GUIDE TO REPEATABLE FLAG LABELLING AND SELF-LAMINATED LABELLING

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1. INTRODUCTION

The aim of this document is to:

- Provide a basic guide on how to reliably and reproducibly apply a label onto wire/cable/bundle (medium) in a flag label or self-laminated label orientation.
- Demonstrate how to have a uniform flag/overlap with minimised exposed adhesive.
- Document fail conditions.

This document is not intended as a complete guide to TE Connectivity (TE) products or printing systems.

The procedures outlined in this document are not infallible and TE does not guarantee 100% success from following the procedures as described.

Knowledge pertaining to label handling is assumed.

2. FLAG LABEL FUNDAMENTALS

To achieve optimum service conditions when applying a label in a flag configuration with the aim to maximise the adhesive contact area between label and medium; there are key points that must be adhered to:

- Label must be perpendicular to medium (at right angle [90℉]).
- Medium must be centrally aligned to label.
  - Label top & bottom edges must be equidistance from medium.
- Medium must have NO deformation.
  - Curve or twist of medium will reduce adhesive contact area and increase area where fluid ingress can occur.
- Label length = (flag length[1] * 2) + (diameter of medium * π).
- Contact by pollutants (skin or other surfaces not intended for contact by label) on adhesive layer must be kept to a minimum.
- Intended contact areas of medium must be free of dust, chemical or other inhibitors that will affect adhesion.
- Post flag, exposed adhesive should be kept to a minimum.
- All product should be stored in its original packaging, including any plastic covers which were included during shipping. Stored out of direct sunlight in a clean, dry, dust free, environment. Product should not be stored outside of the designed storage temperature, which is -10℃ (14℉) to 40℃ (104℉) in most cases. Consult TE datasheet for specific details relating to the label type being used.

[1] Flag length is dependent on the amount of data the user wants to put on the flag and the adhesive strength of the label. Based upon a single letter on the flag of font size 10pt, this equates to 10/72 inch (3.53mm) in height. The glyph for the letter would approximate to 6mm. To this should be added a recommended 1mm buffer around the text to ensure no loss of data if printing near to the label edge; this would give a best estimation of 8mm for a minimum flag length.

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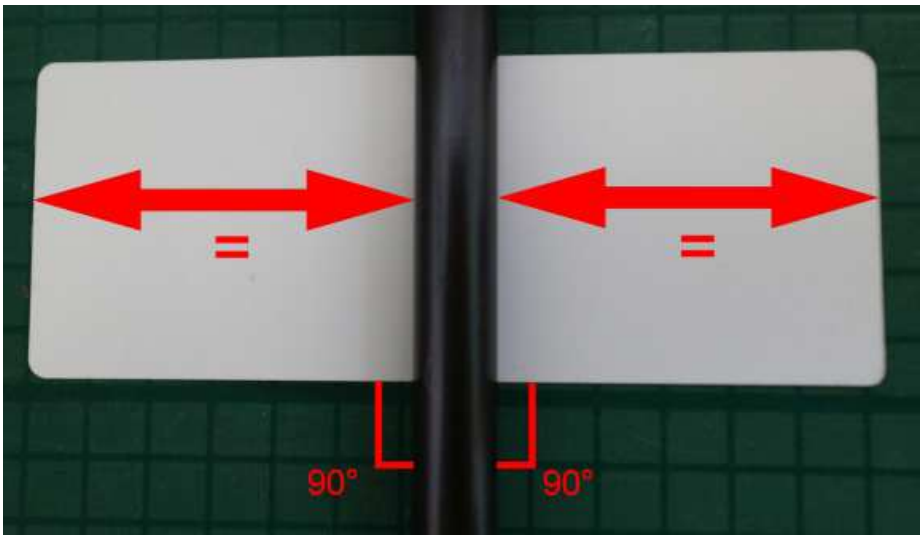

Figure 1 - Label perpendicular and equidistant from medium

2.1. Flag Label

With the label perpendicular to the medium and label edges equidistant from the medium, apply pressure to the label adhered to the medium and progressively wrap the label around the medium ensuring maximum contact to the medium.

Figure 2 - Label adhered to medium

Maintaining the equidistant position of the label continue applying pressure to the label until the adhesive faces of the labels contact and bond to form the flag.

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Apply pressure to the flag faces to ensure:

- bond of label adhesive
- Maximise contact area to medium.
- Minimise area where potential fluid ingress may occur.

