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Version 1.0

Print Quality eXchange
(PQX)
SPECIFICATION

June 22, 2016



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1 STATUS

1.1 Document Status

The status of this document is:

✓	Draft	
✓	Released for Public Comment	
	Final Specification	

1.2 Version History

Version Number	Release Date	Editor	Description
Draft 1.0A	June 22, 2016	Kennedy	First Draft for Public Comment

2 PQX SPECIFICATION STRUCTURE

The Print Quality eXchange Specification provides a definition for the construction of an XML message designed to carry print quality data from a print service provider to the print buyer, or brand. This section describes the structure of the Specification document.

2.1 Normative and Non-Normative Sections

The PQX Specification contains both normative and non-normative material; normative material defines elements and attributes, specifies datatypes and element models that are required in order for quality reporting systems to comply with the PQX Specification. Non-normative material explains, expands on, or clarifies the normative material, but it does not represent requirements for compliance. Normative material in the PQX Specification is contained in the body of the Specification. Non-normative material is included as an Appendix.

2.2 Requirement Wording Note

The key words "MUST," "MUST NOT," "REQUIRED," "SHALL," "SHALL NOT," "SHOULD," "SHOULD NOT," "RECOMMENDED," "MAY," and "OPTIONAL" in this document are to be interpreted as described in [RFC-2119]. The Specification also uses the normative term, "STRONGLY ENCOURAGES," which should be understood as a requirement equivalent to "MUST" in all but the most extraordinary circumstances.

Capitalization is significant; lower-case uses of the key words are intended to be interpreted in their normal, informal, English language way.

2.3 Access to the PQX Specification

The PQX Specification can be accessed at <http://www.idealliance.org/specifications/pqx>

2.4 Access to the PQX Schema

The PQX Schema can be downloaded from <http://www.idealliance.org/specifications/pqx>.

2.5 Access to the CxF Schema

Because PQX imports the CxF schema, developers will need to access CxF as well as PQX. CxF can be accessed from http://www.npes.org/portals/0/standards/docs/CxF3_Core.xsd.

3 INTRODUCTION TO PQX

Brands wish to track the print quality of their suppliers by the supplier and by the location. Today this is difficult and expensive because printers use different measurement tools and send print quality reports to the Brand in a wide variety of formats that cannot be directly utilized or imported into database tracking systems. By establishing a standard print quality exchange specification for printers to report print quality to the print buyer, tools or plug-ins can be developed to streamline print quality reporting and analysis. IDEAlliance, working with the industry has developed this XML print-quality exchange specification to serve as a standard message format for printers to report print quality to Brands (print buyers). The scope and goals of the project are documented in the PQX Terms of Reference.

3.1 Print Quality Ecosystem

The print quality ecosystem is made up of print service providers (Printers), print buyers (Brands) and third party print quality service providers employed by the Brands to act as intermediaries to manage print quality on behalf of a Brand. Because the print quality requirements and reporting criteria are quite varied, we believe that two standardized messages are required. The focus of this Specification is to specify a standard XML message goes from the Printer back to the Brand to deliver raw print quality data. This message is the Print Quality eXchange, or PQX.

The requirements for the setup of the quality press run including the frequency of print quality press runs and the images to be reproduced by the printer to test print quality, as well as the quality parameters that must be reported to the Brand and the specific nomenclature to be used for quality reporting are part of the business agreement between a Brand and its print service providers and outside the scope of PQX.

Note: When the PQX Message has been standardized and is implemented, work is planned to begin to develop a second standard message that Brands can use to communicate press run requirements to the printer in an automated fashion. This message is being tentatively referred to as the PRX (Print Requirement eXchange) Message. Development of PRX will be some time in the future and should not be considered as a pre-requisite for PQX implementation.

3.2 PQX Terms of Reference

PQX is intended to facilitate the one-way transmission of performance data for one or more printed samples from a single press run from print service providers to relevant stakeholders and brand owners; thus allowing brand owners to assess and track relevant business, production, color and quality data of printed materials of all forms. PQX is only intended to transmit raw quality data. The PQX message intentionally excludes tolerance and evaluative information, allowing the receiver to determine acceptability by applying their own scale and tolerance values. PQX incorporates color using the same data containers that are defined in ISO 17972 (CxF). While PQX and CxF are different formats with different parsing requirements, developers can use the same strategies for reading and writing color data in a PQX file that they use for reading and writing color data in a CxF file. PQX is compatible with both spectral and non-spectral color data.

3.3 Relationship to CxF

PQX was designed to directly carry CxF data exported from any tool employing CxF. And rather than requiring the writing of specialized CxF data fragments, PQX carries a complete CxF data set in the CxF namespace. This was intended to simplify the implementation of PQX by software vendors. As stated in the Terms of Reference,

“PQX incorporates color using the same data containers that are defined in ISO 17972 (CxF). While PQX and CxF are different formats with different parsing requirements, developers can use the same strategies for reading and writing color data in a PQX file that they use for reading and writing color data in a CxF file.”

If a PQX message is being used to report color quality, PQX will also require the exchange of CxF sample data generated by the software supporting the color measurement device. Thus, PQX allows for, but *does not require*, the exchange of CxF standard, or reference data. If a Brand wishes to have reference data (as well as sample data) included in the PQX message, that can be accommodated using the PQX message as well. See Section 3.3.

3.4 PQX Design Principles

The following design principles were developed to guide the construction of the PQX message:

3.4.1 General Design

- Structure of the PQX Message will conform to the Terms of Reference as defined by the WG
 - Tolerances and Scoring is out of scope
 - The PQX message will be limited to the reporting of press run results, not for returning the requirements or specs for that press run
 - Standard ANSI/ISO nomenclature (terms/definitions) will be used whenever possible
 - Element/attribute names will self-documenting; i.e. names will not be abbreviated
 - Each element and attribute will be documented in place using <annotation and <documentation XSD structures
 - The namespace for all PQX elements will be pqx:
 - CxF elements will be imported from the CxF3_core schema and will retain their CxF cc: namespace
- Either CxFX1 or CxFX4 may be used for color data. This means that while spectral data is allowed (for packaging) it is not required

3.4.2 Message Structure

- The root element for the Print Quality Report will be the PQX message.
- The Schema will be prescriptive and strictly enforceable, rather than flexible, to allow for little, if any programmer interpretation of intent.
- Ordering of fields within PQX will be absolute.
- Cardinality will be determined by consensus of the stakeholders.
 - Required elements/attributes must be agreed upon by all.
 - Optional elements, within the scope of the project, will be included at the request of any stakeholder.
- The cardinality of elements and attributes will be configurable as specified by a business agreement between the Brand and the Printer, thus allowing for the customization of required fields by printing sector or Brand.
- Enumerated values for elements and attributes will be configurable as specified by a business agreement between the Brand and the Printer, thus allowing for the customization of required values by printing sector or Brand.

3.4.3 Message Field Order

- Business data will fall first in the CxF Message
 - PrintedBy
 - PrintedFor

- MeasuredBy
- ProductionInfo
- DataCaptureInfo
- Color data for references and samples will be reported in separate blocks of the message.
- CxF will be employed as the data store for reference and sample color data.
- A block to reference defect images will be included.

3.4.4 Employing CxF

- Only Core CxF will be employed as the data store for color data.
- CxF will be employed as a *complete CxF hierarchy* (blob) with the cc:CxF element as the root to ensure direct importability from color measurement device software.
- No fragment of CxF will be allowed within the PQX model.
- CxF elements will be employed for only those mechanisms where the intent of CxF is a match for the intent of PQX.
- The use of CxF <Tags to customize CxF to fit the intent of PQX is not appropriate.
- The use of CxF <CustomResources and <CustomAttributes is not appropriate.
- Non-appropriate CxF elements may be written into a PQX message but shall be ignored by receiving systems.
- Quality reporting objects not explicitly supported by CxF Core will be implemented with PQX XML structures, outside of the CxF data store.

3.5 Legend for Diagrams

In this specification, the XML model is often illustrated by a model diagram. Each diagram was produced with the Altova XML Spy product. These diagrams show the elements and attributes that make up a model and their order and frequency.

The legend for reading XML model diagrams is shown in Figure 3.2. Elements that are required by the model are shown in a solid box. Elements that are optional are shown in a dotted box. Likewise attributes may be required (solid box) or optional (dotted box). A repeatable occurrence of elements is indicated by numbers below each element box to the right.

The diagrams also indicate how elements are assembled. When building some models, elements may occur in a sequence with a specified order. Other models provide a choice from among a number of elements. The legend in Figure 3.2 shows the connectors for sequence and choice.

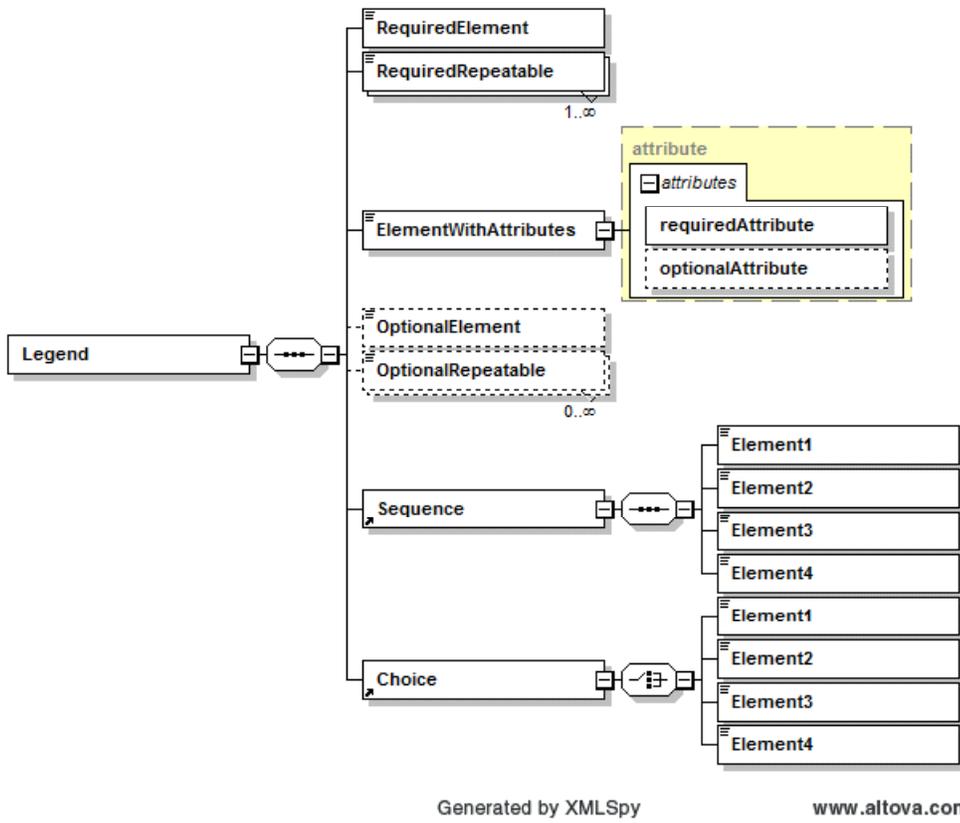


Figure 3.1 Legend for XML Diagrams

4 HIGH LEVEL MESSAGE STRUCTURE

This Section of the Specification documents the high level PQX message structure. The high level data elements make up the major divisions of the PQX data model. Element or attribute values in any high level element may be linked to other values in the model for purposes of computing quality scores by the receiving system. Each high level data element is documented in a following section of the Specification.

The Print Quality Message high level structure is made up of major blocks to carry business, production and sample data from the printer to the brand and its agents. The model is prescriptive in that the elements have a specific order and cardinality. Only those blocks that all parties contributing to the development of the PQX Specification agree are required will be required. Other blocks are optional and can be used based upon the business agreement between the printer and the brand.

The PQX message directly employs ISO 17972 (CxF) using an XML import mechanism. In order to avoid direct dependencies between PQX and CxF versions, attributes to indicate both the version of PQX being used for validation and the version of CxF being used for validation, these versions may be explicitly called out by attributes at the root level. The default version of CxF is set as CxF3_core.

The final three blocks of the PQX high level structure are data storage blocks designed to carry CxF color data and defect images captured by on press cameras that a brand may wish to include.

See Figure 4.1.

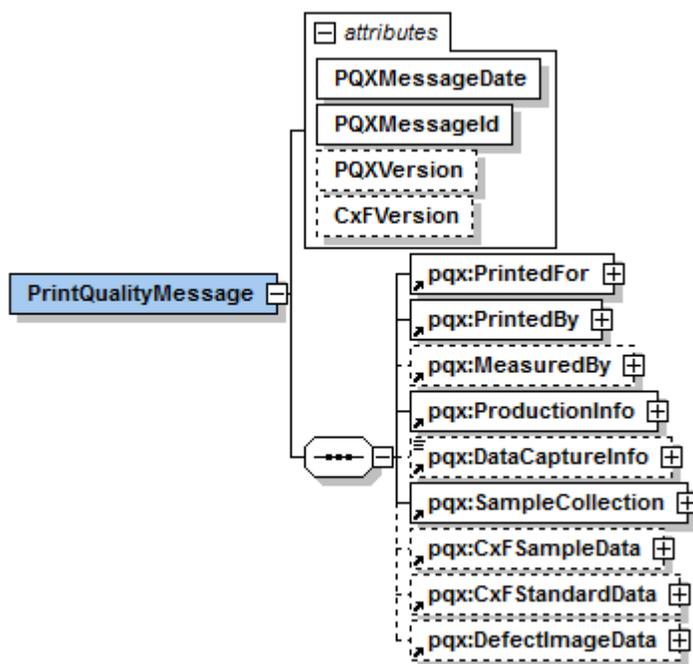


Figure 4.1 High Level PQX Structure

4.1 Print Quality Message Attributes

The Print Quality Message has four attributes; two required attributes and two optional attributes

- **PQX Message Date:** The required transmission date or date/time in ISO format for this PQX message.
- **PQX Message Identifier:** A required unique identifier for this PQX message generated by the print service provider to allow for tracking and archive. The PQX ID must include a universal unique identifier for the print service provider, the location/facility generating the print quality data as well as a tracking identifier for the set of print quality data being exchanged.
- **Schema Location:** An optional attribute that provides a link to the PQX schema to be used to validate this PQX message. If this is a relative URL, the assumption is that the schema is zipped along with the PQX Message that references it. A remote URL can be used to reference a remote secure server where the PQX schema can be accessed.
- **PQX Version:** An optional attribute that captures the version the PQX schema being used to validate the data transmission.

4.2 Print Quality Message Elements

The following are high level elements of the Print Quality Message Structure. Each will be fully documented in a following section of the Specification.

- **Printed For:** A required element that identifies the customer for which print quality data was captured and provides the unique customer identifier(s) for the items printed.
- **Printed By:** A required element about the press run from which print quality data in this report was captured.
- **Measured By:** An optional element that carries information about a party, other than the printer, that was responsible for measuring the printed item.
- **Production Information:** A required element carrying information about the production of the printed item from which print quality data was captured.
- **Data Capture Information:** Optional descriptive information about sampling or data capture techniques used to report the quality data transmitted in this PQX message.
- **Sample Collection:** Required element carrying information about all the samples evaluated and reported on from within a press run. Consists of quality data from at least one sample from the run.
- **CxF Sample Data:** An element made up of CxF data from sample measurements included directly from CxF measurement instrument software. All CxF sample measurement data is held in this block. ID's of CxF objects are referenced to provide direct addressability of object color data stores by receiving systems.
- **CxF Standard Data:** An optional element made up of CxF standard data for quality color aims or references. All CxF color measurement data for aims or references is held in this block. ID's of CxF objects in this block are referenced to provide direct addressability of object color data stores by receiving systems.
- **Defect Image Data:** An optional element made up of links to defect images generated from on-press camera-based defect detection systems. The images may be zipped along with the PQX XML message or stored on a secure server that can be accessed by the brand as defined in the business terms between the printer and the brand. Unique ID's of images are referenced in the sample defect report to provide direct addressability of the defect images by a receiving system.

5 DATA LINKING STRUCTURES

This Section documents the elements within the PQX message that are to be linked by receiving systems in order to calculate quality scoring for the Brand. In the PQX data model we use two different types of Identifiers.

5.1 Labeling Identifiers

The first type of Identifier is a simple identifier used to provide a label for reporting and does not provide computational linking capabilities. An example of a simple identifier is the CustomerItemId that provides a label for the samples being printed to report print quality. Another example of a simple identifier is the PrinterLotId. This is the printer label for the sample that was printed. Again, it is not used for quality computations, but is merely a means of identification. Labeling identifiers are simply strings and are not checked for uniqueness or used for linking data fields by receiving systems.

5.2 Computational Identifiers

The second type of identifier is used by receiving parties in the process of computing/scoring quality. These identifiers link critical pieces of data together in order to compute quality factors such as tone. A good example is the ink channel identifier. This must be unique for each ink channel and is used within the color measurement model to link the measurement back to the ink channel that printed the patch being measured. In this case a link is formed between the InkChannelId and the InkChannelIdLink. Receiving systems also need to connect a color measurement of a patch with the color measurement of the substrate it was printed on. So the SubstrateId and the SubstrateIdLink are used to make that connection. Therefore a computational identifier is defined as a true XML ID and it must be unique and can be used for linking data fields by receiving systems.

