

Worldflags

Drawing flags with TikZ

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Version 1.0
April 21, 2021

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1 Introduction

Worldflags is a package for drawing flags using TikZ. Currently the national flags of all independent nations are included, additionally some other flags of various organizations; there's more to come.

A particular flag is selected via a parameter; for national flags that is the two-letter country code (i. e. the domain name). A flag can be drawn in two ways:

- As a single TikZ-picture within ordinary text.
- As a picture element *within* a TikZ-picture.

The appearance of a flag (size, frame etc.) can be adapted using optional parameters.

The description of every flag resides in a particular flag description file `worldflag_xx.tex`, wherein `xx` is the parameter for selecting a particular flag, as listed in section 4. That saves memory and computing time on the one hand, as only the required flags have to be loaded. On the other hand, the package can easily be extended by adding new flag description files.

Some flags with complicated emblems (e. g. Afghanistan, Ecuador) require a lot of memory. Thus an expansion of \TeX 's main memory size is recommended.

The flag descriptions are based on the construction sheets in [1] (thanks to Mello Luchtenberg for that great website), complex emblems have been taken from the svg-files on Wikipedia and have been translated into Tikz via Inkscape (with a reasonable amount of manual post editing).

2 Usage

2.1 Flags as single TikZ-pictures

Commands:

<code>\worldflag[opts]{xx}</code>	draws the flag <i>xx</i> with the optional parameters <i>opts</i> as a particular TikZ-picture.
<code>\flagsdefault[opts]</code>	sets default values for the options <i>opts</i> for subsequent flags.

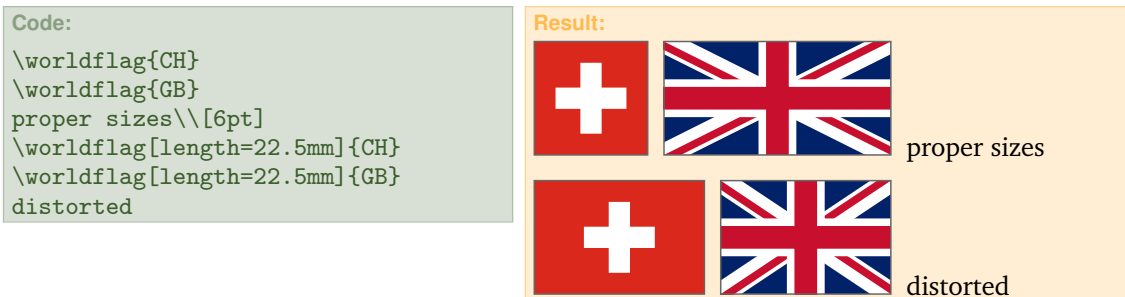
Options:

<code>width=dimension</code>	sets the flag width, default: 15 mm.
<code>length=dimension</code>	sets the flag length; if set to 0 pt (default), the length is calculated according to the proper aspect ratio of the flag.
<code>framewidth=dimension</code>	sets the line width of the frame around the flag, default: 0.2 mm.
<code>framecolor=colormame</code>	sets the color of the flag frame, default: black!60.
<code>stretch=number</code>	controls stretching and shrinking of geometric shapes when the aspect ratio differs from its proper value.
<code>grid</code>	causes a millimeter-grid drawn on the flag as an aid for constructing new flags.
<code>noemblem</code>	supresses the drawing of an emblem, which is part of many flags.
<code>emblem</code>	enforces the drawing of an emblem onto the flag which is otherwise supressed (currently only applies to the flags of Austria and Germany).
<code>emblemdefault</code>	restores the default behavior for drawing emblems.

`\worldflag{xx}` draws a flag, selected by the parameter *xx*, as a single TikZ-picture. Section 4 lists all available flags and their selection code *xx*. Various properties of the flag can be specified with additional optional parameters as key-value pairs.

`\flagsdefault[opts]` specifies default values for the Options *opts* for subsequent flags.

