

### 3.3.11.3.1 The Tiling Operator:

Tiling facilitates the creation of a complex series of images on a PDF/is page to a Consumer that may be memory constrained and unable to otherwise display the page. If the Producer of the Document is able to determine that the current page's image layering will violate the [cache memory](#) constraints of the Consumer; the Consumer MUST break up the current page into non-overlapping regions to be displayed (Tiling) or free up resources using the 'Cache Operator' (see below). Tiling is specified in the [content stream](#) of the page. Tiling indicates that all previous images or masks in the stream up to the "Tiling operator" do not overlay, and are not overlaid by, any images or masks that follow in the stream.

Note: Breaking up a page in this way is not normally necessary for a page that contains a single image. Since a single image can be processed by the Consumer as the data is received, thus not requiring cache space to hold the image data; it becomes unnecessary to Tile the page. Masked images, or multiple images in a non-uniform layout that would require the Consumer to buffer the image data for the page, might call for a Tiled page.

To indicate that a new 'tile' is beginning, the content stream MUST contain the following operator syntax, exactly as shown:

**/Fis\_tile <</Fis\_tile [X Y]>> DP**

Where:

**X:** The maximum X coordinate value that this tile will contain.

**Y:** The minimum Y coordinate value that this tile will contain.

And:

All coordinate values are in the user space coordinate system (0,0 is lower left), at 72 units per inch, relative to the Page Objects 'Media Box'.

- Use of this feature implies that the <MASK> Image Profile is Implemented.
- All Tiles in the same "row" MUST have the same Y value.
- All Tiles in the same "column" MUST have the same X value.
- A value of '0' for either X or Y implies that this Tile covers the remainder of this row or column, respectively.
- Tiles may only progress from left to right, top to bottom: the first tile is in the upper left corner (lowest X coordinate, highest Y coordinate), the last tile will be in the lower right corner.
- The last Tile operator (having a value of [0,0]) MUST not be present, as the close of the Content Stream will indicate that the last tile is to be rendered.
- The extent of an image within a particular Tile MUST meet the following requirements:
  - Its left edge MUST have an x-coordinate value greater than or equal to the X value of the Tile to the left of the current Tile, or '0' if this is the first Tile in a row.
  - Its right edge MUST have an x-coordinate less than the X value of the current Tile.
  - Its top edge MUST have a y-coordinate value less than or equal to the Y value of the Tile above the current Tile, or '0' if this is the first Tile in a column.
  - Its bottom edge MUST have a y-coordinate greater than the Y value of the current Tile.

See the following examples to help illustrate this feature.

For the examples, below:

N: [X, Y]

Where 'N' is the order in which the tile appears in the Content Stream.

'X' is the 'X' value of the Tile operator.

'Y' is the 'Y' value of the Tile operator.

Example #1: an 8.5" X 11" page (612x792 units), divided into 9 equal sized Tiles:

1: [204, 528]	2: [408, 528]	3: [0, 528]
4: [204, 264]	5: [408, 264]	6: [0, 264]
7: [204, 0]	8: [408, 0]	9: (No operator)

Example #2: and 11" X 17" page (792x1224 units), divided into 4 "bands":

1: [0, 918]
2: [0, 612]
3: [0, 306]
4: (No operator)

A 'Tile Operator' MUST only occur between displayed images on a page, and MUST NOT occur at the beginning and/or end of the content stream.

To illustrate this feature here is the content stream for Example #2, above:

```

stream
q
792 0 0 306 0 1224 cm % region of first 'tile'. 792 units wide, 306 units high,
/lm1 Do % Display image in first band.
/Fis_tile <</Fis_tile [0 918]>> DP % 'Tile Operator'
Q
q
792 0 0 306 0 918 cm
/lm2 Do % Display image in second band.
/Fis_tile <</Fis_tile [0 612]>> DP
Q
q
792 0 0 306 0 612 cm
/lm3 Do % Display image in third band.
/Fis_tile <</Fis_tile [0 306]>> DP
Q
q
792 0 0 306 0 306 cm
/lm4 Do % Display image in last band.
endstream

```