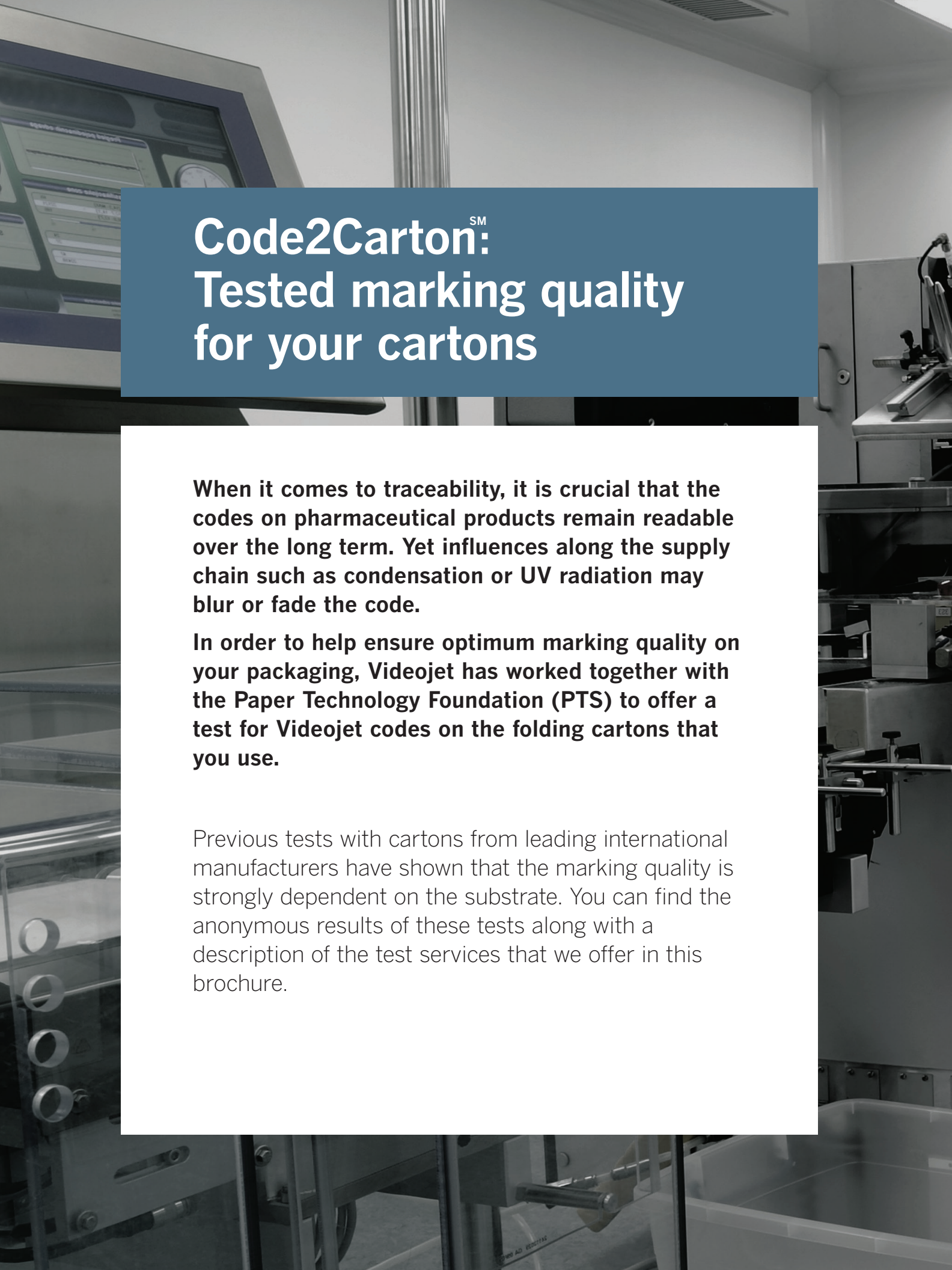
CODE 2 CARTON℠

VIDEOJET PHARMA LINE

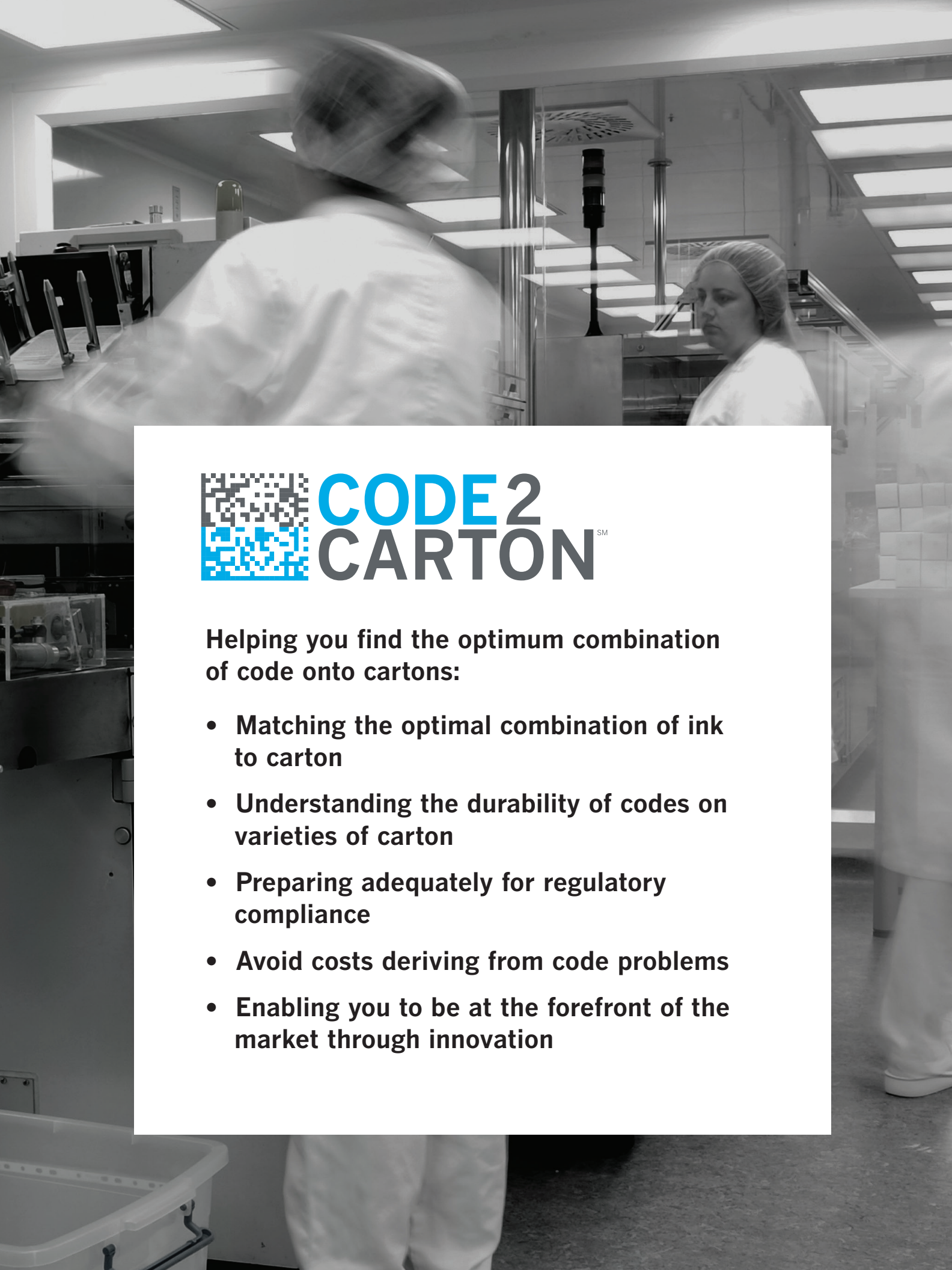


Code2Carton℠: Tested marking quality for your cartons

When it comes to traceability, it is crucial that the codes on pharmaceutical products remain readable over the long term. Yet influences along the supply chain such as condensation or UV radiation may blur or fade the code.

