The tikzfill package

Manual for version 1.0.1pre1 (2022/07/22)

Thomas F. Sturm

Cover code

```
% \documentclass[a4paper]{article}
% \usepackage{tikzfill}
% \usetikzlibrary{fadings,shadings}
% \usepackage[skins,breakable]{tcolorbox}
% \usepackage{ninecolors}
% \begin{document}
\begin{tcolorbox}[spread,blankest,phantom={\thispagestyle{empty}}]
\begin{tikzfadingfrompicture}[name=titlepicture]
  \path
    [
      pattern hexagon cycle = { size=28mm, rings=5 },
      pattern color         = white,
    ]
    (-\tcbtextwidth/2,-\tcbtextheight/2) rectangle
    (\tcbtextwidth/2,\tcbtextheight/2);
\end{tikzfadingfrompicture}%
%
\begin{tikzpicture}
  \fill
    [
      upper left = blue5,    upper right = cyan5,
      lower left = magenta5, lower right = blue5,
    ]
   (-\tcbtextwidth/2,-\tcbtextheight/2) rectangle
   (\tcbtextwidth/2,\tcbtextheight/2);
\shade
    [
      path fading = titlepicture,
      fit fading  = false,
      upper left = blue6,    upper right = cyan6,
      lower left = magenta6, lower right = blue6,
    ]
    (-\tcbtextwidth/2,-\tcbtextheight/2) rectangle
    (\tcbtextwidth/2,\tcbtextheight/2);
\node[white,font=\Huge\bfseries] (title) at (0,\tcbtextheight/4)
     {The \texttt{tikzfill} package};
\node[white,font=\Large\bfseries,below=8mm] (title) at (title.south)
     {Manual for version \version\ (\datum)};
\node[white,font=\large\bfseries,below=8mm] (title) at (title.south)
     {Thomas F.~Sturm};
\end{tikzpicture}
\end{tcolorbox}
% \end{document}
```

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Thomas F. Sturm[1]

https://www.ctan.org/pkg/tikzfill

https://github.com/T-F-S/tikzfill

Abstract

tikzfill is a collection of Ti*k*Z libraries which add further options to fill Ti*k*Z paths with images and patterns. The libraries comprise fillings with images from files and from Ti*k*Z pictures. Also, patterns of hexagons and of rhombi are provided.

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Contents

1 Short Introduction

Ti*k*Z is a very advanced and comprehensive graphics package for LaTeX. The package `tikzfill` comprises a collection of libraries for Ti*k*Z which add further options to fill Ti*k*Z paths with images and patterns.

For LaTeX, the provided libraries can be loaded using the preferred Ti*k*Z mechanism by

```
\usetikzlibrary{fill.***} % LaTeX (primary choice) and plain TeX
```

where `***` is to be replaced by the actual library name found on the following pages.

Alternatively, the libraries can be loaded using LaTeX style files

```
\usepackage{tikzfill.***} % LaTeX (secondary choice)
```

If you want to load all Ti*k*Z libraries of this package, you can use the following LaTeX style file

```
\usepackage{tikzfill} % load all libraries
```

2 Image and Picture Fill Library

TikZ Library `fill.image`

```
\usetikzlibrary{fill.image} % LaTeX (primary choice) and plain TeX
\usetikzlibrary[fill.image] % ConTeXt
\usepackage{tikzfill.image} % LaTeX (secondary choice)
```

This library defines options to fill graphs with images or arbitray pictures.

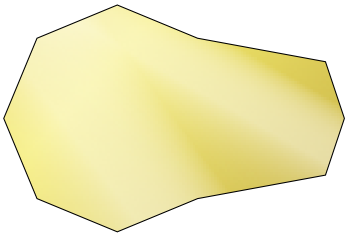
Until `tcolorbox` version 5.1.1 (2022/06/24), the code of this library was part of `tcolorbox`. Now, on suggestion of muzimuzhi, it is a separate library usable without `tcolorbox`. Also, the code is completely rewritten with `expl3`.

2.1 Fill Plain

`/tikz/fill plain image=`⟨*file name*⟩ (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The image is put in the center of the path, but it is not resized to fit into the path area.

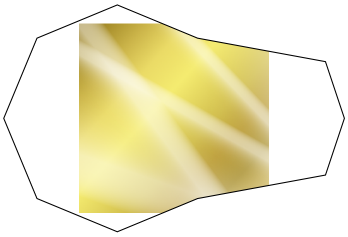
```
\begin{tikzpicture}
\path[draw,fill plain image=goldshade.png]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



`/tikz/fill plain image*=`⟨*file name*⟩ (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The image is put in the center of the path, but it is not resized to fit into the path area. The ⟨*graphics options*⟩ are given to the underlying `\includegraphics` command.

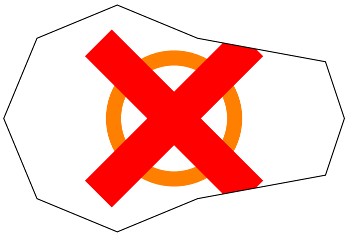
```
\begin{tikzpicture}
\path[draw,
    fill plain image*={width=2.5cm}{goldshade.png}]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



`/tikz/fill plain picture=`⟨*graphical code*⟩ (no default, initially unset)

Fills the current path with the given ⟨*graphical code*⟩. The result is put in the center of the path, but it is not resized to fit into the path area. Note that this is almost identical to the standard `path picture` option.

```
\begin{tikzpicture}
\path[draw,fill plain picture={%
  \draw[red!50!yellow,line width=2mm]
    (0,0) circle (8mm);
  \draw[red,line width=5mm] (-1,-1) -- (1,1);
  \draw[red,line width=5mm] (-1,1) -- (1,-1);
  }]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```

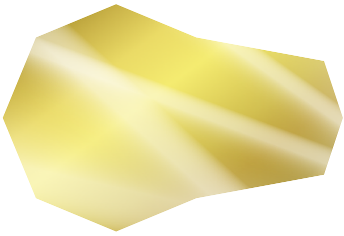


2.2 Fill Stretch

/tikz/fill stretch image=⟨*file name*⟩ (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The image is stretched to fill the path area.

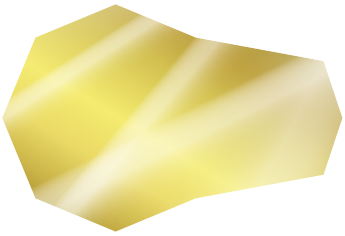
```
\begin{tikzpicture}
\path[fill stretch image=goldshade.png]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



/tikz/fill stretch image*={⟨*graphics options*⟩}{⟨*file name*⟩} (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The ⟨*graphics options*⟩ are given to the underlying `\includegraphics` command. The image is stretched to fill the path area.

