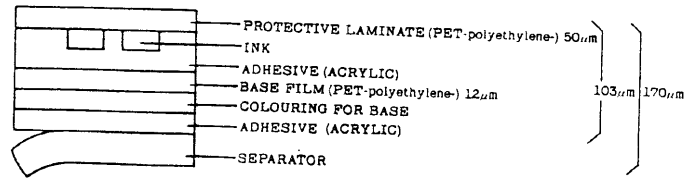


TAPE STRUCTURE

Brother's laminated tapes – both the TC and TX lines – consist of six layers of materials, resulting in thin, yet extremely strong, labels. Characters formed with thermal transfer ink are actually printed onto the underside of a laminate. Sandwiched between two layers of PET (polyethylene) film, the characters are virtually indestructible.

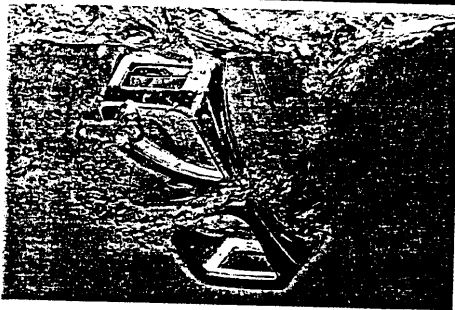


BROTHER LAMINATED TAPE

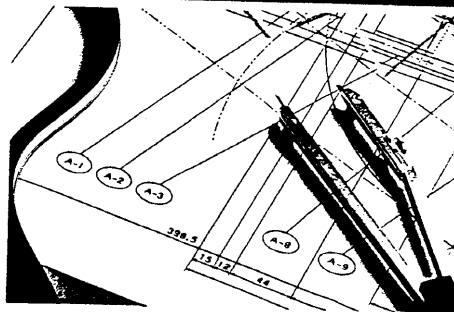
LAMINATION

Brother's 50 µm of top lamination protects the ink from the sorts of hazards which abound in industrial environments: abrasion, chemicals, oil and water. . . even general rough handling.

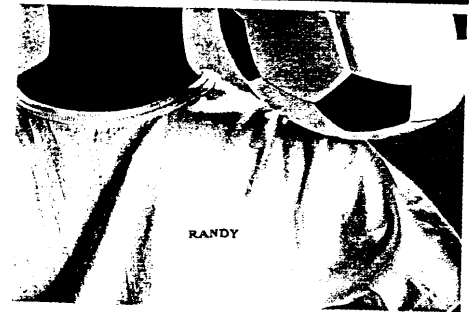
SPECIAL TAPE TECHNOLOGIES



FLUORESCENT TAPES



INSTANT LETTERING TAPES



IRON ON TRANSFER TAPES

SAFE FOR USERS

Brother had its tapes tested by an official Japanese government food research laboratory. For the purpose of the tests, it was assumed that labels would be attached to food containers, food packages, or to food preparation equipment. The tapes met the food sanitation law of Japan. Results can be seen at the right. P-Touch laminated tapes were found to meet all of the chemical limits in the standard. Though they passed the chemical tests, P-Touch tapes are strong, and not easily digested. For this reason, care should be taken to prevent accidental ingestion by infants or the elderly.

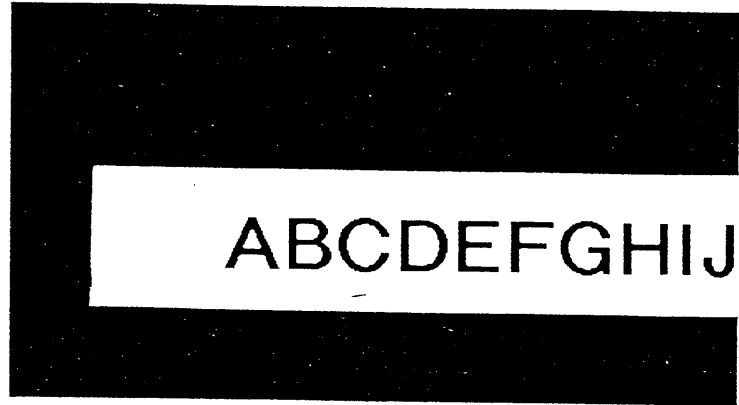
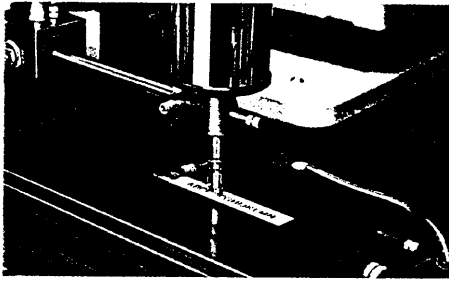
Additional tests were performed to determine the effects of accidental affixation of tapes to one's skin. Again, the tapes caused no skin irritation in the tests and, therefore, are described as safe according to OECD guidelines. Again, though the tapes passed the irritation tests, they could have some effect on people with sensitive skin. Brother recommends that labels not be attached to one's skin.

