SEMI P10-0706
SPECIFICATION OF DATA STRUCTURES FOR PHOTOMASK ORDERS

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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 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 mask writing control file (job file) names must be unique. (i.e., Mask writing control 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 For a given customer, each P10 <mask_order> file transmitted to a mask supplier must have a unique identification. In particular, revisions to a <mask_order> file must have a revised and unique identification.

3.6 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

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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]

ISO/IEC 10646 — UTF-8 character set

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.

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

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

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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 the UTF-8 character set. 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/displayable UTF-8 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 embedded in text data fields will be preserved. Spaces or tabs may not be embedded within integer or real number data values, but may be used to separate data values in multi-value numeric 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.

6.27 Data values may be integer, numeric, text, Boolean, or date (with or without time). Some data fields may contain more than one type of data. "text" should be considered to be any printable/displayable UTF-8 character except carriage return, tab or linefeed. Text data corresponds with "string" in the xsd syntax. Boolean data will only have values of "T" or "F".

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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 a numeric 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}
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```
                    {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]
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[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}

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[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_clear_dark_definition>}
{<cd_same_tone_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_APERTURE
[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]

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	[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]]

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[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

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	{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_clear_dark_definition> =	START_CD_CLEAR_DARK
	CD_CLEAR_SET
	CD_DARK_SET
	[CD_CLEAR_DARK_TOLERANCE]
	[CD_CLEAR_DARK_REFERENCE_ONLY]
	END_CD_CLEAR_DARK
<cd_same_tone_definition> =	START_CD_SAME_TONE
	CD_SAME_TONE_SET
	CD_SAME_TONE_SET
	[CD_SAME_TONE_TOLERANCE]
	[CD_SAME_TONE_REFERENCE_ONLY]
	END_CD_SAME_TONE
<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}

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```
                    {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]
```

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	[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]
	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_clear_dark_definition>}

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```
                    {<cd_same_tone_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>] ]
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[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]]

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[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]
[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_clear_dark_results>}
{<cd_same_tone_results>}
{<defect_measurements>}
[THROUGH_PELLICLE_DEFECTS {<defect_measurements>}]
{<defect_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

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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_APERTURE
[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]

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```
                                [PROCESS]
                                [WRITE_DATE_TIME]  [ELAPSED_WRITE_TIME]
                                [OPERATOR]
                                END_LITHO_INFORMATION
<pattern_group_results> =       START_PATTERN_GROUP_RESULTS
                                PATTERN_GROUP_ID
                                {PATTERN_APPROVED}
                                {<phase_shift_measurements>}
                                {<registr_measurements>}
                                {<closure_measurements>}
                                {<cd_group_measurements>}
                                {<cd_set_results>}
                                {<cd_xy_results>}
                                {<cd_clear_dark_results>}
                                {<cd_same_tone_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]
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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]

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[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_REGISTRATION_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]

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[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]

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[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_clear_dark_results> = START_CD_CLEAR_DARK_RESULTS
CD_CLEAR_SET
CD_DARK_SET
[CD_CLEAR_DARK_TOLERANCE]
[CD_CLEAR_DARK_REFERENCE_ONLY]
[MEASURED_CD_CLEAR_SET_MEAN MEASURED_CD_DARK_SET_MEAN]
[MEASURED_CD_CLEAR_DARK_TOLERANCE]
END_CD_CLEAR_DARK_RESULTS

<cd_same_tone_results> = START_CD_SAME_TONE_RESULTS
CD_SAME_TONE_SET
CD_SAME_TONE_SET
[CD_SAME_TONE_TOLERANCE]
[CD_SAME_TONE_REFERENCE_ONLY]
[MEASURED_CD_SAME_TONE_SET_MEAN
MEASURED_CD_SAME_TONE_SET_MEAN]
[MEASURED_CD_SAME_TONE_TOLERANCE]
END_CD_SAME_TONE_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_FILE_NAME_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]

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[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]
[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="P10-0706">
    <xs:element name="MaskOrder" type="MaskOrderType"/>
    <xs:annotation>
        <xs:documentation>
            <copyright>2006 SEMI.  All rights reserved.</copyright>
            <disclaimer/>
            <purpose>SEMI P10 Mask</purpose>
            <creationDate>01-06-2006</creationDate>
            <keyword/>
            <lastUpdatedDate>01-06-2006</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"/>
```


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```
            <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:sequence minOccurs="0">
                <xs:element name="Checksum" type="xs:integer"/>
            </xs:sequence>
        </xs:sequence>
    </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: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:double"/>
            </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" maxOccurs="unbounded">
                <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"/>
```

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```
</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">
        <xs:simpleType>
            <xs:restriction base="xs:string">
                <xs:enumeration value="QML"/>
                <xs:enumeration value="SECRET"/>
                <xs:enumeration value="TOP_SECRET"/>
                <xs:enumeration value="CCI"/>
                <xs:enumeration value="COMSEC"/>
            </xs:restriction>
        </xs:simpleType>
    </xs:element>
</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">
```

