

THERMSCALE TEMPERATURE MEASURING PAPER

Thermscale overview

This will introduce you to *Thermscale* paper, a temperature (and indirectly pressure) sensitive paper which can be of great help to you in the operation of your heat sealing and processing equipment. Generally speaking, even if *Thermscale's* main applications are related to thermal sealing process as also for packaging (e.g. blister, etc.), *Thermscale* could be also useful indeed for any further application where a thermal "topographical map" (in terms of local temperature distribution revealed), is required. It is economical, so that it can be used on a routine basis to reduce your packaging waste and improve your package quality. The paper is used to check the sealing heads of your packaging equipment so that you may determine if there is even die pressure and sufficient heat for consistent seals. This can be accomplished without breaking the web and interrupting production, and with a minimum loss of time and material. The paper produces a sharp, visual, permanent picture of the seal being produced, under production conditions.

The paper is quite sensitive. It will not respond unless there is sufficient heat, but then the response is very fast (less than 0.1 second) and the picture of the seal is very crisp and sharp. The impression as per side figure on the right shows how the paper responds to the perforated sole plate of a very familiar steam iron. The white spots are the steam holes where there was no pressure applied to the paper. Note the sharp edges of the holes. A cut or nick in a sealing die will show up in the same manner, and if a sealing die is misaligned, the area of lesser pressure will not be as dark as the rest of the impression. You know where, and how well the die is sealing by the picture offered by *Thermscale* paper.



If sealing, drying, odour, or adhesion troubles develop, the paper is invaluable. The operator can determine immediately if the heat-pressure requirements of the operation are adequate without shutting down the machine for a pyrometer check. He can determine if it is the packaging material or the machine that is at fault. If it is the sealing head that is at fault, the paper can be used to check the effect of the corrective adjustments as they are made. The paper provides a check on the entire seal area while a pyrometer checks only the temperature of the spot where it is placed. Having a pack of paper at each station where it is to be used will produce the greatest saving in time and machine waste. To be used most efficiently, it must be readily available. *Product Development* people and *Trouble Shooters* can carry the paper with them. Leaving some paper with a customer may save a trouble call by permitting the customer to determine for himself if it is the sealing head or the packaging material that is producing poor seals.

Thermscale temperature range

The *Thermscale* has a temperature response of 93 °C to 149 °C (200 °F to 300 °F). At the lower temperatures of the range the paper turns a light blue; the colour then increases in intensity as the temperature increases, up to the maximum of the range. *Thermscale* is clean, easy to use, and is provided in packs of convenient sizes so it can be kept on hand at the machines where and when it is needed. The 93 °C to 149 °C paper is designed for below normal heat sealing operations and this instruction sheet suggests methods of using the paper to obtain the best results. For the most effective results, place the paper between the two surfaces which are to be sealed together. For lower temperature applications, a non standard *Thermscale* paper version is available (only with smallest format), with temperature range from 71 °C to 105 °C (160 °F to 220 °F). Please contact us for any further detail. Below a table with most common material to be sealed, with their minimum heat seal temperature:

Normal minimum heat seal temperature		
MATERIAL	°C	°F
ethylene vinyl acetate copolymer (18%)	77	170
ethylene vinyl acetate copolymer (12%)	93	200
ionomer (<i>Surlyn</i>)	104	220
low density polyethylene	118	245
high density polyethylene	141	285
Polypropylene	177	350

Thermscale availability and format

Standard *Thermscale* paper is available in a single format (320 x 520 mm approx.). Larger areas are easily covered by overlapping the paper. Smaller areas could be accommodated simply by a scissor. Each standard package have 25 sheets. The low cost of the paper permits it to be used on a routine basis, such as once a shift, or in a drying operation once a finished roll. This assures you, the operator, and quality control, that the equipment is performing properly. The more you use the paper, the more you will realize the savings in time and waste it can provide. If you are interested in larger sizes or rolls, call or write with your specific requests and cost and details could be provided.

Method of use of *ThermScale* paper

ThermScale paper is a temperature pressure sensitive paper that shows a crisp, clean picture of the entire seal area. The paper turns a light blue colour at the low end of the temperature range and develops the maximum colour at the high end of the temperature range. However, it will not change unless there is sufficient contact pressure, so the impressed paper picture shows both temperature and indirectly pressure variations in the seal. Cut *ThermScale* paper into required shape and size.

