



INTERNATIONAL ORIENTEERING FEDERATION

IOF MAP SPECIFICATIONS

PRINTING AND COLOUR DEFINITIONS

**(Previously named
ISOM 2017 Appendix 1)**

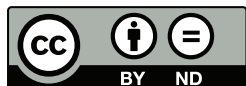


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Errata (changes to the document):

Date	Page	Description
24.05.2021	6	Change from ISMTBOM 2020 to ISMTBOM 202X
27.01.2022	5	New CMYK Colour
27.01.2022	6	New Colour Dark green
27.01.2022	6	New Colour White stripes for area passable at two levles
27.01.2022	6	Change from ISMTBOM 202X to ISMTBOM 2022

This IOF Map Specifications (Printing and Colour Definitions) has been compiled and edited by the IOF Map Commission (November 2020).



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IOF MAP SPECIFICATIONS

Printing and Colour Definitions

1. BACKGROUND

The process of making/drawing orienteering maps has changed completely in the last 25-years. In the early 1990s, maps were still drawn with ink on plastic, at least one plastic sheet for each of the five basic orienteering map colours, but often up to 15-20 plastic sheets were used. The printing houses used old repro technique to produce one printing plate for each colour, and used the defined PMS-colours for the printing.

However nowadays all maps are drawn on a computer, using different advanced soft-ware, and most maps are only reproduced on laser printers, using the CMYK colour separation system.

Today, the offset printing industry almost exclusively uses the CMYK technique, so for each year it is harder to find a print shop that has the knowledge and colours to print using PMS spot colours as in the past.

Therefore, the IOF recommends CMYK printing technology.

2. DESCRIPTIONS OF PRINTING TECHNOLOGIES

PMS (Spot colour printing)

PMS (Pantone Matching System) means that the map is printed in 5 spot colours (black, brown, blue, green and yellow). The hue is defined in the PMS colour definition system. Lower percentages of each colour are made by using simple percentage rasters.

The main advantage of PMS spot colours is that all colours (100%) are solid, making for example contours homogeneous and sharp.

The disadvantages are mainly:

- You cannot print logos, ads., etc. on the map as they will be defined in CMYK.
- It is more expensive to print spot colours because all printing houses normally print CMYK, so they have to clean the printing machine both before and after a printing job using PMS colours. This also means that a lot of heavy cleaning products will be used with a negative impact on the environment. Moreover, these spot colours are presently more expensive than the CMYK ones.
- The lack of experience of spot colour printing in the printing industry can cause quality problems.
- PMS printing causes overprinting effects, which reduces the sharpness of the print.

CMYK

CMYK means that all colour shades are defined by mixing the four colours in the CMYK definition C=cyan, M=magenta, Y=yellow, K=black (or 100% of C+M+Y). For example, the yellow colour used in orienteering maps is defined in CMYK as 27% magenta and 79% yellow.

The main advantages with CMYK are:

- The same technique can be used both for offset and laser printing.
- Logos and advertising can be printed together with the actual map.
- Cheaper and faster offset printing.
- Easier to find a printer that can print without problems.

The disadvantage is that the mixing of CMYK colours used to produce one given orienteering map colour can make thin lines less sharp. This problem affects mainly brown line objects.

CMYK+B

CMYK+B is a hybrid of CMYK and PMS, developed specially for printing orienteering maps with CMYK technique. It means that all 100% brown objects are taken out of the CMYK separation. The brown objects are instead printed with brown spot colour, whilst the rest of the map is printed with normal CMYK. This means that the only disadvantage of CMYK is eliminated (this method is only possible in offset printing).

3. RECOMMENDED PRINTING TECHNIQUE FOR VARIOUS DISCIPLINES AND FORMATS

The main concern in CMYK printing (both laser and offset) is to achieve sufficient resolution. To achieve acceptable sharpness of line objects in a normal map, a resolution of at least 230 lpi at RIP stage¹ is necessary. If CMYK+B is used, 200 lpi is enough. If the RIP resolution is lower, the lines will look pixelated and they will be more difficult to read and understand. For Sprint maps, SkiO maps and MTBO maps, a RIP resolution of 150 lpi is enough.

Foot-O

Long distance

For main IOF events offset printing (CMYK+B) is demanded for 1:15000 and strongly recommended for 1:10000.

Middle distance

For main IOF events offset printing is strongly recommended, but laser printing can be acceptable if the map is not too complicated. Minimum resolution shall be 200 lpi.

Sprint

Sprint maps shall always be laser printed. Minimum resolution shall be 150 lpi.

MTBO

MTBO maps shall always be laser printed. Minimum resolution shall be 150 lpi.

SkiO

SkiO maps shall always be laser printed. Minimum resolution shall be 150 lpi.

Quality of printing shall be compared using the present IOF PrintTech Test Sheets (Offset/laser printed maps shall be compared using their respective test sheet)

¹ lpi is something different than dpi

4. CMYK COLOUR DEFINITION

The seven map colours (including course planning symbols) shall be defined for offset printing as follows:

Colour	C	M	Y	K	
Black:	0	0	0	100	
Blue:	100	0	0	0	
Yellow:	0	27	79	0	
Green:	76	0	91	0	
Dark green:	100	0	80	30	
Brown:	0	56	100	18	(for CMYK+B PMS 471)
Purple:	35	85	0	0	or use PMS "Purple"

For laser printers, no fixed definition can be used because every single laser printer gives its "own colours". For adjusting the CMYK definition for the actual laser printer, the use of the IOF offset Print test sheet is recommended.

5. THE COURSE PLANNING SYMBOLS

In traditional offset printing, the courses and other additional information is overprinted by an extra print after the actual map is printed. Here the PMS colour "purple" is used. In this case, an overprint effect will appear making important symbols visible through the course symbols.