In order to help ensure optimum marking quality on your packaging, Videojet has worked together with the Paper Technology Foundation (PTS) to offer a test for Videojet codes on the folding cartons that you use.

Previous tests with cartons from leading international manufacturers have shown that the marking quality is strongly dependent on the substrate. You can find the anonymous results of these tests along with a description of the test services that we offer in this brochure.



CODE 2 CARTON℠

Helping you find the optimum combination of code onto cartons:

- **Matching the optimal combination of ink to carton**
- **Understanding the durability of codes on varieties of carton**
- **Preparing adequately for regulatory compliance**
- **Avoid costs deriving from code problems**
- **Enabling you to be at the forefront of the market through innovation**

PTS
FIBRE based solutions

Paper Technology Foundation (PTS)

The Paper Technology Foundation supports companies in all industries with the development and implementation of modern fibre-based solutions.

In its business unit “Printing & functional surfaces”, PTS develops papers for high-speed inkjet printing on a laboratory and pilot scale and pre-certifies them using industrial printing technology. Further emphasis is put on the development of formulations and coatings for individual applications.

For more information please visit: www.ptspaper.com

Tested Coding Technologies

Thermal inkjet (TIJ)

Thermal inkjet printers from Videojet are ink-based systems which print non-contact high-resolution serialization codes up to 600x600 dpi. When testing TIJ markings on your cartons, we look at the drying time and test the light and water resistance.

The TIJ inks Universal Black, Premium Black, Water Resistant Black and Black Solvent were used for the previous tests.

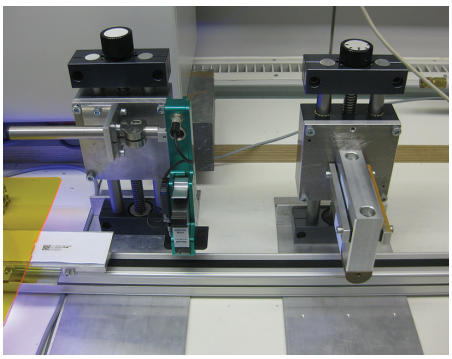
Thermal inkjet
Wolke m600 OEM

CO_2 – Laser

CO_2- laser systems from Videojet create an infrared laser beam which interacts with the product surface. As part of the test service, the laser beam removes the color coating of the coated test box, revealing a different-colored substrate and a GS1 DataMatrix code can be created. This can be tested for light fastness. In addition, we can also determine the optimum marking thickness at a defined marking speed.

CO_2 – Laser
Videojet 3340

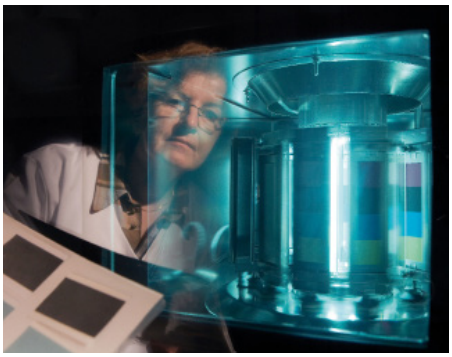
Videojet helps you to find the optimum combination of carton and code



Drying time according to PTS method PTS-DF 103/2011 (TIJ)

To test the drying times of the thermal inkjet codes, your test boxes are printed with a GS1 DataMatrix code (300dpi) and securely placed against a wipe unit in a defined manner after a precisely predetermined time.

The print is then evaluated offline by using a verifier according to DIN EN ISO/IEC 15415. The variation in the smudge times and the verification of the print provide accurate information on the drying time of the code and its quality.



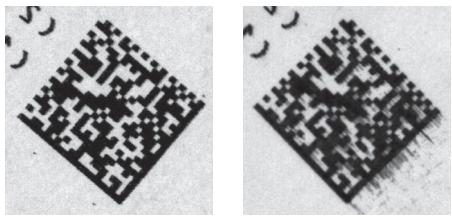
Light fastness test based on DIN EN ISO 105 B02 (TIJ and CO_2 laser)

Light fastness describes the resistance of colors under the influence of light, in particular sunlight with high UV levels. Since UV rays destroy pigments, there is no such thing as permanent light fastness. Sooner or later every printed code will fade and every carton will turn yellow.