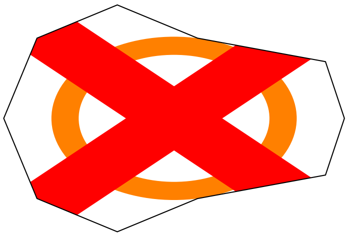
```
\begin{tikzpicture}
\path[fill stretch image*=
  {angle=90,origin=c}{goldshade.png}]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



/tikz/fill stretch picture=⟨*graphical code*⟩ (no default, initially unset)

Fills the current path with the given ⟨*graphical code*⟩. The result is stretched to fill the path area.

```
\begin{tikzpicture}
\path[draw,fill stretch picture={%
  \draw[red!50!yellow,line width=2mm]
    (0,0) circle (8mm);
  \draw[red,line width=5mm] (-1,-1) -- (1,1);
  \draw[red,line width=5mm] (-1,1) -- (1,-1);
  }]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```

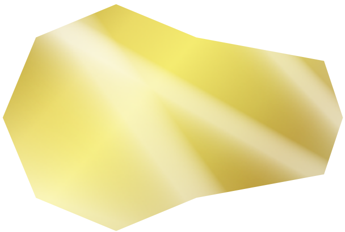


2.3 Fill Overzoom

`/tikz/fill overzoom image=`⟨*file name*⟩ (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The image is zoomed such that the path area fills the image.

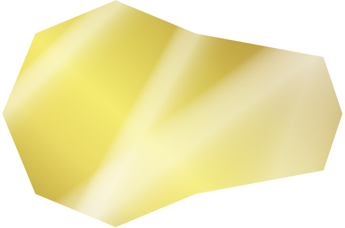
```
\begin{tikzpicture}
\path[fill overzoom image=goldshade.png]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



`/tikz/fill overzoom image*={`⟨*graphics options*⟩`}{`⟨*file name*⟩`}` (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The ⟨*graphics options*⟩ are given to the underlying `\includegraphics` command. The image is zoomed such that the path area fills the image.

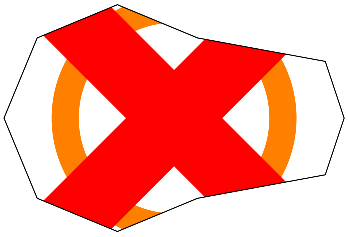
```
\begin{tikzpicture}
\path[fill overzoom image*=
  {angle=90,origin=c}{goldshade.png}]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



`/tikz/fill overzoom picture=`⟨*graphical code*⟩ (no default, initially unset)

Fills the current path with the given ⟨*graphical code*⟩. The result is zoomed such that the path area fills the image.

```
\begin{tikzpicture}
\path[draw,fill overzoom picture={%
  \draw[red!50!yellow,line width=2mm]
    (0,0) circle (8mm);
  \draw[red,line width=5mm] (-1,-1) -- (1,1);
  \draw[red,line width=5mm] (-1,1) -- (1,-1);
  }]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```

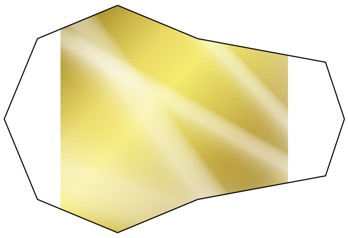


2.4 Fill Zoom

/tikz/fill zoom image=⟨*file name*⟩ (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The image is zoomed such that it fits inside the path area. Typically, some parts of the path area will stay unfilled.

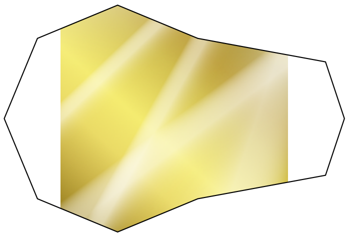
```
\begin{tikzpicture}
\path[draw,fill zoom image=goldshade.png]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



/tikz/fill zoom image*={⟨*graphics options*⟩}{⟨*file name*⟩} (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The ⟨*graphics options*⟩ are given to the underlying `\includegraphics` command. The image is zoomed such that it fits inside the path area. Typically, some parts of the path area will stay unfilled.

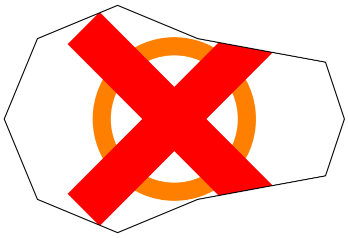
```
\begin{tikzpicture}
\path[draw,fill zoom image*=
  {angle=90,origin=c}{goldshade.png}]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



/tikz/fill zoom picture=⟨*graphical code*⟩ (no default, initially unset)

Fills the current path with the given ⟨*graphical code*⟩. The result is zoomed such that it fits inside the path area. Typically, some parts of the path area will stay unfilled.

```
\begin{tikzpicture}
\path[draw,fill zoom picture={%
  \draw[red!50!yellow,line width=2mm]
    (0,0) circle (8mm);
  \draw[red,line width=5mm] (-1,-1) -- (1,1);
  \draw[red,line width=5mm] (-1,1) -- (1,-1);
  }]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```

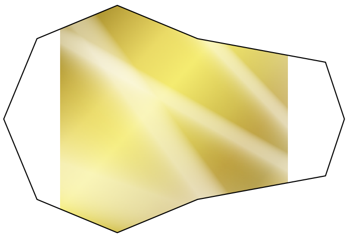


2.5 Fill Shrink

/tikz/fill shrink image=⟨*file name*⟩ (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The image is zoomed such that it fits inside the path area, but it never gets enlarged. Typically, some parts of the path area will stay unfilled.