In laser printing this effect must be simulated. The easiest way to do this is to place the purple track colour in the colour order below black, brown and blue 100% colours (see chapter 7). The IOF does not recommend more advanced methods to achieve overprint because this can impede the effort to print a map with high resolution.

6. PAPERS

For offset printing, a coated paper 100-120 g per square meter is recommended. For laser printing, it is important to use a paper for colour laser printing 100-110 g per square meter.

A number of types of plastic paper can be found on the market, that can be used, both for offset and laser printing. Attention shall be given to a smooth surface and to the folding capability. Testing of new papers in real competition conditions with wet weather circumstances is highly recommended.

7. COLOUR ORDER

It is very important to follow the colour order, otherwise it's impossible to show the course planning symbols correctly.

Colour Name	C	M	Y	K	ISOM 2017-2	ISSprOM 2019-2	ISSkiOM 2019	ISMTBOM 2022
Upper purple for course overprint	35	85	0	0	✓	✓	✓	✓
White for course overprint	0	0	0	0	✓	✓	✓	✓
Purple 50% area symbol	18	43	0	0		✓		✓
Green for Ski-O	91	0	83	0			✓	
White for railroad	0	0	0	0	✓	✓		✓
Black 100%	0	0	0	100	✓	✓	✓	✓
Blue 100% point symbols	100	0	0	0	✓			
Brown 100% point symbols	0	56	100	18	✓			
Green 100% point symbols	76	0	91	0	✓	✓		✓
Blue 100% line symbols	100	0	0	0	✓		✓	✓
Dark green line symbols	100	0	80	30	✓			
Brown 100% line symbols	0	56	100	18	✓			
Lower purple for course overprint	35	85	0	0	✓	✓	✓	✓
Dark green line symbols	100	0	80	30		✓		
Blue 100% point and line symbols	100	0	0	0		✓		✓
Brown 100%	0	56	100	18		✓	✓	✓
White stripes for area passable at two levles	0	0	0	0		✓		
Brown 50% for road infill	0	28	50	9	✓	✓	✓	✓
Brown 30% for road infill	0	17	30	5		✓		
Black 100% for road outline	0	0	0	100	✓	✓	✓	✓
Black 60% for buildings	0	0	0	60			✓	✓
Black 50% for large buildings and tramway	0	0	0	50	✓	✓		
Black 20% for canopy	0	0	0	20	✓	✓		✓
Blue 100% area symbols	100	0	0	0	✓	✓	✓	✓
Blue 70% area symbols	70	0	0	0	✓	✓		✓
Blue 50% area symbols	50	0	0	0	✓	✓	✓	
Blue 30% area symbols	30	0	0	0		✓		
White over green and brown	0	0	0	0	✓	✓		
Brown 50% for paved area	0	28	50	9	✓	✓	✓	✓
Brown 30% for paved area	0	17	30	5		✓		
Yellow 100% + Green 50%	38	27	100	0	✓	✓	✓	✓
Dark green area symbols	100	0	80	30		✓		
Green 100% area symbols	76	0	91	0	✓			
Green 60% area symbols	46	0	55	0	✓	✓		
Green 30% area symbols	24	0	27	0	✓	✓	✓	✓
Black 30% area symbols2	0	0	0	30	✓	✓		
White over Yellow	0	0	0	0	✓	✓	✓	✓
Black for cultivated land and sandy ground	0	0	0	100	✓	✓		✓
Orange for open land permitted to ride	0	60	100	0				✓
Yellow 100% area symbols	0	27	79	0	✓	✓	✓	✓
Yellow 75% area symbols	0	20	59	0	✓		✓	
Yellow 50% area symbols	0	14	40	0	✓	✓	✓	✓

8. COLOUR CALIBRATION

For calibrating the colours of a printer (inkjet or laser), it is necessary to print the PrintTech test sheet on that printer. After that, the results must be compared with the colours of the offset printed PrintTech test sheet (BML Printers 2019). If there are differences, the colours have to be adjusted in the mapping program. To facilitate the process of adjustment, the colour tables therefore can be used.

Print the colour tables on the printer to find the equivalent CMYK values compared to the colours of the offset printed PrintTech test sheet. The CMYK values of the colour tables have a graduation of 10%, starting from 0% up to 100%. The two axes on each page exists of the colours Magenta and Cyan, the colour Yellow changes from one page to the next. If the graduations of the colours are not adequate, the values of the colours have to be interpolated.

As this is an iterative process, the changed PrintTech test sheet must be printed, and the results must be reviewed again. If the results are not satisfying, the process has to be repeated until all colours are matching.