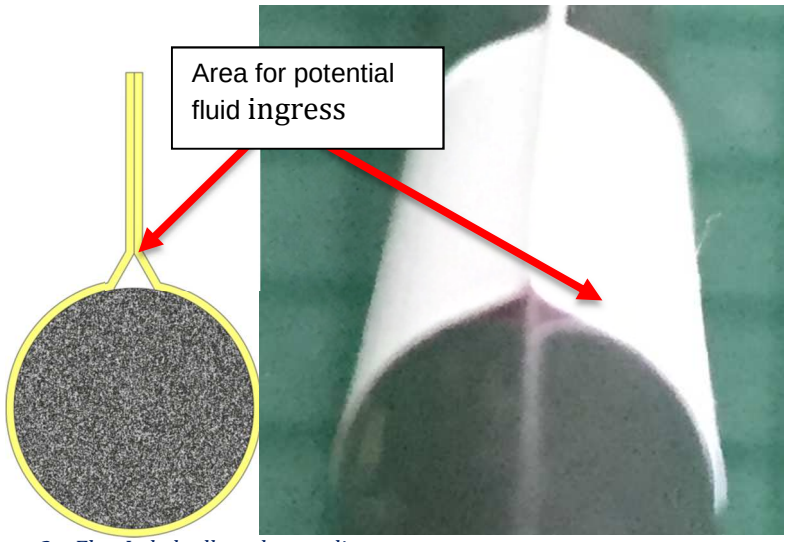

Figure 3 – Flag Label adhered to medium

2.2. Pre-perforated/back-slit Labels

If the label employed for flag labelling is pre-perforated/back-slit, before removing the release liner pre-weaken the perforation by bending label & liner along the crease line[2].

Figure 4 – Pre-slit label product

Ensure the split is completely separated across the length of the split and remove one half of the release liner.

[2] Do not try and tear the release liner as this may result in the label product being stressed or torn.

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Figure 5 – Remove ½ the Liner

Use the remaining release liner as a guide to apply the label to the medium ensuring the label is perpendicular to the medium.

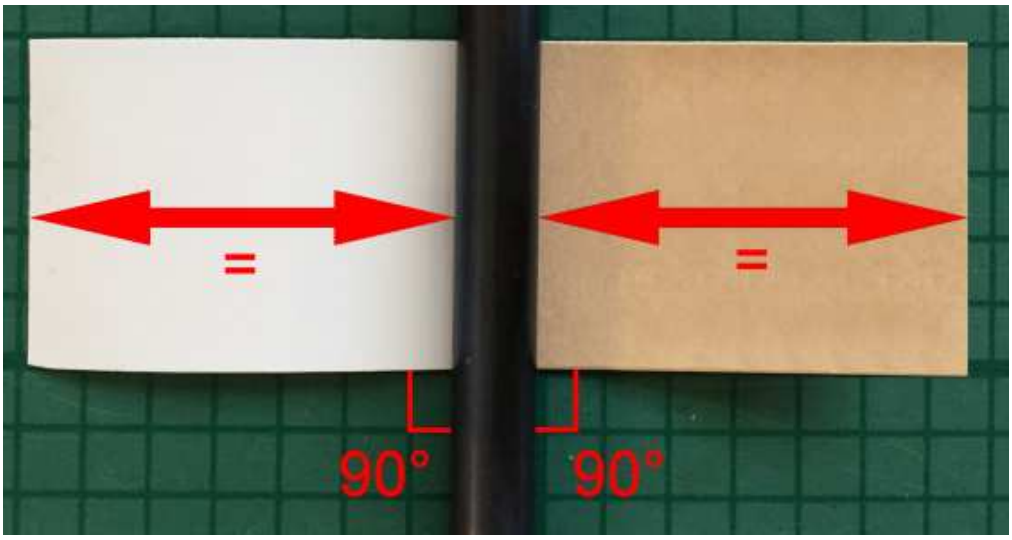

Figure 6 – Label perpendicular, ½ Release still fitted

Remove the remaining release liner and apply pressure to the label adhered to the medium and progressively wrap the label around the medium ensuring maximum contact to the medium.