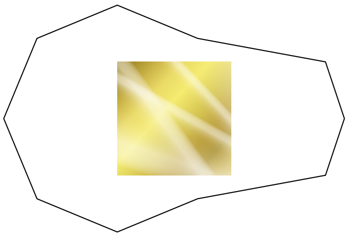
```
\begin{tikzpicture}
\path[draw,fill shrink image=goldshade.png]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



/tikz/fill shrink image*=⟨*file name*⟩ (no default, initially unset)

Fills the current path with an external image referenced by ⟨*file name*⟩. The ⟨*graphics options*⟩ are given to the underlying `\includegraphics` command. The image is zoomed such that it fits inside the path area, but it never gets enlarged. Typically, some parts of the path area will stay unfilled.

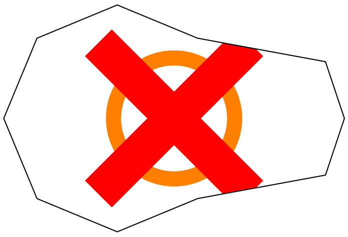
```
\begin{tikzpicture}
\path[draw,
    fill shrink image*={width=1.5cm}{goldshade.png}]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



/tikz/fill shrink picture=⟨*graphical code*⟩ (no default, initially unset)

Fills the current path with the given ⟨*graphical code*⟩. The result is zoomed such that it fits inside the path area, but it never gets enlarged. Typically, some parts of the path area will stay unfilled.

```
\begin{tikzpicture}
\path[draw,fill shrink picture={%
  \draw[red!50!yellow,line width=2mm]
    (0,0) circle (8mm);
  \draw[red,line width=5mm] (-1,-1) -- (1,1);
  \draw[red,line width=5mm] (-1,1) -- (1,-1);
  }]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```

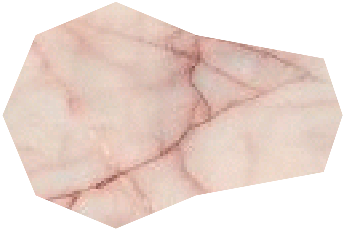


2.6 Fill Tile

/tikz/fill tile image=⟨*file name*⟩ (no default, initially unset)

Fills the current path with a tile pattern using an external image referenced by ⟨*file name*⟩.

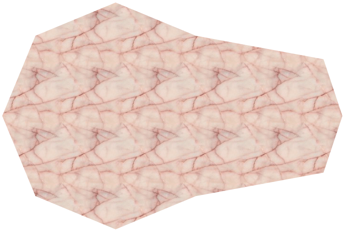
```
\begin{tikzpicture}
\path[fill tile image=pink_marble.png]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



/tikz/fill tile image*={⟨*graphics options*⟩}{⟨*file name*⟩} (no default, initially unset)

Fills the current path with a tile pattern using an external image referenced by ⟨*file name*⟩. The ⟨*graphics options*⟩ are given to the underlying \includegraphics command.

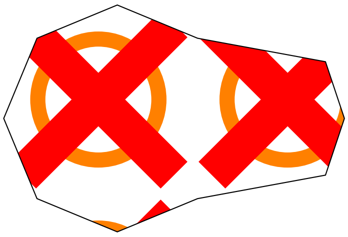
```
\begin{tikzpicture}
\path[fill tile image*={width=8mm}{pink_marble.png}]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



/tikz/fill tile picture=⟨*graphical code*⟩ (no default, initially unset)

Fills the current path with a tile pattern using the given ⟨*graphical code*⟩.

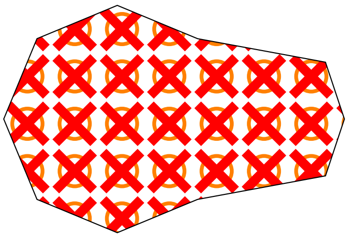
```
\begin{tikzpicture}
\path[draw,fill tile picture={%
  \draw[red!50!yellow,line width=2mm]
    (0,0) circle (8mm);
  \draw[red,line width=5mm] (-1,-1) -- (1,1);
  \draw[red,line width=5mm] (-1,1) -- (1,-1);
  }]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```



/tikz/fill tile picture*={⟨*fraction*⟩}{⟨*graphical code*⟩} (no default, initially unset)

Fills the current path with a tile pattern using the given ⟨*graphical code*⟩. The graphic is resized by ⟨*fraction*⟩.

```
\begin{tikzpicture}
\path[draw,fill tile picture*={0.25}{%
  \draw[red!50!yellow,line width=2mm]
    (0,0) circle (8mm);
  \draw[red,line width=5mm] (-1,-1) -- (1,1);
  \draw[red,line width=5mm] (-1,1) -- (1,-1);
  }]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```

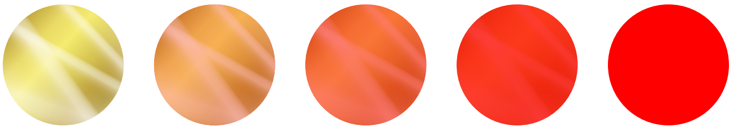


2.7 Filling Options

`/tikz/fill image opacity=`⟨*fraction*⟩ (no default, initially `1.0`)

Sets the fill opacity for the image or picture fill options to the given ⟨*fraction*⟩.

```
\begin{tikzpicture}
\path[fill stretch image=goldshade.png] (0,0) circle (8mm);
\path[fill=red,fill stretch image=goldshade.png,fill image opacity=0.75]
  (2,0) circle (8mm);
\path[fill=red,fill stretch image=goldshade.png,fill image opacity=0.5]
  (4,0) circle (8mm);
\path[fill=red,fill stretch image=goldshade.png,fill image opacity=0.25]
  (6,0) circle (8mm);
\path[fill=red] (8,0) circle (8mm);
\end{tikzpicture}
```



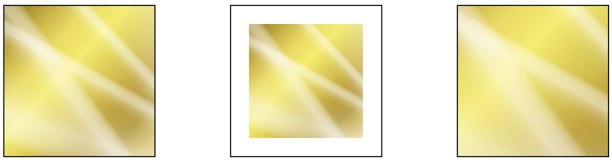
`/tikz/fill image scale=`⟨*fraction*⟩ (no default, initially `1.0`)

Stretches, zooms, overzooms or shrinks the image or picture to the given ⟨*fraction*⟩ of the width and height of the current path.