This table provides the computational identifiers and their matching/linking counterparts:

Ink Channel Linking	<InkChannelId	<InkChannelIdLink
Substrate Linking	<SubstrateId	<SubstrateIdLink
Parent Ink Channel Linking	<ParentInkChannelId	<ParentInkChannelIdLink
CxF Object Linking	<CxFOBJECTId	<CxFOBJECTIdLink
Defect Image Linking	<DefectImageId	<DefectImageIdLink

6 THE PQX BUSINESS DATA BLOCKS

The business reporting data is carried within the first five blocks of the PQX message. While the majority of fields in this block are informational, some blocks are critical to the computation of quality by receiving systems.

6.1 The “Printed For” Block

This block is required for all PQX messages. This block documents the brand that the quality sample was printed for. Definitions for each element within this block can be found in Terms and Definitions. In this block only the company name and the customer item identifier are required. Fields that indicate the brand/product and any additional customer identifiers for the item printed as part of the quality control agreement are optional. See Figure 6.1.

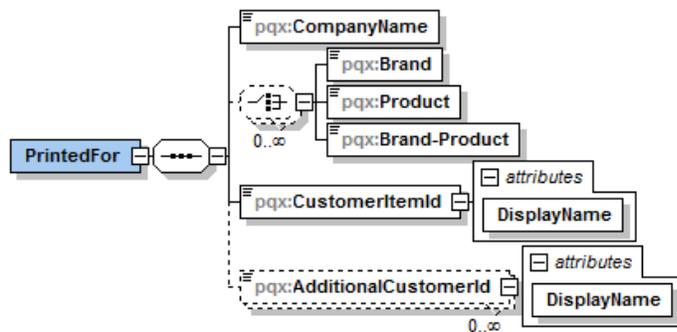


Figure 6.1 PQX “Printed For” Block Structure

6.2 The “Printed By” Block

This block is required for all PQX messages. This block documents the print service provider that printed the quality sample. Definitions for each element within this block can be found in Terms and Definitions. In this block only the printer and the location of the facility where the samples were printed are required. For any PQX message additional fields may be required based on the business agreement between the brand and the printer.

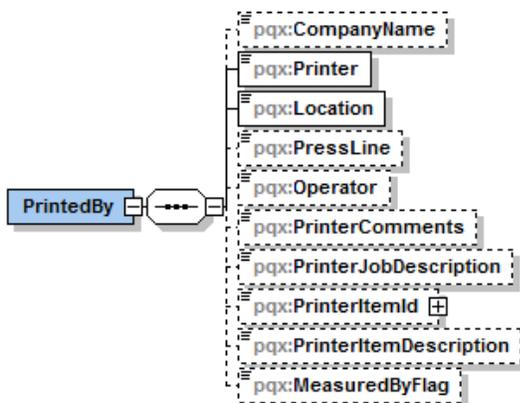


Figure 6.2 PQX “Printed By” Block Structure

The measured by flag indicates whether the printer measured the sample. Sometimes a third party is employed by the brand to capture measurements. If this is the case the information about the party that measured and reported the sample should be entered in the following “Measured By” data block. See Figure 6.2.

6.3 The “Measured By” Block

This block is optional. This block documents the service provider that measured and reported the quality sample. Definitions for each element within this block can be found in Terms and Definitions. In this block only the company name and the location of the facility where the measurement was taken are required. See Figure 6.3.

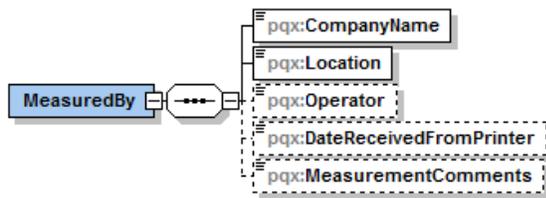


Figure 6.3 PQX “Measured By” Block Structure.

6.4 The “Production Information” Block

This block is required for all PQX messages. This block documents production information that is required for the evaluation of the quality sample by the receiver of the PQX message. Definitions for each element within this block can be found in Terms and Definitions. In this block the date the samples were printed, the printer’s unique identifier for the press run and information about the press are required. Press information, especially the information about the ink channels is critical to the calculation of tone values by receiving systems. Other information about the press run is optional. See Figure 6.4.

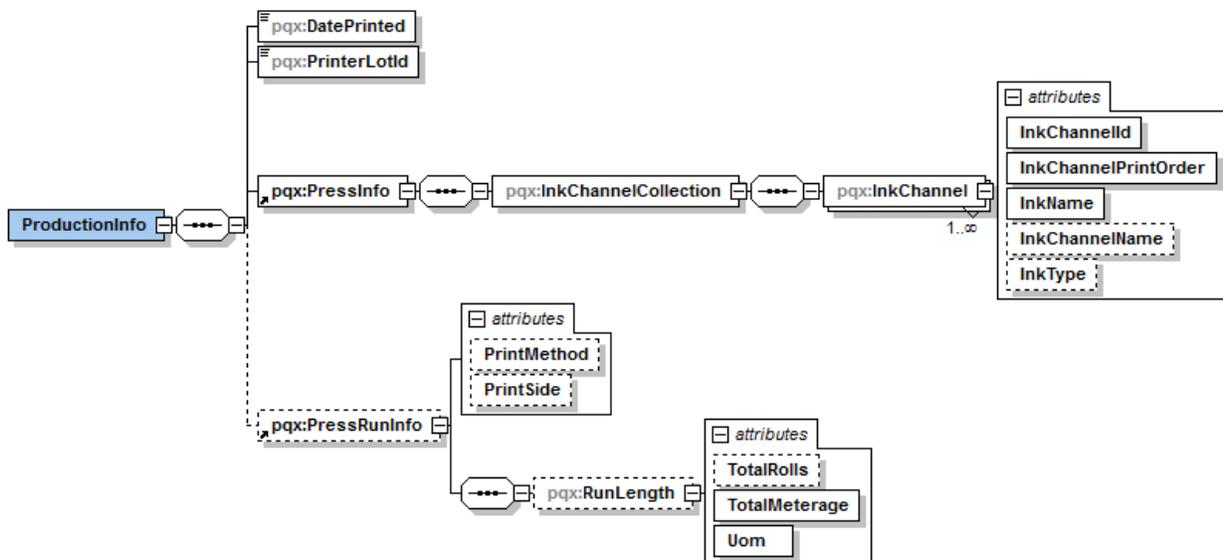


Figure 6.4 PQX Production Information Block Structure

6.5 The “Data Capture Information” Block

The optional Data Capture block documents the reporting techniques used to capture the data being sent within the Print Quality Message. This block has 4 attributes to document the capture methods used for capturing the data sent within the PQX message for color, registration and defects. It also documents the defect inspection percentage. Definitions for each element within this block can be found in Terms and Definitions.

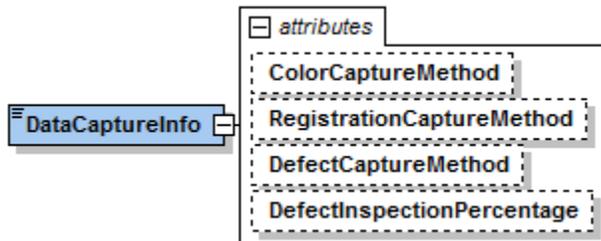


Figure 6.5 PQX Data Capture Information Block Structure

7 THE SAMPLE COLLECTION DATA BLOCK

The PQX message transports quality/performance data from one or more samples from the same press run. These samples are known as the “Sample Collection.” Since PQX can be used to report color, registration and/or defects for printing of any kind, elements in this model are all optional. Another way to look at this is to understand that the requirement for any of these elements is dependent on the kind of printing and the reporting each Brand requires. Definitions for each element within this block can be found in Terms and Definitions.

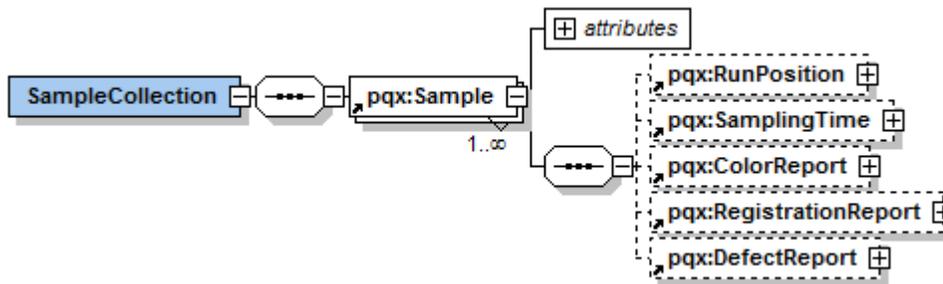


Figure 7.1 Sample Collection Model

7.1 The “Run Position” Data Model

Run Position is a block that defines the position within a press run where a sample was captured for measurement. For example, a sample may be captured by a manual pull of a press sheet or item selected by the pressman. See Figure 7.1. Definitions for each attribute of Run Position can be found in Terms and Definitions.

Note: The Roll= attribute is only used when the sample is printed on a substrate that comes in rolls. The meterage is the counter for the item selected for measurement. It may be a linear measurement or an item number. The Meterage Unit of Measure identifies the meterage, such as the 500th press sheet or the 50th can that was printed for quality assessment.

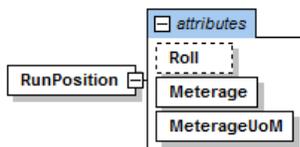


Figure 7.2 Run Position Model

7.2 The “Sampling Time” Data Model

Sampling time is a block that defines when samples from the press run were measured. This block is used for reporting when the sampling includes a number of samples taken during a specified time span. See Figure 7.2. Definitions for each element within this block can be found in Terms and Definitions.

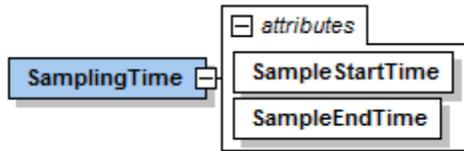


Figure 7.3 Sampling Time Model

7.3 The “Color Report” Data Model

Color Report is a block that carries color quality reporting for a sample. This block may be used for either manual or automated reporting as specified in the <DataCaptureInfo block. The Color Report for any sample are made up of one or more measurement sets taken at a particular position on the sample. Definitions for each element within this block can be found in Terms and Definitions.

Each color Measurement Set carries measurement data for one or more patches. PQX is designed to communicate all aspects of color with the exception of reporting Tone. This is because there is no universal formula for calculating Tone. Therefore PQX was designed to communicate all color characteristics necessary for a receiving system to calculate Tone according to the formula employed by a receiving system. Note that each color measurement is linked to an object in the CxF data block in order to pass color to the receiving system.

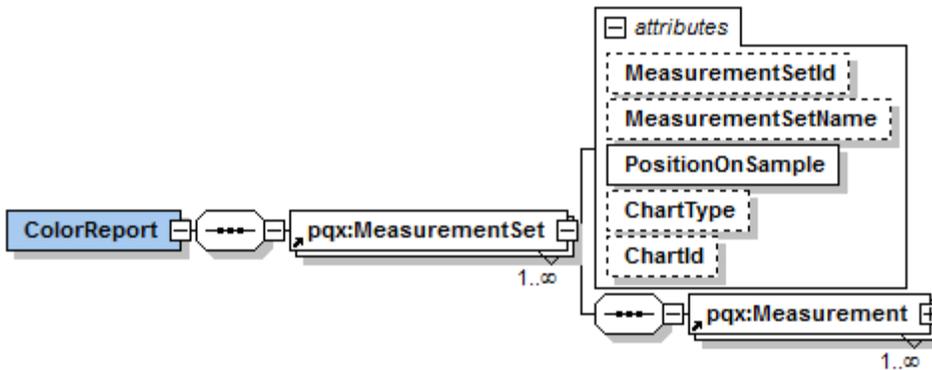


Figure 7.4 PQX Color Report Model

7.3.1 Measurement Attributes

Each color Measurement carries data about color quality in its attributes. See Figure 7.4. These fields include the data that is required to calculate Tone. Each measurement has a patch type and, with the exception of a substrate patch, is linked to ink channel information so lay-down order can be determined for the calculation of Tone. A detailed sample can be found in Appendix ***.

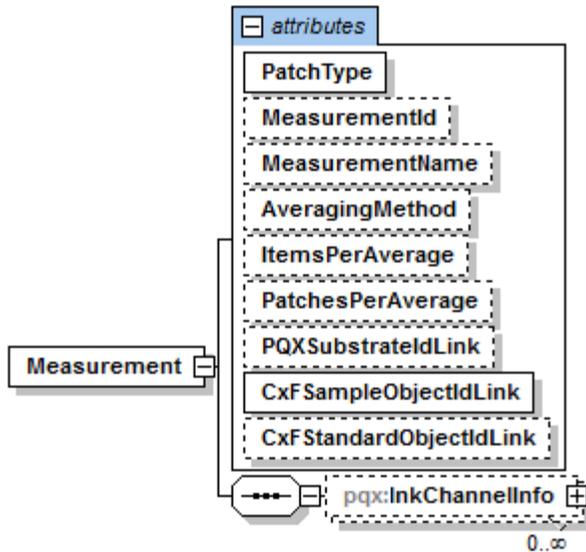


Figure 7.5 Color Measurement Attributes

7.3.2 Ink Channel Information Model

In order for the receiving system to calculate a tone value, it needs not only the color data but information about the patch type, substrate color, ink color and the ink lay-down sequence. This information comes from the ink channels that are linked to the measurement. See Figure 7.5.

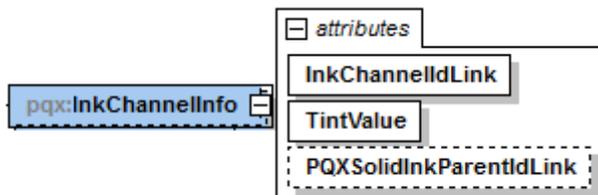


Figure 7.6 Ink Channel Information Model

7.4 The “Registration Report” Data Block

Registration Report is a block that carries registration quality reporting for a sample. This block may be used for either manual or automated reporting as specified in the <DataCaptureInfo block. Definitions for each element within this block can be found in Terms and Definitions. The Registration Report for any sample is made up of one or more Registration Sets taken at a particular position on the sample. A Registration Set may be made up of a Variance Report, A Channel Report or both. See Figure 7.**.

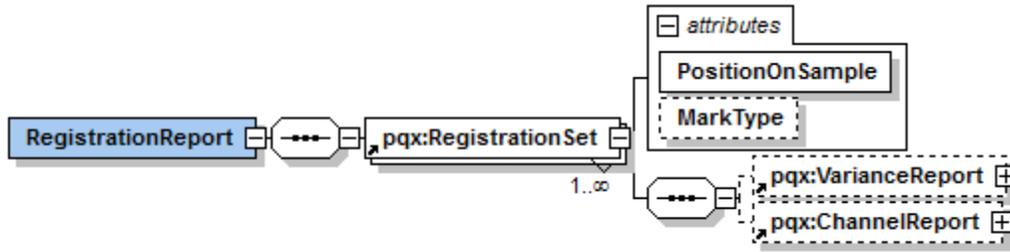


Figure 7.7 Registration Report Model

7.4.1 Registration Variance Report Model

One way to report registration quality is with a Variance Report. This model is used to report overall variance of one ink channel from all others without reference to a single channel. The overall variance or printing alignment differences may be reported from a visual observation or may be measured. See Figure 7.7.

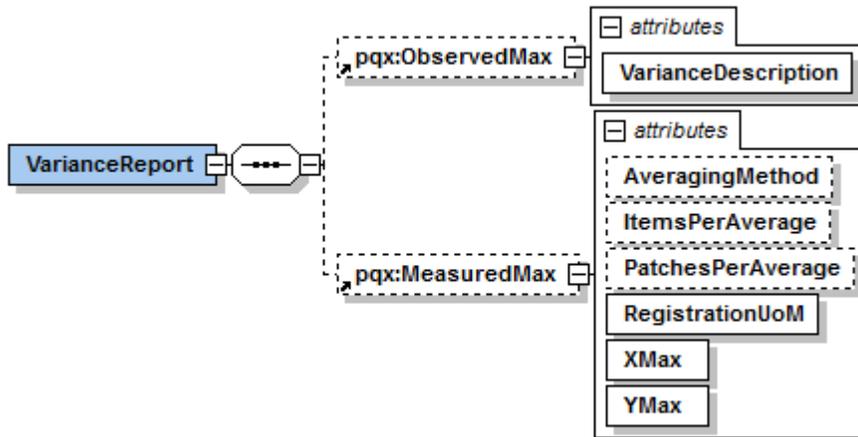


Figure 7.8 Registration Variance Report Model

7.4.2 Registration Channel Report Model

Another way to report registration quality is with a Channel Report. This model is used to report the maximum difference in alignment of printed images judged against a single reference ink channel. The printing alignment difference may be reported from a visual observation or may be measured. See Figure 7.8.

