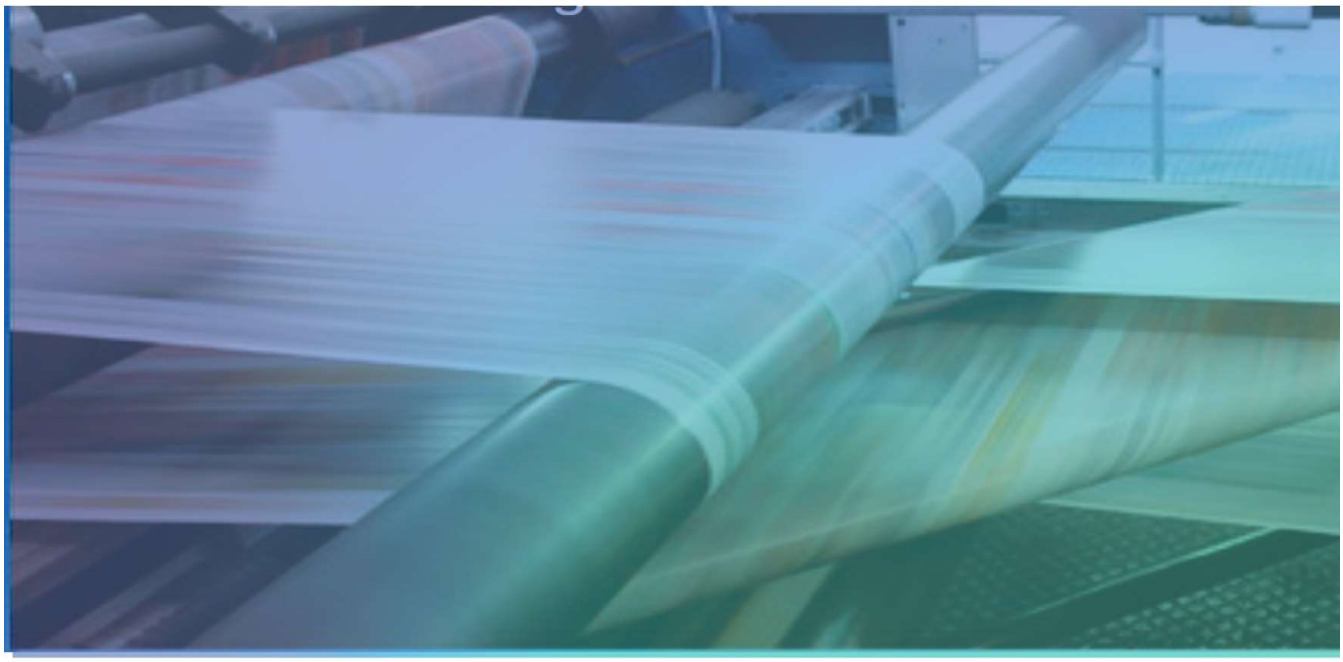
Evaluation of printing quality on the basis of worldwide valid standards



Title specific evaluation for

Self-Check sample report

, ,

Category1

Coldset on newsprint

Summary and detailed points overview

Criterion	**Points accumulated**	**Max Points**	**Min Points**	**Successful**
1: Newsshade	30	30	≥ 20	Yes
2: Mid-tone spread	10	10	≥ 6	Yes
3.1: Dot gain 40%	10	10	≥ 6	Yes
3.2: Dot gain 70%	9.74	10	≥ 6	Yes
4: Gray balance	30	30	≥ 23	Yes
5: Color space in %	11	11	≥ 7	Yes
6: Color conformity Delta E	49	49	≥ 36	Yes
7: Color register	0	30	≥ 30	_
No. of points achieved	**149.74**			
Min. no. of points incl. color register		**≥100**		
Test run successful:				No
Precondition for successful INCQC participation:			**9 * 'Yes'**	

2. Detailed evaluation and results in the individual criteria

The evaluation report supplies information on the ISO-conformity of the criteria newsshade, mid-tone spread, dot gain (40% and 70%), gray balance, color space, color conformity and color register precision. This information helps you to optimize your printing process

Cuboid – Measured values (averaged and rounded)

