



Public Review Comments and Responses
3M-2011 Projected Image System Contrast Ratio

MEMORANDUM

To: General Public,
InfoComm Performance Standards Steering Committee
Reviewers

From: Projected Image System Contrast Ratio Performance Standard Task Group

Date: May 27, 2011

Re: Projected Image System Contrast Ratio Performance Standard Public Review Comments and Responses for Draft Standard 1 (DS1)

The Draft Standard (DS1) was open for public review for 45 days. Per the *InfoComm Procedure for the Development of Standards*, the task group responsible for developing this Standard has considered and responded to all comments. This report details all comments and the task group's responses.

The InfoComm Performance Standards Steering Committee wishes to thank the public for volunteer review of the draft. Comment authorship is a matter of record; however, names have been withheld in this report for privacy considerations.

Please note:

1. Comments for any and all projects are given a number by InfoComm's document development system; comment chronology is not significant, however. Although comments may appear in relative chronological order, there may be numbering gaps if multiple documents in the system are open simultaneously for comment.
2. All comments are reproduced exactly as written without edits to spelling, grammar, or technical errors made by the reviewer.

Comment ID 99

Section: Appendix 2 **Page:** 15 **Line:** 529 **Subject:** Minor, nitpicky error editorial error

Reviewer's Comment:

In discussion of the Photometer specification for testing, the sentence construction is clumsy. One assumes the Minolta LS100 or 110 are the baseline and Sekonic L-558 and Minolta CS200 are acceptable alternatives. Perhaps its only the use of 'also' in both contexts that is confusing? Sentences read:

"Minolta LS100 or LS110 were also considered acceptable. In these tests, a Sekonic L-558 Cine and a Minolta CS200 were also utilized. Both fall within the CIE S002 specification"

Reviewer's Proposed Resolution:

Sentences could be reworked to identify preferred types and acceptable alternatives more clearly; perhaps:

"Minolta LS100 or LS110 were the preferred devices for this testing. A Sekonic L-558 Cine and a Minolta CS200 were also utilised and are considered acceptable as they both conform to CIE S002 specification."

I may have the emphasis wrong there, only the SMEs can adequately advise but its a standard so clarity is important...

Task Group Response:

The task group thanks you for your comment, has carefully considered your recommendation, and agrees that the sentences would benefit from greater clarity. Please note that this section is not meant to recommend any particular type of measurement equipment, rather, it describes the equipment the task group used during testing. For testing purposes, the task group intentionally utilized measurement equipment that represented the full range of potential financial investment required by available products meeting the equipment specifications of the Standard, to allay concerns that only very expensive equipment would be adequate to perform the required measurements. In an effort to clarify the intent and wording concerning test equipment, the task group will modify the sentences to read, "The measurement equipment used for testing met the equipment specifications for this Standard: Minolta LS100, Minolta LS110, Sekonic L-558 Cine, and Minolta CS200, all conforming to the CIE S002 specification."

Comment ID 100

Section: **Page:** **Line:** **Subject:** Headers near the end of document have wrong date

Reviewer's Comment:

Dates on headers are wrong

Reviewer's Proposed Resolution:

Task Group Response:

This comment is no longer valid, as the draft to which it refers is not the Standard Draft (DS1), but a committee draft.

Comment ID 101

Section: **Page:** **Line:** **Subject:** Resolutions

Reviewer's Comment:

The foreword mentions "The quality of a projected image is not determined by contrast alone....."
Please consider that video projectors will likely produce different black/white contrast levels at different resolutions, computer (VGA, XGA etc. and HD 720/1080). I'm not sure if this will affect the measurements or how the results are tabulated. Seems the standard does not make any mention of projector resolutions settings during the measurement process.

Reviewer's Proposed Resolution:

Perhaps the standard could include in the testing results (Detailed System Information form) an indication as to what resolutions the measurements were taken.

Task Group Response:

The task group thanks you for your comment and has carefully considered your recommendation. The task group considered the issue of resolution's effect on contrast ratio, and tested at different resolutions including XGA, WXGA, SXGA+, and 1080P. The differences in resolution did not yield a large enough change in contrast ratio to be statistically significant.

Comment ID 102

Section: Forward **Page:** **Line:** **Subject:** Better define "contrast ratio" in Forward

Reviewer's Comment:

Please consider a small text edit to better define "contrast ratio" in the Forward.

Reviewer's Proposed Resolution:

In the third sentence of the Forward, change the text "relative metric (expressed as a ratio)" to "relative metric (expressed as a ratio of projected image light to ambient light)"

Task Group Response:

The task group thanks you for your comment and has carefully considered your recommendation. Please refer to the definitions section of the document for clarification of the term "contrast ratio."

Comment ID 103

Section: 4 **Page:** 5 **Line:** 279 **Subject:** Better define "Viewing Area Plan"

Reviewer's Comment:

Adding a short definition of a "Viewing Area Plan" will make the concept easier to understand.

Reviewer's Proposed Resolution:

Please consider adding the following text as a paragraph in the Requirements section after the Viewing Area Plan is first mentioned in line 278:

"A Viewing Area Plan is a drawing of the room showing furniture, the screen and five measurement points."