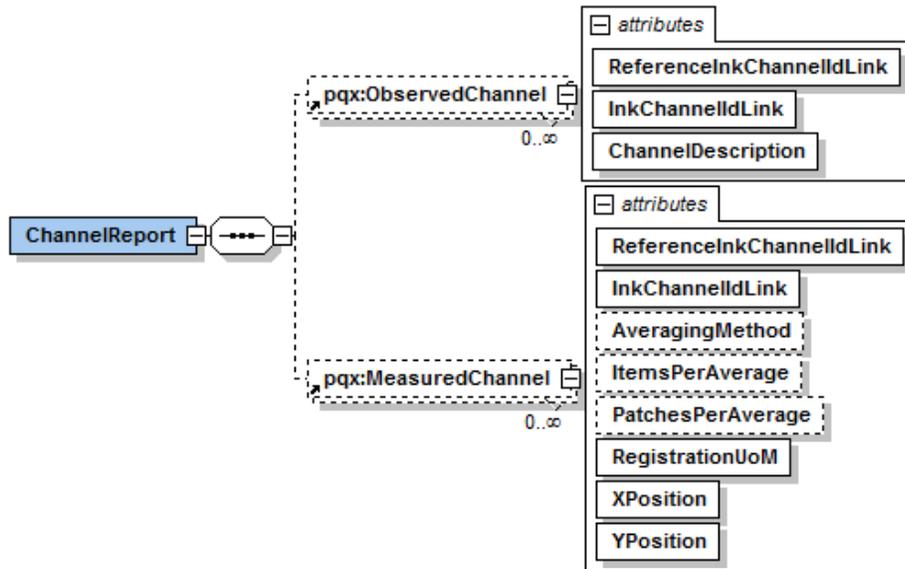


Figure 7.9 Registration Channel Report Model

7.5 Defect Report Model

Defect Report is a block that carries defect reporting for a sample. This block may be used for either manual or automated reporting as specified in the <DataCaptureInfo block. Definitions for each element within this block can be found in Terms and Definitions. The Defect Report for any sample is made up of one or more Defect Entries taken at a particular position on the sample. Required attributes for each entry include the Basis of Reference (how do we know this is a defect?), the zone where the defect occurred, the name of the defect and the severity of the defect.

Note: The name and zone of a defect are part of the business agreement between the Brand and the Printer. PQX does not define defect names or zones. Rather it leaves that definition for each Brand to determine.

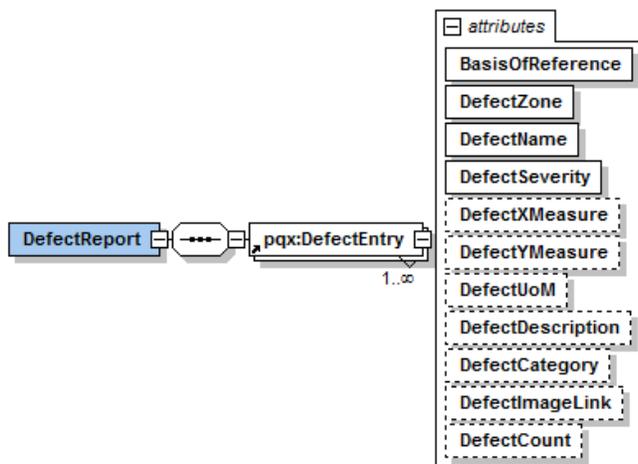


Figure 7.10 Defect Report Model

8 DATA STORAGE BLOCKS

The final three blocks of the PQX high level structure are data storage blocks designed to carry CxF color data and defect images captured by on press cameras that a brand may wish to have included. See Figure 8.1. Definitions for each element within this block can be found in Terms and Definitions.

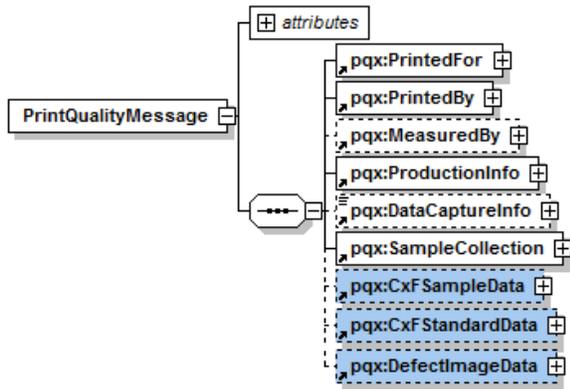


Figure 8.1 Data Storage Blocks

9 TERMS AND DEFINITIONS

The following glossary presents the terms and formal definitions for the elements, attributes and values that are employed in the PQX XML schema. Terms are arranged in alphabetical order.

Term	Definition
Additional Customer Identifier	An optional, additional customer identification field for the printed item from which print quality data was captured.
Automated Data Capture	A data capture type made up of measurements and reports that were taken by automated, inline sampling.
Averaging Method	An optional attribute of the color Measurement or measured registration report that provides the averaging method or technique used to generate reporting values for this PQX report. This is an open text field. Values for this attribute may be a standard averaging method such as "mean" or it may be a custom averaging formula provided by the brand such as "Pepsi" or "PG". BUSINESS RULE: If averaging is not used, then the value is "none" is assumed.
Basis of Reference	A required attribute of each defect entry that specifies the basis for determining a defect through comparison to the reference. Values may be "PrepressFile", "GoldenMaster" or "Proof".
Brand	An element that identifies the brand for which print quality data was captured.
Brand Company Name	An optional element that identifies the parent company of the brand for which print quality data was captured.
Brand-Product	A PQX element that identifies the product brand owner's brand-product designation for which print quality data was captured. The value is a concatenated string with a vertical bar separator such as "Chex Chex Snack Mix Cheddar" (brand, product category, product) or "Chex Rice Chex (brand, product)". BUSINESS RULE: If measuring general printing quality with a color bar and not an image specific to any brand or product, this element is not required.
Build Patch	A patch type that is a generic build, not intended to produce a specific color, like a patch in an image.
Channel Registration Report	An optional element of a Registration Set that holds the registration reports by ink channel for a registration set. The report may be observed, measured or both.
Chart Identifier	An optional attribute on a Measurement Set that provides a declaration that a specific color chart is being measured for evaluation purposes. The Chart Id enables a link to previously defined patches and values to provide a shortcut for dumping an entire chart without having to specify each patch type. If Chart Type is ISO, then the formal ISO Chart Id is used.
Chart Type	An optional attribute on a Measurement Set that provides a declaration that a specific type of color chart is being measured for evaluation purposes. The chart type is commonly specified by a business agreement between the brand and a printer. The Chart Type enables a link to previously defined patches and values to provide a shortcut for dumping an entire chart without having to specify each patch type. An ISO chart will have ChartType equal to ISO. If a brand defines their own chart for purposes of quality assurance, then the brand chart such as Pepsi or Pampers will be specified.
Color Capture Method	An optional attribute on Data Capture Information that provides the method used to capture color measurements. May be "manual" or "automated" where automated refers to reports from an inline digital inspection system.
Color Report	An optional block of elements for a Sample that contains reporting on the color measurements for a sample.

Term	Definition
Customer Item Identifier	The required unique customer identification for a printed item from which print quality data was captured. This is a primary key for the PQX message. The Customer Item Identifier may be cross-referenced to the Printer's Lot Identifier for the press run from which quality data is being reported.
CxF Sample Data	An optional element of the PQX message that is made up of CxF data from sample measurements included directly from CxF measurement instrument software. All CxF sample measurement data is held in this block. ID's of CxF objects are referenced to provide direct addressability of object color data stores by receiving systems. BUSINESS RULE: When sending color data measurements within the PQX message, this block is required.
CxF Sample Object Id-Link	A required attribute of the color measurement that provides a link to the CxF object Id for this measurement. BUSINESS RULE: This element provides uniqueness for a color Measurement.
CxF Standard Data	An optional element of the PQX message that is made up of CxF standard data for quality color aims or references. All CxF color measurement data for aims or references is held in this block. ID's of CxF objects in this block are referenced to provide direct addressability of object color data stores by receiving systems.
CxF Standard Object Id-Link	An optional attribute of the color measurement that provides a link to the Standard/Aim CxF object Id for this measurement. BUSINESS RULE. If standard aim values are known to both parties as part of their business agreement, this field is not required to be transmitted back to the brand within the PQX message.
CxF Version	An optional attribute that captures the version the CxF schema being used to validate the data transmission. A default of CxF3_Core is assumed.
=Data Capture Method	An optional element that provides set of flags used to indicate the data capture techniques used to generate the quality data transmitted in this PQX message. BUSINESS RULE: It is a good practice to provide flags for each type of quality data that will be transmitted in the PQX report. No default values are assumed.
Date Printed	A required element that captures the date of the press run in an ISO date or date/time format.
Date Received From Printer	An optional element in the measured by block that captures the date the sample was received from the printer in a date or date/time in the ISO format.
Defect Capture Method	An optional attribute on Data Capture Information that provides the method used to capture registration. May be "manual" or "automated" where automated refers to reports from an inline digital inspection system.
Defect Category	An optional attribute for the defect entry to provide an optional defect category as a second level of categorization of defect types. Category types for the report are selected from a customizable list defined by business agreement between the brand and the printer. An example of a Category type might be an Ink/toner fault, Substrate fault, Transfer/impression fault, Ink channel fault etc.
Defect Count	An optional attribute for the defect entry to provide the count or frequency for this defect being reported across the inspections reported in this entry. BUSINESS RULE: If the defect count is not provided, a value of 1 defect should be assumed.
Defect Description	An optional attribute for the defect entry to o further describe the nature of the defect. Use of this text field is especially important when defect severity is not directly tied to the defect zone or size.
Defect Entry	A required element of the defect report that contains quality data about a single defect. BUSINESS RULE: If several defects are present for a single sample, multiple defect entries must be made to report each defect individually. Includes severity ranking, zone/location, defect name, etc. Uniqueness can be based on the concatenation of Defect Zone and Defect Name.

Term	Definition
Defect Image Data	An optional element of the PQX message that is made up of links to defect images generated from on-press camera-based defect detection systems. The images may be zipped along with the PQX XML message or stored on a secure server that can be accessed by the brand as defined in the business terms between the printer and the brand. Unique ID's of images are referenced in the sample defect report to provide direct addressability of the defect images by a receiving system.
Defect Image Id	A unique identifier for the defect image. Can be referenced in the sample defect report.
Defect Image Link	An optional attribute for the defect entry to provide the URI/URL from which an image of the defect may be retrieved. Image may be included when PQX XML report is sent or may be on a remote FTP server.
Defect Inspection Percentage	An optional attribute on Data Capture Information that provides the percent of defect inspections taken throughout the press run and reflected in the defect data for this PQX report. Total defects can be calculated by the receiving system using defect count reports and inspection percentages.
Defect Master Reference	Defect evaluation was made by comparison to a printed item designated as the "golden master". The "golden master" may from a previous press run.
Defect Name	A required attribute for each defect entry that provides a first level of categorization for a defect. Defect names for the PQX report should be selected from a customizable list of primary defect types defined by business agreement between the brand and the printer . An example of a defect name might be a hickey, bullseye, streak, etc.
Defect Prepress Reference	Defect evaluation was made by comparison to a reference prepress file such as a pdf or JPG image.
Defect Proof Reference	Defect evaluation was made by comparison to a proof.
Defect Report	A block of elements that carries the defect reporting for this sample. The defect report is made up of one or more defect entries.
Defect Reporting Method	The method used to report defects. May be "visual" or "digital," where digital refers to reports from an inline digital camera-based inspection system.
Defect Severity	A required attribute for each defect entry that provides defect severity values for a defect. Severity values should be selected from a customizable list defined by business agreement between the brand and the printer . An example of defect severity might be "1" "5" or "Severe" "Moderate" "Slight".
Defect Unit of Measure	An optional attribute for the defect entry to indicate the Unit of Measure for reporting the X and Y defect measurements. BUSINESS RULE: If reporting defect measures, the X-Measure, Y-Measure and Defect UoM are all required.
Defect X-Measure	An optional attribute for the defect entry to indicate the measurement of the defect along the X (horizontal) axis. It is to be expressed in the DefectUoM. BUSINESS RULE: If reporting defect measures, the X-Measure, Y-Measure and Defect UoM are all required.
Defect Y-Measure	An optional attribute for the defect entry to indicate the measurement of the defect along the Y (vertical) axis. It is to be expressed in the DefectUoM. BUSINESS RULE: If reporting defect measures, the X-Measure, Y-Measure and Defect UoM are all required.
Defect Zone	A required attribute for each defect entry that describes the zone on the printed item where the defect occurred. The Defect Zone values for the defect entry may be a text description or may be selected from a customizable list defined by business agreement between the brand and the printer . An example of a defect zone might be "1" "2" "3" or "center" "top" "bottom".

Term	Definition
Display Name	This attribute provides the type or name of the identifier or code such as "SKU" or "IPMS", "Art Code" or "GCAS".
Frequency Unit of Measure	The frequency unit of measure is combined with sampling frequency value. For example if SamplingFrequency = "10" and FrequencyUoM = "minutes" then the sampling frequency is once every 10 minutes.
Gray Balance Patch	A patch type that is designed to print as gray.
Defect Image Link	A link to the image of a defect reported in a defect entry. If this is a URL the assumption is that the images are zipped along with the PQX Message that references them. A remote URL can be used to reference a remote secure server where images are stored.
Ink Channel Name	An optional attribute on the ink channel to capture the name of this channel. BUSINESS RULE: The channel name often matches the name of the ink in that channel. For example both the ink name and the channel name might be "cyan". But in the case that the ink name is not the same as the channel name, the ink channel name may be indicated using this attribute.
Ink Channel	A required element within the ink channel collection block use to capture the description of each ink channel on press.
Ink Channel Collection	A required block of elements made up of a listing of the ink channels of the press.
Ink Channel Identifier	A required attribute to provide a unique identifier for this ink channel on press. Can be linked to by elements using an InkChannelIdLink= attribute.
Ink Channel Id-Link	A required attribute on ink channel information for a color measurement that provides a link to the definition of the ink channel for this measurement.
Ink Channel Information	An optional element within a measurement that provides information about the inks used to print the patch. This information is used by the receiving system to calculate tone value. BUSINESS RULE: Ink channel information is not used for a substrate patch. This field is repeated when more than 1 ink is used for an overprint, used to produce grey or used for a build patch.
Ink Channel Print Order	A required attribute on ink channel that provides the numerical print order of this ink channel on press. The value is a positive integer. The ink channel order attribute is expected to match the numeric print order sequence on press.
Ink Name	A required attribute on ink channel that provides the name of the ink in this channel. For example cyan or Coke-Red are both ink names. Process inks often have a generic name such as cyan or yellow while spot colors usually have a very specific name such as "Coke-Red".
Ink Type	An optional attribute on ink channel that provides a classification of the ink type. Values are "process" or "spot".
Defect Inspection Percentage	A optional attribute on data capture info that provides the percent of inspections taken throughout the press run and reflected in the defect data for this PQX report. BUSINESS RULE: Total defects can be calculated by the receiving system using defect count reports and inspection percentages.
Items Per Average	An optional attribute of the color Measurement or measured registration report that provides a way to specify the number of item sample measurements were averaged for the same patch to generate a single reporting value for this PQX report. An item might be a press sheet, a label, can, etc. BUSINESS RULE: If averaging is not employed, then the value is "1".
Items Per Sample	An optional attribute on each Sample that provides the number of contiguous items that were inspected either visually or digitally for this sample of the PQX report. This is a positive integer.
Manual Data Capture	Measurements & reports were taken by manual/human sampling.
Mark Type	A declaration that a specific type of registration mark being measured for evaluation purposes. The mark type is commonly specified by a business agreement between the brand and a printer . The Mark Type may be a URL to the mark itself.