RESULTS

Lead :	none detected (MLD 5ppm)
Cadmium :	none detected (MLD 0.5ppm)
Dissolution tests	
Heavy metals (as Pb) :	none detected (Solvent : 4% V/V acetic acid) (MLD 1µg/ml)
Consumption of Potassium permanganate :	1.1µg/ml (Solvent : water)
Residue on evaporation :	not more than 5µg/ml (Solvent : n-heptan)
Residue on evaporation :	not more than 5µg/ml (Solvent : 20% V/V ethanol)
Residue on evaporation :	not more than 5µg/ml (Solvent : water)
Residue on evaporation :	not more than 5µg/ml (Solvent : 4% V/V acetic acid)
Antimony :	none detected (Solvent : 4% V/V acetic acid) (MLD 0.05µg/ml)
Germanium :	none detected (Solvent : 4% V/V acetic acid) (MLD 0.05µg/ml)
Methyl methacrylate :	none detected (Solvent : 20% V/V ethanol) (MLD 5µg/ml)

ABRASION RESISTANCE

Tapes were tested with a weighted (1kg) sand eraser device. After 50 "return" passes, Brother's tapes' lamination was only slightly scratched. The characters underneath were completely unaffected.



ABRASION RESULT (after 50 passes)

DIELECTRIC STRENGTH

In tests performed by Brother, white P-Touch tapes with black characters began to lose their electric resistance at an applied voltage of 8kv, and lost their resistance entirely at 11kv. Most other colour variations will have a similar resistance. However, though they meet the majority of Japan Industrial Standards for electrical insulator tape, P-Touch tapes are not designed to be used as electrical insulation, and Brother recommends that they not be used as such. (It is important to note that

tapes with "metallic" (gold, silver) backgrounds or characters contain aluminium, and that tapes with black backgrounds contain carbon, and therefore have lower dielectric strength than the standard colour styles.)

TAPES	(a) (mm)	(b) (kV)	(c) (kV/mm)	(d) (kV)
BLACK ON WHITE	0.110	11	100	8
BLACK ON GOLD	0.110	8	55	4
BLACK ON SILVER	0.110	8	55	5

- (a) TAPE'S THICKNESS
- (b) DIELECTRIC BREAKDOWN VOLTAGE
- (c) DIELECTRIC STRENGTH FOR 1MM IN THICKNESS (b)/(a)
- (d) THE MAXIMUM VOLTAGE WHICH CAN BE APPLIED BEFORE THE INSULATOR RUPTURES.

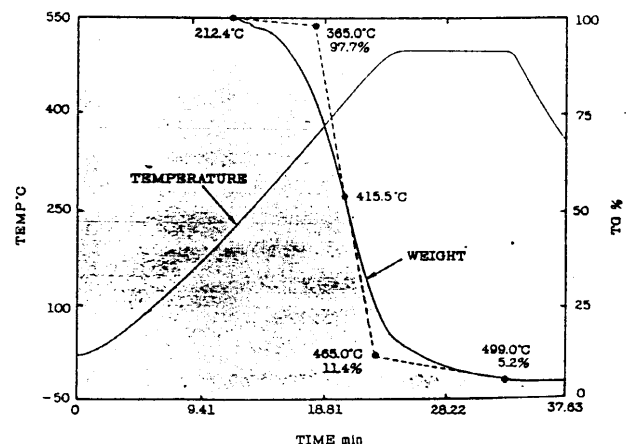
TAKING THE HEAT

Brother's P-Touch tapes retain their integrity even at extremely high temperatures. Tapes were placed in an analysis chamber. Then, starting at room temperature, the chamber was heated at a rate of 20°C increase per minute.