Task Group Response:

The group thanks you for your comment and has carefully considered your recommendation. The group agrees that this will clarify the definition and will add a definition of the "Viewing Area Plan" to the Definitions section of the Standard to read, "Viewing Area Plan: Plan view drawing of the viewing environment that identifies five viewing locations as defined in the Requirements section of this Standard."

Comment ID 104

Section: 4 **Page:** 7 **Line:** 347 **Subject:** Better define a luminance meter

Reviewer's Comment:

Please consider better defining a "luminance meter" and differentiating it from an inexpensive illuminance meter.

Reviewer's Proposed Resolution:

Please consider adding a text to the Equipment Required section where the photometer is listed. The following sentence could be added after the current text:

"A luminance photometer is pointed at a subject and measures light that is reflected off of the subject. It is not an inexpensive illuminance meter which is held next to a subject and measures the light that is falling on the subject."

Task Group Response:

The task group thanks you for your comment and has carefully considered your recommendation. The Standard does not distinguish between meters in terms of cost, but only in terms of performance compliance. The definition of luminance and illuminance meters, and the distinction between them, is included in the Definition section of this Standard.

Comment ID 105

Section: **Page:** **Line:** **Subject:** Black vs System Black

Reviewer's Comment:

Historically in InfoComm's Design School the "Black" on a projector screen has been defined as "System Black" as projectors do not project black. The black squares as represented are a relative black or "System Black" as they represent the darkest condition the screen can reproduce under ambient light conditions.

Reviewer's Proposed Resolution:

Add a definition of black into the definitions category along the lines of, "Black as referenced in the standard is defined as the system's darkest image able be produced as affected by the ambient light level, the screen material and the light from the projector with a solid black image input."

Task Group Response:

The task group thanks you for your comment, has carefully considered your recommendation, and agrees with your request to include a definition for black level, to read, "Black Level: The lowest level of luminance a system is capable of producing."

Comment ID 106

Section: Appendix 4 **Page:** **Line:** **Subject:** Remove Appendix 4

Reviewer's Comment:

Appendix 4, optional HTML test, should not be included in the standard as it is not referenced anywhere in the actual standard. By including an optional and non-authoritative test in a standard, it devalues the

standard as a normative reference as it provide a depreciated reference which is not as authoritative and may be used in lieu of the actual define test (incorrectly) and used by some to reference compliance (incorrectly) as it is included as part of the standard (even as an appendix). While I am appreciate of the time spend in developing it, it is my understanding that is represents as previous test methodology that the task group choose not to pressure and therefore should not be included as part of the standard.

Reviewer's Proposed Resolution:

Remove Appendix 4 from the standard.

Task Group Response:

The task group thanks you for your comment and has carefully considered your recommendation and has determined that the html pattern generator is a valid tool for roughly estimating the performance of the system, is not a test, and is not part of the requirements of the Standard. As it is provided in the Appendix of the Standard, and is optional, the task group has determined that it is a valuable tool for rough estimation and it will remain in the Standard document.

Comment ID 107

Section:

Page: 8

Line: 403

Subject: Partially Conforms

Reviewer's Comment:

The conformance result category "Partially Conforms" in my opinion is a just about an oxymoronic statement as it depreciates the value of the benchmark definitions for contrast ratios set by the standard.

It was my understanding from the webinar that purpose of that definition was to deal with situation where, because of screen gain, off axis-viewing angles or ambient lighting, a test may pass as 4 locations and barely fail at 5th.

I think there are better ways of handling that issue including client education of what the test results really mean.

Reviewer's Proposed Resolution:

Remove "Partially Conforms"

As an option, add a new conformance result category called "Qualified Conformance" which is defined as "The contrast ratio of at least three measurement locations meet or exceed the contrast ratios required by the indentified viewing categories. This will be reported out the measurement form as 'This measurement of contrast ratio and qualified conformance at view locations X, Y, Z and fails to conform at locations A, B.'"

This would also require a revision of "Fails to Conform" to remove the 10% language.

Task Group Response:

The task group thanks you for your comment and has carefully considered your recommendation. Partial conformance, by definition, means that the requirements outlined by the Standard have not been fully met. To accommodate unavoidable environmental conditions that would prevent full conformance to the Standard, the task group considered this category of partial conformance as an appropriate qualifier. In light of your suggestion, the task group agrees that further clarification of intent is appropriate and will edit this text to include the words

"no more than four" to the partial conformance verification category, ensuring that at least one viewing location identified and measured is in conformance with the requirements of the Standard.

Comment ID 108

Section: **Page:** **Line:** **Subject:** Viewing Categories

Reviewer's Comment:

Overall, I find the standard to be well-written and well-conceived. However, there is one area which concerns me greatly: the viewing categories that are listed and the contrast ratios associated with each. In the real world of AV systems in buildings (which is where this standard is applicable), the contrast ratios associated with these categories will prove very problematic, and I fear litigious. First of all, I believe the Information Viewing category and the 7:1 ratio should go away. It is not clear to me (and I believe will not be clear to most readers of this standard) where this category would even apply in the real world (perhaps a sports bar using a projected image or a house of worship). To me, this category is not well defined and probably unnecessary.

