

LGCO-CH
 SBU CD/MTAZ
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BSK 30 CARDS

SPECIFICATIONS LIST (for client use)

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Reviewed by:

LGCO-CH - Geneva

Approved by:

LGCO-CH

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 Landis & Gyr Communications (Suisse) SA

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LANDIS & GYR		Kartenproduktion		B S H 6 1 6 0 0 2			1/14

CARD SPECIFICATIONS LIST
 (For client use)

Issue 14.11.91

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1 DIMENSIONS

<u>TEST NAME</u>	<u>TREATMENT</u>	<u>TEST EQUIPMENT</u>	<u>ACCEPTED VALUES</u>
1.1 Card dimensions	1.1: A,B,C,D,E,	1.1: A	1.1 H BSH 6 14 026
1.2 Track	1.2: A,B,C,D,E,	1.2: A	
1.3 Printed area	1.3: A,B,C,D,E,	1.3: A	1.2 H 4605 0301 0 (code with structure)* H 4605 0300 0 (code with mirror)*
1.4 Curvature	1.4: A,B,C,D,E,	1.4: A	1.3 H BSH 6 14 024 (for Card 66) H BSH 6 14 023 (for Card 53)
	Description of test treatments:	A. Measuring microscope	1.4 ISO standard nr.: 7810 (1985 E)
	A. dry heat & cold (IEC 68-2-1 & ...-2) +50°C during 3 weeks -25°C during 16 h packed		
	B. extreme heat treatment +55°C during 4h unpacked		
	C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C		* Strictly confidential, copying of these documents is strictly prohibited
	D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same cond.		
	E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked		

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2 SIGNAL LIMITS

TEST NAME	TREATMENT	TEST EQUIPMENT	ACCEPTED VALUES
2.1 Signal levels	2.1 : A,B,C,D,E	2.1: A	2.1 Defined per structure see H BSH 6 10 OXX XX=Structure*
2.2 Erasability warm	2.2 : A,B,C,D,E followed by F	2.2: A & B	
2.3 Erasability cold	2.3 : A,B,C,D,E followed by G	2.3: A & B	
	Description of treatments:	A. Calibrated measuring head	2.2.1 Erasability for visible erasing (thermographic lacquer) rest signal 1 order : < 0.8V see H BSH 6 10 OXX XX=Structure*
	A. dry heat & cold (IEC 68-2-1 & ...-2) +50°C during 3 weeks -25°C during 16 h packed	B. BSK 30/31 reader with an average erasing head	2.2.2 Erasability for invisible erasing rest signal 1 order : < 0.9V see H BSH 6 10 OXX XX=Structure*
	B. extreme heat treatment +55°C during 4h unpacked		2.3.1 Erasability for visible erasing (thermographic lacquer) same as 2.2.1
	C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C		2.3.2 Erasability for invisible erasing same as 2.2.2
	D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same cond.		* Strictly confidential, copying of these documents is strictly prohibited
	E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked		
	F. erasing at room temperature energy: 5W during 40ms for erasing		
	G. erasing at -20°C energy: 5W during 60ms		

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3 TOXICITY

TEST NAME	TREATMENT	TEST EQUIPMENT	ACCEPTED VALUES
3.1 Heavy metal content	none	see EN 71 issue 1988	See EN 71 issue 1988 (European standard for toys) these test were made for us by independent subcontractors

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4 BENDABILITY (material properties)

TEST NAME	TREATMENT	TEST EQUIPMENT	ACCEPTED VALUES
4.1 Bendability	4.1: A,B,C,D,E Description of treatments: A. dry heat & cold (IEC 68-2-1 & IEC 68-2-2) +50°C during 3 weeks -25°C during 16 h packed B. extreme heat treatment +55°C during 4h unpacked C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same conditions E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked.	4.1 According to ISO 7816/1	4.1 ISO 7816/1

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5 TRACK COVER for visible erasing marks (thermographic lacquer)