The *width* of a flag defaults to 15 mm, it can be overridden with the option `width`. If one of the dimensions *width* or *length* is set to 0 pt (which is the default value for *length*), its value results from the proper aspect ratio *width*/*length*, which is proprietary to every flag. E. g. the Swiss flag is quadratic, it has an aspect ratio of 1:1, the British flag has an aspect ratio of 1:2. If `width` is set to 0 pt, `length` *must* be specified. If both dimensions are specified, flags loose their proper aspect ratio but get the same size:



If both width and length of a flag are specified, which differs from its proper aspect ratio, some geometries on the flag will unavoidably get distorted. There is presumably no general rule whether certain *distances* on the flag should remain unchanged in that case, or certain *ratios* – as flag owners do not intend to distort their flags – but that behavior can be influenced for many flags applying the option `stretch`. If `stretch` is set to 0 (which is default), certain *distances* and *sizes* on the flag remain unchanged, when the flag is stretched; if set to 1, certain *ratios* remain unchanged in that case. Values within the range of 0...1 are possible to get a compromise between both cases.

The following examples illustrate that behavior:

Canada: `stretch=0` The *size* of the maple leaf remains unchanged.
`stretch=1` The *ratio* of the widths – maple leaf and pale – remains unchanged; the maple leaf has to shrink.



Denmark: `stretch=0` The *distance* from the vertical bar to the hoist remains unchanged.
`stretch=1` The *ratio* of the distances to the hoist and to the fly remains unchanged.



The option `grid` causes a millimeter-grid drawn over the flag. That is primarily a measuring aid for the construction of new flags.

The options `framecolor` and `framewidth` set the color and the line width of the frame drawn around the flag, respectively. The default value for the line width is 0.2 mm, the default color is black!60. If `framewidth` is set to 0 mm (or 0 pt), no frame is drawn at all.

Code:

```
\flagsdefault[framecolor=blue]
\worldflag[grid]{IT}
\worldflag[framewidth=1mm]{IT}
\worldflag[framewidth=0mm]{IT}
```

Result:



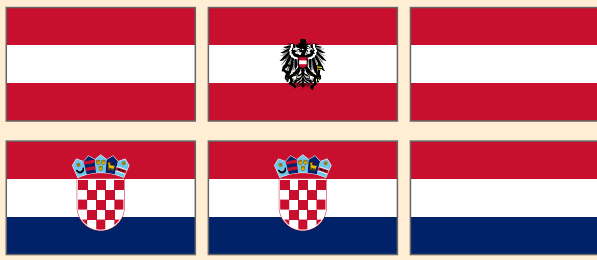
Many flags have an emblem on it, e. g. a coat of arms or a special symbol. Those emblems are often very complex and require a lot of computing time and memory. The depiction of such an emblem can be suppressed with the option `noemblem`, either for the sake of saving computing time (for dafts) or just because simplified version of the flag is required. Some countries distinguish between a *civil* flag without an emblem and a *state* flag containing an emblem.

Some flags don't have an emblem by default, but an emblem is available for special purposes. In that case the depiction of the emblem can be enforced with the option `emblem`. Currently that only applies to the country flags of Austria and Germany (more will come). The option `emblemdefault` restores the default behavior for drawing emblems.

Code:

```
\worldflag{AT}
\worldflag[emblem]{AT}
\worldflag[noemblem]{AT}\[6pt]
\worldflag{HR}
\worldflag[emblem]{HR}
\worldflag[noemblem]{HR}
```

Result:



The emblem (i. e. the coat of arms) in the Austrian flag is suppressed by default, the emblem in the Croatian flag is depicted default.