Larger areas could be accommodated by simply paper overlapping. Please bear in mind that *ThermScale* have more temperature sensitive side, and this could be identified as the reverse side, in respect to the printed one, where:

MACHINE:

DATE:

TIME:

OPERATOR:

test record fields are impressed. If you are cutting a single piece, missing the printed record fields area, please consider that the more shiny and bright side is the sensitive one. It appear like a pre-glued paper (e.g. as card stamp back side). For best results place the paper between the surfaces being sealed. It is not necessary to break the web; tape the paper to the web passing through the machine. The material being sealed will insulate and cushion the *ThermScale* paper from the heat source just as the actual seal is insulated.

A misaligned, nicked, or dirty die will dramatically reduce the heat or pressure and this area will show up as a white spot, or a lighter coloured area in the seal. If the material being sealed, seals to the paper so that the colour cannot be observed in the heat seal area, fold the paper over on itself and it will break apart at the paper/paper interface. By mentioned basic directions, you should be able to meet any of your application. In any case, please consider also the below described specific applications, as they are probably the more often meets application for *ThermScale* paper, and may be they can be close or similar to yours.

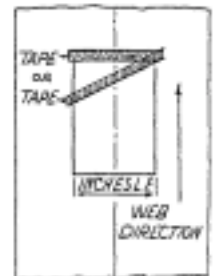
ThermScale application: vertical form and fill machines



Cut the *ThermScale* paper into required shape and size. To check the back seam seal of a vertical form and fill machine, feed a 2" or 3" wide strip of *ThermScale* paper into the back seam, between the two layers of film, while the machine is running. To check the horizontal seams, tape a sheet of *ThermScale* paper to the forming web. Centre the paper between the edges of the web. If the *ThermScale* paper is wider than the "lay flat inches" of the final package there will be two thicknesses of *ThermScale* paper in the ends of the seal. If this causes a problem, cut the *ThermScale* paper to the lay flat width of the final package. *ThermScale* paper should be taped all the way across the leading edge. If it jams going between the forming collar and the fill tube, cut the paper at an angle as is done when threading the machine. Position the paper down the web by using the eye spot of the design. If there is no eye spot, use an idler as a "bench mark" to measure where the paper should be placed, to have it in the horizontal seal area.

ThermScale application: vacuum and flat web machines

To check these machines, cut *ThermScale* paper into required shape and size, and then tape *ThermScale* paper to the formed web, or one of the flat webs just before the top web, or the second web is sealed. The purpose is to get the paper between the surfaces being sealed. The sheets can be overlapped if they are too small to cover the entire seal area. Fasten down the leading edges with small pieces of tape and run the paper through the machine so that the second web is sealed to the *ThermScale* paper. If the *ThermScale* paper is run through the knives, the alignment of the knives and the seals can be checked.



ThermScale's troubleshooting

ThermScale paper responds very quickly, 0.1 second or less, depending upon heat and pressure. Since *ThermScale* technology is very simple, if it does not change colour, one or may be more of the following are the sole possible causes:

1. the temperature of the paper is less than the minimum sensitive temperature of *ThermScale*;
2. there is insufficient pressure to transfer the heat from the heat source to the paper;
3. there was insufficient time for the heat to soak through the materials being sealed.

Precautions on use and storage

Preferably do not perform intense bends and do not rub *ThermScale* before use. Where possible wipe the surfaces to be measured before use. Water or oil, if present on coated surface of paper, can affect proper colour development. *ThermScale* paper is not reusable. Preferably avoid paper exposure to sunlight or in location close to fire or excessive heating. During storage avoid paper contact with any other sensitive or chemical paper, *Diazo* copying paper, solvents, water, oil or other chemicals, or adhesive tapes, rubber products or inside documents subjected to any marking pen writing on them.

Spare can also offer you Fuji Prescale film, the sole pressure sensitive film, producing an immediate and permanent high resolution "topographical map", in terms of local pressure magnitude and distribution, developed between any two contact surfaces. Please contact our sales department for any further detail. Spare can also offer you several further diagnosis tools and instrumentation. Please submit us your application details as we will check for the more cost effective solution.



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