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```
            <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: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">
                <xs:simpleType>
                    <xs:union memberTypes="xs:string">
                        <xs:simpleType>
                            <xs:restriction base="xs:string">
                                <xs:enumeration value="MEBES"/>
                                <xs:enumeration value="RDOS"/>
                                <xs:enumeration value="VAX"/>
                                <xs:enumeration value="GDS-II"/>
                                <xs:enumeration value="OASIS"/>
                                <xs:enumeration value="OASIS_VSB"/>
                                <xs:enumeration value="CIF"/>
                                <xs:enumeration value="DXF"/>
                                <xs:enumeration value="APPLICON"/>
                                <xs:enumeration value="MANN_3000"/>
                                <xs:enumeration value="MANN_3600"/>
                                <xs:enumeration value="ELECTROMASK"/>
                                <xs:enumeration value="DOS"/>
                                <xs:enumeration value="UNIX"/>
                                <xs:enumeration value="APPLE"/>
                                <xs:enumeration value="TAR"/>
                            </xs:restriction>
                        </xs:simpleType>
                    </xs:union>
                </xs:simpleType>
            </xs:element>
            <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">
                <xs:simpleType>
                    <xs:restriction base="xs:string">
                        <xs:enumeration value="800BPI"/>
                        <xs:enumeration value="1600BPI"/>
                        <xs:enumeration value="6250BPI"/>
                        <xs:enumeration value="HIGH"/>
                        <xs:enumeration value="LOW"/>
                    </xs:restriction>
```

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```
            </xs:simpleType>
        </xs:element>
    </xs:sequence>
    <xs:sequence minOccurs="0">
        <xs:element name="DataFileSize" type="xs:integer"/>
    </xs:sequence>
    <xs:sequence minOccurs="0">
        <xs:element name="DataCompression">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:enumeration value="ZIP"/>
                    <xs:enumeration value="ZOO"/>
                    <xs:enumeration value="GZIP"/>
                    <xs:enumeration value="Z"/>
                    <xs:enumeration value="NONE"/>
                    <xs:enumeration value="BINHEX"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
    </xs:sequence>
    <xs:sequence minOccurs="0">
        <xs:element name="DataConsolidation">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:enumeration value="BACKUP"/>
                    <xs:enumeration value="TAR"/>
                    <xs:enumeration value="GNUTAR"/>
                    <xs:enumeration value="ZIP"/>
                    <xs:enumeration value="NONE"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
    </xs:sequence>
    <xs:sequence minOccurs="0">
        <xs:element name="DataEncryption">
            <xs:simpleType>
                <xs:restriction base="xs:string">
                    <xs:enumeration value="PGP"/>
                    <xs:enumeration value="NETWIZARD"/>
                    <xs:enumeration value="USER"/>
                    <xs:enumeration value="HARDWARE"/>
                    <xs:enumeration value="NONE"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:element>
    </xs:sequence>
    <xs:sequence minOccurs="0">
        <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">
            <xs:simpleType>
                <xs:union memberTypes="xs:string">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="CATS"/>
                            <xs:enumeration value="K2"/>
                        </xs:restriction>
```

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```
                    </xs:simpleType>
                </xs:union>
            </xs:simpleType>
        </xs:element>
    </xs:sequence>
    <xs:sequence minOccurs="0" maxOccurs="unbounded">
        <xs:element name="MeasureFileName" type="xs:string"/>
        <xs:sequence minOccurs="0">
            <xs:element name="MeasureFileFormat">
                <xs:simpleType>
                    <xs:union memberTypes="xs:string">
                        <xs:simpleType>
                            <xs:restriction base="xs:string">
                                <xs:enumeration value="MF2"/>
                                <xs:enumeration value="MF3"/>
                                <xs:enumeration value="MTX"/>
                                <xs:enumeration value="IMP"/>
                            </xs:restriction>
                        </xs:simpleType>
                    </xs:union>
                </xs:simpleType>
            </xs:element>
        </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:complexType>
<xs:complexType name="PatternDataType">
  <xs:sequence>
    <xs:sequence minOccurs="0" maxOccurs="unbounded">
        <xs:element name="PatternFormat">
            <xs:simpleType>
                <xs:union memberTypes="xs:string">
                    <xs:simpleType>
                        <xs:restriction base="xs:string">
                            <xs:enumeration value="ALF"/>
                            <xs:enumeration value="APPLICON"/>
                            <xs:enumeration value="AUTOCAD"/>
                            <xs:enumeration value="CATS_CFLT"/>
                            <xs:enumeration value="CATS_CREF"/>
                            <xs:enumeration value="CIF"/>
                            <xs:enumeration value="DERIVED"/>
                            <xs:enumeration value="EEBES"/>
                            <xs:enumeration value="ELECTROMASK"/>
                            <xs:enumeration value="FALCON"/>
                            <xs:enumeration value="GDS-II"/>
                            <xs:enumeration value="HITACHI_700"/>
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```

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Full document details: SEMI P10-0706

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