2.2 Flags as picture elements within a TikZ-picture

Within a Tikz-picture the flags are available as *pic*-Elements named `worldflag`. A particular flag is selectet with the option `country`. Unlike *nodes*, *pic*-elements cannot be referenced by name, but named nodes and coordinates within the *pic*-element can be referenced. Hence every flag has special coordinates for referencing:

- 0 ... center of flag
- nw ... upper left corner ("north-west")
- ne ... upper right corner ("north-east")
- sw ... lower left corner ("south-west")
- se ... lower right corner ("south-east")
- n ... top edge center ("north")
- e ... fly edge center ("east")
- w ... hoist edge center ("west")
- s ... bottom edge center ("south")

Commands:

`\pic (xy) [country=xx,...] at pos {worldflag};`
 draws the flag *xx* and gives it the name *xy*; the flag is centered at the coordinate *pos*.

`\flagsdefault [opts]`
 sets default values for the options *opts*.

Options:

`width=dimension`
 sets the flag width, default: 15 mm.

`length=dimension`
 sets the flag length; if set to 0 pt (default), the length is calculated according to the proper aspect ratio of the flag.

`framewidth=dimension`
 sets the line width of the frame around the flag, default: 0.2 mm.

`framecolor=colormame`
 sets the color of the flag frame, default: black!60.

`stretch=number`
 controls stretching and shrinking of geometric shapes when the aspect ratio differs from its proper value.

`grid`
 causes a millimeter-grid drawn on the flag.

`noemblem`
 supresses the drawing of an emblem onto the flag.

`emblem`
 enforces the drawing of an emblem onto the flag.

`emblemdefault`
 restores the default behavior for drawing emblems.

`rotate= α`
 rotates the flag α degrees around its center.

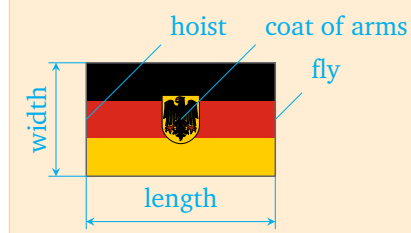
`turn= β`
 rotates the flag β degrees around the (imaginary) flag-pole.

`hang= γ`
 lets the flag “hang down” γ degrees from the (imaginary) flag pole.

The following example illustrates the usage of the special coordinates:

Code:

```
\begin{tikzpicture}[draw=cyan,>stealth,x=1mm,y=1mm]
\draw (de-e)--++(45:5) node [above right,cyan]
{fly};
\draw (de-w)--++(45:14)
node [above right,cyan] {hoist};
\draw (de-0)--++(45:14)
node [above right,cyan] {coat of arms};
\draw (de-nw)--++(-5,0) (de-sw)--++(-5,0);
\draw [<->] ($(de-nw)-(4,0)$)--($(de-sw)-(4,0)$)
node [midway,above,rotate=90,cyan] {width};
\draw [<->] ($(de-sw)-(0,6)$)--($(de-se)-(0,6)$)
node [midway,above,cyan] {length};
\end{tikzpicture}
```

Result:

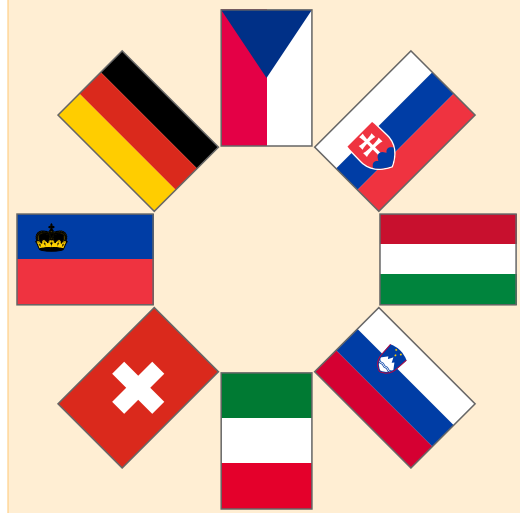
The option `rotate` causes the flag to be rotated around the flag center with a given angle in degree.