9 CMYK COLOUR TABLES

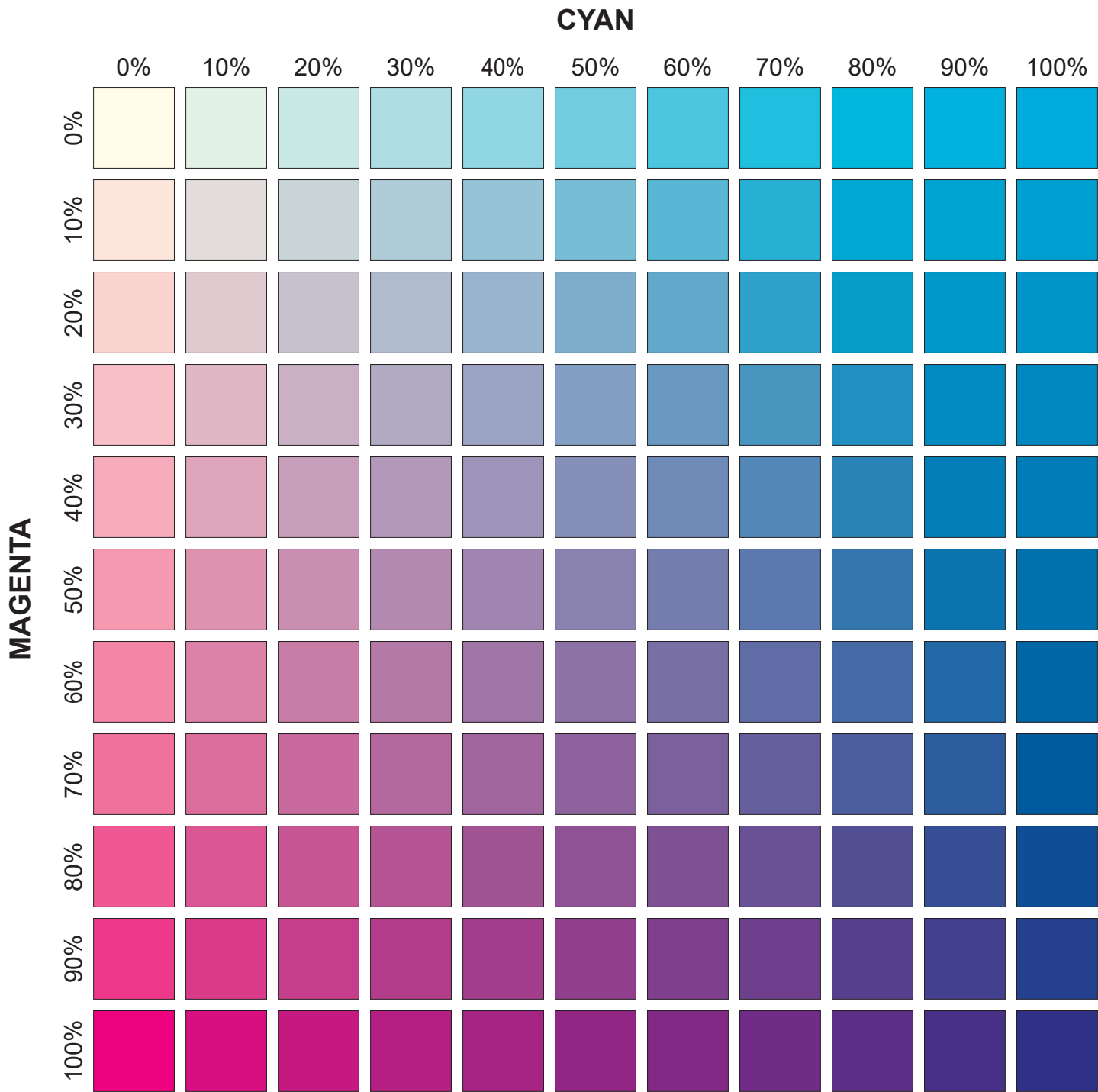
YELLOW: 0%

CYAN

