

The tcolorbox package

Manual for version 2.20 (2013/04/17)

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Abstract

`tcolorbox` provides an environment for colored and framed text boxes with a heading line. Optionally, such a box can be split in an upper and a lower part. The package `tcolorbox` can be used for the setting of L^AT_EX examples where one part of the box displays the source code and the other part shows the output. Another common use case is the setting of theorems. The package supports saving and reuse of source code and text parts.

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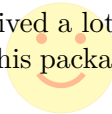
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1 Introduction

The package originates from the first edition of my book «*L^AT_EX – Einführung in das Textsatzsystem*» [11] in about 2006. For the L^AT_EX examples and tutorials given there, I wanted to have accentuated and colored boxes to display source code and compiled text in combination. Since, in my opinion, this type of boxes is also quite useful to highlight definitions and theorems, I applied them for my lecture notes in mathematics [8–10] as well. With this package, you are invited to apply these boxes for similar projects.

Starting with version 2.00, all internal calculations are not longer performed by the package `calc` [13] but by ε -T_EX [1] expressions since ε -T_EX is assumed to be used by everybody (hopefully). The breaking news for version 2.00 is the support for breakable boxes. This new feature allows new applications of the package without affecting the core package too much if you do not need boxes to break automatically. With version 2.20, the often requested 'side by side' mode for listings has been added.

Since the first public release in 2011, I received a lot of feedback from all over the world. I want to thank all who wrote me for supporting this package by sending bug reports and ideas for new or better features.



1.1 Loading the Package

The base package `tcolorbox` loads the packages `pgf` [12] and `verbatim` [7]. `tcolorbox` itself is loaded in the usual manner in the preamble:

```
\usepackage{tcolorbox}
```

The package takes option keys in the key-value syntax. Alternatively, you may use these keys later in the preamble with `\tcboxlibrary`^{→ P. 4} (see there). For example, the key to typeset listings is:

```
\usepackage[listings]{tcolorbox}
```

1.2 Libraries

The base package `tcolorbox` is extendable by program libraries. This is done by using option keys while loading the package or inside the preamble by applying the following macro with the same set of keys.

`\tcbuselibrary{⟨key list⟩}`

Loads the libraries given by the `⟨key list⟩`.

```
\tcbuselibrary{listings,theorems}
```

The following keys are used inside `\tcbuselibrary` respectively `\usepackage` without the key tree path `/tcb/library/`.

`/tcb/library/listings` (no value)

Loads the package `listings` [4] and provides additional macros for typesetting listings which are described in Section 5 from page 45.

`/tcb/library/listingsutf8` (no value)

Loads the packages `listings` [4] and `listingsutf8` [6] for UTF-8 support. This is a variant of the library 'listings' and is described in Section 5 from page 45.

`/tcb/library/theorems` (no value)

Provides additional macros for typesetting theorems which are described in Section 6 from page 64.

`/tcb/library/documentation` (no value)

Provides additional macros for typesetting L^AT_EX documentations which are described in Section 7 from page 74.

`/tcb/library/skins` (no value)

Loads the package `tikz` [12] and provides additional styles (skins) for the appearance of the colored boxes; see Section 8 from page 81.

`/tcb/library/breakable` (no value)

Provides support for automatic box breaking from one page to another; see Section 9 from page 119.

`/tcb/library/hooks` (no value)

Extends several option keys to 'hookable' keys; see Section 10 from page 130.

2 Macros for Box Creation

```
\begin{tcolorbox}[\langle options \rangle]
  \langle environment content \rangle
\end{tcolorbox}
```

This is the main environment to create an accentuated colored text box with rounded corners and, optionally, two parts. The appearance of this box is controlled by numerous options. In the most simple case the source code

```
\begin{tcolorbox}
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

creates the following compiled text box:

This is a **tcolorbox**.

The text content of the box can be divided in an upper and a lower part by the command `\tcblower`^{→ P. 5}. Visually, both parts are separated by a line. For example:

```
\begin{tcolorbox}
This is another \textbf{tcolorbox}.
\tcblower
Here, you see the lower part of the box.
\end{tcolorbox}
```

This code gives the following box:

This is another **tcolorbox**.

Here, you see the lower part of the box.

The `\langle options \rangle` control the appearance and several functions of the boxes, see section 3 for the complete list. A quick example is given here:

```
\begin{tcolorbox}[colback=red!5!white,colframe=red!75!black,title=My nice heading]
This is another \textbf{tcolorbox}.
\tcblower
Here, you see the lower part of the box.
\end{tcolorbox}
```

My nice heading

This is another **tcolorbox**.

Here, you see the lower part of the box.

`\tcblower`

Used inside `tcolorbox`^{→ P. 5} to separate the upper box part from the optional lower box part. The upper and the lower part are treated as separate functional units. If you only want to draw a line, see `\tcblines`^{→ P. 98}.

`\tcbset{<options>}`

Sets options for every following `tcolorbox`^{→P.5} inside the current \TeX group. For example, the colors of the boxes may be defined for the whole document by this:

```
\tcbset{colback=red!5!white,colframe=red!75!black}
```

`\tcbbox[<options>]{<box content>}`

Creates a `tcolorbox`^{→P.5} which is fitted to the width of the given *<box content>*. In principal, most *<options>* for a `tcolorbox`^{→P.5} can be used for `\tcbbox` with some restrictions. A `\tcbbox` cannot have a lower part and cannot be broken.

```
\tcbset{colframe=blue!50!black,colback=white,colupper=red!50!black,
fonttitle=\bfseries,before=,after=,center title}

Text \tcbbox[tcbbox raise base]{Hello World}\hfill
%
\tcbbox[left=0mm,right=0mm,top=0mm,bottom=0mm,boxsep=0mm,
toptitle=0.5mm,bottomtitle=0.5mm,title=My table]{%
\arrayrulecolor{blue!50!black}\renewcommand{\arraystretch}{1.2}%
\begin{tabular}{r|c|l}
One & Two & Three \\\hline\hline
Men & Mice & Lions \\\hline
Upper & Middle & Lower
\end{tabular}}\hfill
%
\tcbbox[colback=blue!85!black,
left=0mm,right=0mm,top=0mm,bottom=0mm,boxsep=1mm,arc=0mm,boxrule=0.5pt,
title=My picture]{%
\includegraphics[width=5cm]{Basilica_5.png}}
```

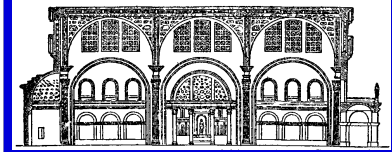
Text

Hello World

My table

One	Two	Three
Men	Mice	Lions
Upper	Middle	Lower

My picture



3 Option Keys

For the $\langle options \rangle$ in `tcolorbox`^{→P.5} respectively `\tcbset`^{→P.6} the following pgf keys can be applied. The key tree path `/tcb/` is not to be used inside these macros. It is easy to add your own style keys using the syntax for pgf keys, see [11, 12] or the examples starting from page 52.

3.1 Title

`/tcb/title= $\langle text \rangle$` (no default, initially empty)
Creates a heading line with $\langle text \rangle$ as content.

```
\begin{tcolorbox}[title=My heading line]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

My heading line

This is a **tcolorbox**.

`/tcb/notitle` (no value, initially set)
Removes the title line if set before.

`/tcb/adjusted title= $\langle text \rangle$` (style, no default, initially unset)
Creates a heading line with $\langle text \rangle$ as content. The minimal height of this line is adjusted to fit the text given by `/tcb/adjust text`^{→P.7}. This option makes sense for single line headings if boxes are set side by side with equal height. Note that it is very easy to trick this adjustment.

```
\tcbset{colback=White,arc=0mm,width=(\linewidth-4pt)/4,
equal height group=AT,before=,after=\hfill,fonttitle=\bfseries}
```

```
The following titles are not adjusted:\\
\foreach \n in {xxx,ggg,AAA,\"Ägypten}
{\begin{tcolorbox}[title=\n,colframe=red!75!black]
Some content.\end{tcolorbox}}
Now, we try again with adjusted titles:\\
\foreach \n in {xxx,ggg,AAA,\"Ägypten}
{\begin{tcolorbox}[adjusted title=\n,colframe=blue!75!black]
Some content.\end{tcolorbox}}
```

The following titles are not adjusted:

xxx	ggg	AAA	Ägypten
Some content.	Some content.	Some content.	Some content.

Now, we try again with adjusted titles:

xxx	ggg	AAA	Ägypten
Some content.	Some content.	Some content.	Some content.

`/tcb/adjust text= $\langle text \rangle$` (no default, initially Äpgjy)
This sets the reference text for `/tcb/adjusted title`^{→P.7}. If your texts never exceed 'Äpgjy' in depth and height you don't need to care about this option.

3.2 Lower Part

/tcb/lowerbox= $\langle mode \rangle$ (no default, initially visible)

Controls the treatment of the lower part of the box. Feasible values for $\langle mode \rangle$ are:

- **visible**: usual type setting of the lower part,
- **invisible**: empty space instead of the lower part contents,
- **ignored**: the lower part is not used (here).

The last two values are usually applied in connection with **savelowerto**.

```
\begin{tcolorbox}[lowerbox=invisible,colback=white]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part (but invisible).
\end{tcolorbox}

\begin{tcolorbox}[lowerbox=ignored,colback=white]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part (but ignored).
\end{tcolorbox}
```

This is a **tcolorbox**.

This is a **tcolorbox**.

/tcb/savelowerto= $\langle file name \rangle$ (no default, initially empty)

Saves the content of the lower box in a file for an optional later usage.

```
\begin{tcolorbox}[lowerbox=invisible,savelowerto=\jobname_bspsave.tex,colback=white]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part which may be quite complex:

$$f(x)=\frac{1+x^2}{1-x^2}$$
.
\end{tcolorbox}

Now, we load the saved text:\
\input{\jobname_bspsave.tex}
```

This is a **tcolorbox**.

Now, we load the saved text:

This is the lower part which may be quite complex: $f(x) = \frac{1+x^2}{1-x^2}$.

`/tcb/savedelimiter=<name>` (no default, initially `tcolorbox`)

Used in connection with new environment definitions which extend `tcolorbox` and use or allow the option `savelowerto`. To catch the end of the new box environment `<name>` has to be the name of this environment. Additionally, the environment definition has to use `\tcolorbox` instead of `\begin{tcolorbox}` and `\end{tcolorbox}` instead of `\end{tcolorbox}`.

```
\newenvironment{mybox}[1]{%
  \tcolorbox[savedelimiter=mybox,
    savelowerto=\jobname_bspsave2.tex,lowerbox=ignored,
    colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries,
    title=#1]}%
  {\end{tcolorbox}}

\begin{mybox}{My Example}
Upper part.
\tcblower
Saved lower part!
\end{mybox}

Now, the saved part is used:
\begin{tcolorbox}[colback=green!5]
\input{\jobname_bspsave2.tex}
\end{tcolorbox}
```

My Example

Upper part.

Now, the saved part is used:

Saved lower part!

3.3 Colors and Fonts

/tcb/colback= $\langle color \rangle$ (no default, initially black!5!white)

Sets the background $\langle color \rangle$ of the box.

```
\begin{tcolorbox}[colback=white]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/colframe= $\langle color \rangle$ (no default, initially black!75!white)

Sets the frame $\langle color \rangle$ of the box.

```
\begin{tcolorbox}[colframe=red!50!yellow]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/colupper= $\langle color \rangle$ (no default, initially black)

Sets the text $\langle color \rangle$ of the upper part.

```
\begin{tcolorbox}[colupper=yellow,
colback=blue!50,colframe=blue]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is the lower part.

/tcb/collower= $\langle color \rangle$ (no default, initially black)

Sets the text $\langle color \rangle$ of the lower part.

```
\begin{tcolorbox}[collower=yellow,
colback=blue!50,colframe=blue]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is the lower part.

/tcb/coltext= $\langle color \rangle$ (style, no default, initially black)

Sets the text $\langle color \rangle$ of the box. This is an abbreviation for setting colupper and collower to the same value.

```
\begin{tcolorbox}[coltext=yellow,
colback=blue!50,colframe=blue]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is the lower part.

/tcb/coltitle= $\langle color \rangle$ (no default, initially white)

Sets the title text $\langle color \rangle$ of the box.

```
\begin{tcolorbox}[coltitle=blue!50!black,
colframe=blue!25,title=Test]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

Test

This is a **tcolorbox**.

/tcb/fontupper= $\langle text \rangle$ (no default, initially empty)
 Sets $\langle text \rangle$ before the content of the upper part (e.g. font settings).

```
\begin{tcolorbox}[fontupper>Hello!~\sffamily]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

Hello! This is a **tcolorbox**.

/tcb/fontlower= $\langle text \rangle$ (no default, initially empty)
 Sets $\langle text \rangle$ before the content of the lower part (e.g. font settings).

```
\begin{tcolorbox}[fontlower=\sffamily\bfseries]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is the lower part.

/tcb/fonttitle= $\langle text \rangle$ (no default, initially empty)
 Sets $\langle text \rangle$ before the content of the title text (e.g. font settings).

```
\begin{tcolorbox}[fonttitle=\sffamily\bfseries\large,title=Hello]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

Hello

This is a **tcolorbox**.

More color options are provided by using skins documented in Section 8 from page 81.

3.4 Geometry

/tcb/width= $\langle length \rangle$ (no default, initially `\linewidth`)
Sets the total width of the colored box to $\langle length \rangle$. See also `/tcb/height`^{→ P. 20}.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[width=\linewidth/2]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/toprule= $\langle length \rangle$ (no default, initially 0.5mm)
Sets the line width of the top rule to $\langle length \rangle$.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[toprule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/bottomrule= $\langle length \rangle$ (no default, initially 0.5mm)
Sets the line width of the bottom rule to $\langle length \rangle$.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[bottomrule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/leftrule= $\langle length \rangle$ (no default, initially 0.5mm)
Sets the line width of the left rule to $\langle length \rangle$.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[leftrule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/rightrule= $\langle length \rangle$ (no default, initially 0.5mm)
 Sets the line width of the right rule to $\langle length \rangle$.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[rightrule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/titlerule= $\langle length \rangle$ (no default, initially 0.5mm)
 Sets the line width of the rule below the title to $\langle length \rangle$.

```
\tcbset{enhanced,colback=red!5!white,colframe=red!75!black,
colbacktitle=red!90!black}

\begin{tcolorbox}[titlerule=3mm,title=This is the title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is the title

This is a **tcolorbox**.

/tcb/boxrule= $\langle length \rangle$ (style, no default, initially 0.5mm)
 Sets all rules of the frame to $\langle length \rangle$, i.e. **/tcb/toprule**^{→P. 12}, **/tcb/bottomrule**^{→P. 12}, **/tcb/leftrule**^{→P. 12}, **/tcb/rightrule**^{→P. 13}, and **/tcb/titlerule**^{→P. 13}.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[boxrule=3mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/arc= $\langle length \rangle$

(no default, initially 1mm)

Sets the inner radius of the four frame arcs to $\langle length \rangle$.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[arc=0mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[arc=4mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is a **tcolorbox**.

/tcb/outer arc= $\langle length \rangle$

(no default, initially unset)

Sets the outer radius of the four frame arcs to $\langle length \rangle$.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[arc=4mm,outer arc=1mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/auto outer arc

(no value, initially set)

Sets the outer radius of the four frame arcs automatically in dependency of the inner radius given by **/tcb/arc**^{P.14}.

/tcb/boxsep= $\langle length \rangle$

(no default, initially 1mm)

Sets a common padding of $\langle length \rangle$ between the text content and the frame of the box. This value is added to the key values of **left**, **right**, **top**, **bottom**, and **middle** at the appropriate places.

```
\tcbset{colback=red!5!white,colframe=red!75!black,width=(\linewidth-4mm)/2,
before=,after=\hfill}

\begin{tcolorbox}[boxsep=5mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[boxsep=5mm,draft]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

frame: w=195.33255pt, h=48.97505pt

upper: w=141.2724pt, h=6.296pt

interior: w=192.4873pt, h=46.1298pt

/tcb/left=*(length)* (style, no default, initially 4mm)

Sets the left space between all text parts and frame (additional to **boxsep**). This is an abbreviation for setting **lefttitle**, **leftupper**, and **leftlower** to the same value.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[left=0mm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/lefttitle=*(length)* (no default, initially 4mm)

Sets the left space between title text and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[lefttitle=3cm,title=My Title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

My Title

This is a **tcolorbox**.

/tcb/leftupper=*(length)* (no default, initially 4mm)

Sets the left space between upper text and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[leftupper=3cm,title=My Title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

My Title

This is a **tcolorbox**.

/tcb/leftlower=*(length)* (no default, initially 4mm)

Sets the left space between lower text and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[leftlower=3cm]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is the lower part.

/tcb/right= $\langle length \rangle$ (style, no default, initially 4mm)

Sets the right space between all text parts and frame (additional to **boxsep**). This is an abbreviation for setting **righttitle**, **rightupper**, and **rightlower** to the same value.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[width=5cm,right=2cm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

/tcb/righttitle= $\langle length \rangle$ (no default, initially 4mm)

Sets the right space between title text and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[width=5cm,righttitle=2cm,title=My very long title text]
This is a \textbf{tcolorbox} with standard upper box dimensions.
\end{tcolorbox}
```

My very long title text

This is a **tcolorbox** with standard upper box dimensions.

/tcb/rightupper= $\langle length \rangle$ (no default, initially 4mm)

Sets the right space between upper text and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[width=5cm,rightupper=2cm,title=My very long title text]
This is a \textbf{tcolorbox} with compressed upper box dimensions.
\end{tcolorbox}
```

My very long title text

This is a **tcolorbox** with compressed upper box dimensions.

/tcb/rightlower= $\langle length \rangle$ (no default, initially 4mm)
 Sets the right space between lower text and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[width=5cm,rightlower=2cm]
This is a \textbf{tcolorbox} with standard upper box dimensions.
\tcblower
This is the lower part with large space at right.
\end{tcolorbox}
```

This is a **tcolorbox** with standard upper box dimensions.

This is the lower part with large space at right.

/tcb/top= $\langle length \rangle$ (no default, initially 2mm)
 Sets the top space between text and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[top=0mm]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is the lower part.

/tcb/toptitle= $\langle length \rangle$ (no default, initially 0mm)
 Sets the top space between title and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[toptitle=3mm,title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

My title

This is a **tcolorbox**.

/tcb/bottom= $\langle length \rangle$ (no default, initially 2mm)
 Sets the bottom space between text and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[bottom=0mm]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



/tcb/bottomtitle= $\langle length \rangle$ (no default, initially 0mm)
 Sets the bottom space between title and frame (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[bottomtitle=3mm,title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```



/tcb/middle= $\langle length \rangle$ (no default, initially 2mm)
 Sets the space between upper and lower text to the separation line (additional to **boxsep**).

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[middle=0mm,boxsep=0mm]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



/tcb/oversize

(style)

Sets the text width of the upper part to the current line width. This is achieved by changed the keys `/tcb/width`^{P.12} `/tcb/enlarge left by`^{P.38}, and `/tcb/enlarge right by`^{P.38} appropriately. The resulting box is overlapping into the left and right margin of the page. Note that this style option has to be given *after* all other geometry keys!

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\textit{Normal text for comparison:}\\
\lipsum[2]

\begin{tcolorbox}[oversize,title=Oversized box]
\lipsum[2]
\end{tcolorbox}

\begin{tcolorbox}[title=Normal box]
\lipsum[2]
\end{tcolorbox}
```

Normal text for comparison:

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Oversized box

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Normal box

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

3.5 Height Control

In a typical usage scenario, the height of a `tcolorbox` is computed automatically to fit the content. Nevertheless, the height can be set to a fixed value or to fit commonly for several boxes, e.g. if boxes are set side by side.

The height control keys are only applicable to unbreakable boxes. If a box is set to be `/tcb/breakable`^{→ P. 121}, the height is always computed according to the *natural height*.

`/tcb/natural height` (no value, initially set)

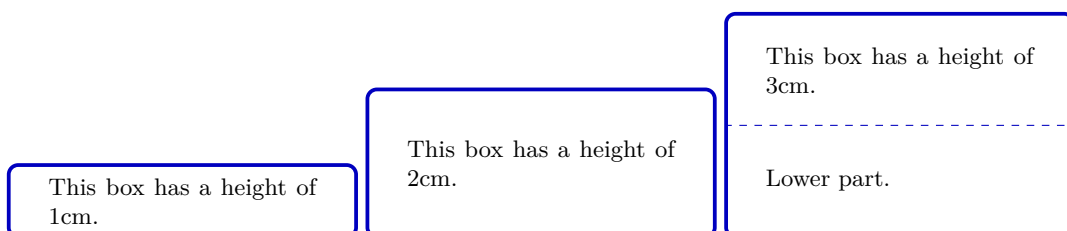
Sets the total height of the colored box to its natural height depending on the box content.

`/tcb/height=<length>` (no default)

Sets the total height of the colored box to $\langle length \rangle$ independent of the box content.

```
\tcbset{width=(\linewidth-2mm)/3,before=,after=\hfill,
colframe=blue!75!black,colback=white}

\begin{tcolorbox}[height=1cm,valign=center]
  This box has a height of 1cm.
\end{tcolorbox}
\begin{tcolorbox}[height=2cm,valign=center]
  This box has a height of 2cm.
\end{tcolorbox}
\begin{tcolorbox}[height=3cm,split=0.5,valign=center,valign lower=center]
  This box has a height of 3cm.
  \tcblower
  Lower part.
\end{tcolorbox}
```

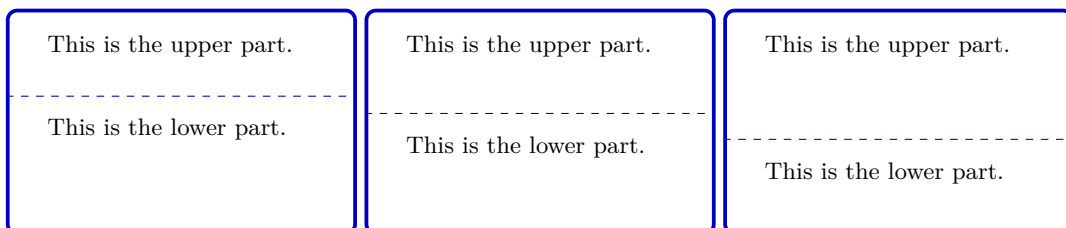


/tcb/space= $\langle fraction \rangle$ (no default, initially 0)

If the height of a `tcolorbox` is not the natural height, the space difference between the forced and the natural size is distributed between the upper and the lower part of the box. This space could also be negative. $\langle fraction \rangle$ with a value between 0 and 1 is the amount of space which is added to the upper part, the rest is added to the lower part. If there is no lower part, then all of the space is added to the upper part always.

```
\tcbset{width=(\linewidth-2mm)/3,before=,after=\hfill,
colframe=blue!75!black,colback=white,height=3cm}

\foreach \f in {0.2,0.4,0.7}
{\begin{tcolorbox}[space=\f]
  This is the upper part.
  \tcblower
  This is the lower part.
\end{tcolorbox}}
```



/tcb/space to upper (style)

This is an abbreviation for `space=1`, i. e. all extra space is added to the upper part.

/tcb/space to lower (style, initially set)

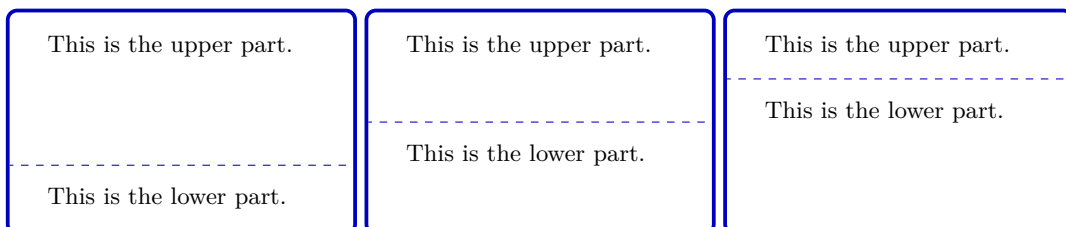
This is an abbreviation for `space=0`, i. e. all extra space is added to the lower part (if there is any).

/tcb/space to both (style)

This is an abbreviation for `space=0.5`, i. e. the extra space equally distributed between the upper and the lower part.

```
\tcbset{width=(\linewidth-2mm)/3,before=,after=\hfill,
colframe=blue!75!black,colback=white,height=3cm}

\foreach \myspace in {space to upper,space to both,space to lower}
{\begin{tcolorbox}[\myspace]
  This is the upper part.
  \tcblower
  This is the lower part.
\end{tcolorbox}}
```

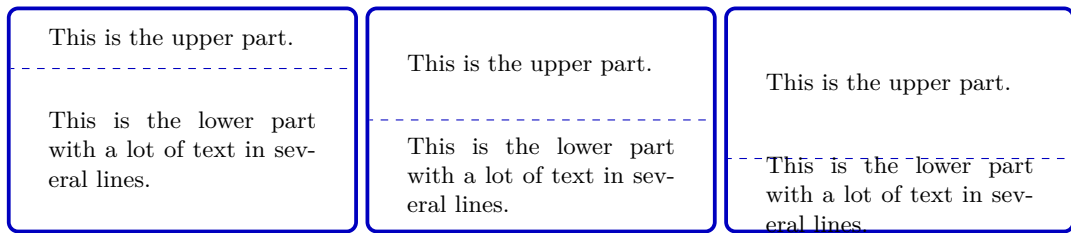


/tcb/split= $\langle fraction \rangle$ (no default)

If the height of a `tcolorbox` is not the natural height, the $\langle fraction \rangle$ with a value between 0 and 1 determines the positioning of the segmentation between the upper and the lower part. Here, 0 stands for top and 1 for bottom. Note that the box is split regardless of the actual dimensions of the text parts!

```
\tcbset{width=(\linewidth-2mm)/3,before=,after=\hfill,height=3cm,
colback=white,colframe=blue!75!black,valign=center,valign lower=center}

\foreach \f in {0.1,0.5,0.8}
{\begin{tcolorbox}[split=\f]
This is the upper part.
\tcblower
This is the lower part with a lot of text in several lines.
\end{tcolorbox}}
```

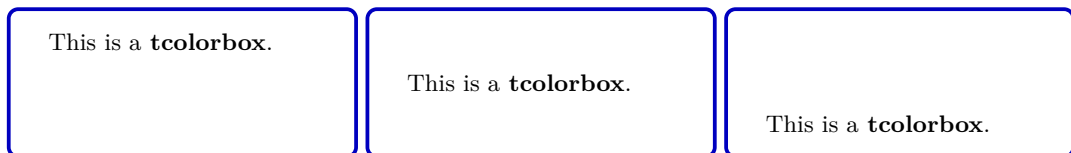


/tcb/valign= $\langle alignment \rangle$ (no default, initially top)

If the height of a `tcolorbox` is not the natural height, `valign` determines the vertical $\langle alignment \rangle$ of the upper part. Feasible values are `top`, `center`, and `bottom`. For a box with natural height, these values are meaningless.

```
\tcbset{width=(\linewidth-2mm)/3,before=,after=\hfill,
colframe=blue!75!black,colback=white,height=2cm}

\foreach \myalign in {top,center,bottom}
{\begin{tcolorbox}[valign=\myalign]
This is a \textbf{tcolorbox}.
\end{tcolorbox}}
```



/tcb/valign lower= $\langle alignment \rangle$ (no default, initially top)

This key has the same meaning for the lower part as `valign` for the upper part, i.e. it determines the vertical $\langle alignment \rangle$ of the lower part with feasible values `top`, `center`, and `bottom`.

`/tcb/equal height group=<id>` (no default)

Boxes which are members of an `equal height group` will all get the same height, i.e. the maximum of all their natural heights. The `<id>` serves to distinguish between different height groups. This `<id>` should contain only characters which are feasible for T_EX macro names, typically alphabetic characters but no numerals and spaces. Note that you have to compile twice to see changes and that height groups are global definitions.

