Record of Letter Ballot Review by TC Chapter for Procedural Review

Region/Locale: Japan
Global Technical Committee: Silicon Wafer
TC Chapter Cochairs: Tetsuya Nakai (SUMCO), Naoyuki Kawai (Meiji University) Ryuji Takeda (GWJ)
Standards Staff: Mami Nakajo

	Scheduled in Background Statement	Actual
Date	7/21/2020	01/15/2021
Location	San Francisco, CA	Tokyo, Japan
Reason for Change of Date and/or Location (if changed)	COVID-19 pandemic	

Note: See *Regulations* ¶ 9.5 Exceptions for allowable reason to change.

I. Document Number and Title

Document Number	Document Title
6363	Revision of SEMI M52-0214 With Title Change To: Guide For Specifying Scanning Surface Inspection Systems For Silicon Wafers For The 130 nm To 5 nm Technology Generations

II. Tally

Standards staff to fill in.

Voting Tally: As-cast tally after close of voting period

Note: A minimum of 60% of the Voting Interests that have TC Members within the global technical committee that issued the Letter Ballot must return Votes. (*Regulations* ¶ 9.6.2.1.1)

Voting Tally:

Voting Interest:	Returned Votes		Distribution		Return Rate	
Letter Ballot	55	÷	91	=	60.4%	≥60%
Intercommittee Ballot	31					
Voting Interest Reject(s)	0		Total Voters with Rejects			0
Voting Interest Accept(s)	42					

Note: See *Regulations* § 3.2.1 for definition of Voting Interest.

III. Rejects

None

IV. Other Technical Issues

V. Comments

V- (i) Voters' Comments

Commenter 1 (David Hyde/SCREEN) - Comment 1

Comment	*TF/TC Chapter to fill in section/paragraph #, if necessary.		
	In general no issues seen, however I am unable to comment on contents of Table 3, therefore I will abstain. Thank you for all of your hard work.		
Action	The TC Chapter agreed to do one of the following actions.		
	*No motion is required in this step.		
		Already addressed by Commenter #, Comment #	
	x	No further action was taken by the TC Chapter.	
		Refer to the TF for more consideration.	
		New Business	
		Editorial Change	
	Options for editorial change (check one)		Case 1: No vote in this section:
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V.*
			Case 2: Voted in this section:
			Original section number and at least one full sentence are required in "FROM" and "TO" fields.

This table is needed for each Comment accompanied a Vote

Commenter 2 (Richard Allen/NIST) - Comment 1

Comment	*TF/TC Chapter to fill in section/paragraph #, if necessary.
	1. **Wording in Scope** Section 2.1: Please change the beginning of the second sentence for clarity. My suggestion would be to change as follows: Current: Recommendations for the 130-11 nm generations are unchanged from previous versions of this Guide. The 7 and 5 nm node characteristics… Replacement: Recommendations for the 130 nm – 11 nm generations are unchanged from previous versions of this Guide. The 7 nm and 5 nm node characteristics…
A	The TC Chapter agreed to do one of the following actions.

	*No motion is required in this step.		
	Already addressed by Commenter #, Comment #		
	No further action was taken by the TC Chapter.		
	Refer to the TF for more consideration.		
	New Business		
x	Editorial Change		
	Options for editorial change (check one)	x	Case 1: No vote in this section:
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V.*
			Case 2: Voted in this section:
			Original section number and at least one full sentence are required in "FROM" and "TO" fields.

This table is needed for each Comment accompanied a Vote

Commenter 2 (Richard Allen/NIST) - Comment 2

Comment	*TF/TC Chapter to fill in section/paragraph #, if necessary.		
	2. Issues with LSE (multiple locations) **a. Please make clear what LSE means on first use. The COT has two definitions, "latex sphere equivalent" and "light scattering equivalent", either of which could apply based on context.** b. Table 1, line 1.13: need space between "nm" and "LSE" (4X) c. Table 3, line 3.1: need space between "nm" and "LSE" (4X)		
Action	**The TC Chapter agreed to do one of the following actions.**		
	*No motion is required in this step.		
	Already addressed by Commenter #, Comment #		
	No further action was taken by the TC Chapter.		
	Refer to the TF for more consideration.		
	New Business		
x	Editorial Change		
	Options for editorial change (check one)	x	Case 1: No vote in this section:
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V.*
			Case 2: Voted in this section:
			Original section number and at least one full sentence are required in "FROM" and "TO" fields.

