
**Graphic technology — Use of PDF
to associate processing steps and
content data —**

**Part 1:
Processing steps for packaging and
labels**

*Technologie graphique — Utilisation du PDF pour associer les étapes
de traitement et les données de contenu —*

Partie 1: Étapes de traitement 2016



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

A list of all parts in the ISO 19593 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

It is common practice in the packaging segment, and other segments of the printing industry, to work with PDF files that contain PDF graphics objects to be used for printing and additional PDF graphics objects and metadata to be used for other steps in the production of the final product. These non-printing PDF objects and metadata correspond to additional processing steps, for example die cutting or creasing. In this way a PDF file can serve as a container for all production data, printing and non-printing, of a printed product, such as a package or a label.

These processing-steps data are used in various steps of the production chain:

- a graphic designer may use them to correctly position graphical elements;
- a quality controller may use them to verify correctness of the design before producing the printed element;
- a system performing layout of the printed products on a substrate may use them to determine an optimal layout with minimal waste of substrate;
- they can be used to manufacture tools for production;
- they can be used directly by digitally controlled finishing devices.

In a typical example workflow:

- a) all PDF graphics objects are rendered for proofing and viewing purposes;
- b) in the final production printing only PDF graphics objects intended for printing are used and the PDF graphics objects intended to describe additional processing steps are ignored;
- c) in a finishing step of the final production workflow the PDF graphics objects intended for printing are ignored while a set of PDF graphics objects corresponding with this processing step are used.

Without an established standard, multiple ad hoc methods are used to store such data in a PDF file depending on the application used to generate the PDF file and the preferences of the user. For example, in a PDF file the cut line can be stored in a layer called “CAD” using a contour with a stroke in spot colourant “coupe”, or the cut line can be stored in the same layer as the graphics and represented as a contour with a stroke in spot colourant “cut”.

The use of multiple ad hoc methods leads to problems of interoperability between companies and systems. When a PDF file is sent from one participant in the packaging supply chain to another, the recipient needs to know how processing-steps data are stored in the PDF file and his or her workflow (often automated) must be able to handle the particular mechanisms used by the sender. When the recipient receives files from multiple senders that all use different mechanisms, this becomes complex and error-prone. For example, if a converter has configured RIPs to ignore separations with spot colourant “cut” in incoming PDF files and the recipient subsequently receives a PDF file with a spot colourant “coupe”, he or she risks wasting a printing plate or, even worse, erroneously printing the die line on the package.

This document defines standardized mechanisms to store graphics objects and metadata corresponding to processing steps in a PDF file. These mechanisms are intended to be generic and applicable not only to packaging and label production but also to other segments of the printing industry.

Besides metadata identifying processing steps, requirements are defined describing how objects related to a particular processing step may interact with the content of other processing steps or regular print content. For example, objects related to a cutting processing step should not knock out regular print objects. Additional requirements define which objects can reasonably be part of certain processing steps. For example, halftone images do not make sense for a cutting processing step.

This document defines the syntax for defining processing steps and technical rules for possible interdependencies between certain processing step information and other content.

This document also defines a first set of processing groups and types that are applicable to the packaging and label segment of the printing industry. Although defined specifically for packaging and labels, these groups and types may also be applicable to other segments of the printing industry such as sign and display or commercial print.

Subsequent parts of the standard might either extend the list of defined processing groups and types to address the needs of other segments of the printing industry or define new groups and types needed in the packaging and labels segment.

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Graphic technology — Use of PDF to associate processing steps and content data —

Part 1: Processing steps for packaging and labels

1 Scope

This document describes a method for storing data in a PDF file that correspond to the processing steps of printed products. This method has three parts:

- 1) metadata identifying processing steps;
- 2) limitations on the interaction between PDF graphics objects that are part of a processing step and other PDF graphics objects;
- 3) limitations on PDF graphics objects in processing steps.

This method is intended to be generic, i.e. not specific to packaging and labels.

In addition, this document defines the following packaging- and label-specific groups of processing-steps data:

- data corresponding to finishing steps, such as cutting, folding or glueing;
- Braille;
- information panels;
- indications of physical dimensions;
- indications of intended positions of graphical elements;
- printed white, for example on transparent or metallic surfaces;
- printed varnish.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 32000-1, *Document management — Portable document format — Part 1: PDF 1.7*

ISO 32000-2, *Document management — Portable document format — Part 2: PDF 2.0*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <http://www.electropedia.org/>

3.1

processing step

step in production of print products other than regular printing of colour on the print surface

EXAMPLE Cutting, printing of white, varnish or similar.