Cuboid	L	A	B	Filter
CYAN	57.977	-21.287	-26.597	0.789
CYAN70	61.835	-17.262	-20.681	0.57
CYAN40	68.542	-12.744	-14.07	0.349
MAGENTA	53.305	44.315	0.167	0.853
MAGENTA70	57.584	36.587	-0.944	0.632
MAGENTA40	65.189	25.28	-1.574	0.369
YELLOW	77.487	-1.963	58.441	0.867
YELLOW70	77.608	-2.08	48.87	0.659
YELLOW40	79.268	-1.854	32.982	0.369
BLACK100	36.722	1.562	4.317	1.089
BLACK70	44.271	1.334	4.537	0.759
BLACK40	57.81	0.935	4.699	0.411
PAPER_WHITE	81.325	0.298	2.686	
RED	50.433	41.4	24.107	
GREEN	52.298	-30.151	15.932	
BLUE	43.071	7.082	-20.692	
C10M8Y8	74.721	0.33	3.277	
C30M24Y24	62.832	1.455	3.676	
C50M42Y42	51.228	2.275	3.851	
BLACK4C_240	35.397	2.331	3.309	
BLACK4C_220	35.332	2.11	3.638	

2.1 Newsshade

The newsshade is measured in accordance with light source D50, measuring geometry 45°/0° or 0°/45° and black backing.

The newsshade is measured on non-printed areas of the Cuboid in patch B5. Points are allocated based on the following criteria:

Color values	**Points per evaluation**
L* = 78 or more	10
L* = less than 78	0
a* = between -2 and 2	10
a* = less than -2 or more than 2	0
b* = between -2 and 5	10
b* = less than -2 or more than 5	0
Total	30

Measured values and result:

Test element	L*	A*	B*	Points
Newsshade	**81.325**	**0.298**	**2.686**	**30**

2.2 Mid-tone spread

The patches D3, D4, C4 and C1 of the Cuboid are used to measure the CMYK mid-tone spread. Points are awarded based on the deviation of mid-tone spread from the 6% production tolerance in the 40% measuring patch specified by the standard. It is not taken into account whether the dot gain is within the tolerances of the 26.2% curve.

If the mid-tone spread is 3% or less, 10 points are awarded. If the mid-tone spread is 6%, 2 points are awarded. In case of a spread between 3% and 6%, points are awarded in a linear process up to the minimum number of 2 points. With a spread in excess of 6%, no points are awarded.

Result	**ISO tolerance**	**Result in %**	**Points**
Mid-tone spread	max. 6%	0.66	10

Graphic representation of mid-tone spread

2.3 Dot gain

2.3.1 Dot gain in the 40% patch

The patches D3, D4, C4 and C1 of the Cuboid are used for measuring the CMYK mid-tone spread in the 40% area for its conformance to 26.2% target dot gain. Each color is evaluated individually.

A deviation from the reference value of 2% or less brings 2.5 points per color (4 x 2.5 = 10). In the case of a deviation between 2% and 5%, points are awarded in a linear process per color up to the minimum number of 1 point. With a deviation in excess of 5% no points are awarded.

Measurement in 40% patch	**Dot gain in %**	**Points**
cyan	25.95	2.50
megenta	26.58	2.50
yellow	26.24	2.50
black	26.61	2.50
Total points:		**10**