The Basic Decision Making category is valid and fairly well defined (although not consistently defined in the document). I would guess that 80% to 90% of AV presentation spaces in commercial buildings would fall under this category (e.g. nearly all classrooms, conference rooms, training rooms, auditoria, etc.). The problem in my opinion is the 15:1 contrast ratio. That's a very high bar, and I would bet that 90% of classrooms, conference rooms, auditoria, etc. today do not meet that standard. If nearly all the AV presentation spaces in the real world do not meet 15:1, the industry could be in for a lot of pain and trouble if (as we should hope) owners begin to adopt this ANSI standard along with our whole suite of InfoComm ANSI standards. I believe that 10:1 is a much more realistic, yet still valid, contrast ratio for this Basic Decision Making category.

The Critical Decision Making category may be as unnecessary as the Informational Viewing category, but much more problematic. One space type implied under this category is courthouses. I would guess that virtually no courtrooms that use projection technology would meet this specification. If court systems around the world were to adopt this specification, a designer would have to specify a very large, bright, expensive, and potentially noisy projector or a rear-projection room (which is not likely to happen) to get to a 50:1 contrast ratio in a typical courthouse. The same question would apply to teaching hospital. Would a grand rounds auditorium have to meet 50:1? Again, I would bet that few, if any, do today. Will there be lawsuits filed by owners if their systems do not meet this specification? I believe these questions need to be seriously considered in the development and deployment of this standard. (I have no comment on the Full Motion Video category or contrast ratio specification since my firm does not do home theaters and very few screening rooms.)

Reviewer's Proposed Resolution:

I would strongly advocate eliminating the Informational Viewing and Critical Decision Making categories and have one category called Typical Presentation Environment with a 10:1 ratio. A second category called Video Theater could be included with either the 50:1 or 80:1 contrast ratio.

Task Group Response:

The task group thanks you for your comments and has carefully considered both your comments and recommendations.

The viewing categories and associated contrast ratios constitute the crux of the task group's work as they satisfied the requirements of the scope of the Standard. Both the categories themselves and the associated contrast ratio requirements reflect the findings of numerous tests and the expertise of a broad range of highly qualified subject matter experts. Please refer to Appendix 2 for details about the testing process, and Appendix 3 for the viewing categories rationale.

As stated in the abstract, this Standard defines four system contrast ratios based on content viewing requirements. The content viewing requirements are based on the needs of the viewer and the stated purpose of viewing. Establishing four viewing categories was predicated on the viewer's need to see a specific level of detail in the projected image, based upon a specific goal or purpose (i.e., a person watching TV has a different goal than a person assisting in a medical procedure). A discussion of the metrics can be found in Appendix 3 (Viewing Requirement Categories Rationale).

As audiovisual professionals representing a broad cross-section of the industry and with many years of combined experience, the task group is keenly aware that the current guidelines often suggest 10:1 as the acceptable ratio for contrast regardless of the purpose, and understands that this has been the guideline by which many AV systems have been designed. However, the goal of the task group was not to confirm or refute current best practices or to pass judgment on current facilities, but to stay within the stated scope of work, defining minimum requirements for audiovisual projected image systems contrast ratios based on test data, research, expertise, and due process.

To address your specific concerns:

Informational Viewing: The task group finds this category to be relevant and necessary. Please see Appendix 3 for an explanation. Based on your comments, the task group will scrutinize and review the definition of this category to ensure consistency throughout the Standard and accurate metrics per the stated purpose.

Basic Decision Making: Based on your comments, the task group will scrutinize and review the definition of this category to ensure consistency throughout the Standard and accurate metrics per the stated purpose. The task group has no data about the percentage of rooms that would or would not meet the requirements of the Standard, and cannot make any assumptions about existing systems based on conjecture. The task group defined minimum requirements based on test data, research, expertise, and due process. To address your concern about "real world" presentation spaces, the group asks that you consider all "system" variables, including ambient light, as integral parts of any projected image system, potentially affecting the resultant performance of the system.

Critical Decision Making: Based on your comments, the task group will scrutinize and review the definition of this category to ensure consistency throughout the Standard and accurate metrics per the stated purpose. The task group has no data about the percentage of rooms that

would or would not meet the requirements of the Standard, cannot make any assumptions about existing systems based on conjecture. The task group defined minimum requirements based on test data, research, expertise, and due process. Again, the group asks that you consider all “system” variables, including ambient light, as integral parts of any projected image system, potentially affecting the resultant performance of the system.

Please refer to Appendix 3 for a summary chart and detailed explanation of the viewing categories. Examples are provided.

Comment ID 109

This comment relates to a different document (8M TOR).

Comment ID 110

Section: **Page:** **Line:** **Subject:** Stereo projection

Reviewer’s Comment:

Very useful and long overdue generally.
There is nothing about active or passive stereo and as we are currently seeing a boom in such things I’d have thought that it would be an ideal time to cover this?

Reviewer’s Proposed Resolution:

None provided

Task Group Response:

The task group thanks you for your comment. The task group recognizes that the variables with this topic are complex and significant. Reconciling this complexity is outside the scope of this Standard.

Comment ID 111

Section: **Page:** **Line:** **Subject:** Query on method

Reviewer’s Comment:

I’m having difficulty interpreting the method for collecting the light level measurements.
The described method asks that a 16 square black & white checker board be projected on to a screen, then 16 corresponding light measurements be taken from each of the various audience positions.
Based on the information provided in the standard I don’t understand how that is possible (without a really long stick).
Regards,
Benjamin Keane, CTS-D

Reviewer’s Proposed Resolution:

Better clarify the method for collecting light level measurements.