Term	Definition
Measured By	An optional element that carries information about a party, other than the printer, that was responsible for measuring the printed item.
Measured By Flag	A true/false flag to indicate that the printer also measured the item for print quality.
Measured Channel Registration	A measurement for the alignment of the printed image from an ink channel relative to the printed image from the reference ink channel for this registration set. BUSINESS RULE: All ink channel measurements must be reported for the registration set if using the channel reporting method.
Measured Max Variance	An element that reports the measured maximum variance for the sample without specification of a reference ink channel.
Measurement	A required block for each Measurement Set that contains elements that describe a single measurement taken to evaluate print quality. Attributes provide information about the measurement that can be used by the receiving to calculate tone and score the sample.
Measurement Comments	An optional field provided for the party that conducted measurement and visual evaluations to transmit additional data to the brand owner. There is no dependency, logic or action based on the content of this field.
Measurement Company Name	An optional element that identifies the company that conducted measurements and visual examinations.
Measurement Identifier	An optional attribute of the color Measurement that provides an identifier for this measurement. BUSINESS RULE: Because the CxF Object Identifier provides uniqueness, this element is not required.
Measurement Location	A required element that identifies the location of the facility where print quality was measured.
Measurement Name	An optional attribute on a color Measurement that provides a human-readable name or label for this set of measurements.
Measurement Operator	A optional element that identifies the operator conducting measurements and visual examinations.
Measurement Set	A required element of Color Measurements that is made up of a set of color measurements taken at a single position on a sample. BUSINESS RULE: If color quality is being reported with PQX, at least one measurement set must be included.
Measurement Set Identifier	An optional attribute on each Measurement Set that provides a unique identifier for this set of measurements. BUSINESS RULE: An identifier is optional because the Position-On-Sample is used to provide uniqueness for purposes of reporting.
Measurement Set Name	An optional attribute on each Measurement Set that provides a human-readable name or label for this set of measurements.
Measurement Side	An optional attribute on each Sample that provides an indication of which side of a printed item a measurement (such as color or registration) or observation was taken from. The measurement side values for the report may be a textual description or may be selected from a customizable list defined by business agreement between the brand and the printer . For example measurement side values might be "top" or "bottom" or alternately values might be "front" or "back" or even "SideA" or "SideB".
MeasurementData	Data from a Measurement taken to evaluate print quality.
Measurements Per Average	The number of sample measurements averaged to generate a single reporting value for this PQX report. If averaging is not employed, then the value is "1".
Meterage	A required attribute of the Run Position that provides a count indicator value for the location on a roll of substrate or a sequential number for a printed item within a press run where the sample was taken for evaluation. This is a positive decimal number. The meaning of this number is specified by the Unit of Measure (Uom) attribute. BUSINESS RULE: Meterage must be used to provide a value for the

Term	Definition
Meterage Unit of Measure	A required attribute of the Run Position that provides the unit used for expressing the meterage for the press run position may be a physical measure such as feet or meters or it may be the count of a physical item printed such as sheet, can or bottle.
Observed Channel Registration	A description of the observed channel registration for the sample registration set.
Observed Max Variance	A description of the observed maximum variance for the sample. This may be a text description or a value from a scale previously defined by the Press Information
Operator	An optional element that identifies the operator running the press.
Overprint Patch	A patch type that prints as a color made with 2 or more solids at a 100% tint value.
Patch Type	A required attribute of the color Measurement that provides a specification of the type of patch being measured. Patch type values include substrate, solid, tint, overprint, graybalance, special build and build.
Patches Per Average	An optional attribute of the color Measurement or measured registration report that provides a way to specify the number of measurements for the same patch on a single item that were averaged to generate a single reporting value for this PQX report. BUSINESS RULE: If averaging is not employed, then the value is "1".
Position on Sample	A required attribute on each Measurement Set or Registration Set that provides a descriptor for this set of data based on the position within a sample. The Position on Sample values for the report may be a textual description or may be selected from a customizable list defined by business agreement between the brand and the printer . An example of a position on sample might be "1" "2" or "Position A" "Position B". BUSINESS RULE: Because PositionOnSample provides uniqueness it is required.
PQX Message Date	The required transmission date or date/time in ISO format for this PQX message.
PQX Message Identifier	A required unique identifier for this PQX message generated by the print service provider to allow for tracking and archive. The PQX ID must include a unique identifier for the print service provider, the location/facility generating the print quality data as well as a tracking identifier for the set of print quality data being exchanged.
PQX Solid Ink Parent Id-Link	An optional attribute of ink channel information that provides a link to the PQX Measurement Id for the solid ink parent measurement for this tint. BUSINESS RULE: The PQX Solid Ink Parent Id-Link is required for patches with a tint value greater than 0.
PQX Substrate Id-Link	An optional attribute of the color Measurement that provides a link to the PQX Measurement Id for the measurement of the substrate. BUSINESS RULE: This attribute is used without ink channel information when the patch type is "substrate."
PQX Version	An optional attribute that captures the version the PQX schema being used to validate the data transmission.
Press Information	A required block of elements carrying information about the press used to print the item from which print quality data was captured.
Press Line	An optional element that identifies the press line where the press run took place.
Press Run Information	An optional block of elements carrying information about the press run.
Press Run Unit of Measure	The Uom (Unit of Measure) may be a physical unit such as feet or meters. The Uom may also be a physical unit such as "sheets" or "cans". This attribute is required.
Print Method	The method by which the sample was printed from which print quality data was captured. For example, a label may have been printed by a flexo, gravure or digital press.
Print Quality Message	An XML message designed to transmit print quality data from print service providers to relevant stake holders and brand owners.

Term	Definition
Print Side	The side of the substrate where the image is printed. Values may be "Reverse" "Surface" or "Both".
Printed By	A required block of elements that identify the printer that printed the sample from which print quality data in this report was captured.
Printed For	A block of elements that identify the customer for which print quality data was printed and captured. Provides the unique customer identifier(s) for the items printed.
Printer	A required element that identifies the name of the printer that conducted the press run to capture print quality data.
Printer Comments	An optional field provided for the printer to transmit additional data to the brand owner. There is no dependency, logic or action based on the content of this field.
Printer Company Name	An optional element that identifies the parent company of the printer that printed the sample from which print quality data was captured.
Printer Item Description	A human readable description of the item/product that the printer might use to identify the item from which print quality data was captured. This is not a machine processable identifier for the job.
Printer Item Identifier	An optional element providing a printer-generated identifier for the printed item from which print quality data was captured.
Printer Job Description	An optional human-readable description of the print run from which print quality data was captured. This is a printer's description of a job, provided for usability on the shop floor. No dependency, logic or action will be based on the content of this field.
Printer Location	A required element that identifies the location of the printing facility where the press run was conducted to capture print quality data.
Printer Lot Identifier	A required unique identifier, used by the printer to identify the press run, or collection of items (pieces of art) and press sheets, panels, cans, etc. from which print quality data was captured.
Process Ink Type	a member of a process ink set (2 or more inks), intended to be printed in combination with other process ink(s) in order to reproduce a range of colors or "gamut".
Product	An element that identifies the product for which print quality data was captured.
Production Information	A required block of elements carrying information about the production of the printed item from which print quality data was captured.
Reference Ink Channel Id-Link	A required link to the ink channel that will serve as the the point of reference to which the alignment of all other ink channels will be compared for channel-based registration reporting.
Registration Capture Method	An optional attribute on Data Capture Information that provides the method used to capture registration. May be "manual" or "automated" where automated refers to reports from an inline digital inspection system.
Registration Channel Description	A description of the registration of an ink channel on the sample that comes from a visual observation of the registration mark or simply from observing the printed sample. This may be a text description or a value from a scale previously defined by the brand and printer as part of their business agreement . An example of a registration channel description scale might be "1" to "10" or "In Register" "Moderately Out of Register" etc.
Registration Report	A block of elements that carry one or more sets of data about the accuracy of the alignment of inks on a printed image. Made up of one or more Registration Sets.
Registration Set	An element that carries data about the accuracy of the alignment of inks on a printed sample. Variance registration data may be reported or registration data relative to the alignment of each ink channel to a reference ink channel may be reported.
Registration Unit of Measure	The Uom (Unit of Measure) is the physical unit, such as a micron, used to measure registration positioning. This UoM may be a static measurement such as a millimeter or may be a relative value such as line or dot. BUSINESS RULE: If registration is reported using metrics, the registration UoM is required.

Term	Definition
Roll	An optional attribute of the Run Position that provides a designation of a roll of substrate from which a sample was taken.
Run Length	Run Length The length of the press run that produced the printed sample from which print quality data was captured. The Run Unit of Measure attribute is used to specify the measurement used.
Run Position	An optional element of each Sample that provides information about the position in a press run where a sample was taken to be evaluated for quality. BUSINESS RULE: This only applies when a single item is selected for data collection.
Run Unit of Measure	The Uom (Unit of Measure) for the length of the press run may be a physical unit such as feet or meters. The Uom may also be a physical unit/item such as "sheets" or "cans". This attribute is required.
Sample	A selected item or items for which quality data is being collected. This may be a single item such as a press sheet, label, can etc. or it may be a number of items gathered over a range of time or even for an entire press run. BUSINESS RULE: If more than a single item makes up a sample, that should be reported using the ItemsPerSample attribute.
Sample Collection	A required block of elements carrying information about all the samples evaluated and reported on from within a press run. Consists of at least one sample from the run.
Sample End Time	A required attribute of Sampling Time used to capture the time when the last of a set of samples to be reported was taken.
Sample Identifier	A required attribute on each Sample that provides unique identifier for this sample being evaluated for quality. This Id is required as it may be used as a reference when a quality scoring report is prepared by the receiving party.
Sample Start Time	A required attribute of Sampling Time used to capture the time when the first of a set of samples to be reported was taken.
Sampling Time	An optional element of Sample that provides information about the time during a press run where a sample was taken to be evaluated for quality. Measurement values for all items printed during this time may be reported, or an average may be reported. BUSINESS RULE: Sampling time may be used as an alternative to specifying a counter for the sequential items that make up a Sample.
Solid Patch	A patch type that prints as 100% of a solid color.
Special Build Patch	A patch type that is designed to produce a specific color (like an ECG recipe).
Spot Ink Type	A single ink, intended to produce a specific color printed color – often associated with a brand equity color.
Substrate Patch	A patch type that used to measure the substrate color.
Tint Patch	A patch type used to measure partial ink coverage. TintValue attribute gives the percent ink coverage.
Tint Value	A required attribute of ink channel information that provides a value indicating the percentage of ink coverage for the tint. This is a positive integer between 0 and 100.
Total Meterage	The total meterage or count indicator value for the entire press run. The meaning of this number is specified by the Unit of Measure (Uom) attribute.
Total Rolls	The total number of rolls of substrate used for the press run. This attribute is optional as sometimes items such as cans or bottles or sheets are printed and a roll count does not apply.
Variance Description	A required description of the registration variance that comes from a visual observation of the registration mark or simply from observing the printed sample. This may be a text description or a value from a scale previously defined by the brand and printer as part of their business agreement. An example of a variance description might be "Severe" "Moderate" "Mild".
Variance Registration Report	An optional element of a Registration Set that holds the maximum variance reports for an registration set. The report may be observed, measured or both.

Term	Definition
X Max Variance	A required attribute on a registration Maximum Variance that specifies the maximum variance across the X (horizontal) axis expressed in the registration unit of measure.
X Position	A numeric value in the registration unit of measure that expresses the X-axis (horizontal) position from the specified ink channel reference. Positive values are to the right and negative values to the left.
Y Max Variance	A required attribute on a registration Maximum Variance that specifies the maximum variance across the Y (vertical) axis expressed in the registration unit of measure.
Y Position	A numeric value in the registration unit of measure that expresses the Y-axis (vertical) alignment from the specified ink channel reference. Positive values are up and negative values are down.

10 THE PQX XSD

```

<?xml version="1.0"?>
<!-- edited June 20, 2016 V47.0 by Dkenedy-->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:pqx="http://idealliance.org/pqx" xmlns:cc="http://colorexchangeformat.com/CxF3-
core" targetNamespace="http://idealliance.org/pqx" elementFormDefault="qualified"
attributeFormDefault="unqualified">
  <!--
+++++++ -->
  <!--Copyright 2016 International Digital Enterprise Alliance, Inc.
(IDEAlliance).
All rights reserved by the Copyright Owner under the laws of the United States. For
support, more information, or to report implementation bugs, please contact
IDEAlliance at www.idealliance.org PQX is a trademark of Idealliance, Inc. -->
  <!--
+++++++ -->
  <xs:import namespace="http://colorexchangeformat.com/CxF3-core"
schemaLocation="cxf3_Core4PQX.xsd"/>
  <!-- <xs:import
namespace="http://www.colorexchangeformat.com/documents/literature/CxF/CxF3_Core"
schemaLocation="http://www.colorexchangeformat.com/documents/literature/CxF/CxF3_Core.
xsd"/>
</xs:import>
-->
  <xs:element name="PrintQualityMessage">
    <xs:annotation>
      <xs:documentation>Print Quality Message: An XML message designed
to transmit print quality data from print service providers to relevant stake holders
and brand owners.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="pqx:PrintedFor" minOccurs="1"
maxOccurs="1"/>
        <xs:element ref="pqx:PrintedBy" minOccurs="1"
maxOccurs="1"/>
        <xs:element ref="pqx:MeasuredBy" minOccurs="0"
maxOccurs="1"/>
        <xs:element ref="pqx:ProductionInfo" minOccurs="1"
maxOccurs="1"/>
        <xs:element ref="pqx:DataCaptureInfo" minOccurs="0"
maxOccurs="1"/>
        <xs:element ref="pqx:SampleCollection" minOccurs="1"/>
        <xs:element ref="pqx:CxFSampleData" minOccurs="0"/>
        <xs:element ref="pqx:CxFStandardData" minOccurs="0"/>
        <xs:element ref="pqx:DefectImageData" minOccurs="0"/>
      </xs:sequence>
      <xs:attribute name="PQXMessageDate" type="pqx:dateOrDateTime"
use="required">
        <xs:annotation>
          <xs:documentation>PQX Message Date: The required
transmission date or date/time in ISO format for this PQX message.</xs:documentation>
        </xs:annotation>
      </xs:attribute>
      <xs:attribute name="PQXMessageId" type="xs:string" use="required">
        <xs:annotation>
          <xs:documentation>PQX Message Identifier: A required
unique identifier for this PQX message generated by the print service provider to
allow for tracking and archive. The PQX ID must include a unique identifier for the

```

print service provider, the location/facility generating the print quality data as well as a tracking identifier for the set of print quality data being exchanged.</xs:documentation>

```

        </xs:annotation>
      </xs:attribute>
      <xs:attribute name="PQXVersion" type="xs:string">
        <xs:annotation>
          <xs:documentation>PQX Version: An optional attribute
that captures the version the PQX schema being used to validate the data
transmission.</xs:documentation>
        </xs:annotation>
      </xs:attribute>
      <xs:attribute name="CxFVersion" type="xs:string">
        <xs:annotation>
          <xs:documentation>CxF Version: An optional attribute
that captures the version the CxF schema being used to validate the data transmission.
A default of CxF3_Core is assumed.</xs:documentation>
        </xs:annotation>
      </xs:attribute>
    </xs:complexType>
  </xs:element>

```

```

  <!--
+++++----- -->
  <!--====                    =====>
  <!--====                    Printed For Block                    =====>
  <!--====                    =====>
  <xs:element name="PrintedFor">
    <xs:annotation>
      <xs:documentation>Printed For: A block of elements that identify
the customer for which print quality data was printed and captured. Provides the
unique customer identifier(s) for the items printed.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
      <xs:sequence>
        <xs:element name="CompanyName" type="xs:string"

```

```

minOccurs="1">
          <xs:annotation>
            <xs:documentation>Brand Company Name: An
optional element that identifies the parent company of the brand for which print
quality data was captured.</xs:documentation>
          </xs:annotation>
        </xs:element>
        <xs:choice minOccurs="0" maxOccurs="unbounded">
          <xs:element name="Brand" type="xs:string"

```

```

minOccurs="1">
          <xs:annotation>
            <xs:documentation>Brand: An element
that identifies the brand for which print quality data was
captured.</xs:documentation>
          </xs:annotation>
        </xs:element>
        <xs:element name="Product" type="xs:string"

```

```

minOccurs="1">
          <xs:annotation>
            <xs:documentation>Product: An element
that identifies the product for which print quality data was
captured.</xs:documentation>
          </xs:annotation>
        </xs:element>
        <xs:element name="Brand-Product" type="xs:string">
          <xs:annotation>

```

```

                <xs:documentation>Brand-Product: A PQX
field that identifies the product brand owner's brand-product designation for which
print quality data was captured. The value is a concatenated string with a vertical
bar separator such as "Chex | Chex Snack Mix | Cheddar" (brand, product category,
product) or "Chex | Rice Chex (brand, product)". If measuring colorbars to measure
general printing quality and not specific to any brand or product, this element is not
required.</xs:documentation>
                </xs:annotation>
            </xs:element>
        </xs:choice>
        <xs:element name="CustomerItemId" minOccurs="1">
            <xs:annotation>
                <xs:documentation>Customer Item Identifier:
The required unique customer identification for a printed item from which print
quality data was captured. This is a primary key for the PQX message. The Customer
Item Identifier may be cross-referenced to the Printer's Lot Identifier for the press
run from which quality data is being reported.</xs:documentation>
            </xs:annotation>
            <xs:complexType>
                <xs:simpleContent>
                    <xs:extension base="xs:string">
                        <xs:attribute name="DisplayName"
type="xs:string" use="required">
                            <xs:annotation>
                                <xs:documentation>Display Name: The type or name of the identifier code such as
"SKU" or "IPMS".</xs:documentation>
                            </xs:annotation>
                        </xs:attribute>
                    </xs:extension>
                </xs:simpleContent>
            </xs:complexType>
        </xs:element>
        <xs:element name="AdditionalCustomerId" minOccurs="0"
maxOccurs="unbounded">
            <xs:annotation>
                <xs:documentation>Additional Customer
Identifier: An optional, additional customer identification field for the printed item
from which print quality data was captured.</xs:documentation>
            </xs:annotation>
            <xs:complexType>
                <xs:simpleContent>
                    <xs:extension base="xs:string">
                        <xs:attribute name="DisplayName"
type="xs:string" use="required">
                            <xs:annotation>
                                <xs:documentation>Display Name: The type or name of the identifier code such as
"Art Code" or "GCAS".</xs:documentation>
                            </xs:annotation>
                        </xs:attribute>
                    </xs:extension>
                </xs:simpleContent>
            </xs:complexType>
        </xs:element>
    </xs:sequence>
</xs:complexType>
</xs:element>
<!--
+++++----- -->
<!--===
<!--===
                Printed By Block
                =====>