Commenter 3 (Frank Riedel/Siltronic) - Comment 1

	*TF/TC Chapter to fill in section/paragraph #, if necessary.

Comm	**1) Section 5.3.12 states "For sizing calibration, deposition CRMs are available from a variety of sources." Unfortunately, for haze CRMs are not available. SEMI M52 does not mention at all neither haze "calibration" nor haze matching. I consider desirable having this topic included.**		
Action	**The TC Chapter agreed to do one of the following actions.**		
	***No motion is required in this step.**		
	Already addressed by Commenter #, Comment #		
	No further action was taken by the TC Chapter.		
	Refer to the TF for more consideration.		
x	New Business		
	Editorial Change		
	Options for editorial change **(check one)**		**Case 1: No vote in this section:**
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V*.
			Case 2: Voted in this section:
			Original section number and at least one full sentence are required in "FROM" and "TO" fields.

Commenter 3 (Frank Riedel/Siltronic) - Comment 2

Comment	***TF/TC Chapter to fill in section/paragraph #, if necessary.**		
	Table 3 Item 5.3 Calibration states "The number of calibration points <120 nm is limited to 4." This is true for KLA SP1. Is this statement still valid for later LLS equipment generations?		
Action	**The TC Chapter agreed to do one of the following actions.**		
	***No motion is required in this step.**		
	Already addressed by Commenter #, Comment #		
	No further action was taken by the TC Chapter.		
	Refer to the TF for more consideration.		
	New Business		
x	Editorial Change		
	Options for editorial change **(check one)**	x	**Case 1: No vote in this section:**
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V*.
			Case 2: Voted in this section:
			Original section number and at least one full sentence are required in "FROM" and "TO" fields.

Commenter 3 (Frank Riedel/Siltronic) - Comment 3

	***TF/TC Chapter to fill in section/paragraph #, if necessary.**

Co	**Table 3 Item 5.3 Calibration refers to SEMI M53 with respect to details of calibration procedure. Is the reference still valid for latest SP7 technology?**		
Action	**The TC Chapter agreed to do one of the following actions.**		
	***No motion is required in this step.**		
	Already addressed by Commenter #, Comment #		
x	No further action was taken by the TC Chapter.		
	Refer to the TF for more consideration.		
	New Business		
	Editorial Change		
	Options for editorial change **(check one)**		**Case 1: No vote in this section:**
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V*.
			Case 2: Voted in this section:
			Original section number and at least one full sentence are required in "FROM" and "TO" fields.

Commenter 3 (Frank Riedel/Siltronic) - Comment 4

Comment	***TF/TC Chapter to fill in section/paragraph #, if necessary.**		
	Here is a request for Table 3 "Metrology Specific Equipment Characteristics": Replace PSL by PSL/Silica, this way indicating both types of spheres are addressed.		
Action	**The TC Chapter agreed to do one of the following actions.**		
	***No motion is required in this step.**		
	Already addressed by Commenter #, Comment #		
x	No further action was taken by the TC Chapter.		
	Refer to the TF for more consideration.		
	New Business		
	Editorial Change		
	Options for editorial change **(check one)**		**Case 1: No vote in this section:**
			To be included and voted on as a group in § VI. *Editorial Changes Other than Those Voted on in § V*.
			Case 2: Voted in this section:
			Original section number and at least one full sentence are required in "FROM" and "TO" fields.

V-(ii) Comments Created by Handling Negative

None

VI. Editorial Changes Other than Those Voted on in § V

Original section/paragraph number and at least one full sentence are required in "FROM" and "TO" fields.