Task Group Response:

The task group thanks you for your comment and has reviewed the method for measuring light levels and is satisfied that the Standard fulfills its obligation for clarity. Measurements for the Standard are luminance measurements taken at a distance (five viewing locations as specified in the Standard requirements) using a spot photometer.

Comment ID 112a

Section: **Page:** **Line:** Foreward

Subject: Please see notes in attached file

Reviewer's Comment:

The foreword states that "the standard applies to both front and rear projection", however there is no further description of tests or measurements of rear projection setups. Indeed given the description of the re-creation of ambient light in the evaluation setups. System black levels could be appreciatively affected using different rear (and indeed different front) screens which have reflectance values which are dependent on the incident illumination angle.

Reviewer's Proposed Resolution:

None provided.

Task Group Response:

The task group thanks you for your comment. As represented, this is a design issue rather than a performance issue. Tests were designed to eliminate all variables and provide a baseline that could be worked toward using other screen surfaces and types.

Comment ID 112b

Section: **Page:** **Line:** 58-87

Subject:

Reviewer's Comment:

Align viewing requirement categories with image size ratio best practice, particularly with reference to categories A-C.

Reviewer's Proposed Resolution:

Above.

Task Group Response:

The task group thanks you for your comment. Image size is not considered in the scope of this Standard; however, InfoComm has submitted notification to ANSI to begin work developing a standard that addresses display image size and is forming the task group to begin development.

Comment ID 112c

Section: **Page:** **Line:** 232

Subject:

Reviewer's Comment:

The screen cannot be represented by a line in an elevation drawing – it would be a square or rectangle.

Reviewer's Proposed Resolution:

None provided

Task Group Response:

The task group thanks you for your comment. The viewing plan, as required by the Standard, is, in fact, a plan view drawing and as such, the screen is represented by a line. We therefore find no fault with the screen being represented as a line.

Comment ID 112d

Section: Page: Line: 290 – 311 Subject:

Reviewer's Comment:

There could be instances where the 2 degree acceptance angle of a spot photometer may be wider than the 1/16th chequerboard test pattern area. This could particularly be the case when the installation is sub-standard in terms of screen size or viewing angles. For example, locations 1 & 2 in the example classroom layout could be a problem, but these locations are also outside the recommended viewing locations. 'Conforming' contrast measurement at this location would therefore be fairly meaningless since in the real world the view of the image would be compromised for other reasons. It might be better to define the off axis measurement positions by a maximum (45 degree?) angle from vertical centre line? Since the standard does not assume anything regarding screen size, there could also be instances where the test pattern areas are too small for correct spot measurements from locations 4 and 5. If the 4 extreme measurement points (1,2,4,5) are not constrained in some way then it may be impossible to get meaningful spot measurements. In summary – one simple question – Is the system contrast ratio using a front projection Lambertian screen affected by measurement angle?

Reviewer's Proposed Resolution:

None provided.

Task Group Response:

The task group has reviewed your comment. It would appear from your example that the viewers located in an area where the user of the Standard cannot make a valid measurement would imply that the space would fail to conform to the requirements of the Standard. Any viewers who fall outside the bounds of what can be measured with the process and equipment in the Standard are beyond the realm of reason. As you so aptly state, if the installation is "sub-standard," it would, in all likelihood, fail to conform to the requirements of the Standard.

Comment ID 112e

Section: Page: Line: 336 Subject:

Reviewer's Comment:

Could there be a reference here to the correct procedure? I recall the European Task Group discussing this procedure at length..... 'Setting proper white and black level' could be interpreted here as maximising the white level and minimising the black level, without paying attention to the grey scale. Given that the adjustment is most critical in affecting projector contrast, I feel this procedure should be more rigorously defined.

Reviewer's Proposed Resolution:

Task Group Response:

The task group thanks you for your well-stated comment, agrees with your recommendation, and will edit the description to read, "Use PLUGE pattern (or similar) to set proper black level (point at which pixels illuminate out of black) and grayscale pattern to set proper white level (point at which pixels dim out of full white)."

Comment ID 112f

Section: Page: Line: 400-410 Subject:

Reviewer's Comment:

Given comments relating to lines 290 -311, would it not be useful to coordinate the conformance criteria with the appropriate recommended viewing distances and angles relating to image size and location? This would also help to eliminate the 2 degree spot measurement acceptance angle from the more extreme or remote viewing locations which might be encountered in the real world.

Reviewer's Proposed Resolution:

None provided.

Task Group Response:

The task group thanks you for your comment. Although display image size is outside the scope of this Standard, InfoComm has submitted notification to ANSI to begin work developing a standard that addresses display image size and is forming the task group to begin development. Your comment related to "extreme" or "remote" viewing locations underscores the need for the projected image system contrast ratio requirements set forth in this draft.

Comment ID 112g

Section: Page: Line: 430 Subject:

Reviewer's Comment:

If we are addressing rear projection and 'optical' (non-Lambertian) front projection screens then ambient lighting angles become important and would need to be noted in this table. The table should also include angle of back row end seat to allow for fan shaped seating layouts.