```
\tcbset{width=(\linewidth-2mm)/3,before=,after=\hfill,arc=0mm,
colframe=blue!75!black,colback=white,fonttitle=\bfseries}

\begin{tcolorbox}[equal height group=A,adjusted title={One}]
  My smallest box.
\end{tcolorbox}%
\begin{tcolorbox}[equal height group=A,adjusted title={Two}]
  This box is also small.
  \tcblower
  But with a lower part.
\end{tcolorbox}%
\begin{tcolorbox}[equal height group=A,adjusted title={Three}]
  This box contains a lot of text just to fill the space
  with word flowing and flowing and flowing until the box
  is filled with all of it.
\end{tcolorbox}\linebreak
%
\tcbset{width=(\linewidth-1mm)/2,before=,after=\hfill,arc=0mm,
colframe=red!75!black,colback=white}
%
\begin{tcolorbox}[equal height group=B]
  Now, we use another equal height group.
\end{tcolorbox}%
\begin{tcolorbox}[equal height group=B]
  \begin{equation*}
    \int\limits_0^1 x^2 = \frac{1}{3}.
  \end{equation*}
\end{tcolorbox}
```

One	Two	Three
My smallest box.	This box is also small. ----- But with a lower part.	This box contains a lot of text just to fill the space with word flowing and flowing and flowing until the box is filled with all of it.
Now, we use another equal height group.	$\int_0^1 x^2 = \frac{1}{3}.$	

`/tcb/minimum for equal height group=<id>:<length>` (no default, initially unset)

Plants a $\langle length \rangle$ into the equal height group with the given $\langle id \rangle$. This ensures that the height will not drop below $\langle length \rangle$. Note that you cannot reduce a computed height value by using this key with a small value. The difference to applying `/tcb/height`^{P. 20} directly is that the boxes are never too small for their content.

```
\tcbset{colframe=blue!75!black,colback=white,arc=0mm,
  before=,after=\hfill,fonttitle=\bfseries,left=2mm,right=2mm,
  width=3.5cm,
  equal height group=C,
  minimum for equal height group=C:3.5cm}

\begin{tcolorbox}
  My first box. All boxes will get 3.5cm times 3.5cm
  if the content height is not too large.
\end{tcolorbox}%
\begin{tcolorbox}
  My second box.
  \tcblower
  This is the lower part.
\end{tcolorbox}%
\begin{tcblisting}{\textbf{Mixed}}
  with a listing.
\end{tcblisting}
\begin{tcolorbox}[title={Fourth box}]
  My final box.
\end{tcolorbox}%
```

My first box. All boxes will get 3.5cm times 3.5cm if the content height is not too large.

My second box.

This is the lower part.

\textbf{Mixed}
with a listing.

Mixed with a listing.

Fourth box

My final box.

3.6 Box Content Additions

The following options introduce some arbitrary *<code>* to the content of a `tcolorbox`. These additions can be given at the begin or at the end of the title, the upper part, or the lower part.

`/tcb/before title=<code>` (no default, initially unset)

The given *<code>* is placed *after* the color and font settings and *before* the content of the title.

```
\tcbset{before title={\textcolor{yellow}{\large Important:}~},
colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```



`/tcb/after title=<code>` (no default, initially unset)

The given *<code>* is placed *after* the content of the title.

```
\tcbset{after title={\hfill\colorbox{Navy}{approved}}},
colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```



`/tcb/before upper=<code>` (no default, initially unset)

The given *<code>* is placed *after* the color and font settings and *before* the content of the upper part.

```
\tcbset{before upper={\textit{The story:}\par},
colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```



`/tcb/after upper=<code>` (no default, initially unset)

The given `<code>` is placed *after* the content of the upper part.

```
\tcbset{after upper={\par\hfill\textit{Read more next week}}},
colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

My title

This is a **tcolorbox**.

Read more next week

`/tcb/before lower=<code>` (no default, initially unset)

The given `<code>` is placed *after* the color and font settings and *before* the content of the lower part.

```
\tcbset{before lower=\textit{Behold:~},colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

This is a **tcolorbox**.

Behold: This is the lower part.

`/tcb/after lower=<code>` (no default, initially unset)

The given `<code>` is placed *after* the content of the lower part.

```
\tcbset{after lower=\ \textit{This is the end.},
colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is the lower part. *This is the end.*

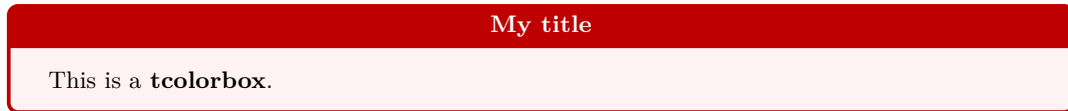
`/tcb/center title`

(style, no value, initially unset)

This style sets `/tcb/before title`^{→ P. 25} and `/tcb/after title`^{→ P. 25} to `\begin{center}` and `\end{center}`.

```
\tcbset{center title,colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```



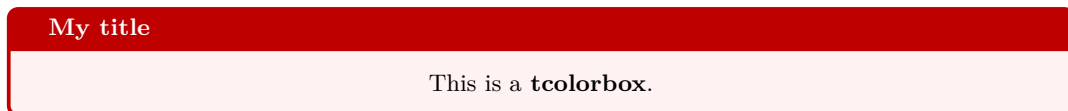
`/tcb/center upper`

(style, no value, initially unset)

This style sets `/tcb/before upper`^{→ P. 25} and `/tcb/after upper`^{→ P. 26} to `\begin{center}` and `\end{center}`.

```
\tcbset{center upper,colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```



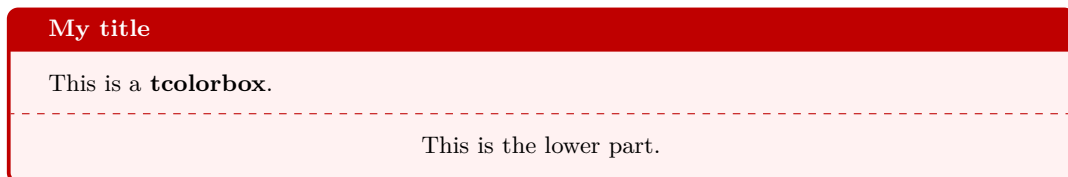
`/tcb/center lower`

(style, no value, initially unset)

This style sets `/tcb/before lower`^{→ P. 26} and `/tcb/after lower`^{→ P. 26} to `\begin{center}` and `\end{center}`.

```
\tcbset{center lower,colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



`/tcb/tabularx=<preamble>` (style)

This style sets `/tcb/before lower`^{→ P. 26} and `/tcb/after lower`^{→ P. 26} and several geometry keys to support a `tabularx` with the given `<preamble>`. The package `tabularx` [2] has to be loaded separately.

```
% \usepackage{array,tabularx}
\newcolumntype{Y}{>\raggedleft\arraybackslashX}% see tabularx
\tcbset{enhanced,fonttitle=\bfseries\large,fontupper=\normalsize\sffamily,
  colback=yellow!10!white,colframe=red!50!black,colbacktitle=Salmon!30!white,
  coltitle=black,center title}

\begin{tcolorbox}[tabularx={X||Y|Y|Y|Y|Y},title=My table]
Group & One & Two & Three & Four & Sum\\\hline\hline
Red & 1000.00 & 2000.00 & 3000.00 & 4000.00 & 10000.00\\\hline
Green & 2000.00 & 3000.00 & 4000.00 & 5000.00 & 14000.00\\\hline
Blue & 3000.00 & 4000.00 & 5000.00 & 6000.00 & 18000.00\\\hline\hline
Sum & 6000.00 & 9000.00 & 12000.00 & 15000.00 & 42000.00
\end{tcolorbox}
```

My table					
Group	One	Two	Three	Four	Sum
Red	1000.00	2000.00	3000.00	4000.00	10000.00
Green	2000.00	3000.00	4000.00	5000.00	14000.00
Blue	3000.00	4000.00	5000.00	6000.00	18000.00
Sum	6000.00	9000.00	12000.00	15000.00	42000.00

`/tcb/tabularx*={<code>}{<preamble>}` (style)

This is a variant of `/tcb/tabularx`^{→ P. 28} which adds some `<code>` before the table starts.

```
% \usepackage{array,tabularx}
\tcbset{enhanced,fonttitle=\bfseries\large,fontupper=\normalsize\sffamily,
  colback=yellow!10!white,colframe=red!50!black,colbacktitle=Salmon!30!white,
  coltitle=black,center title}

\begin{tcolorbox}[tabularx*={\arrayrulewidth0.5mm}{X|X|X},title=My table]
One & Two & Three \\\hline\hline
1000.00 & 2000.00 & 3000.00\\\hline
2000.00 & 3000.00 & 4000.00
\end{tcolorbox}
```

My table		
One	Two	Three
1000.00	2000.00	3000.00
2000.00	3000.00	4000.00

`/tcb/tikz upper=<options>`

(style)

This style adds a centered tikzpicture environment to the begin and to the end of the upper part.

```
% \usepackage{tikz}

\begin{tcolorbox}[tikz upper,fonttitle=\bfseries,colback=white,colframe=black,
                 title=TikZ drawing]
  \path[fill=yellow,draw=yellow!75!red] (0,0) circle (1cm);
  \fill[red] (45:5mm) circle (1mm);
  \fill[red] (135:5mm) circle (1mm);
  \draw[line width=1mm,red] (215:5mm) arc (215:325:5mm);
\end{tcolorbox}
```

TikZ drawing



`/tcb/tikz lower=<options>`

(style)

This style adds a centered tikzpicture environment to the begin and to the end of the lower part.

```
% \usepackage{tikz}
% \usetikzlibrary{skins,listings}
\tcbset{tikz lower,listing side text,fonttitle=\bfseries,
        bicolor,colback=LightBlue!50!white,colbacklower=white,colframe=black,
        righthand width=3cm}

\begin{tcblisting}{title=TikZ drawing}
\path[fill=yellow,draw=yellow!75!red]
  (0,0) circle (1cm);
\fill[red] (45:5mm) circle (1mm);
\fill[red] (135:5mm) circle (1mm);
\draw[line width=1mm,red]
  (215:5mm) arc (215:325:5mm);
\end{tcblisting}
```

TikZ drawing

```
\path[fill=yellow,draw=yellow!75!red]
  (0,0) circle (1cm);
\fill[red] (45:5mm) circle (1mm);
\fill[red] (135:5mm) circle (1mm);
\draw[line width=1mm,red]
  (215:5mm) arc (215:325:5mm);
```



3.7 Overlays

With an overlay, arbitrary *graphical code* can be added to a `tcolorbox`. This code is executed *after* the frame and interior are drawn and *before* the text content is drawn. Therefore, you can decorate the `tcolorbox` with your own extensions. Common special cases are *watermarks* which are implemented using overlays. See Subsection 8.4 from page 90 if you want to add *watermarks*.

If you use the core package only, the *graphical code* has to be `pgf` code and there is not much assistance for positioning. Therefore, the usage of the `/tcb/enhanced`^{P.96} mode from the library skins is recommended which allows `tikz` code and gives access to `/tcb/geometry nodes`^{P.83} for positioning.

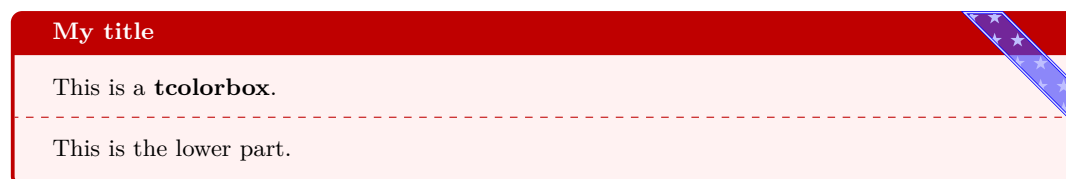
`/tcb/overlay=<graphical code>` (no default, initially unset)

Adds *graphical code* to the box drawing process. This *graphical code* is drawn *after* the frame and interior and *before* the text content.

```
% \tcbuselibrary{skins} % preamble
\tcbset{frogbox/.style={enhanced,colback=green!10,colframe=green!65!black,
  enlarge top by=5.5mm,
  overlay={\foreach \x in {2cm,3.5cm} {
    \begin{scope}[shift={([xshift=\x]frame.north west)}]
      \path[draw=green!65!black,fill=green!10,line width=1mm] (0,0) arc (0:180:5mm);
      \path[fill=black] (-0.2,0) arc (0:180:1mm);
    \end{scope}}}}
\begin{tcolorbox}[frogbox,title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```



```
% \usetikzlibrary{patterns} % preamble
% \tcbuselibrary{skins} % preamble
\tcbset{ribbonbox/.style={enhanced,colback=red!5!white,colframe=red!75!black,
  fonttitle=\bfseries,
  overlay={\path[fill=blue!75!white,draw=blue,double=white!85!blue,
    preaction={opacity=0.6,fill=blue!75!white},
    line width=0.1mm,double distance=0.2mm,
    pattern=fivepointed stars,pattern color=white!75!blue]
    ([xshift=-0.2mm,yshift=-1.02cm]frame.north east)
    -- ++(-1,1) -- ++(-0.5,0) -- ++(1.5,-1.5) -- cycle;}}}
\begin{tcolorbox}[ribbonbox,title=My title]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



/tcb/no overlay (style, no default, initially set)
 Removes the overlay if set before.

/tcb/overlay broken= $\langle graphical\ code \rangle$ (no default, initially unset)
 If the box is set to be **/tcb/breakable**^{→P.121} and *is* broken actually, then the $\langle graphical\ code \rangle$ is added to the box drawing process. **/tcb/overlay**^{→P.30} overwrites this key.

/tcb/overlay unbroken= $\langle graphical\ code \rangle$ (no default, initially unset)
 If the box is set to be **/tcb/breakable**^{→P.121} but *is not* broken actually or if the box is set to be **/tcb/unbreakable**^{→P.122}, then the $\langle graphical\ code \rangle$ is added to the box drawing process. **/tcb/overlay**^{→P.30} overwrites this key.

/tcb/overlay first= $\langle graphical\ code \rangle$ (no default, initially unset)
 If the box is set to be **/tcb/breakable**^{→P.121} and *is* broken actually, then the $\langle graphical\ code \rangle$ is added to the box drawing process for the *first* part of the break sequence. **/tcb/overlay**^{→P.30} overwrites this key.

/tcb/overlay middle= $\langle graphical\ code \rangle$ (no default, initially unset)
 If the box is set to be **/tcb/breakable**^{→P.121} and *is* broken actually, then the $\langle graphical\ code \rangle$ is added to the box drawing process for the *middle* parts (if any) of the break sequence. **/tcb/overlay**^{→P.30} overwrites this key.

/tcb/overlay last= $\langle graphical\ code \rangle$ (no default, initially unset)
 If the box is set to be **/tcb/breakable**^{→P.121} and *is* broken actually, then the $\langle graphical\ code \rangle$ is added to the box drawing process for the *last* part of the break sequence. **/tcb/overlay**^{→P.30} overwrites this key.

/tcb/overlay unbroken and first= $\langle graphical\ code \rangle$ (no default, initially unset)
 This is an optimized abbreviation for setting **/tcb/overlay unbroken**^{→P.31} and **/tcb/overlay first**^{→P.31} together. **/tcb/overlay**^{→P.30} overwrites this key.

/tcb/overlay middle and last= $\langle graphical\ code \rangle$ (no default, initially unset)
 This is an optimized abbreviation for setting **/tcb/overlay middle**^{→P.31} and **/tcb/overlay last**^{→P.31} together. **/tcb/overlay**^{→P.30} overwrites this key.

Floating box from `floatplacement`

This floating box is placed at the top of a page.

3.8 Floating Objects

`/tcb/floatplacement=<values>` (no default, initially `htb`)

Sets `<values>` as default values for the usage of `float`. Feasible are the usual parameters for floating objects.

```
\tcbset{enhanced,colback=red!5!white,colframe=red!75!black,
  watermark color=red!15!white}

\begin{tcolorbox}[floatplacement=t,float,
  title=Floating box from |floatplacement|,
  watermark text={I am floating}]
  This floating box is placed at the top of a page.
\end{tcolorbox}
```

`/tcb/float=<values>` (default from `floatplacement`)

Turns the box to a floating object where `<values>` are the usual parameters for such floating objects. If they are not used, the placement uses the default values given by `floatplacement`.

```
\begin{tcolorbox}[float, title=Floating box from |float|,
  enhanced,watermark text={I'm also floating}]
  This box floats to a feasible place automatically. You do not have to
  use a numbering for this floating object.
\end{tcolorbox}
```

Floating box from `float`

This box floats to a feasible place automatically. You do not have to use a numbering for this floating object.

`/tcb/nofloat` (style, initially set)

Turns the floating behavior off.

3.9 Side by Side

Further side by side options for code examples are `/tcb/listing side text`^{P.51}, `/tcb/text side listing`^{P.51}, `/tcb/listing outside text`^{P.51}, and `/tcb/text outside listing`^{P.51}.

`/tcb/sidebyside=`*(boolean value)* (default `true`, initially `false`)

Normally, the upper part and the lower part of the box have their positions as their names suggest. If `sidebyside` is set to `true`, the upper part is drawn *left-handed* and the lower part is drawn *right-handed*. Both parts are drawn together with the geometry settings of the upper part but the space is divided horizontally according to the following options. Colors, fonts, and box content additions are used individually. The resulting box is unbreakable.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title,sidebyside]
This is the upper (\textit{left-handed}) part.
\tcblower
This is the lower (\textit{right-handed}) part.
\end{tcolorbox}
```

My title

This is the upper (*left-handed*) part.

This is the lower (*right-handed*) part.

`/tcb/sidebyside align=`*(alignment value)* (no default, initially `center`)

Sets the vertical alignment for the left-handed and right-handed part. Feasible values are `center`, `top`, and `bottom`.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries,nobeforeafter,
left=2mm,right=2mm,sidebyside,sidebyside gap=6mm,width=(\linewidth-2mm)/3}

\begin{tcolorbox}[adjusted title=center,sidebyside align=center]
This is a text which is too long for one line.
\tcblower
This is a short text.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=top,sidebyside align=top]
This is a text which is too long for one line.
\tcblower
This is a short text.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=bottom,sidebyside align=bottom]
This is a text which is too long for one line.
\tcblower
This is a short text.
\end{tcolorbox}
```

center

This is a text which is too long for one line.

This is a short text.

top

This is a text which is too long for one line.

This is a short text.

bottom

This is a text which is too long for one line.

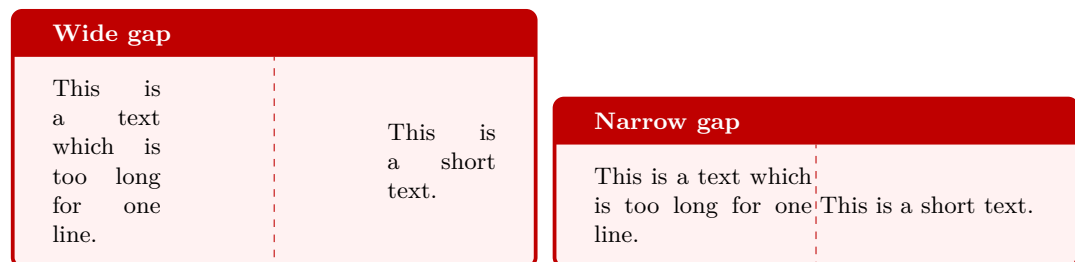
This is a short text.

`/tcb/sidebyside gap=<length>` (no default, initially 10mm)

Sets the horizontal distance between the left-handed and right-handed part to $\langle length \rangle$.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttttitle=\bfseries,nobeforeafter,
sidebyside,width=(\linewidth-2mm)/2}

\begin{tcolorbox}[adjusted title=Wide gap,sidebyside gap=30mm]
This is a text which is too long for one line.
\tcblower
This is a short text.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=Narrow gap,sidebyside gap=1mm]
This is a text which is too long for one line.
\tcblower
This is a short text.
\end{tcolorbox}
```

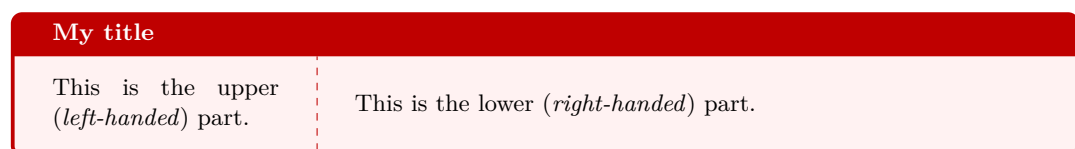


`/tcb/lefthand width=<length>` (no default, initially unset)

Sets the width of the left-handed part to the given $\langle length \rangle$.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttttitle=\bfseries}

\begin{tcolorbox}[title=My title,sidebyside,lefthand width=3cm]
This is the upper (\textit{left-handed}) part.
\tcblower
This is the lower (\textit{right-handed}) part.
\end{tcolorbox}
```



`/tcb/righthand width=<length>` (no default, initially unset)

Sets the width of the right-handed part to the given $\langle length \rangle$.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttttitle=\bfseries}

\begin{tcolorbox}[title=My title,sidebyside,righthand width=3cm]
This is the upper (\textit{left-handed}) part.
\tcblower
This is the lower (\textit{right-handed}) part.
\end{tcolorbox}
```

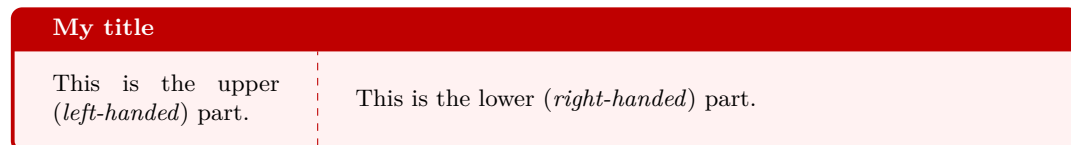


`/tcb/lefthand ratio=<fraction>` (no default, initially 0.5)

Sets the width of the left-handed part to the given $\langle fraction \rangle$ of the available space. $\langle fraction \rangle$ is a value between 0 and 1.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title,sidebyside,lefthand ratio=0.25]
This is the upper (\textit{left-handed}) part.
\tcblower
This is the lower (\textit{right-handed}) part.
\end{tcolorbox}
```



`/tcb/righthand ratio=<fraction>` (no default, initially 0.5)

Sets the width of the right-handed part to the given $\langle fraction \rangle$ of the available space. $\langle fraction \rangle$ is a value between 0 and 1.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title,sidebyside,righthand ratio=0.25]
This is the upper (\textit{left-handed}) part.
\tcblower
This is the lower (\textit{right-handed}) part.
\end{tcolorbox}
```



3.10 Embedding into the Surroundings

Typically, but not necessarily, a `tcolorbox` is put inside a separate paragraph and has some vertical space before and after it. This behavior is controlled by the keys `before` and `after`.

/tcb/before=`<code>` (no default, initially see [/tcb/autoparskip](#)^{→P.36})
Sets the `<code>` which is executed before the colored box. It is not used for floating boxes.

/tcb/after=`<code>` (no default, initially see [/tcb/autoparskip](#)^{→P.36})
Sets the `<code>` which is executed after the colored box. It is not used for floating boxes.

/tcb/parskip (style, no value)
Sets the keys `before` and `after` to values which are recommended, if the package `parskip` is used and there is no better idea for `before` and `after`.

```
\tcbset{parskip/.style={before={\par\pagebreak[0]\noindent},
                        after={\par}}}
```

/tcb/noparskip (style, no value)
Sets the keys `before` and `after` to values which are recommended, if the package `parskip` is *not* used and there is no better idea for `before` and `after`.

```
\tcbset{noparskip/.style={before={\par\smallskip\pagebreak[0]\noindent},
                        after={\par\smallskip}}}
```

/tcb/autoparskip (style, no value, initially set)
Tries to detect the usage of the package `parskip` and sets the keys `before` and `after` accordingly. Actually, the following is done:

- If the length of `\parskip` is greater than `0pt` at the begin of the document, [/tcb/parskip](#)^{→P.36} is executed. Here, the usage of package `parskip` is *assumed*.
- Otherwise, if the length of `\parskip` is not greater than `0pt` at the begin of the document, [/tcb/noparskip](#)^{→P.36} is executed. Here, the absence of package `parskip` is *assumed*.

`autoparskip` is the default for the package `tcolorbox`, if `before` or `after` are not changed otherwise.

/tcb/nobeforeafter (style, no value)
Abbreviation for clearing the keys `before` and `after`. The colored box is not put into a paragraph and there is no space before or after the box.

```
\tcbset{myone/.style={colback=LightGreen,colframe=DarkGreen,
                      equal height group=nobefaf,width=\linewidth/4,nobeforeafter}}
\begin{tcolorbox}[myone,title=Box 1]Box 1\end{tcolorbox}%
\begin{tcolorbox}[myone,title=Box 2]Box 2\end{tcolorbox}%
\begin{tcolorbox}[myone,title=Box 3]Box 3\end{tcolorbox}%
\begin{tcolorbox}[myone,title=Box 4]Box 4\end{tcolorbox}%
```

Box 1	Box 2	Box 3	Box 4
Box 1	Box 2	Box 3	Box 4

3.11 Bounding Box

Normally, every `tcolorbox` has a bounding box which fits exactly to the dimensions of the outer frame. Therefore, \LaTeX reserves exactly the space needed for the box. This behavior can be changed by enlarging (or shrinking) the bounding box. If the bounding box is enlarged, the `tcolorbox` will get some clearance around it. If the bounding box is shrunk, i. e. enlarged with negative values, the `tcolorbox` will overlap to other parts of the page. For example, the `tcolorbox` could be stretched into the page margin.

`/tcb/enlarge top by=<length>` (no default, initially 0mm)

Enlarges the bounding box distance to the top of the box by `<length>`.

```
\tcbset{colframe=blue!75!black,colback=white}
```

```
\begin{tcolorbox}[enlarge top by=-5mm]
```

```
This is a \textbf{tcolorbox}.
```

```
\end{tcolorbox}
```

```
\begin{tcolorbox}[enlarge top by=5mm]
```

```
This is a \textbf{tcolorbox}.
```

```
\end{tcolorbox}
```

This is a **tcolorbox**.

This is a **tcolorbox**.

`/tcb/enlarge bottom by=<length>` (no default, initially 0mm)

Enlarges the bounding box distance to the bottom of the box by `<length>`.

```
\tcbset{colframe=blue!75!black,colback=white}
```

```
\begin{tcolorbox}[enlarge bottom by=5mm]
```

```
This is a \textbf{tcolorbox}.
```

```
\end{tcolorbox}
```

```
\begin{tcolorbox}[enlarge bottom by=-5mm]
```

```
This is a \textbf{tcolorbox}.
```

```
\end{tcolorbox}
```

This is a **tcolorbox**.

This is a **tcolorbox**.

/tcb/enlarge left by= $\langle length \rangle$ (no default, initially 0mm)
 Enlarges the bounding box distance to the left side of the box by $\langle length \rangle$.

```
\tcbset{colframe=blue!75!black,colback=white}

\begin{tcolorbox}[enlarge left by=2cm,width=\linewidth-2cm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[enlarge left by=-2cm,width=\linewidth+2cm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is a **tcolorbox**.

/tcb/enlarge right by= $\langle length \rangle$ (no default, initially 0mm)
 Enlarges the bounding box distance to the right side of the box by $\langle length \rangle$.

```
\tcbset{colframe=blue!75!black,colback=white}

\begin{tcolorbox}[enlarge right by=-2cm,width=\linewidth+2cm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[enlarge right by=2cm,width=\linewidth-2cm]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

This is a **tcolorbox**.

This is a **tcolorbox**.

Floating box from toggle enlargement

This page is an odd page. Therefore, the left and right enlargements are not toggled (with some luck; otherwise use `forced`). This box stretches to the right margin on odd pages and to the left margin on even pages. The current document is one-sided – this feature makes sense for two-sided documents only.

`/tcb/toggle enlargement=<toggle preset>` (no default, initially `none`)

According to the `<toggle preset>`, the left and the right enlargements of the bounding box are switched or not. Feasible values are:

- `none`: no switching.
- `forced`: the values of the left and right enlargement are switched.
- `evenpage`: if the page is an even page, the values of the left and right enlargement are switched. Note that the page number detection may fail in certain cases. For these cases, use the `forced` value.

