SEMI P9-0298
GUIDELINE FOR FUNCTIONAL TESTING OF MICROELECTRONIC RESISTS

1 Purpose

The purpose of this guideline is to provide a baseline program of test procedures needed to functionally test liquid-developed resists, resist developers, and rinses for microelectronic applications. It can also be used as a guide to evaluate process modifications to such systems. This guideline is intended to be applicable for photo, DUV, x-ray, and electron beam processes.

2 Background

Release of the information in this document was approved by the SEMI Photolithographic Chemicals Committee (Resist Committee) in May 1987. This committee plans to complete and revise the guideline as appropriate. Comments will be welcomed.

3 Scope

Virtually all lithographic fabrication processes vary in some way from location to location, even for the same type of resist. Consequently, it is impossible to provide a stringent evaluation program acceptable to most users. It is, therefore, the aim of this guideline to provide a program of tests and methods that allows variable, but controlled, process differences. In order to maintain a proper baseline control for each process, all tests should be run relative to some internal standard product whose functional characteristics are known and characterized. It is understood that each product is to be run at its own preferred or recommended conditions and that different products maybe evaluated under different conditions. It should also be understood that some properties, variables, or conditions, such as normality, are specific to resist type, such as positive photoresist, and are to be used only where applicable. Further, since this guide is directed to functional testing, it is assumed that any products to be evaluated have passed all relevant chemical and physical testing before such functional testing.

4 Priorities

This guideline has been divided into two separate groups. The first group, called "Sustaining Tests," includes tests that are necessary for timely adjustments to coating and exposure conditions in order to maintain consistent image dimensions (Tables 1–3). The second group, called "Extended Testing," includes tests that are required for full evaluation of the resist system (Tables 4–6). These tests may, or may not, be necessary for

evaluation of each lot of product, depending on the individual requirements of the user.

5 Referenced Documents

5.1 *ASTM Standards*[1]

F 518 — Practice for Determining Effective Adhesion for Photoresist of Hard-Surface Photomask Blanks and Semiconductor Wafers during Etching

F 527 — Practice for Adjusting Photoresist Exposure Time

F 528 — Method for Measurement of Common-Emmiter D-C Current Gain of Junction Transistors

F 804 — Practice for Producing Spin Coating Resist Thickness Curves

F 863 — Practice for Detection of Defects in Spin-coated Resist

F 890 — Practice for Determining Pinhole Density in Photoresist Films Used in Microelectonics Device Processsing

F 1059 — Standard Practice for Calculating the Contrast and Threshold Sensitivity of a Positive Photoresist

6 Terminology

6.1 *test method* — A definitive procedure for the identification, measurement, and evaluation of one or more qualities, characteristics, or properties of a material, product, system, or service that produces a test result.

Table 1 Sustaining Tests — Resist Coating

Characteristic	Measured Property	Variable	Fixed Conditions	Test Methods
Thickness curve	Film thickness	Spin speed	Viscosity/Solids	ASTM F 804
			Substrate	
			Measurement method	
			Softbake	
			Coating program	
			Acceleration	
			Dispense volume	
			Exhaust rate	
			Environment	
Film uniformity	Film thickness	Across	As above	
		Wafer to wafer		
Striations	Fringes		As above	
	Film thickness variation		Before and after developing	
Cleanliness	Particles	In/On coating	Filtration	ASTM F 863
		On substrate after removal	Housekeeping	
			External sources	
			Defect size	
			Test method	
Film integrity	Pin holes	Film thickness	As above	ASTM F 890

Table 2 Sustaining Tests — Characteristic Information

Characteristic	Measured Property	Variable	Fixed Conditions	Test Methods
Threshold energy	Film thickness	Exposure energy	Measurement method	
			Calculation method	
			Exposure conditions	
			Developer type	
			Developer normality	
			Development time	
			Rinse type(s)	
			Agitation/Spray	
			Softbake	
			Environment	
Development rate	Film thickness	Exposure energy	As above	
		Development time		
Contrast	Film thickness	Exposure energy	As above	ASTM F 1059
			Film thickness	
Resist loss	Film thickness	Development conditions	As above	
Scum	Resist residue	Environment	As above	

Table 3 Sustaining Tests — Imaging

Characteristic	Measured Property	Variable	Fixed Conditions	Test Methods
Focus	Resolution	Focus	Substrate	
		Exposure energy	Film thickness	
			Exposure method	
			Exposure conditions	
			Measurement method	
			Developer type	
			Developer normality	
			Development time	
			Development method	
			Rinse type(s)	
			Agitation/Spray	
		Development time		
			Softbake	
			Environment	
Exposure requirements	Line width	Exposure energy	As above	ASTM F 527
		Image size		ASTM F 528

Table 4 Extended Testing — Resist Coating

Characteristic	Measured Property	Variable	Fixed Conditions	Test Methods
Planarization	Film thickness variation	Film thickness	Coating method	
		Topography	Spin speed	
			Softbake	
			Environment	
			Orientation of topography	

Table 5 Extended Testing — Imaging

Characteristic	Measured Property	Variable	Fixed Conditions	Test Methods
Focus latitude	Line width	Exposure energy	Substrate	
	Film thickness variation	Focus	Film thickness	
	Resolution		Exposure method	
			Exposure conditions	
			Line width	
			Developer type	
			Developer normality	
			Development time	
			Development method	
			Rinse type(s)	
			Agitation/Spray	
			Softbake	
			Environment	
Exposure latitude	As above	Exposure energy	As above	
Development latitude	As above	Development normality	Line width	
	Contrast	Development time	Exposure conditions	ASTM F 1059
	Threshold energy	Development temperature	Developer type	
		Exposure energy	Development method	

Characteristic	Measured Property	Variable	Fixed Conditions	Test Methods
			Rinse type(s)	
			Agitation/Spray	
			Softbake	
			Environment	
Rinse latitude	As above	Composition	As above	
		Developer overlap		
		Rinse time		
Softbake latitude	As above	Softbake time	Line width	
		Softbake temperature	Exposure energy	
			Exposure conditions	
		Exposure energy	Film thickness	
			Ramp rate	
			Development conditions	
			Environment	
Thickness latitude	As above	Film thickness	As above	
		Exposed Energy	Substrate	
Resolution	As above	Exposure method	Substrate	
		Exposure energy	Exposure energy	
		Film thickness	Exposure conditions	
		Development conditions	Measurement method	
		Softbake conditions	Developer type	
			Development method	
			Rinse type(s)	
			Agitation/Spray	
			Focus	
			Softbake	
			Environment	
Resist profile	Wall angle	As above	As above	
	Corner rounding	Pre/Post treatment	Hardbake conditions	
	Shape			

Table 6 Extended Testing — Processing

Characteristic	Measured Property	Variable	Fixed Conditions	Test Methods
Thermal image stability	Shape	Temperature	Post exposure	
	Wall angle	Line width	Image hardening	
			Ramp rate	
	Corner rounding		Line width	
	Line width		Film thickness	
	Film integrity		Environment	
Wet etch adhesion (undercut/side)	Line width (top & bottom)	Etch time	Substrate	ASTM F 518
		Etch temp	Etch composition	
			Temperature	
			Resist treatment	
			Developer	
Wet etch adhesion (bias)	Line width etch-resist	As above	As above	
Dry etch resistance	Film thickness	Hardbake conditions	Ion	
	Line width	Image hardening	Process gases	
	Surface appearance		Process conditions	
Ion implant effects	Outgassing	Hardbake conditions	Ion	
	Film integrity	Image hardening	Power	
			Temperature	
			Film thickness	
Resist removal	Removal rate	Hardbake conditions	Stripping time	
	Residue	Post processing	Stripping temperature	
	Particles		Removal method	

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SEMI P10-0705
SPECIFICATION OF DATA STRUCTURES FOR PHOTOMASK ORDERS

1 Purpose

1.1 These data structure specifications are intended to facilitate the transmittal of mask order data between software systems to allow:

- automated order placement by mask customers and to allow the automatic processing of such orders by mask shops, and

- automated delivery of actual mask data by mask shops and to allow the automatic processing of such data by mask customers.

1.2 By using these standardized structures, software written independently for either mask customers or mask shops should be able to communicate unambiguously with software written by other parties.

2 Scope

2.1 This structure only defines the data format for the transmitted file. No particular database or programming language is specified by this standard, except that implementation of the Mask Results Data Structure Syntax is also shown in Extensible Markup Language (XML) Format for those that choose to use it. The data file is to be transmitted as an ASCII file. As such, it is compatible with the SECS-II standard.

NOTICE: This standard does not purport to address safety issues, if any, associated with its use. It is the responsibility of the users of this standard to establish appropriate safety and health practices and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 For a given customer, all pattern file names must be unique. (i.e., Pattern files which are different may not have the same name.)

3.2 For a given customer, all job file names must be unique. (i.e., Job files which are different may not have the same name.)

3.3 For a given customer, each mask set must have a unique identification.

3.4 For a given customer, each magnetic tape or other physical media delivered to the mask shop must have a unique identification.

3.5 All <pattern_data>, <job_data>, FRACTURE_FILE, MEASURE_FILE_NAME and CD_MATRIX_FILE_NAME files should be introduced through a <data> structure to be used within the <mask_order>. If such files are referenced in a <mask_order> without identification through <data>, specific methods to identify and locate such files must be established between the customer and the vendor.

4 Referenced Standards and Documents

4.1 *SEMI Standards*

SEMI P1 — Specification for Hard Surface Photomask Substrates

SEMI P2 — Specification for Chrome Thin Films for Hard Surface Photomasks

SEMI P4 — Specification for Round Quartz Photomask Substrates

SEMI P5 — Specification for Pellicles

SEMI P6 — Specification for Registration Marks for Photomasks

SEMI P21 — Guidelines for Precision and Accuracy Expression for Mask Writing Equipment

SEMI P22 — Guideline for Photomask Defect Classification And Size Definition

SEMI P24 — CD Metrology Procedures

SEMI P29 — Guideline for Description of Characteristics Specific to Halftone/Attenuated Phase Shift Masks and Mask Blanks

SEMI P35 — Terminology for Microlithography Metrology

SEMI P37 — Specification for Extreme Ultraviolet Lithography Mask Substrates

SEMI P38 — Specification for Absorbing Film Stacks and Multilayers on Extreme Ultraviolet Lithography Mask Blanks

SEMI P39 — Specification for Open Artwork System Interchange Standard (OASIS)

SEMI P43 — Photomask Qualification Terminology

4.2 *ISO Standards[1]*

ISO 4217:2001 — Currency and funds code list[2]

ISO 8601:2000 — Date and time notation[3]

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

5 Terminology

5.1 See §8.

6 Instructions and Conventions

6.1 Each record in the file will be composed of a specific keyword identifier followed by one or more data values, and will be terminated by a carriage return and/or linefeed.

