

DNP

DNP Imagingcomm Europe B.V.

Durability Testing Report

Arjobex Polyart

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Overview test results

In this section the actual results of the durability tests on the substrates, which DNP Imagingcomm Europe received from Arjobex, are shown.

The results are the outcome of the abrasion tests, which have been conducted on a SANGYO AB-301 Crock Meter smudge machine, using a weight of 400 grams per rub over the printed substrate. Z

The presented numbers can be divided in two sorts of data:

- Number of Cycles**

Every cycle stands for two rubs

- ANSI value**

The ANSI value is determined with an LVS-9510 Barcode Verifier

ANSI values are rated from 0.0 till 4.0, where 0.0 stands for absolutely no barcode readability and 4.0 stands for a perfectly readable barcode print. The cut-off for most companies (in retail) is an ANSI-rate with a minimum of 1.5. When a Barcode is 1.5 or lower, a barcode scanner won't be able to read the printed data anymore. Above 1.5 a scan is readable.

Therefore, DNP used the following scale for presenting the ANSI-values in the tables:

Poor	0.0 - 1.5
Average	1.5 - 2.0
Good	2.1 - 2.6
Excellent	2.7 - 4.0

The results are presented per Arjobex substrate.

General observation of the results per product

General finding regarding **water resistance**: in quite a few cases, the water resistance of the material caused too much friction, so the label material tear apart. Although the label tore apart due to repetitive friction, the barcode usually looked fine and undamaged. As the occurred failures versus water happened with various label materials with different TTR combinations, the test was performed again to see if it would happen again. Sometimes it did, sometimes it did not, so DNP is not certain what causes this. DNP suspects that the top-coat of the label material is relatively more susceptible to repetitive water friction or immersion, causing it to break under the pressure.

Polyart 75

Polyart 75	TR4085plus®		M255		M265		TR5080		R300		R510		R550		TR7541		V300	
		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0				4,0		4,0		4,0	
	# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles	
dry smudge	100	3,8	100	4,0	100	4,0	100	3,2	100	4,0			100	4,0	100	4,0	100	4,0
water	100	4,0	100	4,0	100	4,0	100	2,2	100	4,0			100	4,0	100	4,0	100	4,0
olive oil	20	2,3	100	4,0	100	4,0	20	0,0	100	4,0			100	4,0	100	3,3	100	4,0
fish oil	20	2,9	50	3,3	100	3,8	20	0,0	100	4,0			100	4,0	100	3,2	100	4,0
liquid butter	20	0,6	50	3,2	100	4,0	20	2,2	100	4,0			100	4,0	100	4,0	100	2,4
bleach	30	1,5	100	2,3	60	4,0	30	1,5	40	3,6			100	4,0	70	3,8	60	4,0
detergent	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0			100	4,0	100	4,0	100	4,0
bacon	20	0,3	15	0,0	100	4,0	20	0,3	10	2,4			100	4,0	100	4,0	100	3,6
vinegar	100	2,2	100	4,0	100	4,0	100	2,2	100	4,0			100	4,0	100	4,0	100	4,0
IPA	5	0,0	10	0,0	5	4,0	5	0,0	5	0,0			5	0,0	5	0,0	5	0,8