```
\tcbset{colframe=blue!75!black,colback=white,
enlarge left by=-20mm,enlarge right by=5mm,width=\linewidth+15mm}

\begin{tcolorbox}[toggle enlargement=none]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[toggle enlargement=forced]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
\begin{tcolorbox}[toggle enlargement=evenpage]
This page is an \ifthenelse{\isodd{\thepage}}{odd}{even} page.
Therefore, the left and right enlargements
\ifthenelse{\isodd{\thepage}}{are not}{are} toggled (with some luck).
\end{tcolorbox}
```

This is a `tcolorbox`.

This is a `tcolorbox`.

This page is an odd page. Therefore, the left and right enlargements are not toggled (with some luck).

```
\begin{tcolorbox}[colframe=red!60!black,colback=red!15!white,
fonttitle=\bfseries,title=Floating box from \texttt{toggle enlargement},
width=\textwidth+20mm,enlarge right by=-20mm,
toggle enlargement=evenpage,float=t]
This page is an \ifthenelse{\isodd{\thepage}}{odd}{even} page.
Therefore, the left and right enlargements
\ifthenelse{\isodd{\thepage}}{are not}{are} toggled (with some luck; otherwise
use |forced|). This box stretches to the right margin on odd pages and to the left
margin on even pages. The current document is one-sided -- this feature makes
sense for two-sided documents only.
\end{tcolorbox}
```

`/tcb/shrink tight`

(style, no value, initially unset)

The total colored box is shrunk to the dimensions of the upper part. There should be no lower part and no title. This style sets the `/tcb/boxsep`^{→ P. 14} to 0pt and other geometry keys to fitting values. This option is likely to be used with the following extrusion keys.

```
\tcbset{colframe=blue!75!black,colback=white,arc=0mm,boxrule=0.4pt,
  tcbbox raise base,shrink tight}
```

```
\begin{tcolorbox}
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

Lorem \tcbbox{ipsum} dolor sit amet, consectetur adipiscing elit.

This is a **tcolorbox**.

Lorem ipsum dolor sit amet, consectetur adipiscing elit.

`/tcb/extrude left by=<length>`

(style, no default, initially unset)

The (upper part of the) colored box is extruded by the given *<length>* to the left side. The inner width and the bounding box is kept unchanged and the operation is additive!

```
\tcbset{enhanced,colframe=red,colback=yellow!25!white,
  frame style={opacity=0.25},interior style={opacity=0.5},
  tcbbox raise base,shrink tight,extrude left by=2mm}
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis.

\tcbbox[extrude left by=1cm]{Curabitur} dictum gravida mauris.

Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.

`/tcb/extrude right by=<length>`

(style, no default, initially unset)

The (upper part of the) colored box is extruded by the given *<length>* to the right side. The inner width and the bounding box is kept unchanged and the operation is additive!

```
\tcbset{enhanced,colframe=red,colback=yellow!25!white,
  frame style={opacity=0.25},interior style={opacity=0.5},
  tcbbox raise base,shrink tight,extrude right by=2mm}
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis.

\tcbbox[extrude right by=1cm]{Curabitur} dictum gravida mauris.

Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.

/tcb/extrude top by= $\langle length \rangle$ (style, no default, initially unset)

The (upper part of the) colored box is extruded by the given $\langle length \rangle$ to the top side. The inner width and the bounding box is kept unchanged and the operation is additive!

```
\tcbset{enhanced,colframe=red,colback=yellow!25!white,  
  frame style={opacity=0.25},interior style={opacity=0.5},  
  tcbbox raise base,shrink tight,extrude by=2mm}
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis.

\tcbbox[extrude top by=1cm]{Curabitur} dictum gravida mauris.

Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.

/tcb/extrude bottom by= $\langle length \rangle$ (style, no default, initially unset)

The (upper part of the) colored box is extruded by the given $\langle length \rangle$ to the bottom side. The inner width and the bounding box is kept unchanged and the operation is additive!

```
\tcbset{enhanced,colframe=red,colback=yellow!25!white,  
  frame style={opacity=0.25},interior style={opacity=0.5},  
  tcbbox raise base,shrink tight,extrude by=2mm}
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis.

\tcbbox[extrude bottom by=1cm]{Curabitur} dictum gravida mauris.

Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna.

/tcb/extrude by= $\langle length \rangle$ (style, no default, initially unset)

The (upper part of the) colored box is extruded by the given $\langle length \rangle$ to all sides. The inner width and the bounding box is kept unchanged and the operation is additive!

```
\tcbset{enhanced,colframe=red,colback=yellow!25!white,  
  frame style={opacity=0.25},interior style={opacity=0.5},  
  tcbbox raise base,shrink tight,extrude by=2mm}
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. \tcbbox{Curabitur} dictum gravida mauris. \tcbbox[colframe=Green,interior style={opacity=0.0}]{Nam} arcu libero, nonummy eget, consectetur id, \tcbbox{vulputate} a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. \tcbbox{Mauris ut leo.}

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo.

3.12 Text Characteristics

`/tcb/parbox=<boolean value>` (default `true`, initially `true`)

The text inside a `tcolorbox` is formatted using a `LaTeX minipage` if the box is unbreakable. If breakable, the box tries a mimicry of a `minipage`. In a `minipage` or `parbox`, paragraphs are formatted slightly different as the main text. If the key value is set to `false`, the normal main text behavior is restored. In some situations, this has some unwanted side effects. It is recommended to use this experimental setting only where you really want to have this feature.

```
% \usepackage{lipsum} % preamble
\tcbset{width=(\linewidth-2mm)/2,nobeforeafter,arc=1mm,
  colframe=blue!75!black,colback=white,fonttitle=\bfseries,fontupper=\small,
  left=2mm,right=2mm,top=1mm,bottom=1mm,equal height group=parbox}

\begin{tcolorbox}[parbox,adjusted title={parbox=true (normal)}]
  \lipsum[1-2]
\end{tcolorbox}\hfill%
\begin{tcolorbox}[parbox=false,adjusted title={parbox=false}]
  \lipsum[1-2]
\end{tcolorbox}%
```

parbox=true (normal)

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

parbox=false

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

3.13 Files

/tcb/tempfile= $\langle file\ name \rangle$ (no default, initially `\jobname.tcbtemp`)
 Sets $\langle file\ name \rangle$ as name for the temporary file which is used inside `tcbwritetemp`^{→ P.44} and `\tcbusetemp`^{→ P.44} implicitly.

3.14 \tcbbox Specials

The following options are applicable for `\tcbbox`^{→ P.6} and `\tcbboxmath`^{→ P.64} only.

/tcb/tcbbox raise= $\langle length \rangle$ (no default, initially 0pt)
 Raises the `\tcbbox`^{→ P.6} by the given $\langle length \rangle$.

```
\tcbset{colframe=blue!50!black,colback=white,colupper=red!50!black,
fonttitle=\bfseries,before=,after=,center title}
```

```
Test\dotfill
\tcbbox[tcbbox raise base]{Hello World 1}\dotfill
\tcbbox{Hello World 2}\dotfill
\tcbbox[tcbbox raise=5mm]{Hello World 3}
```

Test Hello World 1 Hello World 2 Hello World 3

/tcb/tcbbox raise base (style, no value, initially unset)
 Raises the `\tcbbox`^{→ P.6} such that the base of its content matches the base of the environmental line; see example above.

3.15 Skins

There are additional option keys which change the appearance of a `tcolorbox`. If only the core package is used, there is only one *skin* and these keys are meaningless. The library 'skins' adds more skins. The appropriate option keys for skins of the core package are therefore described in section 8.1 from page 81.

4 Saving and Loading of Verbatim Texts

The following macros are slightly modified versions of the original macros from the known packages `moreverb` and `verbatim`. They are used implicitly inside of a `tcolorbox` environment, but they can be used outside also.

```
\begin{tcbverbatimwrite}{\file name}  
  \environment content  
\end{tcbverbatimwrite}
```

Saves the `\environment content` to a file named by `\file name`. \TeX macros inside the environment are not expanded.

```
\begin{tcbverbatimwrite}{\jobname_verbexp.tex}  
  This text is saved \textit{as is}.  
\end{tcbverbatimwrite}
```

```
Now, we are using the file:\par  
\input{\jobname_verbexp.tex}
```

Now, we are using the file:
This text is saved *as is*.

This environment may be used inside an own environment. Note, that inside the environment definition `\tcbverbatimwrite` has to be used instead of `\begin{tcbverbatimwrite}` and `\end{tcbverbatimwrite}` instead of `\end{tcbverbatimwrite}`.

```
\newenvironment{myverbatim}{%  
  \begin{tcbverbatimwrite}{\jobname_myverb.tex}}%  
  {\end{tcbverbatimwrite}\endgroup}
```

```
\begin{myverbatim}  
  This is the text which is saved by my own environment.  
\end{myverbatim}
```

```
Now, we are using the file:\par  
\input{\jobname_myverb.tex}
```

Now, we are using the file:
This is the text which is saved by my own environment.

```
\begin{tcbwritetemp}  
  \environment content  
\end{tcbwritetemp}
```

Has the same function as `tcbverbatimwrite`^{→ P. 44}, but uses the key value of `tempfile` for the file name.

```
\begin{tcbwritetemp}  
  This text is saved \textit{as is}.  
\end{tcbwritetemp}
```

```
Now, we are using the file:\par  
\tcbusetemp
```

Now, we are using the file:
This text is saved *as is*.

```
\tcbusetemp
```

Loads the current temporary file which was saved by `tcbwritetemp`^{→ P. 44}.

5 Library 'listings' / 'listingsutf8'

The library is loaded by a package option or inside the preamble by:

```
\tcbuselibrary{listings}
```

This also loads the package `listings` [4].

Alternatively, if your sources are encoded with UTF-8, you can use the support from the package `listingsutf8` [6] by loading the library variant 'listingsutf8'.

```
\tcbuselibrary{listingsutf8}
\tcbset{listing utf8=latin1}% optional; 'latin1' is the default.
```

This also loads the packages `listings` [4] and `listingsutf8` [6].

5.1 Macros of the Library

```
\begin{tcblisting}{\langle options \rangle}
\langle environment content \rangle
\end{tcblisting}
```

Creates a colored box based on a `tcolorbox`^{P.5}. Controlled by the given $\langle options \rangle$, the environment content is typeset normally and/or as a listing. Furthermore, the $\langle options \rangle$ control appearance and functions of the `tcolorbox`. By default, the listing is interpreted as a \LaTeX listing.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black}
This is a \LaTeX\ example which displays the text as source code
and in compiled form.
\end{tcblisting}
```

This is a \LaTeX example which displays the text as source code
and in compiled form.

This is a \LaTeX example which displays the text as source code and in compiled form.

```
\begin{tcblisting}{colback=yellow!5,colframe=yellow!50!black,listing only,
title=This is source code in another language (XML), fonttitle=\bfseries,
listing options={language=XML,columns=fullflexible,keywordstyle=\color{red}}}
<?xml version="1.0"?>
<project name="Package tcolorbox" default="documentation" basedir=".">
  <description>
    Apache Ant build file (http://ant.apache.org/)
  </description>
</project>
\end{tcblisting}
```

This is source code in another language (XML)

```
<?xml version="1.0"?>
<project name="Package_tcolorbox" default="documentation" basedir=". ">
  <description>
    Apache Ant build file (http://ant.apache.org/)
  </description>
</project>
```

`\begin{tcboutputlisting}`

<environment content>

`\end{tcboutputlisting}`

Saves the environment content to a file which is named by the key value of `listing file`. Later, this file can be loaded by `\tcbinputlisting` or `\tcbuselistingtext` or `\tcbuselistinglisting`.

```
\begin{tcboutputlisting}
This \textbf{text} is written to a standardized file for later usage.
\end{tcboutputlisting}
```

`\tcbinputlisting{<options>}`

Creates a colored boxed based on a `tcolorbox`. The text content is read from a file named by the key value of `listing file`. Apart from that, the function is equal to that of `tcblisting`^{→ P. 45}.

```
\tcbinputlisting{colback=red!5!white,colframe=red!75!black,text only}
\tcbinputlisting{colback=green!5,colframe=green!75!black,listing only}
```

```
<?xml version="1.0"?> <project name="Package tcolorbox" default="documentation"
basedir=". "> <description> Apache Ant build file (http://ant.apache.org/) </description>
</project>
```

```
<?xml version="1.0"?>
<project name="Package tcolorbox" default="documentation" basedir=". ">
  <description>
    Apache Ant build file (http://ant.apache.org/)
  </description>
</project>
```

`\tcbuselistingtext`

Loads text from a file named by the key value of `listing` file.

`\tcbuselistingtext`

```
<?xml version="1.0"?> <project name="Package tcolorbox" default="documentation" basedir=".">
<description> Apache Ant build file (http://ant.apache.org/) </description> </project>
```

`\tcbuselistinglisting`

Typesets text as listing from a file named by the key value of `listing` file.

`\tcbuselistinglisting`

```
<?xml version="1.0"?>
<project name="Package tcolorbox" default="documentation" basedir=".">
  <description>
    Apache Ant build file (http://ant.apache.org/)
  </description>
</project>
```

`\tcbusetemplisting`

Typesets text as listing from a temporary file which was written by `tcbwritetemp`^{→ P. 44}.

5.2 Option Keys of the Library

For the $\langle options \rangle$ in `tcblisting`^{→P.45} respectively `\tcbinputlisting`^{→P.46} the following pgf keys can be applied. The key tree path `/tcb/` is not to be used inside these macros.

/tcb/listing file= $\langle file name \rangle$ (no default, initially `\jobname.listing`)
Sets the $\langle file name \rangle$ of the file which is used to save listings.

/tcb/listing options= $\langle key list \rangle$ (no default, initially `style=tcblatex`)
Sets the options from the package `listings` [4] which are used during typesetting of the listing. For L^AT_EX listings, there is a predefined `listings` style named `tcblatex` which can be used.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!25,left=6mm,
listing options={style=tcblatex,numbers=left,numberstyle=\tiny\color{red!75!black}}}
This is a \LaTeX\ example which displays the text as source code
and in compiled form. Additionally, we use line numbers here.
\end{tcblisting}
```

```
1 This is a \LaTeX\ example which displays the text as source code
2 and in compiled form. Additionally, we use line numbers here.
```

This is a L^AT_EX example which displays the text as source code and in compiled form.
Additionally, we use line numbers here.

/tcb/listing style= $\langle style \rangle$ (no default, initially `tcblatex`)
Abbreviation for `listing options={style=...}`. This key sets a $\langle style \rangle$ for the `listings` package, see [4]. For L^AT_EX, there is a predefined style named `tcblatex`.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,
listing style=tcblatex}
Here, we use the predefined style.
\end{tcblisting}
```

Here, we use the predefined style.

Here, we use the predefined style.

/tcb/listing inputencoding= $\langle encoding \rangle$ (no default, initially `\inputencodingname`)
Sets the input encoding value for the predefined listing style `tcblatex` and `tcbdocumentation` from the library 'documentation'. The initial value is derived from the package `inputenc` if used.

/tcb/listing utf8= $\langle one-byte-encoding \rangle$ (style, no default, initially `latin1`)
Abbreviation for using `/tcb/listing inputencoding`^{→P.48} together with UTF-8 support from the package `listingsutf8` [6]. This option is available only for the library variant 'listingsutf8'. The $\langle one-byte-encoding \rangle$ is one of the applicable encodings from [6], e.g. `latin1`.

`/tcb/listing and text`

(no value, initially set)

Typesets the environment content as listing in the upper part and as compiled text in the lower part.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing and text}  
This is a \LaTeX\ example.  
\end{tcblisting}
```

This is a \LaTeX\ example.

This is a L^AT_EX example.

`/tcb/text and listing`

(no value)

Typesets the environment content as compiled text in the upper part and as listing in the lower part.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text and listing}  
This is a \LaTeX\ example.  
\end{tcblisting}
```

This is a L^AT_EX example.

This is a \LaTeX\ example.

`/tcb/listing only`

(no value)

Typesets the environment content as listing.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing only}  
This is a \LaTeX\ example.  
\end{tcblisting}
```

This is a \LaTeX\ example.

`/tcb/text only`

(no value)

Typesets the environment content as compiled text.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text only}  
This is a \LaTeX\ example.  
\end{tcblisting}
```

This is a L^AT_EX example.

/tcb/comment=*<text>* (no default, initially empty)

Records a comment with *<text>* as content. The comment is displayed only in conjunction with `/tcb/listing` and `comment`^{→ P.50} and `/tcb/comment` and `listing`^{→ P.50}.

```
\begin{tcblisting}{comment={This comment is really only a comment},
colback=red!5!white,colframe=red!75!black}
This is a \textbf{tcolorbox}.
\end{tcblisting}
```

This is a `\textbf{tcolorbox}`.

This is a `tcolorbox`.

/tcb/listing and comment (no value)

Typesets the environment content as listing in the upper part and a given comment in the lower part.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing and comment,
comment={This is my comment. It may contain line breaks.\par
It can even use the environment content
\flqq\ignorespaces\tcbuselistingtext\unskip\frqq}}
This is a \LaTeX\ example.
\end{tcblisting}
```

This is a `\LaTeX\ example`.

This is my comment. It may contain line breaks.
It can even use the environment content «This is a `LaTeX` example.»

/tcb/comment and listing (no value)

Typesets a given comment in the upper part and the environment content as listing in the lower part.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,comment and listing,
comment={This is my comment.}}
This is a \LaTeX\ example.
\end{tcblisting}
```

This is my comment.

This is a `\LaTeX\ example`.

`/tcb/listing side text`

(no value)

Typesets the environment content side by side as listing in the left (upper) part and as compiled text in the right (lower) part.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing side text}
This is a \LaTeX\ example.
\end{tcblisting}
```

This is a \LaTeX\ example.

This is a L^AT_EX example.

`/tcb/text side listing`

(no value)

Typesets the environment content side by side as compiled text in the left (upper) part and as listing in the right (lower) part.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text side listing}
This is a \LaTeX\ example.
\end{tcblisting}
```

This is a L^AT_EX example.

This is a \LaTeX\ example.

`/tcb/listing outside text`

(no value)

Typesets the environment content side by side as listing in a `tcolorbox` and as compiled text outside the box in the right part of the page. Nevertheless, the outside text is treated as *lower* part of the `tcolorbox` and can be formatted with all lower part options. The space partitioning is done with the side by side options from Section 3.9, see page 33.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,listing outside text}
This is a \LaTeX\ example.
\end{tcblisting}
```

This is a \LaTeX\ example.

This is a L^AT_EX example.

`/tcb/text outside listing`

(no value)

Typesets the environment content side by side as listing in a `tcolorbox` and as compiled text outside the box in the left part of the page. Nevertheless, the outside text is treated as *lower* part of the `tcolorbox` and can be formatted with all lower part options. The space partitioning is done with the side by side options from Section 3.9, see page 33.

```
\begin{tcblisting}{colback=red!5!white,colframe=red!75!black,text outside listing}
This is a \LaTeX\ example.
\end{tcblisting}
```

This is a L^AT_EX example.

This is a \LaTeX\ example.

5.3 Creation of L^AT_EX Tutorials

The following source code gives a guideline for the creation of L^AT_EX tutorials. In the next section, a framework for L^AT_EX exercises is described. All examples shall be numbered optionally.

Firstly, some additional `tcb` keys are defined for the appearance and automatic numbering.

```
%\newcounter{texexp} % preamble

\begin{tcbset}
  texexp/.style={colframe=red!50!yellow!50!black, colback=red!50!yellow!5!white,
    coltitle=red!50!yellow!3!white,
    fonttitle=\small\sffamily\bfseries, fontupper=\small, fontlower=\small},
  example/.code 2 args={\refstepcounter{texexp}\label{#2}%
    \pgfkeysalso{texexp,title={Example \thetexexp: #1}}},
\end{tcbset}
```

```
\begin{tcblisting}{texexp}
This is a \LaTeX\ example which displays the text as source code
and in compiled form.
\end{tcblisting}
```

This is a \LaTeX\ example which displays the text as source code
and in compiled form.

This is a L^AT_EX example which displays the text as source code and in compiled form.

```
\begin{tcblisting}{example={Direct application of \texttt{example}}}{firstExample}
Here, we use Example \ref{firstExample} with a title line.
\end{tcblisting}
```

Example 1: Direct application of example

Here, we use Example \ref{firstExample} with a title line.

Here, we use Example 1 with a title line.

For the next examples, two environments `texexp` and `texexpitled` are defined for abbreviation.

```
\newenvironment{texexp}[1]{\begin{tcblisting}{texexp,#1}}{\end{tcblisting}}
\newenvironment{texexpitled}[3][1]{\begin{tcblisting}{example={#2}{#3},#1}}{\end{tcblisting}}
```

For special cases, `tcolorbox` with the key `texexp` can be used instead of these two environments.

Now, we have a flexible box for L^AT_EX examples which is demonstrated in the following.

```
\begin{texexp}{}  
This is a \LaTeX\ example which displays the text as source code  
and in compiled form.  
\end{texexp}
```

This is a \LaTeX\ example which displays the text as source code
and in compiled form.

This is a L^AT_EX example which displays the text as source code and in compiled form.

```
\begin{texexp}{text and listing}  
This is a \LaTeX\ example which displays the text as source code  
and in compiled form.  
\end{texexp}
```

This is a L^AT_EX example which displays the text as source code and in compiled form.

This is a \LaTeX\ example which displays the text as source code
and in compiled form.

```
\begin{texexp}{listing only}  
This is a \LaTeX\ example which displays the text as source code only.  
\end{texexp}
```

This is a \LaTeX\ example which displays the text as source code only.

```
\begin{texexp}{text only}  
This is a \LaTeX\ example which displays the text in compiled form only.  
\end{texexp}
```

This is a L^AT_EX example which displays the text in compiled form only.

```
\begin{texeptitled}{An Example with a Heading}{heading1}
This is a \LaTeX\ example with a numbered heading line
which can be referred to.
\end{texeptitled}
Here, we see Example \ref{heading1}.
```

Example 2: An Example with a Heading

This is a \LaTeX\ example with a numbered heading line
which can be referred to.

This is a L^AT_EX example with a numbered heading line which can be referred to.

Here, we see Example 2.

```
\begin{texeptitled}[listing only]{Another Example with a Heading}{heading2}
The keys can be used in combination. Here, an example with a heading line
and source code only is given.
\end{texeptitled}
Here, we see Example \ref{heading2}.
```

Example 3: Another Example with a Heading

The keys can be used in combination. Here, an example with a heading line
and source code only is given.

Here, we see Example 3.

```
\begin{texeptitled}[float]{A floating Example with a Heading}{heading3}
This is another \LaTeX\ example with numbered heading line.
But now, the box is a floating object.
\end{texeptitled}
```

Example 4: A floating Example with a Heading

This is another \LaTeX\ example with numbered heading line.
But now, the box is a floating object.

This is another L^AT_EX example with numbered heading line. But now, the box is a floating object.

The floating box of the last example is seen as Example \ref{heading3}
on page \pageref{heading3}.

The floating box of the last example is seen as Example 4 on page 54.

```

\begin{tcolorbox}[example={Direct application of the style |texexp|}{texexpbox1}]
\begin{lstlisting}[style=tcblatex]
Some \LaTeX\ source code.
\end{lstlisting}
\tcblower

```

For special cases, the environment `tcolorbox` with style `example` can be used directly. As one can see, the upper and the lower part of the box can be used uncoupled also.

```

\end{tcolorbox}

```

Example 5: Direct application of the style `texexp`

Some `\LaTeX` source code.

For special cases, the environment `tcolorbox` with style `example` can be used directly. As one can see, the upper and the lower part of the box can be used uncoupled also.

The following series of examples demonstrate the application of `tcolorbox`^{→P.5} options for diversification.

```

\begin{texeptitled}{How to use options (1):\par The basic example}{options1}
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c] (\w:1cm) circle (7mm);}
\end{tikzpicture}
\end{texeptitled}

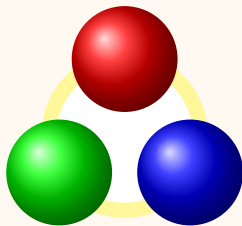
```

Example 6: How to use options (1): The basic example

```

\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c] (\w:1cm) circle (7mm);}
\end{tikzpicture}

```



```

\begin{texexptitled}[center lower,enhanced,segmentation hidden,middle=0mm]
  {How to use options (2):\par The text output is centered and the
    segmentation line has vanished.}{options2}
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c] (\w:1cm) circle (7mm);}
\end{tikzpicture}
\end{texexptitled}

```

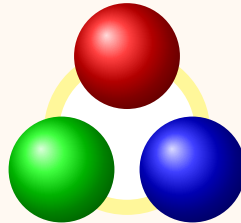
Example 7: How to use options (2):

The text output is centered and the segmentation line has vanished.

```

\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c] (\w:1cm) circle (7mm);}
\end{tikzpicture}

```



```

\begin{texexptitled}[tikz lower,bicolor,colbacklower=white]
  {How to use options (3):\par Here, the |tikzpicture| is totally hidden.
    The |bicolor| skin highlights the output.}{options3}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c] (\w:1cm) circle (7mm);}
\end{texexptitled}

```

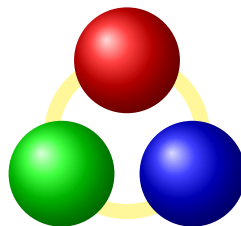
Example 8: How to use options (3):

Here, the tikzpicture is totally hidden. The bicolor skin highlights the output.

```

\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c] (\w:1cm) circle (7mm);}

```



```

\begin{texexptitled}[center lower,listing side text,righthand width=3.5cm,
  bicolor,colbacklower=white]
  {How to use options (4):\par The |bicolor| skin also works with side
    by side mode}{options4}
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
  (\w:1cm) circle (7mm);}
\end{tikzpicture}
\end{texexptitled}

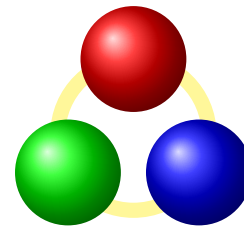
```

Example 9: How to use options (4):
The bicolor skin also works with side by side mode

```

\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
  (\w:1cm) circle (7mm);}
\end{tikzpicture}

```



```

\begin{texexptitled}[center lower,listing outside text,righthand width=3.5cm]
  {How to use options (5):\par Putting our picture outside is just
    a matter of one word.}{options5}
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
  (\w:1cm) circle (7mm);}
\end{tikzpicture}
\end{texexptitled}

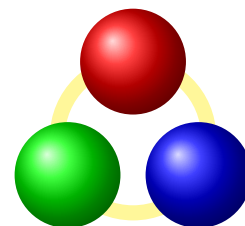
```

Example 10: How to use options (5):
Putting our picture outside is just a matter of one word.

```

\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
  (\w:1cm) circle (7mm);}
\end{tikzpicture}

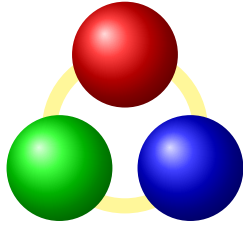
```



```

\begin{texeptitled}[beamer,center lower,text outside listing,lefthand width=3.5cm]
{How to use options (6):\par Our style is easily transformed into
a beamerish one.}{options6}
\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
(\w:1cm) circle (7mm);}
\end{tikzpicture}
\end{texeptitled}

```



Example 11: How to use options (6):

Our style is easily transformed into a beamerish one.