To determine the degree of light fastness, your test boxes are marked with a GS1 DataMatrix code and subjected to a defined level of UV radiation for several periods, under laboratory conditions. After the radiation, the codes are evaluated by means of a verifier.

Water resistance according to ISO 18935 Method 3 (TIJ)

Condensation can form on packaging, particularly in pharmaceutical cold chains. Water-resistant markings are a must here. To determine the water resistance of the thermal inkjet codes, your test boxes are printed with a GS1 DataMatrix code (300 dpi) and immersed in deionized water for one hour. Afterwards, the samples are placed on a glass plate to dry. The code quality is then evaluated by means of a verifier.



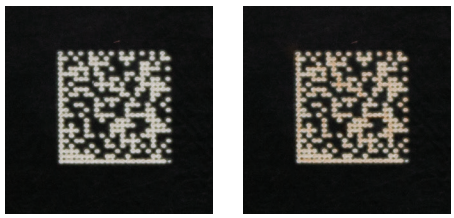
Particularly in pharmaceutical cold chains, codes are exposed to moisture. Codes with a low level of water resistance are easily smeared and may become illegible.

Laser coding ability according to the PTS method PTS-DF 105/2015

To achieve the best possible laser marking, the coated carton samples are marked with different marking intensities and wavelengths for a defined marking time. The subsequent code evaluation with a verifier provides information on the ideal combination of both.

When it comes to selecting an appropriate coating for the carton, coatings with a high kaolin percentage are preferable. These coatings form a ceramic layer, which protects the carton from the laser beam heat.

In addition, black or dark blue contrasting coatings achieve the best grading results. Red, orange or brown color coatings should be avoided because of the spectral characteristics of the verifier illumination.



If the coating contains a low koalin percentage, the carton tends to burn when it is hit by the laser beam (right picture) This creates a low contrast code, which may lead to poor camera readability.

Definition of the code quality levels

ANSI grading	A	B	C	D	F
ISO/IEC class	4	3	2	1	0
Meaning	Very good Code clearly legible on the first scan	Good Code clearly legible on the first scan	Satisfactory Code clearly legible, multiple scans may be required	Adequate Keyboard input required if the code cannot be read	Fail Code may be incorrectly read

Drying time according to PTS method PTS-DF 103/2011

Marking technology		Thermal inkjet (TIJ)			
Ink		Universal Black			
Code		GS1 DataMatrix code - ECC 200 (300 dpi)			
Carton coating		None			
Manufacturer	Carton	Grading Without wipe test	Grading Wipe test after 0.3 sec	Grading Wipe test after 0.5 sec	Grading Wipe test after 0.7 sec
Manufacturer 1	Carton 1	B	B	B	-
Manufacturer 2	Carton 2	B	F	C	B
Manufacturer 2	Carton 3	B	F	C	A
Manufacturer 3	Carton 4	B	B	B	-
Manufacturer 3	Carton 5	B	B	B	-
Manufacturer 4	Carton 6	B	B	B	B
Manufacturer 4	Carton 7	B	C	B	-
Manufacturer 5	Carton 8	B	B	B	-
Manufacturer 5	Carton 9	B	C	B	-
Manufacturer 5	Carton 10	B	B	B	-
Manufacturer 5	Carton 11	B	B	B	-
Manufacturer 6	Carton 12	B	B	B	-
Manufacturer 7	Carton 13	B	B	B	-

Fields without grading were not measured, as no considerable increase in the grading was to be expected or the minimum grading C could not have been achieved.