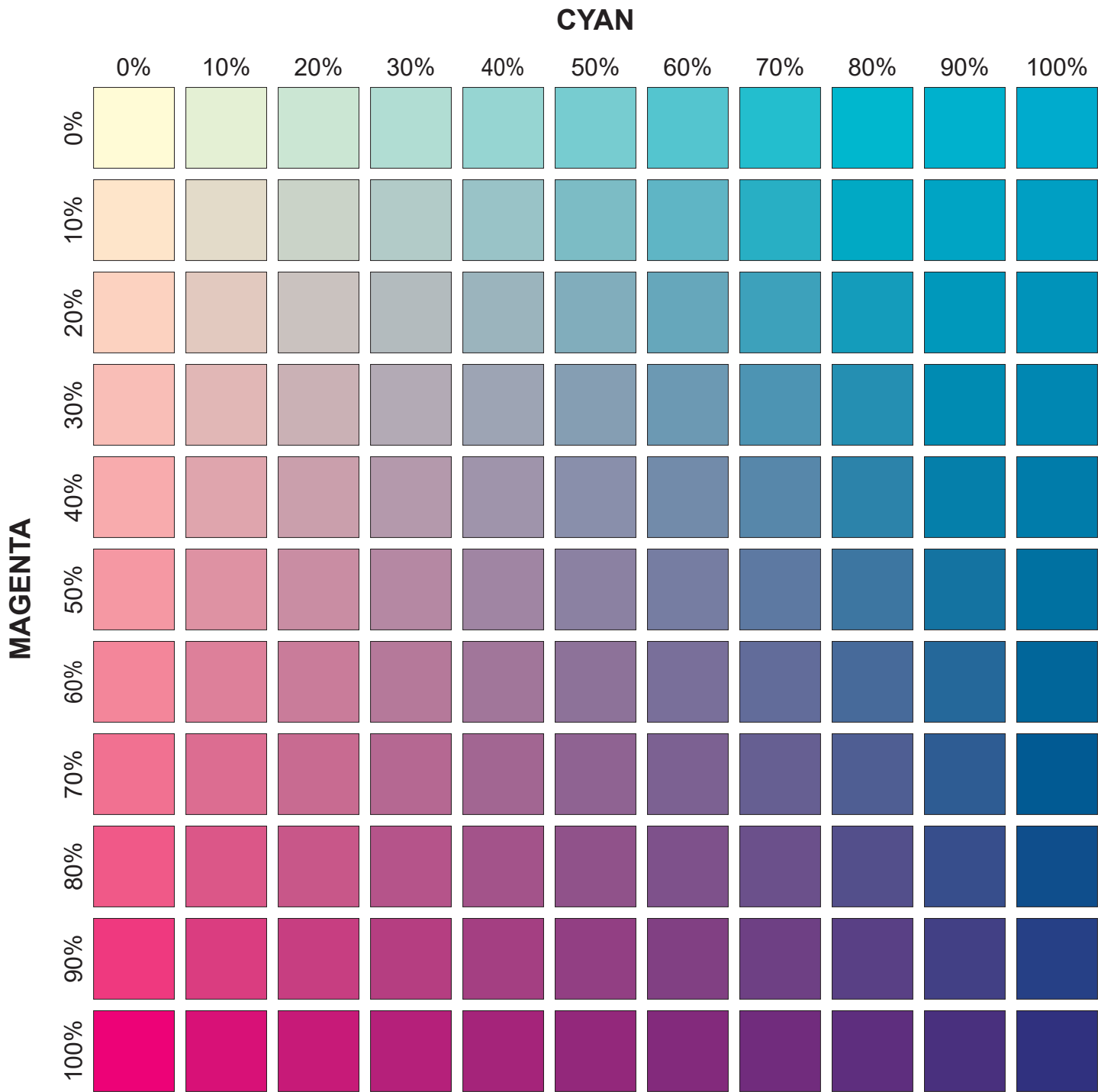
MAGENTA



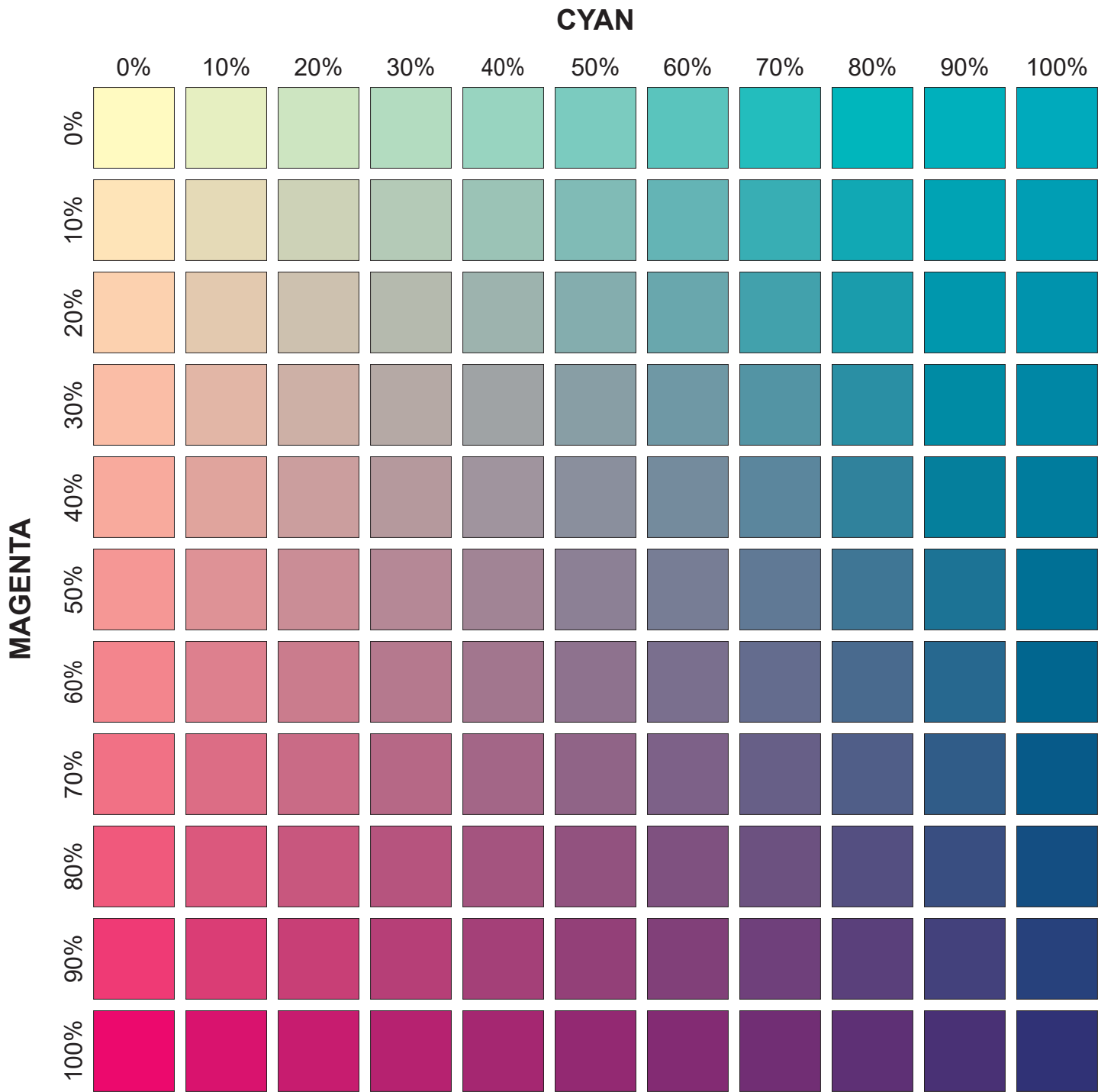
YELLOW: 10%