```



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        </xs:element>
        <xs:element name="PrinterItemId" minOccurs="0"
maxOccurs="1">
            <xs:annotation>
                <xs:documentation>Printer Item Identifier: An
optional element providing a printer-generated identifier for the printed item from
which print quality data was captured.</xs:documentation>
            </xs:annotation>
            <xs:complexType>
                <xs:simpleContent>
                    <xs:extension base="xs:string">
                        <xs:attribute name="DisplayName"
type="xs:string" use="required">
                            <xs:annotation>
                                <xs:documentation>Display Name: The optional type or name of the identifier
code.</xs:documentation>
                            </xs:annotation>
                        </xs:attribute>
                    </xs:extension>
                </xs:simpleContent>
            </xs:complexType>
        </xs:element>
        <xs:element name="PrinterItemDescription" type="xs:string"
minOccurs="0">
            <xs:annotation>
                <xs:documentation>Printer Item Description: A
human readable description of the item/product that the printer might use to identify
the item from which print quality data was captured. This is not a machine processable
identifier for the job.</xs:documentation>
            </xs:annotation>
        </xs:element>
        <xs:element name="MeasuredByFlag" type="xs:boolean"
minOccurs="0">
            <xs:annotation>
                <xs:documentation>Measured By Flag: A
true/false flag to indicate that the printer also measured the item for print
quality.</xs:documentation>
            </xs:annotation>
        </xs:element>
    </xs:sequence>
</xs:complexType>
</xs:element>

<!--
+++++----- -->
<!--====                               =====>
<!--====                               Measured By Block           =====>
<!--====                               =====>
<xs:element name="MeasuredBy">
    <xs:annotation>
        <xs:documentation>Measured By: An optional block of elements that
carry information about a party, other than the printer, that was responsible for
measuring the printed item.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
        <xs:sequence>
            <xs:element name="CompanyName" type="xs:string">
                <xs:annotation>
                    <xs:documentation>Measurement Company Name: An
optional element that identifies the company that conducted measurements and visual
examinations.</xs:documentation>
                </xs:annotation>
            </xs:element>
        </xs:sequence>
    </xs:complexType>
</xs:element>

```

```

        </xs:element>
        <xs:element name="Location" type="xs:string" minOccurs="1">
          <xs:annotation>
            <xs:documentation>Measurement Location: A
required element that identifies the location of the facility where print quality was
measured.</xs:documentation>
          </xs:annotation>
        </xs:element>
        <xs:element name="Operator" type="xs:string" minOccurs="0">
          <xs:annotation>
            <xs:documentation>Measurement Operator: A
optional element that identifies the operator conducting measurements and visual
examinations.</xs:documentation>
          </xs:annotation>
        </xs:element>
        <xs:element name="DateReceivedFromPrinter"
type="pqx:dateOrDateTime" minOccurs="0">
          <xs:annotation>
            <xs:documentation>Date Received From Printer:
Date Received From Printer: A date or date/time in the ISO format.</xs:documentation>
          </xs:annotation>
        </xs:element>
        <xs:element name="MeasurementComments" type="xs:string"
minOccurs="0" maxOccurs="1">
          <xs:annotation>
            <xs:documentation>Measurement Comments: An
optional field provided for the party that conducted measurement and visual
evaluations to transmit additional data to the brand owner. There is no dependency,
logic or action based on the content of this field.</xs:documentation>
          </xs:annotation>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>

  <!--
+++++----->
  <!--====
  <!--====           Production Information           =====>
  <!--====
  <xs:element name="ProductionInfo">
    <xs:annotation>
      <xs:documentation>Production Information: A required block of
elements carrying information about the production of the printed item from which
print quality data was captured.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
      <xs:sequence>
        <xs:element name="DatePrinted" type="pqx:dateOrDateTime"
minOccurs="1">
          <xs:annotation>
            <xs:documentation>Date Printed: A required
element that captures the date of the press run in an ISO date or date/time
format.</xs:documentation>
          </xs:annotation>
        </xs:element>
        <xs:element name="PrinterLotId" type="xs:string"
minOccurs="1">
          <xs:annotation>
            <xs:documentation>Printer Lot Identifier: A
required unique identifier, used by the printer to identify the press run, or
collection of items (pieces of art) and press sheets, panels, cans, etc. from which
print quality data was captured.</xs:documentation>
          </xs:annotation>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>

```

```

        </xs:annotation>
    </xs:element>
    <xs:element ref="pqx:PressInfo"/>
    <xs:element ref="pqx:PressRunInfo" minOccurs="0"/>
</xs:sequence>
</xs:complexType>
</xs:element>

<!--====                                     =====>
<!--====                                     =====>
<!--====                                     =====>
<xs:element name="PressInfo">
    <xs:annotation>
        <xs:documentation>Press Information: A required block of elements
carrying information about the press used to print the item from which print quality
data was captured.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
        <xs:sequence>
            <xs:element name="InkChannelCollection">
                <xs:annotation>
                    <xs:documentation>Ink Channel Collection: A
required block of elements made up of a listing of the ink channels of the
press.</xs:documentation>
                </xs:annotation>
                <xs:complexType>
                    <xs:sequence>
                        <xs:element name="InkChannel"
minOccurs="1" maxOccurs="unbounded">
                            <xs:annotation>
                                <xs:documentation>Ink
Channel: A description of an ink channel on press.</xs:documentation>
                            </xs:annotation>
                            <xs:complexType>
                                <xs:attribute
name="InkChannelId" type="xs:ID" use="required">
                                    <xs:annotation>
                                        <xs:documentation>Ink Channel Identifier: A unique identifier for this ink
channel on press. Can be linked to by using a InkChannelIdLink=
attribute.</xs:documentation>
                                    </xs:annotation>
                                    </xs:attribute>
                                <xs:attribute
name="InkChannelPrintOrder" type="xs:nonNegativeInteger" use="required">
                                    <xs:annotation>
                                        <xs:documentation>Ink Channel Print Order: The numerical print order of this
ink channel on press. The ink channel order attribute is expected to match the
sequence on press.</xs:documentation>
                                    </xs:annotation>
                                    </xs:attribute>
                                <xs:attribute
name="InkName" type="xs:string" use="required">
                                    <xs:annotation>
                                        <xs:documentation>Ink Name: The name of the ink in this channel. For example
cyan or Coke-Red are both ink names. Process inks often have a generic name such as
cyan or yellow while spot colors usually have a very specific name such as "Coke-
Red".</xs:documentation>
                                    </xs:annotation>
                                    </xs:attribute>
                                </xs:sequence>
                            </xs:complexType>
                        </xs:element>
                    </xs:sequence>
                </xs:complexType>
            </xs:element>
        </xs:sequence>
    </xs:complexType>
</xs:element>

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```

name="InkChannelName">
    <xs:attribute
        <xs:annotation>
            <xs:documentation>Ink Cannel Name: The name of this channel. The channel name
            often matches the name of the ink in that channel. For example both the ink name and
            the channel name might be Cyan. But in the case that the ink name is not the same as
            the channel name, both may be indicated. </xs:documentation>
        </xs:annotation>
    </xs:attribute>
    <xs:simpleType
        <xs:restriction base="xs:NMTOKEN">
            <xs:enumeration value="cyan">
                <xs:annotation>
                    <xs:documentation>Cyan Channel: The cyan ink channel.
                </xs:documentation>
            </xs:annotation>
            </xs:enumeration>
            <xs:enumeration value="magenta">
                <xs:annotation>
                    <xs:documentation>Magenta Channel: The magenta ink channel.
                </xs:documentation>
            </xs:annotation>
            </xs:enumeration>
            <xs:enumeration value="yellow">
                <xs:annotation>
                    <xs:documentation>Yellow Channel: The yellow ink channel.
                </xs:documentation>
            </xs:annotation>
            </xs:enumeration>
            <xs:enumeration value="black">
                <xs:annotation>
                    <xs:documentation>Black Channel: The black ink channel.
                </xs:documentation>
            </xs:annotation>
            </xs:enumeration>
            <xs:enumeration value="orange">

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```
<xs:annotation>
  <xs:documentation>Orange Channel: The orange ink channel.
</xs:documentation>
</xs:annotation>
</xs:enumeration>
<xs:enumeration value="violet">
  <xs:annotation>
    <xs:documentation>Violet Channel: The violet ink channel.
  </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="red">
  <xs:annotation>
    <xs:documentation>Red Channel: The red ink channel.
  </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="blue">
  <xs:annotation>
    <xs:documentation>Blue Channel: The blue ink channel.
  </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="green">
  <xs:annotation>
    <xs:documentation>Green Channel: The green ink channel.
  </xs:documentation>
  </xs:annotation>
</xs:enumeration>
<xs:enumeration value="spot">
  <xs:annotation>
```

```

    <xs:documentation>Spot Color Channel: A spot color ink
channel.</xs:documentation>

    </xs:annotation>

    </xs:enumeration>

    </xs:restriction>

name="InkType">
    </xs:simpleType>
    </xs:attribute>
    <xs:attribute

    <xs:annotation>

    <xs:documentation>Ink Type: The classification of ink as "process" or
"spot".</xs:documentation>

    </xs:annotation>
    <xs:simpleType>

    <xs:restriction base="xs:NMTOKEN">

    <xs:enumeration value="process">

    <xs:annotation>

    <xs:documentation>Process Ink Type: a member of a process ink set (2 or more
inks), intended to be printed in combination with other process ink(s) in order to
reproduce a range of colors or "gamut"

    </xs:documentation>

    </xs:annotation>

    </xs:enumeration>

    <xs:enumeration value="spot">

    <xs:annotation>

    <xs:documentation>Spot Ink Type: A single ink, intended to produce a specific
color printed color - often associated with a brand equity color</xs:documentation>

    </xs:annotation>

    </xs:enumeration>

    </xs:restriction>

    </xs:simpleType>
    </xs:attribute>
    </xs:complexType>
    </xs:element>
    </xs:sequence>
    </xs:complexType>
    </xs:element>
    </xs:sequence>
    </xs:complexType>
    </xs:element>

    <!--===
===-->
    <!--===
    Press Run Inforation
    ==-->

```

```

<!--====
====-->
<xs:element name="PressRunInfo">
  <xs:annotation>
    <xs:documentation>Press Run Information: An optional block of
elements carrying information about the press run.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element name="RunLength" minOccurs="0">
        <xs:annotation>
          <xs:documentation>Run Length: The length of
the press run that produced the printed sample from which print quality data was
captured. The Run Unit of Measure attribute is used to specify the measurement
used.</xs:documentation>
        </xs:annotation>
        <xs:complexType>
          <xs:attribute name="TotalRolls"
type="xs:positiveInteger">
            <xs:annotation>
              <xs:documentation>Total Rolls:
The total number of rolls used for the press run. This attribute is optional as
sontimes items such as cans or bottles or sheets are printed and a roll count does not
apply.</xs:documentation>
            </xs:annotation>
            </xs:attribute>
            <xs:attribute name="TotalMeterage"
type="xs:string" use="required">
              <xs:annotation>
                <xs:documentation>Total Meterage:
The total meterage or count indicator value for the entire press run. The meaning of
this number is specified by the Unit of Measure (Uom) attribute.</xs:documentation>
              </xs:annotation>
              </xs:attribute>
              <xs:attribute name="Uom" type="xs:string"
use="required">
                <xs:annotation>
                  <xs:documentation>Run Unit of
Measure: The Uom (Unit of Measure) for the length of the press run may be a physical
unit such as feet or meters. The Uom may also be a physical unit/item such as
"sheets" or "cans". This attribute is required.</xs:documentation>
                </xs:annotation>
                </xs:attribute>
              </xs:complexType>
            </xs:element>
          </xs:sequence>
          <xs:attribute name="PrintMethod" type="xs:string">
            <xs:annotation>
              <xs:documentation>Print Method: The method by which
the sample was printed from which print quality data was captured. For example, a
label may have been printed by a flexo, gravure or digital press.</xs:documentation>
            </xs:annotation>
            </xs:attribute>
            <xs:attribute name="PrintSide">
              <xs:annotation>
                <xs:documentation>Print Side: The side of the
substrate where the image is printed. Values may be "Reverse" "Surface" or
"Both".</xs:documentation>
              </xs:annotation>
              <xs:simpleType>
                <xs:restriction base="xs:NMTOKEN">
                  <xs:enumeration value="surface">
                    <xs:annotation>

```

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                                                                 <xs:documentation>Surface Side
Printed: The press prints the image on the surface of the
substrate.</xs:documentation>
                                                                 </xs:annotation>
                                                                 </xs:enumeration>
                                                                 <xs:enumeration value="reverse">
                                                                 <xs:annotation>
                                                                 <xs:documentation>Reverse Side
Printed: The press prints the image on the reverse side of the
substrate.</xs:documentation>
                                                                 </xs:annotation>
                                                                 </xs:enumeration>
                                                                 <xs:enumeration value="both">
                                                                 <xs:annotation>
                                                                 <xs:documentation>Both Sides
Printed: The press prints the image on both the surface and the reverse side of the
substrate. This may take place when a ticket or coupon is printed with one image on
the front and another image on the back (the substrate is opaque). It may also happen
when an image is printed on the front that the reverse image is printed on the back of
transparent material to give very intense coloration to an image when viewed with back
lighting. </xs:documentation>
                                                                 </xs:annotation>
                                                                 </xs:enumeration>
                                                                 </xs:restriction>
                                                                 </xs:simpleType>
                                                                 </xs:attribute>
                                                                 </xs:complexType>
</xs:element>

<!-- ++++++====-->
<!--====                                     =====>
<!--====          Data Capture Information  =====>
<!--====                                     =====>
<xs:element name="DataCaptureInfo">
  <xs:complexType>
    <xs:annotation>
      <xs:documentation>Data Capture Method: An optional element
that provides set of flags used to indicate the data capture techniques used to
generate the quality data transmitted in this PQX message. BUSINESS RULE: It is a good
practice to provide flags for each type of quality data that will be transmitted in
the PQX report. No default values are assumed.</xs:documentation>
    </xs:annotation>
    <xs:simpleContent>
      <xs:extension base="xs:string">
        <xs:attribute name="ColorCaptureMethod">
          <xs:annotation>
            <xs:documentation>Color Capture Method:
An optional attribute on Data Capture Information that provides the method used to
capture color measurements. May be "manual" or "automated" where automated refers to
reports from an inline digital inspection system.</xs:documentation>
          </xs:annotation>
          <xs:simpleType>
            <xs:restriction base="xs:NMTOKEN">
              <xs:enumeration value="manual">
                <xs:annotation>
                  <xs:documentation>Manual Data Capture: Measurements and reports were taken by
manual/human sampling.
                </xs:documentation>
              </xs:annotation>
            </xs:enumeration>
          </xs:enumeration
value="automated">

```

```

                                <xs:annotation>
    <xs:documentation>Automated Data Capture: Measurements and reports were taken
    by automated, inline sampling.
                                </xs:documentation>
                                </xs:annotation>
                                </xs:enumeration>
                                </xs:restriction>
                                </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="RegistrationCaptureMethod">
      <xs:annotation>
        <xs:documentation>Registration Capture
        Method: An optional attribute on Data Capture Information that provides the method
        used to capture registration. May be "manual" or "automated" where automated refers
        to reports from an inline digital inspection system.</xs:documentation>
        </xs:annotation>
        <xs:simpleType>
          <xs:restriction base="xs:NMTOKEN">
            <xs:enumeration value="manual">
              <xs:annotation>
                <xs:documentation>Manual Data Capture: Measurements and reports were taken by
                manual/human sampling.
                </xs:documentation>
                </xs:annotation>
              </xs:enumeration>
            <xs:enumeration
    value="automated">
              <xs:annotation>
                <xs:documentation>Automated Data Capture: Measurements and reports were taken
                by automated, inline sampling.
                </xs:documentation>
                </xs:annotation>
              </xs:enumeration>
            </xs:restriction>
          </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="DefectCaptureMethod">
          <xs:annotation>
            <xs:documentation>Defect Capture
            Method: An optional attribute on Data Capture Information that provides the method
            used to capture defects. May be "manual" or "automated" where automated refers to
            reports from an inline digital inspection system.</xs:documentation>
            </xs:annotation>
            <xs:simpleType>
              <xs:restriction base="xs:NMTOKEN">
                <xs:enumeration value="manual">
                  <xs:annotation>
                    <xs:documentation>Manual Data Capture: Measurements and reports were taken by
                    manual/human sampling.
                    </xs:documentation>
                    </xs:annotation>
                  </xs:enumeration>
                <xs:enumeration
    value="automated">
                  <xs:annotation>
                    <xs:documentation>Automated Data Capture: Measurements and reports were taken
                    by automated, inline sampling.
                    </xs:documentation>
                    </xs:annotation>
                  </xs:enumeration>
                </xs:restriction>
              </xs:simpleType>
            </xs:attribute>
          </xs:annotation>
        </xs:attribute>
      </xs:annotation>
    </xs:annotation>
  </xs:annotation>

