X9 REGISTRY FOR CHECK IMAGE TESTS

FSTC Image Out Of Focus #005.00

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W = Withdrawn (not for use)
S = Superseded (not for use - replaced by specified test)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 Out Of Focus		
Image Test Number	005.00		
Image Test Version	00		
Image Test Results (Ref. #):			
Image Focus Score (R1)	'0' through '100'		
Image Test Parameters (Ref #):			
Minimum Focus Threshold (P1)	'0' through '100'	Front: 46 Rear: Not Available	
Number of Pixels to Include "*N*" (P2)	'0' through '100'	64	

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 Out Of Focus
2.2	**Image Test XML Name:**	ImageOutOfFocus
2.3	**Image Test Definition:**	An image defect due to the image camera subsystem being "out of focus" resulting in blurred image renditions of the document.
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. The Image Out of Focus metric is used to flag the presence of an image which may be sufficiently blurry that the information on the image is unusable. The business impact may include: • Inability to read pre-printed and written information that is present on the source document due to the image being blurred. • Reduced performance of automated system processing due to loss of clarity of text in the image.
2.6	**Possible Causes for Condition Being Tested:**	Image Out of Focus may be due to: • An image camera that was not properly manufactured to the vendor's specifications. • A change in the image camera's optical-mechanical settings(s) after being installed/used at a client site. • Imaging of a document that is not positioned within the image camera's "depth of focus".

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 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.
		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.
		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: This metric has a defined data range 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.
		Value Reporting: The value of this metric will be reported under all image quality flag conditions. If the defect condition is "not tested" or "indeterminate", the value of the image metric(s) reported for this defect will be set to zero (0).

2.8	Test Results
	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: Image Focus Score				
Test Result XML Name:	**Data Type:**	**Data Units:**	**Data Range:**	**Margin of Error (in Data Units) (Where Applicable):**
ImageFocusScore	Numeric		0 - 100	10

Description:	The ratio of the maximum video gradient between adjacent pixels, measured over the entire image (excluding borders) and normalized with respect to the image's gray level dynamic range and "pixel pitch".
Formula and/ or Algorithm:	$$\text{Image Focus Score} = \frac{\text{Max(Video Gradient)}}{(\text{Gray Level Dynamic Range}) * (\text{Pixel Pitch})}$$ Where Video Gradient (Horizontal) = Absolute Value[Gray level for Pixel i) – Gray level for Pixel "$i+1$")] Video Gradient (Vertical) = Absolute Value[Gray level for Pixel j) – Gray level for Pixel "$j+1$")] Gray Level Dynamic Range = Average("N" Lightest Pixels) – Average("N" Darkest Pixels) Pixel Pitch = 1/Image Resolution (in DPI)
Additional Information:	See section 2.7. See 2.9.3 for definition and value of "N". **Special Score Truncation Rule**: An Image Focus Score of greater than 100 should be truncated to a value of 100. Notes: 1. *A horizontal video gradient is computed at each pixel in the image by computing the absolute value difference in gray level between the pixel (i) and the pixel located to it's right (i+1). A vertical video gradient is also computed for each pixel in the image by computing the absolute value difference in gray level between the pixel (j) and the pixel located below (j+1). The maximum video gradient is determined by recording the largest gradient value computed (either horizontal or vertical) measured over the entire image (excluding borders).* 2. *The gray level dynamic range for the image is computed by taking the difference between the average of the "N" lightest pixels and the average of the "N" darkest pixels in the image. This "N" parameters is not the same as the "N" and "M" parameters specified by FSTC in "Image Too Light" and "Image Too Dark".* 3. *Pixel pitch is computed by taking the inverse of the image resolution expressed in dots or pixels-per-inch.*

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 Test Parameter (P1)

Test Parameter Name: Minimum Focus Threshold

Test Parameter XML Name:	Data Type:	Data Units:	Data Range:	Recommended Value(s) (Where Applicable):
MinFocusThreshold	Numeric		0 - 100	Front: 46 Rear: Not Available
Description:	The threshold value at which focus was determined to have a reasonable probability of impacting the usability of the check image.			
Additional Information:				

2.9.2 Second Test Parameter (P2)					
Test Parameter Name: Number of Pixels to Include "*N*"					
Test Parameter XML Name:		**Data Type:**	**Data Units:**	**Data Range:**	**Recommended Value(s) (Where Applicable):**
NumberPixelsIncluded		Numeric		0 - 100	64
Description:	The number of pixels used to determine the average darkest and lightest pixel gray levels in the image. It is recommended that the value of *N* be 64. Therefore, the 64 lightest pixels in the image are averaged together and the 64 darkest pixels in the image are averaged together, to compute the "Gray Level Dynamic" range value.				
Additional Information:					

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 the following condition is present: Image Focus Score Front (2.8.1) **>** Minimum Focus Front Threshold (2.9.1) 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.*