Reviewer's Proposed Resolution:

Task Group Response:

The task group thanks you for your comment. The Standard applies to both front and rear projection. The testing methodologies and examples do not specify whether the tested image is front or rear projected. The group agrees with the comment's implicit observation that rear projection (and variants thereof) will typically outperform standard front projection systems per given ambient light level. However, in all cases, the Standard addresses system contrast ratio which includes ambient light (illuminance) on the screen. The task group accepts that there may

be viewing areas where some viewers are located within the implied boundaries of the Viewing Plan, but the Standard requires that the viewing locations identified and measured are those that are farthest and widest in both the front and rear of the space.

Comment ID 112h

Section: Page: Line: 432-486 Subject:

Reviewer's Comment:

The rationale and procedure only describes a front projection setup using a Lambertian surface. It also only describes measurements from an on axis viewing position.

Reviewer's Proposed Resolution:

Task Group Response:

The task group thanks you for your comment. A Lambertian surface was used to eliminate screen variables. Various gain and contrast enhanced screens may be used to bring a system into compliance, but this is a design issue, beyond the scope of the Standard. Please note that the task group also used actual off-axis viewing areas for the compliance testing.

Comment ID 112i

Section: Page: Line: 489-490 Subject:

Reviewer's Comment:

c.f comments on line 336. Dynamic range needs a definition here, since it can be interpreted as max white and min black rather than correct greyscale adjustment.

Reviewer's Proposed Resolution:

Task Group Response:

The task group thanks you for your comment, agrees with your recommendation, and will clarify this description to read, "Use PLUGE pattern (or similar) to set proper black level (point at which pixels illuminate from black) and grayscale pattern to set proper white level (point at which pixels fade from full white).

Comment ID 112j

Section: Page: Line: 502 Subject:

Reviewer's Comment:

Ambient light measured off the screen'? Should this be 'Ambient light measured at the screen'?

Reviewer's Proposed Resolution:

Task Group Response:

The task group thanks you for your comment. To clarify, the text refers to the environment in which the task group tested, and was referring to ambient light in the space away from the screen.

Comment ID 112k

Section: Page: Line: 605-606 Subject:

Reviewer's Comment:

I understood that the Infocomm best practice states 3 categories; General viewing, Detailed viewing and Inspection viewing. The adoption of 4 categories with different descriptions is confusing and does not relate to the current Infocomm best practice (e.g. http://www.ctsforav.com/documents/BestPractice_DisplaySize.pdf) A fourth category might well be appropriate, but the new categories should be compared with the Infocomm ones.

Reviewer's Proposed Resolution:

Task Group Response:

The task group thanks you for your comment. The goal of the task group was not to confirm or refute current best practices or to pass judgment on current facilities, but to stay within the stated scope of work, defining minimum requirements for audiovisual projected image systems contrast ratios based on test data, research, expertise, and due process. However, the first three categories as described in the Standard, although slightly different semantically, were evaluated and determined to equate quite well to the best practices taught by InfoComm. A fourth category was added to provide a minimum contrast ratio for viewing video (home theater), since this Standard applies to both commercial and home theater applications. Clarification of the category descriptions will be provided.

Comment ID 112l

Section: Page: Line: 694-730 Subject:

Reviewer's Comment:

The performance of this tool relies on the screen having even ambient illumination. It might be useful to have patterns with the text near the top and bottom of the image as well as in the centre, since in the real world most screens have more ambient light at the top rather than the bottom, and much content is formatted with the important stuff in the upper two thirds of the image.

Reviewer's Proposed Resolution:

Task Group Response:

The task group thanks you for your comment. The test pattern was not intended for precise measurement, only for rough estimation and checking. It is an optional tool included in the Appendix.

Comment ID 113

Section: Page: Line: Subject: This standard is an excellent one and long overdue. Thanks!

Reviewer's Comment:

Dear Committee,
The proposed standard draft has taken a practical approach to articulate and address a real need for an industry wide confusion and I really appreciate the effort and applaud the outcome.
Regards.
Richard

Reviewer's Proposed Resolution:

Task Group Response:

The task group thanks you for your support and is gratified that you find the Standard to be of benefit.

Comment ID 114

Section: N/A Page: Line: Subject: Overall reaction

Reviewer's Comment:

This is just a short note to congratulate all concerned. This is an excellent document that will be a real help to AV professionals. Its great benefit is that the main conclusions are easily understood while being rigorously supported.
Well done!

Reviewer's Proposed Resolution:

N/A

Task Group Response:

The task group thanks you for your support and is gratified that you find the Standard to be of benefit.

Comment ID 115

Section: Page: Line: Subject: Great information and effort, but too long

Reviewer's Comment:

Great information that obviously has significant effort behind it, but....

1. Needs to be simplified at least in presentation, if not in process.
2. Seems that Standard values should be based on a broader audience than only the task group members.
3. Perhaps it is just how it is presented, however the testing process defined seemed to only asses the impact of 7:1, 15:1, 50:1, 80:1 and 100:1 contrast ratios. Especially notable is the absence of the long accepted 10:1 ratio for image contrast. The stated Purpose is "...to define acceptable minimum contrast ratios for projected images, relative to their stated purpose or application." However, testing the effect of specific contrast ratios on different applications seems different than assessing the contrast ratios required for specific applications.

4. Needs to translate to practical design applications.
5. Why do the Exceptions on Page 2 specifically note in A that "This Standard is limited to projected image contrast ratio measurements and does not include related factors such as display luminance, image size or display resolution." but then at the bottom of Page 5 is states that the required Viewing Area Plan must identify the image size while the Sample Conformance Form with Optional Detailed System Information includes identifying the native projector resolution?