```

```

                </xs:annotation>
                </xs:enumeration>
            </xs:restriction>
            </xs:simpleType>
        </xs:attribute>
        <xs:attribute name="DefectInspectionPercentage"
type="pqx:percent">
            <xs:annotation>
                <xs:documentation>Defect Inspection
Percentage: An optional attribute on Data Capture Information that provides the
percent of defect inspections taken throughout the press run and reflected in the
defect data for this PQX report. Total defects can be calculated by the receiving
system using defect count reports and inspection percentages.</xs:documentation>
            </xs:annotation>
        </xs:attribute>
    </xs:extension>
</xs:simpleContent>
</xs:complexType>
</xs:element>

<!--
+++++----->
<!--====                                     =====>
<!--====                                     Sample Collection                               =====>
<!--====                                     =====>
<!--====                                     =====>
<xs:element name="SampleCollection">
    <xs:annotation>
        <xs:documentation>Sample Collection: A required block of elements
carrying information about all the samples measured, observed and reported on from
within a press run. Consists of at least one sample from the run.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="pqx:Sample" minOccurs="1"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
</xs:element>

<!--====                                     =====>
<!--====                                     Sample Model                               =====>
<!--====                                     =====>
<!--====                                     =====>
<xs:element name="Sample">
    <xs:annotation>
        <xs:documentation>Sample: A selected item or items for which
quality data is being collected. This may be a single item such as a press sheet,
label, can etc. or it may be a number of items gathered over a range of time or even
for an entire press run. BUSINESS RULE: If more than a single item makes up a sample,
that should be reported using the ItemsPerSample attribute.</xs:documentation>
    </xs:annotation>
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="pqx:RunPosition" minOccurs="0"/>
            <xs:element ref="pqx:SamplingTime" minOccurs="0"/>
            <xs:element ref="pqx:ColorMeasurements" minOccurs="0"/>
            <xs:element ref="pqx:RegistrationReport" minOccurs="0"/>
            <xs:element ref="pqx:DefectReport" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute name="SampleId" type="xs:ID" use="required">
            <xs:annotation>
                <xs:documentation>Sample Identifier: A unique
identifier for this sample being evaluated for quality. This Id is required as it may

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<!--====>
<xs:element name="SamplingTime">
  <xs:annotation>
    <xs:documentation>Sampling Time: Information about the time during
a press run where a sample was taken to be evaluated for quality. Measurement values
for all items printed during this time may be reported, or an average may be
reported.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:attribute name="SampleStartTime" type="xs:dateTime"
use="required">
      <xs:annotation>
        <xs:documentation>Sample Start Time: A required
attribute of SamplingTime to capture the time when the first of a set of samples to be
reported was taken.</xs:documentation>
      </xs:annotation>
    </xs:attribute>
    <xs:attribute name="SampleEndTime" type="xs:dateTime"
use="required">
      <xs:annotation>
        <xs:documentation>Sample End Time: A required
attribute of SamplingTime to capture the time when the last of a set of samples to be
reported was taken.</xs:documentation>
      </xs:annotation>
    </xs:attribute>
  </xs:complexType>
</xs:element>

<!-- ++++++>
<!--====>
<!--==== Registration Report Block >
<!--====>
<xs:element name="RegistrationReport">
  <xs:annotation>
    <xs:documentation>Registration Report: A block of elements that
carry one or more sets of data about the accuracy of the alignment of inks on a
printed image. Made up of one or more Registration Sets.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element name="RegistrationSet" minOccurs="1"
maxOccurs="unbounded">
        <xs:annotation>
          <xs:documentation>Registration Set: An element
that carries data about the accuracy of the alignment of inks on a printed sample.
Variance registration data may be reported or registration data relative to the
alignment of each ink channel relative to a reference ink channel may be
reported.</xs:documentation>
        </xs:annotation>
        <xs:complexType>
          <xs:sequence>
            <xs:element ref="pqx:VarianceReport"
minOccurs="0" maxOccurs="1"/>
            <xs:element ref="pqx:ChannelReport"
minOccurs="0" maxOccurs="1"/>
          </xs:sequence>
          <xs:attribute name="PositionOnSample"
type="xs:string" use="required">
            <xs:annotation>
              <xs:documentation>Position on
Sample: A descriptor for this set of registration data based on the position within a
sample. The Position on Sample values for the report may be a textual description or
may be selected from a customizable list defined by business agreement between the

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brand and the printer . An example of a position on sample might be "1" "2" or
"Position A" "Position B". BUSINESS RULE: If more than one registration set is
reported for a single sample, then PositionOnSample is required.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="MarkType"
type="xs:string">
    <xs:annotation>
      <xs:documentation>Mark Type: A
declaration that a specific type of registration mark being measured for evaluation
purposes. The mark type is commonly specified by a business agreement between the
brand and a printer . The Mark Type may be a URL to the mark
itself.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
</xs:complexType>
</xs:element>
</xs:sequence>
</xs:complexType>
</xs:element>

<!-- ++++++ =====>
<!--===                                     =====>
<!--===           Registration Variance Report           =====>
<!--===                                     =====>
<xs:element name="VarianceReport">
  <xs:annotation>
    <xs:documentation>Variance Report: An element that holds the
maximum variance reports for an registration set. The report may be observed, measured
or both.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element name="ObservedMax" minOccurs="0">
        <xs:annotation>
          <xs:documentation>Observed Max Variance: A
description of the observed maximum variance for the sample. </xs:documentation>
        </xs:annotation>
        <xs:complexType>
          <xs:attribute name="VarianceDescription"
type="xs:string" use="required">
            <xs:annotation>
              <xs:documentation>Variance
Description: A required description of the registration variance that comes from a
visual observation of the registration mark or simply from observing the printed
sample. This may be a text description or a value from a scale previously defined by
the brand and printer as part of their business agreement . An example of a variance
description might be "Severe" "Moderate" "Mild".</xs:documentation>
            </xs:annotation>
          </xs:attribute>
        </xs:complexType>
      </xs:element>
      <xs:element name="MeasuredMax" minOccurs="0">
        <xs:annotation>
          <xs:documentation>Measured Max Variance: An
element that reports the measured maximum variance for the sample without
specification of a reference ink channel.</xs:documentation>
        </xs:annotation>
        <xs:complexType>
          <xs:attribute name="AveragingMethod"
type="xs:string">
            <xs:annotation>

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                                <xs:documentation>Averaging
Method: An optional field specifying the averaging method or technique used to
generate reporting values for this PQX report. May be a standard averaging method
such as "mean" or it may be a custom averaging formula provided by the brand such as
"Pepsi" or "PG". This is an open text field.</xs:documentation>
                                </xs:annotation>
                                </xs:attribute>
                                <xs:attribute name="ItemsPerAverage"
type="xs:nonNegativeInteger">
                                <xs:annotation>
                                <xs:documentation>Items Per
Average: An optional field specifying the number of item sample measurements that were
averaged for the same patch to generate a single reporting value for this PQX report.
An item might be a press sheet, a label, can, etc. BUSINESS RULE: If averaging is not
employed, then the value is "1". </xs:documentation>
                                </xs:annotation>
                                </xs:attribute>
                                <xs:attribute name="PatchesPerAverage"
type="xs:nonNegativeInteger">
                                <xs:annotation>
                                <xs:documentation>Patches Per
Average: An optional field specifying the number of measurements for the same patch on
a single item that were averaged to generate a single reporting value for this PQX
report. An item might be a press sheet, a label, can, etc. BUSINESS RULE: If
averaging is not employed, then the value is "1".</xs:documentation>
                                </xs:annotation>
                                </xs:attribute>
                                <xs:attribute name="RegistrationUoM"
type="xs:string" use="required">
                                <xs:annotation>
                                <xs:documentation>Registration
Unit of Measure: The Uom (Unit of Measure) is the physical unit, such as a micron,
used to measure registration positioning. This UoM may be a static measurement such as
a millimeter or may be a relative value such as line or dot. BUSINESS RULE: If
registration is reported using metrics, the registration UoM is
required.</xs:documentation>
                                </xs:annotation>
                                </xs:attribute>
                                <xs:attribute name="XMax" type="xs:string"
use="required">
                                <xs:annotation>
                                <xs:documentation>X Max Variance:
A required attribute on a registration Maximum Variance that specifies the maximum
variance across the X (horizontal) axis expressed in the registration unit of measure.
</xs:documentation>
                                </xs:annotation>
                                </xs:attribute>
                                <xs:attribute name="YMax" type="xs:string"
use="required">
                                <xs:annotation>
                                <xs:documentation>Y Max Variance:
A required attribute on a registration Maximum Variance that specifies the maximum
variance across the Y (vertical) axis expressed in the registration unit of measure.
</xs:documentation>
                                </xs:annotation>
                                </xs:attribute>
                                </xs:complexType>
                                </xs:element>
                                </xs:sequence>
                                </xs:complexType>
                                </xs:element>

<!-- ++++++ =====>

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<!--====                                                                    =====>
<!--====          Registration Channel Report          =====>
<!--====                                                                    =====>
<xs:element name="ChannelReport">
  <xs:annotation>
    <xs:documentation>Channel Registration Report: An element that
holds the registration reports by ink channel for an registration set. The report may
be observed, measured or both.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element name="ObservedChannel" minOccurs="0"
maxOccurs="unbounded">
        <xs:annotation>
          <xs:documentation>Observed Channel
Registration: A description of the observed channel registration for the sample
registration set. BUSINESS RULE: All ink channels must be reported for the
registration set if using the channel reporting method.</xs:documentation>
        </xs:annotation>
        <xs:complexType>
          <xs:attribute name="ReferenceInkChannelIdLink"
type="xs:NCName" use="required">
            <xs:annotation>
              <xs:documentation>Reference Ink
Channel Id-Link: A required link to the ink channel that will serve as the the point
of reference to which the alignment of all other ink channels will be compared for
channel-based registration reporting.</xs:documentation>
            </xs:annotation>
          </xs:attribute>
          <xs:attribute name="InkChannelIdLink"
type="xs:NCName" use="required">
            <xs:annotation>
              <xs:documentation>Ink Channel Id-
Link: A required link to the definition of the ink channel for this entry (as
specified in press information).</xs:documentation>
            </xs:annotation>
          </xs:attribute>
          <xs:attribute name="ChannelDescription"
type="xs:string" use="required">
            <xs:annotation>
              <xs:documentation>Registration
Channel Description: A description of the registration of an ink channel on the sample
that comes from a visual observation of the registration mark or simply from observing
the printed sample. This may be a text description or a value from a scale previously
defined by the brand and printer as part of their business agreement . An example of a
registration channel description scale might be "1" to "10" or "In Register"
"Moderately Out of Register" etc.</xs:documentation>
            </xs:annotation>
          </xs:attribute>
        </xs:complexType>
      </xs:element>
      <xs:element name="MeasuredChannel" minOccurs="0"
maxOccurs="unbounded">
        <xs:annotation>
          <xs:documentation>Measured Channel
Registration: A measurement for the alignment of the printed image from an ink channel
relative to the printed image from the reference ink channel for this registration
set. BUSINESS RULE: All ink channel measurements must be reported for the registration
set if using the channel reporting method.</xs:documentation>
        </xs:annotation>
        <xs:complexType>
          <xs:attribute name="ReferenceInkChannelIdLink"
type="xs:NCName" use="required">

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                <xs:annotation>
                    <xs:documentation>Reference Ink
Channel Id-Link: A link to the ink channel that will serve as the the point of
reference to which the alignment of all other ink channels will be compared for
channel-based registration reporting.</xs:documentation>
                </xs:annotation>
            </xs:attribute>
            <xs:attribute name="InkChannelIdLink"
type="xs:NCName" use="required">
                <xs:annotation>
                    <xs:documentation>Ink Channel Id-
Link: A required link to the definition of the ink channel for this entry (as
specified in press information).</xs:documentation>
                </xs:annotation>
            </xs:attribute>
            <xs:attribute name="AveragingMethod"
type="xs:string">
                <xs:annotation>
                    <xs:documentation>Averaging
Method: An optional field specifying the averaging method or technique used to
generate reporting values for this PQX report. May be a standard averaging method
such as "mean" or it may be a custom averaging formula provided by the brand such as
"Pepsi" or "PG". This is an open text field.</xs:documentation>
                </xs:annotation>
            </xs:attribute>
            <xs:attribute name="ItemsPerAverage"
type="xs:nonNegativeInteger">
                <xs:annotation>
                    <xs:documentation>Items Per
Average: An optional field specifying the number of item sample measurements were
averaged for the same patch to generate a single reporting value for this PQX report.
If averaging is not employed, then the value is "1". An item might be a press sheet,
a label, can, etc.</xs:documentation>
                </xs:annotation>
            </xs:attribute>
            <xs:attribute name="PatchesPerAverage"
type="xs:nonNegativeInteger">
                <xs:annotation>
                    <xs:documentation>Patches Per
Average: An optional field specifying the number of measurements for the same patch on
a single item that were averaged to generate a single reporting value for this PQX
report. If averaging is not employed, then the value is "1".</xs:documentation>
                </xs:annotation>
            </xs:attribute>
            <xs:attribute name="RegistrationUoM"
type="xs:string" use="required">
                <xs:annotation>
                    <xs:documentation>Registration
Unit of Measure: The Uom (Unit of Measure) is the physical unit, such as a micron,
used to measure registration positioning. This UoM may be a static measurement such as
a micron or may be a relative value such as line or dot.</xs:documentation>
                </xs:annotation>
            </xs:attribute>
            <xs:attribute name="XPosition"
type="xs:string" use="required">
                <xs:annotation>
                    <xs:documentation>X Position: A
numeric value in the registration unit of measure that expresses the X-axis
(horizontal) position from the specified ink channel reference. Positive values are to
the right and negative values to the left.</xs:documentation>
                </xs:annotation>
            </xs:attribute>

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        </xs:enumeration>
        <xs:enumeration value="GoldenMaster">
          <xs:annotation>
            <xs:documentation>Defect Master
Reference: Defect evaluation was made by comparison to a printed item designated as
the "golden master". The "golden master" may from a previous press run.
            </xs:documentation>
          </xs:annotation>
        </xs:enumeration>
        <xs:enumeration value="Proof">
          <xs:annotation>
            <xs:documentation>Defect Proof
Reference: Defect evaluation was made by comparison to a proof.
            </xs:documentation>
          </xs:annotation>
        </xs:enumeration>
      </xs:restriction>
    </xs:simpleType>
  </xs:attribute>
  <xs:attribute name="DefectZone" type="xs:string" use="required">
    <xs:annotation>
      <xs:documentation>Defect Zone: A required attribute
for each defect entry that describes the zone on the printed item where the defect
occurred. The Defect Zone values for the defect entry may be a text description or
may be selected from a customizable list defined by business agreement between the
brand and the printer . An example of a defect zone might be "1" "2" "3" or "center"
"top" "bottom".</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="DefectName" type="xs:string" use="required">
    <xs:annotation>
      <xs:documentation>Defect Name: A required attribute
for each defect entry that provides a first level of categorization for a defect.
Defect names for the PQX report should be selected from a customizable list of primary
defect types defined by business agreement between the brand and the printer . An
example of a defect name might be a hickey, bullseye, streak, etc.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="DefectSeverity" type="xs:string"
use="required">
    <xs:annotation>
      <xs:documentation>Defect Severity: A required
attribute for each defect entry that provides defect severity values for a defect.
Severity values should be selected from a customizable list defined by business
agreement between the brand and the printer . An example of defect severity might be
"1" "5" or "Severe" "Moderate" "Slight".</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="DefectXMeasure" type="xs:decimal">
    <xs:annotation>
      <xs:documentation>Defect X-Measure: An optional
attribute for the defect entry to indicate the measurement of the defect along the X
(horizontal) axis. This value is to be expressed in the DefectUoM. BUSINESS RULE: If
reporting defect measures, the X-Measure, Y-Measure and Defect UoM are all
required.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="DefectYMeasure" type="xs:decimal">
    <xs:annotation>
      <xs:documentation>Defect Y-Measure: An optional
attribute for the defect entry to indicate the measurement of the defect along the Y
(vertical) axis. This value is to be expressed in the DefectUoM. BUSINESS RULE: If

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reporting defect measures, the X-Measure, Y-Measure and Defect UoM are all
required.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="DefectUoM" type="xs:string">
    <xs:annotation>
      <xs:documentation>Defect Unit of Measure: An optional
attribute for the defect entry to indicatethe Unit of Measure for reporting the X and
Y defect measurements. BUSINESS RULE: If reporting defect measures, the X-Measure, Y-
Measure and Defect UoM are all required.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="DefectDescription" type="xs:string">
    <xs:annotation>
      <xs:documentation>Defect Description: An optional
attribute for the defect entry to further describe the nature of the defect. Use of
this field is especially important when defect severity is not directly tied to the
defect zone or size.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="DefectCategory" type="xs:string">
    <xs:annotation>
      <xs:documentation>Defect Category: An optional
attribute for the defect entry to provide an optional defect category as a second
level of categorization of defect types. Category types for the report are selected
from a customizable list defined by business agreement between the brand and the
printer . An example of a Category type might be an Ink/toner fault, Substrate fault,
Transfer/impression fault, Ink channel fault etc.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="DefectImageLink" type="xs:anyURI">
    <xs:annotation>
      <xs:documentation>Defect Image Link: An optional
attribute for the defect entry to provide the URI/URL from which an image of the
defect may be retrieved. Image may be included when PQX XML report is sent or may be
on a remote FTP server.</xs:documentation>
    </xs:annotation>
  </xs:attribute>
  <xs:attribute name="DefectCount" type="xs:positiveInteger">
    <xs:annotation>
      <xs:documentation>Defect Count: An optional attribute
for the defect entry to provide the count or frequency for this defect being reported
across the inspections reported in this entry. BUSINESS RULE: If the defect count is
not provided, a value of 1 defect should be assumed. </xs:documentation>
    </xs:annotation>
  </xs:attribute>
</xs:complexType>
</xs:element>
<!--====>====>
<!--====>====> Color Measurements <!--====>====>
<!--====>====>
<xs:element name="ColorMeasurements">
  <xs:annotation>
    <xs:documentation>Color Measurements: A block containing all color
measurements for a sample. </xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="pqx:MeasurementSet" minOccurs="1"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

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<!--====>
<!--====> Measurement Set <!--====>
<!--====>
<xs:element name="MeasurementSet">
  <xs:annotation>
    <xs:documentation>Measurement Set: A set of color measurements
taken at a single position on a sample.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="pqx:Measurement" minOccurs="1"
maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="MeasurementSetId" type="xs:string">
      <xs:annotation>
        <xs:documentation>Measurement Set Identifier: An
optional attribute on a measurement set that provides a unique identifier for this set
of measurements.</xs:documentation>
      </xs:annotation>
    </xs:attribute>
    <xs:attribute name="MeasurementSetName" type="xs:string">
      <xs:annotation>
        <xs:documentation>Measurement Set Name: An optional
attribute on a measurement set that provides a human-readable name or label for this
set of measurements.</xs:documentation>
      </xs:annotation>
    </xs:attribute>
    <xs:attribute name="PositionOnSample" type="xs:string"
use="required">
      <xs:annotation>
        <xs:documentation>Position on Sample: A required
attribute on a measurement set that provides a descriptor for this set of color
measurement data based on the position within a sample. This may be a number or a
simple descriptor of the position such as "Top left" "Lane 2 Row 3" or "Baby's face"
or even "Baby's face Lane 2 Row 3".</xs:documentation>
      </xs:annotation>
    </xs:attribute>
    <xs:attribute name="ChartType" type="xs:string">
      <xs:annotation>
        <xs:documentation>Chart Type: An optional attribute
on a measurement set that provides a declaration that a specific type of color chart
is being measured for evaluation purposes. The chart type is commonly specified by a
business agreement between the brand and a printer. The Chart Type enables a link to
previously defined patches and values to provide a shortcut for dumping an entire
chart without having to specify each patch type. An ISO chart will have ChartType
equal to ISO. If a brand defines their own chart for purposes of quality assurance,
then the brand chart such as Pepsi or Pampers may be specified.</xs:documentation>
      </xs:annotation>
    </xs:attribute>
    <xs:attribute name="ChartId" type="xs:string">
      <xs:annotation>
        <xs:documentation>Chart Identifier: An optional
attribute on a measurement set that provides a declaration that a specific color chart
is being measured for evaluation purposes. The Chart Id enables a link to previously
defined patches and values to provide a shortcut for dumping an entire chart without
having to specify each patch type. If Chart Type is ISO, then the formal ISO Chart Id
is used.</xs:documentation>
      </xs:annotation>
    </xs:attribute>
  </xs:complexType>
</xs:element>
<!--====>
<!--====> Measurement <!--====>

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<!--====                                     ===-->
<xs:element name="Measurement">
  <xs:annotation>
    <xs:documentation>Measurement: A block containing elements that
describe a single measurement taken to evaluate print quality. Attributes provide
information about the the measurement that can be used by the receiving to calculate
tone and score the sample.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element name="InkChannelInfo" minOccurs="0"
maxOccurs="unbounded">
        <xs:annotation>
          <xs:documentation>Ink Channel Information: An
optional element within a measurement that provides information about the inks used to
print the patch. This information is used by the receiving system to calculate tone
value. BUSINESS RULE: Ink channel information is not used for a substrate patch.
This field is repeated when more than 1 ink is used for an overprint, used to produce
grey or used for a build patch.</xs:documentation>
        </xs:annotation>
        <xs:complexType>
          <xs:attribute name="InkChannelIdLink"
type="xs:NCName" use="required">
            <xs:annotation>
              <xs:documentation>Ink Channel Id-
Link: A required attribute of ink channel information that provides a link to the
definition of the ink channel for this measurement.</xs:documentation>
            </xs:annotation>
          </xs:attribute>
          <xs:attribute name="TintValue"
type="xs:nonNegativeInteger" use="required">
            <xs:annotation>
              <xs:documentation>Tint Value: A
required attribute of ink channel information that provides a value indicating the
percentage of ink coverage for the tint. This is a positive integer between 0 and
100.</xs:documentation>
            </xs:annotation>
          </xs:attribute>
          <xs:attribute name="PQXSolidInkParentIdLink"
type="xs:NCName">
            <xs:annotation>
              <xs:documentation>PQX Solid Ink
Parent Id-Link: An optional attribute of ink channel information that provides a link
to the PQX Measurement Id for the solid ink parent measurement for this tint.
BUSINESS RULE: The PQX Solid Ink Parent Id-Link is required for all tint
patches.</xs:documentation>
            </xs:annotation>
          </xs:attribute>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
    <xs:attribute name="PatchType" use="required">
      <xs:annotation>
        <xs:documentation>Patch Type: A required attribute of
the color measurement that provides a specification of the type of patch being
measured. Patch type values include substrate, solid, tint, overprint, graybalance,
special build and build.</xs:documentation>
      </xs:annotation>
      <xs:simpleType>
        <xs:restriction base="xs:NMTOKEN">
          <xs:enumeration value="substrate">
            <xs:annotation>

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        <xs:documentation>Substrate
Patch: A patch used to measure substrate color.</xs:documentation>
        </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="solid">
        <xs:annotation>
            <xs:documentation>Solid Patch: A
patch used to measure a 100% solid color.
        </xs:documentation>
        </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="tint">
        <xs:annotation>
            <xs:documentation>Tint Patch: A
patch used to measure partial ink coverage. TintValue attribute gives the percent
coverage.
        </xs:documentation>
        </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="grayBalance">
        <xs:annotation>
            <xs:documentation>Gray Balance
Patch: A patch to be gray.
        </xs:documentation>
        </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="overprint">
        <xs:annotation>
            <xs:documentation>Overprint
Patch: A patch color made with 2 or more solids at a 100% tint value.
        </xs:documentation>
        </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="build">
        <xs:annotation>
            <xs:documentation>Build Patch: A
patch that is a generic build, not intended to produce a specific color, like a patch
in an image.
        </xs:documentation>
        </xs:annotation>
    </xs:enumeration>
    <xs:enumeration value="special">
        <xs:annotation>
            <xs:documentation>Special Build
Patch: A patch that is designed to produce a specific color (like an ECG recipe).
        </xs:documentation>
        </xs:annotation>
    </xs:enumeration>
</xs:restriction>
</xs:simpleType>
</xs:attribute>
<xs:attribute name="MeasurementId" type="xs:ID">
    <xs:annotation>
        <xs:documentation>Measurement Identifier: A required
attribute of the color measurement that provides a unique identifier for this
measurement. BUSINESS RULE: Because the CxF Object Identifier provides uniqueness,
this element is not required.</xs:documentation>
    </xs:annotation>
</xs:attribute>
<xs:attribute name="MeasurementName" type="xs:string">
    <xs:annotation>

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        <xs:documentation>Measurement Name: An optional
attribute of the color measurement that provides a human-readable name or label for
this measurement.</xs:documentation>
        </xs:annotation>
    </xs:attribute>
    <xs:attribute name="AveragingMethod" type="xs:string">
        <xs:annotation>
            <xs:documentation>Averaging Method: An optional
attribute of the color measurement that provides the averaging method or technique
used to generate reporting values for this PQX report. This is an open text field.
Values for this attribute may be a standard averaging method such as "mean" or it may
be a custom averaging formula provided by the brand such as "Pepsi" or "PG". BUSINESS
RULE: If averaging is not used, then the value is "none". </xs:documentation>
        </xs:annotation>
    </xs:attribute>
    <xs:attribute name="ItemsPerAverage" type="xs:nonNegativeInteger">
        <xs:annotation>
            <xs:documentation>Items Per Average: An optional
attribute of the color measurement that provides a way to specify the number of item
sample measurements were averaged for the same patch to generate a single reporting
value for this PQX report. An item might be a press sheet, a label, can, etc.
BUSINESS RULE: If averaging is not employed, then the value is "1".
</xs:documentation>
        </xs:annotation>
    </xs:attribute>
    <xs:attribute name="PatchesPerAverage"
type="xs:nonNegativeInteger">
        <xs:annotation>
            <xs:documentation>Patches Per Average: An optional
attribute of the color measurement that provides a way to specify the number of
measurements for the same patch on a single item that were averaged to generate a
single reporting value for this PQX report. BUSINESS RULE: If averaging is not
employed, then the value is "1".</xs:documentation>
        </xs:annotation>
    </xs:attribute>
    <xs:attribute name="PQXSubstrateIdLink" type="xs:NCName">
        <xs:annotation>
            <xs:documentation>PQX Substrate Id-Link: An optional
attribute of the color measurement that provides a link to the PQX Measurement Id for
the measurement of the substrate. BUSINESS RULE: This attribute is used when the
patch type is "substrate." In this case there will be no ink channel
information.</xs:documentation>
        </xs:annotation>
    </xs:attribute>
    <xs:attribute name="CxFSampleObjectIdLink" type="xs:NCName"
use="required">
        <xs:annotation>
            <xs:documentation>CxF Sample Object Id-Link: A
required attribute of the color measurement that provides a link to the CxF object Id
for this measurement.</xs:documentation>
        </xs:annotation>
    </xs:attribute>
    <xs:attribute name="CxFStandardObjectIdLink" type="xs:NCName">
        <xs:annotation>
            <xs:documentation>CxF Standard Object Id-Link: An
optional attribute of the color measurement that provides a link to the Standard/Aim
CxF object Id for this measurement. BUSINESS RULE. If standard aim values are known
to both parties this field is not required to be transmitted back to the brand within
the PQX message.</xs:documentation>
        </xs:annotation>
    </xs:attribute>
</xs:complexType>
</xs:element>