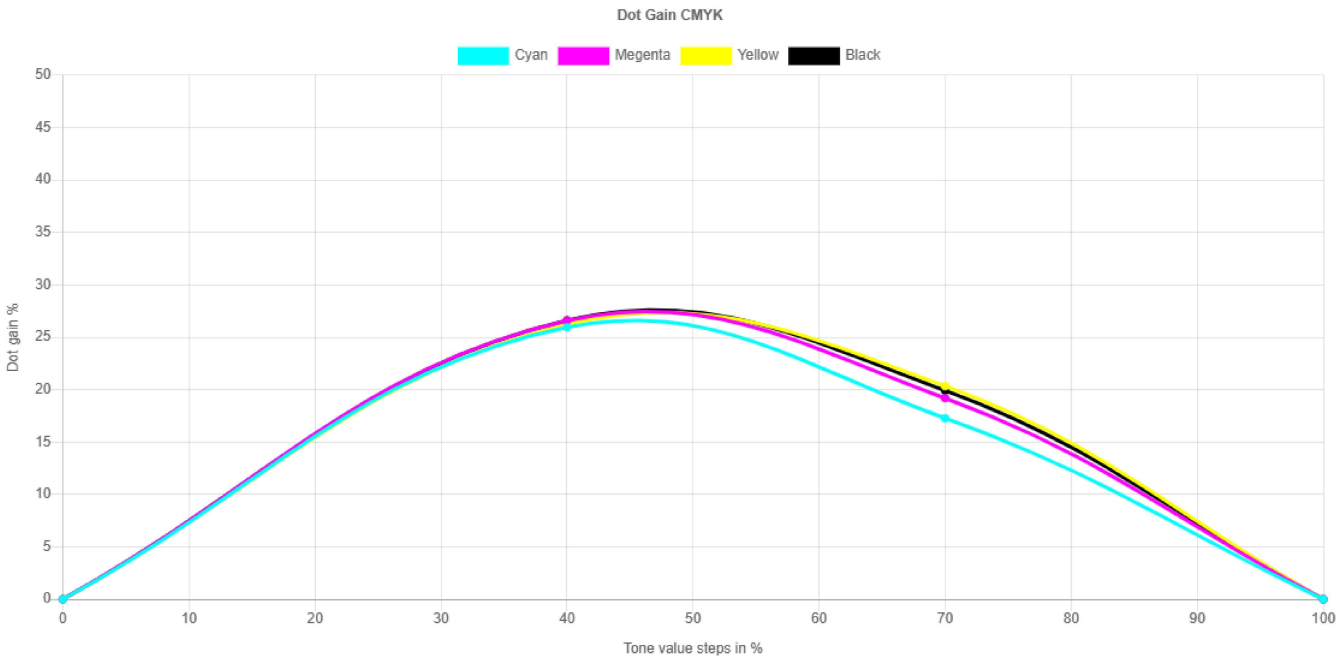
2.3.2 Dot gain in the 70% patch

Patches C2, C5, C3 and D2 of the Cuboid are used for measuring the CMYK dot gain in the 70% range for its conformance to 19.8% target dot gain. Each color is evaluated individually.

A deviation from the reference value of 2% or less brings 2.5 points per color (4 x 2.5 = 10). In the case of a deviation between 2% and 5%, points are awarded in a linear process per color up to the minimum number of 1 point. With a deviation in excess of 5% no points are awarded.

Measurement in 70% patch	**Dot gain in %**	**Points**
cyan	17.27	2.24
megenta	19.18	2.50
yellow	20.34	2.50
black	19.91	2.50
Total points:		**9.74**

Representation of dot gain based on 40% and 70% patches



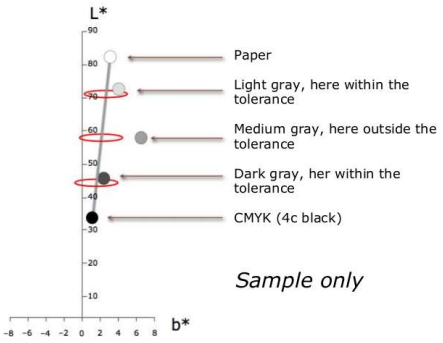
2.4 Gray balance in print

The patches A4, A5, C6 and D6 of the Cuboid are used for the measurement. Patch D6 corresponds to a TIC of 220

The reference gray (a* and b*) is calculated as follows:

The lightest and darkest measured values (color of the paper, patch B4, and CMYK (4c black), patch D6) are connected via a straight line. This produces a reference gray axis in the color space that is used as an individual scale for the evaluation.

Based on the individually measured brightness value L* of bright, medium and dark gray on the Cuboid concerned in each case, the color values a* and b* are now mathematically calculated on the reference gray axis. These serve as targets for the measured a* and b*values of the gray patches A4, A5 and C6. We refer to the thus-calculated color difference as "Delta C* absolute".



- The individual reference gray axis is the connection between the news-shade and CMYK (4c black).
- The gray axis is in most cases not parallel to the brightness axis L*, but instead at an angle to it because the typical yellow hue of newsprint becomes less in the shadows.
- The printed CMY gray tones are compared to the reference gray axis. The deviation is referred to as “Delta C* absolute”.

Points are awarded based on the following criteria:

Deviation per gray patch (A4, A5, C6)	Points per gray patch and evaluation
Less than or equal to 1,5 “Delta C* absolute”	10
Corresponds to “Delta C* absolute”	2
Greater than 3 “Delta C* absolute”	0

In the case of a deviation of between 1.5 and 3 "Delta C absolute" from the reference value, points are awarded in a linear process between 10 points and 2 points. With a deviation in excess of 3 "Delta C absolute" from the reference value no points are awarded.

