

TECHNICAL INFORMATION - Calibration Label Kit

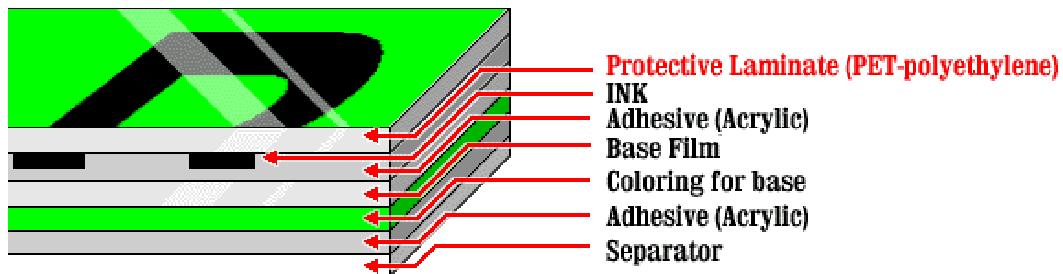
The Calibration Label Kit includes a dedicated label printer that allows GAGetrak to generate low-cost, highly durable calibration labels. The printer attaches to your PC's serial port so it won't interfere with your existing printer.

The labels are automatically cut-to-length and ejected out of the printer. Peel-an-stick labels allow for easy application to your Gauges, check-fixtures, measuring equipment, storage bins and laboratory equipment. The 50-foot label cartridges are available in a variety of colors and sizes and the label are laminated to withstand abrasion, oil, moisture and temperature extremes.

The kit also includes label design software, fonts, clipart and barcodes which allows it to be used for many other quality control and production labeling applications.

CALIBRATION LABEL TAPE STRUCTURE

The laminated calibration tapes 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 printed characters (and bar codes) are virtually indestructible.



CUT-TO-SIZE

The built-in cutter mechanism allows the labels to be cut-to-size and are automatically ejected out of the printer.

LAMINATION

The top lamination layer protects the ink from the sort of hazards which abound in industrial environments: abrasion, chemicals, oil and water.

ABRASION RESISTANCE

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

DIELECTRIC STRENGTH

In electrical tests, white 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 color variations will have a similar resistance. However, the tapes are not designed to be used as electrical insulation it is

recommended that they not be used as such. It is important to note that tapes with "metallic" (gold, silver) backgrounds or characters contain aluminum, and that tapes with black backgrounds contain carbon, and therefore have lower dielectric strength than the standard color styles.

HEAT RESISTANCE

The 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 degrees increase per minute.

Decomposition of the tapes did not begin until the temperature reached 365 degrees. 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 degrees.

ADHESIVE STRENGTH

The tape's adhesive strength has been tested 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, the 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

Tapes attached to stainless steel slightly roughened with abrasive paper were heated and cooled. After two hours in (-50) degrees, a force of 710gf was required to remove the tape. No change in tape or adhesive color had occurred.

Heating, on the other hand, actually increased the tapes' adhesive strength, due to slight softening and spreading of adhesive. (After two hours in +200 degrees though, the tape's white backing and adhesive had slightly discolored.)

ADHESIVE STRENGTH (gf/12mm)

- 50 deg x2 HOURS 710

+200 deg x2 HOURS 1100

ADHESION IN HIGH TEMPERATURE & HIGH HUMIDITY

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

ADHESIVE STRENGTH (gf/12mm)

40 degree DISTILLED WATER x24 HOURS 1440

40 degree 5% SALT WATER x24 HOURS 1560

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 65degrees and 80% humidity, some label 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.

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 tapes' adhesion strengths.

ADHESIVE STRENGTH
(gf/12mm)

SPECULAR GLOSS STAINLESS STEEL 560

STAINLESS STEEL RUBBED WITH A.P. 780
#280

STAINLESS STEEL RUBBED WITH A.P. 750
#240

STAINLESS STEEL RUBBED WITH A.P. 710
#180

STAINLESS STEEL RUBBED WITH A.P. 730
#120

STAINLESS STEEL RUBBED WITH A.P. 660
80

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

CHEMICALS & WATER

Tapes, attached to glass, were bathed in a variety of materials for two hours. Despite some changes in appearance and structure, all tapes remained affixed to their slides. The tested laminated tapes fared remarkably well.

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

Findings:

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: Slight 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

FADING RESISTANCE

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

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

TAPES' FADE-O-METER

BACKGROUNDS 20 HOURS 50 HOURS 100 HOURS

CLEAR 0.09 0.06 0.26

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 0.29

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 degrees 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' FADE-O-METER

BACKGROUNDS 100 HOURS, 200 HOURS, 300 HOURS

CLEAR 1.94 2.58 3.76

WHITE 1.13 1.99 3.54

RED 0.79 1.58 2.47

BLUE 1.56 2.08 4.37

YELLOW 3.02 4.82 6.27

GREEN 1.09 1.52 3.32

GREY 1.24 1.54 2.28

BLACK 0.70 1.35 2.58

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 colors 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.

"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 adhesive to most materials. Many customers already use the label tapes in refrigerated environments for a variety of applications and are satisfied with the results. Domestic refrigerator/freezers reach low temperatures of approximately -20 degrees, while industrial models reach -30 degrees. During adhesion tests, even at -50 degrees, no adhesive strength problems, ink or tape changes were noted. High temperatures can even increase the labels' adhesion. After two hours in 200 degree 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, fluoroc 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?"

The 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