TEST NAME	TREATMENT	TEST EQUIPMENT	ACCEPTED VALUES
5.1 Colour	5.1: A,B,C,D,E	5.1: none	5.1 Bright under any angle
5.2 Covering	5.2: A,B,C,D,E	5.2: A	5.2 Bits do not attract attention
5.3 Adhesion	5.3: A,B,C,D,E followed by I	5.3: B	5.3 GT0 (DIN 53 151)
5.4 Flexibility	5.4: A,B,C,D,E followed by J	5.4: C	5.4 No cracking of the track cover
5.5 Abrasion	5.5: A,B,C,D,E followed by K	5.5: D	5.5 Covering is not removed
5.6 Profile	5.6: A,B,C,D,E	5.6: E	5.6 No border ridge
5.7 Erasability	5.7: A,B,C,D,E followed by F & G	5.7: F	5.7 Same as specified in 2.2.1 (Signal limits)
5.8 Contrast	5.8: A,B,C,D,E followed by L	5.8: none	5.8 Contrast visually noticeable
5.9 Adhesion to erasing head	5.9: A,B,C,D,E followed by H & L	5.9: G	5.9 Adhesion has to be less than 200g after 40ms with 40ms erasure and after 100ms with 80ms erasure
5.10 Thickness	5.10: A,B,C,D,E	5.10: H	5.10 6-10µm
5.11 Compatability to erasing head	5.11: M Description of treatment: A. dry heat & cold (IEC 68-2-1 & ...-2) +50°C during 3 weeks -25°C during 16 h packed B. extreme heat treatment +55°C during 4h unpacked C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same cond. E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked F. erasing at room temperature energy: 5W during 40ms G. erasing at -20°C energy: 5W during 60ms H. erasing at -20°C up to +50°C energy: 5W during 40ms I. grating cut incl. TESAKREPP ^R 4300 (DIN 53 151) J. winding around a 20mm bolt K. TABER ^R -Test, 250g, wheel CS-10F, 100 turns L. blackening at -20°C up to +50°C energy: 5W during 80ms M. 200'000 erasings at 20° to 25°C	5.11: I A. 100W bulb in 1m distance B. Grating cutter C. 20mm bolt D. TABER ^R E. Thickness gauge F. BSK 30/31 reader with an average erasing head G. BSK 30/31 reader with an average erasing head equipped with an adhesion force measuring device H. Thickness gauge I. Robot test equipment	5.11 No reduction in functionality of the erasing head

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6 TRACK COVER for invisible erasure marks (non thermographic lacquer)

TEST NAME	TREATMENT	TEST EQUIPMENT	ACCEPTED VALUES
6.1 Colour	6.1: A,B,C,D,E	6.1: none	6.1 Customer dependent
6.2 Covering	6.2: A,B,C,D,E	6.2: A	6.2 Bits do not attract attention
6.3 Adhesion	6.3: A,B,C,D,E followed by I	6.3: B	6.3 GTO (DIN 53 151)
6.4 Flexibility	6.4: A,B,C,D,E followed by J	6.4: C	6.4 No cracking of the track cover
6.5 Abrasion	6.5: A,B,C,D,E followed by K	6.5: D	6.5 Covering is not removed
6.6 Profile	6.6: A,B,C,D,E	6.6: E	6.6 No border ridge
6.7 Erasability	6.7: A,B,C,D,E followed by F & G	6.7: F	6.7 Same as specified in 2.2.2 (Signal limits)
6.8 Contrast	6.8: A,B,C,D,E followed by F & G	6.8: none	6.8 No colour change
6.9 Adhesion to erasing head	6.9: A,B,C,D,E followed by H	6.9: G	6.9 Adhesion has to be less than 200g after 40ms with 40ms erasure and after 100ms with 80ms erasure
6.10 Thickness	6.10: A,B,C,D,E	6.10: H	6.10 5-10µm
6.11 Compatability to erasing head	6.11: L	6.11: I	6.11 No reduction in functionality of the erasing head
	Description of treatments:		
	A. dry heat & cold (IEC 68-2-1 & ...-2) +50°C during 3 weeks -25°C during 16 h packed	A. 100W bulb in 1m distance	
	B. extreme heat treatment +55°C during 4h unpacked	B. Grating cutter	
	C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C	C. 20mm bolt	
	D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same cond.	D. TABER ^R	
	E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked	E. Thickness gauge	
	F. erasing at room temperature energy: 5W during 40ms	F. BSK 30/31 reader with an average erasing head	
	G. erasing at -20°C energy: 5W during 60ms	G. BSK 30/31 reader with an average erasing head equipped with an adhesion force measuring device	
	H. erasing at -20°C up to +50°C energy: 5W during 40ms	H. Thickness gauge	
	I. grating cut incl. TESAKREPP ^R 4300 (DIN 53 151)	I. Robot test equipment	
	J. winding around a 20mm bolt		
	K. TABER ^R -Test, 250g, wheel CS-10F, 100 turns		
	L. 200'000 erasings at 20° to 25°C		