```

\begin{tikzpicture}
\path[fill=yellow!50!white] (0,0) circle (11mm);
\path[fill=white] (0,0) circle (9mm);
\foreach \w/\c in {90/red,210/green,330/blue}
{\path[shading=ball,ball color=\c]
(\w:1cm) circle (7mm);}
\end{tikzpicture}

```

5.4 Creation of L^AT_EX Exercises

In the following, a guideline is given for the creation of L^AT_EX exercises with solutions. These solutions are saved to disk for application at a place of choice. Therefore, all used exercises are logged to a file `\jobname.sol` for automatic processing. The solution contents themselves are saved to a subdirectory named `solutions`.

```
%\newcounter{texercise} % preamble

\newwrite\solout
\def\openoutsol{\immediate\openout\solout\jobname.sol}
\def\solfile#1{solutions/texercise#1.tex}
\def\writesol#1{\immediate\write\solout{\noexpand\processsol{\thetexercise}{#1}}}%
\def\closeoutsol{\immediate\closeout\solout}
\def\inputsol{\IfFileExists{\jobname.sol}{\input{\jobname.sol}}{}}
```

- Before the first exercise is given, `\openoutsol` has to be called to start logging.
- The solution is given as content of a `tcboutputlisting`^{→ P. 46} environment. Note, that you can use this content also inside the exercise with `\tcbuselistingtext`^{→ P. 47} in compiled form.
- After the last exercise is given (and before using the solutions), `\closeoutsol` has to be called to stop logging.
- The solutions are loaded by `\inputsol`.

Inside the exercise text, there may be text parts which are needed as L^AT_EX source code and as compiled text as well. These parts can be saved by `tcbwritetemp`^{→ P. 44} and used in compiled form by `\tcbusetemp`^{→ P. 44} or as source code by `\tcbusetemplisting`^{→ P. 47}.

At first, we generate some new keys. Since exercises and solutions should be numbered, we force to use a label `\marker` while using the style `texercise`. Automatically, the label `exe:\marker` is used to mark the exercise and the label `sol:\marker` is used to mark the solution.

```
\tcbset{
texercisestyle/.style={arc=0.5mm, colframe=blue!25!yellow!90!white,
colback=blue!25!yellow!5!white, coltitle=blue!25!yellow!40!black,
fonttitle=\small\sffamily\bfseries, fontupper=\small, fontlower=\small},
texercise/.code={\refstepcounter{texercise}\label{exe:#1}\writesol{#1}%
\pgfkeysalso{texercisestyle,
listing file={\solfile\thetexercise},
title={Exercise \arabic{texercise}\hfill\mdseries Solution on page \pageref{sol:#1}}
}}
}
```

With these preparations, the kernel environment `texercise` for our exercises is created quickly:

```
\newenvironment{texercise}[2][{}]{%
\tcolorbox[texercise=#2,savedelimiter=texercise,#1]}%
{\endcolorbox}
```

The following examples demonstrate the application.

```

\begin{texercise}{tabular_example}
\textit{Create the following table:}\par\smallskip%
\begin{tcboutputlisting}
\begin{tabular}{|p{3cm}|p{3cm}|p{3cm}|p{3cm}|}\hline
\multicolumn{4}{|c|}{\bfseries\itshape Das alte Italien}\hline
\multicolumn{2}{|c|}{\bfseries Antike} & & \\
\multicolumn{2}{|c|}{\bfseries Mittelalter}\hline
\multicolumn{1}{|c|}{\itshape Republik}& & & \\
\multicolumn{1}{|c|}{\itshape Kaiserreich}& & & \\
\multicolumn{1}{|c|}{\itshape Franken}& & & \\
\multicolumn{1}{|c|}{\itshape Teilstaaten}\hline
In den Zeiten der r\{"o}mischen Republik standen dem Staat jeweils zwei
Konsuln vor, deren Machtbefugnisse identisch waren. & & & \\
Das r\{"o}mische Kaiserreich wurde von einem Alleinherrscher, dem Kaiser,
regiert. & & & \\
& In der V\{"o}lkerwanderungszeit \{"u}bernahmen die Goten und sp\{a}ter die
Franken die Vorherrschaft. & & & \\
& Im sp\{a}teren Mittelalter regierten F\{"u}rsten einen Fleckenteppich
von Einzelstaaten.\hline
\end{tabular}
\end{tcboutputlisting}
\tcbuselistingtext%
\end{texercise}

```

Exercise 1

Solution on page 63

Create the following table:

<i>Das alte Italien</i>			
Antike		Mittelalter	
<i>Republik</i>	<i>Kaiserreich</i>	<i>Franken</i>	<i>Teilstaaten</i>
In den Zeiten der römischen Republik standen dem Staat jeweils zwei Konsuln vor, deren Machtbefugnisse identisch waren.	Das römische Kaiserreich wurde von einem Alleinherrscher, dem Kaiser, regiert.	In der Völkerwanderungszeit übernahmen die Goten und später die Franken die Vorherrschaft.	Im späteren Mittelalter regierten Fürsten einen Fleckenteppich von Einzelstaaten.

```

\begin{texercise}{macro_oneparam}
\begin{tcboutputlisting}
\newcommand{\headingline}[1]{%
  \begin{center}\Large\bfseries #1\end{center}}
\end{tcboutputlisting}
\tcbuselistingtext%

```

Create a new macro `\verb+\headingline+` which produces the following output: `\par\smallskip`

```

\begin{tcbwritetemp}
\headingline{Very important heading}
\end{tcbwritetemp}
\tcbusetemplisting\tcbusetemp%
\end{texercise}

```

Exercise 2

Solution on page 63

Create a new macro `\headingline` which produces the following output:

```
\headingline{Very important heading}
```

Very important heading

```

\begin{texercise}{macro_twoparam}
\begin{tcboutputlisting}
\newcommand{\minitable}[2]{%
  \begin{center}\begin{tabular}{p{10cm}}\hline%
    \multicolumn{1}{c}{\bfseries#1}\hline%
    #2\hline%
  \end{tabular}\end{center}}
\end{tcboutputlisting}
\tcbuselistingtext%

```

Create a new macro `\verb+\minitable+` which produces the following output: `\par\smallskip`

```

\begin{tcbwritetemp}
\minitable{My heading}{In this tiny tabular, there is only a heading
  and some text below which has a width of ten centimeters.}
\end{tcbwritetemp}
\tcbusetemplisting\par\smallskip\tcbusetemp%
\end{texercise}

```

Exercise 3

Solution on page 63

Create a new macro `\minitable` which produces the following output:

```
\minitable{My heading}{In this tiny tabular, there is only a heading
  and some text below which has a width of ten centimeters.}
```

My heading

In this tiny tabular, there is only a heading and some text below
which has a width of ten centimeters.

```

\begin{texercise}{macro_threeparam}
\begin{tcboutputlisting}
\newcommand{\synop}[3]{%
  \begin{tabular}{@{}p{(\linewidth-\tabcolsep*2-\arrayrulewidth)/2}|%
    p{(\linewidth-\tabcolsep*2-\arrayrulewidth)/2}@{}}\hline
    \multicolumn{2}{c}{\bfseries #1}\hline
    \multicolumn{1}{c|}{\itshape English}&
    \multicolumn{1}{c}{\itshape German}\hline
    #2 & #3
  \end{tabular}}
\end{tcboutputlisting}
\begin{tcbusetlistingtext}%
Create a new macro \verb+\synop+ which typesets a synoptic text according
to the following example. Base your macro on a tabular which takes the
total line width.\par\smallskip
\begin{tcbwritetemp}
\synop{Neil Armstrong}%
{That's one small step for a man, one giant leap for mankind.}%
{Das ist ein kleiner Schritt f\"{u}r einen Mann,
  ein riesiger Sprung f\"{u}r die Menschheit.}
\end{tcbwritetemp}
\begin{tcbusetlisting}\par\smallskip\end{tcbusetemp}%
\end{texercise}

```

Exercise 4

Solution on page 63

Create a new macro `\synop` which typesets a synoptic text according to the following example. Base your macro on a tabular which takes the total line width.

```

\synop{Neil Armstrong}%
{That's one small step for a man, one giant leap for mankind.}%
{Das ist ein kleiner Schritt f\"{u}r einen Mann,
  ein riesiger Sprung f\"{u}r die Menschheit.}

```

Neil Armstrong	
<i>English</i>	<i>German</i>
That's one small step for a man, one giant leap for mankind.	Das ist ein kleiner Schritt für einen Mann, ein riesiger Sprung für die Menschheit.

5.5 Solutions for the given L^AT_EX Exercises

For all solutions, a macro `\processsol` was written to the file `\jobname.sol`. Now, we need a definition for this macro to use the solutions.

```

\newcommand{\processsol}[2]{%
  \tcbinputlisting{texercisestyle,listing only,
    title={Solution for Exercise \ref{exe:#2} on page \pageref{exe:#2}\label{sol:#2}},
    listing file={\solfile#1}%
  }}

```

The loading of all solutions is done by:

```
\inputsol
```

With this, we get:

Solution for Exercise 1 on page 60

```
\begin{tabular}{|p{3cm}|p{3cm}|p{3cm}|p{3cm}|}\hline
\multicolumn{4}{|c|}{\bfseries\itshape Das alte Italien}\hline
\multicolumn{2}{|c|}{\bfseries Antike} &
\multicolumn{2}{|c|}{\bfseries Mittelalter}\hline
\multicolumn{1}{|c|}{\itshape Republik}&
\multicolumn{1}{|c|}{\itshape Kaiserreich}&
\multicolumn{1}{|c|}{\itshape Franken}&
\multicolumn{1}{|c|}{\itshape Teilstaaten}\hline
In den Zeiten der r\"{o}mischen Republik standen dem Staat jeweils zwei
Konsuln vor, deren Machtbefugnisse identisch waren. &
Das r\"{o}mische Kaiserreich wurde von einem Alleinherrscher, dem Kaiser,
regiert.
& In der V\"{o}lkerwanderungszeit \"{u}bernahmen die Goten und sp\"{a}ter die
Franken die Vorherrschaft.
& Im sp\"{a}teren Mittelalter regierten F\"{u}rsten einen Fleckenteppich
von Einzelstaaten.\hline
\end{tabular}
```

Solution for Exercise 2 on page 61

```
\newcommand{\headingline}[1]{%
\begin{center}\Large\bfseries #1\end{center}}
```

Solution for Exercise 3 on page 61

```
\newcommand{\minitable}[2]{%
\begin{center}\begin{tabular}{p{10cm}}\hline%
\multicolumn{1}{c}{\bfseries#1}\hline%
#2\hline%
\end{tabular}\end{center}}
```

Solution for Exercise 4 on page 62

```
\newcommand{\synop}[3]{%
\begin{tabular}{@{}p{(\linewidth-\tabcolsep*2-\arrayrulewidth)/2}|%
p{(\linewidth-\tabcolsep*2-\arrayrulewidth)/2}@{}}\hline
\multicolumn{2}{c}{\bfseries #1}\hline
\multicolumn{1}{c|}{\itshape English}&
\multicolumn{1}{c|}{\itshape German}\hline
#2 & #3
\end{tabular}}
```

6 Library 'theorems'

The library is loaded by a package option or inside the preamble by:

```
\tcbuselibrary{theorems}
```

This also loads the package `amsmath`.

6.1 Macros of the Library

`\tcbmaketheorem`{ $\langle name \rangle$ }{ $\langle display name \rangle$ }{ $\langle options \rangle$ }{ $\langle counter \rangle$ }{ $\langle prefix \rangle$ }

Creates a new environment $\langle name \rangle$ based on `tcolorbox` to frame a (mathematical) theorem. The $\langle display name \rangle$ is used in the title line with a number, e.g. «Theorem 5.1». The $\langle options \rangle$ are given to the underlying `tcolorbox` to control the appearance. The $\langle counter \rangle$ is used for automatic numbering. The new environment $\langle name \rangle$ takes one optional and two mandatory parameters. The optional parameter supplements the options and should be used only in rare cases. The first mandatory parameter is the title text for the theorem and the second mandatory parameter is a $\langle marker \rangle$. The theorem is automatically labeled with $\langle prefix \rangle:\langle marker \rangle$.

```
\tcbmaketheorem{theo}{My Theorem}{colback=green!5,colframe=green!35!black,
fonttitle=\bfseries}{texercise}{th}

\begin{theo}{This is my title}{theoexample}
  This is the text of the theorem. As can be seen, the counter \texttt{texercise}
  is reused. The theorem is numbered with \ref{th:theoexample} and is
  given on page \pageref{th:theoexample}.
\end{theo}
```

My Theorem 5: This is my title

This is the text of the theorem. As can be seen, the counter `texercise` is reused. The theorem is numbered with 5 and is given on page 64.

`\tcbboxmath`[$\langle options \rangle$]{ $\langle mathematical box content \rangle$ }

Creates a `tcolorbox`^{P.5} which is fitted to the width of the given $\langle mathematical box content \rangle$. This box is intended to be applied as part of a larger formula and may be used as replacement for the `\boxed` macro of `amsmath`.

```
\begin{equation}
\tcbset{fonttitle=\scriptsize}
\tcbboxmath[colback=LightBlue!25!white,colframe=blue]{ a^2 = 16 }
\quad \Rightarrow \quad
\tcbboxmath[colback=Salmon!25!white,colframe=red,title=Implication]{
  { a = 4 ~\vee~ a=-4. }
}
\end{equation}
```

$$a^2 = 16$$

\Rightarrow

Implication

$$a = 4 \vee a = -4.$$

(1)

`\tcbhighmath[<options>]{<mathematical box content>}`

This is a special case of the `\tcboxmath`^{P.64} macro which uses the style `/tcb/highlight math`^{P.66}. It is intended to provide context sensitive highlighting of formula parts. The color settings via `/tcb/highlight math style`^{P.66} may be different inside theorems or other colored areas and outside.

```
\tcbset{myformula/.style={colback=yellow!10!white,colframe=red!50!black,
highlight math style={colback=LightBlue!50!white,colframe=Navy}}}

\begin{align}
\tcbhighmath{\sum\limits_{n=1}^{\infty} \frac{1}{n}} &= \infty. \\
\int x^2 \sim \text{d}x &= \frac{1}{3} x^3 + c.
\end{align}

\begin{tcolorbox}[ams align,myformula]
\tcbhighmath{\sum\limits_{n=1}^{\infty} \frac{1}{n}} &= \infty. \\
\int x^2 \sim \text{d}x &= \frac{1}{3} x^3 + c.
\end{tcolorbox}
```

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty. \quad (2)$$

$$\int x^2 \, dx = \frac{1}{3} x^3 + c. \quad (3)$$

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty. \quad (4)$$

$$\int x^2 \, dx = \frac{1}{3} x^3 + c. \quad (5)$$

6.2 Option Keys of the Library

/tcb/theorem= $\langle display name \rangle \langle counter \rangle \langle title \rangle \langle marker \rangle$ (no default)

This key is internally used by `\tcbmaketheorem`^{→ P.64}, but can be used directly in a `tcolorbox` for a more flexible approach. The $\langle display name \rangle$ is used together with the increased $\langle counter \rangle$ value and the $\langle title \rangle$ for the title line of the box. Additionally, a `\label` with the given $\langle marker \rangle$ is created.

```
\begin{tcolorbox}[colback=green!10,colframe=green!50!black,arc=4mm,
                 theorem={Test}{texercise}{Direct usage}{myMarker}]
Here, we see the test \ref{myMarker}.
\end{tcolorbox}
```

Test 6: Direct usage

Here, we see the test 6.

For a common appearance inside the document, the key `theorem` should not be used directly as in the example above, but as part of a new environment created by hand or using `\tcbmaketheorem`^{→ P.64}.

/tcb/highlight math (style, no value)

Predefined style which is used for `\tcbhighmath`^{→ P.65}. It can be changed comfortable with `/tcb/highlight math style`^{→ P.66}.

/tcb/highlight math style= $\langle style definition \rangle$ (style, no default)

Changes the definition for `/tcb/highlight math`^{→ P.66} to the given $\langle style definition \rangle$. See `\tcbhighmath`^{→ P.65} for an example.

/tcb/math upper (style, no value)

Sets the upper part to mathematical mode with font `\displaystyle`.

/tcb/math lower (style, no value)

Sets the lower part to mathematical mode with font `\displaystyle`.

/tcb/math (style, no value)

Sets the upper part *and* lower part to mathematical mode with font `\displaystyle`.

```
\begin{tcolorbox}[math,colback=yellow!10!white,colframe=red!50!black]
\sum\limits_{n=1}^{\infty} \frac{1}{n} = \infty.
\end{tcolorbox}
```

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty.$$

The following styles are only tested to work with the original `amsmath` environments. If e.g. the `equation` environment is redefined as `gather`, then `/tcb/ams equation`^{P.67} should / could not be used. Obviously, you are encouraged to use `/tcb/ams gather`^{P.69} in this case.

`/tcb/ams equation upper` (style, no value)

Adds an `amsmath equation` environment to the begin and to the end if the upper part.

`/tcb/ams equation lower` (style, no value)

Adds an `amsmath equation` environment to the begin and to the end if the lower part.

`/tcb/ams equation` (style, no value)

Adds an `amsmath equation` environment to the begin and to the end if the upper *and* lower part.

```
\begin{tcolorbox}[ams equation,colback=yellow!10!white,colframe=red!50!black]
  \sum\limits_{n=1}^{\infty} \frac{1}{n} = \infty.
\end{tcolorbox}
```

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty. \quad (6)$$

`/tcb/ams equation* upper` (style, no value)

Adds an `amsmath equation*` environment to the begin and to the end if the upper part.

`/tcb/ams equation* lower` (style, no value)

Adds an `amsmath equation*` environment to the begin and to the end if the lower part.

`/tcb/ams equation*` (style, no value)

Adds an `amsmath equation*` environment to the begin and to the end if the upper *and* lower part.

```
\begin{tcolorbox}[ams equation*,colback=yellow!10!white,colframe=red!50!black]
  \sum\limits_{n=1}^{\infty} \frac{1}{n} = \infty.
\end{tcolorbox}
```

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty.$$

`/tcb/ams align upper` (style, no value)

Adds an `amsmath align` environment to the begin and to the end if the upper part.

`/tcb/ams align lower` (style, no value)

Adds an `amsmath align` environment to the begin and to the end if the lower part.

`/tcb/ams align` (style, no value)

Adds an `amsmath align` environment to the begin and to the end if the upper *and* lower part.

```
\begin{tcolorbox}[ams align,colback=yellow!10!white,colframe=red!50!black]
  \sum\limits_{n=1}^{\infty} \frac{1}{n} &= \infty.\\\
  \int x^2 \, dx &= \frac{1}{3} x^3 + c.
\end{tcolorbox}
```

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty. \quad (7)$$

$$\int x^2 \, dx = \frac{1}{3} x^3 + c. \quad (8)$$

`/tcb/ams align* upper` (style, no value)

Adds an `amsmath align*` environment to the begin and to the end if the upper part.

`/tcb/ams align* lower` (style, no value)

Adds an `amsmath align*` environment to the begin and to the end if the lower part.

`/tcb/ams align*` (style, no value)

Adds an `amsmath align*` environment to the begin and to the end if the upper *and* lower part.

```
\begin{tcolorbox}[ams align*,colback=yellow!10!white,colframe=red!50!black]
  \sum\limits_{n=1}^{\infty} \frac{1}{n} &= \infty.\\\
  \int x^2 \, dx &= \frac{1}{3} x^3 + c.
\end{tcolorbox}
```

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty.$$

$$\int x^2 \, dx = \frac{1}{3} x^3 + c.$$

`/tcb/ams gather upper` (style, no value)

Adds an `amsmath gather` environment to the begin and to the end if the upper part.

`/tcb/ams gather lower` (style, no value)

Adds an `amsmath gather` environment to the begin and to the end if the lower part.

`/tcb/ams gather` (style, no value)

Adds an `amsmath gather` environment to the begin and to the end if the upper *and* lower part.

```
\begin{tcolorbox}[ams gather,colback=yellow!10!white,colframe=red!50!black]
  \sum\limits_{n=1}^{\infty} \frac{1}{n} = \infty.\allowbreak
  \int x^2 \, dx = \frac{1}{3} x^3 + c.
\end{tcolorbox}
```

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty. \quad (9)$$

$$\int x^2 \, dx = \frac{1}{3} x^3 + c. \quad (10)$$

`/tcb/ams gather* upper` (style, no value)

Adds an `amsmath gather*` environment to the begin and to the end if the upper part.

`/tcb/ams gather* lower` (style, no value)

Adds an `amsmath gather*` environment to the begin and to the end if the lower part.

`/tcb/ams gather*` (style, no value)

Adds an `amsmath gather*` environment to the begin and to the end if the upper *and* lower part.

```
\begin{tcolorbox}[ams gather*,colback=yellow!10!white,colframe=red!50!black]
  \sum\limits_{n=1}^{\infty} \frac{1}{n} = \infty.\allowbreak
  \int x^2 \, dx = \frac{1}{3} x^3 + c.
\end{tcolorbox}
```

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty.$$

$$\int x^2 \, dx = \frac{1}{3} x^3 + c.$$

/tcb/ams nodisplayskip upper (style, no value)

Neutralizes the `\abovedisplayskip` of a following `align` or `gather` environment for the upper part. Note that the text content has to start with such a formula.

/tcb/ams nodisplayskip lower (style, no value)

Neutralizes the `\abovedisplayskip` of a following `align` or `gather` environment for the lower part. Note that the text content has to start with such a formula.

/tcb/ams nodisplayskip (style, no value)

Neutralizes the `\abovedisplayskip` of a following `align` or `gather` environment for the upper part *and* lower part. Note that the text content has to start with such a formula.

```
\begin{tcolorbox}[ams nodisplayskip,colback=yellow!10!white,colframe=red!50!black]
  \begin{gather}
    \sum\limits_{n=1}^{\infty} \frac{1}{n} = \infty.\\
    \int x^2 \sim \text{d}x = \frac{1}{3} x^3 + c.
  \end{gather}
  And now for something completely different.
\end{tcolorbox}
```

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty. \quad (11)$$

$$\int x^2 \, dx = \frac{1}{3} x^3 + c. \quad (12)$$

And now for something completely different.

6.3 Examples for Definitions and Theorems

In the following, the application of `\tcbmaketheorem`^{P.64} to highlight mathematical definitions, theorems, or the like is demonstrated.

At first, additional `tcb` keys are created for the appearance of the colored boxes. It is assumed that theorems and corollaries should be identically colored. All following environments are numbered with a common counter, but this can be changed easily. Here, the counter output is supplemented by the section number.

```
%\newcounter{mytheorem}[section] % preamble
\def\themytheorem{\thesection.\arabic{mytheorem}}

\tcbset{
  defstyle/.style={fonttitle=\bfseries\upshape, fontupper=\slshape,
    arc=0mm, colback=blue!5!white,colframe=blue!75!black},
  theostyle/.style={fonttitle=\bfseries\upshape, fontupper=\slshape,
    colback=red!10!white,colframe=red!75!black},
}
```

By `\tcbmaketheorem`^{P.64}, commonly numbered theorem environments are created now. `defstyle` and `theostyle` are used for the appearance.

```
\tcbmaketheorem{Definition}{Definition}{defstyle}{mytheorem}{def}
\tcbmaketheorem{Theorem}{Theorem}{theostyle}{mytheorem}{theo}
\tcbmaketheorem{Corollary}{Corollary}{theostyle}{mytheorem}{cor}
```

Now, everything is prepared for the following examples.

```
The following theorem is numbered as Theorem \ref{theo:diffbarstetig} and
referenced with the marker \texttt{theo:diffbarstetig}.\bigskip

\begin{Theorem}{Differenzierbarkeit bedingt Stetigkeit, wobei diese Benennung
zu Testzwecken ungew\''{o}hnlich lang ist}{diffbarstetig}%
Eine Funktion  $f:I\rightarrow\mathbb{R}$  ist in  $x_0\in I$  stetig, wenn  $f$  in
 $x_0$  differenzierbar ist.
\end{Theorem}
```

The following theorem is numbered as Theorem 6.1 and referenced with the marker `theo:diffbarstetig`.

Theorem 6.1: Differenzierbarkeit bedingt Stetigkeit, wobei diese Benennung zu Testzwecken ungewöhnlich lang ist

Eine Funktion $f : I \rightarrow \mathbb{R}$ ist in $x_0 \in I$ stetig, wenn f in x_0 differenzierbar ist.

The following definition is numbered as Definition \ref{def:diffbarkeit} and referenced with the marker \texttt{def:diffbarkeit}.\bigskip

```
\begin{Definition}{Differenzierbarkeit}{diffbarkeit}
  Eine Funktion  $f: I \rightarrow \mathbb{R}$  auf einem Intervall  $I$  heit in  $x_0 \in I$  differenzierbar oder linear approximierbar, wenn der Grenzwert
  \begin{equation*}
    \lim_{x \rightarrow x_0} \frac{f(x) - f(x_0)}{x - x_0} = \lim_{h \rightarrow 0} \frac{f(x_0 + h) - f(x_0)}{h}
  \end{equation*}
  existiert. Bei Existenz heit dieser Grenzwert Ableitung oder Differentialquotient von  $f$  in  $x_0$  und man schreibt fr ihn
  \begin{equation*}
    f'(x_0) \quad \text{oder} \quad \frac{df}{dx}(x_0).
  \end{equation*}
\end{Definition}
```

The following definition is numbered as Definition 6.2 and referenced with the marker def:diffbarkeit.

Definition 6.2: Differenzierbarkeit

Eine Funktion $f : I \rightarrow \mathbb{R}$ auf einem Intervall I heit in $x_0 \in I$ differenzierbar oder linear approximierbar, wenn der Grenzwert

$$\lim_{x \rightarrow x_0} \frac{f(x) - f(x_0)}{x - x_0} = \lim_{h \rightarrow 0} \frac{f(x_0 + h) - f(x_0)}{h}$$

existiert. Bei Existenz heit dieser Grenzwert Ableitung oder Differentialquotient von f in x_0 und man schreibt fr ihn

$$f'(x_0) \quad \text{oder} \quad \frac{df}{dx}(x_0).$$

The following corollary is numbered as Corollary \ref{cor:nullstellen} and referenced with the marker \texttt{cor:nullstellen}.\bigskip

```
\begin{Corollary}{Nullstellenexistenz}{nullstellen}
  Ist  $f: [a, b] \rightarrow \mathbb{R}$  stetig und haben  $f(a)$  und  $f(b)$  entgegengesetzte Vorzeichen, also  $f(a)f(b) < 0$ , so besitzt  $f$  eine Nullstelle  $x_0 \in ]a, b[$ , also  $f(x_0) = 0$ .
\end{Corollary}
```

The following corollary is numbered as Corollary 6.3 and referenced with the marker cor:nullstellen.

Corollary 6.3: Nullstellenexistenz

Ist $f : [a, b] \rightarrow \mathbb{R}$ stetig und haben $f(a)$ und $f(b)$ entgegengesetzte Vorzeichen, also $f(a)f(b) < 0$, so besitzt f eine Nullstelle $x_0 \in]a, b[$, also $f(x_0) = 0$.

```
\begin{Theorem}[boxrule=2mm,toptitle=-1.5mm,bottomtitle=-1.5mm]{%
  Hinreichende Bedingung f\"{u}r Wendepunkte}{wendehinreichend}%
  $$$ sei eine auf einem Intervall $]a,b[$ dreimal stetig differenzierbare Funktion.
  Ist $f''(x_0)=0$ in $x_0\in]a,b[$ und $f'''(x_0)\neq 0$, so ist
  $(x_0,f(x_0))$ ein Wendepunkt von $f$.
\end{Theorem}
```

Theorem 6.4: Hinreichende Bedingung für Wendepunkte

f sei eine auf einem Intervall $]a,b[$ dreimal stetig differenzierbare Funktion. Ist $f''(x_0) = 0$ in $x_0 \in]a,b[$ und $f'''(x_0) \neq 0$, so ist $(x_0, f(x_0))$ ein Wendepunkt von f .

You need more attention for your theorems? Here, you are ...