Marking technology		Thermal inkjet (TIJ)				
Ink		Universal Black				
Code		GS1 DataMatrix code - ECC 200 (300 dpi)				
Carton coating		Terrawet G9/817				
Manufacturer	Carton	Grading Without wipe test	Grading Wipe test after 0.3 sec	Grading Wipe test after 0.5 sec	Grading Wipe test after 0.7 sec	Grading Wipe test after 1 sec
Manufacturer 1	Carton 1	B	-	D	B	-
Manufacturer 2	Carton 2	B	-	F	F	B
Manufacturer 2	Carton 3	B	-	D	D	C
Manufacturer 3	Carton 4	B	B	B	-	-
Manufacturer 4	Carton 6	B	F	B	B	-
Manufacturer 4	Carton 7	B	-	C	D	-
Manufacturer 5	Carton 8	B	-	F	D	B
Manufacturer 5	Carton 9	B	-	D	D	B
Manufacturer 6	Carton 12	B	B	B	-	-
Manufacturer 7	Carton 13	B	B	B	-	-
Manufacturer 8	Carton 14	B	D	B	-	-
Manufacturer 8	Carton 15	B	B	B	-	-
Manufacturer 8	Carton 16	B	-	F	F	F

Fields without grading were not measured, as no considerable increase in the grading was to be expected or the minimum grading C could not have been achieved.

Drying time according to PTS method PTS-DF 103/2011

Marking technology		Thermal inkjet (TIJ)				
Ink		Water Resistant Black				
Code		GS1 DataMatrix code - ECC 200 (300 dpi)				
Coating		None				
Manufacturer	Carton	Grading Without wipe test	Grading Wipe test after 0.3 sec	Grading Wipe test after 0.5 sec	Grading Wipe test after 0.7 sec	Grading Wipe test after 1 sec
Manufacturer 1	Carton 1	A	-	F	C	C
Manufacturer 2	Carton 2	A	-	-	-	F
Manufacturer 2	Carton 3	A	-	-	-	F
Manufacturer 3	Carton 4	B	-	F	D	C
Manufacturer 3	Carton 5	A	-	F	D	C
Manufacturer 4	Carton 6	B	-	F	D	C
Manufacturer 4	Carton 7	B	-	-	F	C
Manufacturer 5	Carton 8	A	-	F	C	B
Manufacturer 5	Carton 9	A	-	F	D	B
Manufacturer 5	Carton 10	A	-	-	F	C
Manufacturer 5	Carton 11	A	-	-	F	C
Manufacturer 6	Carton 12	A	D	B	A	-
Manufacturer 7	Carton 13	A	-	F	F	C
Manufacturer 8	Carton 14	A	-	F	D	C
Manufacturer 8	Carton 15	A	-	F	C	B
Manufacturer 8	Carton 16	A	-	-	-	F

Fields without results were not measured, as no considerable increase in the grading was to be expected or the minimum grading C could not have been achieved.

Marking technology		Thermal inkjet (TIJ)				
Ink		Premium Black				
Code		GS1 DataMatrix code - ECC 200 (300 dpi)				
Carton coating		None				
Manufacturer	Carton	Grading Without wipe test	Grading Wipe test after 0.3 sec	Grading Wipe test after 0.5 sec	Grading Wipe test after 0.7 sec	Grading Wipe test after 1 sec
Manufacturer 1	Carton 1	A	C	B	A	-
Manufacturer 2	Carton 2	B	F	F	C	B
Manufacturer 2	Carton 3	B	F	F	C	B
Manufacturer 3	Carton 4	A	C	B	B	-
Manufacturer 3	Carton 5	A	B	A	-	-
Manufacturer 4	Carton 6	B	C	B	B	-
Manufacturer 4	Carton 7	A	F	D	C	B
Manufacturer 5	Carton 8	A	B	A	-	-
Manufacturer 5	Carton 9	A	C	B	A	-
Manufacturer 5	Carton 10	A	F	C	A	-
Manufacturer 5	Carton 11	A	C	A	-	-
Manufacturer 6	Carton 12	A	A	A	-	-
Manufacturer 7	Carton 13	A	A	A	-	-
Manufacturer 8	Carton 14	A	B	B	-	-
Manufacturer 8	Carton 15	A	B	A	-	-
Manufacturer 8	Carton 16	A	F	F	C	B

Fields without results were not measured, as no considerable increase in the grading was to be expected or the minimum grading C could not have been achieved.