Note: That option is not proprietary to flags, it is a general option for *any* pic-element. Hence it is *not* possible to give it a default value with the command `flagsdefault`.

Code:

```
\begin{tikzpicture}
\flagsdefault[width=12mm,length=18mm]
\foreach \c/\n in {HU/0,SK/1,IT/6,SI/7}
  \pic [country=\c,rotate=\n*45]
    at (\n*45:24mm) {worldflag};
\foreach \c/\n in {CZ/2,DE/3,LI/4,CH/5}
  \pic [country=\c,rotate=\n*45-180]
    at (\n*45:24mm) {worldflag};
\end{tikzpicture}
```

Result:



The option `turn` lets the flag rotate around the imaginary flagpole with a given angle β (in degrees). The length of the flag will *seemingly* shrink with a factor of $\cos \beta$. With a value of $\beta = 180$ the flag will just appear mirrored. The option `hang` lets the flag “hang down” from the imaginary flagpole with a given angle γ (in degrees); the flag will be sheared and compressed accordingly.

The following example shows a combination of `rotate`, `turn` and `hang`.

Code:

```
\begin{tikzpicture}[x=1mm,y=1mm]
\def\w{30}
\def\d{20}
\pgfdeclarehorizontalshading{flagpole}
  {30mm}{color(0mm)=(white);
  color(1mm)=(brown); color(2mm)=(black)}
\flagsdefault[width=15mm,hang=20]
\pic (gb) [country=GB,rotate=-\w]
  at (\d,0) {worldflag};
\pic (us) [country=US,rotate=\w,turn=180]
  at (-\d,0) {worldflag};
\fill [shading=flagpole,shading angle=-\w,
  rotate around={-\w:(gb-nw)}]
  (gb-nw)-|++(-2,-60)-|cycle;
\fill [shading=flagpole,shading angle=\w,
  rotate around={\w:(us-nw)}]
  (us-nw)-|++(2,-60)-|cycle;
\end{tikzpicture}
```

Result:



3 Internals

This section is intended for those who want to *extend* the worldflag package and create new flags. Those who just want to *use* the package and draw existing flags, need not read it.

Every flag resides in a particular “flag description file” named `worldflag_XX.tex`, wherein `XX` is the code for selecting a flag. Extending the package with new flags is quite easy: Just a flag description file for every new flag has to be written and put into a directory, where \TeX can find it. No configuraion files, no other actions; that’s it.

3.1 Flag description file

Every flag description file has the following structure:

```
\BeginFlagDescription{y}{x} ①
\definecolor{red}{RGB}{r,g,b} ②
\definecolor{gold}{RGB}{r,g,b}
:
③
:
\FrameCode ④
\EndFlagDescription ⑤
```

- ① This command calculates the flag length, which will be stored in the dimension register `\flaglength`, from the flag width, which is stored in the dimension register `\flagwidth` (or vice versa) using the proper aspect ratio of the flag. That aspect ratio has to be specified with the two parameters `y` (width) and `x` (length). Those parameters have to be interger numbers, their absolute values don’t matter.

Furthermore, two nested scopes are opened: The outer scope sets the drawing unit to `\flagwidth` (note: the top edge of a flag has always a y-coordinate of 1) and performs the coordinate transformation according to the options `turn` and `hang`. The inner scope shifts the coordinate system to the flag center.

In the sequel, the special coordinates `-0`, `-n`, `-ne`, `-e`, `-se`, `-s`, `-sw`, `-w` and `-nw` are established – as described in section 2.2.

- ② Every flag has proprietary shadings of colors. Hence even common colors have to be redefined for every flag separately.
- ③ TikZ commands for drawing and filling of shapes make up the core of a flag description file. A couple of macros (see section 3.3) for common geometric figures facilitate the creation of the flag image.