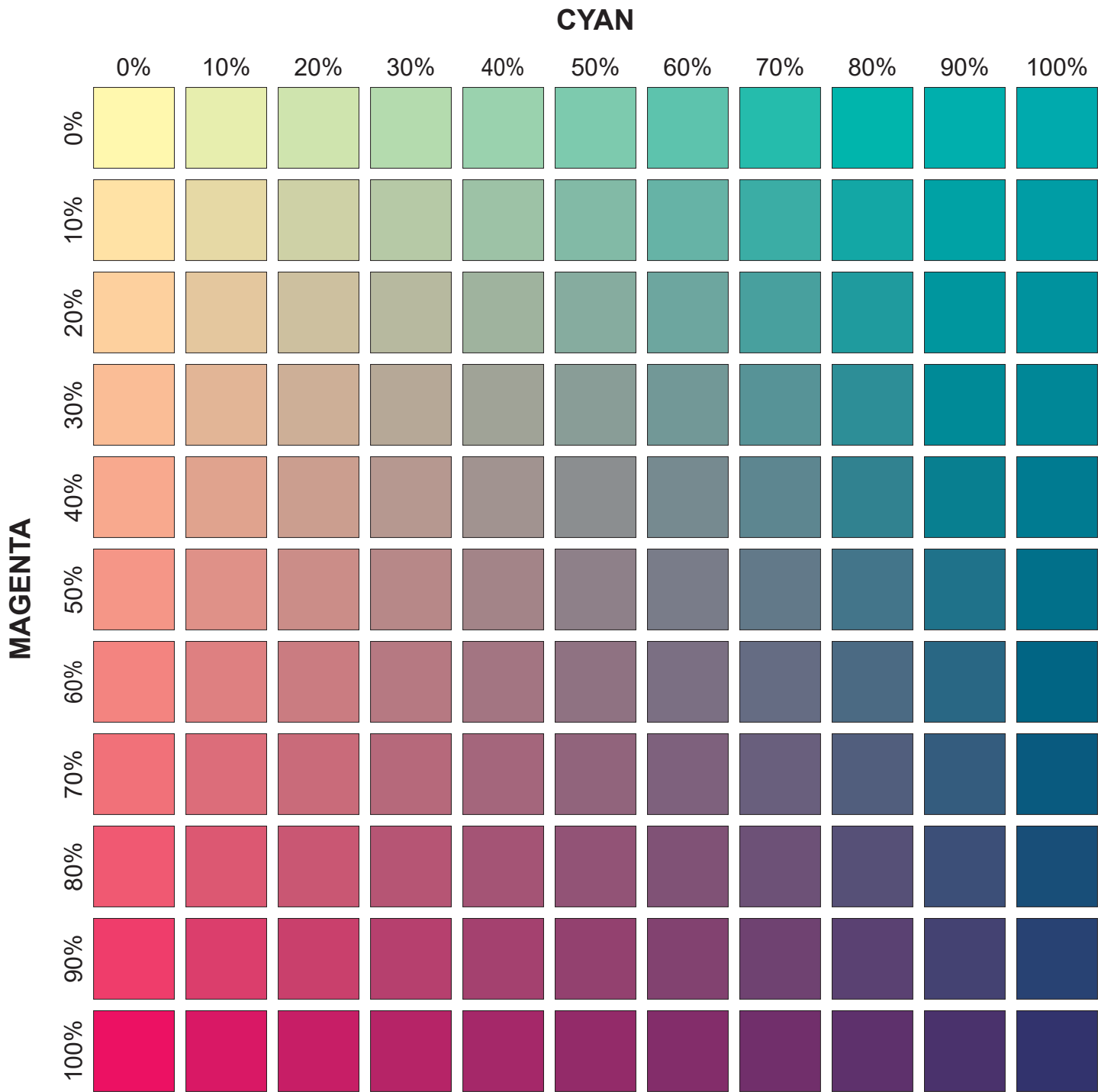
YELLOW: 20%



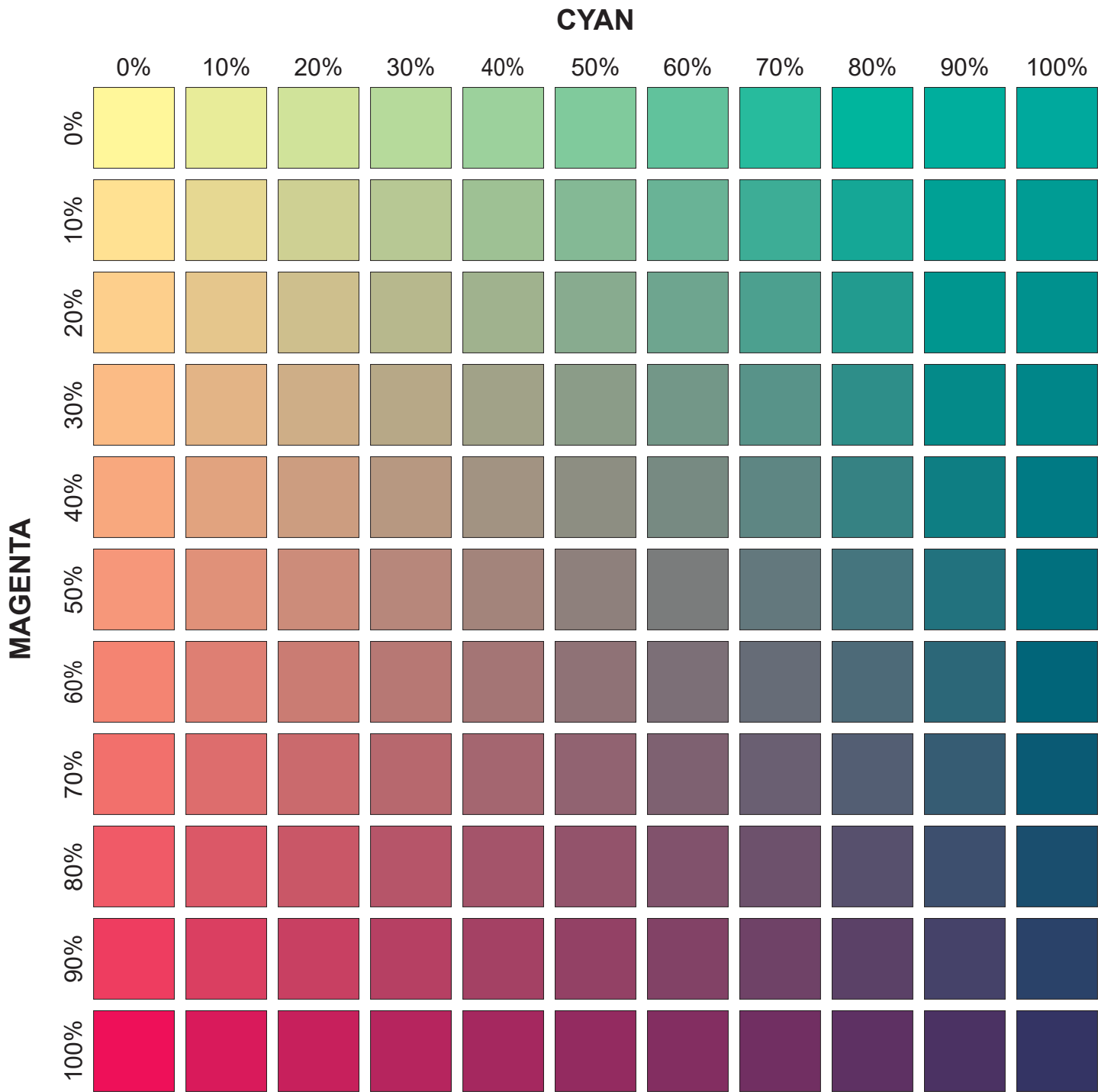