Drying time according to PTS method PTS-DF 103/2011

Marking technology		Thermal inkjet (TIJ)	
Ink		Black Solvent	
Code		GS1 DataMatrix code - ECC 200 (300 dpi)	
Carton coating		Terrawet G9/378 Food Safe (gloss coating)	
Manufacturer	**Carton**	**Grading Without wipe test**	**Grading After wipe test**
Manufacturer 1	Carton 1	B	The gloss coating Terrawet G9/378 Food Safe forms a highly-smooth non-porous lacquer coating on the cartons. For this difficult surface finish, the rapid-drying, solvent-based Black Solvent ink is the best choice. Here, the smudge-proof drying time is at least 1 second.
Manufacturer 2	Carton 2	B	
Manufacturer 3	Carton 5	B	
Manufacturer 4	Carton 6	B	
Manufacturer 4	Carton 7	B	
Manufacturer 5	Carton 8	B	
Manufacturer 5	Carton 9	B	
Manufacturer 5	Carton 10	B	
Manufacturer 5	Carton 11	B	
Manufacturer 6	Carton 12	B	
Manufacturer 7	Carton 13	B	
Manufacturer 8	Carton 14	B	
Manufacturer 8	Carton 15	B	
Manufacturer 8	Carton 16	B	

Light fastness test based on DIN EN ISO 105 B02

Light fastness grade (LF)	LF 1	LF 2	LF 3	LF 4
Irradiation period in the laboratory at 42 W/m²	4 h	14 h	30 h	72 h
Corresponds to an average open air duration in Germany of	Approx. 5 days	Approx. 10 days	Approx. 20 days	Approx. 40 days

Marking technology		Thermal inkjet (TIJ)				
Ink		Universal Black				
Code		GS1 DataMatrix code - ECC 200 (300 dpi)				
Carton coating		None				
Manufacturer	**Carton**	**Grading Unexposed**	**Grading after LF 1**	**Grading after LF 2**	**Grading after LF 3**	**Grading after LF 4**
Carton	Avanta Prima	B	B	B	C	C
Manufacturer 8	Carton 14	B	B	B	C	C
Manufacturer 5	Carton 8	B	B	C	C	D
Manufacturer 3	Carton 5	B	B	B	C	C

Marking technology		Laser marking				
Code		GS1 DataMatrix code - ECC 200				
Offset color as contrast area		Black contrast color, type 408010, 2 µm				
Manufacturer	**Carton**	**Grading Unexposed**	**Grading after LF 1**	**Grading after LF 2**	**Grading after LF 3**	**Grading after LF 4**
Manufacturer 4	Carton 6	B	B	B	B	B
Manufacturer 4	Carton 7	B	B	B	B	B
Manufacturer 5	Carton 8	C	C	C	C	B

Water resistance according to ISO 18935 Method 3

Marking technology		Thermal inkjet (TIJ)
Ink		Water Resistant Black
Code		GS1 DataMatrix code - ECC 200 (300 dpi)
Carton coating		None
Manufacturer	**Carton**	**Grading after water bath**
Manufacturer 1	Carton 1	A
Manufacturer 2	Carton 2	B
Manufacturer 2	Carton 3	A
Manufacturer 3	Carton 4	A
Manufacturer 3	Carton 5	A
Manufacturer 4	Carton 6	C
Manufacturer 4	Carton 7	B
Manufacturer 5	Carton 8	B
Manufacturer 5	Carton 9	B
Manufacturer 5	Carton 10	A
Manufacturer 5	Carton 11	B
Manufacturer 6	Carton 12	B
Manufacturer 7	Carton 13	C
Manufacturer 8	Carton 14	B
Manufacturer 8	Carton 15	B
Manufacturer 8	Carton 16	C