- ④ This command draws a rectangular frame around the flag. The line width, set with the option `framewidth`, is stored in the dimension register `\flagframe`; the frame color, set with the option `framecolor`, is stored in the macro `\framecolor`. For non-rectangular flags (e. g. Nepal) the flag frame has to be programmed “manually”.
- ⑤ This command draws a millimeter-grid onto the flag, if invoked with the option `grid` and closes the two previously opened scopes.

3.2 Variables

A couple of properties of a flag are kept in variables, which are either dimension registers or macros. Those variables are set by the user, specifying options or are calculated internally. They are used in the code for the flag description, but need not be set directly.

Dimension registers:

<code>\flagwidth</code>	width of the flag (vertical extent)
<code>\flaglength</code>	length of the flag (horizontal extent)
<code>\flagframe</code>	line width of the flag frame

Macros:

<code>\framecolor</code>	color name of the flag frame
<code>\viewangle</code>	angle of the rotation around the flagpole
<code>\hangangle</code>	angle of the “hanging down” from the flagpole
<code>\flagstretch</code>	controls stretching of certain geometries, when stretching the entire flag
<code>\StretchFactor</code>	factor for stretching of certain geometries according to <code>\flagstretch</code>

`\flagwidth` and `\flaglength` specify the width and length of a flag. They are set by the user with the options `width` and `length` or are calculated from each other by `\AspectRatio` internally. `\flagwidth` is the unit for coordinates and lengths in the flag description.

The properties of the flag frame are kept in the variables `\flagframe` and `\framecolor`; they can be set with the options `framewidth` and `framecolor`.

`\StretchFactor` is a factor for stretching certain x -coordinates, when the whole flag is stretched (or compressed), i. e. when the aspect ratio differs from its proper value. It is calculated by `\AspectRatio` from the variable `\flagstretch`, which itself is user-specified with the Option `stretch`.

3.3 Commands

<code>\BeginFlagDescription{y}{x}</code>	see section 3.1
<code>\EndFlagDescription</code>	see section 3.1
<code>\AspectRatio{y}{x}</code>	calculates the dimensions of the flag and the variable <code>\StretchFactor</code> ; called by <code>\BeginFlagDescription</code> .
<code>\FrameCode</code>	draws the rectangular frame around the flag.
<code>\GridCode</code>	draws a millimeter-grid onto the flag; called by <code>\EndFlagDescription</code> .
<i>Geometric flag elements:</i>	
<code>\hstripesII{c₁}{c₂}</code>	partitions the flag into two horizontal stripes with the colors c_1 and c_2 .
<code>\hstripesIII{c₁}{c₂}{c₃}</code>	three horizontal stripes with the colors c_1, \dots
<code>\hstripesIV{c₁}{c₂}{c₃}{c₄}</code>	four horizontal stripes with the colors c_1, \dots
<code>\vstripesII{c₁}{c₂}</code>	partitions the flag into two vertical stripes with the colors c_1 and c_2 .
<code>\vstripesIII{c₁}{c₂}{c₃}</code>	three vertical stripes with the colors c_1, \dots
<code>\hbar{c}{y}{w}</code>	horizontal bar with the color c and the line width w at the y-coordinate y
<code>\vbar{c}{x}{w}</code>	vertical bar with the color c and the line width w at the x-coordinate x
<code>\chevron{c}{x}</code>	isosceles triangle at the hoist with the color c and the vertex at the x-coordinate x
<code>\starV{c}{p}{r}{\alpha}</code>	5-pointed star as a complex polygon with the fill color c , an outer radius r , an angle α at the coordinate p
<code>\starVI{c}{p}{r}{\alpha}</code>	6-pointed star as a complex polygon with the fill color c , an outer radius r , an angle α at the coordinate p
<code>\starn{c}{n}{p}{r₁}{r₂}{\alpha}</code>	n -pointed star with the fill color c , an outer radius r_a , an inner radius r_i and an angle α at the coordinate p
<code>\moon{c}{p₁}{r₁}{p₂}{r₂}</code>	crescent moon with the fill color c , as a difference set of two generating circles with the radii r_1, r_2 , and center coordinates p_1 and p_2
<code>\UnionJack{x₁}{y₁}{x₂}{y₂}</code>	Union Jack between the coordinates (x_1, y_1) and (x_2, y_2)