```
% tcbuselibrary{skins} % preamble
\begin{Theorem}[enhanced,frame style={circular glow={fill=yellow}},
  watermark color=red!35!white,
  watermark text={Overacting\!\Fundamental Theorem}]%
  {Fundamental Theorem of Theorems}{fundamental}%
  \lipsum[1-2]
\end{Theorem}
```

Theorem 6.5: Fundamental Theorem of Theorems

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultrices et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

7 Library 'documentation'

This library has the single purpose to support L^AT_EX package documentations like this one. Actually, the visual nature follows the approach from Till Tantau's `pgf` [12] documentation. Typically, this library is assumed to be used in conjunction with the class `ltxdoc` or alike.

The library is loaded by a package option or inside the preamble by:

```
\tcbuselibrary{documentation}
```

This also loads the library 'listings', see section 5, and a bunch of packages, namely `doc`, `pifont`, `marvosym`, `hyperref`, and `makeidx`.

For UTF-8 support, load:

```
\tcbuselibrary{listingsutf8,documentation}
```

7.1 Macros of the Library

```
\begin{docCommand}{\langle name \rangle}{\langle parameters \rangle}
  \langle environment content \rangle
\end{docCommand}
```

Documents a L^AT_EX macro with given $\langle name \rangle$ where $\langle name \rangle$ is written without backslash. This macro takes mandatory or optional $\langle parameters \rangle$. It is automatically indexed and can be referenced with `\refCom`^{P. 78} $\{\langle name \rangle\}$.

```
\begin{docCommand}{\foomakedocSubKey}{\marg{name}\marg{key path}}
  Creates a new environment \meta{name} based on \refEnv{docKey} for the
  documentation of keys with the given \meta{key path}.
\end{docCommand}
```

```
\foomakedocSubKey{\langle name \rangle}{\langle key path \rangle}
  Creates a new environment \langle name \rangle based on docKeyP. 75 for the documentation of keys with
  the given \langle key path \rangle.
```

```
\begin{docEnvironment}{\langle name \rangle}{\langle parameters \rangle}
  \langle environment content \rangle
\end{docEnvironment}
```

Documents a L^AT_EX environment with given $\langle name \rangle$. This environment takes mandatory or optional $\langle parameters \rangle$. It is automatically indexed and can be referenced with `\refEnv`^{P. 78} $\{\langle name \rangle\}$.

```
\begin{docEnvironment}{foocolorbox}{\oarg{options}}
  This is the main environment to create an accentuated colored text box with
  rounded corners and, optionally, two parts.
\end{docEnvironment}
```

```
\begin{foocolorbox}[\langle options \rangle]
  \langle environment content \rangle
\end{foocolorbox}
  This is the main environment to create an accentuated colored text box with rounded corners
  and, optionally, two parts.
```

`\begin{docKey}[\langle key path \rangle]{\langle name \rangle}{\langle parameters \rangle}{\langle description \rangle}`
`\end{docKey}`

Documents a key with given $\langle name \rangle$ and an optional $\langle key path \rangle$. This key takes mandatory or optional $\langle parameters \rangle$ as value with a short $\langle description \rangle$. It is automatically indexed and can be referenced with `\refKey`^{P. 78} $\{\langle name \rangle\}$.

```
\begin{docKey}[foo]{footitle}{=\meta{text}}{no default, initially empty}
  Creates a heading line with \meta{text} as content.
\end{docKey}
```

`/foo/footitle= $\langle text \rangle$` (no default, initially empty)
 Creates a heading line with $\langle text \rangle$ as content.

`\docAuxCommand{\langle name \rangle}`

Documents an auxiliary or minor L^AT_EX macro with given $\langle name \rangle$ where $\langle name \rangle$ is written without backslash. This macro is automatically indexed.

The macro `\docAuxCommand{fooaux}` holds some interesting data.

The macro `\fooaux` holds some interesting data.

`\docColor{\langle name \rangle}`

Documents a color with given $\langle name \rangle$. The color is automatically indexed.

The color `\docColor{foocolor}` is available.

The color `foocolor` is available.

`\cs{\langle name \rangle}`

Macro from ltxdoc [3] to typeset a command word $\langle name \rangle$ where the backslash is prefixed. The library overwrites the original macro.

This is a `\cs{foocommand}`.

This is a `\foocommand`.

`\meta{\langle text \rangle}`

Macro from doc [5] to typeset a meta $\langle text \rangle$.

This is a `\meta{text}`.

This is a $\langle text \rangle$.

`\marg{\langle text \rangle}`

Macro from ltxdoc [3] to typeset a $\langle text \rangle$ with curly brackets as a mandatory argument. The library overwrites the original macro.

This is a mandatory `\marg{argument}`.

This is a mandatory $\{\langle argument \rangle\}$.

`\oarg{⟨text⟩}`

Macro from `ltxdoc` [3] to typeset a `⟨text⟩` with square brackets as an optional argument. The library overwrites the original macro.

```
This is an optional \oarg{argument}.
```

```
This is an optional [⟨argument⟩].
```

`\brackets{⟨text⟩}`

Sets the given `⟨text⟩` with curly brackets.

```
Here we use \brackets{some text}.
```

```
Here we use {some text}.
```

`\begin{dispExample}`

`⟨environment content⟩`

`\end{dispExample}`

Creates a colored box based on a `tcolorbox`^{P.5}. It displays the environment content as source code in the upper part and as compiled text in the lower part of the box. The appearance is controlled by `/tcb/documentation listing style`^{P.79} and the style `/tcb/docexample`^{P.79}. It may be changed by redefining this style.

```
\begin{dispExample}
This is a \LaTeX\ example.
\end{dispExample}
```

```
This is a \LaTeX\ example.
```

```
This is a LATEX example.
```

`\begin{dispExample*}{⟨options⟩}`

`⟨environment content⟩`

`\end{dispExample*}`

The starred version of `dispExample`^{P.76} takes `tcolorbox`^{P.5} `⟨options⟩` as parameter. These `⟨options⟩` are executed after `/tcb/docexample`^{P.79}.

```
\begin{dispExample*}{sidebyside}
This is a \LaTeX\ example.
\end{dispExample*}
```

```
This is a \LaTeX\ example.
```

```
This is a LATEX example.
```

```
\begin{displisting}
  <environment content>
\end{displisting}
```

Creates a colored box based on a `tcolorbox`^{→P.5}. It displays the environment content as source code. The appearance is controlled by `/tcb/documentation listing style`^{→P.79} and the style `/tcb/docexample`^{→P.79}. It may be changed by redefining this style.

```
\begin{displisting}
This is a \LaTeX\ example.
\end{displisting}
```

This is a \LaTeX\ example.

```
\begin{displisting*}[<options>]
  <environment content>
\end{displisting*}
```

The starred version of `displisting`^{→P.77} takes `tcolorbox`^{→P.5} `<options>` as parameter. These `<options>` are executed after `/tcb/docexample`^{→P.79}.

```
\begin{displisting*}[title=My listing]
This is a \LaTeX\ example.
\end{displisting*}
```

My listing

This is a \LaTeX\ example.

```
\begin{absquote}
  <environment content>
\end{absquote}
```

Used to typeset an abstract as quoted and small text.

```
\begin{absquote}
|tcolorbox| provides an environment for colored and framed text boxes with a
heading line. Optionally, such a box can be split in an upper and a lower part.
\end{absquote}
```

`tcolorbox` provides an environment for colored and framed text boxes with a heading line. Optionally, such a box can be split in an upper and a lower part.

`\tcbmakedocSubKey``{⟨name⟩}{⟨key path⟩}`

Creates a new environment `⟨name⟩` based on `docKey`^{→ P. 75} for the documentation of keys with the given `⟨key path⟩` as default. The new environment `⟨name⟩` takes the same parameters as `docKey`^{→ P. 75} itself.

```
\tcbmakedocSubKey{docFooKey}{foo}

\begin{docFooKey}{foodummy}{=\meta{nothing}}{no default, initially empty}
Some key.
\end{docFooKey}

/foo/foodummy=⟨nothing⟩ (no default, initially empty)
Some key.
```

`\refCom``{⟨name⟩}`

References a documented L^AT_EX macro with given `⟨name⟩` where `⟨name⟩` is written without backslash.

```
We have created \refCom{foomakedocSubKey} as an example.

We have created \foomakedocSubKey→ P. 74 as an example.
```

`\refEnv``{⟨name⟩}`

References a documented L^AT_EX environment with given `⟨name⟩`.

```
We have created \refEnv{foocolorbox} as an example.

We have created foocolorbox→ P. 74 as an example.
```

`\refKey``{⟨name⟩}`

References a documented key with given `⟨name⟩` where `⟨name⟩` is the full path name of the key.

```
We have created \refKey{/foo/footitle} as an example.

We have created /foo/footitle→ P. 75 as an example.
```

`\colDef``{⟨text⟩}`

Sets `⟨text⟩` with the definition color, see `/tcb/color definition`^{→ P. 79}.

```
This is my \colDef{text}.

This is my text.
```

`\colOpt``{⟨text⟩}`

Sets `⟨text⟩` with the option color, see `/tcb/color option`^{→ P. 79}.

```
This is my \colOpt{text}.

This is my text.
```

7.2 Option Keys of the Library

- /tcb/docexample** (style, no value)
Sets the style for `dispExample`^{→P.76} and `dispListing`^{→P.77} with the colors `ExampleBack` and `ExampleFrame`. To change the appearance of the examples, this style can be redefined.
- /tcb/documentation listing style**= $\langle listing\ style \rangle$ (no default, initially `tcbdocumentation`)
Sets a $\langle listing\ style \rangle$ for the `listings` package [4]. It is used inside `dispExample`^{→P.76} and `dispListing`^{→P.77} to typeset the listings. Note that this is not identical to the key `/tcb/listing style`^{→P.48} which is used for 'normal' listings.
- /tcb/color definition**= $\langle color \rangle$ (no default, initially `Definition`)
Sets the highlight color used by macro and key definitions.
- /tcb/color option**= $\langle color \rangle$ (no default, initially `Option`)
Sets the color used for optional arguments.
- /tcb/color hyperlink**= $\langle color \rangle$ (no default, initially `Hyperlink`)
Sets the color for all hyper-links, i. e. all internal and external links.
- /tcb/before example**= $\langle macros \rangle$ (no default, initially `\par\smallskip`)
Sets the $\langle macros \rangle$ which are executed before `dispExample`^{→P.76} and `dispListing`^{→P.77} additional to `/tcb/before`^{→P.36}.
- /tcb/after example**= $\langle macros \rangle$ (no default, initially empty)
Sets the $\langle macros \rangle$ which are executed after `dispExample`^{→P.76} and `dispListing`^{→P.77} additional to `/tcb/after`^{→P.36}.
- /tcb/index actual**= $\langle character \rangle$ (no default, initially `@`)
Sets the character for 'actual' in automatic indexing.
- /tcb/index quote**= $\langle character \rangle$ (no default, initially `"`)
Sets the character for 'quote' in automatic indexing.
- /tcb/index level**= $\langle character \rangle$ (no default, initially `!`)
Sets the character for 'level' in automatic indexing.
- /tcb/index default settings** (style, no value)
Sets the `makeindex` default values for `/tcb/index actual`^{→P.79}, `/tcb/index quote`^{→P.79}, and `/tcb/index level`^{→P.79}.
- /tcb/index german settings** (style, no value)
Sets the `makeindex` values recommended for German language texts. This is identical to setting the following:


```
\tcbset{index actual={=},index quote={!},index level={>}}
```

The following keys are provided for language specific settings. The English language is predefined.

/tcb/english language	(style, no value)
Sets all language specific settings to English.	
/tcb/doclang/color = $\langle text \rangle$	(no default, initially color)
Text used in the index for colors.	
/tcb/doclang/colors = $\langle text \rangle$	(no default, initially Colors)
Heading text in the index for colors.	
/tcb/doclang/environment content = $\langle text \rangle$	(no default, initially environment content)
Text used in <code>docEnvironment</code> ^{→ P. 74} .	
/tcb/doclang/environment = $\langle text \rangle$	(no default, initially environment)
Text used in the index for environments.	
/tcb/doclang/environments = $\langle text \rangle$	(no default, initially Environments)
Heading text in the index for environments.	
/tcb/doclang/key = $\langle text \rangle$	(no default, initially key)
Text used in the index for keys.	
/tcb/doclang/index = $\langle text \rangle$	(no default, initially Index)
Heading text for the index.	
/tcb/doclang/pageshort = $\langle text \rangle$	(no default, initially P.)
Short text for page references.	

7.3 Predefined Colors of the Library

The following colors are predefined. They are used as default colors in some library commands.

Option , **Definition** , **ExampleFrame** , **ExampleBack** , **Hyperlink** .

8 Library 'skins'

The library is loaded by a package option or inside the preamble by:

```
\tcbuselibrary{skins}
```

This also loads the package `tikz` [12]. Typically but not necessarily, the following skins use `tikz` instead of `pgf`.

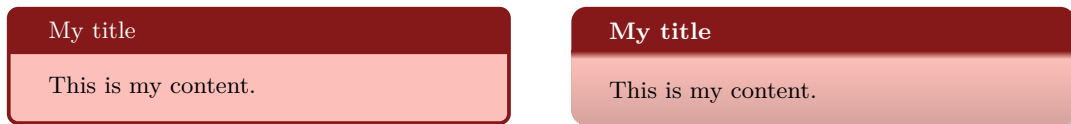
8.1 Technical Overview and Core Package Option Keys

From a technical point of view, a *skin* is a style definition for the appearance of a `tcolorbox`. The core package provides some additional option keys for skins but only a single skin called `standard`^{→ P. 95}. The 'skins' library adds several more skins. To change a skin, only one option from the core package has to be set.

/tcb/skin= $\langle name \rangle$ (style, no default, initially **standard**)
Sets the current skin to $\langle name \rangle$. This is a style definition which sets all the following keys, i.e. for many use cases there is nothing more to do.

```
\tcbset{colback=Salmon!50!white,colframe=FireBrick!75!black,
width=(\linewidth-8mm)/2,before=,after=\hfill,equal height group=ske}

\begin{tcolorbox}[adjusted title=My title]
  This is my content.
\end{tcolorbox}
\begin{tcolorbox}[skin=beamer,beamer,adjusted title=My title]
  This is my content.
\end{tcolorbox}
```



On first read, you may skip the rest of this subsection and proceed to Subsection 8.2 on page 84. All following keys in this subsection are automatically set by the selected skin and you may never have to temper with them. Nevertheless, they can be used after a skin was selected to modify this skin.

/tcb/skin first= $\langle name \rangle$ (style, no default, initially **standard**)
If the box is set to be `/tcb/breakable`^{→ P. 121} and *is* broken actually, then the skin for the *first* part of the break sequence is set to $\langle name \rangle$, see Subsection 9.5 on page 125. Typically, this key is set by a `/tcb/skin`^{→ P. 81}.

/tcb/skin middle= $\langle name \rangle$ (style, no default, initially **standard**)
If the box is set to be `/tcb/breakable`^{→ P. 121} and *is* broken actually, then the skin for the *middle* parts (if any) of the break sequence is set to $\langle name \rangle$, see Subsection 9.5 on page 125. Typically, this key is set by a `/tcb/skin`^{→ P. 81}.

/tcb/skin last= $\langle name \rangle$ (style, no default, initially **standard**)
If the box is set to be `/tcb/breakable`^{→ P. 121} and *is* broken actually, then the skin for the *last* part of the break sequence is set to $\langle name \rangle$, see Subsection 9.5 on page 125. Typically, this key is set by a `/tcb/skin`^{→ P. 81}.

/tcb/graphical environment= $\langle name \rangle$ (no default, initially **pgfpicture**)

Sets the graphical environment for the **tcolorbox** to $\langle name \rangle$. Feasible values are **pgfpicture** and **tikzpicture** or environments which inherit from one of these two. This key is set by a **/tcb/skin**^{→P.81} and may seldom be used directly.

The skin of a **tcolorbox** is drawn by up to four *engines*. Afterwards, the text content is drawn which is not part of a skin. The four steps are:

1. The *frame* of the box.
2. The *interior* of the box. The interior of a box with title is drawn differently from a box without title.
3. The *segmentation* (line) of the box, if there is a lower part.
4. The *title area* of the box, if there is a title.

Every engine for the up to four steps can be set to one of the following types:

1. **standard**: the original code from the core package.
2. **path**: a **tikz** path which can be controlled by options.
3. **pathfirst**: a **tikz** path which can be controlled by options.
4. **pathmiddle**: a **tikz** path which can be controlled by options.
5. **pathlast**: a **tikz** path which can be controlled by options.
6. **freelance**: arbitrary user code.

/tcb/frame engine= $\langle name \rangle$ (no default, initially **standard**)

Sets the *frame* drawing engine for a box to $\langle name \rangle$. Typically, this key is set by a **/tcb/skin**^{→P.81}. Feasible values for $\langle name \rangle$ are:

- **standard**: the original code from the core package,
- **path**: a **tikz** path which is controlled by **/tcb/frame style**^{→P.84},
- **pathfirst**: a **tikz** path which is controlled by **/tcb/frame style**^{→P.84},
- **pathmiddle**: a **tikz** path which is controlled by **/tcb/frame style**^{→P.84},
- **pathlast**: a **tikz** path which is controlled by **/tcb/frame style**^{→P.84},
- **freelance**: arbitrary user code which is given by **/tcb/frame code**^{→P.87}.

/tcb/interior titled engine= $\langle name \rangle$ (no default, initially **standard**)

Sets the *interior* drawing engine for a titled box to $\langle name \rangle$. Typically, this key is set by a **/tcb/skin**^{→P.81}. Feasible values for $\langle name \rangle$ are:

- **standard**: the original code from the core package,
- **path**: a **tikz** path which is controlled by **/tcb/interior style**^{→P.84},
- **pathfirst**: a **tikz** path which is controlled by **/tcb/interior style**^{→P.84},
- **pathmiddle**: a **tikz** path which is controlled by **/tcb/interior style**^{→P.84},
- **pathlast**: a **tikz** path which is controlled by **/tcb/interior style**^{→P.84},
- **freelance**: arbitrary user code which is given by **/tcb/interior titled code**^{→P.87}.

/tcb/interior engine= $\langle name \rangle$ (no default, initially **standard**)

Sets the *interior* drawing engine for an untitled box to $\langle name \rangle$. Typically, this key is set by a **/tcb/skin**^{→P.81}. Feasible values for $\langle name \rangle$ are:

- **standard**: the original code from the core package,
- **path**: a **tikz** path which is controlled by **/tcb/interior style**^{→P.84},
- **pathfirst**: a **tikz** path which is controlled by **/tcb/interior style**^{→P.84},
- **pathmiddle**: a **tikz** path which is controlled by **/tcb/interior style**^{→P.84},
- **pathlast**: a **tikz** path which is controlled by **/tcb/interior style**^{→P.84},
- **freelance**: arbitrary user code which is given by **/tcb/interior code**^{→P.88}.

/tcb/segmentation engine= $\langle name \rangle$ (no default, initially **standard**)

Sets the *segmentation* (line) drawing engine for a box to $\langle name \rangle$. Typically, this key is set by a **/tcb/skin**^{→P.81}. Feasible values for $\langle name \rangle$ are:

- **standard**: the original code from the core package,
- **path**: a tikz path which is controlled by **/tcb/segmentation style**^{→P.85},
- **freelance**: arbitrary user code which is given by **/tcb/segmentation code**^{→P.88}.

/tcb/title engine= $\langle name \rangle$ (no default, initially **standard**)

Sets the *title area* drawing engine for a titled box to $\langle name \rangle$. Typically, this key is set by a **/tcb/skin**^{→P.81}. Feasible values for $\langle name \rangle$ are:

- **standard**: the original code from the core package,
- **path**: a tikz path which is controlled by **/tcb/title style**^{→P.86},
- **pathfirst**: a tikz path which is controlled by **/tcb/title style**^{→P.86},
- **pathmiddle**: a tikz path which is controlled by **/tcb/title style**^{→P.86},
- **pathlast**: a tikz path which is controlled by **/tcb/title style**^{→P.86},
- **freelance**: arbitrary user code which is given by **/tcb/title code**^{→P.89}.

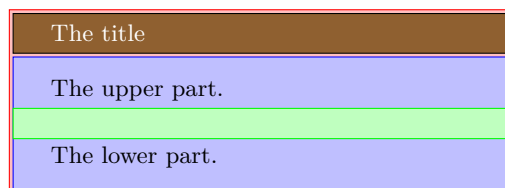
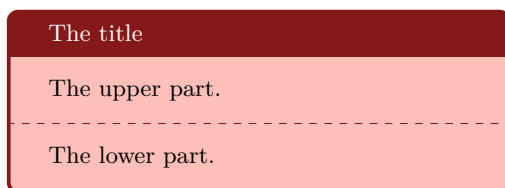
/tcb/geometry nodes= $\langle boolean value \rangle$ (default **true**, initially **false**)

If set to **true**, up to four tikz nodes are defined for a **tcolorbox** which are named **frame**, **interior**, **segmentation**, and **title**. These nodes describe the boundaries of the equally named parts of a **tcolorbox**. They are used by all engines of type **path** and they may be used by engines of type **freelance**. Typically, this key is set by a **/tcb/skin**^{→P.81}.

```
\tcbset{colback=Salmon!50!white,colframe=FireBrick!75!black,
width=(\linewidth-8mm)/2,before=,after=\hfill,equal height group=geon}

\begin{tcolorbox}[adjusted title=The title]
  The upper part.\tcblower The lower part.
\end{tcolorbox}

\begin{tcolorbox}[adjusted title=The title,skin=freelance,
frame code={\path[draw=red,fill=red!25]
  (frame.south west) rectangle (frame.north east);},
interior titled code={\path[draw=blue,fill=blue!25]
  (interior.south west) rectangle (interior.north east);},
segmentation code={\path[draw=green,fill=green!25]
  (segmentation.south west) rectangle (segmentation.north east);},
title code={\path[draw=black,fill=brown!75!black]
  (title.south west) rectangle (title.north east);}]
  The upper part.\tcblower The lower part.
\end{tcolorbox}
```



8.2 Style Option Keys

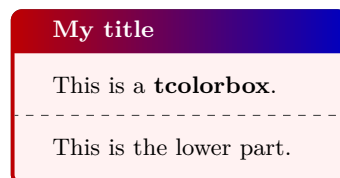
The following style options are applicable for all skins which use engines of type `path`, `pathfirst`, `pathmiddle`, or `pathlast`. Especially, the skin `enhanced`^{→P.96} supports *all* of them and `standard`^{→P.95} *none*.

/tcb/frame style= \langle tikz keys \rangle (style, no default)

The \langle tikz keys \rangle are used inside the `tikz` path command for drawing the *frame* of the box. This option is available if the `/tcb/frame engine`^{→P.82} is set to `path`, `pathfirst`, `pathmiddle`, or `pathlast`. It is *not* available for `standard` and it *may* be applicable for `freelance`.

```
\tcbset{colback=red!5!white,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,
  frame style={left color=red!75!black,
    right color=blue!75!black}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



/tcb/frame hidden (style, no value)

This is a shortcut for `frame style={draw=none,fill=none}`. Depending on the skin, this option switches off the drawing of the frame.

```
\tcbset{colback=red!5!white,colframe=red!75!black,
  fonttitle=\bfseries,coltitle=black}

\begin{tcolorbox}[enhanced,title=My title,
  frame hidden]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

My title

This is a **tcolorbox**.

This is the lower part.

/tcb/interior style= \langle tikz keys \rangle (style, no default)

The \langle tikz keys \rangle are used inside the `tikz` path command for drawing the *interior* of the box. They are used for the titled and for the untitled version as well.

This option is available if the `/tcb/interior titled engine`^{→P.82} or `/tcb/interior engine`^{→P.82} is set to `path`, `pathfirst`, `pathmiddle`, or `pathlast`. It is *not* available for `standard` and it *may* be applicable for `freelance`.

```
\tcbset{colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,
  interior style={left color=red!20!white,
    right color=yellow!50!white}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

My title

This is a **tcolorbox**.

This is the lower part.

`/tcb/interior hidden`

(style, no value)

This is a shortcut for `interior style={draw=none,fill=none}`. Depending on the skin, this option switches off the drawing of the interior.

```
\tcbset{frame style={top color=red!20!white,
  bottom color=red!20!white!75!black},
  fonttitle=\bfseries,coltitle=black}

\begin{tcolorbox}[enhanced,title=My title,
  interior hidden]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

My title

This is a **tcolorbox**.

This is the lower part.

`/tcb/segmentation style=<tikz keys>`

(style, no default)

The `<tikz keys>` are used inside the `tikz` path command for drawing the *segmentation* line of the box.

This option is available if the `/tcb/segmentation engine`^{→P.83} is set to `path`. It is *not* available for `standard` and it *may* be applicable for `freelance`.

```
\tcbset{colback=red!5!white,colframe=red!75!black,
  fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,
  segmentation style={double=white,draw=blue,
    double distance=1pt,solid}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

My title

This is a **tcolorbox**.

This is the lower part.

`/tcb/segmentation hidden`

(style, no value)

This is a shortcut for `segmentation style={draw=none,fill=none}`. Depending on the skin, this option switches off the drawing of the segmentation line.

```
\tcbset{colback=red!5!white,colframe=red!75!black,
  fonttitle=\bfseries}

\begin{tcolorbox}[title=My title,
  enhanced,segmentation hidden]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

My title

This is a **tcolorbox**.

This is the lower part.

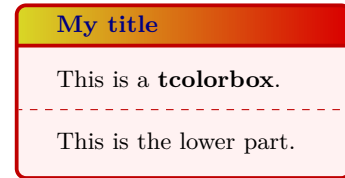
`/tcb/title style=<tikz keys>` (style, no default)

The `<tikz keys>` are used inside the `tikz` path command for drawing the *title area* of the box.

This option is available if the `/tcb/title engine`^{→P.83} is set to `path`, `pathfirst`, `pathmiddle`, or `pathlast`. It is *not* available for `standard` and it *may* be applicable for `freelance`.

```
\tcbset{colback=red!5!white,colframe=red!75!black,
coltitle=blue!50!black,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,
title style={left color=blue!15!yellow,
right color=red!85!black}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



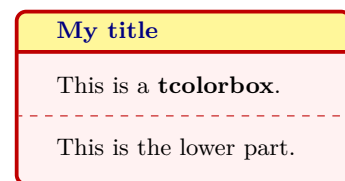
`/tcb/colbacktitle=<color>` (style, no default, initially unset)

Abbreviation for setting `/tcb/title style`^{→P.86} to `fill=<color>`. This fills the background of the title area with the given `<color>`.

This option is available if the `/tcb/title engine`^{→P.83} is set to `path`, `pathfirst`, `pathmiddle`, or `pathlast`. It is *not* available for `standard` and it *may* be applicable for `freelance`.

```
\tcbset{colback=red!5!white,colframe=red!75!black,
coltitle=blue!50!black,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,
colbacktitle=yellow!50!white]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```

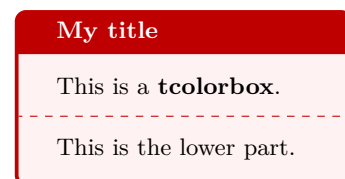


`/tcb/title hidden` (style, no value)

This is a shortcut for `title style={draw=none,fill=none}`. Depending on the skin, this option switches off the drawing of the title background. This is the default behavior for `standard`^{→P.95} and `enhanced`^{→P.96}.