Decomposition of the tapes did not begin until the temperature reached 365°C. In other words, under general working environments the tapes will retain their form and readability. Tapes began to decompose more rapidly before and after temperature reached 415.5°C.

People often ask about using P-Touch tapes in conjunction with Diazo copy machines and with laminators. Copying an original document with a label attached will not cause problems with a Diazo machine. However, attaching a label to Diazo output may be difficult, due to the outputted document's wetness or coatings. As for

lamination machines, extreme heat and pressure can cause the label's structure and printed characters to be damaged. For this reason, items with P-Touch labels attached should not be fed through a laminator.



PERCENTAGE CHANGE OF TAPE WEIGHT UNDER HIGH TEMPERATURE

ADHESIVE STRENGTH

A label that falls off ceases to perform its function. Anybody who has experience using embossed stiff films knows that their reduced surface adhesion area decreases the tape's ability to cling to items.

ADHESION TO VARIOUS MATERIALS ●

First, Brother tested their tapes' adhesive strength under ordinary conditions when applied to various materials. Though the exact forces required to remove the labels varied, the finding was that in a general working environment, even after handling, P-Touch tapes will remain affixed.

	ADHESIVE STRENGTH (gf/12mm)
STAINLESS STEEL	780
GLASS	730
PVC	880
ACRYLIC	700
POLYPROPYLENE	340
POLYESTER-COATED WOOD	650

(ADHESIVE STRENGTH gf/12mm: required force to remove 12mm wide tapes.)

ADHESION AFTER EXPOSURE TO HEAT AND COLD ●

Next, tapes attached to stainless steel slightly roughened with abrasive paper were heated and cooled. After two hours in -50°C , a force of 710 gf was required to remove the P-Touch tape. No change in tape or adhesive colour had occurred. Heating, on the other hand, actually increased the tapes' adhesive strength, due to a slight softening and spreading of adhesive. [After two hours in 200°C though, the tape's white backing and adhesive had slightly discoloured.]

	ADHESIVE STRENGTH (gf/12mm)
$-50^{\circ}\text{C} \times 2$ HOURS	710
$200^{\circ}\text{C} \times 2$ HOURS	1100

ADHESION IN HIGH TEMPERATURE & HIGH HUMIDITY ●

The combination of high temperature and high humidity was no problem for Brother's tapes. The highest adhesion strengths of any test were registered after the tapes' exposure to 40°C temperatures and 5% salt water baths. No change in ink colour occurred, and no adhesive was left behind when tapes were removed.

	ADHESIVE STRENGTH (gf/12mm)
40°C DISTILLED WATER $\times 24$ HOURS	1440
40°C 5% SALT WATER $\times 24$ HOURS	1580

(OBJECTS: STAINLESS STEEL RUBBED WITH ABRASIVE PAPER #280)

ADHESION TO ROUNDED OBJECTS ●

Adhesion strength on rounded objects was also tested. Tapes were attached to stainless steel poles of various diameters, prepared with #280 abrasive paper. The poles were then placed in a variety of environments. On tightly-rounded, 8mm-diameter poles, after 24 hours in 65°C and 80% humidity, some labels' ends pulled up slightly from the pole (up to 3mm), and in a few cases, the background tape remained attached while the laminate pulled up (i.e. some tape separation occurred). In both normal and cold temperatures, even on the 8mm-diameter poles, no loss of adhesion was noted. More importantly, on all poles with larger diameters (from 12mm to 24mm), no loss of contact between label and pole resulted.

Tapes were attached to stainless steel poles of various diameters, prepared with #280 abrasive paper. The poles were then placed in a variety of environments. On tightly-rounded, 8mm-diameter poles, after 24 hours in 65°C and 80% humidity, some labels' ends pulled up slightly from the pole (up to 3mm), and in a few cases, the background tape remained attached while the laminate pulled up (i.e. some tape separation occurred). In both normal and cold temperatures, even on the 8mm-diameter poles, no loss of adhesion was noted. More importantly, on all poles with larger diameters (from 12mm to 24mm), no loss of contact between label and pole resulted.