Reviewer's Proposed Resolution:

1. I still believe that the appropriate approach is to separate the 'performance standard' aspect from the testing process aspect. Using the ASTM definitions, this proposed Standard seems to be combining a Test Method Standard with a Specification Standard. I think that in the long term it is better to separate the two not only to keep each as short and simple as possible, but also to take advantage of Test Methods that could be common to more than one Performance Standard. Think of it this way, could the test measurement procedure defined here potentially apply as defined or in a slightly modified form to any other potential Performance or Specification Standards? If so, then the test method should probably be a separate Standard.
2. You have tens of thousands of people attending InfoComm, could that much broader audience be used to help assess or at least verify the proposed values and results?
3. The solution may be as simple as misunderstanding the test process that was used and that being clarified. Or perhaps the Purpose should be modified to reflect it actually being establishing acceptable applications for different contrast ratios. Or maybe the testing process should have been establishing goals for each application, varying the contrast until the goals were met and then documenting the resulting projected image contrast ratio.
4. It is great to have Standards for the measurement process and results, but are the tools there to translate this back to practical design application as stated on Page 1? Looking at the general projected white level and potential black levels on a screen is one thing, but I do not recall ever having been provided sufficient information on the proposed ambient light levels for 16 points on the screen or the projected image brightness at 16 at different points to be able to calculate the resulting average contrast ratio for five specific viewing locations. A simple example, are you working with projector manufacturers to provide more than a single lumen rating and/or a single uniformity value so that one can accurately predict the average white levels generated across the 8 points defined?
5. If the Standard is going to state that it does not include image size or display resolution, then it should not include them and references to them should be deleted. Or maybe "include" is simply not the right word to use in the Exceptions and "address" or some other terminology might be more appropriate.

Task Group Response:

The task group thanks you for your comments and has considered your recommendations. The task group considers the elements of the Viewing Area Plan as part of basic system information. Please review the Foreword of the Standard as there is a reference to the performance metrics you have mentioned. Image size is not considered in the scope of this Standard; however, InfoComm has submitted notification to ANSI to develop a standard that addresses display image size and is forming the task group to begin development. Practical design applications are outside the scope of this Standard. Please refer to the abstract for a clear understanding of what this Standard does, and does not, include. The Standard does not prescribe a testing method, rather a measurement method and conditions for effective measurement. InfoComm has met its obligation as an ANSI Standard Development Organization which precludes any need to further assess the values determined by the task group at the InfoComm show. The premise of your statement, "Seems that Standard values should be based on a broader

audience than only the task group members” is erroneous; the values for the Standard’s projected image system contrast ratios are not based upon task group members’ subjective opinions; they are based upon test data, research, and consensus. The test methodology mentioned in the Appendix is the rationale for the task group testing required to determine the metrics for measurement.

Comment ID 116

Section: Page: Line: Subject: 3M-2011 PISCR standard addendum for 3D Projection

Reviewer’s Comment:

I believe that this draft standard is very timely since the ANSI std has been discontinued. However, this standard does not address 3D projection. This technology is certainly not mainstream as of April 2011, but my company, no doubt along with others, has very compelling lab prototypes. These prototypes, all projection-based, range in useful size from 20" (using 3D LED-based pico-projectors) to 200" (yes, almost 18 feet in diagonal) using laser-illuminated LCOS projection systems. The PISCR standard would be more useful if it addressed these systems as well. This could be done with simple modifications to the standard s currently written:

- each channel should meet the standard individually as a 2D channel
- some new specs are needed for differences (deltas) between left (L) and right (R) channels
- some new specs are needed for allowable cross-talk between channels
- some new specs are needed for allowable focal length deltas between L and R
- some guidelines would be desirable for spacing between L and R projection lenses (if 2 lenses are used instead of one)
- some specs would be useful for allowable z-axis (depth) cue differences between L and R channels as these have the potential to affect perceived contrast ratios

Reviewer’s Proposed Resolution:

Task Group Response:

The task group thanks you for your thoughtful and well-stated comment. The task group agrees that the variables with 3D are significant and and may be best addressed through white papers, best practice documents, or a separate standard entirely. The topic of 3D is outside the scope of this Standard.

Comment ID 117

Section: Appendix 3 Page: Line: Subject: Viewing Requirement Categories

Reviewer’s Comment:

In general I am quite happy with the rationale behind the proposed standard. However, I found it very confusing trying to differentiate between the four viewing requirement categories.

For example, 'Basic Decision Making' is for "...information displays..." and allows that "Decisions made are based on comprehending the informational content itself and are not dependent on the resolution of every element of detail." "Information obtained from the projected image informs a decision..." This description would logically seem more likely tied to the category 'Informational Viewing.'

A second example - If your CEO shows a YouTube clip in his PowerPoint, are you now under the 'Full Motion Video' category? At what point do you need to conform to the 'Full Motion Video' standard rather than 'Basic Decision Making?' What about a venue that uses Image Magnification? Is that 'Full Motion Video', or something else?