```
\tcbset{colback=red!5!white,colframe=red!75!black,
fonttitle=\bfseries}

\begin{tcolorbox}[title=My title,
enhanced,title hidden]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



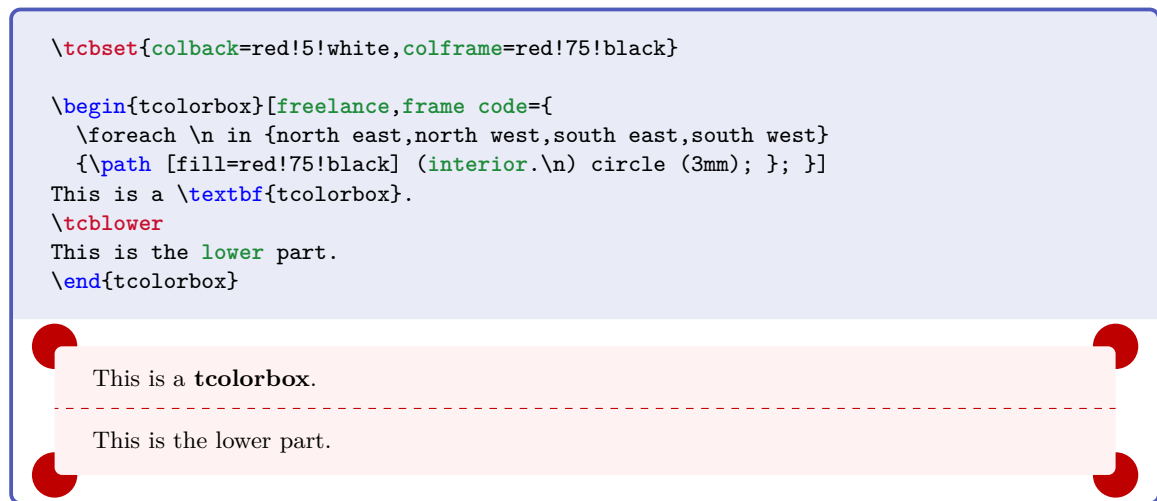
8.3 Code Option Keys

The following code options are applicable for all skins which use engines of type **freelance**. Especially, the skin **freelance**^{→P.102} supports *all* of them, **standard**^{→P.95} and **enhanced**^{→P.96} *none* of them.

/tcb/frame code=*<graphical code>* (code, default from **standard**)

The given *<graphical code>* is used for drawing the *frame* of the box.

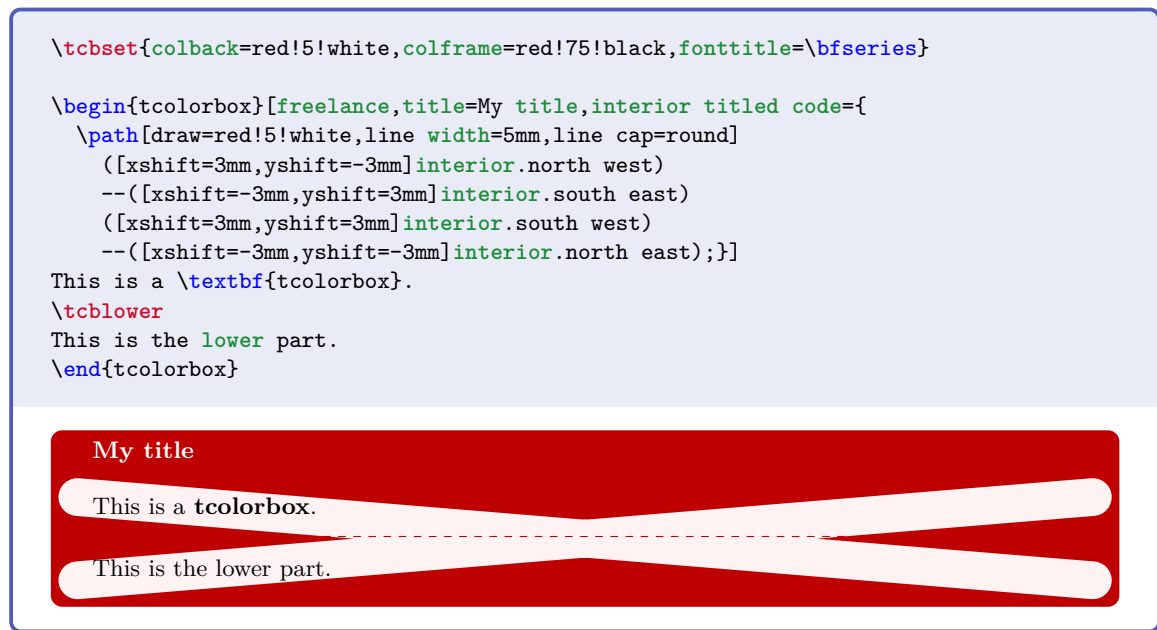
This option is available only if the **/tcb/frame engine**^{→P.82} is set to **freelance**.



/tcb/interior titled code=*<graphical code>* (code, default from **standard**)

The given *<graphical code>* is used for drawing the *interior* of the box, if the box comes with a title.

This option is available only if the **/tcb/interior titled engine**^{→P.82} is set to **freelance**.



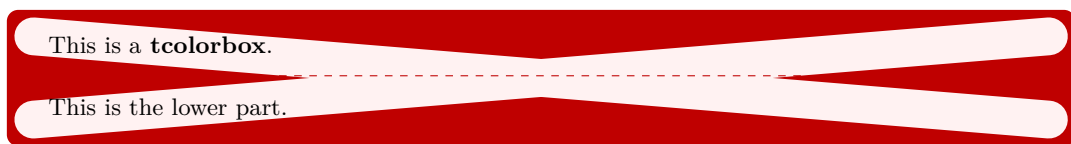
`/tcb/interior code=<graphical code>` (code, default from `standard`)

The given `<graphical code>` is used for drawing the *interior* of the box, if the box is without a title.

This option is available only if the `/tcb/interior engine`^{→ P.82} is set to `freelance`.

```
\tcbset{colback=red!5!white,colframe=red!75!black}

\begin{tcolorbox}[freelance,interior code={
  \path[draw=red!5!white,line width=5mm,line cap=round]
    ([xshift=3mm,yshift=-3mm]interior.north west)
    --([xshift=-3mm,yshift=3mm]interior.south east)
    ([xshift=3mm,yshift=3mm]interior.south west)
    --([xshift=-3mm,yshift=-3mm]interior.north east);}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



`/tcb/segmentation code=<graphical code>` (code, default from `standard`)

The given `<graphical code>` is used for drawing the *segmentation* area of the box.

This option is available only if the `/tcb/segmentation engine`^{→ P.83} is set to `freelance`.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[freelance,title=My title,segmentation code={
  \path[top color=red!5!white,bottom color=red!5!white,middle color=blue]
    (segmentation.south west) rectangle (segmentation.north east);}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



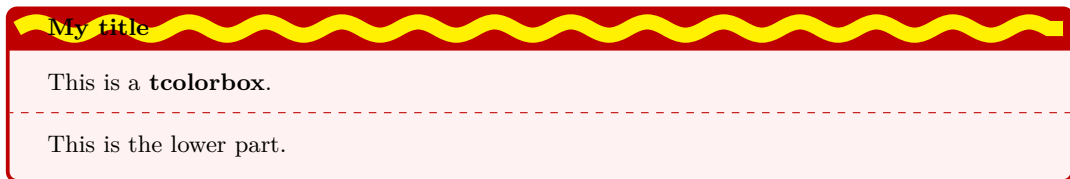
`/tcb/title code=<graphical code>` (code, default from `standard`)

The given `<graphical code>` is used for drawing the *title* area of the box.

This option is available only if the `/tcb/title engine`^{→P.83} is set to `freelance`.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries,
coltitle=black}

\begin{tcolorbox}[freelance,title=My title,title code={
  \path[draw=yellow,solid,decorate,line width=2mm,
    decoration={coil,aspect=0,segment length=10.1mm}]
    ([xshift=1mm]title.west) -- ([xshift=-1mm]title.east);}]
This is a \textbf{tcolorbox}.
\tcblower
This is the lower part.
\end{tcolorbox}
```



8.4 Watermark Option Keys

The following watermark options are applicable for all skins which use `tikzpicture` as `/tcb/graphical environment`^{→ P. 82}. Therefore, the skin `standard`^{→ P. 95} does not support these watermarks, but all other skins, e. g. `enhanced`^{→ P. 96}.

The watermark options rely on the more general overlay options described in Section 3.7 from page 30. Therefore, *watermarks* and *overlays* cannot be used mixed. But a mixture is possible with the 'hooks' library, see Section 10.

`/tcb/watermark text=`*<text>* (no default, initially unset)

Writes some *<text>* in the center of the interior region of a `tcolorbox`. This *<text>* is written *after* the frame and interior are drawn and *before* the text content is drawn. It is zoomed or stretched according the values of `/tcb/watermark zoom`^{→ P. 93} or `/tcb/watermark stretch`^{→ P. 94}.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,watermark text=My Watermark]
\lipsum[1]
\tcblower
\lipsum[2]
\end{tcolorbox}
```

My title

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orei dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

`/tcb/watermark text on=`*<part>* is *<text>* (no default, initially unset)

This option writes some *<text>* in the center of the interior region of a `tcolorbox` as described for `/tcb/watermark text`^{→ P. 90}. But this is done only for boxes named *<part>* of a break sequence, see `/tcb/breakable`^{→ P. 121}.

Feasible values for *<part>* are:

- **broken**: all broken box parts,
- **unbroken**: unbroken boxes only,
- **first**: first parts of a break sequence,
- **middle**: middle parts of a break sequence,
- **last**: last parts of a break sequence,
- **unbroken and first**: unbroken boxes and first parts of a break sequence,
- **middle and last**: middle and last parts of a break sequence.

/tcb/watermark graphics= $\langle file name \rangle$ (no default, initially unset)

Draws an external picture referenced by $\langle file name \rangle$ in the center of the interior region of a `tcolorbox`. The picture is drawn *after* the frame and interior are drawn and *before* the text content is drawn. It is zoomed or stretched according the values of `/tcb/watermark zoom`^{P.93} or `/tcb/watermark stretch`^{P.94}.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,watermark graphics=Basilica_5.png,
  watermark opacity=0.15]
\lipsum[1-2]
\tcblower
This example uses a public domain picture from\
\url{http://commons.wikimedia.org/wiki/File:Basilica_5.png}
\end{tcolorbox}
```

My title

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

This example uses a public domain picture from
http://commons.wikimedia.org/wiki/File:Basilica_5.png

/tcb/watermark graphics on= $\langle part \rangle$ is $\langle file name \rangle$ (no default, initially unset)

This option draws a picture referenced by $\langle file name \rangle$ in the center of the interior region of a `tcolorbox` as described for `/tcb/watermark graphics`^{P.91}. But this is done only for boxes named $\langle part \rangle$ of a break sequence, see `/tcb/breakable`^{P.121}.

Feasible values for $\langle part \rangle$ are:

- **broken**: all broken box parts,
- **unbroken**: unbroken boxes only,
- **first**: first parts of a break sequence,
- **middle**: middle parts of a break sequence,
- **last**: last parts of a break sequence,
- **unbroken and first**: unbroken boxes and first parts of a break sequence,
- **middle and last**: middle and last parts of a break sequence.

`/tcb/watermark tikz=<graphical code>` (no default, initially unset)

Draws the given `tikz` *<graphical code>* in the center of the interior region of a `tcolorbox`. The code is executed *after* the frame and interior are drawn and *before* the text content is drawn. The result is zoomed or stretched according the values of `/tcb/watermark zoom`^{→ P. 93} or `/tcb/watermark stretch`^{→ P. 94}.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,
  watermark tikz={\draw[line width=2mm] (interior) circle (1cm)
    node{\fontfamily{ptm}\fontseries{b}\fontsize{20mm}{20mm}\selectfont ?};}]
\lipsum[1]
\tcblower
\lipsum[2]
\end{tcolorbox}
```

My title

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

`/tcb/watermark tikz on=<part>` *<graphical code>* (no default, initially unset)

This option draws the given `tikz` *<graphical code>* in the center of the interior region of a `tcolorbox` as described for `/tcb/watermark tikz`^{→ P. 92}. But this is done only for boxes named *<part>* of a break sequence, see `/tcb/breakable`^{→ P. 121}.

Feasible values for *<part>* are:

- **broken**: all broken box parts,
- **unbroken**: unbroken boxes only,
- **first**: first parts of a break sequence,
- **middle**: middle parts of a break sequence,
- **last**: last parts of a break sequence,
- **unbroken and first**: unbroken boxes and first parts of a break sequence,
- **middle and last**: middle and last parts of a break sequence.

`/tcb/no watermark` (style, no default, initially set)

Removes the watermark if set before. This is an alias for `/tcb/no overlay`^{→ P. 31}.

`/tcb/watermark opacity=<fraction>`

(no default, initially 1.00)

Sets the opacity value $\in [0, 1]$ for a watermark.

```
\tcbset{enhanced,colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries,
  watermark text=Watermark,nobeforeafter,width=(\linewidth-2mm)/2}

\begin{tcolorbox}[title=Opacity 1.00,watermark opacity=1.00]
\lipsum[2]
\end{tcolorbox}\hfill%
\begin{tcolorbox}[title=Opacity 0.50,watermark opacity=0.50]
\lipsum[2]
\end{tcolorbox}%
```

Opacity 1.00

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Opacity 0.50

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

`/tcb/watermark zoom=<fraction>`

(no default, initially 0.75)

Sets the zoom value for a watermark. The zoom respects the aspect ratio. The value 1.0 means to fill the whole box.

```
\tcbset{enhanced,colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries,
  watermark text=Watermark,nobeforeafter,width=(\linewidth-2mm)/2}

\begin{tcolorbox}[title=Zoom 1.00,watermark zoom=1.00]
\lipsum[2]
\end{tcolorbox}\hfill%
\begin{tcolorbox}[title=Zoom 0.50,watermark zoom=0.50]
\lipsum[2]
\end{tcolorbox}%
```

Zoom 1.00

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Zoom 0.50

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

`/tcb/watermark stretch=<fraction>` (no default, initially unset)

Sets the stretch value for a watermark. The stretch value is applied to width and height in relation to the box dimensions. It does not respect the aspect ratio. The value 1.0 means to fill the whole box.

```
\tcbset{enhanced,colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries,
  watermark graphics=Basilica_5.png,watermark opacity=0.15,
  nobeforeafter,width=(\linewidth-2mm)/2}

\begin{tcolorbox}[title=Stretch 1.00,watermark stretch=1.00]
\lipsum[2]
\end{tcolorbox}\hfill%
\begin{tcolorbox}[title=Stretch 0.50,watermark stretch=0.50]
\lipsum[2]
\end{tcolorbox}%
```

Stretch 1.00

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Stretch 0.50

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

`/tcb/watermark color=<color>` (no default, initially mixed background and frame color)

Sets the color for the watermark.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,watermark text=My Watermark,
  watermark color=yellow!50!red]
\lipsum[1]
\end{tcolorbox}
```

My title

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

8.5 Skin 'standard'

Note that the option keys `/tcb/frame style`^{→P.84}, `/tcb/interior style`^{→P.84}, `/tcb/segmentation style`^{→P.85}, and `/tcb/title style`^{→P.86} are not applicable to the standard skin. Also, watermarks (see Subsection 8.4) are not usable with the standard skin.

`/tcb/skin=standard` (skin)

This is the standard skin from the core package. All drawing engines are set to type `standard`. The drawing is based on `pgf` commands and does not need the `tikz` package.

Environment and engines for the skin 'standard'

```
/tcb/graphical environment→P.82: pgfpicture
/tcb/frame engine→P.82: standard
/tcb/interior titled engine→P.82: standard
/tcb/interior engine→P.82: standard
/tcb/segmentation engine→P.83: standard
/tcb/title engine→P.83: standard
```

`/tcb/standard` (style, no value)

This is an abbreviation for setting `skin=standard`.

```
\tcbset{standard,equal height group=standard,
  colback=LightGreen,colframe=DarkGreen,colbacklower=LimeGreen!75!LightGreen,
  width=(\linewidth-6mm)/4,nobeforeafter,
  left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}
```

This is my content.

This is my content.

More content.

My title

This is my content.

My title

This is my content.

More content.

8.6 Skin family 'enhanced'

If you like the standard appearance of a `tcolorbox` but you want to have some 'enhanced' features, the `enhanced` skin is what you are looking for.

`/tcb/skin=enhanced` (skin)

This skin translates the drawing commands of the core package into `tikz` path commands. Therefore, it allows all `tikz` high level options for these paths and has more flexibility compared to the `standard`^{→P.95} skin. You pay for this with some prolonged compilation time. The `tikz` path options can be given with the option keys `/tcb/frame style`^{→P.84}, `/tcb/interior style`^{→P.84}, `/tcb/segmentation style`^{→P.85}, and `/tcb/title style`^{→P.86}.

Environment and engines for the skin 'enhanced'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: path
/tcb/interior titled engine→P.82: path
/tcb/interior engine→P.82: path
/tcb/segmentation engine→P.83: path
/tcb/title engine→P.83: path
```

`/tcb/enhanced` (style, no value)

This is an abbreviation for setting `skin=enhanced`.

```
\tcbset{enhanced,equal height group=enhanced,
colback=LightGreen,colframe=DarkGreen,colbacklower=LimeGreen!75!LightGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

```
% \usetikzlibrary{shadings} % preamble
\tcbset{skin=enhanced,fonttitle=\bfseries,
  frame style={upper left=blue,upper right=red,lower left=yellow,lower right=green},
  interior style={white,opacity=0.5},
  segmentation style={black,solid,opacity=0.2,line width=1pt}}

\begin{tcolorbox}[title=Nice box in rainbow colors]
  With the 'enhanced' skin, it is quite easy to produce fancy looking effects.
  \tcblower
  Note that this is still a \texttt{tcolorbox}.
\end{tcolorbox}
```

Nice box in rainbow colors

With the 'enhanced' skin, it is quite easy to produce fancy looking effects.

Note that this is still a `tcolorbox`.

```
% \usetikzlibrary{shadows} % preamble
% \usetikzlibrary{decorations.pathmorphing} % preamble
\tcbset{skin=enhanced,fonttitle=\bfseries,boxrule=1mm,
  frame style={draw=FireBrick,fill=Salmon,drop shadow},
  interior style={draw=FireBrick,top color=Salmon!10,bottom color=Salmon!20},
  segmentation style={draw=FireBrick,solid,decorate,
    decoration={coil,aspect=0,segment length=10.1mm}}}}

\begin{tcblisting}[title=A listing box with shadow and some specials]
Of course, skins can be used for listings also.
\begin{equation}
\int\limits_1^2 \frac{1}{x} dx = \ln(2).
\end{equation}
\end{tcblisting}
```

A listing box with shadow and some specials

Of course, skins can be used for listings also.

```
\begin{equation}
\int\limits_1^2 \frac{1}{x} dx = \ln(2).
\end{equation}
```

Of course, skins can be used for listings also.

$$\int_1^2 \frac{1}{x} dx = \ln(2). \quad (13)$$

`\tcbline`

Sometimes, a line is only a line. With `\tcblower`^{→P.5} you separate the box content into two functional units. `\tcbline` draws only a line which looks like the segmentation line between upper and lower part. Furthermore, you can use `\tcbline` more than just once. `\tcbline` always uses the `path` drawing engine. Therefore, the `/tcb/segmentation` style^{→P.85} can be applied.

```
\tcbset{enhanced,colframe=blue!50!black,colback=white}  
  
\begin{tcolorbox}[colupper=red!50!black,collower=green!50!black]  
  \lipsum[1]  
  \tcbline  
  \lipsum[2]  
  \tcblower  
  \lipsum[3]  
  \tcbline  
  \lipsum[4]  
\end{tcolorbox}
```

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetur adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

/tcb/skin=**enhancedfirst** (skin)

This is a flavor of **enhanced**^{→P.96} which is used as a *first* part in a break sequence for **enhanced**^{→P.96}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'enhancedfirst'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathfirst
/tcb/interior titled engine→P.82: pathfirst
/tcb/interior engine→P.82: pathfirst
/tcb/segmentation engine→P.83: path
/tcb/title engine→P.83: pathfirst
```

```
\tcbset{skin=enhancedfirst,equal height group=enhancedfirst,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

More content.

My title

This is my content.

My title

This is my content.

More content.

`/tcb/skin=enhancedmiddle` (skin)

This is a flavor of `enhanced`^{→P.96} which is used as a *middle* part in a break sequence for `enhanced`^{→P.96}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'enhancedmiddle'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathmiddle
/tcb/interior titled engine→P.82: pathmiddle
/tcb/interior engine→P.82: pathmiddle
/tcb/segmentation engine→P.83: path
/tcb/title engine→P.83: pathmiddle
```

```
\tcbset{skin=enhancedmiddle,equal height group=enhancedmiddle,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

More content.

My title

This is my content.

My title

This is my content.

More content.

`/tcb/marker` (style, no value)

This styles relies on the skin `enhancedmiddle`^{→P.100}. It is intended to be used as an optical marker like a highlighter pen.

```
\begin{marker}
\lipsum[2]
\end{marker}
```

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

/tcb/skin=**enhancedlast** (skin)

This is a flavor of `enhanced`^{→P.96} which is used as a *last* part in a break sequence for `enhanced`^{→P.96}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'enhancedlast'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathlast
/tcb/interior titled engine→P.82: pathlast
/tcb/interior engine→P.82: pathlast
/tcb/segmentation engine→P.83: path
/tcb/title engine→P.83: pathlast
```

```
\tcbset{skin=enhancedlast,equal height group=enhancedlast,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

More content.

My title

This is my content.

My title

This is my content.

More content.

8.7 Skin 'freelance'

`/tcb/skin=freelance` (skin)

This skin gives full freedom for the appearance of the `tcolorbox`. All drawing engines are set to type `freelance`; they use the `tikz` package and compute the `/tcb/geometry nodes`^{→P.83}. This skin is useful for boxes which should differ much from the normal appearance. Note that this difference has to be programmed by the user. The drawing code can be given with the following option keys. As default value, the code from the `standard` skin is set.

Environment and engines for the skin 'freelance'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: freelance
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: freelance
```

`/tcb/freelance` (style, no value)

This is an abbreviation for setting `skin=freelance`.

```
\tcbset{freelance,equal height group=freelance,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

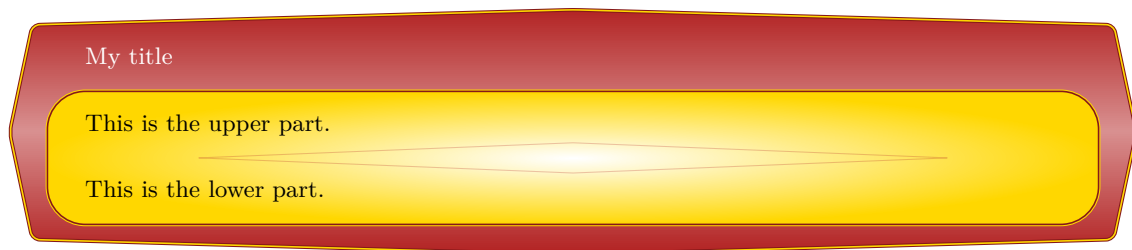
More content.

```

\tcbset{skin=freelance,boxrule=2mm,enlarge top by=2mm,enlarge bottom by=2mm,
  enlarge left by=3mm,enlarge right by=3mm,width=\linewidth-6mm,
frame code={\path[top color=FireBrick,bottom color=FireBrick,middle color=FireBrick!50,
draw=FireBrick!75!black,double=Gold,rounded corners=1mm]
  (frame.south west) -- ([xshift=-3mm]frame.west) -- (frame.north west)
  -- ([yshift=2mm]frame.north) -- (frame.north east) -- ([xshift=3mm]frame.east)
  -- (frame.south east) -- ([yshift=-2mm]frame.south) -- cycle;},
interior titled code={\path[outer color=Gold,inner color=white,draw=Gold,
double=FireBrick!75!black,rounded corners=5mm]
  (interior.south west) rectangle (interior.north east);},
segmentation code={\path[draw=FireBrick,opacity=0.25] ([xshift=2cm]segmentation.west)
  -- (segmentation.north) -- ([xshift=-2cm]segmentation.east)
  -- (segmentation.south) -- cycle;}}

\begin{tcolorbox}[title=My title]
  This is the upper part.
  \tcblower
  This is the lower part.
\end{tcolorbox}

```



8.8 Skin family 'bicolor'

`/tcb/skin=bicolor` (skin)


This skin is quite similar to the `standard`^{→P.95} and `enhanced`^{→P.96} skin. But instead of a segmentation line, the optional lower part of the box is filled with a different color or drawn with a different style.

Environment and engines for the skin 'bicolor'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: path
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: path
```

- The most basic usage of this skin is to set the background color of the lower part by `/tcb/colbacklower`^{→P.105} and all other options like for the `standard`^{→P.95} skin.

```
\begin{tcolorbox}[skin=bicolor,title=The title,
  colframe=FireBrick!75!black,colback=Salmon!50!white,colbacklower=Salmon]
  The upper part.
  \tcblower
  The lower part.
\end{tcolorbox}
```



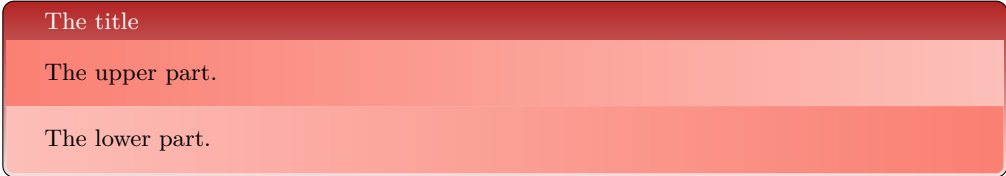
The title

The upper part.

The lower part.

- The more advanced usage of this skin is to apply the `/tcb/frame style`^{→P.84} and the `/tcb/interior style`^{→P.84} like for the `enhanced`^{→P.96} skin. Also, the `/tcb/segmentation style`^{→P.85} can be used, but it is applied to the whole lower part.

```
\begin{tcolorbox}[skin=bicolor,title=The title,
  frame style={top color=FireBrick,
    bottom color=FireBrick!15!white,draw=black},
  interior style={left color=Salmon,right color=Salmon!50!white},
  segmentation style={right color=Salmon,left color=Salmon!50!white}]
  The upper part.
  \tcblower
  The lower part.
\end{tcolorbox}
```



The title

The upper part.

The lower part.

`/tcb/bicolor` (style, no value)

This is an abbreviation for setting `skin=bicolor`.

```

\tcbset{bicolor,equal height group=bicolor,
  colback=LightGreen,colframe=DarkGreen,colbacklower=LimeGreen!75!LightGreen,
  width=(\linewidth-6mm)/4,nobeforeafter,
  left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}

```

This is my content.

This is my content.
More content.

My title
This is my content.

My title
This is my content.
More content.

`/tcb/colbacklower=<color>` (no default, initially black!15!white)
Sets the background `<color>` of the lower part. It depends on the skin, if this value is used.

```

\tcbset{gitexample/.style={listing and comment,comment={#1},
  skin=bicolor,boxrule=1mm,fonttitle=\bfseries,coltitle=black,
  frame style={draw=black,left color=Gold,right color=Goldenrod!50!Gold},
  colback=black,colbacklower=Goldenrod!75!Gold,
  colupper=white,collower=black,
  listing options={language={bash},aboveskip=0pt,belowskip=0pt,nolol,
  basicstyle=\ttfamily\bfseries,extendedchars=true}}}

\begin{tcblisting}{title={Snapshot of the staging area},
  gitexample={The option '-a' automatically stages all tracked and modified
    files before the commit.\par
    This can be combined with the message option '-m'
    as seen in the third line.}}

git commit
git commit -a
git commit -am 'changes to my example'
\end{tcblisting}

```

Snapshot of the staging area

```

git commit
git commit -a
git commit -am 'changes to my example'

```

The option '-a' automatically stages all tracked and modified files before the commit.
This can be combined with the message option '-m' as seen in the third line.

/tcb/skin=**bicolorfirst** (skin)

This is a flavor of `bicolor`^{→P.104} which is used as a *first* part in a break sequence for `bicolor`^{→P.104}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'bicolorfirst'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathfirst
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: pathfirst
```

```
\tcbset{skin=bicolorfirst,equal height group=bicolorfirst,
colback=LightGreen,colframe=DarkGreen,colbacklower=LimeGreen!75!LightGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}
```

This is my content.

This is my content.

More content.

My title

This is my content.

My title

This is my content.

More content.