ENVIRONMENTAL CONDITION	PRELING ADHESION PROBLEM	PERCENTAGE OF TAPES WHICH DETACHED FROM SUBSTRATE OR SEPARATED ON 8MM (1/3")-DIAMETER POLES		
		1 MM OR LESS (0.04" OR LESS)	1-3 MM (0.04"-1/8")	3 MM OR MORE (1/8" OR MORE)
$65^{\circ}\text{C} \times 24$ HOURS	SEPARATED	20%	50%	0
	DETACHED	20%	0	0
$23^{\circ}\text{C} \times 24$ HOURS	SEPARATED	0	0	0
	DETACHED	0	0	0
$-20^{\circ}\text{C} \times 24$ HOURS	SEPARATED	0	0	0
	DETACHED	0	0	0

PERCENTAGE OF TAPES WHICH DETACHED FROM SUBSTRATE OR SEPARATED ON 8MM (1/3")-DIAMETER POLES

ADHESION TO ROUGH SURFACE ●

The last adhesion tests addressed the issue of surface roughness. Stainless steel samples were prepared using a variety of abrasive paper weights. Roughening the surface actually increased the Brother tapes' adhesion strengths.

	ADHESIVE STRENGTH (gf/12mm)
SPECULAR GLOSS STAINLESS STEEL	560
STAINLESS STEEL RUBBED WITH A.P. #280	780
STAINLESS STEEL RUBBED WITH A.P. #240	750
STAINLESS STEEL RUBBED WITH A.P. #180	710
STAINLESS STEEL RUBBED WITH A.P. #120	730
STAINLESS STEEL RUBBED WITH A.P. #80	660

In general, the adhesion strengths determined through the various tests demonstrate that Brother's tapes will remain affixed under all but the most extreme environments.

CHEMICALS & WATER

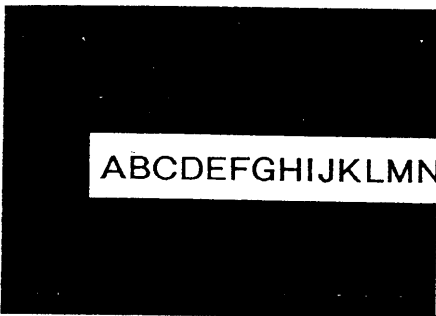
P-Touch tapes, attached to glass slides, were bathed in a variety of materials for two hours. Despite some changes in appearance and structure, all tapes remained affixed to their slides. As the photographs show, in a number of tests, Brother's laminated tapes fared remarkably well.



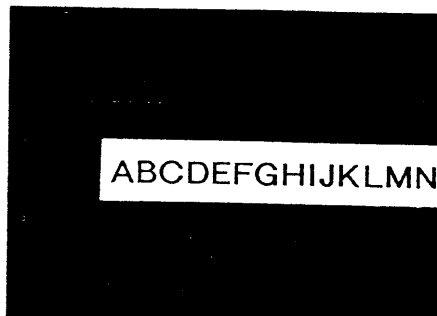
TOLUENE:	Slight adhesive swelling Slight puffing of tape and laminate
HEXANE:	No noticeable change
ETHANOL:	Slight adhesive swelling Slight puffing of tape
ETHYL ACETATE:	Slight adhesive swelling Slight puffing of laminate
ACETONE:	Some adhesive dissolving Slight puffing of laminate
1.1.1 TRICHLOROETHANE:	Slight adhesive swelling Slight puffing of laminate
MINERAL SPIRITS:	Slight adhesive swelling Slight puffing of laminate
WATER:	No noticeable change in structure Very slight weakening of adhesive
0.1N HCl:	No noticeable change in structure Very slight weakening of adhesive
0.1N NaOH:	No noticeable change in structure Very slight weakening of adhesive

CHANGES OF APPEARANCE AND STRUCTURE IN VARIOUS CHEMICALS

Also, though soaking labels in chemicals for two hours caused some changes, rubbing P-Touch labels with cloths soaked in those same chemicals had no effect on the tapes. This implies that even if chemicals are spilled on the P-Touch tapes, quick wiping should prevent damage. Here, Brother's laminated tape technology clearly protects the printed characters.



ETHYL ACETATE BATH RESULT



ETHYL ACETATE RUBBING RESULT

FADING RESISTANCE

Brother's laminated tapes of various background colours were attached to coated metal plates (similar to a car's surface), and placed in a fade-inducing chamber at 83°C. They were left for 100 hours to simulate a year in sunny surroundings. Afterwards, measurements of the change in reflective strength (ΔE) were taken, with results as shown:

Only yellow tape showed significant fading. The other background films, though yielding measurable ΔE s, were not overly affected to the eye. Ink remained basically unchanged, and all characters were still completely legible.