Printability: excellent, apart from R510

Wax/Resin: M265 best in class

Resin: R550 best in class

Polyart 80 C1S

Polyart 80 C1S	TR4085plus®		M255		M265		TR5080		R300		R510		R550		TR7541		V300	
		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0				4,0		3,6		4,0	
	# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles	
dry smudge	100	3,4	100	3,0	100	4,0	100	3,1	100,00	4,0			100	3,2	100	3,5	100	4,0
water	100	2,5	100	4,0	100	0,0	100	2,9	100,00	4,0			100	4,0	100	3,6	100	4,0
olive oil	20	2,4	100	3,3	100	4,0	20	3,4	100,00	3,7			100	3,5	100	2,8	100	4,0
fish oil	20	2,8	50	3,4	100	4,0	20	3,0	100,00	3,9			100	3,2	100	3,1	100	4,0
liquid butter	20	2,5	50	4,0	100	4,0	20	2,5	100,00	3,6			100	2,7	100	2,5	100	2,8
bleach	30	2,6	70	0,0	20	0,0	30	2,6	20,00	0,0			20	3,6	20	0,0	10	0,0
detergent	90	4,0	100	3,1	60	0,0	80	4,0	60,00	0,0			80	0,0	80	0,0	35	0,0
bacon	18	0,2	20	0,2	100	3,1	20	0,2	100,00	4,0			100	4,0	100	4,0	100	4,0
vinegar	100	0,4	100	2,7	100	4,0	100	0,4	100,00	3,9			100	3,5	100	3,9	100	4,0
IPA	X	0	10	0,6	X	4,0	X	0,0	X	0,0			100	3,0	X	0,0	X	0,0

Printability: excellent, apart from R510

Wax/Resin: M255 best in class

Resin: R300 best in class

Polyart SR 84, Scuff resistant

Polyart SR 84	TR4085plus®		M255		M265		TR5080		R300		R510		R550		TR7541		V300	
	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0		4,0		4,0		4,0		4,0	
	# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles	
dry smudge	100	3,2	100	3,8	100	3,8	100	2,4	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
water	100	4,0	100	4,0	100	3,3	100	2,9	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
olive oil	20	2,9	65	3,1	100	3,0	20	1,8	100	3,7	100	4,0	100	4,0	100	3,9	100	2,7
fish oil	20	2,7	65	2,6	100	3,4	20	1,9	100	3,4	100	4,0	100	4,0	100	3,7	100	2,6
liquid butter	20	2,4	80	2,7	100	3,7	20	0,7	100	3,2	100	4,0	100	4,0	100	3,7	100	2,0
bleach	100	2,4	100	3,8	20	3,9	100	2,4	100	3,9	100	4,0	100	4,0	25	0,0	100	3,6
detergent	100	4,0	100	4,0	100	3,6	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
bacon	40	1,6	30	0,2	100	2,8	35	1,6	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
vinegar	100	4,0	100	3,8	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
IPA	X	0,0	8	2,0	X	0,0	X	0,0	8	1,5	10	3,5	10	0,0	3	0,0	5	0,0

Printability: excellent,
Wax/Resin: M265 best in class
Resin: R510 best in class

Polyart TE60

Polyart TE60	TR4085plus®	M255		M265		TR5080		R300		R510		R550		TR7541		V300		
		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0		2,5		4,0		4,0		4,0	
	# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles	
dry smudge	100	3,5	100	2,7	100	4,0	100	2,8	100	4,0	100,00	2,5	100	4,0	100	4,0	100	4,0
water	100	3,7	100	4,0	100	4,0	100	3,2	100	4,0	100,00	2,1	100	4,0	100	3,3	100	4,0
olive oil	20	4,0	100	4,0	100	4,0	20	0,7	100	4,0	100,00	1,5	100	4,0	100	4,0	100	4,0
fish oil	20	3,3	100	4,0	100	4,0	20	2,7	100	4,0	100,00	1,5	100	4,0	100	4,0	100	4,0
liquid butter	20	3,7	100	4,0	100	4,0	20	2,1	100	4,0	100,00	1,5	100	4,0	100	4,0	100	3,9
bleach	60	3,6	30	3,5	30	4,0	60	3,6	60	3,3	100,00	0,0	100	1,3	50	0,0	80	3,1
detergent	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0	40,00	0,8	100	0,0	X	0,0	100	3,3
bacon	20	0,4	15	0,0	100	4,0	18	0,4	100	4,0	70,00	2,8	100	4,0	100	4,0	100	4,0
vinegar	100	2,8	100	4,0	100	4,0	100	2,8	100	4,0	100,00	0,0	100	4,0	X	3,8	100	4,0
IPA	X	0,0	10	0,0	X	0,0	X	0,0	X	0,0	5,00	1,5	10	0,0	X	0,0	5	1,3