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3. FLAG LABEL FAIL CONDITIONS

3.1. Label NOT Perpendicular

If the label is NOT perpendicular to the medium

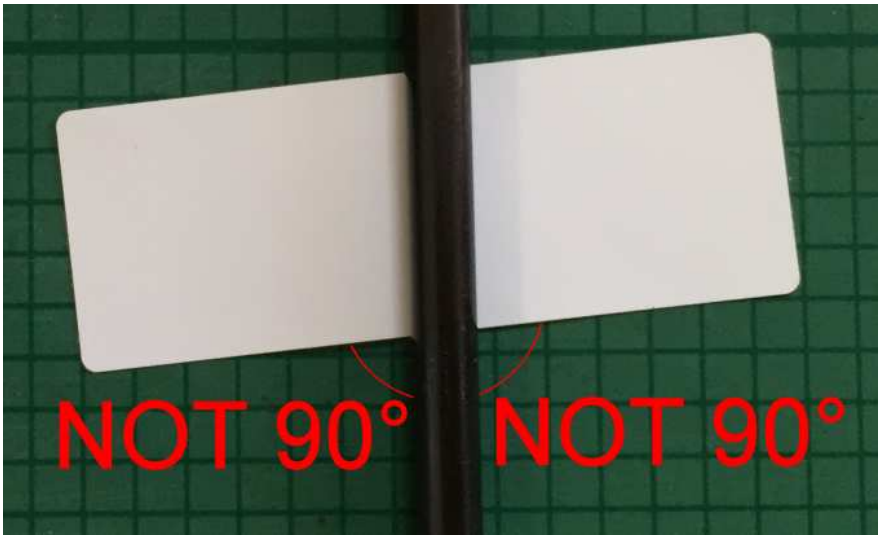

Figure 7 - Label NOT perpendicular to medium

The resulting flag will be misaligned and adhesive surface exposed.