The macros `\hstripesII`, `\hstripesIII`, `\hstripesIV`, `\vstripesII`, `\vstripesIII` partition the flag into an according number of horizontal or vertical colored stripes. `\hbar` draws a horizontal bar of given width and color at a specified y-coordinate across the flag; `\vbar` does the same vertically. `\chevron` draws an isosceles triangle with a given height

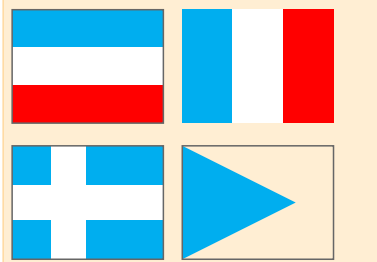
over the hoist. Those macros need to know the variables `\flagwidth` and `\flaglength` which have to be defined, if called outside a flag description file:

Code:

```
\newdimen\flagwidth\flagwidth=15mm
\newdimen\flaglength\flaglength=20mm

\begin{tikzpicture}[x=\flagwidth,y=\flagwidth]
\begin{scope}\hstripesIII{cyan}{white}{red}
\FrameCode\end{scope}
\begin{scope}[shift=(1.5,0)]
\vstripesIII{cyan}{white}{red}
\FrameCode\end{scope}
\begin{scope}[shift={(0,-1.2)}]
\hbar{cyan}{0.5}{1}
\hbar{white}{0.5}{0.3}
\vbar{white}{0.5}{0.3}
\FrameCode\end{scope}
\begin{scope}[shift=(1.5,-1.2)]
\chevron{cyan}{1}\FrameCode\end{scope}
\end{tikzpicture}
```

Result:



Note: A flag needs no background.

The following commands don't require the variables `\flagwidth` and `\flaglength`; they can be used arbitrarily outside a flag, anywhere in a TikZ-picture.

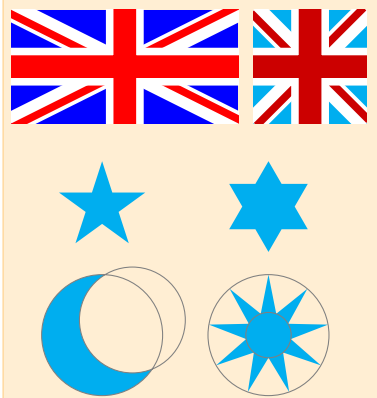
`\Union Jack` draws the Union Jack (which is part of a couple of flags) between a lower left and an upper right point. Their coordinates – x_1, y_1, x_2, y_2 – are separate parameters, which *must* be specified as dimensions (i. e. using a unit), not just as numbers. The colors `blue`, `red` and `white` can be redefined arbitrarily.

The various types of stars `\starV`, `\starVI`, `\starn` and `\moon` are self-explanatory. In the following example `\starn` and `\moon` are overlayed with the generating circles.

Code:

```
\begin{tikzpicture}[x=1mm,y=1mm]
\UnionJack{0mm}{0mm}{30mm}{15mm}
\colorlet{blue}{cyan}
\definecolor{red}{rgb}{0.8,0,0}
\UnionJack{32mm}{0mm}{47mm}{15mm}
\begin{scope}[shift={(12,-28)}]
\starV{cyan}{(0,17)}{6}{0}
\starVI{cyan}{(22,17)}{6}{0}
\starn{cyan}{9}{(22,0)}{8}{3}{0}
\draw[gray] (22,0)circle(8) (22,0)circle(3);
\moon{cyan}{(0,0)}{8}{(4,2)}{7}
\draw[gray] (0,0)circle(8) (4,2)circle(7);
\end{scope}
\end{tikzpicture}
```