Printability: excellent, apart from R510

Wax/Resin: M265 best in class

Resin: R300 and V300 are best in class

Polyart HS 130

Polyart HS 130	TR4085plus®	M255		M265		TR5080		R300		R510		R550		TR7541		V300		
	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0		4,0		4,0		4,0		4,0	
dry smudge	100	4,0	100	4,0	100	3,8	100	3,9	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
water	100	4,0	100	4,0	100	4,0	100	3,4	100	4,0	100	4,0	100	0,0	100	4,0	100	4,0
olive oil	20	0,0	50	3,3	100	4,0	20	1,7	100	4,0	100	4,0	100	3,7	100	4,0	100	4,0
fish oil	20	0,0	50	2,3	100	3,9	20	1,1	100	4,0	100	4,0	100	3,8	100	4,0	100	4,0
liquid butter	20	0,0	50	2,2	100	3,5	20	1,9	100	4,0	100	4,0	100	3,8	100	4,0	100	3,7
bleach	70	3,5	100	4,0	30	3,4	70	3,5	100	4,0	100	4,0	20	4,0	100	0,0	100	3,6
detergent	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0	20	4,0	100	4,0	100	4,0
bacon	50	0,1	30	3,1	100	4,0	50	0,1	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
vinegar	100	4,0	100	3,0	100	4,0	100	4,0	100	4,0	100	4,0	40	4,0	100	4,0	100	4,0
IPA	X	0,0	10	2,0	X	0,0	X	0,0	100,00	4,0	100	4,0	60	0,0	2,00	0,0	100	0,0

Printability: excellent

Wax/Resin: M265 best in class

Resin: R300, R510, TR7541 and V300 were equal in providing the best resistance, also against IPA

Polyart PSL50

Polyart PSL 50	TR4085plus®		M255		M265		TR5080		R300		R510		R550		TR7541		V300	
	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0		4,0		4,0		4,0		4,0	
dry smudge	100	3,5	100	3,3	100	4,0	100	3,3	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
water	100	4,0	100	3,8	100	4,0	100	3,8	100	4,0	100	4,0	100	0,0	100	4,0	100	4,0
olive oil	20	1,0	80	3,8	100	4,0	20	1,9	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
fish oil	20	1,1	60	1,0	100	4,0	20	2,0	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
liquid butter	20	1,9	80	1,5	100	4,0	20	1,7	100	4,0	100	4,0	100	3,1	100	4,0	100	4,0
bleach	25	4,0	100	4,0	60	3,6	20	4,0	100	4,0	100	4,0	100	4,0	100	0,0	100	4,0
detergent	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0	60	0,0	100	4,0	100	4,0
bacon	15	0,0	20	2,7	100	3,2	10	0,0	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
vinegar	100	3,6	100	4,0	100	4,0	100	3,6	100	4,0	100	4,0	100	4,0	100	4,0	100	4,0
IPA	X	0,0	X	0,0	X	0,0	X	0,0	100	3,5	40	4,0	100	4,0	2	0,0	70	2,8

Printability: excellent

Wax/Resin: M265 best in class

Resin: R300, R510 and V300 were equal in providing the best resistance, whereas R510 had the best IPA resistance

MDV Robuskin PE

Robuskin PE	TR4085plus®		M255		M265		TR5080		R300		R510		R550		TR7541		V300	
	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0		3,6		4,0		4,0		4,0	
dry smudge	100	2,5	100	2,7	100	2,6	100	2,7	100	3,4	100	2,9	100	2,9	100	2,9	100	2,7
water	100	3,2	100	2,9	100	2,9	100	2,9	100	3,3	100	3,3	100	3,2	100	3,0	100	2,8
olive oil	20	0,9	60	1,5	100	2,5	20	0,9	100	3,0	100	3,1	100	2,8	100	2,7	100	2,2
fish oil	20	0,8	60	0,9	100	2,2	20	0,0	100	2,8	100	3,3	100	3,0	100	2,8	100	3,1
liquid butter	20	0,9	60	1,6	100	2,3	20	1,1	100	2,8	100	2,2	100	1,2	100	3,0	100	2,7
bleach	40	2,6	100	2,7	40	1,9	40	2,6	100	3,2	100	3,5	100	2,9	100	2,2	100	2,0
detergent	100	3,2	100	3,1	100	3,2	100	3,2	100	3,2	100	3,6	70	0,0	100	3,3	100	2,6
bacon	15	1,9	35	0,0	100	2,0	15	1,9	100	2,8	100	3,5	100	3,1	100	3,3	100	2,6
vinegar	100	2,9	100	3,2	100	3,1	100	2,9	100	3,2	100	3,4	100	2,9	100	3,2	100	3,0
IPA	X	0,0	15	0,0	X	0,0	X	0,0	100	2,5	100	3,5	100	3,2	X	0,0	100	2,4