Reviewer's Proposed Resolution:

Give the four categories names that more clearly communicate the intended applications for those standards. I don't think I have a perfect solution, but maybe something like:

- 1.) Casual/Passive Viewing
- 2.) Active/Presentational Viewing
- 3.) Analytical Viewing
- 4.) Private Theater Viewing

I'm assuming in this that the intent is for uses like image magnification and YouTube clips in PowerPoint presentations to go under category 2, not category 4.

Task Group Response:

The task group thanks you for your well-written comment. The task group feels your recommendation has great merit and on that basis will further refine the definitions of the viewing categories to provide clarification and differentiation.

Comment ID 118

Section: 259-265

Page: Line:

Subject: Contrast Ratio Figures

Reviewer's Comment:

My personal opinion on the 7:1 ratio for 'informational viewing' is that it is too low and encourages integrators to install systems that are only just acceptable.

I agree with the 15:1 and I believe this should be the target for all general installations.

I agree with your comment on Line 667 that the 50:1 ratio will in general practice be unachievable and as such becomes a nonsense. Targets have to be achievable to be meaningful.

I wholeheartedly agree with the methodology and concept. It is something the industry as a whole needs to grasp. However, when designing systems for new builds (possibly 30- 50% of system designs) we need to address the problem as a means of advising on ambient light control (natural and / or artificial) and the standard needs to address this aspect of AV System design.

Reviewer's Proposed Resolution:

For 'informational viewing' at 7:1, or 'critical decision making' at 50:1, the only solution I can suggest is to move the goalposts.

As for designing systems for new buildings at blueprint stage, the system should be reversed designed to propose the allowable level of ambient light reflecting off the screen plane and this should become part of the building design specification.

Task Group Response:

The task group thanks you for your comments and has considered your recommendations. The stated categories are the results of many tests and rigorous metric development. The scope of the Standard requires minimum acceptable contrast levels and leaves it to the user to determine which viewing category applies to the contrast level dictated by the intended purpose. The task

group's reflection as stated on line 667 in the Appendix does not mean to imply that 50:1 for Critical Decision is not achievable, rather that the designer would need to pay close attention to both the system design and environmental characteristics to achieve the desired contrast. The text will be modified to reflect this clarification. The task group agrees wholeheartedly with the issue of addressing ambient light control.

Comment ID 119

Section: Page: Line: Subject: question the use of ansi contrast vs full field

Reviewer's Comment:

When designing a meeting room or conference hall, using the ansi contrast is more difficult to calculate than full field. To measure perfectly ansi contrast of the projector a full dark room with black screen is needed. Sometimes this value is given by the manufacturer in the spec document. So far no real issue. However this environment is not achievable in real world rooms and hall. The real ansi contrast value will be once installed physically in the room with the white screen and room paint. Until that moment after instal it is not possible to calculate the presumed ansi contrast. This due to the reflections from the screen in the room and back on the screen.

For that I could be easier to just make the calculation of the full field contrast. At that moment only light sources like direct sunlight or lamps will reduce the full field contrast. They can also relatively easily be controlled by using direct light/ dimmers/ window cover foils without having the change architectural looks/design of the conference space. It is a efficient quick way to know the maximal achievable contrast in conference space. The ansi contrast can then further be improved by using dark neutral colored curtains or painted wall/ceiling.

Reviewer's Proposed Resolution:

None provided.

Task Group Response:

The task group thanks you for your comment. This Standard does not concern itself with projector contrast measurement. This Standard is specifically concerned with the contrast of the installed system, which includes the screen, projector, and ambient light, and it considers environmental factors of the room. This Standard does not include predictions of system contrast ratio, only requirements for measured readings.

Comment ID 120

Section: 137-177 Page: Line: Line 137-177 Subject:

Reviewer's Comment:

SMPTE has worked on this issue for many years. There is no reference that their standards, engineering practices or recommended practices have been considered.

Reviewer's Proposed Resolution:

None provided.

Task Group Response:

The task group thanks you for your comment. SMPTE documents were considered along with many other resources as the task group extensively researched contrast.

Comment ID 121

Section: 137-177 Page: Line: Line 137-177 Subject:

Reviewer's Comment:

SMPTE has worked on this issue for many years. There is no reference that their standards, engineering practices or recommended practices have been considered.

Reviewer's Proposed Resolution:

None provided.

Task Group Response:

This comment is identical to comment ID 120 and submitted by the same reviewer; no response is required.

Comment ID 122

Section: 290-311 Page: Line: Lines 290-311 Subject:

Reviewer's Comment:

These locations do not comply with SMPTE measurement locations. SMPTE as many similar locations called out. I would think we would not want to confuse the issue with this simple change.

Reviewer's Proposed Resolution:

None provided.

Task Group Response:

The task group thanks you for your comment. The SMPTE reference to which you refer is a best practice recommendation for a carefully controlled theatre environment (RP98-1995) whereas this Standard sets contrast ratio requirements with variable environments most commonly found in commercial audiovisual spaces. To reiterate; SMPTE documents were considered along with many other resources as the task group researched contrast.

Comment ID 123

Section: 316 Page: Line: Line 316 Subject:

Reviewer's Comment:

The mandatory Project Image System Criteria calls for a warm up of the project. How long are the observers to sit in the darkened room to allow their eyes to adjust for the low light adjustment for the "dynamic contract ratio", spatial contrast sensitivity or Weber Fechner Law II issues. This gets down to the of "night vision" and the ability for our eyes to adjust to dark settings. (This is an issue with the human side of the equation... what is acceptable, where the SME's tested in low light environments). Why was something like SMPTE 196 considered.