Result:



4 Flags

4.1 Country Flags



Afghanistan
(AF)



Albania
(AL)



Algeria
(DZ)



Andorra
(AD)



Angola
(AO)



Antigua & Barbuda
(AG)



Argentina
(AR)



Armenia
(AM)



Australia
(AU)



Austria
(AT)



Azerbaijan
(AZ)



Bahamas
(BS)



Bahrain
(BH)



Bangladesh
(BD)



Barbados
(BB)



Belarus
(BY)



Belgium
(BE)



Belize
(BZ)



Benin
(BJ)



Bhutan
(BT)



Bolivia
(BO)



Bosnia & Herzegovina
(BA)



Botswana
(BW)



Brazil
(BR)



Brunei
(BN)



Bulgaria
(BG)



Burkina Faso
(BF)



Burundi
(BI)



Cambodia
(KH)



Cameroon
(CM)



Canada
(CA)



Cape Verde
(CV)



Central African Rep.
(CF)



Chad
(TD)



Chile
(CL)



China
(CN)



Colombia
(CO)



Comoros
(KM)



Congo, Democratic
Rep.
(CD)



Congo, Republic
(CG)



Costa Rica
(CR)



Cote d'Ivoire
(CI)



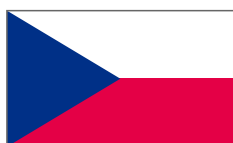
Croatia
(HR)



Cuba
(CU)



Cyprus
(CY)



Czech Republic
(CZ)



Denmark
(DK)



Djibouti
(DJ)



Dominica
(DM)



Dominican Republic
(DO)



Ecuador
(EC)



Egypt
(EG)



EL Salvador
(SV)



Equatorial Guinea
(GQ)



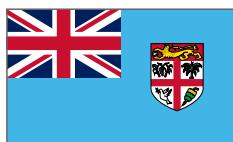
Eritrea
(ER)



Estonia
(EE)



Ethiopia
(ET)



Fiji
(FJ)



Finnland
(FI)



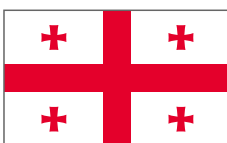
France
(FR)



Gabon
(GA)



Gambia
(GM)



Georgia
(GE)



Germany
(DE)



Ghana
(GH)



Great Britain
(GB)



Greece
(GR)



Grenada
(GD)



Guatemala
(GT)



Guinea
(GN)



Guinea Bissau
(GW)



Guyana
(GY)



Haiti
(HT)



Honduras
(HN)



Hungary
(HU)



Iceland
(IS)



India
(IN)



Indonesia
(ID)



Iran
(IR)



Iraq
(IQ)



Ireland
(IE)



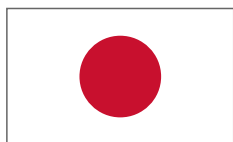
Israel
(IL)



Italy
(IT)



Jamaica
(JM)



Japan
(JP)



Jordan
(JO)



Kazakhstan
(KZ)



Kenya
(KE)



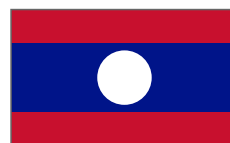
Kiribati
(KI)



Kuwait
(KW)



Kyrgyzstan
(KG)



Laos
(LA)



Latvia
(LV)



Lebanon
(LB)



Lesotho
(LS)



Liberia
(LR)



Libya
(LY)



Liechtenstein
(LI)



Lithuania
(LT)



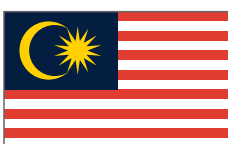
Luxembourg
(LU)



Madagaskar
(mg)



Malawi
(MW)



Malaysia
(MY)



Maledives
(MV)



Mali
(ML)