1	Origin of this editorial change **(Check one)**	**x**	Commenter 2/ Comment 1
			Other [ ]
	FROM: 2.1 This Guide outlines and recommends basic specifications for SSIS equipment used for the 130, 90, 65, 45, 32, 22, 16, 11, 7, and 5 nm technology generations. Recommendations for the 130-11 nm generations are unchanged from previous versions of this Guide. The 7 and 5 nm node characteristics are taken from the 2018 edition of the International Roadmap for Devices and Systems (IRDS)[1], the successor to the International Technology Roadmap for Semiconductors (ITRS).		
	TO: 2.1 This Guide outlines and recommends basic specifications for SSIS equipment used for the 130, 90, 65, 45, 32, 22, 16, 11, 7, and 5 nm technology generations. Recommendations for the 130 nm - 11 nm generations are unchanged from previous versions of this Guide. The 7 nm and 5 nm node characteristics are taken from the 2018 edition of the International Roadmap for Devices and Systems (IRDS)[1], the successor to the International Technology Roadmap for Semiconductors (ITRS).		
	Justification: (If necessary) **Editorial, clarifying the unit.**		
2	Origin of this editorial change **(Check one)**	**x**	Commenter 2/ Comment 2
			Other [ ]
	FROM: 5.4.3 All size units of LLS are given in [length unit]LSE (e.g., nmLSE) and refer to a nominal diameter.		
	TO: 5.4.3 All size units of LLS are given in [length unit]LSE (e.g., nmLSE) and refer to a nominal diameter. NOTE XX: In this document, the initialism *LSE* has the specific meaning *latex sphere equivalent*, rather than the general term *light scattering equivalent*. *Latex* refers to polystyrene spheres, polymerized in water suspension (hence *latex*) from the styrene monomer, to produce nearly perfect, highly monodisperse spherical nanoparticles. Although the most advanced SSIS systems use other materials (chiefly silica) for calibration and matching, widespread industry practice reports SSIS sizes and sensitivity thresholds in terms of [length unit]LSE.		
	Justification: **Editorial. Add a NOTE to explain that intended meaning is "latex sphere equivalent".**		

3	Origin of this editorial change **(Check one)**	**x**	Commenter 3/ Comment 2
			Other [ ]

FROM: Table 3 Metrology Specific Equipment Characteristics
Row 5.3

5.3 Calibration[#5]	Automated. The number of calibration points <120 nm is limited to 4. The interpolation between calibration points will be done by using the calculated and system specific predicted response curve (SEMI M53).	In order to reduce PSL or silica sphere sizing uncertainty in the 65–200 nm range, the diameter distribution should have a full width at half maximum (FWHM) ≤5%. In addition, it is desirable that the peak PSL diameter as deposited on the wafer have a relative expanded uncertainty at about 95% confidence level as small as possible but not greater than 3% (see SEMI M53, SEMI M58)

TO: FROM: Table 3 Metrology Specific Equipment Characteristics
Row 5.3

5.3 Calibration[#5]	Automated. The number of calibration points <120 nm is limited to 4[#6]. The interpolation between calibration points will be done by using the calculated and system specific predicted response curve (SEMI M53).	In order to reduce PSL or silica sphere sizing uncertainty in the 65–200 nm range, the diameter distribution should have a full width at half maximum (FWHM) ≤5%. In addition, it is desirable that the peak PSL diameter as deposited on the wafer have a relative expanded uncertainty at about 95% confidence level as small as possible but not greater than 3% (see SEMI M53, SEMI M58)

#6 Many advanced SSIS tools have additional calibration points < 120 nmLSE as their minimum detectable particle sizes have improved over time.

Justification:
Add footnote (editorial change): More than 4 calibration points exist for more advanced SSIS, commensurate with advanced sensitivity. Seller and buyer may mutually to any number of calibration points.