```
\begin{tikzpicture}
\path[draw,fill zoom image=goldshade.png]
  (0,0) rectangle +(2,2);

\path[draw,fill zoom image=goldshade.png,fill image scale=0.75]
  (3,0) rectangle +(2,2);

\path[draw,fill zoom image=goldshade.png,fill image scale=1.5]
  (6,0) rectangle +(2,2);
\end{tikzpicture}
```



`/tikz/fill image options=`⟨*graphics options*⟩ (no default, initially empty)

The ⟨*graphics options*⟩ are given to the underlying `\includegraphics` command for the image fill options. This can be just together with `/tikz/fill stretch image`→P. 7, `/tikz/fill overzoom image`→P. 8, `/tikz/fill zoom image`→P. 9, and `/tikz/fill tile image`→P. 11.

```
\begin{tikzpicture}
\path[fill image options={width=8mm},
  fill tile image=pink_marble.png]
  (2.75,-0.75) -- (3,0) -- (2.75,0.75)
  \foreach \w in {45,90,...,315}
    { -- (\w:1.5cm) } -- cycle;
\end{tikzpicture}
```

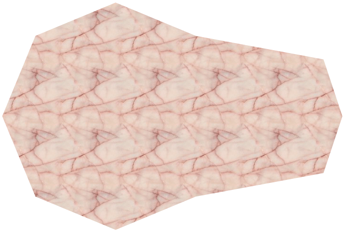
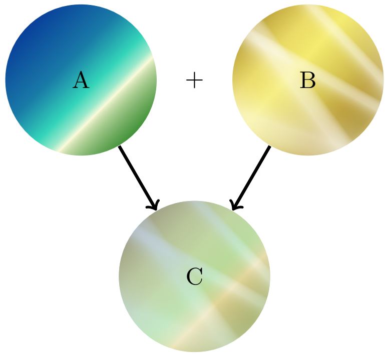


Image blending example

```
\begin{tikzpicture}[every node/.style=
  {circle,minimum width=2cm}]
\node[fill stretch image=blueshade.png]
  (A) at (120:3cm) {A};
\node[fill stretch image=goldshade.png]
  (B) at (60:3cm) {B};
\node[
  preaction={fill stretch image=blueshade.png},
  fill stretch image=goldshade.png,
  fill image opacity=0.5] (C) {C};
\path (A) -- node{$+$} (B);
\draw[->,very thick] (A)--(C);
\draw[->,very thick] (B)--(C);
\end{tikzpicture}
```



3 Hexagon Pattern Library

Ti*k*Z Library `fill.hexagon`

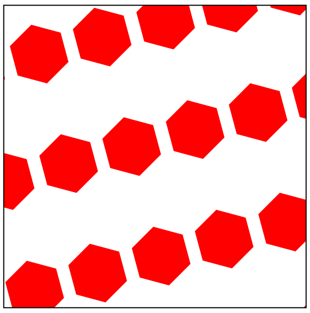
```
\usetikzlibrary{fill.hexagon} % LaTeX (primary choice) and plain TeX
\usetikzlibrary[fill.hexagon] % ConTeXt
\usepackage{tikzfill.hexagon} % LaTeX (secondary choice)
```

Based on `patterns.meta`, this library defines new hexagon patterns to fill graphs.

3.1 Hexagon

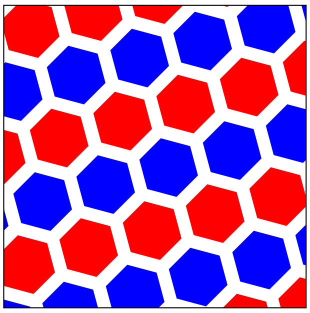
The `hexagon` pattern draws hexagons which may be filled or outlined. A single pattern is one of two different *bands*, called band 0 and band 1.

```
\begin{tikzpicture}
\draw[
  pattern = { hexagon
    [
      size = 5mm, angle = 15, line width = 1mm
    ]},
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



Both bands together build a uniform combined pattern.

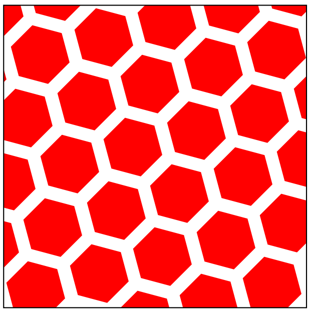
```
\begin{tikzpicture}
\draw[
  preaction = {
    pattern = { hexagon
      [
        size = 5mm, angle = 15, line width = 1mm, band = 1
      ]},
    pattern color=blue },
  pattern = { hexagon
    [
      size = 5mm, angle = 15, line width = 1mm, band = 0
    ]},
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



`/tikz/pattern hexagon={⟨pattern keys⟩}` (style, no default)

Convenience shortcut for setting the combined pattern (in one color).

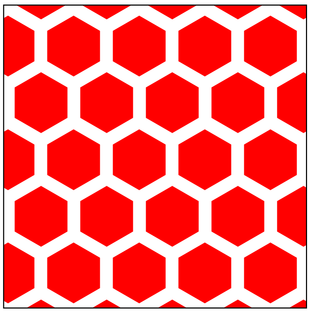
```
\begin{tikzpicture}
\draw[
  pattern hexagon =
    {
      size = 5mm, angle = 15, line width = 1mm
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/size=⟨*size*⟩ (no default, initially 8mm)

The given ⟨*size*⟩ denotes the length of an edge of one hexagonical tile where the (possibly smaller) hexagon is located in.