Malta
(MT)



Marshall Islands
(MH)



Mauritania
(MR)



Mauritius
(MU)



Mexico
(MX)



Micronesia
(FM)



Moldova
(MD)



Mongolia
(MN)



Montenegro
(ME)



Morocco
(MA)



Mozambique
(MZ)



Myanmar
(MM)



Namibia
(NA)



Nauru
(NR)



Nepal
(NP)



Netherlands
(NL)



New Zealand
(NZ)



Nicaragua
(NI)



Niger
(NE)



Nigeria
(NG)



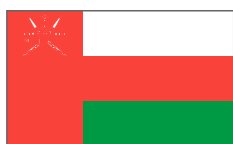
North Korea
(KP)



North Macedonia
(MK)



Norway
(NO)



Oman
(OM)



Pakistan
(PK)



Palau
(PW)



Panama
(PA)



Papua New Guinea
(PG)



Paraguay
(PY)



Peru
(PE)



Philippines
(PH)



Poland
(PL)



Portugal
(pt)



Quatar
(QA)



Romania
(RO)



Russia
(RU)



Rwanda
(RW)



St. Kitts & Nevis
(KN)



St. Lucia
(LC)



St. Vincent
(VC)



Samoa
(WS)



San Marino
(SM)



Sao Tome & Principe
(ST)



Saudi Arabia
(SA)



Senegal
(SN)



Serbia
(RS)



Seychelles
(SC)



Sierra Leone
(SL)



Singapore
(SG)



Slovakia
(SK)



Slovenia
(SI)



Solomon Islands
(SB)



Somalia
(SO)



South Africa
(ZA)



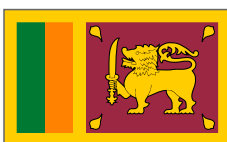
South Korea
(KR)



South Sudan
(SS)



Spain
(ES)



Sri Lanka
(LK)



Sudan
(SD)



Suriname
(SR)



Swaziland
(SZ)



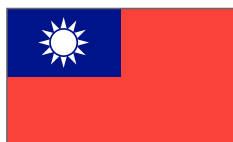
Sweden
(SE)



Switzerland
(CH)



Syria
(SY)



Taiwan
(TW)



Tajikistan
(TJ)



Tanzania
(TZ)



Thailand
(TH)



Togo
(TG)



Tonga
(TO)



Trinidad & Tobago
(TT)



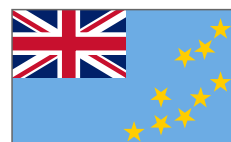
Tunisia
(TN)



Turkey
(TR)



Turkmenistan
(TM)



Tuvalu
(TV)



Uganda
(UG)



Ukraine
(UA)



United Arab Emirates
(AE)



United States
(US)



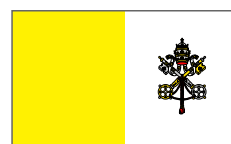
Uruguay
(UY)



Uzbekistan
(UZ)



Vanuatu
(VU)



Vatican
(VA)



Venezuela
(VE)



Viet Nam
(VN)



Yemen
(YE)



Zambia
(ZM)



Zimbabwe
(ZW)

4.2 Other Flags



European Union
(EU)



United Nations
(UNO)



Red Cross
(RedCross)



Olympics
(Olympics)



Jolly Roger
(JollyRoger)



Rainbow fag
(Rainbow)

5 Links

- [1] <http://www.vexilla-mundi.com>: Comprehensive website with flags of all nations including construction sheets, historical flags, flags of many cities and regions.
- [2] <https://www.fotw.info>: Website of the FOTW (“Flags Of The World”), vexillological association and internet resource; many background informations about flags and vexillology.
- [3] <https://www.welt-flaggen.de>: Flags of and information about all countries of the world; contains flag quizzes.
- [4] <https://www.nationalflaggen.de>: Provides various images and animated gifs of all national flags.