```

```

<!--====>
<!--====>          CxF Sample Data          <!--====>
<!--====>
<xs:element name="CxFSampleData">
  <xs:annotation>
    <xs:documentation>CxF Sample Data: An optional element of the PQX
message made up of CxF data from sample measurements included directly from CxF
measurement instrument software. All CxF sample measurement data is held in this
block. ID's of CxF objects are referenced to provide direct addressability of object
color data stores by receiving systems. BUSINESS RULE: When sending color data
measurements within the PQX message, this block is required.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="cc:CxF" minOccurs="1"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<!--====>
<!--====>          CxF Standard Data          <!--====>
<!--====>
<xs:element name="CxFStandardData">
  <xs:annotation>
    <xs:documentation>CxF Standard Data: An optional element of the
PQX message that is made up of CxF standard data for quality color aims or references.
All CxF color measurement data for aims or references is held in this block. ID's of
CxF objects in this block are referenced to provide direct addressability of object
color data stores by receiving systems. BUSINESS RULE. If standard aim values are
known to both parties, this element is not required.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="cc:CxF" minOccurs="1"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
<!--====>
<!--====>          Defect Image Data          <!--====>
<!--====>
<xs:element name="DefectImageData">
  <xs:annotation>
    <xs:documentation>Defect Image Data: An optional element of the
PQX message that is made up of links to defect images generated from on-press camera-
based defect detection systems. The images may be zipped along with the PQX XML
message or stored on a secure server that can be accessed by the brand as defined in
the business terms between the printer and the brand. Unique ID's of images are
referenced in the sample defect report to provide direct addressability of the defect
images by a receiving system.</xs:documentation>
  </xs:annotation>
  <xs:complexType>
    <xs:sequence>
      <xs:element name="DefectImage" minOccurs="1"
maxOccurs="unbounded">
        <xs:complexType>
          <xs:attribute name="ImageId" type="xs:ID">
            <xs:annotation>
              <xs:documentation>Defect Image
Id: A unique identifier for the defect image. Can be referenced in the sample defect
report.
              </xs:documentation>
            </xs:annotation>
          </xs:attribute>

```

```

                                <xs:attribute name="ImageLink"
type="xs:anyURI">
                                <xs:annotation>
                                    <xs:documentation>Image Link: A
link to the image of the defect. If this is a URL the assumption is that the images
are zipped along with the PQX Message that references them. A remote URL can be used
to reference a remote secure server where images are stored.
                                    </xs:documentation>
                                </xs:annotation>
                                </xs:attribute>
                            </xs:complexType>
                        </xs:element>
                    </xs:sequence>
                </xs:complexType>
            </xs:element>
            <!--====
            =====>
            <!--====          Date or DateTime Type          =====>
            <!--====
            =====>
            <xs:simpleType name="dateOrDateTime">
                <xs:union memberTypes="xs:date xs:dateTime"/>
            </xs:simpleType>
            <!--====
            =====>
            <!--====          Percent Type          =====>
            <!--====
            =====>
            <xs:simpleType name="percent">
                <xs:restriction base="xs:double">
                    <xs:minInclusive value="0.0"/>
                    <xs:maxInclusive value="100.0"/>
                </xs:restriction>
            </xs:simpleType>
        </xs:schema>

```


Appendix A BUSINESS DATA SAMPLE

The following sample shows the business data block of a PQX message. In this sample, a press run at Printer ABC in Queens, New York is conducted for Jupiter Candy, Inc. The product is the 12 oz WoWs bag with the SKU 1234. The measurements are not being taken by the printer. Measurements is being handled by their contractor, Q-TraX in Cincinnati. The job was run on November 15, 2015 under the printer's LOT Id 701-123-3331. There are 5 ink channels on the press, Cyan, Yellow, Magenta, Black and the "Wow Red" spot color. The data capture method for both color and registration was by manual pressman pulls throughout the run. Defects were reported from an automated camera system, with a defect reporting 80 percent.