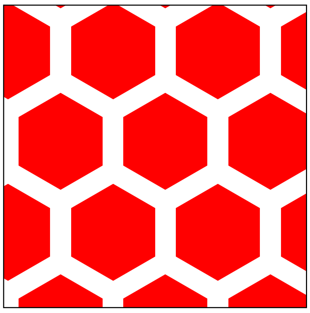
```
\begin{tikzpicture}
\draw[
  pattern hexagon =
    {
      size = 5mm,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/fill (no value, initially set)

Sets the hexagons to be filled. fill and draw are mutually exclusionary.

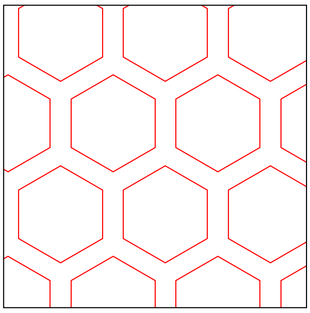
```
\begin{tikzpicture}
\draw[
  pattern hexagon =
    {
      fill,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/draw (no value, initially unset)

Sets the hexagons to be outlined. fill and draw are mutually exclusionary.

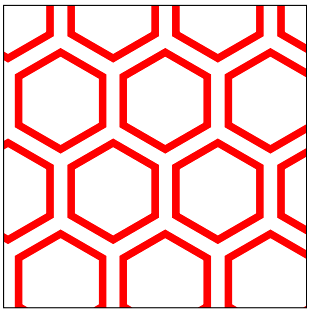
```
\begin{tikzpicture}
\draw[
  pattern hexagon =
    {
      draw,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/line width=⟨*length*⟩ (no default, initially 0.4pt)

Sets the ⟨*length*⟩ value of the line width. This is only relevant, if the hexagons are not filled.

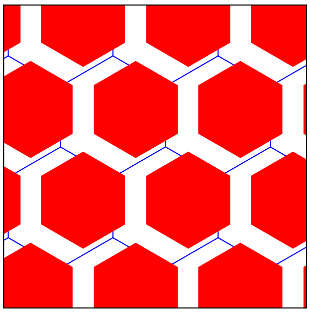
```
\begin{tikzpicture}
\draw[
  pattern hexagon =
    {
      draw, line width = 1mm,
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/xshift=⟨*xshift*⟩ (no default, initially `0pt`)
/pgf/pattern keys/yshift=⟨*yshift*⟩ (no default, initially `0pt`)

The pattern is shifted by ⟨*xshift*⟩ and ⟨*yshift*⟩.
Note that for **hexagon** is valid, that a pattern is shifted first and rotated afterwards.

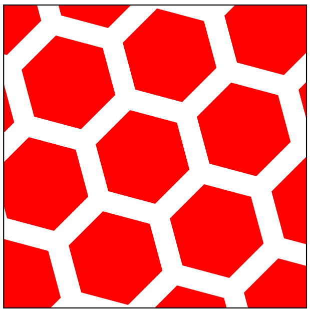
```
\begin{tikzpicture}
\draw[
  preaction={pattern hexagon grid, pattern color=blue},
  pattern hexagon =
    {
      xshift=3mm, yshift=1mm,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/angle=⟨*angle*⟩ (no default, initially `0`)

The pattern is rotated by the given ⟨*angle*⟩.
Note that for **hexagon** is valid, that a pattern is shifted first and rotated afterwards.

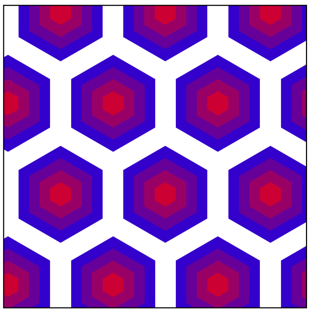
```
\begin{tikzpicture}
\draw[
  pattern hexagon =
    {
      angle = 15,
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/pos=⟨*value*⟩ (no default, initially `0.8`)

Sets the edge position with a ⟨*value*⟩ between 0 and 1, where 0 is the center and 1 the outer rim of the hexagonical tile. 1 is a less efficient way to either fill the whole graph or to draw a **hexagon grid**.

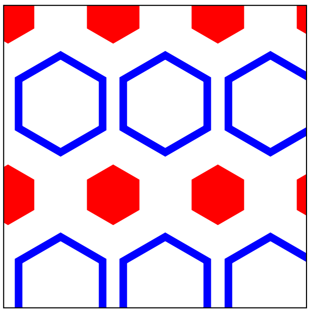
```
\begin{tikzpicture}
\draw[
  preaction={ pattern hexagon={pos=0.8},
    pattern color=blue!80!red },
  preaction={ pattern hexagon={pos=0.6},
    pattern color=blue!60!red },
  preaction={ pattern hexagon={pos=0.4},
    pattern color=blue!40!red },
  pattern hexagon={pos=0.2},
    pattern color=blue!20!red,
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/band=⟨*number*⟩ (no default, initially 0)

⟨*number*⟩ can take 0 or 1 and denotes one of two different bands of the pattern.

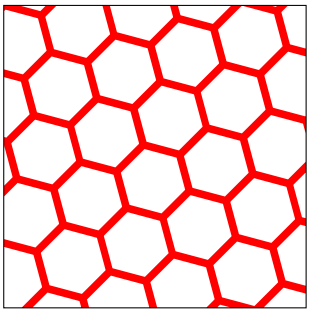
```
\begin{tikzpicture}
\draw[
  preaction = { pattern={hexagon[band=1,draw,
      line width=1mm]},
    pattern color=blue },
  pattern={hexagon[band=0,pos=0.5]},
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



3.2 Hexagon Grid

The hexagon grid pattern draws a grid made of hexagons. It is a single pattern und more efficient than hexagon with settings draw,pos=1.

```
\begin{tikzpicture}
\draw[
  pattern = { hexagon grid
    [
      size = 5mm, angle = 15, line width = 1mm
    ]},
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```

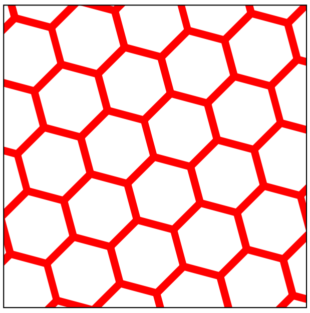


/tikz/pattern hexagon grid={⟨*pattern keys*⟩} (style, no default)

Convenience shortcut for setting the pattern to hexagon grid:

```
pattern = { hexagon grid [ ... ] }
```

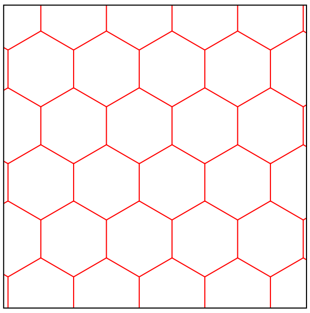
```
\begin{tikzpicture}
\draw[
  pattern hexagon grid =
    {
      size = 5mm, angle = 15, line width = 1mm
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/size=⟨*size*⟩ (no default, initially 8mm)

The given ⟨*size*⟩ denotes the length of an edge of one hexagon.