3.2

contour

path or text PDF graphics object

3.3

processing-step PDF object

PDF graphics object associated with a processing step

3.4

surface of the printed product

area of the printed substrate that will be used for the final printed product

Note 1 to entry: Each part of the ISO 19593 series contains a precise definition of the surface of the printed product. For this document this definition can be found in [7.4.1](#).

3.5

spot colourant

colourant that is not a process colourant

Note 1 to entry: It is defined in a separation colour space or a DeviceN colour space.

4 Notations

PDF operators, PDF keywords, the names of keys in PDF dictionaries and other predefined names are written in **bold**; for example, the key **BM**. Operands of PDF operators or values of PDF dictionary keys are written in *italic*; for example, the *multiply* value for the **BM** key.

5 Conformance

This document defines the use of processing step PDF graphics objects for the exchange of processing-steps data.

A PDF file conforming to this document shall be one in which processing-steps data are included in the PDF using a method that adheres to this document. Such a PDF file shall conform with the requirements of both [Clause 6](#) and [Clause 7](#). A conforming file may also use additional methods to describe processing-steps data. If used, these alternative methods shall not contradict the data stored using the method described in this document.

A conforming file shall conform to at least one of the following standards: ISO 32000-1 or ISO 32000-2.

A conforming reader is a software application that shall be able to read and appropriately process all files conforming to this document and conforming to at least one of ISO 32000-1 or ISO 32000-2.

NOTE Since a PDF/X-4 file can conform with ISO 32000-1, this document does not exclude the usage of files conforming to ISO 15930-7.

6 Storing processing-steps data in PDF — generic requirements

6.1 Processing-step optional content groups

The use of optional content groups (OCGs) allows labelling graphics objects throughout a PDF file in such a way that they can easily be included or excluded from output. While an OCG can easily be used to group graphics objects together, there is no standardized mechanism to store identifying information in such an OCG.

A processing-step OCG is an OCG with an additional **GTS_Metadata** key in the OCG dictionary, as described in 6.2. The value of this key is a dictionary containing standardized identifying information for the processing step which this processing-step OCG corresponds to.

A processing-step OCG shall only contain PDF graphics objects whose intended usage is consistent with the processing step defined by **GTS_Metadata**.

NOTE The **Name** key of the OCG cannot be used for identification because it is a) not standardized and b) often used for display in user interface which conflicts with the possibility of standardizing it. Although it might be acceptable for an English user, for example, to work with an OCG called “Die cut” and learn to standardize on it, the same would likely not be true for a Dutch or Chinese user.

6.2 Processing-step OCG metadata

The optional content group dictionary of a processing-step OCG shall contain the **GTS_Metadata** key, the value of which shall be a dictionary, as indicated in Table 1. The **GTS_Metadata** dictionary shall contain the **GTS_ProcStepsGroup** key. For some values of the **GTS_ProcStepsGroup** key, the **GTS_ProcStepsType** key shall also be present. The combination of the value of the **GTS_ProcStepsGroup** and the value of the **GTS_ProcStepsType** key uniquely define the processing step.

A PDF file may contain multiple OCGs with the same combination of values of **GTS_ProcStepsGroup** and **GTS_ProcStepsType**. These OCGs correspond with the same kind of processing step.

Table 1 — Additional GTS_Metadata entry in an optional content group dictionary

Key	Type	Value
GTS_Metadata	dictionary	(Required for processing-step OCG) GTS_Metadata dictionary containing keys defined in Table 2

It is often necessary to preserve hierarchical information about processing steps. For automated tools, for example, it might not be enough to know that graphics objects are related to a “Structural” processing step; one might need to be able to discern the difference between cut and crease lines. To enable this, the **GTS_Metadata** dictionary contains enough information to preserve such hierarchy.

The **GTS_ProcStepsGroup** defines the group of processing steps the graphics objects in this OCG belong to. **GTS_ProcStepsType** optionally defines the type of processing steps for the graphics objects in the OCG as indicated in Table 2.