6.2 Only records which are required to specify the order need to be included in the transmitted <mask_order> file, but each record included must appear in the sequence shown in the syntax specification.

6.3 Subsequent modifications or additions to the mask set require transmittal of all the information for the specific masks involved, including previously transmitted keywords and data fields if they still apply. Masks previously ordered which are not affected by the new order transmission may have their <mask_definition>, <mask_group> or <mask_set> omitted as appropriate.

6.4 Options are specified hierarchically such that those specified at a higher level are the default for all masks below, unless overridden at a lower level. The hierarchy is such that mask set options are overridden by mask group options, followed by mask definition, cell definition, cell instance, pattern group definition, and pattern definition.

6.5 Mask groups describe sets of masks which are similarly constructed. In simple cases there will be only one mask group per mask set. Multiple mask groups will be needed to describe mix-and-match sets, or for situations within a mask set where different features are required on some masks.

6.6 Pattern group definitions are intended for patterns which are similarly placed on all or most masks within a mask group (e.g., primary pattern files or test pattern files).

6.7 Cell definitions describe the construction of clusters of pattern groups and/or other cells. The PLACEMENT_TOP_CELL under a mask group describes the overall layout of the cells on all masks within the mask group.

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1 International Organization for Standardization, ISO Central Secretariat, 1, rue de Varembé, Case postale 56, CH-1211 Geneva 20, Switzerland. Telephone: 41.22.749.01.11; Fax: 41.22.733.34.30, Website: www.iso.ch

2 http://www.bsi-global.com/Technical+Information/Publications/_Publications/tig90.xalter

3 http://www.cl.cam.ac.uk/~mgk25/iso-time.html

6.8 Within a given mask set, each mask must have a unique identification (MASK_ID), independent of any titles on the mask.

6.9 Masks which require multiple writing operations (such as phase shift masks) will find those MASK_ID's identified with the same group number by the MULTIWRITE keyword.

6.10 The MASK_ID's defined under a mask group specify the masks to be built. The MASK_ID's also identify which patterns are to appear on the mask. A pattern is placed on the mask if and only if the MASK_ID matches the LEVEL_ID of a pattern referenced under the mask group's PLACEMENT_TOP_CELL.

6.11 <cell instance> and <pattern group instance> LOCATION's position the center of the patterns relative to the center of the CELL_ID referencing them. The cell referenced by the PLACEMENT_TOP_CELL is positioned at the center of the mask.

6.12 Job file data may be supplied in place of cell and pattern group data. In this case, the MASK_ID is understood to correspond to JOB_LEVEL in JOB_NAME.

6.13 For coordinate locations, unless otherwise specified for a given keyword, mask options are relative to the nominal center of the mask, while cell or pattern options are relative to the center of the cell or pattern. Mask coordinates are after scaling and mirroring, whereas cell and pattern options are before scaling and mirroring. The coordinates and directions refer to right-handed, rectangular (Cartesian) coordinates, applied to the substrate being written. All of these features and the orientation of all other patterns written on the substrate assume that it is from the perspective of the mask writing tool (i.e., "chrome side up"). The nominal center of the mask is determined using the bottom and left edges (chrome side up) and assumes nominal substrate dimensions. (See SEMI P1.)

6.14 All data in the structure will be in ASCII. The keyword in each record must include only upper case alphabetic characters and underscore.

6.15 Records (keyword, data value, comment and new line) may not exceed 256 characters. Some records may be repeated (e.g., BUSINESS_ADDRESS) in order to allow for longer field requirements; these are explicitly indicated in the syntax specification.

6.16 Comments may be included in records by preceding them with an exclamation point (!). Any data following an exclamation point and preceding a carriage return and/or linefeed will be ignored. Such comments are included in the 256 character record limit. If a record starts with an exclamation point, the entire record will be ignored. Only printable ASCII characters (plus spaces and tabs) are permitted in comments. Comments are for development and diagnostic purposes only. In commercial use, comments may always be ignored by the recipient without consequence. On the other hand, ADDITIONAL_..._INFO records must be evaluated by the recipient and applied to the masks being ordered, and may justify delay in mask delivery.

6.17 Spaces or tabs preceding the keyword will be ignored. At least one space or tab must precede the data field. Spaces and tabs imbedded in alphanumeric data fields will be preserved. Spaces or tabs may not be imbedded within numeric data values, but may be used to separate data values in multi-value data fields. At least one comma must appear between adjacent data values in multi-value data fields; more than one comma may not appear between adjacent data values. Spaces or tabs trailing the last data value in a data field will be ignored.

6.18 All numeric record values which require units will be in metric unless otherwise specified in §8. Units of length or position will be in microns unless otherwise specified.

6.19 Dates will be in the numeric format YYYY-MM-DD. Times will be in the format HH:MM:SSZ or HH:MMZ. Within the transmitted file, times and dates will always be Coordinated Universal Time (UTC) and times will be followed by the suffix Z.

6.20 Sizing to achieve a CD_TARGET from a CD_DATA must be applied to all pattern files hierarchically affected by the CD_TARGET record.

6.21 Binary data manipulation operations expect operands (input pattern files) to align center-to-center. This requires that DATA_PATTERN_WINDOW be defined for patterns which do not contain an explicit record of file extents.

6.22 All references to horizontal (or "x") and vertical (or "y") correspond to normal Cartesian coordinates and assume the rotational orientation of the substrate when the mask was written.

6.23 All <shippable_data> keywords can be followed by <ship_to> specifying the destination and/or method of transmission for the transmitted data. Whenever applicable, the SEMI <mask_results> file (see §7.5) should be sent accordingly if electronic transmission is specified.

6.24 <shippable_data> keywords which require reference to specific mask feature locations will reference CD_SITE_ID and/or REGISTR_MARK_ID which must be unique for each location within all transmissions of <mask_order> for a given MASK_SET_ID.

6.25 When modifications to this standard are required between ballot cycles (e.g. new data field values "on request"), users should contact the N.A. SEMI P10 task force leader directly. After a poll of the active task force members, a tentative recommendation will be posted on the SEMI P10 task force web site at SEMI so that all users can adopt a common interim solution until a formal ballot can officially resolve the issue.

6.26 Every effort should be made to construct a SEMI P10 file without inconsistencies or ambiguities. If a vendor detects such flaws in a file from a customer, the vendor should contact the customer to correct the inconsistencies and/or remove the ambiguities before proceeding with making the mask.

7 Syntax Specification

The following specifies the syntax for the mask order structures. The record order is specific; records must appear in the sequence shown. Terminology for the individual records and their allowed data values are specified in §8.

7.1 *Syntax Symbol Definition* — The lower case syntactic names within < > are used to refer to collections of records. The use of { } around records or collections of records means an arbitrary number of repetitions of the records, including none at all. The use of [ ] around a record or collection of records means that the collection is optional.

7.2 *Record Syntax* — A keyword is followed by a data field which is followed by an optional comment. The record is terminated by a carriage return and/or linefeed. Each of these elements may be preceded by any combination of spaces or tabs, which will be ignored. At least one space or tab is required preceding the first data value in the record. An exclamation point (!) is required to initiate a comment. Exclamation points, carriage returns, and linefeeds are not allowed in keywords, data values or comments. Note that a record consisting of a comment only is also allowed. The syntax for individual records is defined as:

> <record> = [{<separator>} <keyword>
>
> <separator> {<separator>} <data_field>]
>
> [{<separator>} ! <comment>]
>
> {<separator>} <new_line>

where "separator" is a space or a tab, "comment" is any string of printable ASCII characters (plus spaces and tabs), and "new_line" is a carriage return, linefeed or both.

7.3 *Multi-value Data Field Syntax* — When data_field contains more than one data_value, such as (x,y) pairs or (x1,y1,x2,y2) double pairs (see §8), the individual values must be separated by a comma and any combination of spaces or tabs. One comma is required between each data_value, but not more than one comma. Two commas without an intervening data value are not permissible.

(x,y) = data_value {separator} comma {separator} data_value

(x,y,z) = (x,y) {separator} comma {separator} (z)

(x1,y1,x2,y2) = (x1,y1) {separator} comma {separator} (x2,y2)

(x,y,x1,y1,x2,y2) = (x,y) {separator} comma {separator} (x1,y1,x2,y2)

For data manipulation operations only, a semicolon separates layers from its datatype, and a dash indicates a range of layers or a range of datatypes.

layer1;datatype6 , layer3-layer4;datatype1-datatype9

7.4 *Mask Order Structure Syntax* — The following syntax definition uses the upper case keyword to represent the permissible applications of the corresponding data record within the mask order structure.