Printability: fairly equal for all grades

Wax/Resin: M265 best in class

Resin: R510 provided the best resistance, also against IPA

Satinex HLS2

Satinex HLS2	TR4085plus®		M255		M265		TR5080		R300		R510		R550		TR7541		V300	
		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after		ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0		3,9		4,0		4,0		4,0	
	# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles	
dry smudge	100	2,8	100	2,9	100	3,1	100	2,6	100	3,2	100	2,9	100	3,5	100	2,2	100	3,3
water	100	3,6	100	3,0	100	3,2	100	2,8	100	3,0	100	3,3	100	3,5	100	1,3	100	2,8
olive oil	20	0,8	50	1,4	100	2,7	20	0,0	100	2,8	100	3,5	100	3,5	100	3,0	100	2,7
fish oil	20	0,0	50	1,2	100	2,8	20	0,0	100	3,0	100	3,6	100	3,7	100	0,0	100	3,0
liquid butter	20	0,0	50	1,8	100	2,5	20	0,0	100	3,2	100	2,8	100	3,3	100	0,0	100	2,5
bleach	50	2,7	100	3,3	80	2,8	45	2,7	100	3,7	100	3,5	100	3,7	80	0,0	100	3,6
detergent	100	3,2	100	3,4	100	3,3	100	3,2	100	3,5	100	3,5	100	2,5	100	3,0	100	3,6
bacon	20	0,0	20	0,5	100	1,1	15	0,0	100	2,9	100	3,5	100	3,6	90	0,0	100	2,9
vinegar	100	0,0	100	3,4	100	2,8	100	3,0	100	3,6	100	3,9	100	3,6	100	0,0	100	3,6
IPA	X	0,0	12	0,2	X	0,0	X	0,0	100	2,8	100	3,8	100	3,5	X	0,0	100	2,8

Printability: fairly equal for all grades

Wax/Resin: M265 best in class

Resin: R510 and R550 provided the best resistance, also against IPA

MDV Satinex Std

Satinex Std	TR4085plus®		M255		M265		TR5080		R300		R510		R550		TR7541		V300	
	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0		3,4		4,0		4,0		4,0	
	# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles		# of cycles	
dry smudge	100	2,1	100	2,7	100	2,3	100	2,5	100	3,0	100	3,0	100	2,8	100	2,9	100	3,0
water	100	2,4	100	3,1	100	3,1	100	2,8	100	2,4	100	3,1	100	3,1	100	2,7	100	2,7
olive oil	20	0,0	50	1,9	100	2,8	20	0,0	100	2,8	100	2,9	100	3,1	100	2,8	100	2,0
fish oil	20	0,0	50	2,4	100	2,4	20	0,0	100	3,0	100	2,9	100	2,8	100	2,5	100	2,8
liquid butter	20	0,0	50	1,2	100	2,2	20	0,8	100	2,8	100	1,7	100	2,4	100	1,9	100	2,2
bleach	100	2,9	100	3,2	100	2,3	100	2,9	100	3,2	100	3,3	100	3,0	70	2,0	100	3,2
detergent	100	2,9	100	3,2	100	3,1	100	2,9	100	3,2	100	3,4	100	2,8	100	3,0	100	3,1
bacon	25	0,0	20	0,2	100	1,8	20	0,0	100	2,5	100	3,4	100	3,2	100	1,9	100	2,4
vinegar	100	2,4	100	3,0	100	3,1	100	2,4	100	3,0	100	3,2	100	2,9	100	2,8	100	3,3
IPA	X	0,0	X	0,0	X	0,0	X	0,0	100	2,5	100	3,2	100	3,0	X	0,0	50	2,1