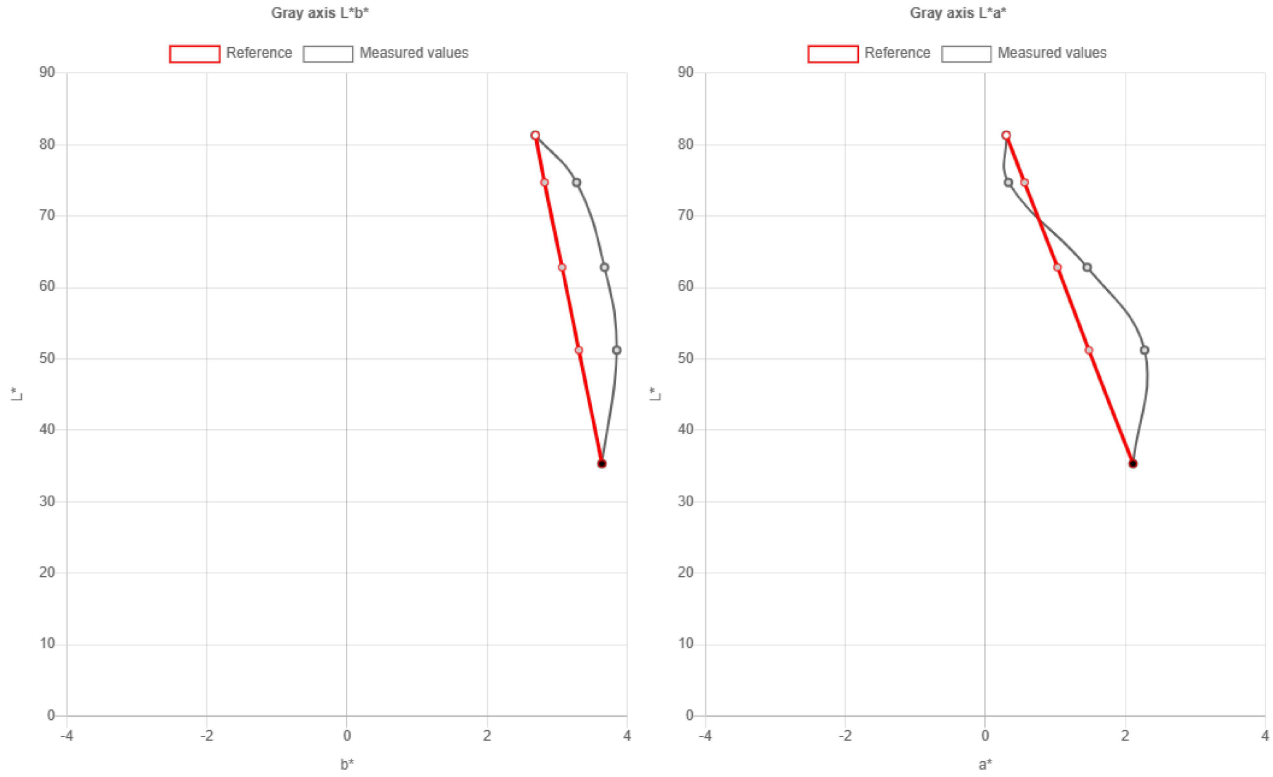
Measurement-based valuation of grey balance

	Measured Values			Target Values		
	L*	a*	b*	L*	a*	b*
Paper White	81.325	0.298	2.686	81.325	0.3	2.69
Light gray	74.721	0.33	3.277	74.721	0.56	2.82
Medium gray	62.832	1.455	3.676	62.832	1.03	3.07
Dark gray	51.228	2.275	3.851	51.228	1.48	3.31
4c black (220 TAC)	35.332	2.11	3.638	35.332	2.11	3.64