<mask_order> =	START_ORDER SEMI_REVISION CUSTOMER VENDOR
	FILE_DATE_TIME [OPERATOR_NAME]
	<mask_set> END_ORDER CHECKSUM
<mask_set> =	MASK_SET_ID <mask_set_options> END_MASK_SET_OPTIONS
	{<mask_group>} END_MASK_SET
<mask_set_options> =	[BUSINESS_CONTACT] {BUSINESS_ADDRESS} {BUSINESS_PHONE}
	{BUSINESS_FAX} [BUSINESS_EMAIL]
	[BILLING_CONTACT] {BILLING_ADDRESS}
	{BILLING_PHONE} {BILLING_FAX} [BILLING_EMAIL]
	[DESIGN_RULE] [FAB_TECHNOLOGY] [WAFER_FAB]
	[CUSTOMER_SPEC CUSTOMER_SPEC_REVISION]
	{WAIVER} {WAIVER_OVERRIDE}
	[PRICE_UNITS]
	[SECURITY_CLASS] [QS9000]
	[ENGINEERING_CONTACT] {ENGINEERING ADDRESS} {ENGINEERING_PHONE}
	{ENGINEERING_FAX} [ENGINEERING_EMAIL]
	[SHIPPING_CONTACT] {SHIPPING_ADDRESS} {SHIPPING_PHONE}
	{SHIPPING_FAX} [SHIPPING_EMAIL]
	{SHIPPING_METHOD}
	[REPAIRS_AUTHORIZED]
	[<shippable_data>]
	{<data>}
	{<standard_pattern>}
	[MASK_SET_NAME [MASK_SET_VERSION]] [ORDER_ID]
	{ADDITIONAL_MASK_SET_INFO}
<data> =	DATA_MEDIUM [DATA_LOCATION] [DATA_ID]
	[DATA_FORMAT [DXF_ANGLE DXF_UNIT]]
	[DATA_DENSITY] [DATA_FILE_SIZE]
	[DATA_COMPRESSION] [DATA_CONSOLIDATION] [DATA_ENCRYPTION]
	[DATA_CHECKSUM DATA_CHECKSUM_TYPE]
	{<pattern_data>} {<job_data>}
	[FRACTURE_FILE FRACTURE_FILE_FORMAT]
	{MEASURE_FILE_NAME [MEASURE_FILE_FORMAT] }
	{CD_MATRIX_FILE_NAME [CD_MATRIX_FILE_FORMAT] }
	END_DATA_MEDIUM
<pattern_data> =	DATA_PATTERN_NAME {PATTERN_FORMAT} [DATA_FILE_NUMBER]
	[PATTERN_UNITS] [PATTERN_CHARACTER_SET]

[FRACTURE_FILE]

{ [<data_manipulation>] [<data_function>] }

END_DATA_PATTERN_NAME

<data_manipulation> =   START_DATA_MANIPULATION

[BOOLEAN

[PATTERN_GENERATION_AREA]

<data_file_parameters> { <data_file_parameters> }]

{<data_fracture>}

END_DATA_MANIPULATION

<data_file_parameters> =   DATA_SOURCE_FILE [PATTERN_FORMAT]

[DATA_TOP_CELL] [DATA_LAYER_ID]

[DATA_PATTERN_WINDOW]

{<data_fracture>}

END_DATA_SOURCE_FILE

<data_function> =   START_DATA_FUNCTION

DATA_FUNCTION_PURPOSE

{ SOFTWARE_NAME {SOFTWARE_REVISION}

{ RUNSET_NAME [RUNSET_REVISION] [DATA_LOCATION]

{ PARAMETER_FILE_NAME [PARAMETER_FILE_REVISION] }

{ INPUT_FILE_NAME INPUT_FILE_FORMAT

[TOP_CELL] [DATA_LOCATION] }

{RESULT_FILE_NAME} {SUMMARY_FILE_NAME} {LOG_FILE_NAME} } }

END_DATA_FUNCTION

<data_fracture> =   START_DATA_FRACTURE

[SIZING [SIZING_RULE] [SIZING_BORDER_RULE]]

[FRACTURING_SCALE] [DATA_SCALE_FACTOR]

[PATTERN_ADDRESS_SIZE]

[DARK_INTERNAL_WINDOW] [CLEAR_INTERNAL_WINDOW]

[EXTERNAL_WINDOW] [ROTATION] [MIRROR]

END_DATA_FRACTURE

<job_data> =   DATA_JOB_NAME   JOB_FORMAT

<standard_pattern> =   STD_PATTERN_NAME   PATTERN_FORMAT

<mask_group> =   MASK_GROUP_ID [<mask_options>] END_MASK_GROUP_OPTIONS

PLACEMENT_TOP_CELL {<mask_definition>}

{<cell_definition>} {<pattern_group>} END_MASK_GROUP

<mask_options> =   [BLANKET_PO_NUMBER] [PO_NUMBER] [SO_NUMBER] [ORDER_ID]

[RELEASE_NUMBER] [LINE_ITEM_NUMBER] [QUOTE_NUMBER]

[STATUS]

[DUE_DATE_TIME_REQUESTED] [DELIVERY_PRIORITY]

[LAYER_PRIORITY [ELAPSED_TIME]]

[MILESTONES <ship_to>] [PERIODIC_UPDATES <ship_to>]

[ESTIMATED_ARRIVALS <ship_to>]

[BUSINESS_CONTACT] {BUSINESS_ADDRESS} {BUSINESS_PHONE}

   {BUSINESS_FAX} [BUSINESS_EMAIL]

[BILLING_CONTACT] {BILLING_ADDRESS}

   {BILLING_PHONE} {BILLING_FAX} [BILLING_EMAIL]

[PRICE]

{PTC_HOURS [PTC_RATE] [PTC_FIXED] }

[EWT_THRESHOLD EWT_RATE [EWT_CEILING]]

[SECURITY_CLASS] [QS9000]

[SHIPPING_CONTACT] {SHIPPING_ADDRESS} {SHIPPING_PHONE}

   {SHIPPING FAX} [SHIPPING_EMAIL]

{SHIPPING_METHOD}

[REPAIRS_AUTHORIZED]

[<shippable_data>]

{ MFG_SITE_REQD }

{ [LITHO_EQUIP_REQD] {EQUIP_SITE_REQD}

      { [LITHO_MODEL_REQD] {LITHO_MODE_REQD} } }

PRODUCT_TYPE [PRODUCT_MAGNIFICATION] [PRODUCT_IMAGING_TYPE]

      [QUANTITY] [PRODUCT_AS_CHECKPLATE]

[MULTIWRITE]

{WAFER_EXPOSURE_TOOL}

[<wafer_exposure_data> <aerial_image_data>]

[FAB_TECHNOLOGY] [WAFER_FAB]

[JOB_NAME] [JOB_LEVEL]

[RETROFIT_JOB_NAME] [RETROFIT_JOB_LEVEL]

[RETROFIT_MASK_SET_ID] [RETROFIT_MASK_ID]

[RETROFIT_MASK_SET_NAME [RETROFIT_MASK_SET_VERSION]

   [RETROFIT_MASK_NAME]]

{<title_data>}

{<barcode_data>}

[JOB_ONLY_APPROVAL_REQD] [JOB_WITH_PATTERNS_APPROVAL_REQD]

{PATTERN_APPROVAL_REQD} [ALL_PATTERNS_APPROVAL_REQD]

{APPROVAL_REQD}{REVIEW_REQD}

[SERIAL_NUMBER]

[MIRROR_MASK] [MASK_ROTATION]

<substrate>

[<phase_shift>]

[UT1X_UNCUT] [PROCESS] [PROCESS_ETCHING_TYPE]

[CUSTOMER_SPEC CUSTOMER_SPEC_REVISION]

{TOP_PELLICLE_TYPE [TOP_PELLICLE_CENTRALITY_ERROR] [PRICE] }

{BOTTOM_PELLICLE_TYPE [BOTTOM_PELLICLE_CENTRALITY_ERROR] [PRICE]}

[GUIDES_REQD [PRICE]]

[CENTRALITY]

{<registration>}

[REGISTR_CLOSURE [REGISTR_CLOSURE_REFERENCE_ONLY]

    {REGISTR_CLOSURE_EQUIP_REQD} {EQUIP_SITE_REQD}

    [REGISTR_CLOSURE_BEGIN REGISTR_CLOSURE_END]]

[BUTTING_ERROR [BUTTING_ERROR_METHOD]]

{<cd_group>}

{<cd_set>}

{<cd_xy_definition>}

{<cd_iso_dense_definition>}

[MIN_MASK_FEATURE_SIZE] [MIN_CORNER_TO_CORNER_GAP]

[PERCENT_CLEAR]

{<opc_definition>}

{<defect_definition>}

[INSPECTION_REF_LOCATION]

{<surface_definition>}

[INSPECT_THROUGH_PELLICLE <defect_definition>]

{<sem_photo>}

[QUALITY_GROUP_ID]

[COMPACT_LABEL]

{PACKAGE [MAX_MASKS_IN_PACKAGE] }

{ADDITIONAL_MASK_INFO}

<wafer_exposure_data> = START_WAFER_EXPOSURE_DATA

    WAFER_EXPOSURE_NUMERICAL_APERATURE

    [WAFER_EXPOSURE_SIGMA]

    [WAFER_EXPOSURE_SIGMA_INNER WAFER_EXPOSURE_SIGMA_OUTER]

    WAFER_EXPOSURE_ILLUMINATION

    END_WAFER_EXPOSURE_DATA

<aerial_image_data> = START_AERIAL_IMAGE_DATA

    AIM_WAVELENGTH

    [AIM_INTENSITY_VARIATION_DELTA]

    [AIM_FLUX_INTENSITY_DELTA]

    [AIM_CD_DELTA]

    END_AERIAL_IMAGE_DATA

<title_data> = START_TITLE [TITLE_TEXT] [TITLE_TYPE] [TITLE_FONT] [TITLE_HEIGHT]

    [TITLE_MAG] [TITLE_JUSTIFICATION] [TITLE_LOCATION] [MIRROR_TITLE]

	[ROTATE_TITLE] [ROTATE_TITLE_CHARACTERS] END_TITLE
<barcode_data> =	START_BARCODE [BARCODE_TYPE] [BARCODE_TEXT] [BARCODE_LOCATION]
	[BARCODE_ROTATION] END_BARCODE
<substrate> =	START_SUBSTRATE
	[BLANK_SIZE] [BLANK_TYPE] [BLANK_GRADE] [BLANK_FLATNESS]
	[MASK_COATING] [RESIST_TYPE] [RESIST_THICKNESS]
	[BLANK_BIREFRINGENCE_REQD]
	[ATTENUATOR] [COATING_GRADE]
	[<euv_blank_type>]
	END_SUBSTRATE
<euv_blank_type> =	EUV_BLANK_TYPE
	EUV_FLATNESS_FRONT
	EUV_FLATNESS_BACK
	EUV_MULTILAYER_COMPOSITION
	EUV_CAPPING_COMPOSITION
	EUV_MMR_WAVELENGTH
	EUV_MEAN_PEAK_REFLECTIVITY
	EUV_PEAK_REFLECTIVITY_UNIFORMITY
	EUV_ABSORBER_COMPOSITION
	EUV_ABSORBER_OPTICAL_PROPERTIES
	EUV_BLANK_RESISTANCE
	EUV_EXPANSION_COEFF
<ship_plot> =	START_SHIP_PLOT
	PLOT_TYPE PLOT_SCALE QUANTITY [PRICE]
	[PLOT_FORMAT] [PATTERN_PLOT_NORMAL_TONE]
	[<ship_to>]
	END_SHIP_PLOT
<films> =	SHIP_FILM [QUANTITY]
	[FILM_SCALE] [FILM_SIZE] [FILM_COLOR] [FILM_NORMAL_TONE]
	[PRICE] [<ship_to>] END_SHIP_FILM
<phase_shift> =	START_PHASE_SHIFT [PHASE_SHIFT_QUALITY_ID]
	PSM_WAVELENGTH
	[TRANSMISSION_TARGET
	[TRANSMISSION_REFERENCE_ONLY]
	[TRANSMISSION_TOLERANCE]
	[TRANSMISSION_RANGE] [TRANSMISSION_ERROR]
	{TRANSMISSION_EQUIP_REQD [TRANSMISSION_MODE_REQD] }
	{ [TRANSMISSION_MARK_SITE_ID] TRANSMISSION_MARK_LOCATION }
	[TRANSMISSION_MARK_FEATURE]
	[TRANSMISSION_MARK_LOCATION_DRAWING]