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7 SCRATCH RESISTENT LACQUER

TEST NAME	TREATMENT	TEST EQUIPMENT	ACCEPTED VALUES
7.1 Colour	7.1: A,B,C,D,E	7.1: A	7.1 Colourless
7.2 Absorption	7.2: A,B,C,D,E	7.2: B	7.2 Absorption < 0.5% measured between -20 and 50°C at the wavelength (nm) used in the readers
7.3 Adhesion	7.3: A,B,C,D,E, followed by F	7.3: C	7.3 GTO (DIN 53 151)
7.4 Flexibility	7.4: A,B,C,D,E, followed by G	7.4: D	7.4 No cracking of the lacquer
7.5 Abrasion	7.5: A,B,C,D,E, followed by H	7.5: E	7.5 The card is accepted by the reader
7.6 Thickness	7.6: A,B,C,D,E	7.6: F	7.6 Less than 20µ
	Description of treatments:		
	A. dry heat & cold (IEC 68-2-1 & ...-2) +50°C during 3 weeks -25°C during 16 h packed	A. Visual	
	B. extreme heat treatment +55°C during 4h unpacked	B. Visible & IR Spectrometer	
	C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C	C. Grating cutter	
	D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same cond.	D. 20mm bolt	
	E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked	E. TABER ^R	
	F. grating cut incl. TESAKREPP ^R 4300 (DIN 53 151)	F. Thickness gauge	
	G. winding around an 20mm bolt		
	H. TABER ^R -Test, 250g, wheel CS-10F, 100 turns		

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TEST NAME	TREATMENT	TEST EQUIPMENT	ACCEPTED VALUES
8.1 Layout	8.1: none	8.1: A	8.1. The layouts (images on the front and back sides) are designed in cooperation between the customer and supplier. The design specifications are defined by H BSH 6 14 025
8.2 Adhesion	8.2: A,B,C,D,E, followed by F	8.2: B	8.2. GT2
8.3 Flexibility	8.3: A,B,C,D,E, followed by G	8.3: C	8.3. No cracking
8.4 Abrasion	8.4: A,B,C,D,E, followed by H	8.4: D	8.4. Printing must still be readable
Description of treatments:		A. none	
A. dry heat & cold (IEC 68-2-1 & ...-2) +50°C during 3 weeks -25°C during 16 h packed		B. Grating cutter	
B. extreme heat treatment +55°C during 4h unpacked		C. 20mm bolt	
C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C		D. TABER ^R	
D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same cond.			
E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked			
F. grating cut incl. TESAKREPP ^R 4300 (DIN 53 151)			
G. winding around an 20mm bolt			
H. TABER ^R -Test, 250g, wheel CS-10F, 100 turns			
* Test performed on an average card:			
Front: 4 colour print on white or non base.			
Reverse: single colour print on white or non base.			

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9 INSPECTION OF PRODUCTION

TEST NAME	SAMPLING & TEST	TEST EQUIPMENT	ACCEPTED VALUES
9.1 Measuring of signal	9.1 All cards (100% control); A	9.1 A	9.1 Defined per structure see H BSH 6 10 0XX XX=structure **
9.2 Erasability	9.2 1 out of 1200 cards per lot; B	9.2 B	
9.3 Contrast of track cover	9.3 1 out of 1200 cards per lot; C	9.4 B	9.2 Erasability for visible erasing marks (Thermographic lacquer) -Rest signal 1. order : < 0.8 Volts see H BSH 6 10 0XX XX=Structure **
9.4 Sticking of lacquer to the erasing head *	9.4 1 out of 3600 cards per lot; D	9.4 C	
9.5 Layout conformity	9.5 all cards (100% control); E	9.5 D	Erasability for non visible erasing marks -Rest signal 1. order : < 0.9 Volts see H BSH 6 10 0XX XX=Structure **
Description of test:		A. Calibrated measuring head	
A. signal measurement		B. BSK 30/31 reader with an average erasing head	9.3 -Contrast visually noticeable (for thermographic lacquer) -No colour change (for non thermographic lacquer)
B. 1 to 4 erasures per track, erasure time 40 ms at room temperature		C. BSK 31 reader with an average erasing head equipped with an adhesion force measuring device	9.4 Less than 200g
C. 1 erasure per track, erasure time 80 ms (as field reader) at room temperature		D. None (Visual)	9.5 a) Major defects: -heavy scratches are not accepted, -printing failures with high contrast or larger than 2 mm ² are not accepted. b) Minor defects: -light scratches with a length of up to half of the card, that don't show high contrast are accepted, max. of 2 per card, -failures in printing showing little contrast and being smaller than 2 mm ² are accepted, max. of 3 per card -geometric tolerance of the border is ± 0.5mm. c) Colour matching: -4 colour printing: Due to different substrates (paper/aluminised PVC) deviations in colour from the proof are accepted. Also a certain production tolerance is given, depending on the complexity of the layout and clarity of contrast. -Full tone printing: Deviations of colours in single PANTONE ^R steps, such as 297-298-...-303, are accepted. For production of high quantities the customer can arrange limit samples with LGCO.
D. 6 erasures at 40ms and 6 erasures at 80ms (at room temperature), measuring the adhesion force			
E. visual inspection.			