TAPES' BACKGROUNDS	FADE-O-METER		
	20 HOURS	50 HOURS	100 HOURS
CLEAR	0.09	0.06	0.28
WHITE	0.13	0.11	0.16
RED	0.30	0.46	0.74
BLUE	0.80	0.82	0.52
YELLOW	1.14	2.32	4.13
GREEN	0.32	0.29	0.91
GREY	0.52	0.71	1.09
BLACK	0.24	0.11	0.35

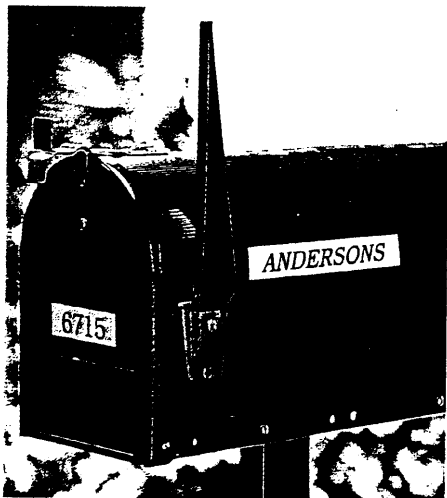
Next, tape samples were placed in a sunshine weather-o-meter at 63°C for 400 hours. They were subjected to not only heat and light, but also water, to simulate a year of outdoor conditions. Again, yellow tapes were the most affected, with these results:

TAPES' BACKGROUNDS	WEATHER-O-METER		
	100 HOURS	200 HOURS	400 HOURS
CLEAR	1.04	2.58	3.78
WHITE	2.15	1.90	3.54
RED	0.70	0.55	2.71
BLUE	1.50	2.00	4.57
YELLOW	3.00	4.80	6.27
GREEN	1.00	1.20	3.30
GREY	2.20	1.50	2.20
BLACK	0.70	1.30	2.30

SOME COMMONLY ASKED QUESTIONS

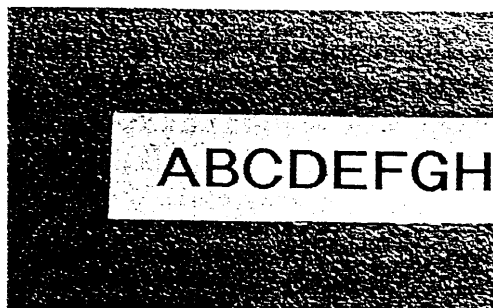
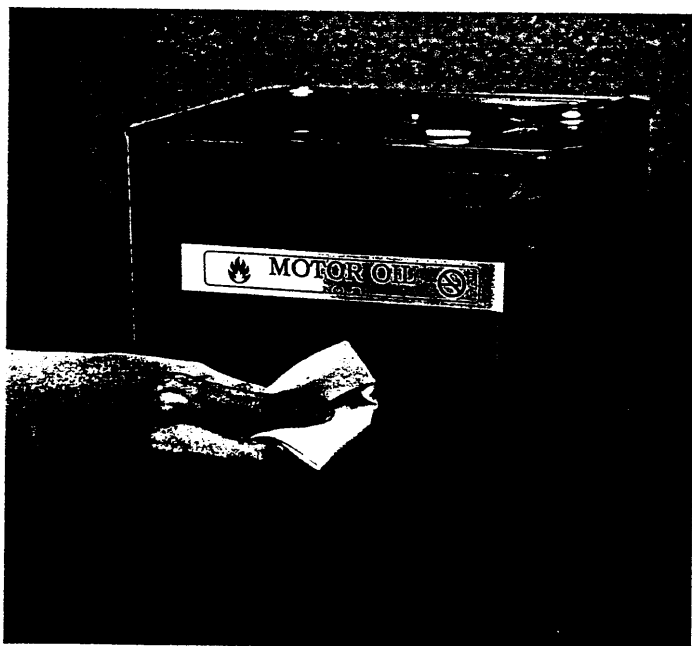
“Can I use these labels outside ?”

If the label is originally attached to a clean, dry surface, it will be able to stand even harsh environments without falling off. After prolonged exposure to the sun, some fading of tape or print colours may occur. Readability will not be affected.