[TRANSMISSION_MARK_DRAWING]]

[PHASE_ANGLE_TARGET

[PHASE_ANGLE_REFERENCE_ONLY]

[PHASE_ANGLE_TOLERANCE]

[PHASE_ANGLE_RANGE] [PHASE_ANGLE_ERROR]

{PHASE_ANGLE_EQUIP_REQD [PHASE_ANGLE_MODE_REQD] }

{ [PHASE_ANGLE_SITE_ID] PHASE_ANGLE_MARK_LOCATION }

[PHASE_ANGLE_MARK_FEATURE]

[PHASE_ANGLE_MARK_LOCATION_DRAWING]

[PHASE_ANGLE_MARK_DRAWING]]

[ETCH_DEPTH_TARGET

[ETCH_DEPTH_REFERENCE_ONLY]

[ETCH_DEPTH_TOLERANCE]

[ETCH_DEPTH_RANGE] [ETCH_DEPTH_ERROR]

{ETCH_DEPTH_EQUIP_REQD [ETCH_DEPTH_MODE_REQD] }

{ [ETCH_DEPTH_SITE_ID] ETCH_DEPTH_MARK_LOCATION }

[ETCH_DEPTH_MARK_FEATURE]

[ETCH_DEPTH_MARK_LOCATION_DRAWING]

[ETCH_DEPTH_MARK_DRAWING]]

END_PHASE_SHIFT

\<registration\> =   START_REGISTR [REGISTR_QUALITY_ID]

[REGISTR_ERROR] [REGISTR_SCALE [REGISTR_SCALE_REFERENCE_ONLY]]

[REGISTR_RESIDUAL [REGISTR_RESIDUAL_REFERENCE_ONLY]]

[REGISTR_THREE_SIGMA [REGISTR_THREE_SIGMA_REFERENCE_ONLY]]

[REGISTR_RESIDUAL_THREE_SIGMA

   [REGISTR_RESIDUAL_THREE_SIGMA_REFERENCE_ONLY]]

[REGISTR_TOLERANCE]

[REGISTR_ORTHO [REGISTR_ORTHO_REFERENCE_ONLY]]

[REGISTR_RELATIVE [REGISTR_RELATIVE_REFERENCE_ONLY]]

{REGISTR_REF_MASK_ID REGISTR_REF_MASK_SET_ID}

{REGISTR_REF_MASK_NAME REGISTR_REF_MASK_SET_NAME

   [REGISTR_REF_MASK_SET_VERSION] }

{REGISTR_EQUIP_REQD} {EQUIP_SITE_REQD}

[REGISTR_STD_GRID] {REGISTR_REF_METHOD_REQD}

[REGISTR_ALGORITHM] [REGISTR_COMPENSATION_TEMPERATURE]

{ [REGISTR_MARK_ID] [MASK_REGISTR_MARK] [CELL_REGISTR_MARK]

   [MEASURE_FILE_NAME]

   [REGISTR_MARK_FEATURE]

   [REGISTR_MARK_LOCATION_DRAWING] [REGISTR_MARK_DRAWING]

   [REGISTR_MARK_SEPARATION REGISTR_MARK_COUNT] }

	END_REGISTR
<cd_group> =	START_CD
	[<cd_definition>]
	[NUMBER_OF_CDS]
	{ [CD_SITE_ID] CD_LOCATION } [CD_MATRIX_FILE_NAME]
	END_CD
<cd_definition> =	[CD_QUALITY_ID] [CD_DATA] [CD_DIGITIZED] [CD_TONE_CLEAR]
	[CD_MORPHOGRAPHY]
	[CD_PERCENT_CLEAR] [CD_PERCENT_CLEAR_WINDOW]
	[CD_TARGET] [CD_ORIENTATION] [CD_PITCH]
	[CD_FEATURE] [CD_LOCATION_DRAWING] [CD_DRAWING]
	[CD_REFERENCE_ONLY]
	[CD_TOLERANCE]
	[CD_RANGE] [CD_THREE_SIGMA]
	[CD_DEVIATION_FROM_TARGET] [CD_DEVIATION_FROM_MEAN]
	[CD_STD] [CD_CORRELATION_ID]
	{CD_EQUIP_REQD} {EQUIP_SITE_REQD}
<cd_set> =	START_CD_SET
	{CD_GROUP_NAME}
	[CD_REFERENCE_ONLY]
	[CD_QUALITY_ID]
	[CD_TOLERANCE] [CD_RANGE] [CD_THREE_SIGMA]
	[CD_DEVIATION_FROM_TARGET] [CD_DEVIATION_FROM_MEAN]
	[CD_STD] [CD_CORRELATION_ID]
	END_CD_SET
<cd_xy_definition> =	START_CD_XY_DEFINITION
	{CD_X_GROUP} {CD_Y_GROUP}
	{<cd_xy_site>}
	[CD_XY_TOLERANCE] [CD_XY_DEVIATION]
	[CD_XY_REFERENCE_ONLY]
	END_CD_XY_DEFINITION
<cd_xy_site> =	START_CD_XY_SITE
	{ [CD_HORIZONTAL_ID] CD_HORIZONTAL_LOCATION
	[CD_VERTICAL_ID] CD_VERTICAL_LOCATION }
	END_CD_XY_SITE
<cd_iso_dense_definition> =	START_CD_ISO_DENSE
	{CD_ISO_GROUP} {CD_DENSE_GROUP}
	[CD_ISO_DENSE_TOLERANCE]
	[CD_ISO_DENSE_REFERENCE_ONLY]
	END_CD_ISO_DENSE

<opc_definition> =	START_OPC
	[OPC_TYPE [OPC_MINIMUM_FEATURE_SIZE] [OPC_MINIMUM_GAP]
	[OPC_PATTERN_SEPARATE] [OPC_PATTERN_MODIFIABLE]]
	END_OPC
<defect_definition> =	START_DEFECT_DEFINITION [DEFECT_QUALITY_ID]
	[VISUAL_INSPECTION_OK] [VISUAL_INSPECTION_REQD]
	{VISUAL_INSP_CRITERIA}
	[AUTO_INSPECTION_REQD] [DIE_TO_DIE_INSPECTION]
	[DEFECT_SIZE] [DEFECT_SIZE_CL] [DEFECT_SIZE_DK]
	[DEFECT_SIZE_CL_ADJ] [DEFECT_SIZE_CL_ADJ_REP]
	[DEFECT_SIZE_DK_ADJ] [DEFECT_SIZE_DK_ADJ_REP]
	[DEFECT_SIZE_CL_ISO] [DEFECT_SIZE_CL_ISO_REP]
	[DEFECT_SIZE_DK_ISO] [DEFECT_SIZE_DK_ISO_REP]
	[DEFECT_DENSITY] [DEFECT_COUNT] [DEFECT_COUNT_REP]
	[DEFECTIVE_DIE_DENSITY] [DEFECTIVE_DIE_COUNT]
	[DEFECTIVE_DIE_COUNT_REP]
	[PERCENT_DEFECTIVE_DIE]
	[EDGE_ROUGHNESS]
	{INSPECTION_AREA} {INSPECTION_AREA_EXCLUDE}
	{SCRATCH_SIZE_FRONT {SCRATCH_INSP_AREA {SCRATCH_INSP_EXCLUDE }}}
	{SCRATCH_SIZE_BACK {SCRATCH_INSP_AREA {SCRATCH_INSP_EXCLUDE }}}
	[GOOD_FIELDS]
	{DEFECT_EQUIP_REQD {EQUIP_SITE_REQD} [DEFECT_INSP_MODE_REQD]
	[DEFECT_INSP_PIXEL_SIZE_REQD]
	{ DEFECT_TYPE DEFECT_INSP_SENSITIVITY_REQD
	{ BIN_SIZE SEVERITY_CRITERION_REQD } }
	[DEFECT_SETUP_FILE_NAME_REQD] }
	[<database_inspection>]
	[<repair_definition>]
	END_DEFECT_DEFINITION
<database_inspection> =	DATABASE_INSPECTION [PRICE]
	[DATABASE_SOURCE]
	[DATABASE_TOP_CELL DATABASE_LAYER]
	[DATABASE_FILE_NAME]
	[DATABASE_UNIT] [USER_UNIT]
	[DATABASE_WITH_JOB [DATABASE_JOB_NAME DATABASE_JOB_LEVEL]]
	{DATABASE_AREA}
<repair_definition> =	START_REPAIR_DEFINITION
	{ REPAIR_EQUIP_REQD {EQUIP_SITE_REQD} }
	END_REPAIR_DEFINITION