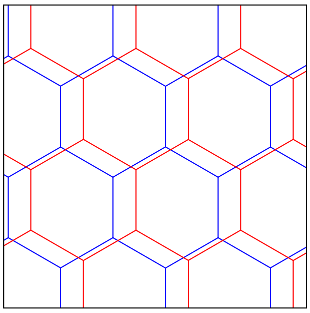
```
\begin{tikzpicture}
\draw[
  pattern hexagon grid =
    {
      size = 5mm,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/xshift=⟨*xshift*⟩ (no default, initially 0pt)
/pgf/pattern keys/yshift=⟨*yshift*⟩ (no default, initially 0pt)

The pattern is shifted by ⟨*xshift*⟩ and ⟨*yshift*⟩.
Note that for hexagon grid is valid, that a pattern is shifted first and rotated afterwards.

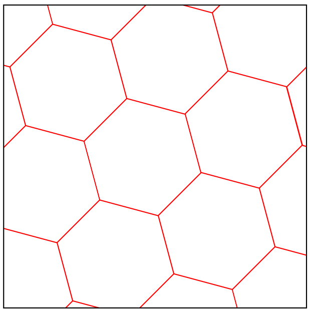
```
\begin{tikzpicture}
\draw[
  preaction={pattern={hexagon grid}, pattern color=blue},
  pattern hexagon grid =
    {
      xshift=3mm, yshift=1mm,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/angle=⟨*angle*⟩ (no default, initially 0)

The pattern is rotated by the given ⟨*angle*⟩.
Note that for hexagon grid is valid, that a pattern is shifted first and rotated afterwards.

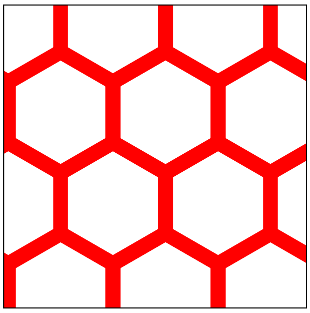
```
\begin{tikzpicture}
\draw[
  pattern hexagon grid =
    {
      angle = 15,
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/line width=⟨*length*⟩ (no default, initially 0.4pt)

Sets the ⟨*length*⟩ value of the line width.

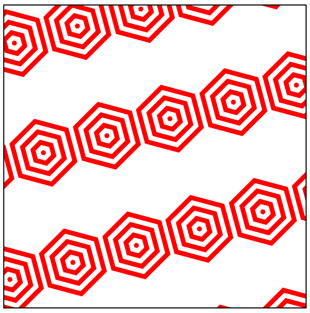
```
\begin{tikzpicture}
\draw[
  pattern hexagon grid =
    {
      line width = 2mm,
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



3.3 Hexagon Cycle

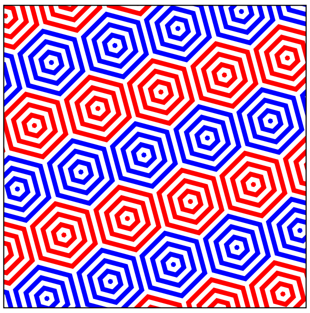
The `hexagon cycle` pattern draws several hexagon rings in a cyclic manor. A single pattern is one of two different *bands*, called band 0 and band 1.

```
\begin{tikzpicture}
\draw[
  pattern = { hexagon cycle
    [
      size = 5mm, angle = 15
    ]},
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



Both bands together build a uniform combined pattern.

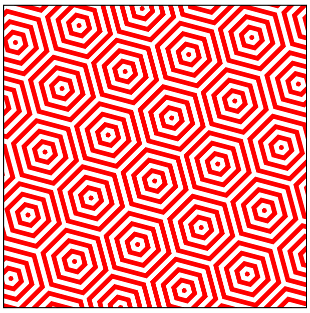
```
\begin{tikzpicture}
\draw[
  preaction = {
    pattern = { hexagon cycle
      [
        size = 5mm, angle = 15, band = 1
      ]},
    pattern color=blue },
  pattern = { hexagon cycle
    [
      size = 5mm, angle = 15, band = 0
    ]},
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



`/tikz/pattern hexagon cycle`={⟨*pattern keys*⟩} (style, no default)

Convenience shortcut for setting the combined pattern (in one color).

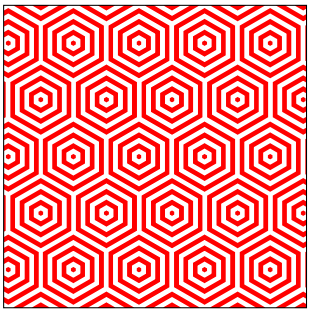
```
\begin{tikzpicture}
\draw[
  pattern hexagon cycle =
    {
      size = 5mm, angle = 15
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/size=⟨*size*⟩ (no default, initially 8mm)

The given ⟨*size*⟩ denotes the length of an edge of one hexagonical tile where the (smaller) hexagons are located in.

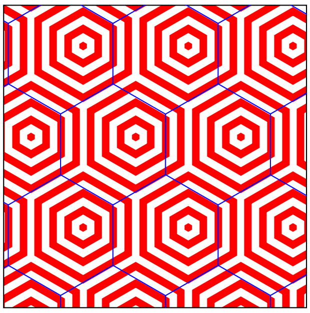
```
\begin{tikzpicture}
\draw[
  pattern hexagon cycle =
    {
      size = 5mm,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/xshift=⟨*xshift*⟩ (no default, initially 0pt)
/pgf/pattern keys/yshift=⟨*yshift*⟩ (no default, initially 0pt)

The pattern is shifted by ⟨*xshift*⟩ and ⟨*yshift*⟩.
Note that for hexagon cycle is valid, that a pattern is shifted first and rotated afterwards.