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10 RIDGE LACQUER

TEST NAME	TREATMENT	TEST EQUIPMENT	ACCEPTED VALUES
10.1 Colour	10.1: A,B,C,D,E,	10.1: A	10.1 Clear
10.2 Adhesion	10.2: A,B,C,D,E, followed by F	10.2: B	10.2 Adhesion > 3N/cm
10.3 Flexibility	10.3: A,B,C,D,E, followed by G	10.3: C	10.3 Card do not break when bent
10.4 Abrasion	10.4: A,B,C,D,E, followed by H	10.4: D	10.4 Not more than 30µ thickness reduction of the lacquer
10.5 Thickness	10.5: A,B,C,D,E,	10.5: E	10.5 Thickness > 50µ Total card thickness must meet specification H BSH 6 14 026
Description of test treatments:			
A. dry heat & cold (IEC 68-2-1 & ...-2) +50°C during 3 weeks -25°C during 16 h packed		A. none	
B. extreme heat treatment +55°C during 4h unpacked		B. Shear Instrument as described in DIN 53 455	
C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C		C. 20mm bolt	
D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same cond.		D. TABER ^R	
E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked		E. Thickness gauge	
F. Shear Test (as described in DIN 53 455)			
G. Winding around a 20mm bolt			
H. TABER ^R -Test, 250g wheel CS-10F, 100 turns			

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11 NUMBERING

TEST NAME	TREATMENT	TEST EQUIPMENT	ACCEPTED VALUES
11.1 Visibility	11.1: A,B,C,D,E,	11.1: A	11.1 Clearly visible
11.2 Position	11.2: none	11.2: B	11.2 H BSH 6 14 024 (for Card 66) H BSH 6 14 023 (for Card 53)
11.3 Size	11.3: none	11.3: B	11.3 Not more than 3mm high
Description of test treatments:			
A. dry heat & cold (IEC 68-2-1 & ...-2) +50°C during 3 weeks -25°C during 16 h packed		A. none	
B. extreme heat treatment +55°C during 4h unpacked		B. Measuring microscope	
C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C			
D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same cond.			
E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked			

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12 SUBSTRATE

<u>TEST NAME</u>	<u>TREATMENT</u>	<u>TEST EQUIPMENT</u>	<u>ACCEPTED VALUES</u>
12.1 Transmission 400-720nm	12.1: A,B,C,D,E, followed by F 12.2: A,B,C,D,E, followed by F	12.1: A 12.2: B	12.1 Less than 5% Transmission 12.2 Defined by proper function of the card with respect to point 2.1 above.
12.2 Transmission IR Region	Description of test treatments: A. dry heat & cold (IEC 68-2-1 & ...-2) +50°C during 3 weeks -25°C during 16 h packed B. extreme heat treatment +55°C during 4h unpacked C. sun test (IEC 68-2-5) Power: 820W/m ² during 24h the temperature should not exceed 40°C D. wet heat treatment (IEC 68-2-3) +40°C during 2 weeks in 93% rel. hum. packed then 1 week unpacked same cond. E. condensation (DIN 50 017 / Climate KTW) during 3 cycles unpacked F. Signal measurement	A. Visible & IR spectrometer B. Calibrated measuring head	

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By Alain KNECHT, September 2009