<surface_definition> =	START_SURFACE_DEFINITION
	[SURFACE_INSPECTION] [SURFACE_QUALITY_ID]
	{ [SURF_INSP_EQUIP_REQD] {EQUIP_SITE_REQD} [SURF_INSP_MODE_REQD]
	[SURF_INSP_PIXEL_SIZE_REQD]
	{SURF_DEFECT_TYPE
	SURF_INSP_SENSITIVITY_REQD
	{ BIN_SIZE SEVERITY_CRITERION_REQD } }
	[SURF_INSP_SETUP_FILE_NAME_REQD] }
	[SURF_INSP_METHOD] [SURF_INSP_AREA]
	[SURF_INSP_PELL_TOP]
	[SURF_INSP_PELL_TOP_ON_CLEAR_PATTERN]
	[SURF_INSP_PELL_TOP_ON_OPAQUE_PATTERN]
	[SURF_INSP_PELL_TOP_OUTSIDE_FRAME]
	[SURF_INSP_PELL_TOP_OUTSIDE_ON_OPAQUE]
	[SURF_INSP_PELL_TOP_OUTSIDE_MEMBRANE]
	[SURF_INSP_PELL_TOP_INSIDE_MEMBRANE]
	[SURF_INSP_PELL_TOP_OUTSIDE_ON_FRAME]
	[SURF_INSP_PELL_TOP_INSIDE_ON_FRAME]
	[SURF_INSP_PELL_BOTTOM]
	[SURF_INSP_GLASS_SIDE] [SURF_INSP_PATTERN_SIDE]
	[TRANSMISSION_DEFECT_CLEAR] [TRANSMISSION_DEFECT_DARK]
	END_SURFACE_DEFINITION
<sem_photo> =	{START_SEM_PHOTO
	{ [SEM_PHOTO_SITE_ID] [SEM_PHOTO_LOCATION] }
	[SEM_PHOTO_MATRIX_FILENAME]
	[CD_FEATURE] [CD_LOCATION_DRAWING] [CD_DRAWING]
	[SEM_PHOTO_SCALE]
	[SEM_PHOTO_TILT] [SEM_PHOTO_ROTATION]
	END_SEM_PHOTO }
<mask_definition> =	MASK_ID [MASK_NAME] DELIVERABLE_MASK
	<mask_options> END_MASK
<cell_definition> =	CELL_ID [<pattern_options>] END_CELL_OPTIONS
	{<cell_instance>} {<pattern_instance>} END_CELL
<pattern_group> =	PATTERN_GROUP_ID [<pattern_options>]
	END_PATTERN_GROUP_OPTIONS {<pattern_definitions>}
	END_PATTERN_GROUP
<pattern_definitions> =	LEVEL_ID
	[PATTERN_NAME] [PATTERN_VISUAL_ID] [FIGURE_COUNT]
	[MINIMUM_FEATURE_SIZE {MINIMUM_FEATURE_LOCATION}]
	{<opc_definition>}

[OPTICAL_MASK_SET_ID [OPTICAL_MASK_ID]]

[OPTICAL_MASK_TITLE]

[<pattern_options>]

END_PATTERN_DEFINITION

<cell_instance> =   CELL_INSTANCE [<pattern_options>]

END_CELL_INSTANCE_OPTIONS {<placement>}

END_CELL_INSTANCE

<pattern_instance> =   PATTERN_GROUP_INSTANCE [<pattern_options>]

{<placement>}

END_PATTERN_GROUP_INSTANCE

<placement> =   START_PLACEMENT { LOCATION [STEPPING_DISTANCE STEPPING_COUNT] }

[ARRAY_DIAMETER ARRAY_CENTER [ARRAY_DIAMETER_INCLUSIVE]]

[DATA_OFFSET]

{DROPOUT [SCRIBE_TONE SCRIBE_INSIDE_CORNERS

  SCRIBE_OUTSIDE_CORNERS] }

[LOCATION_SPEC] [CD_MEASURE_DIE]

END_PLACEMENT

<pattern_options> =   START_PATTERN_OPTIONS [PATTERN_FUNCTION]

[DATA_FILE_SIZE] [DATA_CHECKSUM DATA_CHECKSUM_TYPE]

[PATTERN_ADDRESS_SIZE] [SCALE_FACTOR]

[DIGITIZED_DATA_DARK]

[STRIPE_HEIGHT]

[UNSCALED_PATTERN_SIZE]

[MFG_BIAS_PREAPPLIED]

{ LITHO_MODE_REQD } [VIRTUAL_ADDRESS]

[SURROUNDING_TONE SURROUNDING_WIDTH SURROUNDING_HEIGHT]

[MIRROR_PATTERN]

[<ship_plot>] [PATTERN_PLOT_APPR_REQD]

{<films>}

[<phase_shift>]

{<registration>}

{<cd_group>}

{<cd_set>}

{<cd_xy_definition>}

{<cd_iso_dense_definition>}

[PERCENT_CLEAR]

[INSPECT_ALL_SITES]

{<defect_definition>}

[BUTTING_ERROR]

[ADDITIONAL_PATTERN_INFO]

END_PATTERN_OPTIONS

<shippable_data> =   START_SHIPPABLE_DATA

[SEND_MASK_SHIPPED_DATE_TIME [<ship_to>]]

[SEND_FINAL_AUDIT_DATE_TIME [<ship_to>]]

[SHIP_CD_DATA [<ship_to>]]

[SHIP_CD_PRINTOUT [<ship_to>]]

[SHIP_CD_UNIFORMITY_MAP [<ship_to>]]

[SHIP_AIM_DATA [<ship_to>]]

[SHIP_DEFECT_DATA [<ship_to>]]

[SHIP_THRU_PELLICLE_DATA [<ship_to>]]

[SHIP_MANUAL_INSPECTION_FORM [<ship_to>]]

[SHIP_INSP_DATABASE_DATA [INSP_DATABASE_DATA_FORMAT] [<ship_to>]]

[SHIP_FIRST_PREPELL_DIE_DB_MSK_MAP [<ship_to>]]

[SHIP_FIRST_PREPELL_DIE_DB_PTN_MAP [<ship_to>]]

[SHIP_FIRST_PREPELL_DIE_DIE_MAP [<ship_to>]]

[SHIP_FIRST_ROT_PREPELL_DIE_DIE_MAP [<ship_to>]]

[SHIP_FINAL_PREPELL_DIE_DB_MSK_MAP [<ship_to>]]

[SHIP_FINAL_PREPELL_DIE_DB_PTN_MAP [<ship_to>]]

[SHIP_FINAL_PREPELL_DIE_DIE_MAP [<ship_to>]]

[SHIP_FINAL_ROT_PREPELL_DIE_DIE_MAP [<ship_to>]]

[SHIP_FIRST_POSTPELL_DIE_DB_MSK_MAP [<ship_to>]]

[SHIP_FIRST_POSTPELL_DIE_DB_PTN_MAP [<ship_to>]]

[SHIP_FIRST_POSTPELL_DIE_DIE_MAP [<ship_to>]]

[SHIP_FIRST_ROT_POSTPELL_DIE_DIE_MAP [<ship_to>]]

[SHIP_FINAL_POSTPELL_DIE_DB_MSK_MAP [<ship_to>]]

[SHIP_FINAL_POSTPELL_DIE_DB_PTN_MAP [<ship_to>]]

[SHIP_FINAL_POSTPELL_DIE_DIE_MAP [<ship_to>]]

[SHIP_FINAL_ROT_POSTPELL_DIE_DIE_MAP [<ship_to>]]

[SHIP_REPAIR_DATA [<ship_to>]]

[SHIP_REGISTR_DATA [<ship_to>]]

[SHIP_ARRAY_REGISTR_MAP [<ship_to>]]

[SHIP_CLOSURE_DATA [<ship_to>]]

[SHIP_DIE_FIT_MAP [<ship_to>]]

[SHIP_MEASURE_FILE_REGISTR_MAP [<ship_to>]]

[SHIP_FIELD_FIT_MAP [<ship_to>]]

[SHIP_CENTRALITY_DATA [<ship_to>]]

[SHIP_CENTRALITY_MAP [<ship_to>]]

[SHIP_SURF_INSP_MEASUREMENTS [<ship_to>]]

[SHIP_SURF_INSPECTION_MAP [<ship_to>]]

[SHIP_SURF_INSP_PELL_TOP_MAP [<ship_to>]]

[SHIP_SURF_INSP_PELL_BOTTOM_MAP [<ship_to>]]

[SHIP_SURF_INSP_GLASS_SIDE_MAP [<ship_to>]]

[SHIP_SURF_INSP_PATTERN_SIDE_MAP [<ship_to>]]

[SHIP_STARLIGHT_MAP [<ship_to>]]

[SHIP_PHASE_SHIFT_MEASUREMENTS [<ship_to>]]

[SHIP_PHASE_SHIFT_REPORT [<ship_to>]]

[SHIP_SEM_PHOTOS [<ship_to>]]

{<ship_plot>}

[SHIP_BARCODE_PLOT [<ship_to>]]

{<films>}

[SHIP_CERTIFICATE_OF_CONFORMANCE [<ship_to>]]

{SHIP_CUSTOMER_QUALITY_FORM [<ship_to>] }

[SHIP_TRAVELER [<ship_to>]]

[PERCENT_CLEAR_REQUESTED [<ship_to>]]

{SHIP_SPECIAL_REQUEST [<ship_to>] }

END_SHIPPABLE_DATA

<ship_to> =   START_SHIP_TO

{EMAIL_ADDRESS} [<ftp_address>] [WEB_ADDRESS]

{MAILING_ADDRESS} [SHIP_TO_FAX]

[DUE_DATE_TIME_REQUESTED]

END_SHIP_TO

<ftp_address> =   FTP_HOST_NAME [FTP_LOGIN] [FTP_PASSWORD] [FTP_DIRECTORY]

[FTP_MODE] END_FTP_HOST

7.5 *Mask Results Data Structure Syntax* — The following syntax definition uses the upper case keyword to represent the permissible applications of the corresponding data record within the mask results data structure. This structure allows the vendor to deliver to the customer actual data regarding masks being built.