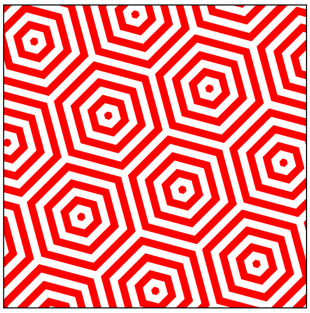
```
\begin{tikzpicture}
\draw[
  postaction={pattern={hexagon grid}, pattern color=blue},
  pattern hexagon cycle =
    {
      xshift=3mm, yshift=1mm,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/angle=⟨*angle*⟩ (no default, initially 0)

The pattern is rotated by the given ⟨*angle*⟩.
Note that for hexagon cycle is valid, that a pattern is shifted first and rotated afterwards.

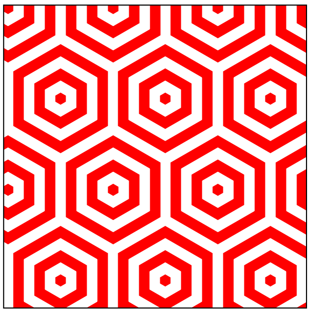
```
\begin{tikzpicture}
\draw[
  pattern hexagon cycle =
    {
      angle = 15,
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/rings=⟨*number*⟩ (no default, initially 3)

Sets the ⟨*number*⟩ of rings as $0, 1, 2, 3, \ldots$

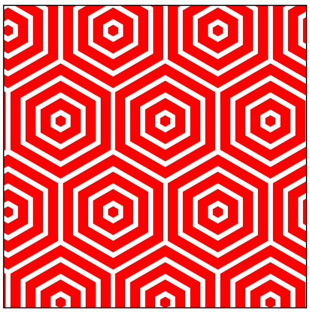
```
\begin{tikzpicture}
\draw[
  pattern hexagon cycle =
    {
      rings = 2,
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/gap=⟨*value*⟩ (no default, initially 1)

Sets the gap between two rings as ⟨*value*⟩ times the line width of a ring. ⟨*value*⟩ has to be greater or equal 0.01.

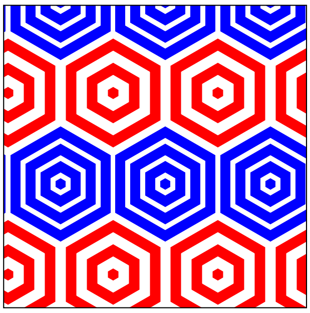
```
\begin{tikzpicture}
\draw[
  pattern hexagon cycle =
    {
      gap = 0.5,
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/band=⟨*number*⟩ (no default, initially 0)

⟨*number*⟩ can take 0 or 1 and denotes one of two different bands of the pattern.

```
\begin{tikzpicture}
\draw[
  preaction = { pattern={hexagon cycle[
    band=1, gap=0.5 ]}, pattern color=blue },
  pattern={hexagon cycle[band=0,rings=2]},
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



4 Rhombus Pattern Library

TikZ Library `fill.rhombus`

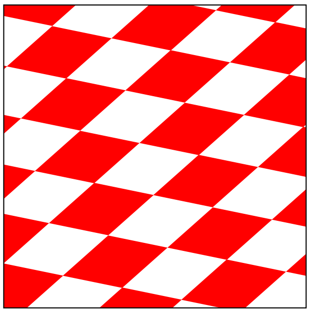
```
\usetikzlibrary{fill.rhombus} % LaTeX (primary choice) and plain TeX
\usetikzlibrary[fill.rhombus] % ConTeXt
\usepackage{tikzfill.rhombus} % LaTeX (secondary choice)
```

Based on `patterns.meta`, this library defines new rhombus patterns to fill graphs.

4.1 Rhombus

The `rhombus` pattern draws rhombi or diamonds. The rhombi may be filled or outlined and can be arranged in different *bands*, called band 0, band 1, and band 2.

```
\begin{tikzpicture}
\draw[
  pattern = { rhombus
    [
      size = 8mm, angle = 15
    ]},
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```

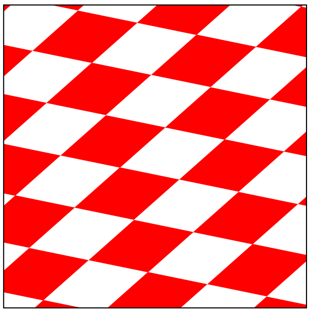


`/tikz/pattern rhombus`=`{`⟨*pattern keys*⟩`}` (style, no default)

Convenience shortcut for setting the pattern to `rhombus`:

```
pattern = { rhombus [ ... ] }
```

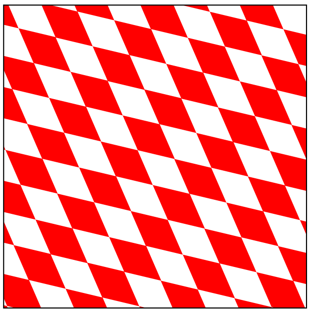
```
\begin{tikzpicture}
\draw[
  pattern rhombus =
    {
      size = 8mm, angle = 15
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



`/pgf/pattern keys/size`=⟨*size*⟩ (no default, initially `10mm`)

The given ⟨*size*⟩ denotes the length of an edge of one rhombical tile where the (possibly smaller) rhombus is located in.

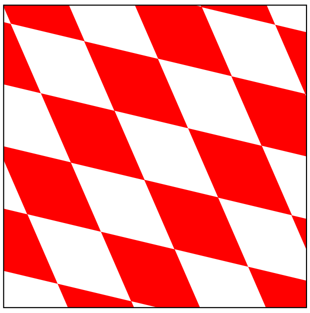
```
\begin{tikzpicture}
\draw[
  pattern rhombus =
    {
      size = 5mm,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



`/pgf/pattern keys/fill` (no value, initially set)

Sets the rhombi to be filled. `fill` and `draw` are mutually exclusionary.