YELLOW: 30%



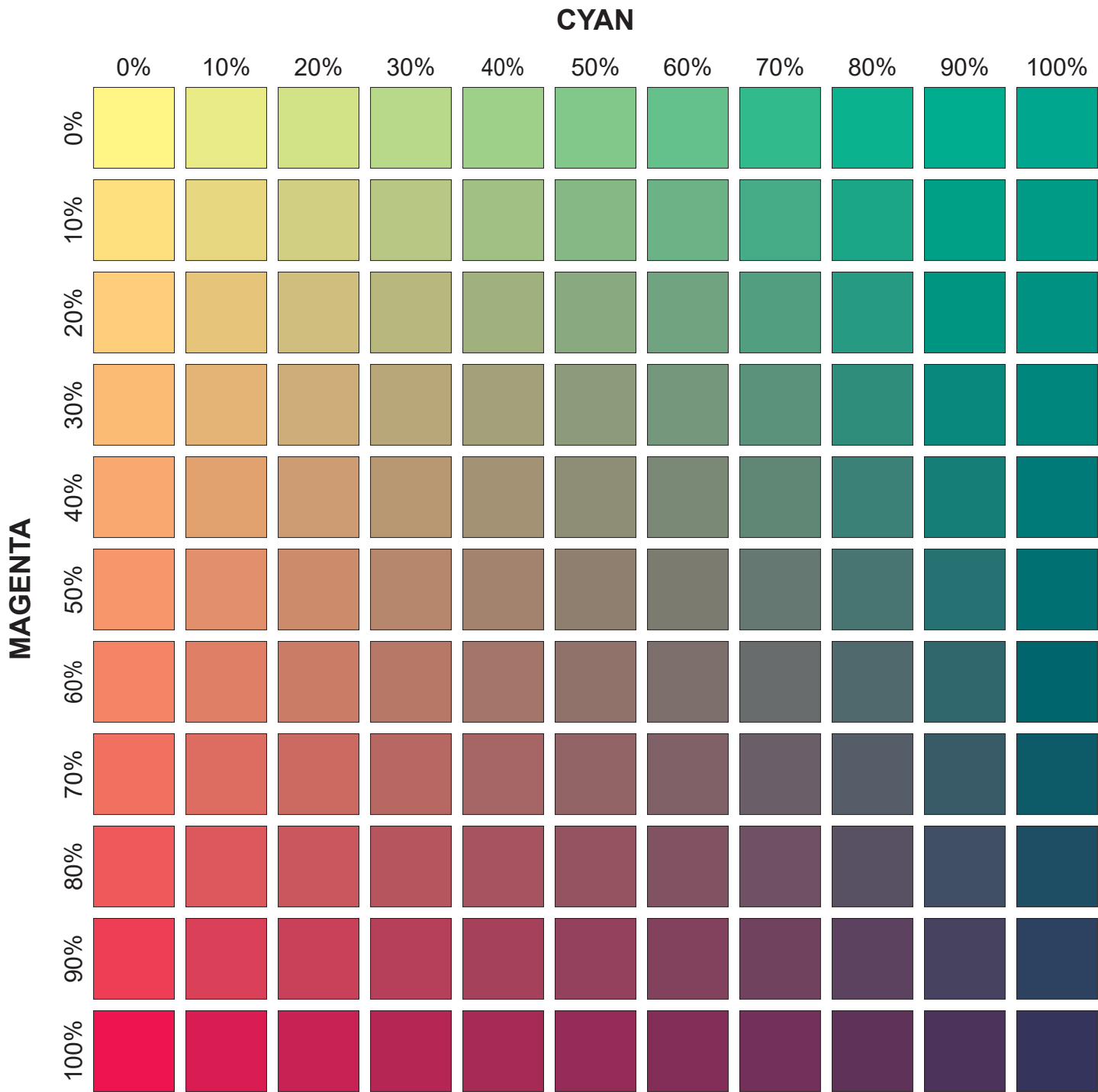
YELLOW: 40%



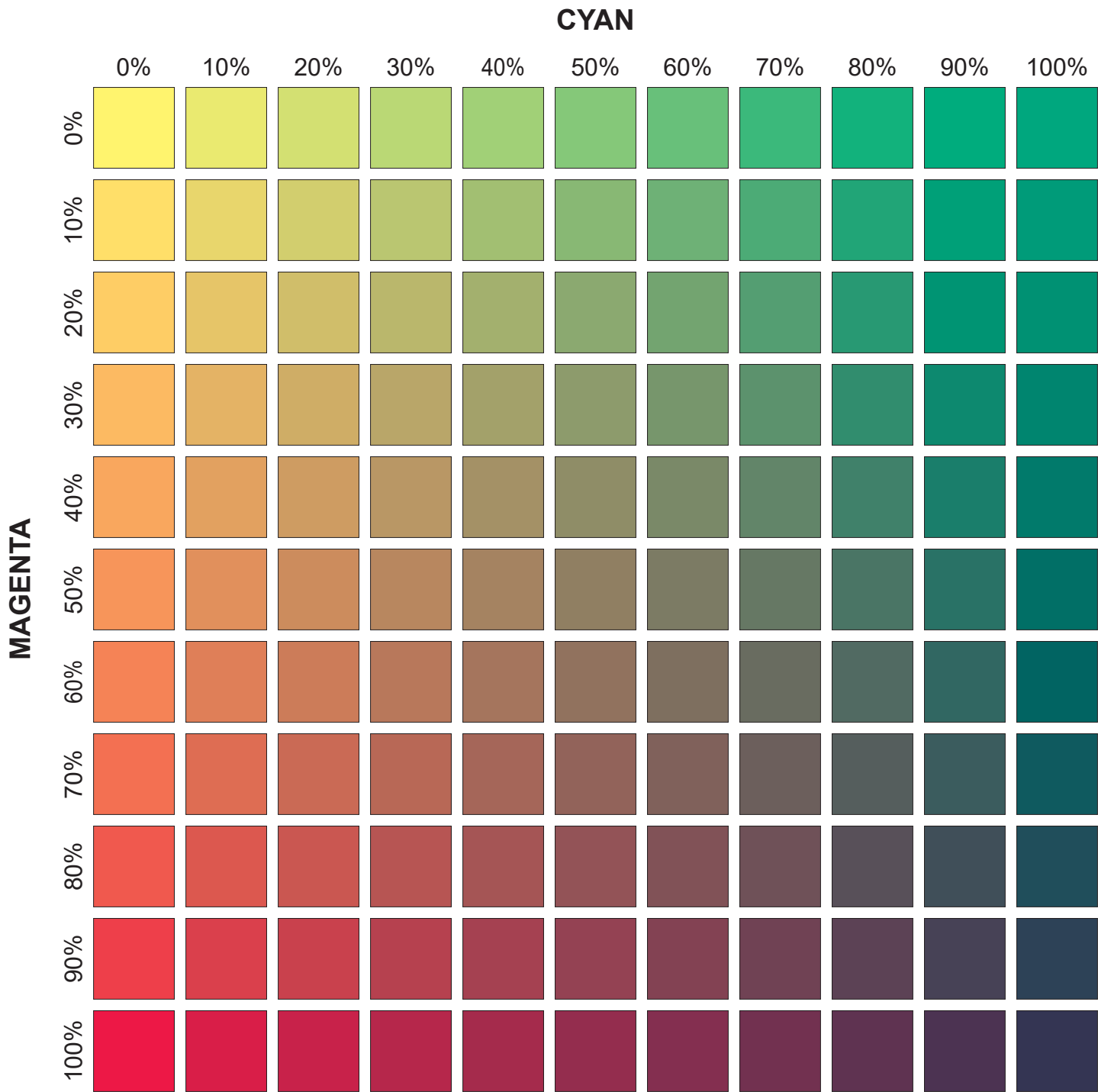