Reviewer's Proposed Resolution:

None provided.

Task Group Response:

The task group thanks you for your comment. The issue of human eye adjusting to light levels is indeed important and was discussed in the test rationale. However, in the setup requirements outlined by the Standard, light or dark adaptation is not controllable. The SMPTE 196m recommendation was considered by the task group, but refers to a cinematic environment, which is outside the scope of this Standard. Please see additional information in comment response ID123.

Comment ID 124

Section: 608 Page: Line: Subject: SME – subject matter experts

Reviewer's Comment:

Nothing has been stated as to the number, age, gender, quality of eye sight (aided / unaided). From my knowledge of the group, they all appear to fit a single demographic. If this is to be a standard based on human needs, the human sampling needs to be defined. Blackwell (line 154) in his publication at least stated his SME's eye sight level. A similar acoustical study has been done on the threshold of hearing and equal loudness curves called the Fletcher Munson curves. The original work was completed in the 1930's and it has been contested over the years, retested and adjusted. To date more than 17 subsequent tests with over 460 test subjects have been used to improve the accuracy of the Fletcher Munson curves / equal loudness curves.

The test group should be expanded to non industry experts of all ages, gender and nationalities. Given this standard will be applied to schools, it is important for us to understand how young and old view the need for contrast.

Reviewer's Proposed Resolution:

None provided.

Task Group Response:

The task group thanks you for your comment. Testing was based on measurements from meters. The task group used meters to measure and validate the contrast levels. The important metric for human sampling for this Standard was not the ethnicity or age of the test group, rather the visual acuity of the group. Task group members' eyesight was at 20/20 or above (normal or corrected) per the Snellen Eye Chart and the American Optometric Assn., taking into consideration the CSF (Contrast Sensitivity Function) of the human eye. In addition, the work of Peter Barten (Barten – Knegsel, Contrast Ratio Sensitivity of the Human Eye and its effects on Image Quality, HV Press, 1999) is listed as a normative reference for this Standard.

Comment ID 125

Section: Page: 316-488 Line: Subject: Lamp color

Reviewer's Comment:

Nothing is stated about the “temperature of the lamp” is it red, white or blue in hue? What is the reference source? This is an issue for SMPTE as outlined in Recommended Practice 59 – 1999.

Reviewer’s Proposed Resolution:

None provided, but SMPTE RP-59-1999, Color and Luminance of Review Room Screens for Viewing Motion-Picture Materials Intended for Slides or Film Strips, Archived 2004, was attached to the comment

Task Group Response:

See comment response to ID126. This comment is not germane to the scope of work as outlined. The group did not look at slides or filmstrips.

Comment ID 126

Section: Page: 499 Line: Subject: Light

Reviewer’s Comment:

It is stated that four 100 watt par lamps were used to set the ambient light levels. Did this light level look at the particle requirements of exiting light requirements? This will define the “ambient light level noise floor”. Did it address color change of the lamp from “white to red” as they were dimmed?

Reviewer’s Proposed Resolution:

None provided.

Task Group Response:

The task group thanks you for your comment. The task group did not concern itself with particle requirements of exiting lights as they are not germane to the scope of this Standard. The task group examined the impact different lighting types had on the projected image and factored the results into the test methodology. Color temperature variations were observed but measurements were ultimately limited to illuminance levels.

Comment ID 127

Section: Page: 525 Line: Subject: Luminance Measurement Equipment

Reviewer’s Comment:

No statement as to the last time the light meters were calibrated by a standards laboratory.

Reviewer’s Proposed Resolution:

None provided.

Task Group Response:

The task group thanks you for your comment. All light meters used for testing were professionally and currently calibrated.

Comment ID 128

Section: 81-87 Page: 265 Line: Subject: Full motion Video requires 80:1

Reviewer's Comment:

This is somewhat in conflict with SMPTE Digital Cinema standards that state theatres should be at 100:1. Again, have the SMPTE standards been consulted? Had the Digital Cinema Initiatives, LLC (DCI) looked for 2000:1 SEQUENTIAL Contrast ratio for their theatres. (page 81 to 87)

Reviewer's Proposed Resolution:

None provided, however; a document (Color Processing for Digital Cinema 4: Measurements and Tolerances) was attached to the comment.

Task Group Response:

The task group thanks you for your comment. This Standard does not address the cinematic experience you reference, as stated in the Exceptions section (item H). The task group is familiar with the SMPTE and DCI (Digital Cinema Initiative) documents you have attached or otherwise identified, and in fact, lists the 2009 Digital Cinema System Specification, Compliance Test Plan as an informative reference. Please refer to the Normative and Informative references provided in the Standard. Documents that included contrast recommendations of a qualitative nature were not listed as they were outside the scope of this Standard. Sequential contrast of 2000:1 is mentioned here but is not germane, as the Scope (Section 1) of the Standard states that the Standard does not use any kind of sequential test and instead measures contrast achievable on the same image at the same time using a 16-zone black and white intra-frame (checkerboard) test pattern as well as the Exceptions section (item E). The task group concerned itself with the minimum amount of contrast required by the information on screen necessary for a stated purpose, and loss thereof.

End of comments.