<mask_results> =   START_MASK_RESULTS SEMI_REVISION CUSTOMER VENDOR

FILE_DATE_TIME [OPERATOR_NAME]

MASK_SET_ID [<vendor_info>]

ORDER_ID MASK_SET_NAME MASK_SET_VERSION

{MASK_GROUP_ID [<vendor_info>]

  {MASK_ID <mask_results_options> END_MASK}

END_MASK_GROUP}

END_MASK_SET

END_MASK_RESULTS

CHECKSUM

<mask_results_options> =   START_MASK_RESULTS_OPTIONS

[STATUS]

[<vendor_info>]

[<billing_information>]

[<materials_used >]

{MFG_SITE_REQD} [MFG_SITE_USED]

[PRODUCT_TYPE] [PRODUCT_MAGNIFICATION]

[MASK_NAME]

{ TITLE_TEXT [TITLE_TYPE] }

[DUE_DATE_TIME_COMMITTED] [ELAPSED_TIME_COMMITTED]

[MILESTONE [ADDITIONAL_MILESTONE_INFO]]

[PERIODIC_UPDATE [ADDITIONAL_MILESTONE_INFO]]

[ESTIMATED_ARRIVAL [ADDITIONAL_MILESTONE_INFO]]

[MASK_SHIPPED_DATE_TIME]

[FINAL_AUDIT_DATE_TIME]

[DESIGN_RULE]

[<wafer_exposure_data> <aerial_image_data>]

[FAB_TECHNOLOGY] [WAFER_FAB]

[JOB_ONLY_APPROVED] [JOB_WITH_PATTERNS_APPROVED]

{PATTERN_APPROVED} [ALL_PATTERNS_APPROVED]

[APPROVAL_GRANTED]

[MIRROR_MASK] [MASK_ROTATION]

[CUSTOMER_SPEC CUSTOMER_SPEC_REVISION]

{WAIVER} {WAIVER_OVERRIDE}

{ [BARCODE_TYPE] BARCODE_TEXT BARCODE_ROTATION }

[SHIPPING_METHOD_USED]

[MEASURED_PERCENT_CLEAR]

[CENTRALITY] [MEASURED_CENTRALITY]

{<litho_information>}

{<pattern_group_results>}

[<phase_shift_measurements>]

{<registr_measurements>}

{<closure_measurements>}

{<cd_group_measurements>}

{<cd_set_results>}

{<cd_xy_results>}

{<cd_iso_dense_results>}

{<defect_measurements>}

[THROUGH_PELLICLE_DEFECTS {<defect_measurements>}]

{<surface_insp_measurements>}

[QUALITY_GROUP_ID]

	[FINAL_QC_AUDITOR]
	{ADDITIONAL_RESULTS_INFO}
	END_MASK_RESULTS_OPTIONS
<vendor_info> =	START_VENDOR_INFO
	[VENDOR_CONTACT] [VENDOR_PHONE] {VENDOR_ADDRESS}
	[VENDOR_FAX] [VENDOR_EMAIL]
	[FINAL_QC_AUDITOR]
	[VENDOR_ORDER_ID]
	END_VENDOR_INFO
<billing_information> =	START_BILLING_INFORMATION
	[BLANKET_PO_NUMBER] [PO_NUMBER] [SO_NUMBER] [RELEASE_NUMBER]
	END_BILLING_INFORMATION
<materials_used> =	START_MATERIALS_USED
	[TOP_PELLICLE_USED] [BOTTOM_PELLICLE_USED]
	[PACKAGE_USED]
	[<substrate>] END_MATERIALS_USED
<substrate> =	START_SUBSTRATE
	BLANK_LENGTH [BLANK_WIDTH] BLANK_THICKNESS
	BLANK_TYPE [BLANK_GRADE]
	[BLANK_FLATNESS] [BLANK_FLATNESS_USED] [BLANK_VENDOR]
	[BLANK_BIREFRINGENCE_REQD] [BLANK_BIREFRINGENCE_USED]
	{<coating>}
	[BLANK_INDEX_OF_REFRACTION]
	[BLANK_LOT] [BLANK_DATE_OF_MFG]
	[<euv_blank_type>] END_SUBSTRATE
<coating> =	START_COATING
	COATING_TYPE [COATING_COMPOSITION] [COATING_THICKNESS]
	[COATING_REFLECTANCE] [COATING_TRANSMITTANCE]
	[COATING_WAVELENGTH] [COATING_GRADE]
	[COATING_PHASE] [COATING_OPTICAL_DENSITY]
	[COATING_LOT_NUMBER] [COATING_DATE_TIME]
	[COATING_MASK_VENDOR_APPLIED] [COATING_EQUIP_USED]
	END_COATING
<euv_blank_type> =	START_EUV_BLANK_TYPE
	EUV_BLANK_TYPE
	EUV_FLATNESS_FRONT
	EUV_FLATNESS_BACK
	EUV_MULTILAYER_COMPOSITION
	EUV_CAPPING_COMPOSITION

EUV_MMR_WAVELENGTH

EUV_MEAN_PEAK_REFLECTIVITY

EUV_PEAK_REFLECTIVITY_UNIFORMITY

EUV_ABSORBER_COMPOSITION

EUV_ABSORBER_OPTICAL_PROPERTIES

EUV_BLANK_RESISTANCE

EUV_EXPANSION_COEFF

END_EUV_BLANK_TYPE

<wafer_exposure_data> = START_WAFER_EXPOSURE_DATA

WAFER_EXPOSURE_NUMERICAL_APERATURE

[WAFER_EXPOSURE_SIGMA]

[WAFER_EXPOSURE_SIGMA_INNER WAFER_EXPOSURE_SIGMA_OUTER]

WAFER_EXPOSURE_ILLUMINATION

END_WAFER_EXPOSURE_DATA

<aerial_image_data> = START_AERIAL_IMAGE_DATA

AIM_WAVELENGTH

[AIM_INTENSITY_VARIATION_DELTA]

[AIM_FLUX_INTENSITY_DELTA]

[AIM_CD_DELTA]

END_AERIAL_IMAGE_DATA

<litho_information> = START_LITHO_INFORMATION

{ [LITHO_EQUIP_REQD] {EQUIP_SITE_REQD}

{ [LITHO_MODEL_REQD] {LITHO_MODE_REQD} } }

[LITHO_EQUIP_USED] [EQUIP_SITE_USED]

[LITHO_MODEL_USED] [LITHO_MODE_USED]

[MACHINE_SERIAL_NUMBER]

[MASK_SERIAL_NUMBER]

[PROCESS]

[WRITE_DATE_TIME] [ELAPSED_WRITE_TIME]

[OPERATOR]

END_LITHO_INFORMATION

<pattern_group_results> = START_PATTERN_GROUP_RESULTS

PATTERN_GROUP_ID

{<phase_shift_measurements>}

{<registr_measurements>}

{<closure_measurements>}

{<cd_group_measurements>}

{<cd_set_results>}

{<cd_xy_results>}

{<cd_iso_dense_results>}

{<defect_measurements>}

END_PATTERN_GROUP_RESULTS

<phase_shift_measurements> =　START_PHASE_SHIFT_MEASUREMENTS

PSM_WAVELENGTH

[PHASE_SHIFT_QUALITY_ID]

[START_TRANSMISSION_MEASUREMENTS

[TRANSMISSION_MEASUREMENT_DATE]

[TRANSMISSION_EQUIP_USED]

[TRANSMISSION_MODE_USED]

[TRANSMISSION_MEASUREMENT_FILE_NAME]

TRANSMISSION_TARGET

[TRANSMISSION_REFERENCE_ONLY]

[TRANSMISSION_TOLERANCE]

[TRANSMISSION_RANGE]

[TRANSMISSION_ERROR]

[MEASURED_TRANSMISSION_AVERAGE]

[MEASURED_TRANSMISSION_TOLERANCE]

[MEASURED_TRANSMISSION_RANGE]

[TRANSMISSION_MARK_FEATURE]

[TRANSMISSION_MARK_LOCATION_DRAWING]

[TRANSMISSION_MARK_DRAWING]

{MEASURED_TRANSMISSION_MARK_SITE_ID

[TRANSMISSION_MARK_LOCATION]

MEASURED_TRANSMISSION_MARK_LOCATION

MEASURED_TRANSMISSION

[MEASURED_TRANSMISSION_ERROR]

END_MEASURED_TRANSMISSION_SITE }

END_TRANSMISSION_MEASUREMENTS]

[START_PHASE_ANGLE_MEASUREMENTS

[PHASE_ANGLE_MEASUREMENT_DATE]

[PHASE_ANGLE_EQUIP_USED]

[PHASE_ANGLE_MODE_USED]

[PHASE_ANGLE_MEASUREMENT_FILE_NAME]

PHASE_ANGLE_TARGET

[PHASE_ANGLE_REFERENCE_ONLY]

[PHASE_ANGLE_TOLERANCE]

[PHASE_ANGLE_RANGE]

[PHASE_ANGLE_ERROR]

[MEASURED_PHASE_ANGLE_AVERAGE]

[MEASURED_PHASE_ANGLE_TOLERANCE]

[MEASURED_PHASE_ANGLE_RANGE]

[PHASE_ANGLE_MARK_FEATURE]

[PHASE_ANGLE_MARK_LOCATION_DRAWING]

[PHASE_ANGLE_MARK_DRAWING]

{MEASURED_PHASE_ANGLE_MARK_SITE_ID

[PHASE_ANGLE_MARK_LOCATION]

MEASURED_PHASE_ANGLE_MARK_LOCATION

MEASURED_PHASE_ANGLE

[MEASURED_PHASE_ANGLE_ERROR]

END_MEASURED_PHASE_ANGLE_SITE }

END_PHASE_ANGLE_MEASUREMENTS]

[START_ETCH_DEPTH_MEASUREMENTS

[ETCH_DEPTH_MEASUREMENT_DATE]

[ETCH_DEPTH_EQUIP_USED]

[ETCH_DEPTH_MODE_USED]

[ETCH_DEPTH_MEASUREMENT_FILE_NAME]

ETCH_DEPTH_TARGET

[ETCH_DEPTH_REFERENCE_ONLY]

[ETCH_DEPTH_TOLERANCE]

[ETCH_DEPTH_RANGE]

[ETCH_DEPTH_ERROR]

[MEASURED_ETCH_DEPTH_AVERAGE]

[MEASURED_ETCH_DEPTH_TOLERANCE]

[MEASURED_ETCH_DEPTH_RANGE]

[ETCH_DEPTH_MARK_FEATURE]

[ETCH_DEPTH_MARK_LOCATION_DRAWING]

[ETCH_DEPTH_MARK_DRAWING]

{MEASURED_ETCH_DEPTH_MARK_SITE_ID

[ETCH_DEPTH_MARK_LOCATION]

MEASURED_ETCH_DEPTH_MARK_LOCATION

MEASURED_ETCH_DEPTH

[MEASURED_ETCH_DEPTH_ERROR]

END_MEASURED_ETCH_DEPTH_SITE }

END_ETCH_DEPTH_MEASUREMENTS]

[OPERATOR]

END_PHASE_SHIFT_MEASUREMENTS

<registr_measurements> =   START_REGISTR_MEASUREMENTS

[REGISTR_QUALITY_ID]

{REGISTR_EQUIP_REQD} {EQUIP_SITE_REQD} {REGISTR_REF_METHOD_REQD}

[REGISTR_STD_GRID] [REGISTR_ALGORITHM]

[REGISTR_COMPENSATION_TEMPERATURE]

[REGISTR_EQUIP_USED] [EQUIP_SITE_USED] [REGISTR_REF_METHOD_USED]

[REGISTR_STD_GRID_USED] [REGISTR_ALGORITHM_USED]

[REGISTR_MEASUREMENT_DATE]