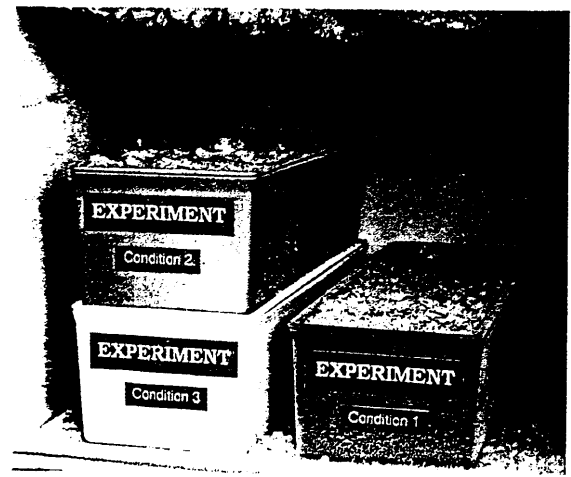
“What happens if water/motor oil/diluted acid gets on the labels ?”

Water presents no problems for the tape. Motor oil, diluted acid and other chemicals, in time, will weaken the tape's adhesive and/or laminate. If the spilled chemicals are wiped within a reasonable amount of time, the tapes will remain affixed, and will not be adversely affected.



NO DAMAGE TO BROTHER'S LAMINATED TAPE FROM SPILLED LACQUER

“Will the labels fall off if they are left in a refrigerator/freezer, or in a hot environment ?”



Even at extremely low temperatures, labels will remain adhered to most materials. Many customers already use P-Touch tapes in refrigerated environments for a variety of applications and are satisfied with the results. Domestic refrigerator/freezers reach low temperatures of approximately -20°C , while industrial models reach -30°C . During adhesion tests, even at -50°C , no adhesive strength problems, ink or tape changes were noted. High temperatures can even increase the labels' adhesion. After two hours in 200°C temperatures, tested labels did not fall off (though some discoloration may occur.)

“When I remove the label, will messy adhesive remain ? How can I remove it ?”

Tapes can be easily removed from most materials such as polyethylene, polypropylene, fluoric resin, silicon-process materials, etc. Unless subjected to extreme heat, humidity or certain chemicals, adhesive will not remain on the item's surface after removal. On some other materials, portions of adhesive might remain after extended periods of affixation. If this occurs, the adhesive can --in most cases -- be removed by rubbing with Ethanol.

“Does the label adversely affect the item to which it is attached ?”

P-Touch tapes are harmless for nearly all objects to which you might attach them. However, labels should not be affixed to copper, because corrosion is possible. This is especially true for copper plates of electrical circuits, whose components could be damaged.

TAPE DIRECTORY

PRINTS IN VARIOUS COLOURS



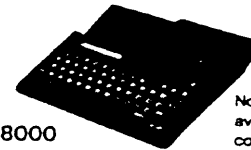
PT-5000/20

ON WHITE ADHESIVE



PT-3000/15

ON CLEAR ADHESIVE



PT-8000

ON BLACK ADHESIVE BLACK ON FLUORESCENT

Not all models are available in all countries.

Tape Width	ON WHITE ADHESIVE		
	BLACK	RED	BLUE
TX TAPE 24mm	TX-251	TX-252	TX-253
18mm	TX-241	TX-242	TX-243
12mm	TX-231	TX-232	TX-233
9mm	TX-221	---	---
6mm	TX-211	---	---
TC TAPE 12mm	TC-201	TC-202	TC-203
9mm	TC-291	TC-292	TC-293

Tape Width	ON CLEAR ADHESIVE				
	BLACK	RED	BLUE	GOLD	WHITE
TX TAPE 24mm	TX-151	TX-152	TX-153	---	---
18mm	TX-141	---	---	---	---
12mm	TX-131	TX-132	TX-133	---	---
9mm	---	---	---	---	---
6mm	---	---	---	---	---
TC TAPE 12mm	TC-101	TC-102	TC-103	TC-104	---
9mm	---	---	---	---	TC-195