Table 2 — Entries in a GTS_Metadata dictionary

Key	Type	Value
GTS_ProcStepsGroup	name	<i>(Required)</i> Name of the processing step group this processing step belongs to. The value of this key shall be taken from a list of predefined values in the relevant part of the ISO 19593 series when such value is applicable. If the relevant part of the ISO 19593 series does not define an applicable value, a custom value may be used in a conforming file. All custom values for this key shall be second-class names as described in ISO 32000-1:2008, Annex E.
GTS_ProcStepsType	name	<i>(Optional; required for some values of GTS_ProcStepsGroup)</i> Name of the type of processing step within the group defined by the value of GTS_ProcStepsGroup. The value of this key shall be taken from a list of predefined values in the relevant part of the ISO 19593 series when such value is applicable. If the relevant part of the ISO 19593 series does not define an applicable value, a custom value may be used in a conforming file. All custom values for this key shall be second-class names as described in ISO 32000-1:2008, Annex E.

6.3 Colouring and positioning of processing-step objects

6.3.1 Introduction

This subclause defines alternative sets of requirements for processing steps. The relevant part of the ISO 19593 series indicates which set of requirements is applicable to which groups or types of processing steps and may specify alternative requirements that differ from these.

The purpose of the sets of requirements is to guarantee that rendering of the device colourants within the surface of the printed product on the intended final printing device (i.e. the printing device that will be used to print the content of the conforming file in production) are not affected by the presence of processing-step objects in the PDF.

6.3.2 Colouring and positioning of processing-step objects in off-bleed areas

This set of requirements is applicable to processing-step PDF objects that are not allowed to overlap with the actual print content.

- These processing-step PDF objects may have any PDF-conforming colouring, overprint or transparency blending.
- These processing-step PDF objects shall be positioned in an “off-bleed” area, i.e. they shall not overlap geometrically with the surface of the printed product. Determination of overlapping shall use areas marked by the actual graphics objects and shall not be defined by a rectangular bounding box or similar method.

The specific definition of the surface of the printed product to be used shall be taken from the relevant part of the ISO 19593 series.

6.3.3 Colouring and positioning of processing-step objects allowed to overlap with print content

This set of requirements is applicable to processing-step PDF objects that are allowed to overlap with print content.

- These processing-step PDF objects may appear anywhere on the PDF page.

- These processing-step PDF objects shall be coloured using a spot colourant. Colourants used for page content that does not form part of a processing-step OCG shall not be used to colour these processing-step PDF objects. Colourants with the name **All**, **None**, **Cyan**, **Magenta**, **Yellow** or **Black** shall not be used to colour these processing-step PDF objects.
- The graphics state for these processing-step PDF objects shall have the overprint parameter set to true for stroke when the object is painted with a stroke. The graphics state for these processing-step PDF objects shall have the overprint parameter set to true for fill if the object is painted with a fill. These processing-step PDF objects shall not use PDF transparency, either directly or through membership of a transparency group other than the page-level transparency group. The method to determine if a PDF object uses transparency shall be as described in ISO 32000-2:2017, Annex Q.
- Page content that does not belong to a processing step shall be placed in the appropriate order of the content stream such that no PDF graphics objects are drawn on top of and overlapping with these processing-step PDF objects. Determination of overlapping shall use areas marked by the actual graphics objects or within the area of a soft mask and shall not be defined by a rectangular bounding box or similar method.

6.4 Limitations on processing-step PDF objects describing paths and surfaces

The purpose of this set of requirements is to limit the types of PDF objects in certain processing steps describing paths or surfaces. The relevant part of the ISO 19593 series indicates for which group or type of processing steps these requirements are valid and may specify alternative requirements that differ from these.

- These processing-step OCGs shall only contain PDF path objects, PDF text objects and form XObjects. PDF objects in these form XObjects shall follow the requirements of [6.4](#).
- Processing-step objects in these processing-step OCGs describing paths shall have a stroke. They should not have a fill.
- Processing-step objects in these processing-step OCGs describing surfaces shall have a fill or a stroke or both a fill and a stroke.
- The Pattern colour space shall not be used for either stroke or fill of these processing-step PDF objects.
- Type 3 fonts shall not be used for defining these processing-step PDF objects.
- Text rendering mode 3 should not be used for these processing-step PDF objects. Text rendering modes 4, 5, 6 and 7 shall not be used for these processing-step PDF objects.
- 0 % tint of a colourant should not be used for colouring these processing-step PDF objects.
- The graphics state for these processing-step PDF objects shall not have a clipping path that partially or completely clips these objects.