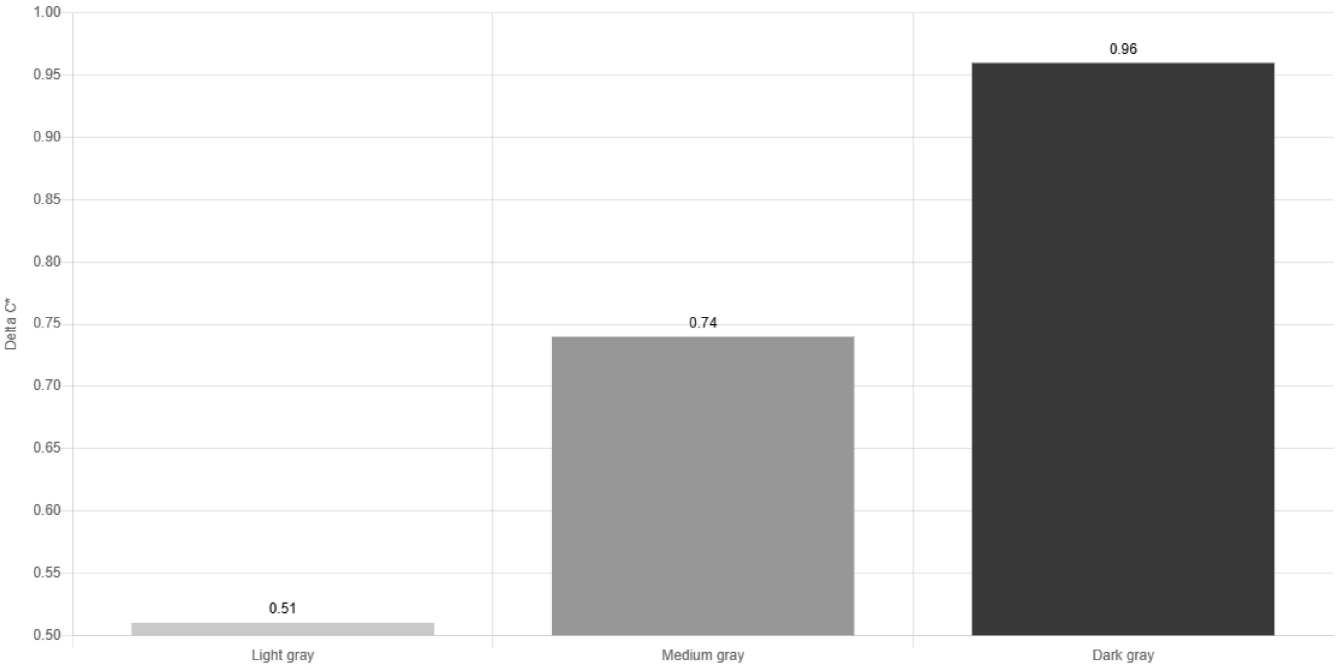
Result

Test element	Light gray balance	Medium gray balance	Dark gray balance	Total no.of Points
Delta C* value:	0.51	0.74	0.96	**30**
Result	10	10	10	

The following diagrams show your deviation from the gray axis in print:

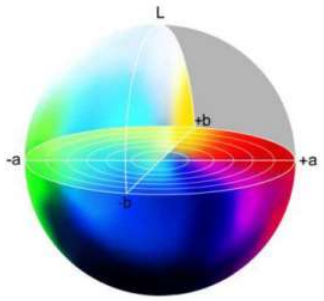


The following diagram shows the „ΔC* absolute" values measured on your printed samples in histogram form:



2.5 Color space

The printed color space should be of a minimum size and have certain geometry in order to satisfy international standards. This is very important for the standardized high-quality printing of images and color ads



The L*a*b* values of the patches A6, A2, A1, B1, B6, A3, B5 and D6 of the Cuboid are used for the calculation. The size of the color space range, which results from the combination of the colors CMY and RGB as well as the paper white and 4c black (220 TAC), can be shown as a three-dimensional entity within the L*a*b* color space.