Printability: fairly equal for all grades

Wax/Resin: M265 best in class

Resin: R510 provided the best resistance, also against IPA

Satinex X-Tear

Satinex X-Tear	TR4085plus®		M255		M265		TR5080		R300		R510		R550		TR7541		V300	
	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after	# of cycles	ANSI after
ANSI before	4,0		4,0		4,0		4,0		4,0		4,0		4,0		4,0		4,0	
dry smudge	100	3,6	100	3,0	100	3,0	100	3,7	100	3,7	100	2,5	100	1,3	100	3,7	100	3,7
water	100	4,0	100	3,6	100	3,0	100	3,9	50	0,0	100	3,7	100	1,9	100	3,7	100	3,5
olive oil	20	0,9	100	1,8	100	3,4	20	1,7	100	2,8	100	3,8	100	2,1	100	3,5	100	3,7
fish oil	20	0,6	100	0,9	100	3,3	20	1,1	100	2,0	100	3,7	100	0,0	100	3,5	100	3,7
liquid butter	20	0,0	70	2,1	100	2,9	20	1,4	100	1,7	100	2,5	100	2,4	100	3,3	100	3,4
bleach	100	3,7	100	3,8	70	2,1	100	3,7	50	2,5	100	4,0	100	2,3	5	0,0	100	3,9
detergent	100	3,9	100	3,8	100	3,8	100	3,9	50	3,2	100	2,8	60	0,0	100	3,9	100	4,0
bacon	25	0,0	15	0,9	100	2,2	20	0,0	100	3,0	100	4,0	100	2,9	100	3,3	100	3,4
vinegar	100	3,6	100	3,9	100	3,6	100	3,6	30	0,0	100	2,8	100	1,8	100	3,8	100	4,0
IPA	0	0	X	0,0	X	0,0	X	0,0	100	3,1	100	4,0	100	3,3	X	0,0	60	2,9

Printability: excellent

Wax/Resin: M265 best in class

Resin: V300 provided the best resistance, although R510 has the best resistance against IPA

DNP Thermal Transfer Ribbon - General observation of the results per thermal transfer ribbon

Wax Thermal Transfer Ribbons

MP Wax - Standard Wax

Overall printability is excellent

The resistance has not been measured, as MP Wax is not made to have any resistance apart from rub resistance. MP Wax is designed for printing on goods, of which the print is no longer required within a few days (e.g., logistic labelling).

TR4085plus® - Resin Enhanced Wax

Overall printability is excellent

The overall resistance with Polyart grades is better than the other grades

Overall dry smudge, water and detergent resistance is good

Most other resistance is limited to bad

Wax/Resin Thermal Transfer Ribbons

TR5080 - Standard Wax / Resin

Overall printability is excellent

The overall resistance is not expected from this wax/resin

M255 - Premium Wax / Resin

Overall printability is excellent

Overall resistance with Polyart grades is good

Overall dry smudge, water and detergent resistance is good

Most other resistance is limited to bad

M265 - Ultra-Durable Wax / Resin

Overall printability is excellent

Overall resistance is best in the wax/resin range

Resin Thermal Transfer Ribbons**R300 - General Purpose Resin**

Overall printability and resistance is good to excellent

R510 - Ultra-Durable Resin

R510 requires a very smooth surface to print on, so apart from Polyart 75, 80 and TE60, the printability is good to excellent

Apart from Polyart TE60, the overall resistance is excellent

R550 - Extremely Durable Resin

Overall printability and resistance is good to excellent

Overall resistance is usually good to excellent, however on Tech Folien it lacks resistance

TR7541 - Boiling Resistant Resin

Overall printability and resistance is good to excellent

Lacking resistance against bleach, the resistance is usually good to excellent

V300 - Versatility Defined

Overall printability and resistance is good to excellent