Tape Width	ON BLACK ADHESIVE		BLACK ON FLUORESCENT		
	---	WHITE	---	YELLOW	GREEN
TX TAPE 24mm	TX-304	TX-355	TX-B51	TX-C51	TX-D51
18mm	---	TX-345	---	---	---
12mm	TX-334	TX-335	TX-B31	TX-C31	TX-D31
9mm	---	TX-325	---	---	---
6mm	---	TX-315	---	---	---
TC TAPE 12mm	TC-301	---	TC-B01	TC-C01	TC-D01
9mm	TC-391	TC-395	---	---	---

WHITE ON COLOURS

BLACK ON COLOURS

Tape Width	WHITE ON COLOURS				
	RED	BLUE	ORANGE	GREEN	GREY
TX TAPE 24mm	---	---	---	---	---
18mm	---	---	---	---	---
12mm	---	---	---	---	---
9mm	---	---	---	---	---
6mm	---	---	---	---	---
TC TAPE 12mm	---	---	---	---	---
9mm	TC-495	TC-595	TC-695	TC-795	TC-A95

Tape Width	BLACK ON COLOURS					
	---	BLUE	YELLOW	GREEN	GREY	---
TX TAPE 24mm	TX-451	TX-551	TX-651	TX-751	TX-A51	---
18mm	TX-441	TX-541	TX-641	TX-741	---	---
12mm	TX-431	TX-531	TX-631	TX-731	TX-A31	---
9mm	---	---	TX-621	---	---	---
6mm	---	---	TX-611	---	---	---
TC TAPE 12mm	TC-401	TC-501	TC-601	TC-701	---	---
9mm	TC-491	TC-591	TC-691	TC-791	---	TC-891 TC-991

ON MATT FINISH

IRON ON TRANSFER TAPE

ON INSTANT LETTERING TAPE

Tape Width	ON MATT FINISH		
	BLACK	RED	BLUE
TX TAPE 24mm	TX-M51	---	---
18mm	---	---	---
12mm	---	---	---
9mm	TX-M21	---	---
6mm	TX-M11	---	---
TC TAPE 12mm	---	---	---
9mm	TC-M91	TC-M92	TC-M93

Tape Width	IRON ON TRANSFER TAPE		
	BLACK	RED	BLUE
TX TAPE 24mm	---	---	---
18mm	---	---	---
12mm	---	---	---
9mm	---	---	---
6mm	---	---	---
TC TAPE 12mm	TC-Y01	TC-Y02	TC-Y03
9mm	---	---	---

Tape Width	ON INSTANT LETTERING TAPE		
	BLACK	RED	BLUE
TX TAPE 24mm	TX-051	---	---
18mm	---	---	---
12mm	TX-031	---	---
9mm	---	---	---
6mm	---	---	---
TC TAPE 12mm	TC-001	TC-002	TC-003
9mm	---	---	---

- ★ Actual tape colours may differ from the printed samples here.
- ★ Some kinds of tapes are not available in some countries.
- ★ Tape Width Variations:
 TX TAPE-24mm (1")
 18mm (3/4")
 12mm (1/2")
 9mm (3/8")
 6mm (1/4")
 TC TAPE-12mm (1/2")
 9mm (3/8")

All tests, with the exception of toxicity and skin irritation analyses, were performed by Brother Industries, Ltd. Though they were not performed by an independent research laboratory, their procedures conformed to Japanese Industrial Standards. Results published here could differ slightly from those conducted by different groups, under different circumstances.

As a service to our customers, Brother will provide Material Safety Data Sheets for its tapes upon request. For additional information on tapes, including available styles and pricing, please call Brother Customer Service Dept.