6.5 Evaluating processing steps

6.5.1 Introduction

This clause defines alternative sets of requirements for processing steps. The relevant part of the ISO 19593 series indicates which set of requirements is applicable to which groups or types of processing steps.

The purpose of the sets of requirements is to describe the usage of these processing-step objects by a conforming reader evaluating processing steps, for example for the purpose of performing a production step such as cutting.

6.5.2 Processing steps describing paths

This set of requirements is applicable to processing-step OCGs where the PDF graphics objects are used to describe a path, for example for a finishing production step such as cutting.

A conforming reader evaluating processing steps shall use the paths of processing-step PDF objects without regard to any stroke or fill parameters or clipping.

For PDF text objects a conforming reader evaluating processing steps shall use the glyph outline without regard to any stroke or fill parameters or clipping.

NOTE The visual appearance of the PDF path or text objects in a PDF-compatible renderer has no significance for the execution of a processing step in the production of the final printed product. The technical specification and requirements for executing a processing step in production are not defined in this document. Detailed technical specifications for executing a processing step, for example the depth of cutting or the depth of embossing, could be defined in an external job ticket such as a JDF.

6.5.3 Processing steps describing a surface

This set of requirements is applicable to processing-step OCGs where the PDF objects are used to describe a surface, for example for a finishing production step such as applying a foil.

A conforming reader evaluating processing steps describing a surface shall determine the surface of the processing step as the union of the inside areas of all contours in that processing step:

- if that contour has a fill, the inside of the contour is determined using the fill winding rule as defined in ISO 32000-1:2008, 8.5.3.3;
- if the contour has no fill, the inside of the contour is determined using the non-zero winding rule as defined in ISO 32000 1:2008, 8.5.3.3.2.

7 Storing processing-steps data in PDF— packaging and labels requirements

7.1 Groups of processing-step OCGs

7.1.1 Structural data (CAD)

The Structural processing-step OCGs contain contours that describe how a printed product will be processed in finishing for producing the 3D end product from the flat substrate. These contours correspond to operations performed on finishing devices such as die cutters or folder-glueers.

[Figure 1](#) shows a folding carton box with processing-steps data corresponding to cutting and creasing performed on a die-cut device.



a) PDF with structural data



b) 3D representation

Key

- 1 cutting
- 2 creasing

NOTE The names “Murphy & Lyons” and “Collision Colours” are fictitious. They were created by ISO/TC 130 to aid in the realistic representation of a folding carton box. Any similarity between these fictitious names and any existing brand is unintended and entirely coincidental.

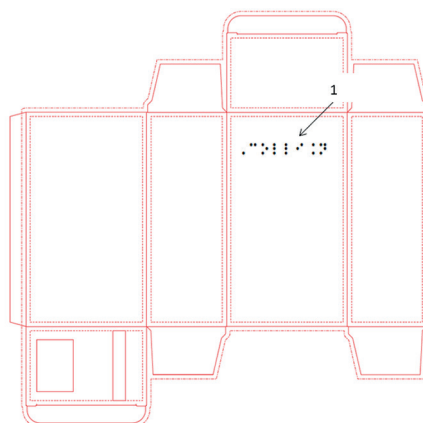
Figure 1 — Folding carton box with processing steps data corresponding to cutting and creasing performed on a die-cut device

7.1.2 Braille

The Braille processing-step OCG contains contours in the PDF document representing Braille that is applied to the printed product after printing (e.g. on a finishing device such as a die cutter, folder/gluer or inkjet device).

NOTE The Braille processing step contains the actual Braille content that needs to appear on the printed product. This is unlike the Positions processing steps that indicate intended positions and not actual content.

[Figure 2](#) shows a folding carton box with processing-steps data for braille that will be applied after printing.

**Key**

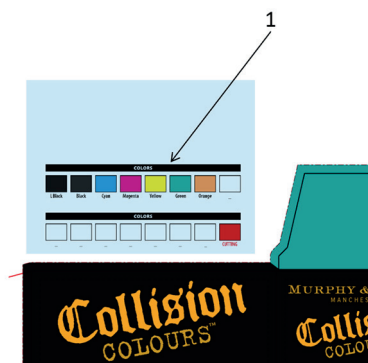
- 1 braille

Figure 2 — Folding carton box with processing-steps data for Braille

7.1.3 Legend

The Legend processing-step OCG contains PDF graphics objects outside the surface of the actual printed product containing job-related data used in review and approval and other production steps.