[REGISTR_REF_MASK_ID REGISTR_REF_MASK_SET_ID]

[REGISTR_ERROR] [REGISTR_SCALE [REGISTR_SCALE_REFERENCE_ONLY]]

[REGISTR_RESIDUAL [REGISTR_RESIDUAL_REFERENCE_ONLY]]

[REGISTR_THREE_SIGMA [REGISTR_THREE_SIGMA_REFERENCE_ONLY]]

[REGISTR_RESIDUAL_THREE_SIGMA

   [REGISTR_RESIDUAL_THREE_SIGMA_REFERENCE_ONLY]]

[REGISTR_TOLERANCE]

[REGISTR_ORTHO [REGISTR_ORTHO_REFERENCE_ONLY]]

[REGISTR_RELATIVE [REGISTR_RELATIVE_REFERENCE_ONLY]]

{<measured_registr_mark>}

[MEASURED_REGISTR_ERROR] [MEASURED_REGISTR_SCALE]

[MEASURED_REGISTR_THREE_SIGMA]

[MEASURED_REGISTR_RESIDUAL]

[MEASURED_REGISTR_RESIDUAL_THREE_SIGMA]

[MEASURED_REGISTR_TOLERANCE]

[MEASURED_REGISTR_MINIMUM] [MEASURED_REGISTR_MAXIMUM]

[MEASURED_REGISTR_ORTHO] [MEASURED_REGISTR_RELATIVE]

[MEASURED_REGISTR_FILE_NAME]

[OPERATOR]

END_REGISTR_MEASUREMENTS

<measured_registr_mark> =   START_MEASURED_REGISTR_MARK

MEASURED_REGISTR_MARK_ID

[VENDOR_REGIGISTRATION_MARK_ID]

[MASK_REGISTR_MARK_LOCATION]

MEASURED_REGISTR_MARK_LOCATION

[MEASURED_REGISTR_MARK_ERROR]

[MEASURED_REGISTR_MARK_RESIDUAL]

END_MEASURED_REGISTR_MARK

<closure_measurements> =   START_CLOSURE_MEASUREMENTS

{REGISTR_CLOSURE_EQUIP_REQD} {EQUIP_SITE_REQD}

[REGISTR_CLOSURE_EQUIP_USED] [EQUIP_SITE_USED]

[REGISTR_CLOSURE]

[REGISTR_CLOSURE_REFERENCE_ONLY]

MEASURED_REGISTR_CLOSURE

{ MEASURED_CLOSURE_READING [MEASURED_CLOSURE_LOCATION] }

[OPERATOR]

END_CLOSURE_MEASUREMENTS

<cd_group_measurements> =	START_CD_GROUP_MEASUREMENTS

[CD_QUALITY_ID]

[CD_TONE_CLEAR]

[CD_MORPHOGRAPHY]

[CD_PERCENT_CLEAR] [CD_PERCENT_CLEAR_WINDOW]

[CD_TARGET]

[CD_ORIENTATION]

[CD_PITCH]

[CD_FEATURE]

[CD_REFERENCE_ONLY]

[CD_TOLERANCE]

[CD_RANGE] [CD_THREE_SIGMA]

[CD_DEVIATION_FROM_TARGET]

[CD_DEVIATION_FROM_MEAN]

[CD_STD] [CD_CORRELATION_ID]

{CD_EQUIP_REQD} {EQUIP_SITE_REQD}

[CD_EQUIP_USED] [EQUIP_SITE_USED]

[CD_MEASUREMENT_DATE]

[NUMBER_OF_CDS]

{<cd_measurement>}

[MEASURED_CD_MEAN] [MEASURED_CD_MIN] [MEASURED_CD_MAX]

[MEASURED_CD_TOLERANCE]

[MEASURED_CD_RANGE] [MEASURED_CD_THREE_SIGMA]

[MEASURED_CD_DEVIATION_FROM_TARGET]

[MEASURED_CD_DEVIATION_FROM_MEAN]

[MEASURED_CD_FILE_NAME]

[OPERATOR]

END_CD_GROUP_MEASUREMENTS

<cd_measurement> =	START_CD_MEASUREMENT

[[CD_SITE_ID] CD_LOCATION]

MEASURED_CD_SITE_ID

MEASURED_CD_LOCATION

MEASURED_CD

END_CD_MEASUREMENT

<cd_set_results> =	START_CD_SET_RESULTS

{CD_GROUP_NAME}

[CD_REFERENCE_ONLY]

[CD_QUALITY_ID]

[CD_TOLERANCE] [CD_RANGE] [CD_THREE_SIGMA]

[CD_DEVIATION_FROM_TARGET] [CD_DEVIATION_FROM_MEAN]

[MEASURED_CD_MEAN] [MEASURED_CD_MIN] [MEASURED_CD_MAX]

[MEASURED_CD_TOLERANCE]

[MEASURED_CD_RANGE] [MEASURED_CD_THREE_SIGMA]

[MEASURED_CD_DEVIATION_FROM_TARGET]

[MEASURED_CD_DEVIATION_FROM_MEAN]

END_CD_SET_RESULTS

<cd_xy_results> =   START_CD_XY_RESULTS

{CD_X_GROUP} {CD_Y_GROUP}

{<cd_xy_site>}

[CD_XY_TOLERANCE] [CD_XY_DEVIATION] [CD_XY_REFERENCE_ONLY]

[MEASURED_CD_XY_TOLERANCE] [MEASURED_CD_XY_DEVIATION]

[MEASURED_CD_XY_MORPHOGRAPHY]

[MEASURED_CD_XY_TONE_CLEAR]

END_CD_XY_RESULTS

<cd_xy_site> =   START_CD_XY_SITE

[CD_HORIZONTAL_ID CD_HORIZONTAL_LOCATION]

[CD_HORIZONTAL_MORPHOGRAPHY] [CD_HORIZONTAL_TONE_CLEAR]

MEASURED_HORIZONTAL_CD

[CD_VERTICAL_ID CD_VERTICAL_LOCATION]

[CD_VERTICAL_MORPHOGRAPHY] [CD_VERTICAL_TONE_CLEAR]

MEASURED_VERTICAL_CD

END_CD_XY_SITE

<cd_iso_dense_results> =   START_CD_ISO_DENSE_RESULTS

{CD_ISO_GROUP} {CD_DENSE_GROUP}

[CD_ISO_DENSE_TOLERANCE]

[CD_ISO_DENSE_REFERENCE_ONLY]

[MEASURED_CD_ISO_MEAN] [MEASURED_CD_ISO_RANGE]

[MEASURED_CD_DENSE_MEAN] [MEASURED_CD_DENSE_RANGE]

[MEASURED_CD_ISO_DENSE_TOLERANCE]

END_CD_ISO_DENSE_RESULTS

<defect_measurements> =   START_DEFECT_MEASUREMENTS

[DEFECT_QUALITY_ID]

{INSPECTION_AREA} {INSPECTION_AREA_EXCLUDE}

{VISUAL_INSP_CRITERIA}

DIE_TO_DIE_INSPECTION

DIE_TO_DIE_MEASUREMENTS

{DEFECT_EQUIP_REQD {EQUIP_SITE_REQD}

[DEFECT_INSP_MODE_REQD] [DEFECT_INSP_PIXEL_SIZE_REQD]

{DEFECT_TYPE DEFECT_INSP_SENSITIVITY_REQD

{BIN_SIZE   SEVERITY_CRITERION_REQD } }

    [DEFECT_SETUP_FILE_NAME_REQD] }

[DEFECT_EQUIP_USED [EQUIP_SITE_USED]

    [DEFECT_INSP_MODE_USED] [DEFECT_INSP_PIXEL_SIZE_USED]

    {DEFECT_TYPE DEFECT_INSP_SENSITIVITY_USED

            {BIN_SIZE SEVERITY_CRITERION_USED } }

    [DEFECT_SETUP_FILENAME_USED]]

[DEFECT_INSP_DATE]

{REPAIR_EQUIP_REQD {EQUIP_SITE_REQD} }

[REPAIR_EQUIP_USED [EQUIP_SITE_USED]]

{MEASURED_INSPECTION_AREA} {MEASURED_INSPECTION_AREA_EXCLUDE}

[MEASURED_DEFECT_DENSITY]

[MEASURED_DEFECT_COUNT]

[MEASURED_DEFECT_COUNT_REP]

[MEASURED_DEFECT_COUNT_WITHIN_SPEC]

[MEASURED_DEFECTIVE_DIE_DENSITY]

[MEASURED_DEFECTIVE_DIE_COUNT]

[MEASURED_DEFECTIVE_DIE_COUNT_REP]

[MEASURED_PERCENT_DEFECTIVE_DIE]

{MEASURED_DEFECT_FILE_NAME}

[PRE_PELL_INSPECTION_ID] [PRE_PELL_INSPECTION_DATE_AND_TIME]

[POST_PELL_INSPECTION_ID] [POST_PELL_INSPECTION_DATE_AND_TIME]

[OPERATOR]

END_DEFECT_MEASUREMENTS

<surface_insp_measurements> = START_SURFACE_INSP_MEASUREMENTS

[SURFACE_QUALITY_ID]

{SURF_INSP_EQUIP_REQD {EQUIP_SITE_REQD}

    [SURF_INSP_MODE_REQD] [SURF_INSP_PIXEL_SIZE_REQD]

    {SURF_DEFECT_TYPE SURF_INSP_SENSITIVITY_REQD

    {BIN_SIZE SEVERITY_CRITERION_REQD } }

    [SURF_INSP_SETUP_FILE_NAME_REQD] }

[SURF_INSP_EQUIP_USED [EQUIP_SITE_USED]

    [SURF_INSP_MODE_USED] [SURF_INSP_PIXEL_SIZE_USED]

    {SURF_DEFECT_TYPE SURF_INSP_SENSITIVITY_USED

            { BIN_SIZE SEVERITY_CRITERION_USED } }

    [SURF_INSP_SETUP_FILE_NAME_USED]]

[MEASURED_DEFECT_COUNT]

[MEASURED_DEFECT_COUNT_WITHIN_SPEC]

{MEASURED_SURF_INSP_FILE_NAME}

> [PRE_PELL_INSPECTION_ID] [PRE_PELL_INSPECTION_DATE_AND_TIME]
>
> [POST_PELL_INSPECTION_ID] [POST_PELL_INSPECTION_DATE_AND_TIME]
>
> [OPERATOR]
>
> END_SURFACE_INSP_MEASUREMENTS