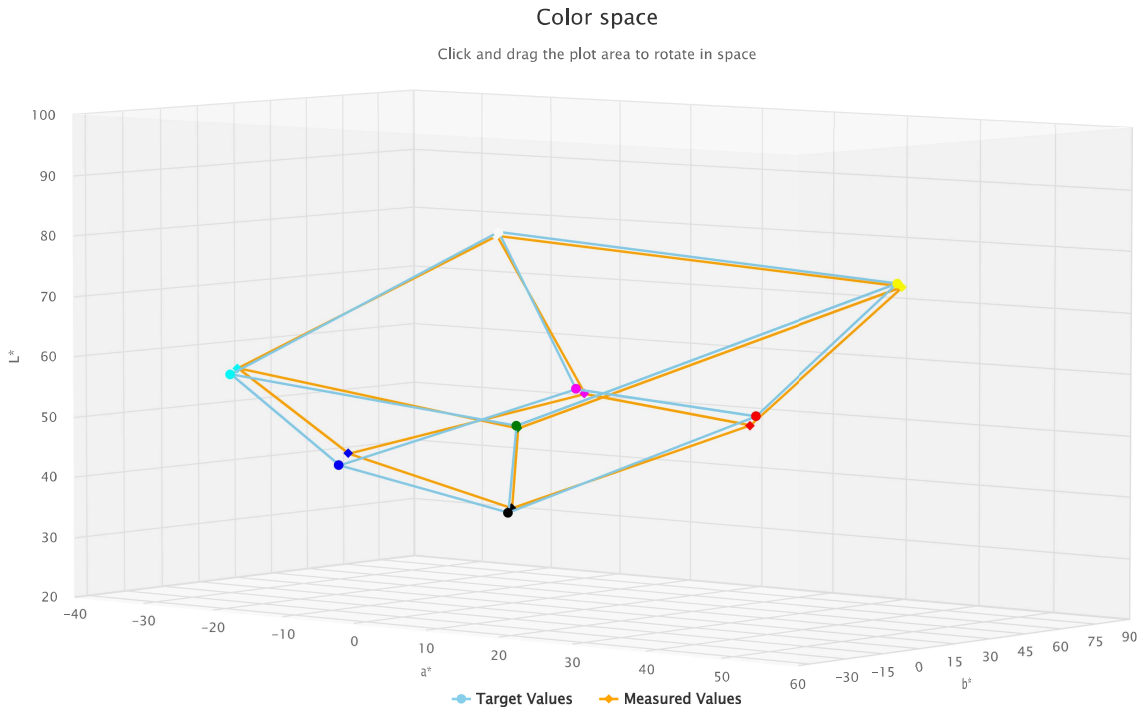
If the color gamut is between 75% and 90% of the reference color gamut points will be deducted in the range from 11 to 2 points. If the color gamut is smaller than 75% no points will be applied.

Measured values and result:

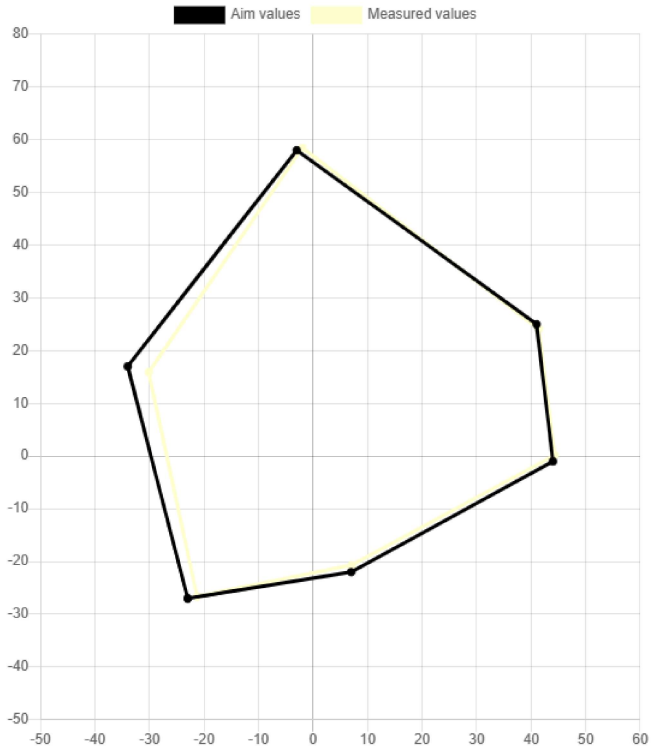
Test element	% match with reference color space	Points
Result	**91.76**	**11**
Reference color space	100%	

The following L*a*b* values were measured on your printed samples:

Color	**Measured Values**			**Target Values**		
	L*	**a***	**b***	**L***	**a***	**b***
cyan	57.977	-21.287	-26.597	57	-23	-27
magenta	53.305	44.315	0.167	54	44	-1
yellow	77.487	-1.963	58.441	78	-3	58
black	36.722	1.562	4.317	36	1	4
red	50.433	41.4	24.107	52	41	25
green	52.298	-30.151	15.932	53	-34	17
blue	43.071	7.082	-20.692	41	7	-22
black_cmyk	35.332	2.11	3.638	34	1	2
paper_white	81.325	0.298	2.686	82	0	3



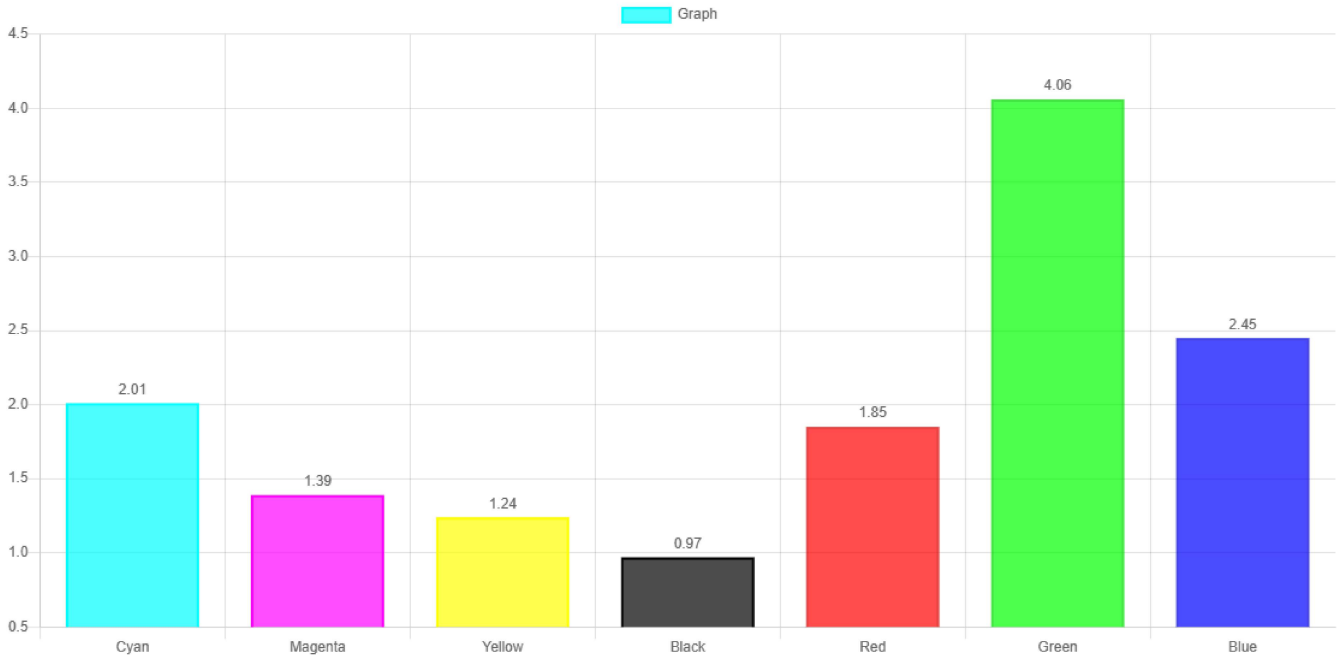
The following diagram shows the measured color space compared to the reference color space for your company



2.6 Color conformity evaluation

Color/Delta	Delta C	Delta L	Delta H	Result	Delta E	Points
cyan	( )	( )	( )		2.01	7
magenta	( )	( )	( )		1.39	7
yellow	( )	( )	( )		1.24	7
black	( )	( )	( )		0.97	7
red	( )	( )	( )		1.85	7
green	( )	( )	( )		4.06	7
blue	( )	( )	( )		2.45	7
Total points for color conformity:						49

The following diagram shows the color conformity of the publication title



2.7 Color register

If the register deviation is 200 µm or less (0.20 mm), 30 points are awarded. No points are awarded where mis-register exceeds 200 µm (0.20 mm).
NA

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This concludes our evaluation. We are confident that the evaluation will help you to motivate your personnel, optimize your production processes and coordinate with suppliers.

Despite every effort to ensure correct calculations, errors or faults cannot be excluded. We remain at your disposal for all queries, impulses or individual advice.

Yours sincerely,

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