Motion	To approve the above editorial change(s).
Motion by/ 2nd by	Kurt Haller (KLA)/ Kenji Oka (Hitachi High-Tech)
Discussion	None
Vote	8 **Y**-0 **N**; Motion passed

VII. Approval Conditions Check

VII. - (i). Approval Rate

APPROVAL CONDITION 1: All Negatives have been discussed and were withdrawn, found not related, found not persuasive, or addressed by a technical change. (*Regulations* ¶ 9.6.2.1.2)

APPROVAL CONDITION 2: At least 90% of the sum of valid Voting Interest Accept and Voting Interest Reject Votes must be Accept. (*Regulations* ¶ 9.6.2.1.3)

Note: If both approval conditions are not satisfied, the Document fails.

		Accepts		(Accepts + Valid Rejects)				
Approval Rate	=	42	/	42	=	100.0%		≥90%

VII. – (ii) Approval Level (check one)

Note: See *Regulations* § 9.6.2 for further information.

X	**Globally Approved (No Ratification Ballot needed):** **The Letter Ballot meets the Letter Ballot approval conditions for the global technical committee.**
	Need a Ratification Ballot: **The Letter Ballot meets the Letter Ballot approval conditions for the TC Chapter and a Ratification Ballot will be issued to validate technical changes.**

VIII. Safety Check

Note: See *Regulations* § 15 for further information.

Motion		
	X	**This is not a Safety Document**, when all safety-related information is removed, the Document is still technically sound and complete. (*Regulations* ¶ 8.7.1)
		This is a Safety Document, when all safety-related information is removed, the Document is not technically sound and complete. (*Regulations* ¶ 8.7.2)
		Safety Checklist (*Regulations* ¶ 15.3) is complete and has been included with the Document throughout the balloting process. (*Regulations* ¶ 15.1.2)
Motion by/2nd by		Kurt Haller (KLA)/ Kenji Oka (Hitachi High-Tech)
Discussion		None
Vote		8 **Y**-0 **N**; Motion passed

IX. Intellectual Property (IP) Check

Note: This Letter Ballot may cover all or part of a Standard or Safety Guideline. Regardless of the coverage, this IP check applies to the entire Standard or Safety Guideline*. See *Regulations* § 16 for further information.

X	The TC Chapter meeting chair asked those participating, if they were aware of any patented technology that might be relevant (see *Regulations* ¶ 16.3.1.1) to the Standard or Safety Guideline; or, any copyrighted items or trademarks that are used/reproduced (see *Regulations* ¶ 16.4.1.2) in the Standard or Safety Guideline. (Also see, *Regulations* § 8.8)

	X	The question is NOT answered in affirmative (No potentially material patented technology or use/reproduction of copyrighted items/trademarks is known.)	**GO TO SECTION X.**			
		The question is answered in affirmative	Is any of the known IPs a patented technology?		**Yes, at least one of them is a patented technology**	**GO TO IX (a) "Patented Technology" subsection**
					No	**GO TO IX (b) "Copyright items" subsection**

IX(a) Patented Technologies subsection

IX(a1) Total numbers of Patented Technologies to be dealt with

# **Fill number**	**(l)** Known Patented Technology that might be relevant to the Standard/Safety Guideline	**#** **Fill number**	**(m)** Number of patented technologies first became known to the TC Chapter on or after the day of the issuance of this Letter Ballot	**Postpone assessment of such patented technologies to be performed at the next scheduled TC Chapter meeting.**
		# **Fill number**	**(n)** Number of patented technologies first became known to the TC Chapter before the day of the issuance of this Letter Ballot	**GO TO IX (a2)**

IX(a2) Assessment of disclosed patented technologies

Disclosed patented technology #1 (***Brief description, e.g., patent title and number***):			**Date of Assessment (If different from the date of Letter Ballot adjudication)** MM/DD/YYYY		
Is disclosed patented technology #1 found to be "might be material" to the Standard/Safety Guideline?		YES (It is a PMPT)	Is the use of this PMPT technically justified?	**YES**	**PROCEED to assess NEXT one, or if this is the last one, GO TO IX(a3)**
				NO	**The Document is failed and returned to the TF**
		NO	No further action is needed for patented technology #1		

This table is needed for each disclosed patented technology.