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- Defect Report from inline system reporting on 100 sample taken every 15 minutes -->
<PrintQualityMessage
xmlns:cc="http://colorexchangeformat.com/CxF3-core"
xmlns:pqx="http://idealliance.org/pqx"
xmlns="http://idealliance.org/pqx"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:n1="http://www.altova.com/samplexml/other-namespace" PQXVersion="Draft44"
PQXDate="2016-08-23" PQXMessageID="pqx010"
xsi:schemaLocation="http://idealliance.org/pqx PQX_Draft44.xsd">
  <PrintedFor>
    <CompanyName>Jupiter Candy, Inc.</CompanyName>
    <Brand>J-WoW Candy</Brand>
    <Product>WoWs 12 oz bag</Product>
    <CustomerItemID DisplayName="SKU">SKU1234</CustomerItemID>
  </PrintedFor>

  <PrintedBy>
    <CompanyName>Printer ABC</CompanyName>
    <Printer>Printer ABC </Printer>
    <Location>Queens, NY </Location>
    <PressLine>3</PressLine>
    <Operator>John Schmidt</Operator>
    <PrinterComments/>
    <PrinterJobDescription>WoWs 12 oz bags</PrinterJobDescription>
    <PrinterItemID DisplayName="Bag012">Bag012</PrinterItemID>
    <PrinterItemDescription/>
    <MeasuredByFlag>>false</MeasuredByFlag>
  </PrintedBy>

  <MeasuredBy>
    <CompanyName>Q-TraX</CompanyName>
    <Location>Cincinnati, OH</Location>
    <Operator>Jan Janus</Operator>
    <DateReceivedFromPrinter>2015-11-15</DateReceivedFromPrinter>
```

```
        <Comments/>
    </MeasuredBy>

    <ProductionInfo>
    <DatePrinted>2015-11-15</DatePrinted>
    <PrinterLotId>701-123-3331</PrinterLotId>
    <PressInfo>
        <InkChannelCollection>
            <InkChannel InkChannelId="Cyan01" InkChannelPrintOrder="1"
InkChannelName="cyan" InkName="Cyan224"
                InkType="process" />
            <InkChannel InkChannelId="Magenta01"
InkChannelPrintOrder="2" InkChannelName="magenta" InkName="Magenta224"
                InkType="process" />
            <InkChannel InkChannelId="Yellow01"
InkChannelPrintOrder="3" InkChannelName="yellow" InkName="Yellow224"
                InkType="process" />
            <InkChannel InkChannelId="Black01" InkChannelPrintOrder="4"
InkChannelName="black" InkName="Black224"
                InkType="process" />
            <InkChannel InkChannelId="Spot01" InkChannelPrintOrder="5"
InkChannelName="spot" InkName="WoW Red" InkType="spot" />
        </InkChannelCollection>
    </PressInfo>
    <PressRunInfo PrintMethod="flexo"
    PrintSide="surface">
        <RunLength TotalRolls="8" TotalMeterage="16000"
        Uom="feet" />
    </PressRunInfo>
</ProductionInfo>

<DataCaptureInfo
    ColorCaptureMethod="manual"
    RegistrationCaptureMethod="manual"
    DefectCaptureMethod="automated"
    InspectionPercent="80" />
. . .
```

Appendix B COLOR QUALITY REPORTING SAMPLE

The following sample shows color quality reporting in a PQX message. In this sample, the Press Information specifies that there here are 5 ink channels; Cyan, Yellow, Magenta, Black and the “Wow Red” spot color (in that laydown order). The data capture method for color was by manual pressman pulls of printed packages throughout the run. Color quality is reported in the Color Report block and linked back to the Ink Channel information using the InkChannelIdLink attribute.

Note: The PQX Color Report contains many targets and links to those targets. In the example below, all link targets are highlighted in cyan. All links to those targets are highlighted in green.

The Color Report consists of a Measurement Set at position “1” on the package. In a full PQX report, multiple Measurement Sets at Brand-specified positions on the printed item would be sent.

Each Measurement Set is made up of measurements of one or more patches. Each measurement has an indication of the patch type being measured. All patches except the substrate patch are linked pack to ink channels using the InkChannelIdLink attribute. Patches that are made up of overprints of more than one color are linked back to multiple ink channels. Tint patches have tint values specified and are linked back to their parent ink channel. This example shows coding for measurements of the substrate, 4 solids, 2 tints, an overprint, a graybalance and a build patch (highlighted in yellow).

Within a PQX message, color data must be expressed as CxF. Rather than embedding CxF object into a color measurement, the CxF data is stored, in its entirety within separate CxF blocks of the message. So each PQX Measurement element in the Color Report must be linked to the Object in the CxF Sample data block. Links for each measurement may also be made back to standard (aim) CxF data if the Brand requires a return of that data. CxF sample color object links are highlighted in magenta in this example.

Note: The goal of this model is to provide enough information about color printing so that the receiving system can use their formula for calculating tone. For example to calculate tone one must know about the ink colors, the substrate, the order inks are applied, the tint value, etc. Through the color reporting model, PQX provides the raw ingredients for tone value calculations.

```
<PrintQualityMessage . . .
. . .
<ProductionInfo>
  <DatePrinted>2015-11-15</DatePrinted>
  <PrinterLotId>701-123-3331</PrinterLotId>
  <PressInfo>
    <InkChannelCollection>
      <InkChannel InkChannelId="Cyan01" InkChannelPrintOrder="1"
        InkChannelName="cyan" InkName="Cyan224" InkType="process" />
      <InkChannel InkChannelId="Magenta01" InkChannelPrintOrder="2"
        InkChannelName="magenta" InkName="Magenta224" InkType="process" />
      <InkChannel InkChannelId="Yellow01" InkChannelPrintOrder="3"
        InkChannelName="yellow" InkName="Yellow224" InkType="process" />
```

```

<InkChannel InkChannelId="Black01" InkChannelPrintOrder="4"
  InkChannelName="black" InkName="Black224" InkType="process" />
<InkChannel InkChannelId="Spot01" InkChannelPrintOrder="5"
  InkChannelName="spot" InkName="WoW Red" InkType="spot" />
</InkChannelCollection>
</PressInfo>
<PressRunInfo PrintMethod="flexo" PrintSide="top">
  <RunLength TotalRolls="8" TotalMeterage="16000" Uom="feet" />
</PressRunInfo>
</ProductionInfo>

<DataCaptureInfo
  ColorCaptureMethod="manual" />

<SampleCollection>
  <Sample>
    <ColorReport>
      <MeasurementSet PositionOnSample="1">
        <Measurement MeasurementName="My Substrate"
          MeasurementId="M00S" PatchType="substrate"
          CxFSampleObjectIdLink="xxx" />
        <Measurement MeasurementName="My Cyan" MeasurementId="M001"
          PatchType="solid" PQXSubstrateIdLink="M00S"
          CxFSampleObjectIdLink="xxx">
          <InkChannelInfo InkChannelIdLink="Cyan01" TintValue="100"/>
        </Measurement>

        <Measurement MeasurementName="My Magenta"
          MeasurementId="M002" PatchType="solid" PQXSubstrateIdLink="M00S"
          CxFSampleObjectIdLink="xxx" >
          <InkChannelInfo InkChannelIdLink="Magenta01" TintValue="100" />
        </Measurement>

        <Measurement MeasurementName="My Yellow" MeasurementId="M003"
          PatchType="solid" PQXSubstrateIdLink="M00S"
          CxFSampleObjectIdLink="xxx" >
          <InkChannelInfo InkChannelIdLink="Yellow01" TintValue="100" />
        </Measurement>

        <Measurement MeasurementName="My Black" MeasurementId="M004"
          PatchType="solid" PQXSubstrateIdLink="M00S"
          CxFSampleObjectIdLink="xxx" >
          <InkChannelInfo InkChannelIdLink="Black01" TintValue="100" />
        </Measurement>

        <Measurement MeasurementName="My Cyan Tint50" MeasurementId="M005"
          PatchType="tint" PQXSubstrateIdLink="M00S"
          CxFSampleObjectIdLink="xxx" >
          <InkChannelInfo InkChannelIdLink="Cyan01"
            TintValue="50" PQXSolidInkParentIdLink="M001"/>
        </Measurement>
      </MeasurementSet>
    </ColorReport>
  </Sample>
</SampleCollection>

```

```

<Measurement MeasurementName="My Cyan Tint25"
  MeasurementId= "M006" PatchType="tint" PQXSubstrateIdLink= "M00S"
  CxFSampleObjectIdLink="xxx" >
  <InkChannelInfo InkChannelIdLink="Cyan01" TintValue="25"
    PQXSolidInkParentIdLink="M001" />
</Measurement>

<Measurement MeasurementName="Blue Overprint" MeasurementId="M007"
  PatchType="overprint" PQXSubstrateIdLink="M00S"
  CxFSampleObjectIdLink="xxx" >
  <InkChannelInfo InkChannelIdLink="Magenta01" TintValue="100"
    PQXSolidInkParentIdLink="M002" />
  <InkChannelInfo InkChannelIdLink="Cyan01"
    TintValue="100" PQXSolidInkParentIdLink="M001" />
</Measurement>

<Measurement MeasurementName="My50Gray" MeasurementId= "M008"
  PatchType="grayBalance" PQXSubstrateIdLink="M00S"
  CxFSampleObjectIdLink="xxx" >
  <InkChannelInfo InkChannelIdLink="Cyan01" TintValue="50"
    PQXSolidInkParentIdLink="M001" />
  <InkChannelInfo InkChannelIdLink="Magenta01" TintValue="40"
    PQXSolidInkParentIdLink="M002" />
  <InkChannelInfo InkChannelIdLink="Yellow01" TintValue="40"
    PQXSolidInkParentIdLink="M003" />
</Measurement>

<Measurement MeasurementName="MyBuildCadetBlue"
  MeasurementId= "M009" PatchType="build"
  PQXSubstrateIdLink="M00S" CxFSampleObjectIdLink="xxx" >
  <InkChannelInfo InkChannelIdLink="Cyan01" TintValue="41"
    PQXSolidInkParentIdLink="M001" />
  <InkChannelInfo InkChannelIdLink="Magenta01" TintValue="33"
    PQXSolidInkParentIdLink="M002" />
  <InkChannelInfo InkChannelIdLink="Black01" TintValue="37"
    PQXSolidInkParentIdLink="M004" />
</Measurement>
</MeasurementSet>
<MeasurementSet> . . . </MeasurementSet>
</ColorReport>
</Sample>
</SampleCollection>

<CxFSampleData>
  <cc:CxF> . . . </cc:CxF>
</CxFSampleData>
</PrintQualityMessage>

```


Appendix C REGISTRATION REPORTING SAMPLE

The following sample shows the business data block of a PQX message. In this sample, there are 5 ink channels on the press, Cyan, Yellow, Magenta, Black and the “Wow Red” spot color. The data capture method for registration was by manual pressman pulls throughout the run. The registration reporting method used was the “Channel Registration” method where the alignment of each ink channel is compared to the reference ink channel. In this example the reference ink channel is the “Cyan01” which can be referenced back as the first in print order in the Press Information. The Registration Report in the sample is made up of two Registration Sets. In each set the alignment of non-reference ink channels is compared with the reference on both the X (horizontal) and Y (vertical) axis.

Note: Registration Scoring is not within the scope of PQX. The data about registration will be scored by the receiving system.

```
<PrintQualityMessage . . .
. . .
<ProductionInfo>
  <DatePrinted>2015-11-15</DatePrinted>
  <PrinterLotId>701-123-3331</PrinterLotId>
  <PressInfo>
    <InkChannelCollection>
      <InkChannel InkChannelId="Cyan01" InkChannelPrintOrder="1"
        InkChannelName="cyan" InkName="Cyan224" InkType="process" />
      <InkChannel InkChannelId="Magenta01" InkChannelPrintOrder="2"
        InkChannelName="magenta" InkName="Magenta224" InkType="process" />
      <InkChannel InkChannelId="Yellow01" InkChannelPrintOrder="3"
        InkChannelName="yellow" InkName="Yellow224" InkType="process" />
      <InkChannel InkChannelId="Black01" InkChannelPrintOrder="4"
        InkChannelName="black" InkName="Black224" InkType="process" />
      <InkChannel InkChannelId="Spot01" InkChannelPrintOrder="5"
        InkChannelName="spot" InkName="WoW Red" InkType="spot" />
    </InkChannelCollection>
  </PressInfo>
  <PressRunInfo PrintMethod="flexo" PrintSide="top">
    <RunLength TotalRolls="8" TotalMeterage="16000" Uom="feet" />
  </PressRunInfo>
</ProductionInfo>

<DataCaptureInfo RegistrationCaptureMethod="manual" />

<SampleCollection>
  <Sample SampleId="SS002">
    <RunPosition Roll="4" Meterage="1234" MeterageUoM="feet" />
    <RegistrationReport>
      <RegistrationSet PositionOnSample = "left" >
        <ChannelReport ReferenceInkChannelIdLink="Cyan01" >
```

```
<MeasuredChannel InkChannelIdLink="Magenta01"
  RegistrationUoM="mm" XPosition="0" YPosition="0" />
<MeasuredChannel InkChannelIdLink="Yellow01"
  RegistrationUoM="mm" XPosition="-.02" YPosition="0" />
<MeasuredChannel InkChannelIdLink="Black01" RegistrationUoM="mm"
  XPosition="0" YPosition = ".01" />
<MeasuredChannel InkChannelIdLink="Spot01" RegistrationUoM="mm"
  XPosition="0" YPosition="0" />
</ChannelReport>
</RegistrationSet>

<RegistrationSet PositionOnSample = "right" >
  <ChannelReport ReferenceInkChannelIdLink="Cyan01" >
    <MeasuredChannel InkChannelIdLink="Magenta01"
      RegistrationUoM="mm" XPosition="0" YPosition="0" />
    <MeasuredChannel InkChannelIdLink="Yellow01"
      RegistrationUoM="mm" XPosition="-.01" YPosition="0" />
    <MeasuredChannel InkChannelIdLink="Black01" RegistrationUoM="mm"
      XPosition="0" YPosition = ".02" />
    <MeasuredChannel InkChannelIdLink="Spot01" RegistrationUoM="mm"
      XPosition="0" YPosition="0" />
  </ChannelReport>
</RegistrationSet>
</Registration>
</Sample>
</SampleCollection>
</PrintQualityMessage>
```

Appendix D DEFECT REPORTING SAMPLE

The following sample shows a PQX message carrying a defect report. The report was generated from an automated system that has reported at a 100% rate of inspection. Two defects were reported. Both were determined to be defects when compared to the proof. The first defect was a hickey in the center zone with a severity of “4”. The count for this defect was 200. The second defect was a line in the top margin zone with a severity of “1”. The count for this defect was 1000.

Note: The defect zone, defect naming convention and severity rankings are to be established by a business agreement between the Brand and the Printer prior to the quality press run.

```
<PrintQualityMessage . . .
. . .
<DataCaptureInfo DefectCaptureMethod="automated"
  InspectionPercent="100"/>

<SampleCollection>
  <Sample SampleId="SS003" MeasureSide="top">
    <SamplingTime SampleStartTime = "09:00:00" SampleEndTime = "'09:45:00"/>
    <DefectReport>
      <DefectEntry BasisOfReference = "proof" DefectZone = "center"
        DefectName = "hickey" DefectSeverity = "4" DefectXMeasure = ".2"
        DefectYMeasure = ".2" DefectUoM = "mm" DefectDescription = "This is a donut
        hickey with a diameter of .2mm" DefectCount = "200" />
      <DefectEntry BasisOfReference = "proof" DefectZone = "top margin"
        DefectName = "line" DefectSeverity="1" DefectXMeasure = ".1"
        DefectYMeasure = "3.0" DefectUoM = "mm"
        DefectDescription = "This is a very thin black hairline near the top margin"
        DefectCount = "1000" />
    </DefectReport>
  </Sample>
</SampleCollection>
```


Appendix E PQX WORKING GROUP MEMBERS

PQX was developed by the PQX Working Group. This group is made up of interested Idealliance and industry experts from around the world. Members include:

Mr.	Glenn	Andrews	Color Clarity	US
Mr.	Jeff	Bauer	EFI	US
Mr.	Bruce	Bayne	Alder Technology	US
Dr.	Mark	Bohan	Heidelberg USA, Inc.	US
Mr.	Steve	Bonoff	Idealliance	US
Mr.	Carlo	Carnelli	ColorConsulting S.r.l	IT
Mr.	John	Charnock	Print Research International	GB
Mr.	Raymond	Cheydleur	X-Rite, Inc.	US
Mr.	Jeffrey	Collins	Konica Minolta Business Solutions USA	US
Mr.	Jan	de Maeyer	CGS Publishing Technologies Intl.	US
Mr.	Ron	Ellis	Ron Ellis Consulting LLC	US
Mr.	Scott	Gilbert	Phototype	US
Mr.	Arthur	Grundfast	Jostens, Inc. - Clarksville Manufacturing	US
Mr.	Trevor	Haworth	CGS Publishing Technologies Intl.	US
Ms.	Eileen	Henry	Hammer Packaging Corporation	US
Mr.	Jan-Peter	Homann	Homann ColorManagement	DE
Mr.	David	Hunter	Pilot Marketing Group	US
Mr.	Akihiro	Ito	Fuji Xerox CO., Ltd.	JP
Ms.	Dianne	Kennedy	Idealliance	US
Mr.	Elie	Khoury	Alwan Color Expertise	FR
Ms.	Leslie	Kogan	Trusted Media Brands	US
Mr.	Edmund	Kopaczynski	Graphic Packaging International	US
Mr.	Marc	Levine	Schawk - Des Plaines	US
Mr.	William	Li	Kodak Graphic Communications, Canada	CA
Mr.	Garett	Long	SGS International	US
Mr.	Ben	Lubin	FUJIFILM North America Corporation	US
Mr.	Noriaki	Matsubara	Konica Minolta, Inc.	JP
Mr.	Rafiq	Mulla	Xrite Ltd.	GB
Mr.	Michael	Patrissi	Hearst Magazines	US
Mr.	Iain	Pike	Xrite Ltd.	US
Mr.	Stephen	Pinney	Graphic Packaging International	US
Mr.	Lieven	Plettinck	Esko NV	US
Mr.	Peter	Pretzer	FUJIFILM North America Corporation	US
Dr.	Rainer	Prosi	Heidelberger Druckmaschinen AG	DE
Mr.	James	Raffel	Colormetrix Technologies	US
Mr.	Ian	Reid	Bodoni Systems Ltd	GB
Mr.	Socrates	Rettos	Phototype	US

Mr.	Gary	Russell	Phototype	US
Mr.	Donald	Schroeder	FUJIFILM North America Corporation	US
Mr.	Barry	Schweitzer	Phototype	US
Mr.	Chad	Sherwood	Phototype	US
Mr.	Michael	Sisco	QuadTech	US
Mr.	Steven	Smiley	SmileyColor & Associates LLC	US
Mr.	John	Sweeney	John P. Sweeney, Inc.	US
Mr.	Steve	Upton	Chromix	US
Mr.	Pierre	Urbain	Pilot Marketing Group	US
Mr.	Dan	Uress	MeasureColor, Inc.	US
Mr.	Lawrence	Warter	WarterColor	US