7.6 *Mask Order Data Structure Syntax in Extensible Markup Language (XML) Format* — The following file defines the Mask Order Data Structure Syntax (above) in Extensible Markup Language Schema Definition (XSD) format. Should the user choose to implement the mask order data file in Extensible Markup Language (XML), the file must validate against this XSD. For optimal viewing, paste the text into a program designed to read XML such as an internet browser. The content of both versions of representation of mask order data should be entirely equivalent. Since the XML schema is derived directly from the Mask Order Data Structure Syntax, in the event of a discrepancy between the two, the Data Structure Syntax should be considered to be the more correct.

```
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
elementFormDefault="qualified" attributeFormDefault="unqualified"
version="P10-0705 ">
      <xs:element name="MaskOrder" type="MaskOrderType"/>
      <xs:annotation>
            <xs:documentation>
                  <copyright>2005 SEMI. All rights reserved.</copyright>
                  <disclaimer/>
                  <purpose>SEMI P10 MaskOrder</purpose>
                  <creationDate>01-05-2005</creationDate>
                  <keyword/>
                  <lastUpdatedDate>01-05-2005</lastUpdatedDate>
            </xs:documentation>
      </xs:annotation>
      <xs:complexType name="MaskOrderType">
            <xs:sequence>
                  <xs:element name="SemiRevision" type="xs:string"/>
                  <xs:element name="Customer" type="xs:string"/>
                  <xs:element name="Vendor" type="xs:string"/>
                  <xs:element name="FileDateTime" type="xs:dateTime"/>
                  <xs:sequence minOccurs="0">
                        <xs:element name="OperatorName" type="xs:string"/>
                  </xs:sequence>
                  <xs:element name="MaskSet" type="MaskSetType"/>
                  <xs:element name="Checksum" type="xs:string"/>
            </xs:sequence>
            <xs:attribute name="groupName" type="xs:string" use="required"/>
            <xs:attribute name="p10Start" type="xs:string" use="required"
fixed="StartMaskOrder"/>
            <xs:attribute name="p10End" type="xs:string" use="required"
fixed="EndMaskOrder"/>
      </xs:complexType>
      <xs:complexType name="MaskSetType">
            <xs:sequence>
                  <xs:element name="MaskSetOptions"
type="MaskSetOptionsType"/>
                  <xs:sequence minOccurs="0" maxOccurs="unbounded">
                        <xs:element name="MaskGroup" type="MaskGroupType"/>
                  </xs:sequence>
            </xs:sequence>
            <xs:attribute name="groupName" type="xs:string" use="required"/>
```

```
                <xs:attribute name="p10Start" type="xs:string" use="required"
fixed="StartMaskSet"/>
                <xs:attribute name="p10End" type="xs:string" use="required"
fixed="EndMaskSet"/>
        </xs:complexType>
        <xs:complexType name="MaskSetOptionsType">
                <xs:sequence>
                        <xs:sequence minOccurs="0">
                                <xs:element name="BusinessContact" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0" maxOccurs="unbounded">
                                <xs:element name="BusinessAddress" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0" maxOccurs="unbounded">
                                <xs:element name="BusinessPhone" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0" maxOccurs="unbounded">
                                <xs:element name="BusinessFax" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0">
                                <xs:element name="BusinessEmail" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0">
                                <xs:element name="BillingContact" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0" maxOccurs="unbounded">
                                <xs:element name="BillingAddress" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0" maxOccurs="unbounded">
                                <xs:element name="BillingPhone" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0" maxOccurs="unbounded">
                                <xs:element name="BillingFax" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0">
                                <xs:element name="BillingEmail" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0">
                                <xs:element name="DesignRule" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0">
                                <xs:element name="FabTechnology" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0">
                                <xs:element name="WaferFab" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0">
                                <xs:element name="CustomerSpec" type="xs:string"/>
                                <xs:element name="CustomerSpecRevision"
type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0" maxOccurs="unbounded">
                                <xs:element name="Waiver" type="xs:string"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0" maxOccurs="unbounded">
                                <xs:element name="WaiverOverride" type="xs:string"/>
                        </xs:sequence>
```

```
<xs:sequence minOccurs="0">
      <xs:element name="PriceUnits" type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0">
      <xs:element name="SecurityClass" type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0">
      <xs:element name="Qs9000" type="xs:boolean"/>
</xs:sequence>
<xs:sequence minOccurs="0">
      <xs:element name="EngineeringContact"
type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0" maxOccurs="unbounded">
      <xs:element name="EngineeringAddress"
type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0" maxOccurs="unbounded">
      <xs:element name="EngineeringPhone"
type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0" maxOccurs="unbounded">
      <xs:element name="EngineeringFax" type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0">
      <xs:element name="EngineeringEmail"
type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0">
      <xs:element name="ShippingContact" type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0" maxOccurs="unbounded">
      <xs:element name="ShippingAddress" type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0" maxOccurs="unbounded">
      <xs:element name="ShippingPhone" type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0" maxOccurs="unbounded">
      <xs:element name="ShippingFax" type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0">
      <xs:element name="ShippingEmail" type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0" maxOccurs="unbounded">
      <xs:element name="ShippingMethod" type="xs:string"/>
</xs:sequence>
<xs:sequence minOccurs="0">
      <xs:element name="RepairsAuthorized"
type="xs:boolean"/>
</xs:sequence>
<xs:sequence minOccurs="0">
      <xs:element name="ShippableData"
type="ShippableDataType"/>
</xs:sequence>
<xs:sequence minOccurs="0" maxOccurs="unbounded">
      <xs:element name="Data" type="DataType"/>
</xs:sequence>
```

```
                      <xs:sequence minOccurs="0" maxOccurs="unbounded">
                              <xs:element name="StandardPattern"
type="StandardPatternType"/>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="MaskSetName" type="xs:string"/>
                              <xs:sequence minOccurs="0">
                                      <xs:element name="MaskSetVersion"
type="xs:string"/>
                              </xs:sequence>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="OrderId" type="xs:string"/>
                      </xs:sequence>
                      <xs:sequence minOccurs="0" maxOccurs="unbounded">
                              <xs:element name="AdditionalMaskSetInfo"
type="xs:string"/>
                      </xs:sequence>
              </xs:sequence>
              <xs:attribute name="groupName" type="xs:string" use="required"/>
              <xs:attribute name="p10Start" type="xs:string" use="required"
fixed="StartMaskSetOptions"/>
              <xs:attribute name="p10End" type="xs:string" use="required"
fixed="EndMaskSetOptions"/>
      </xs:complexType>
      <xs:complexType name="DataType">
              <xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="DataLocation" type="xs:string"/>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="DataId" type="xs:string"/>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="DataFormat" type="xs:string"/>
                              <xs:sequence minOccurs="0">
                                      <xs:element name="DxfAngle" type="xs:integer"/>
                                      <xs:element name="DxfUnit" type="xs:integer"/>
                              </xs:sequence>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="DataDensity" type="xs:string"/>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="DataFileSize" type="xs:integer"/>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="DataCompression" type="xs:string"/>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="DataConsolidation"
type="xs:string"/>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
                              <xs:element name="DataEncryption" type="xs:string"/>
                      </xs:sequence>
                      <xs:sequence minOccurs="0">
```

```xml
                        <xs:element name="DataChecksum" type="xs:integer"/>
                        <xs:element name="DataChecksumType"
type="xs:string"/>
                    </xs:sequence>
                    <xs:sequence minOccurs="0" maxOccurs="unbounded">
                        <xs:element name="PatternData"
type="PatternDataType"/>
                    </xs:sequence>
                    <xs:sequence minOccurs="0" maxOccurs="unbounded">
                        <xs:element name="JobData" type="JobDataType"/>
                    </xs:sequence>
                    <xs:sequence minOccurs="0">
                        <xs:element name="FractureFile" type="xs:string"/>
                        <xs:element name="FractureFileFormat"
type="xs:string"/>
                    </xs:sequence>
                    <xs:sequence minOccurs="0" maxOccurs="unbounded">
                        <xs:element name="MeasureFileName" type="xs:string"/>
                        <xs:sequence minOccurs="0">
                            <xs:element name="MeasureFileFormat"
type="xs:string"/>
                        </xs:sequence>
                    </xs:sequence>
                    <xs:sequence minOccurs="0" maxOccurs="unbounded">
                        <xs:element name="CdMatrixFileName"
type="xs:string"/>
                        <xs:sequence minOccurs="0">
                            <xs:element name="CdMatrixFileFormat"
type="xs:string"/>
                        </xs:sequence>
                    </xs:sequence>
            </xs:sequence>
            <xs:attribute name="groupName" type="xs:string" use="required"/>
            <xs:attribute name="p10Start" type="xs:string" use="required"
fixed="StartData"/>
            <xs:attribute name="p10End" type="xs:string" use="required"
fixed="EndData"/>
        </xs:complexType>
        <xs:complexType name="PatternDataType">
            <xs:sequence>
                    <xs:sequence minOccurs="0" maxOccurs="unbounded">
                        <xs:element name="PatternFormat" type="xs:string"/>
                    </xs:sequence>
                    <xs:sequence minOccurs="0">
                        <xs:element name="DataFileNumber" type="xs:string"/>
                    </xs:sequence>
                    <xs:sequence minOccurs="0">
                        <xs:element name="PatternUnits" type="xs:string"/>
                    </xs:sequence>
                    <xs:sequence minOccurs="0">
                        <xs:element name="PatternCharacterSet"
type="xs:string"/>
                    </xs:sequence>
                    <xs:sequence minOccurs="0">
                        <xs:element name="FractureFile" type="xs:string"/>
                    </xs:sequence>
                    <xs:sequence minOccurs="0" maxOccurs="unbounded">
```

```xml
                        <xs:sequence minOccurs="0">
                                <xs:element name="DataManipulation"
type="DataManipulationType"/>
                        </xs:sequence>
                        <xs:sequence minOccurs="0">
                                <xs:element name="DataFunction"
type="DataFunctionType"/>
                        </xs:sequence>
                </xs:sequence>
        </xs:sequence>
        <xs:attribute name="groupName" type="xs:string" use="required"/>
        <xs:attribute name="p10Start" type="xs:string" use="required"
fixed="StartPatternData"/>
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type="xs:string"/>
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type="xs:double"/>
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type="xs:string"/>
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type="xs:double"/>
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