YELLOW: 50%



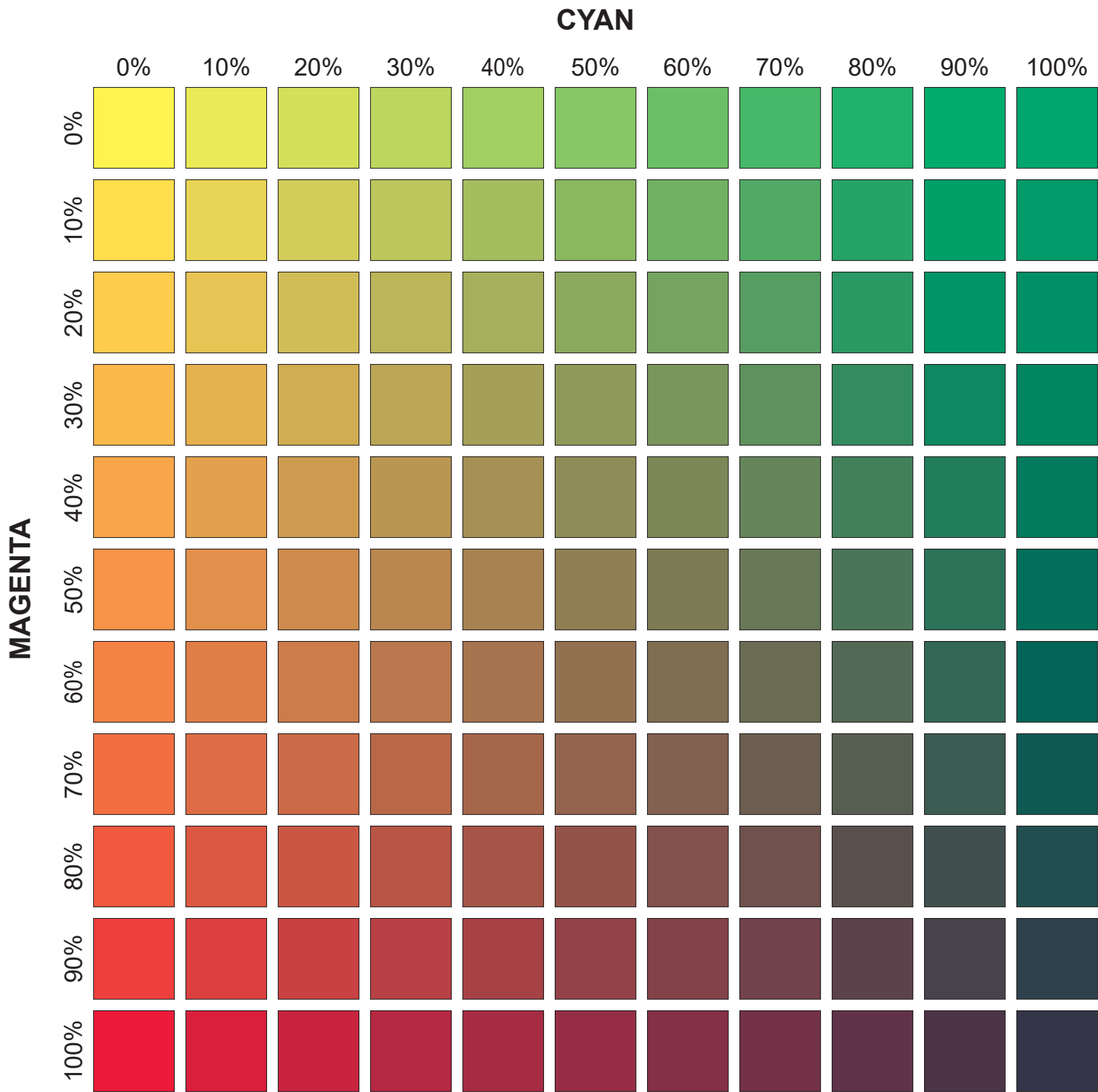
YELLOW: 60%