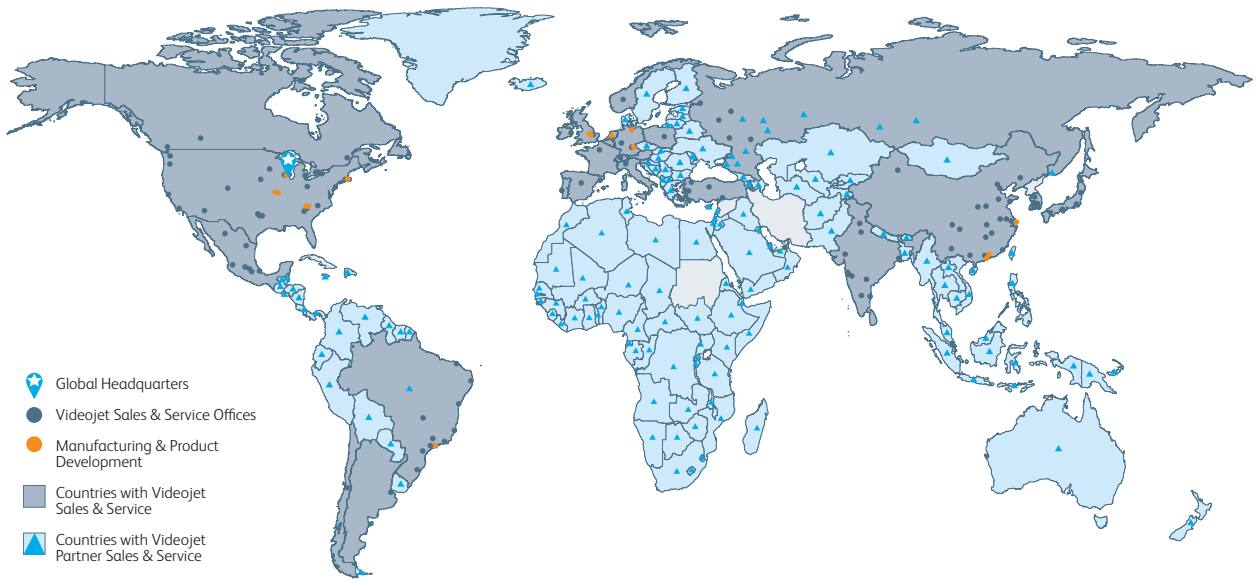
Laser coding ability according to the PTS method PTS-DF 105/2015

Marking technology		Laser marking	
Code		GS1 DataMatrix code - ECC 200	
Offset color as contrast area		Black contrast color, type 408010, 2 µm	
Manufacturer	**Carton**	**Grading**	**Wattage**
Manufacturer 1	Carton 1	B	18
Manufacturer 2	Carton 2	B	18
Manufacturer 2	Carton 3	B	18
Manufacturer 3	Carton 4	B	18
Manufacturer 3	Carton 5	B	21
Manufacturer 4	Carton 6	B	21
Manufacturer 4	Carton 7	B	18
Manufacturer 5	Carton 8	B	18
Manufacturer 5	Carton 9	B	18
Manufacturer 5	Carton 10	B	18
Manufacturer 5	Carton 11	B	18
Manufacturer 6	Carton 12	B	27
Manufacturer 7	Carton 13	C	21
Manufacturer 8	Carton 14	C	24
Manufacturer 8	Carton 15	C	21
Manufacturer 8	Carton 16	B	21

Peace of mind comes as standard

Videojet Technologies is a world leader in industrial coding and marking solutions with a dedicated global pharmaceutical team supporting organizations and supply chain partners with solutions, certifications and fast, reliable service. A product portfolio including thermal inkjet, laser marking, continuous inkjet and labeling provides consistent, high-quality serialization and traceability codes, helping the pharmaceutical and medical device industries safeguard their products against counterfeiting and protect consumer safety. With a wide range of technologies addressing virtually any application, Videojet is the expert in realizing the specific requirements of a wide range of healthcare applications.

With decades of knowledge, Videojet Technologies' expertise in industry standards and global regulations makes them the right partner for understanding complex coding needs. Videojet solutions code 10 billion products a day worldwide, playing a vital and responsible role in the world. With over 4,000 associates serving 135 countries, Videojet has the capability to provide local service through global resources.



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