		PT350
		Jun-97
Hardware	Dimensions	178(W) x 205(D) x 60(H) mm
	Weight	700g (excl. batteries)
	Housing Design	Low Profile
	Housing Colour	B900
	Keyboard	QWERTY, QWERTZ, AZERTY
	Number of Keys	51
	Cutter	Manual
	Power	Dry Cell AA Batteries x 6 (inc.) / Op. AC Adapter
	LCD	12 Chrs x 2 Line
	Attachments	12mm Black on Clear, 6 x AA Batteries
	Print Head	180 dpi / 128 dot (available 98 dot)
	Print Speed	10mm / sec
	Tape Type	TZ
	Tape Width	6, 9, 12, 18, 24 mm
	Tape Feed	Yes
Software	Built-In Font	Helsinki, Brussels, Bermuda
	Title Font	San Diego, Florida, US, Belgium, Istanbul
	Characters and Symbols	216 (UK, FRA, BEL) / 256 (GER)
	Max Character Height	12.4mm
	Max Print Height	13.5mm
	Character Size (point)	Auto, 10, 13, 19, 26, 38 (Normal or Wide)
	Font Styles (8)	Normal, Outline, Shadow, Bold, Italic It +(Outline, Shadow, Bold)
	Multi-Line	4 Line -
	Label Length Set	Yes (Also 7 presets)
	Multi-Block	No
	Buffer	255 Characters
	Memory	2000 Characters
	Framing (15 kinds)	Square, Round, Background shadow, background cross, Background diagonal, Nameplate, Telephone, Dog, Cat, Hands, Candy, Banner, Aeroplane, Vine, Flower
	Barcode	CODE39, CODE128, EAN8, EAN13, EAN128, CODABAR, I 2/5, UPC-E, UPC-A
	Copy Printing	Yes (1-9)
	Delete	BackSpace, Line Out, All Clear
	Underline	Underline, Strike out
	Tape Margin	Full, Large, Middle, Small, None
	Text Alignment	Horizontal, Left, Centre, Right, Justify
	Fill Pattern	(Use "background" options in frame function)
	Mirror Printing	Yes
	Text Insert	Insert
	Vertical Printing	Yes
	Numbering	Yes (1-99)
	Split Printing	No
	Stamp Format	Yes (Hidden Function)
	Calendar Printing	Yes
Auto Power Off	Yes	
Multi Colour Software	Semi-Automatic	

957513

		PT220
	Target Production Date	Jul-97
Hardware	Dimensions	109(W) x 190(D) x 68(H) mm
	Weight	570g (excl. batteries)
	Housing Design	Large Handy
	Housing Colour	B900 (With light grey middle)
	Keyboard	QWERTY, QWERTZ, AZERTY
	Number of Keys	52
	Cutter	Manual
	Power	Dry Cell LR66 Batteries x 6 (inc.) / Op. AC Adapter
	LCD	12 Chrs x 2 Line
	Attachments	12mm Black on Clear, 6 x LR66 Batteries
	Print Head	180 dpi / 128 dot
	Print Speed	10mm / sec
	Tape Type	TZ
	Tape Width	6, 9, 12, 18 mm
	Tape Feed	Yes
	Software	Built-In Font
Title Font		No
Characters and Symbols		175?? (UK, FRA, BEL) / 187 (GER)
Max Character Height		12.4mm
Max Print Height		13.5mm
Character Size (dots)		24, 32, 48, 56, 88 +BIG
Font Styles (8)		Normal, Outline, Shadow, Bold, Italic It+(Outline, Shadow, Bold)
Multi-Line		4 Line
Label Length Set		Yes
Multi-Block		No
Buffer		99 Characters
Memory		300 Characters
Framing (15 kinds)		Rectangle, Ribbon, Nameplate, Vine
Barcode		CODE39, EAN8, EAN13, CODEBAR, I 2/5, UPC E, UPC-A
Delete		BackSpace, Line Out ?, All Clear
Underline		Underline
Tape Margin		Full, Middle, Small, None
Text Alignment		No
Fill Pattern		No
Mirror Printing		Yes
Text Insert		Insert
Vertical Printing		Yes
Numbering		Yes (1-9)
Split Printing	No	
Auto Power Off	Yes	
Multi Colour Software	Semi-Automatic	

STAMP KIT ACCESSORIES
FOR P-TOUCH LABEL PRINTERS

<u>Model</u>	<u>Description</u>	<u>Can be used with</u>
SKLB	24mm Large Stamp Kit Contains Stamp Holder - Black Ink Pad-Stencil Film	PT-350 Only Automatic
SKMB	18mm Medium Stamp Kit Contains Stamp Holder - Black Ink Pad-Stencil Film	PT-350 Automatic PT-220 Manual PT-540C Manual
SHLB	24mm Large Stamp Holder and Black Ink Pad	PT-350 Automatic only
SHMB	18mm Medium Stamp Holder and Black Ink Pak	PT-350 Automatic PT-220 Manual PT-540C Manual

Automatic: Set-up for use of the Stamp Kit is automatic on PT-350

Manual : Requires manual set-up from special instructions supplied with all Stamp Kits when used with PT-220, PT-340, PT-340C & PT-540.