[Figure 3](#) shows a folding carton box with a legend containing technical information, i.e. the inks that need to be used to print the product.



Key

1 legend

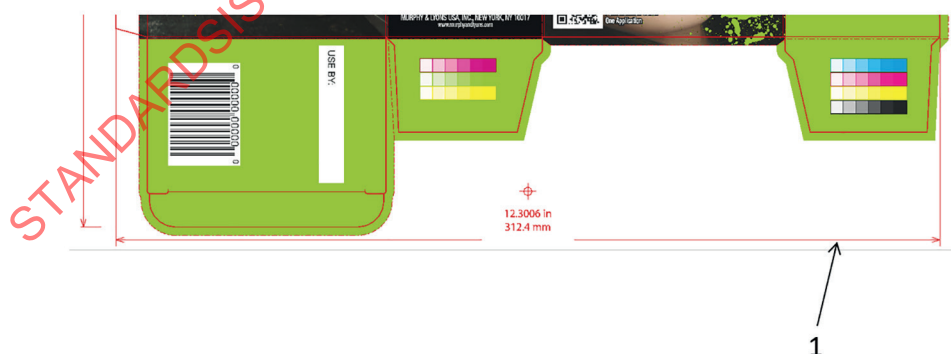
NOTE The names “Murphy & Lyons” and “Collision Colours” are fictitious. They were created by ISO/TC 130 to aid in the realistic representation of a folding carton box. Any similarity between these fictitious names and any existing brand is unintended and entirely coincidental.

Figure 3 — Folding carton box with a legend containing technical information

7.1.4 Dimensions

The Dimensions processing-step OCG contains contours giving indications (arrows, numbers and units) of physical sizes of items in the design.

Figure 4 shows a folding carton box with lines and arrows indicating physical dimensions.



Key

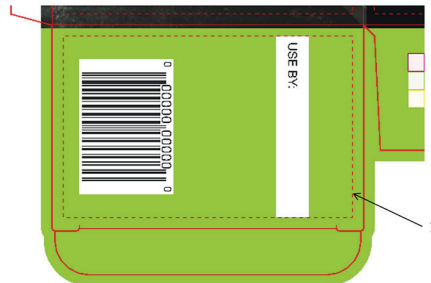
1 dimensions

Figure 4 — Folding carton box with lines and arrows indicating physical dimensions

7.1.5 Positions

The Positions optional content OCGs contain contours giving indications of intended, allowed or forbidden positions for certain types of graphic elements.

[Figure 5](#) shows a PDF with indications of allowed positions for content in a flap of a folding carton.



Key

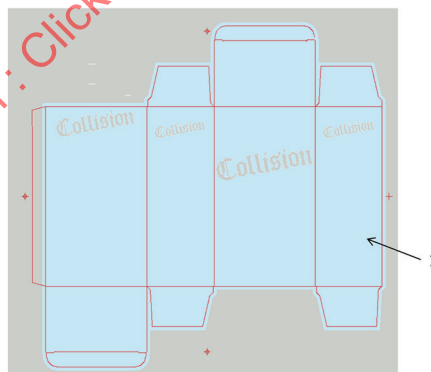
1 positions

Figure 5 — PDF with indications of allowed positions

7.1.6 White

The White processing-step OCG contains PDF graphics objects indicating application of white backing ink, such as might be used on transparent or metallic substrates.

[Figure 6](#) shows the outlines of a folding carton printed on a metallic substrate. The greyish background represents the metallic surface. The cyan colour indicates areas where opaque white ink will be applied before printing of the actual graphics.



Key

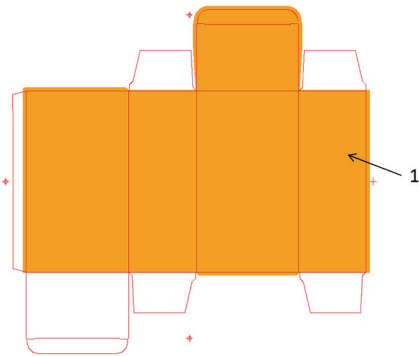
1 white

Figure 6 — Folding carton printed on a metallic substrate with backing white

7.1.7 Varnish

The Varnish processing-step OCG contains PDF graphics objects indicating application of varnish after printing.

[Figure 7](#) shows the outlines of a folding carton. The orange colour indicates areas where varnish will be applied after printing of the actual graphics.