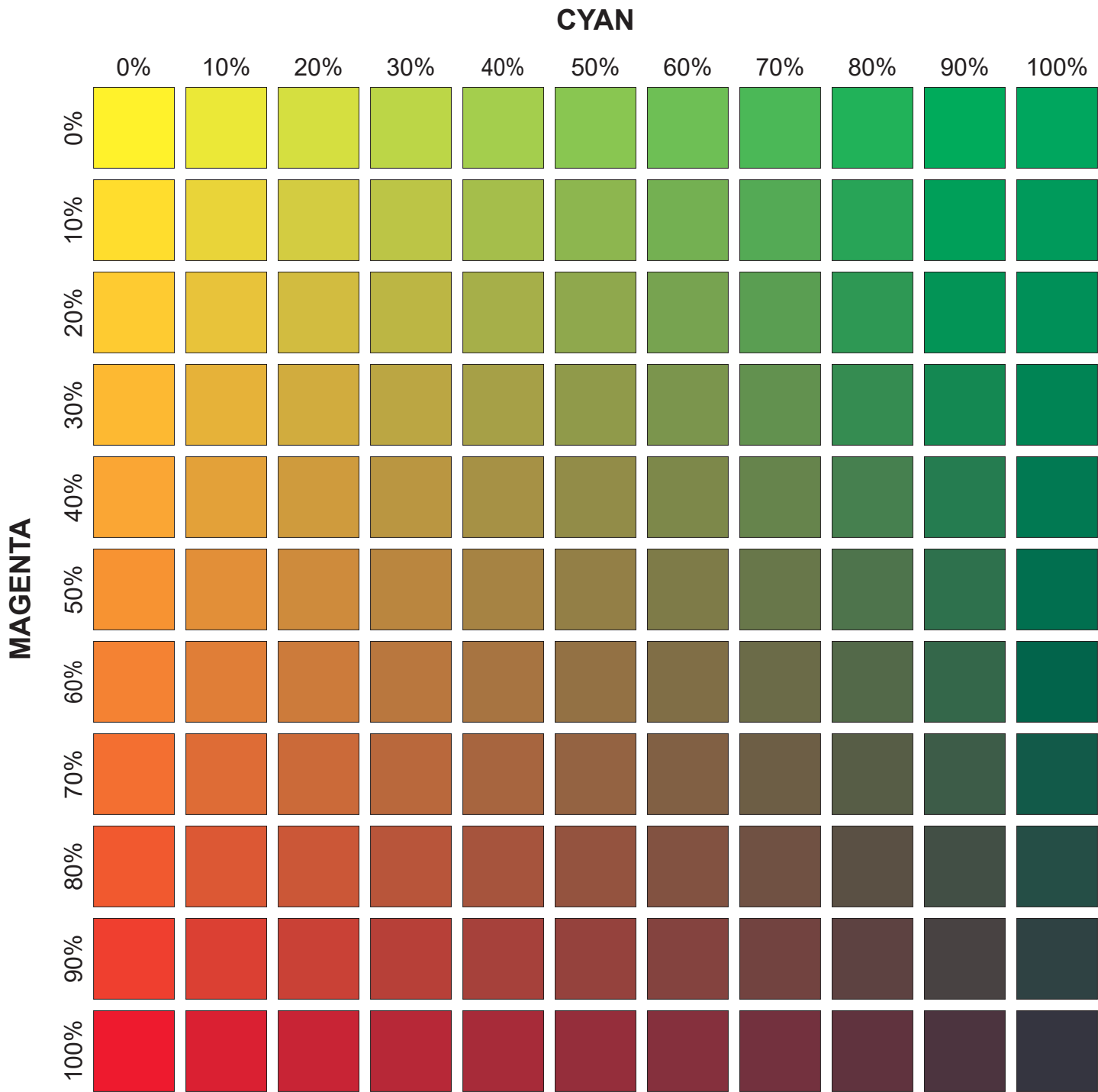
YELLOW: 70%



YELLOW: 80%



YELLOW: 90%



YELLOW: 100%

