2.8.3) **<** Minimum Percent Contrast Threshold (2.9.3) If condition tested and none of the fail conditions is present then **flag=pass** If condition tested but could not determine pass or fail for any reason then **flag=indeterminate**

3.0	**Restrictions & Intellectual Property**	
3.1	Are there any known restrictions in the use of the submitted check image test and related technology (technical, performance, legal, business, platform, etc.)?	☒ No ☐ Yes - *please provide details:*
3.2	Are proprietary Intellectual Property (IP) rights in the form of Patents associated with the description and use of the submitted check image test?	☒ No ☐ Yes – *Please provide patent and/or patent application numbers and indicate who owns the IP. Also provide evidence that the patent holder agrees to comply with the X9 Procedures including the X9 patent policy:*
3.3	Are proprietary Intellectual Property (IP) rights in the form of proprietary material and/or other intellectual property (e.g. specific to a vendor tool, device, or product) associated with the description and use of the submitted check image test?	☒ No ☐ Yes – *Please provide evidence that the owner agrees to provide the Proprietary IP Holder Statement contained in Annex B of ANS X9.100-40-2006 Part 2:*

Notice: *By accepting a check image test for registration, ASC X9 is not endorsing, certifying validity, certifying performance, nor providing any warranty for the registered check image test. The organization using the test shall determine which test(s) to use based on their own business needs, perceived benefit, and validation/ assessment of any test results provided by the check image test supplier, their own testing, or a third party.*