`/tcb/skin=bicolormiddle` (skin)

This is a flavor of `bicolor`^{→P.104} which is used as a *middle* part in a break sequence for `bicolor`^{→P.104}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'bicolormiddle'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathmiddle
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: pathmiddle
```

```
\tcbset{skin=bicolormiddle,equal height group=bicolormiddle,
colback=LightGreen,colframe=DarkGreen,colbacklower=LimeGreen!75!LightGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

/tcb/skin=**bicolorlast** (skin)

This is a flavor of `bicolor`^{→P.104} which is used as a *last* part in a break sequence for `bicolor`^{→P.104}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'bicolorlast'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathlast
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: pathlast
```

```
\tcbset{skin=bicolorlast,equal height group=bicolorlast,
colback=LightGreen,colframe=DarkGreen,colbacklower=LimeGreen!75!LightGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

8.9 Skin family 'beamer'

`/tcb/skin=beamer` (skin)

This skin resembles boxes known from the `beamer` class and therefore is called 'beamer'. It uses the normal colors from the core package but shades them a little bit. To use this skin, the `tikz` libraries `shadings` and `shadows` have to be included in the preamble by:

```
\usetikzlibrary{shadings,shadows}
```

The appearance of the skin can be controlled by `/tcb/frame style`^{→P.84} and `/tcb/interior style`^{→P.84}, if needed. Here, the *segmentation* cannot be controlled by a style.

Environment and engines for the skin 'beamer'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: path
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: path
```

`/tcb/beamer` (style, no value)

This is an abbreviation for setting `skin=beamer`.

It also changes the geometry and some style options.

```
\tcbset{beamer,equal height group=beamer,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

```
\begin{tcolorbox}[beamer,colback=Salmon!50!white,colframe=FireBrick!75!black,
adjusted title=A colored box with the 'beamer' skin]
This box looks like a box provided by the \texttt{beamer} class.
\end{tcolorbox}
```

A colored box with the 'beamer' skin

This box looks like a box provided by the `beamer` class.

`/tcb/skin=beamerfirst`

(skin)

This is a flavor of `beamer`^{→P.109} which is used as a *first* part in a break sequence for `beamer`^{→P.109}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'beamerfirst'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathfirst
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: pathfirst
```

```
\tcbset{beamer,skin=beamerfirst,equal height group=beamerfirst,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

/tcb/skin=**beamermiddle** (skin)

This is a flavor of **beamer**^{→P.109} which is used as a *middle* part in a break sequence for **beamer**^{→P.109}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'beamermiddle'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathmiddle
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: pathmiddle
```

```
\tcbset{beamer,skin=beamermiddle,equal height group=beamermiddle,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

/tcb/skin=**beamerlast** (skin)

This is a flavor of `beamer`^{→P.109} which is used as a *last* part in a break sequence for `beamer`^{→P.109}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'beamerlast'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathlast
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: pathlast
```

```
\tcbset{beamer,skin=beamerlast,equal height group=beamerlast,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
  This is my content.
  \tcblower
  More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

8.10 Skin family 'widget'

`/tcb/skin=widget` (skin)

This skin uses the normal colors from the core package but shades them a little bit. To use this skin, the `tikz` library `shadings` has to be included in the preamble by:

```
\usetikzlibrary{shadings}
```

The appearance of the skin can be controlled by `/tcb/frame style`^{→P.84}, `/tcb/interior style`^{→P.84}, and `/tcb/segmentation style`^{→P.85}, if needed.

Environment and engines for the skin 'widget'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: path
/tcb/interior titled engine→P.82: path
/tcb/interior engine→P.82: path
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: freelance
```

`/tcb/widget` (style, no value)

This is an abbreviation for setting `skin=widget`.

It also changes the geometry and some style options.

```
\tcbset{widget,equal height group=widget,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

```
\begin{tcolorbox}[widget,colback=Salmon!50!white,colframe=FireBrick!75!black,
adjusted title=A colored box with the 'widget' skin]
This is my content.
\end{tcolorbox}
```

A colored box with the 'widget' skin

This is my content.

/tcb/skin=**widgetfirst**

(skin)

This is a flavor of `widget`^{→P.113} which is used as a *first* part in a break sequence for `widget`^{→P.113}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'widgetfirst'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathfirst
/tcb/interior titled engine→P.82: pathfirst
/tcb/interior engine→P.82: pathfirst
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: freelance
```

```
\tcbset{widget,skin=widgetfirst,equal height group=widgetfirst,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcbblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcbblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

/tcb/skin=**widgetmiddle** (skin)

This is a flavor of `widget`^{→P.113} which is used as a *middle* part in a break sequence for `widget`^{→P.113}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'widgetmiddle'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathmiddle
/tcb/interior titled engine→P.82: pathmiddle
/tcb/interior engine→P.82: pathmiddle
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: freelance
```

```
\tcbset{widget,skin=widgetmiddle,equal height group=widgetmiddle,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcbblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcbblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

/tcb/skin=**widgetlast** (skin)

This is a flavor of `widget`^{→P.113} which is used as a *last* part in a break sequence for `widget`^{→P.113}. Nevertheless, this skin can be applied independently.

Environment and engines for the skin 'widgetlast'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: pathlast
/tcb/interior titled engine→P.82: pathlast
/tcb/interior engine→P.82: pathlast
/tcb/segmentation engine→P.83: freelance
/tcb/title engine→P.83: freelance
```

```
\tcbset{widget,skin=widgetlast,equal height group=widgetlast,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcbblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcbblower
More content.
\end{tcolorbox}
```

This is my content.

This is my content.

My title

My title

More content.

This is my content.

This is my content.

More content.

8.11 Skin 'draft'

`/tcb/skin=draft` (skin)

This skin is intended to be used while drafting new geometric settings for a `tcolorbox`.

Environment and engines for the skin 'draft'

```
/tcb/graphical environment→P.82: tikzpicture
/tcb/frame engine→P.82: freelance
/tcb/interior titled engine→P.82: freelance
/tcb/interior engine→P.82: freelance
/tcb/segmentation engine→P.83: path
/tcb/title engine→P.83: path
```

`/tcb/draft`

(style, no value)

This is an abbreviation for setting `skin=draft`.

```
\tcbset{draft,equal height group=draft,
colback=LightGreen,colframe=DarkGreen,
width=(\linewidth-6mm)/4,nobeforeafter,
left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}
%
\begin{tcolorbox}
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}
This is my content.
\tcblower
More content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\end{tcolorbox}\hfill
\begin{tcolorbox}[adjusted title=My title]
This is my content.
\tcblower
More content.
\end{tcolorbox}
```

frame: w=101.71863pt, h=56.11296pt, h=56.11296pt, h=56.11296pt, h=56.11296pt, h=56.11296pt, h=56.11296pt, h=56.11296pt

upper: w=87.49234pt, h=7.941pt, h=7.941pt, h=7.941pt, h=7.941pt, h=7.941pt, h=7.941pt, h=7.941pt
upper: w=87.49234pt, h=41.8866pt, h=41.8866pt, h=41.8866pt, h=41.8866pt, h=41.8866pt, h=41.8866pt, h=41.8866pt
lower: w=87.49234pt, h=22.5531pt, h=22.5531pt, h=22.5531pt, h=22.5531pt, h=22.5531pt, h=22.5531pt, h=22.5531pt
interior: w=98.87338pt, h=53.2675pt, h=53.2675pt, h=53.2675pt, h=53.2675pt, h=53.2675pt, h=53.2675pt, h=53.2675pt

A colored box with the "draft" skin title: w=392.64822pt, h=6.2pt

interior: w=421.10092pt, h=490.04318pt

9 Library 'breakable'

The library is loaded by a package option or inside the preamble by:

```
\tcbuselibrary{breakable}
```

9.1 Technical Overview

The library 'breakable' supports the automatic breaking of a `tcolorbox`. This feature is enabled by `/tcb/breakable`^{→P. 121} and disabled by `/tcb/unbreakable`^{→P. 122}.

If a `tcolorbox` is set to be `/tcb/breakable`^{→P. 121}, then the following algorithm is executed:

1. The box content is read to a box register similar but not identical to the unbreakable case.
2. If the total box fits into the current page, it is shipped out visibly unbroken and the algorithm stops.

Unbroken Box

The box.

unbroken

3. Otherwise, it is checked if at least `/tcb/lines before break`^{→P. 122} of the upper box can be placed on the current page. If not, a page break is inserted and the algorithm goes back to Step 2.
4. Now, the *break sequence* starts. The upper box part or the lower box part is split such that it fits into the current page. The fitting part is named *first part* of the *break sequence* and shipped out.

Broken Box

The box.

first

5. If the remaining content of the total box fits into the current page, the algorithm continues with Step 7, else with Step 6.
6. The upper box part or the lower box part is split such that it fits into the current page. The fitting part is named *middle part* of the *break sequence* and shipped out. Then, the algorithm goes back to Step 5.

The box.

middle

7. The remaining part is named *last part* of the *break sequence* and shipped out. The algorithm stops.

The box.

last

The algorithm takes care that the optional segmentation line never appears at the end of a box. The optional lower box part is also checked to have at least `/tcb/lines before break`^{→P. 122}.

In principal, all boxes of the *break sequence* share the same geometric parameters. The differences are:

- The given `/tcb/before→P.36` and `/tcb/after→P.36` values are used only before the *first* and after the *last* part of the *break sequence*.
- A special behavior between the parts of the *break sequence* can be given by `/tcb/toprule at break→P.123`, `/tcb/bottomrule at break→P.123`, `/tcb/enlarge top at break by→P.124`, and `/tcb/enlarge bottom at break by→P.124`.
- The `/tcb/skin→P.81` decides *how* the *first*, *middle*, and *last* part look like. Actually, every part type has its own skin given by the options `/tcb/skin first→P.81`, `/tcb/skin middle→P.81`, and `/tcb/skin last→P.81`. Typically, these options are set automatically by the main skin, see Subsection 9.5 from page 125.

9.2 Limitations and Known Bugs

- The box content is a \TeX `\vbox` register which has a restricted capacity. Therefore, you cannot place hundreds of pages inside a `tcolorbox`.
- Footnotes can be used inside an `/tcb/unbreakable→P.122` box but not inside a `/tcb/breakable→P.121` box, even if it is not broken actually. Other different behaviors may and will be effective.
- You can nest an unbreakable `tcolorbox` inside another `tcolorbox`, even inside a breakable one. But you should not nest a breakable box inside a breakable box since this will give a mess. Inside a breakable box, the further breaking is disabled by default. If you really want to or have to use the keys `/tcb/breakable→P.121` or `/tcb/unbreakable→P.122` inside the content of an outer `tcolorbox`, you have to guard this with a \TeX group.
- If your text content contains some text color changing commands, your color will not survive the break to the next box².

²The reason is that I am too dumb to catch the current color at the split point. If you know the trick, let me know.

9.3 Main Option Keys

/tcb/breakable

(no value)

Allows the `tcolorbox` to be breakable. If the box is larger than the available space at the current page, the box is automatically broken and continued to the next next page. All sorts of `tcolorbox` can be made breakable. It depends on the skin how the breaking looks like. If you do not know better, use `/tcb/enhanced`^{P.96} for breaking a box. The parts of the *break sequence* are numbered by the counter `tcbbreakpart`.

```
% \usepackage{lipsum} % preamble
\tcbset{colback=red!5!white,colframe=red!75!black,
  watermark color=yellow!25!white,watermark text=\arabic{tcbbreakpart},
  fonttitle=\bfseries}

\begin{tcolorbox}[breakable,enhanced,title=My breakable box]
\lipsum[1-6]
\end{tcolorbox}
```

My breakable box

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

Nulla malesuada porttitor diam. Donec felis erat, congue non, volutpat at, tincidunt tristique, libero. Vivamus viverra fermentum felis. Donec nonummy pellentesque ante. Phasellus adipiscing semper elit. Proin fermentum massa ac quam. Sed diam turpis, molestie vitae, placerat a, molestie nec, leo. Maecenas lacinia. Nam ipsum ligula, eleifend at, accumsan nec, suscipit a, ipsum. Morbi blandit ligula feugiat magna. Nunc eleifend consequat lorem. Sed lacinia nulla vitae enim. Pellentesque tincidunt purus vel magna. Integer non enim. Praesent euismod nunc eu purus. Donec bibendum quam in tellus. Nullam cursus pulvinar lectus. Donec et mi. Nam vulputate metus eu enim. Vestibulum pellentesque felis eu massa.

Quisque ullamcorper placerat ipsum. Cras nibh. Morbi vel justo vitae lacus tincidunt ultrices. Lorem ipsum dolor sit amet, consectetur adipiscing elit. In hac habitasse platea dictumst. Integer tempus convallis augue. Etiam facilisis. Nunc elementum fermentum wisi. Aenean placerat. Ut imperdiet, enim sed gravida sollicitudin, felis odio placerat quam, ac pulvinar elit purus eget enim. Nunc vitae tortor. Proin tempus nibh sit amet nisl. Vivamus quis tortor vitae risus porta vehicula.

Fusce mauris. Vestibulum luctus nibh at lectus. Sed bibendum, nulla a faucibus semper,

leo velit ultricies tellus, ac venenatis arcu wisi vel nisl. Vestibulum diam. Aliquam pellentesque, augue quis sagittis posuere, turpis lacus congue quam, in hendrerit risus eros eget felis. Maecenas eget erat in sapien mattis porttitor. Vestibulum porttitor. Nulla facilisi. Sed a turpis eu lacus commodo facilisis. Morbi fringilla, wisi in dignissim interdum, justo lectus sagittis dui, et vehicula libero dui cursus dui. Mauris tempor ligula sed lacus. Duis cursus enim ut augue. Cras ac magna. Cras nulla. Nulla egestas. Curabitur a leo. Quisque egestas wisi eget nunc. Nam feugiat lacus vel est. Curabitur consetetuer.

Suspendisse vel felis. Ut lorem lorem, interdum eu, tincidunt sit amet, laoreet vitae, arcu. Aenean faucibus pede eu ante. Praesent enim elit, rutrum at, molestie non, nonummy vel, nisl. Ut lectus eros, malesuada sit amet, fermentum eu, sodales cursus, magna. Donec eu purus. Quisque vehicula, urna sed ultricies auctor, pede lorem egestas dui, et convallis elit erat sed nulla. Donec luctus. Curabitur et nunc. Aliquam dolor odio, commodo pretium, ultricies non, pharetra in, velit. Integer arcu est, nonummy in, fermentum faucibus, egestas vel, odio.

/tcb/unbreakable (no value, initially set)

Sets the `tcolorbox` to be unbreakable.

/tcb/title after break= $\langle text \rangle$ (no default, initially empty)

The `/tcb/title`^{P.7} is used only for the *first* part of a *break sequence*. Use `title after break` to create a heading line with $\langle text \rangle$ as content for all following parts.

/tcb/notitle after break (no value, initially set)

Removes the title line or following parts in a *break sequence* if set before.

/tcb/adjusted title after break= $\langle text \rangle$ (style, no default, initially unset)

Works like `/tcb/adjusted title`^{P.7} but applied to `/tcb/title after break`^{P.122}.

/tcb/lines before break= $\langle number \rangle$ (no default, initially 2)

Assures that the given $\langle number \rangle$ of lines of the upper box part or the lower box part are placed before a break happens.

/tcb/shrink break goal= $\langle length \rangle$ (no default, initially 0pt)

This is an emergency parameter if the break algorithm produces unpleasant breaks. It shrinks the goal height of the current box part by $\langle length \rangle$ which may result in smaller boxes. Never use negative values.

9.4 Option Keys for the Break Appearance

/tcb/toprule at break= $\langle length \rangle$ (no default, initially 0.5mm)

Sets the line width of the top rule to $\langle length \rangle$ if the box is **/tcb/breakable**^{→ P. 121}. In this case, it is applied to *middle* and *last* parts in a break sequence. Note that **/tcb/toprule**^{→ P. 12} overwrites this value if used afterwards.

/tcb/bottomrule at break= $\langle length \rangle$ (no default, initially 0.5mm)

Sets the line width of the bottom rule to $\langle length \rangle$ if the box is **/tcb/breakable**^{→ P. 121}. In this case, it is applied to *first* and *middle* parts in a break sequence. Note that **/tcb/bottomrule**^{→ P. 12} overwrites this value if used afterwards.

/tcb/topsep at break= $\langle length \rangle$ (no default, initially 0mm)

Additional vertical space of $\langle length \rangle$ which is added at the top of *middle* and *last* parts in a break sequence. In general, it is not advisable to change this value if these parts start with a rule or a title.

/tcb/bottomsep at break= $\langle length \rangle$ (no default, initially 0mm)

Additional vertical space of $\langle length \rangle$ which is added at the bottom of *first* and *middle* parts in a break sequence. In general, it is not advisable to change this value if these parts end with a rule.

/tcb/pad before break= $\langle length \rangle$ (style, no default, initially 3.5mm)

Sets the total amount of vertical space after the text content and before the break point to $\langle length \rangle$. This style sets **/tcb/toprule at break**^{→ P. 123} to 0pt and changes **/tcb/topsep at break**^{→ P. 123} as required. In general, it is not advisable to change this value if the *middle* and *last* parts in a break sequence start with a rule or a title.

/tcb/pad after break= $\langle length \rangle$ (style, no default, initially 3.5mm)

Sets the total amount of vertical space after the break point and before the text content to $\langle length \rangle$. This style sets **/tcb/bottomrule at break**^{→ P. 123} to 0pt and changes **/tcb/bottomsep at break**^{→ P. 123} as required. In general, it is not advisable to change this value if the *first* and *middle* parts in a break sequence end with a rule.

/tcb/pad at break= $\langle length \rangle$ (style, no default, initially 3.5mm)

Abbreviation for setting $\langle length \rangle$ to **/tcb/pad before break**^{→ P. 123} and **/tcb/pad after break**^{→ P. 123}.

```
% \usepackage{lipsum} % preamble
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,breakable,pad at break=0mm,
  title={For this box, the pad space at the break point is set to 0mm}]
  \lipsum[1-2]
\end{tcolorbox}
```

For this box, the pad space at the break point is set to 0mm

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur

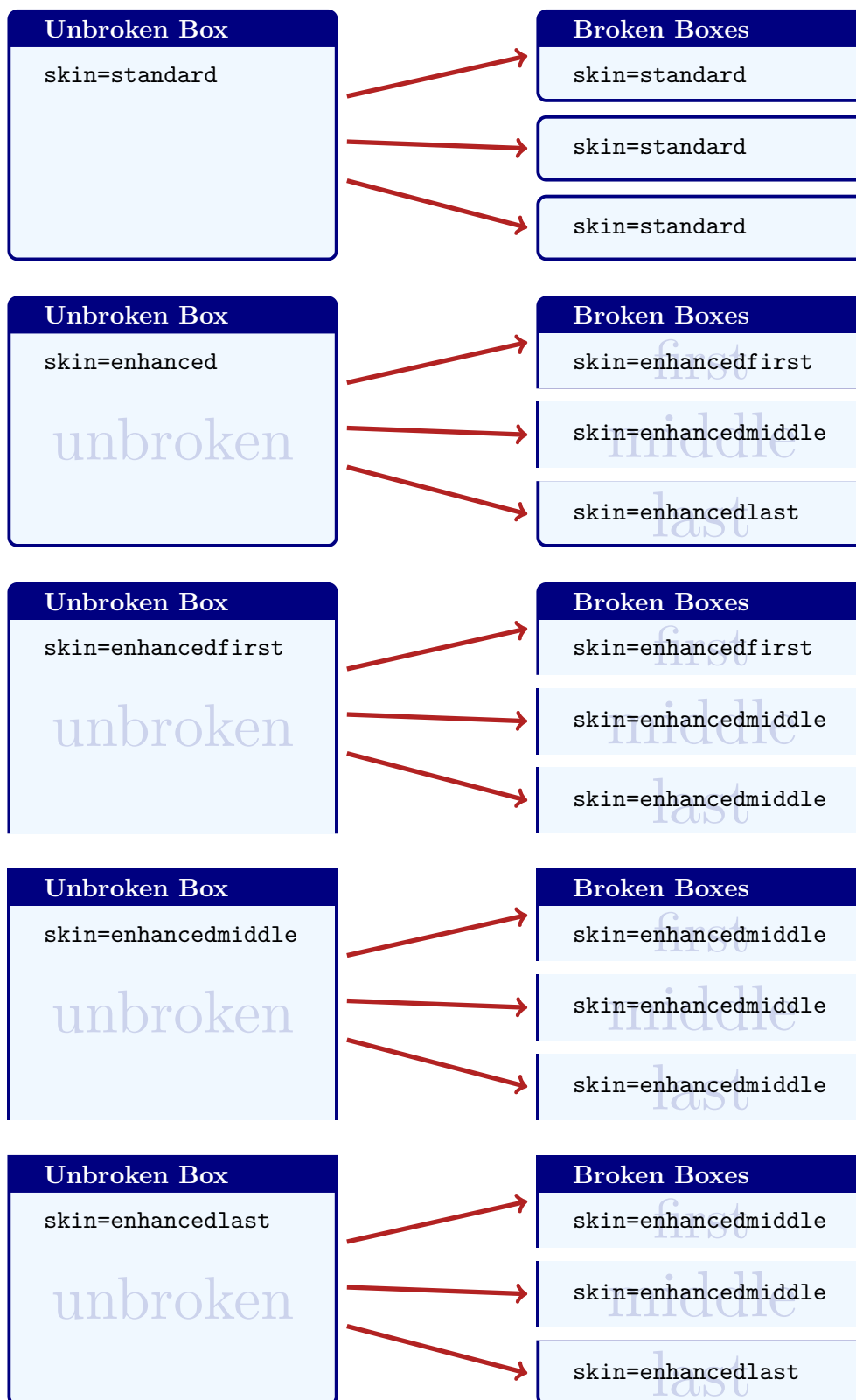
auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum. Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

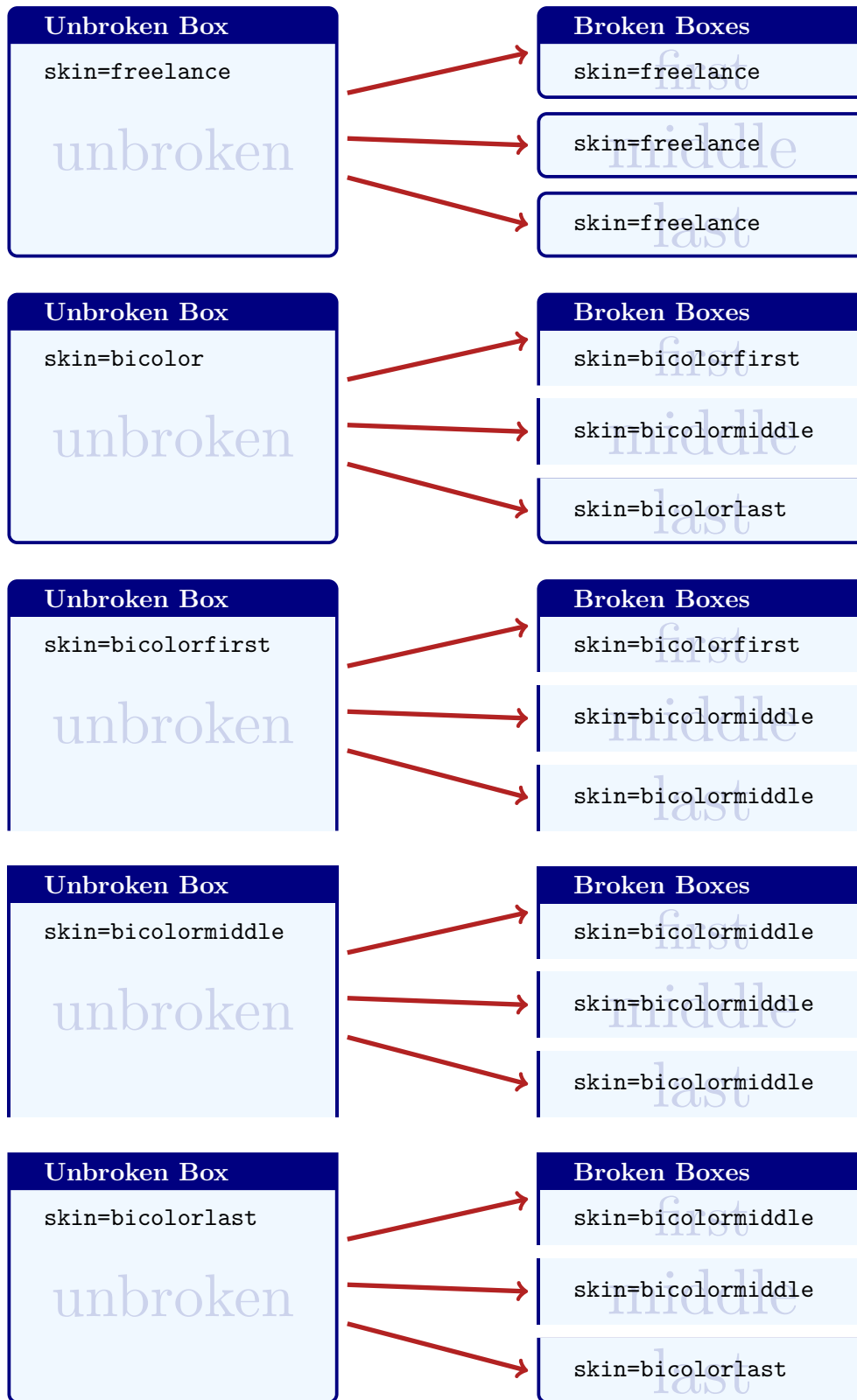
/tcb/enlarge top at break by= $\langle length \rangle$ (no default, initially 0mm)
 Enlarges the bounding box distance to the top of the box by $\langle length \rangle$ if the box is **/tcb/breakable**^{→P.121}. In this case, it is applied to *middle* and *last* parts in a break sequence. **/tcb/enlarge top by**^{→P.37} overwrites this key.

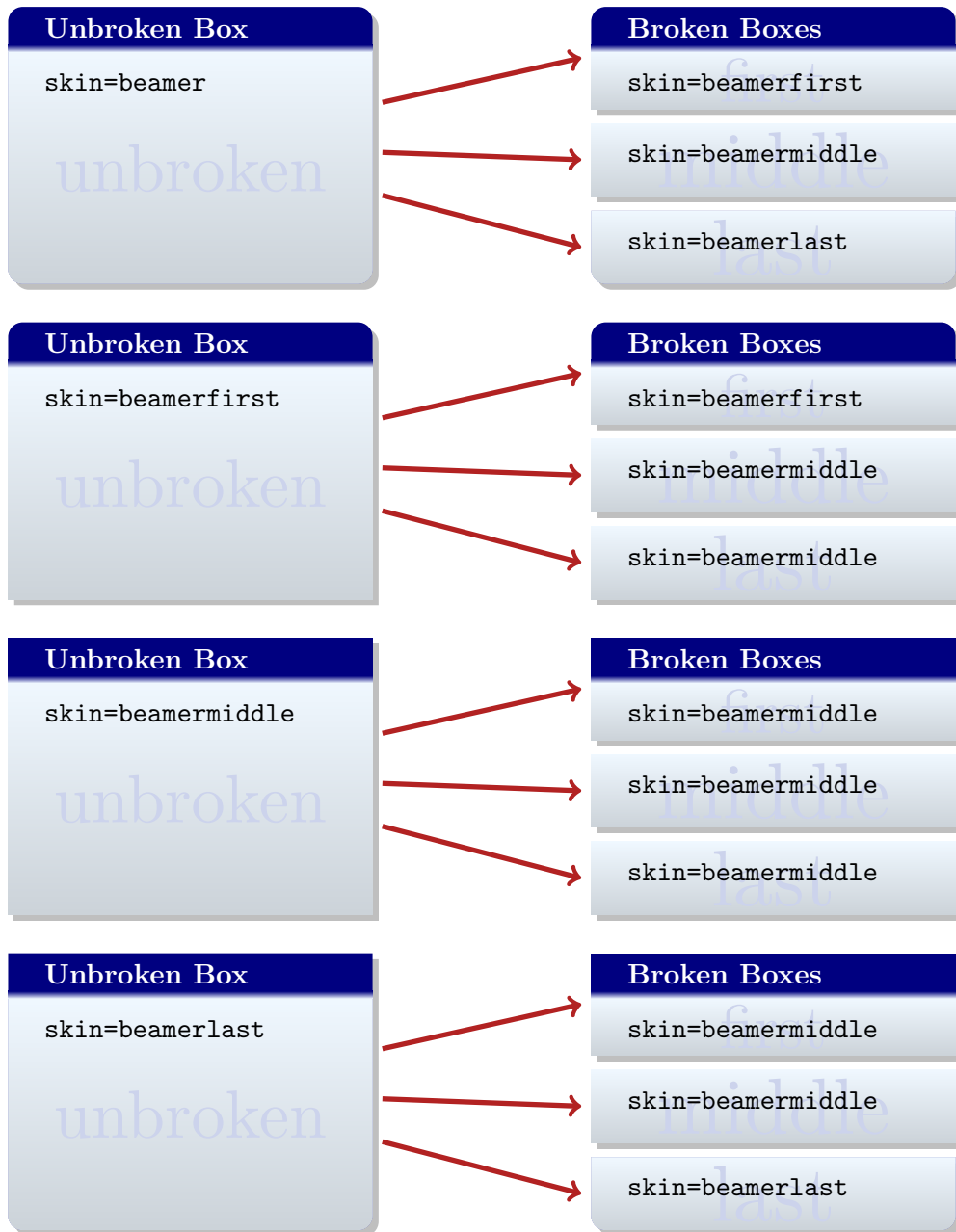
/tcb/enlarge bottom at break by= $\langle length \rangle$ (no default, initially 0mm)
 Enlarges the bounding box distance to the bottom of the box by $\langle length \rangle$ if the box is **/tcb/breakable**^{→P.121}. In this case, it is applied to *first* and *middle* parts in a break sequence. **/tcb/enlarge bottom by**^{→P.37} overwrites this key.

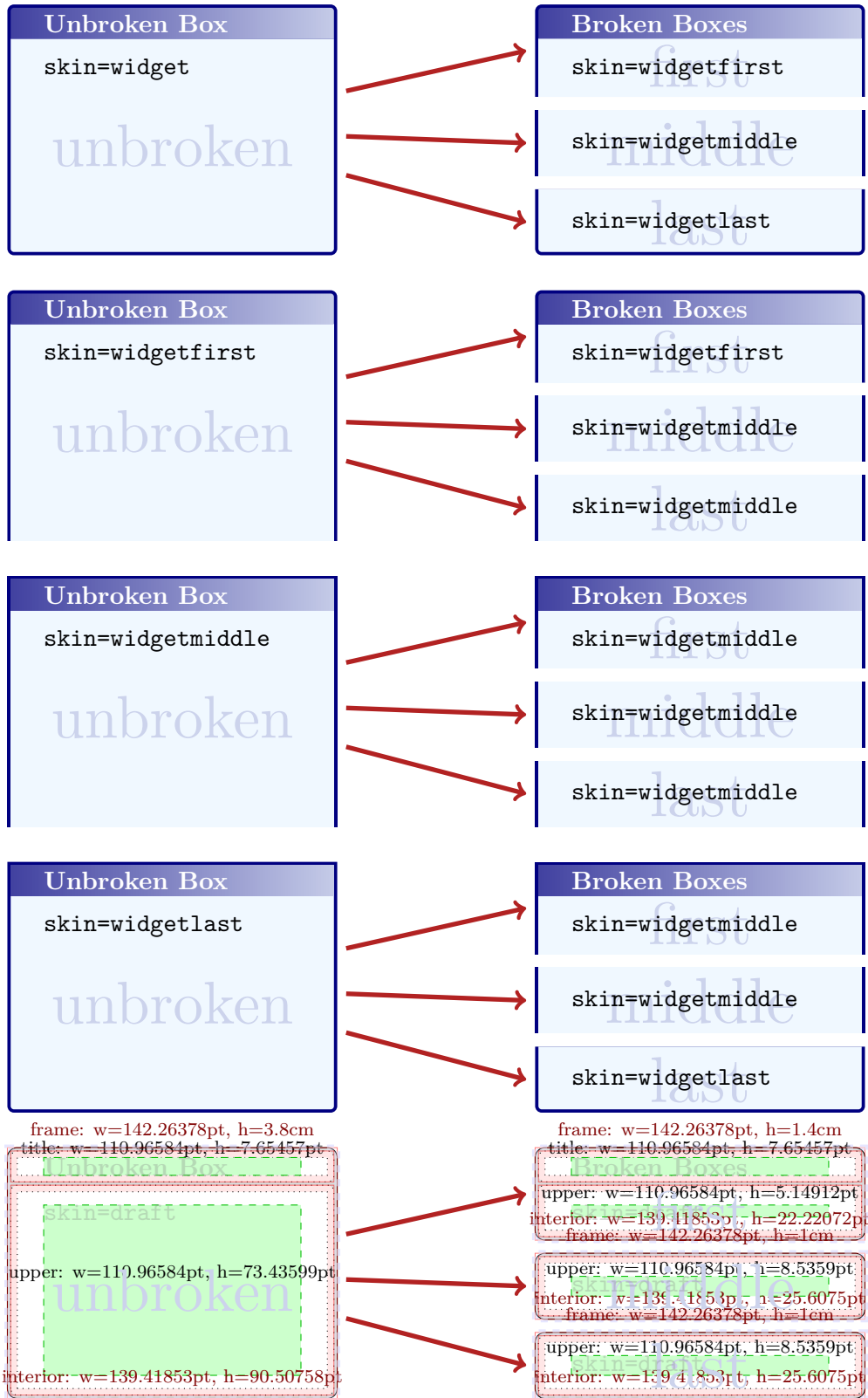
9.5 Break Sequence for the Skins

The following diagrams document the *break sequence* for different skins. Depending on the main skin of a `tcolorbox`, the actual skins of the *break sequence* parts are displayed.









9.6 Break by Hand (Faked Break)

Since the appearance of broken boxes is done by skins, it is quite easy to 'fake a break'. For this, you actually don't need the 'breakable' library at all.