Key
1 varnish

Figure 7 — PDF with orange colour indicating the areas with varnish

7.2 Values for GTS_ProcStepsGroup

The **GTS_ProcStepsGroup** entry in the **GTS_Metadata** dictionary shall have one of the values defined in [Table 3](#) or a custom value as specified in [Table 2](#).

Table 3 — Values for GTS_ProcStepsGroup

GTS_ProcStepsGroup	Description
Structural	Group containing a set of processing-step objects that describe how the printed product will be processed in finishing.
Dimensions	Group containing a set of processing-step objects (arrows, numbers and units) indicating physical sizes of items in the design.
Braille	Group containing a set of processing-step objects representing Braille text.
Legend	Group containing a set of processing-step objects representing product-related administrative and technical information.
Positions	Group containing a set of processing-step objects for positioning information for various graphical and non-graphical elements.
White	Group containing a set of processing-step objects describing a white backing applied on, for example, transparent foils or metallic surfaces.
Varnish	Group containing processing-step objects describing printed varnish.

7.3 Values for GTS_ProcStepsType

7.3.1 Structural processing step group

When the **GTS_ProcStepsGroup** entry in the **GTS_Metadata** dictionary has the value *Structural*, the **GTS_ProcStepsType** entry in the **GTS_Metadata** dictionary shall have one of the values defined in [Table 4](#) or a custom value as specified in [Table 2](#).

Table 4 — Values for GTS_ProcStepsType for the structural group

GTS_ProcStepsType	Description
<i>Cutting</i>	Processing-step objects indicating where the printed artwork will be cut from the printed sheet, e.g. with a guillotine cutter or die-cutting device.
<i>PartialCutting</i>	Processing-step objects indicating where the substrate will be cut partially, i.e. not entirely through the material.
<i>ReversePartialCutting</i>	Processing-step objects indicating where the substrate will be cut partially, i.e. not entirely through the material on the back side of the substrate
<i>Creasing</i>	Processing-step objects indicating where the substrate will be creased to guide subsequent folding.
<i>ReverseCreasing</i>	Processing-step objects indicating where the substrate will be creased on the back side of the substrate.
<i>CuttingCreasing</i>	Processing-step objects indicating where the substrate will undergo alternating cutting and creasing.
<i>ReverseCuttingCreasing</i>	Processing-step objects indicating where the substrate will undergo alternating cutting and creasing on the back side of the substrate.
<i>PartialCuttingCreasing</i>	Processing-step objects indicating where the substrate will undergo alternating partial cutting and creasing.
<i>ReversePartialCuttingCreasing</i>	Processing-step objects indicating where the substrate will undergo alternating partial cutting and creasing on the back side of the substrate.
<i>Drilling</i>	Processing-step objects indicating locations where the substrate will be drilled and the intended size of the resulting hole.
<i>Gluing</i>	Processing-step objects enclosing an area where glue will be applied.
<i>FoilStamping</i>	Processing-step objects enclosing an area where foil will be applied through hot foil stamping.
<i>ColdFoilStamping</i>	Processing-step objects enclosing an area where foil will be applied through cold foil stamping (i.e. using glue).
<i>Embossing</i>	Processing-step objects enclosing an area where embossing will be applied.
<i>Debossing</i>	Processing-step objects enclosing an area where debossing will be applied.
<i>Perforating</i>	Processing-step objects indicating where the substrate will be perforated.
<i>Bleed</i>	Processing-step objects indicating the intended bleed for print.
<i>VarnishFree</i>	Processing-step objects enclosing an area where it is not permitted to have varnish.
<i>InkFree</i>	Processing-step objects enclosing an area where it is not permitted to have printing ink.
<i>InkVarnishFree</i>	Processing-step objects enclosing an area where it is not permitted to have printing ink and where it is not allowed to have varnish.
<i>Folding</i>	Processing-step objects indicating where the substrate will be folded without prior creasing.
<i>Punching</i>	Processing steps objects indicating the locations at which the substrate will be punched and the size and shape of the resulting holes.
<i>Stapling</i>	Processing steps objects indicating the locations at which the substrate will be stapled or stitched, and the size of the staples or stitches to be used.

7.3.2 Positions processing step group

When the **GTS_ProcStepsGroup** entry in the **GTS_Metadata** dictionary has the value *Positions*, the **GTS_ProcStepsType** entry in the **GTS_Metadata** dictionary shall have one of the values defined in [Table 5](#) or a custom value as specified in [Table 2](#).