IX(a3) LOA status check of PMPT of which inclusion assessed to be justified

LOA Status of PMPT #1						
Has an LOA for this patented technology been received from every owner ?		YES	**PROCEED to check NEXT one, or if this is the last one, GO TO IX(b)**			
		NO	MOTIO		Ask ISC for special permission to publish.	
					Quit activity.	**The Document is failed and returned to the TF**

					Wait for LOA	**PROCEED to check NEXT one, or if this is the last one, GO TO IX(b1)**
			Motion by/ 2nd by			Name (Company)/Name (Company)
			Discussion			XXXX
			Vote			XX **Y**-XX **N**; Motion passed (or failed)

This table is needed for each PMPT of which inclusion assessed to be justified.

IX(b1) Total numbers of copyrighted items to be dealt with

# Fill number	**(o)** Known copyrighted items that are used or reproduced to the Standard/Safety Guideline		**o > 0** There is at least one known copy righted items that might be relevant to the Standard/Safety Guideline	**GO TO IX (b2)**
			o = 0 There is no disclosed copyrighted item	**GO TO IX (c)**

IX(b2) Assessment of disclosed copyrighted items

Disclosed copyrighted item #1 (***Brief description of its use in the Document***):						
Is disclosed copyrighted item #1 used or reproduced in the Standard/Safety Guideline?		YES	Is the use/reproduction of this copyrighted item technically justified?		YES	**PROCEED to assess NEXT one, or if this is the last one, GO TO IX(b3)**
					NO	**The Document is failed and returned to the TF**
		NO	No further action is needed for copyrighted item #1			

This table is needed for each disclosed copyrighted item.

IX(b3) Copyright release status check of copyrighted item of which inclusion assessed to be justified

Copyright release Status of copyrighted item #1						
Has the copyright release been received from its owner ?.		YES	**PROCEED to assess NEXT one, or if this is the last one, GO TO IX(c)**			
		NO	MOTION		Ask ISC for special permission to publish.	
					Quit activity.	**The Document is failed and returned to the TF**
					Wait for copyright release letter	**PROCEED to check NEXT one, or if this is the last one, GO TO IX(c)**
			Motion by/ 2nd by			Name (Company)/Name (Company)
			Discussion			XXXX
			Vote			XX **Y**-XX **N**; Motion passed (or failed)

This table is needed for each copyrighted item of which use/reproduction assessed to be justified.

IX(c) Assessment of disclosed (identified) trademark

Is there any trademark in the Standard/Safety Guideline?		YES	Is every instance of trademark use technically justified?		YES	**GO TO** IX(d)
					NO	**The Document is failed and returned to the TF**
		NO	**GO TO IX(d)**			

IX(d) IP check completion condition check

The co-chair checks if any Patented Technologies first become known to the TC Chapter on or after the day of the issuance of this Letter Ballot? i.e., m>0 in IX(a1)		YES	**Sections IX(a2) and IX(a3) shall be completed and recorded for such patented technologies at next scheduled meeting of the TC Chapter. Until then, the TC Chapter shall NOT go to** X (making motion to pass/fail this Document) **(see *Regulations* ¶ 16.4.1.2)** **Until then this Letter Ballot Review is on hold.**
		NO	**GO TO X**

X. Action for This Document

Motion		This Document passed TC Chapter review as balloted and will be forwarded to the ISC A&R SC for procedural review.
	X	This Document passed TC Chapter review with editorial changes and will be forwarded to the ISC A&R SC for procedural review.
		This Document passed TC Chapter review with technical changes and with or without editorial changes and will be forwarded to the ISC A&R SC for procedural review. A Ratification Ballot will be issued to verify the technical changes.
		This Document failed TC Chapter review and will be returned to the TF for rework.
		This Document failed TC Chapter review and work will be discontinued.
Motion by/ 2nd by		Kurt Haller (KLA)/ Kenji Oka (Hitachi High-Tech)
Discussion		None
Vote		8 **Y**-0 **N**
Final Action	X	Motion passed
		Motion failed

Note: If the use of PMPT or copyrighted item is justified by the TC Chapter, LOA or release form must be received before publication can proceed.