```
\tcbsset{enhanced,equal height group=fakedbreak,  
  colback=LightGreen,colframe=DarkGreen,  
  width=(\linewidth-6mm)/3,nobeforeafter,  
  left=1mm,right=1mm,top=1mm,bottom=1mm,middle=1mm}  
%  
\begin{tcolorbox}[title=My broken box,skin=enhancedfirst]  
This is a box which breaks from one column to another  
\end{tcolorbox}\hfill  
\begin{tcolorbox}[skin=enhancedmiddle]  
column. I am sorry to say that this is a trick.  
Nevertheless, you may use this trick for your  
\end{tcolorbox}\hfill  
\begin{tcolorbox}[skin=enhancedlast]  
own purposes.  
\end{tcolorbox}
```

My broken box

This is a box which breaks
from one column to another

column. I am sorry to say that
this is a trick. Nevertheless,
you may use this trick for your

own purposes.

10 Library 'hooks'

The library is loaded by a package option or inside the preamble by:

```
\tcbuselibrary{hooks}
```

For the skin related options, the library 'skins' has to be loaded separately.

10.1 Concept of Hooks

A hook is a placeholder in some L^AT_EX code where additional code can be added. For example, the L^AT_EX macro `\AtBeginDocument` adds code to a hook which is placed at the begin of every document.

Several option keys of `tcolorbox` allow to provide some code which is added to specific places of a colored box. For example, `/tcb/before upper`^{→P. 25} places code before the content of the upper part. A following usage of this key overwrites any prior settings.

The library 'hooks' extends `/tcb/before upper`^{→P. 25} and several more existing keys to 'hookable' versions, e.g. `/tcb/before upper app`^{→P. 131} and `/tcb/before upper pre`^{→P. 131}. The 'hookable' keys don't overwrite prior settings but either *append* or *prepend* the newly given code to the existing code.

The general naming convention (with some small exceptions) is:

- `<option key> app`: works like `<option key>` but *appends* its code to the existing code.
- `<option key> pre`: works like `<option key>` but *prepends* its code to the existing code.

If the original `<option key>` is used (again), all code will be overwritten. Therefore, the order of the option key usage is crucial.

```
% \usepackage{array, tabularx}
\newcolumntype{Y}{>{\raggedleft\arraybackslash}X}% see tabularx
\tcbset{enhanced,fonttitle=\bfseries\large,fontupper=\normalsize\sffamily,
colback=yellow!10!white,colframe=red!50!black,colbacktitle=Salmon!30!white,
coltitle=black,center title,
tabularx={X||Y|Y|Y|Y|Y},% this sets 'before upper' and 'after upper'
before upper app={Group & One & Two & Three & Four & Sum\\\hline\hline} }

\begin{tcolorbox}[title=My table]
Red   & 1000.00 & 2000.00 & 3000.00 & 4000.00 & 10000.00\\\hline
Green & 2000.00 & 3000.00 & 4000.00 & 5000.00 & 14000.00\\\hline
Blue  & 3000.00 & 4000.00 & 5000.00 & 6000.00 & 18000.00\\\hline
Sum   & 6000.00 & 9000.00 & 12000.00 & 15000.00 & 42000.00
\end{tcolorbox}
```

My table					
Group	One	Two	Three	Four	Sum
Red	1000.00	2000.00	3000.00	4000.00	10000.00
Green	2000.00	3000.00	4000.00	5000.00	14000.00
Blue	3000.00	4000.00	5000.00	6000.00	18000.00
Sum	6000.00	9000.00	12000.00	15000.00	42000.00

10.2 Box Content Additions

The following option keys extend the options given in Subsection 3.6 from page 25.

/tcb/before title app= $\langle code \rangle$ (no default)
 Appends the given $\langle code \rangle$ to **/tcb/before title**^{→P.25} *after* the color and font settings and *before* the content of the title.

/tcb/before title pre= $\langle code \rangle$ (no default)
 Prepends the given $\langle code \rangle$ to **/tcb/before title**^{→P.25} *after* the color and font settings and *before* the content of the title.

/tcb/after title app= $\langle code \rangle$ (no default)
 Appends the given $\langle code \rangle$ to **/tcb/after title**^{→P.25} *after* the content of the title.

/tcb/after title pre= $\langle code \rangle$ (no default)
 Prepends the given $\langle code \rangle$ to **/tcb/after title**^{→P.25} *after* the content of the title.

/tcb/before upper app= $\langle code \rangle$ (no default)
 Appends the given $\langle code \rangle$ to **/tcb/before upper**^{→P.25} *after* the color and font settings and *before* the content of the upper part.

/tcb/before upper pre= $\langle code \rangle$ (no default)
 Prepends the given $\langle code \rangle$ to **/tcb/before upper**^{→P.25} *after* the color and font settings and *before* the content of the upper part.

/tcb/after upper app= $\langle code \rangle$ (no default)
 Appends the given $\langle code \rangle$ to **/tcb/after upper**^{→P.26} *after* the content of the upper part.

/tcb/after upper pre= $\langle code \rangle$ (no default)
 Prepends the given $\langle code \rangle$ to **/tcb/after upper**^{→P.26} *after* the content of the upper part.

```
% \tcbuselibrary{theorems}
\tcbset{ams align,% this sets 'before upper' and 'after upper'
  colback=yellow!10!white,colframe=red!50!black,
  before upper app={\frac{2}{\sqrt{2}}&=\sqrt{2}.\},
  after upper pre={\\sin\left(\frac{\pi}{2}\right)&=1.},
}

\begin{tcolorbox}
  \sum\limits_{n=1}^{\infty} \frac{1}{n} &= \infty.\\
  \int x^2 \, dx &= \frac{1}{3} x^3 + c.
\end{tcolorbox}
```

$$\frac{2}{\sqrt{2}} = \sqrt{2}. \quad (14)$$

$$\sum_{n=1}^{\infty} \frac{1}{n} = \infty. \quad (15)$$

$$\int x^2 \, dx = \frac{1}{3} x^3 + c. \quad (16)$$

$$\sin\left(\frac{\pi}{2}\right) = 1. \quad (17)$$

- `/tcb/before lower app=<code>` (no default)
 Appends the given `<code>` to `/tcb/before lower`^{→ P. 26} *after* the color and font settings and *before* the content of the lower part.
- `/tcb/before lower pre=<code>` (no default)
 Prepends the given `<code>` to `/tcb/before lower`^{→ P. 26} *after* the color and font settings and *before* the content of the lower part.
- `/tcb/after lower app=<code>` (no default)
 Appends the given `<code>` to `/tcb/after lower`^{→ P. 26} *after* the content of the lower part.
- `/tcb/after lower pre=<code>` (no default)
 Prepends the given `<code>` to `/tcb/after lower`^{→ P. 26} *after* the content of the lower part.

10.3 Embedding into the Surroundings

The following option keys extend the options given in Subsection 3.10 from page 36.

The 'hookable' versions are usable inside the document. In the preamble, they can only be used after explicit setting of `/tcb/before`^{→ P. 36} and `/tcb/after`^{→ P. 36} or by e.g. `/tcb/parskip`^{→ P. 36}.

- `/tcb/before app=<code>` (no default)
 Appends the given `<code>` to `/tcb/before`^{→ P. 36} before the colored box.
- `/tcb/before pre=<code>` (no default)
 Prepends the given `<code>` to `/tcb/before`^{→ P. 36} before the colored box.
- `/tcb/after app=<code>` (no default)
 Appends the given `<code>` to `/tcb/after`^{→ P. 36} after the colored box.
- `/tcb/after pre=<code>` (no default)
 Prepends the given `<code>` to `/tcb/after`^{→ P. 36} after the colored box.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[title=My title,before app={The box follows:\\[4pt]},
  after app={This is the end.}]
This is a \textbf{tcolorbox}.
\end{tcolorbox}
```

The box follows:

My title

This is a **tcolorbox**.

This is the end.

10.4 Overlays

The following option keys extend the options given in Subsection 3.7 from page 30.

/tcb/overlay app= \langle graphical code \rangle (no default)

Appends the given \langle graphical code \rangle to /tcb/overlay^{→ P. 30}.

```
% \usetikzlibrary{patterns} % preamble
% \tcbuselibrary{skins} % preamble
\tcbset{frogbox/.style={enhanced,colback=green!10,colframe=green!65!black,
  enlarge top by=5.5mm,
  overlay={\foreach \x in {2cm,3.5cm} {
    \begin{scope}[shift={([xshift=\x]frame.north west)}]
      \path[draw=green!65!black,fill=green!10,line width=1mm] (0,0) arc (0:180:5mm);
      \path[fill=black] (-0.2,0) arc (0:180:1mm);
    \end{scope}}}}
\tcbset{ribbon/.style={overlay app={%
  \path[fill=blue!75!white,draw=blue,double=white!85!blue,
    preaction={opacity=0.6,fill=blue!75!white},
    line width=0.1mm,double distance=0.2mm,
    pattern=fivepointed stars,pattern color=white!75!blue]
    ([xshift=-0.2mm,yshift=-1.02cm]frame.north east)
    -- ++(-1,1) -- ++(-0.5,0) -- ++(1.5,-1.5) -- cycle;}}}

\begin{tcolorbox}[frogbox,title=My title]
This is a \textbf{tcolorbox}.
\end{tcolorbox}

\begin{tcolorbox}[frogbox,ribbon,title=My title]
This is a \textbf{tcolorbox}.\par
Here, we apply a second overlay.
\end{tcolorbox}
```



/tcb/overlay pre= \langle graphical code \rangle (no default)

Prepends the given \langle graphical code \rangle to /tcb/overlay^{→ P. 30}.

/tcb/overlay unbroken app= \langle graphical code \rangle (no default)

Appends the given \langle graphical code \rangle to /tcb/overlay unbroken^{→ P. 31}.

/tcb/overlay unbroken pre= \langle graphical code \rangle (no default)

Prepends the given \langle graphical code \rangle to /tcb/overlay unbroken^{→ P. 31}.

/tcb/overlay first app= \langle graphical code \rangle (no default)

Appends the given \langle graphical code \rangle to /tcb/overlay first^{→ P. 31}.

/tcb/overlay first pre= \langle graphical code \rangle (no default)

Prepends the given \langle graphical code \rangle to /tcb/overlay first^{→ P. 31}.

/tcb/overlay middle app = $\langle graphical\ code \rangle$	(no default)
Appends the given $\langle graphical\ code \rangle$ to /tcb/overlay middle ^{→P.31} .	
/tcb/overlay middle pre = $\langle graphical\ code \rangle$	(no default)
Prepends the given $\langle graphical\ code \rangle$ to /tcb/overlay middle ^{→P.31} .	
/tcb/overlay last app = $\langle graphical\ code \rangle$	(no default)
Appends the given $\langle graphical\ code \rangle$ to /tcb/overlay last ^{→P.31} .	
/tcb/overlay last pre = $\langle graphical\ code \rangle$	(no default)
Prepends the given $\langle graphical\ code \rangle$ to /tcb/overlay last ^{→P.31} .	
/tcb/overlay broken app = $\langle graphical\ code \rangle$	(no default)
Appends the given $\langle graphical\ code \rangle$ to /tcb/overlay broken ^{→P.31} .	
/tcb/overlay broken pre = $\langle graphical\ code \rangle$	(no default)
Prepends the given $\langle graphical\ code \rangle$ to /tcb/overlay broken ^{→P.31} .	
/tcb/overlay unbroken and first app = $\langle graphical\ code \rangle$	(no default)
Appends the given $\langle graphical\ code \rangle$ to /tcb/overlay unbroken and first ^{→P.31} .	
/tcb/overlay unbroken and first pre = $\langle graphical\ code \rangle$	(no default)
Prepends the given $\langle graphical\ code \rangle$ to /tcb/overlay unbroken and first ^{→P.31} .	
/tcb/overlay middle and last app = $\langle graphical\ code \rangle$	(no default)
Appends the given $\langle graphical\ code \rangle$ to /tcb/overlay middle and last ^{→P.31} .	
/tcb/overlay middle and last pre = $\langle graphical\ code \rangle$	(no default)
Prepends the given $\langle graphical\ code \rangle$ to /tcb/overlay middle and last ^{→P.31} .	

10.5 Watermarks

The following option keys extend the options given in Subsection 8.4 from page 90.

Watermarks are special overlays. The 'hooks' library allows the combination of several watermarks and overlays.

/tcb/watermark text app= $\langle text \rangle$ (no default)

Appends a **/tcb/watermark text**^{→P.90} to the colored box.

```
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries}

\begin{tcolorbox}[enhanced,title=My title,watermark graphics=Basilica_5.png,
  watermark opacity=0.25,
  watermark text app=Basilica,watermark color=Navy
]
\lipsum[1-2]
\tcblower
This example uses a public domain picture from\\
\url{http://commons.wikimedia.org/wiki/File:Basilica_5.png}
\end{tcolorbox}
```

My title

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

This example uses a public domain picture from
http://commons.wikimedia.org/wiki/File:Basilica_5.png

/tcb/watermark text pre= $\langle text \rangle$ (no default)

Prepends a **/tcb/watermark text**^{→P.90} to the colored box.

/tcb/watermark text app on= $\langle part \rangle$ is $\langle text \rangle$ (no default)

Appends a **/tcb/watermark text on**^{→P.90} the named $\langle part \rangle$ of a break sequence.

/tcb/watermark text pre on= $\langle part \rangle$ is $\langle text \rangle$ (no default)

Prepends a **/tcb/watermark text on**^{→P.90} the named $\langle part \rangle$ of a break sequence.

`/tcb/watermark graphics app=<file name>` (no default)

Appends a `/tcb/watermark graphics` ^{→ P.91} referenced by `<file name>` to the colored box.

`/tcb/watermark graphics pre=<file name>` (no default)

Prepends a `/tcb/watermark graphics` ^{→ P.91} referenced by `<file name>` to the colored box.

`/tcb/watermark graphics app on=<part>` is `<file name>` (no default)

Appends a `/tcb/watermark graphics on` ^{→ P.91} the named `<part>` of a break sequence. The picture is referenced by `<file name>`.

`/tcb/watermark graphics pre on=<part>` is `<file name>` (no default)

Prepends a `/tcb/watermark graphics on` ^{→ P.91} the named `<part>` of a break sequence. The picture is referenced by `<file name>`.

`/tcb/watermark tikz app=<graphical code>` (no default)

Appends a `/tcb/watermark tikz` ^{→ P.92} with the given `tikz <graphical code>` to the colored box.

`/tcb/watermark tikz pre=<graphical code>` (no default)

Prepends a `/tcb/watermark tikz` ^{→ P.92} with the given `tikz <graphical code>` to the colored box.

```
% \usepackage{tikz}
\tcbset{colback=red!5!white,colframe=red!75!black,fonttitle=\bfseries,
watermark color=Navy,watermark opacity=0.25,
smiley/.style={watermark tikz pre={%
\path[fill=yellow,draw=yellow!75!red] (0,0) circle (1cm);
\fill[red] (45:5mm) circle (1mm);
\fill[red] (135:5mm) circle (1mm);
\draw[line width=1mm,red] (215:5mm) arc (215:325:5mm);}}}

\begin{tcolorbox}[enhanced,title=My title, watermark text=Watermark,
smiley]
\lipsum[1-2]
\end{tcolorbox}
```

My title

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

Nam dui ligula, fringilla a, euismod sodales, sollicitudin vel, wisi. Morbi auctor lorem non justo. Nam lacus libero, pretium at, lobortis vitae, ultricies et, tellus. Donec aliquet, tortor sed accumsan bibendum, erat ligula aliquet magna, vitae ornare odio metus a mi. Morbi ac orci et nisl hendrerit mollis. Suspendisse ut massa. Cras nec ante. Pellentesque a nulla. Cum sociis natoque penatibus et magnis dis parturient montes, nascetur ridiculus mus. Aliquam tincidunt urna. Nulla ullamcorper vestibulum turpis. Pellentesque cursus luctus mauris.

`/tcb/watermark tikz app on=<part>` is `<graphical code>` (no default)

Appends a `/tcb/watermark tikz on` ^{→ P.92} the named `<part>` of a break sequence.

`/tcb/watermark tikz pre on=<part>` is `<graphical code>` (no default)

Prepends a `/tcb/watermark tikz on` ^{→ P.92} the named `<part>` of a break sequence.

10.6 Skin Code

The following option keys extend the options given in Subsection 8.3 from page 87.

The following code options are applicable only for skins which use engines of type **freelance**. If you intend to add only a few things to an existing skin, you should consider using overlays instead.

/tcb/frame code app=*<graphical code>* (no default)

Appends the given *<graphical code>* to **/tcb/frame code**^{→P.87}.

/tcb/frame code pre=*<graphical code>* (no default)

Prepends the given *<graphical code>* to **/tcb/frame code**^{→P.87}.

/tcb/interior titled code app=*<graphical code>* (no default)

Appends the given *<graphical code>* to **/tcb/interior titled code**^{→P.87}.

```
\begin{tcolorbox}[title=My title,freelance,colframe=Navy,
  frame code app={\draw[yellow,line width=1cm] (
    frame.south west)--(frame.north east);},
  interior titled code app={\draw[red,line width=1cm]
    (frame.north west)--(frame.south east);},
]
\lipsum[1]
\end{tcolorbox}
```

My title

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Ut purus elit, vestibulum ut, placerat ac, adipiscing vitae, felis. Curabitur dictum gravida mauris. Nam arcu libero, nonummy eget, consectetur id, vulputate a, magna. Donec vehicula augue eu neque. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Mauris ut leo. Cras viverra metus rhoncus sem. Nulla et lectus vestibulum urna fringilla ultrices. Phasellus eu tellus sit amet tortor gravida placerat. Integer sapien est, iaculis in, pretium quis, viverra ac, nunc. Praesent eget sem vel leo ultrices bibendum. Aenean faucibus. Morbi dolor nulla, malesuada eu, pulvinar at, mollis ac, nulla. Curabitur auctor semper nulla. Donec varius orci eget risus. Duis nibh mi, congue eu, accumsan eleifend, sagittis quis, diam. Duis eget orci sit amet orci dignissim rutrum.

/tcb/interior titled code pre=*<graphical code>* (no default)

Prepends the given *<graphical code>* to **/tcb/interior titled code**^{→P.87}.

/tcb/interior code app=*<graphical code>* (no default)

Appends the given *<graphical code>* to **/tcb/interior code**^{→P.88}.

/tcb/interior code pre=*<graphical code>* (no default)

Prepends the given *<graphical code>* to **/tcb/interior code**^{→P.88}.

/tcb/segmentation code app=*<graphical code>* (no default)

Appends the given *<graphical code>* to **/tcb/segmentation code**^{→P.88}.

/tcb/segmentation code pre=*<graphical code>* (no default)

Prepends the given *<graphical code>* to **/tcb/segmentation code**^{→P.88}.

/tcb/title code app=*<graphical code>* (no default)

Appends the given *<graphical code>* to **/tcb/title code**^{→P.89}.

/tcb/title code pre=*<graphical code>* (no default)

Prepends the given *<graphical code>* to **/tcb/title code**^{→P.89}.

References

- [1] Peter Breitenlohner. *The ε -TEX manual*. Version 2. Feb. 1998.
http://ftp.gwdg.de/pub/ctan/systems/e-tex/v2/doc/etex_man.pdf.
- [2] David Carlisle. *The tabularx package*. Jan. 7, 1999.
<http://mirror.ctan.org/macros/latex/required/tools/tabularx.pdf>.
- [3] David Carlisle. *The file ltxdoc.dtx for use with L^AT_EX 2_ε*. Nov. 11, 2007.
<http://mirror.ctan.org/macros/latex/base/ltxdoc.dtx>.
- [4] Carsten Heinz and Brooks Moses. *The Listings Package*. Version 1.4. Feb. 2007.
<http://mirror.ctan.org/macros/latex/contrib/listings/listings.pdf>.
- [5] Frank Mittelbach. *The doc and shortvrb Packages*. June 30, 2011.
<http://mirror.ctan.org/macros/latex/base/doc.dtx>.
- [6] Heiko Oberdiek. *The listingsutf8 package*. Nov. 10, 2011.
<http://mirror.ctan.org/macros/latex/contrib/oberdiek/listingsutf8.pdf>.
- [7] Rainer Schöpf, Bernd Raichle, and Chris Rowley. *A New Implementation of L^AT_EX's verbatim and verbatim* Environments*. Mar. 12, 2001.
<http://mirror.ctan.org/macros/latex/required/tools/verbatim.pdf>.
- [8] Thomas F. Sturm. *Mathematik 1 (B.Eng.) Vorlesungs-Skriptum*. Neubiberg: Universität der Bundeswehr München, 2007.
<http://www.unibw.de/bw/sturm>.
- [9] Thomas F. Sturm. *Mathematik 2 (B.Eng.) Vorlesungs-Skriptum*. Neubiberg: Universität der Bundeswehr München, 2008.
<http://www.unibw.de/bw/sturm>.
- [10] Thomas F. Sturm. *Höhere Mathematik: Fortgeschrittene mathematische Methoden (M.Eng.) Vorlesungs-Skriptum*. Neubiberg: Universität der Bundeswehr München, 2010.
<http://www.unibw.de/bw/sturm>.
- [11] Thomas F. Sturm. *L^AT_EX – Einführung in das Textsatzsystem*. 9th edition. RRZN-Handbücher. Hannover: Regionales Rechenzentrum für Niedersachsen (RRZN), May 2012.
<http://www.rrzn.uni-hannover.de/buch.html?&titel=latex>.
- [12] Till Tantau. *The TikZ and PGF Packages. Manual for version 2.10*. Oct. 25, 2010.
<http://mirror.ctan.org/graphics/pgf/base/doc/generic/pgf/pgfmanual.pdf>.
- [13] Kresten Krab Thorub, Frank Jensen, and Chris Rowley. *The calc package – Infix notation arithmetic in L^AT_EX*. Aug. 22, 2007.
<http://mirror.ctan.org/macros/latex/required/tools/>.

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