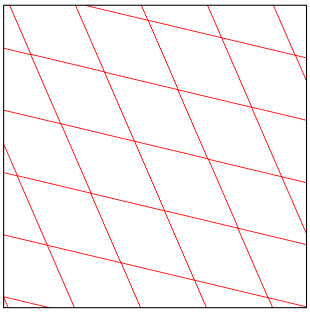
```
\begin{tikzpicture}
\draw[
  pattern rhombus =
    {
      fill,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



`/pgf/pattern keys/draw` (no value, initially unset)

Sets the rhombi to be outlined. `fill` and `draw` are mutually exclusionary.

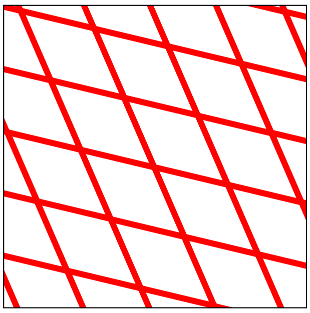
```
\begin{tikzpicture}
\draw[
  pattern rhombus =
    {
      draw,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



`/pgf/pattern keys/line width=`⟨*length*⟩ (no default, initially `0.4pt`)

Sets the ⟨*length*⟩ value of the line width. This is only relevant, if the rhombi are not filled.

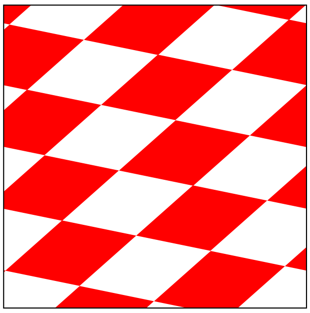
```
\begin{tikzpicture}
\draw[
  pattern rhombus =
    {
      line width = 1mm, draw
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



`/pgf/pattern keys/angle=`⟨*angle*⟩ (no default, initially `-40`)

The pattern is rotated by the given ⟨*angle*⟩.
Note that for **`rhombus`** is valid, that a pattern is rotated first and shifted afterwards.

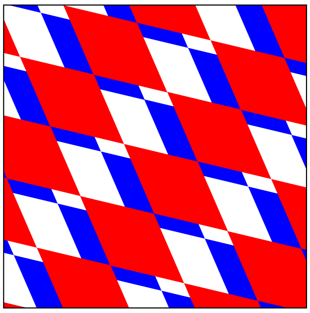
```
\begin{tikzpicture}
\draw[
  pattern rhombus =
    {
      angle = 15,
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/xshift=⟨*xshift*⟩ (no default, initially `0pt`)
/pgf/pattern keys/yshift=⟨*yshift*⟩ (no default, initially `0pt`)

The pattern is shifted by ⟨*xshift*⟩ and ⟨*yshift*⟩.
Note that for `rhombus` is valid, that a pattern is rotated first and shifted afterwards.

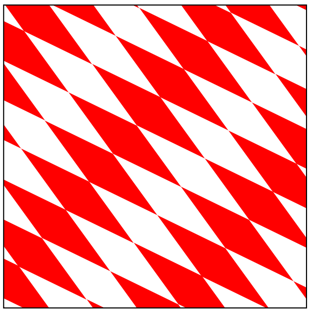
```
\begin{tikzpicture}
\draw[
  preaction={pattern rhombus, pattern color=blue},
  pattern rhombus =
    {
      xshift=3mm, yshift=1mm,
    },
  pattern color=red
  ]
  (0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/ratio=⟨*value*⟩ (no default, initially `2`)

Sets the ⟨*value*⟩ of the ratio between the longer diagonal and the shorter diagonal. Therefore, ⟨*value*⟩ ≥ 1.

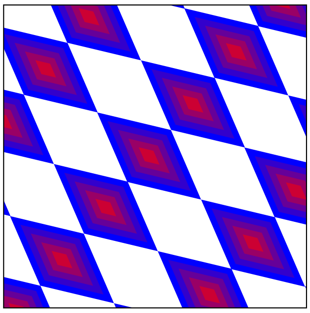
```
\begin{tikzpicture}
\draw[
  pattern rhombus =
    {
      ratio = 4
    },
  pattern color=red
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```



/pgf/pattern keys/pos=⟨*value*⟩ (no default, initially `1`)

Sets the edge position with a ⟨*value*⟩ between 0 and 1, where 0 is the center and 1 the outer rim of the rhombical tile.

```
\begin{tikzpicture}
\draw[
  preaction={ pattern rhombus={pos=1},
    pattern color=blue },
  preaction={ pattern rhombus={pos=0.8},
    pattern color=blue!80!red },
  preaction={ pattern rhombus={pos=0.6},
    pattern color=blue!60!red },
  preaction={ pattern rhombus={pos=0.4},
    pattern color=blue!40!red },
  pattern rhombus={pos=0.2},
    pattern color=blue!20!red,
  ]
(0,0) rectangle (4,4);
\end{tikzpicture}
```

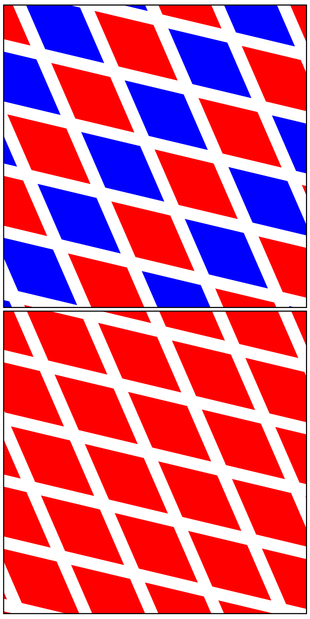


/pgf/pattern keys/band=⟨*number*⟩ (no default, initially 0)

⟨*number*⟩ can take 0, 1, or 2. Here, 0 and 1 denote one of two different bands of the pattern, while 2 denotes the comination of both.

```
\begin{tikzpicture}
\draw[
  preaction = {
    pattern rhombus = {
      pos = 0.8, band = 0 },
    pattern color=red },
  pattern rhombus = {
      pos = 0.8, band = 1
    },
  pattern color=blue
  ] (0,0) rectangle (4,4);
\end{tikzpicture}

\begin{tikzpicture}
\draw[
  pattern rhombus = {
      pos = 0.8, band = 2
    },
  pattern color=red
  ] (0,0) rectangle (4,4);
\end{tikzpicture}
```



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