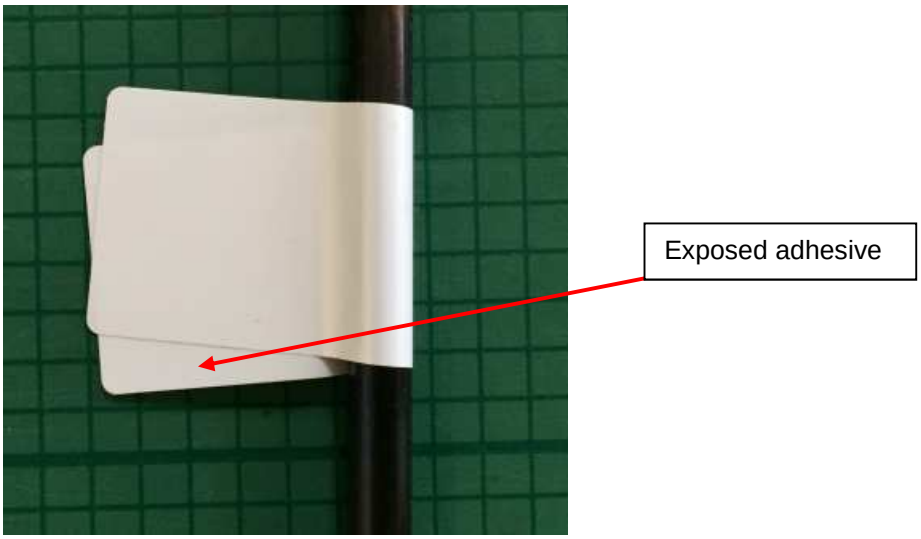

Figure 8 – Misaligned flag - label NOT perpendicular to medium

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3.2. Label NOT Equidistant

If the label is NOT equidistant to the medium

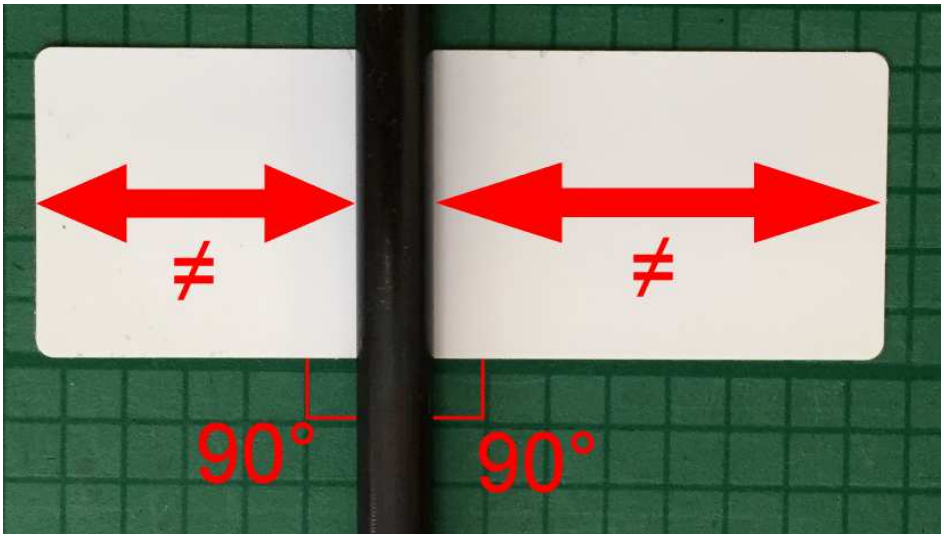

Figure 9 - Label NOT equidistant to medium

The resulting flag will be misaligned with adhesive surface exposed.

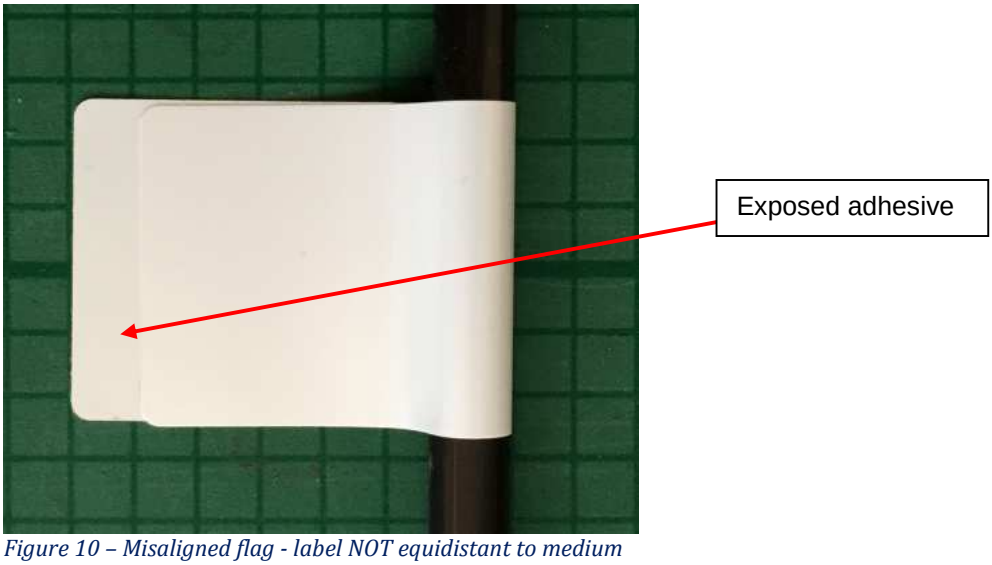

Figure 10 – Misaligned flag - label NOT equidistant to medium

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3.3. Curved Medium

If the medium is curved, then contact from the label will be reduced and the area for potential fluid ingress will be increased.

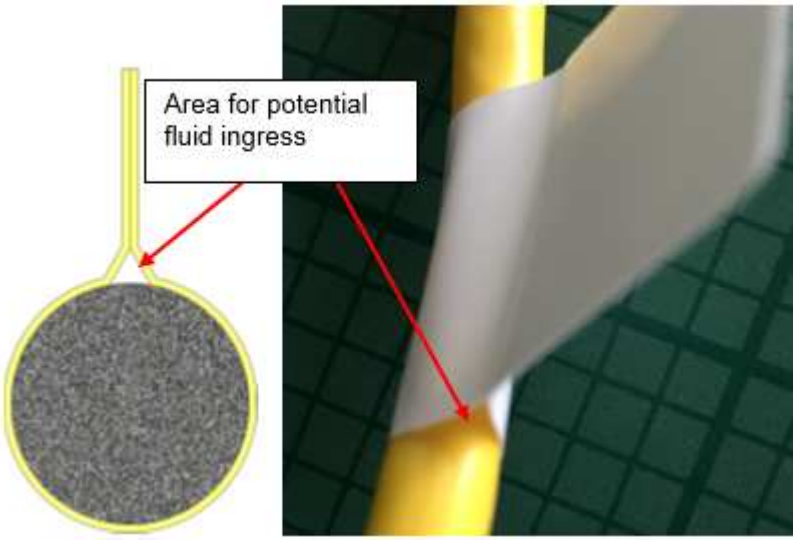

Figure 11 – Flag applied to curved medium

3.4. Flag Label Wrinkled

A user induced fault/wrinkle can occur if whilst creating the flag the user tries to compensate for the label not being perpendicular or equidistant on the medium.

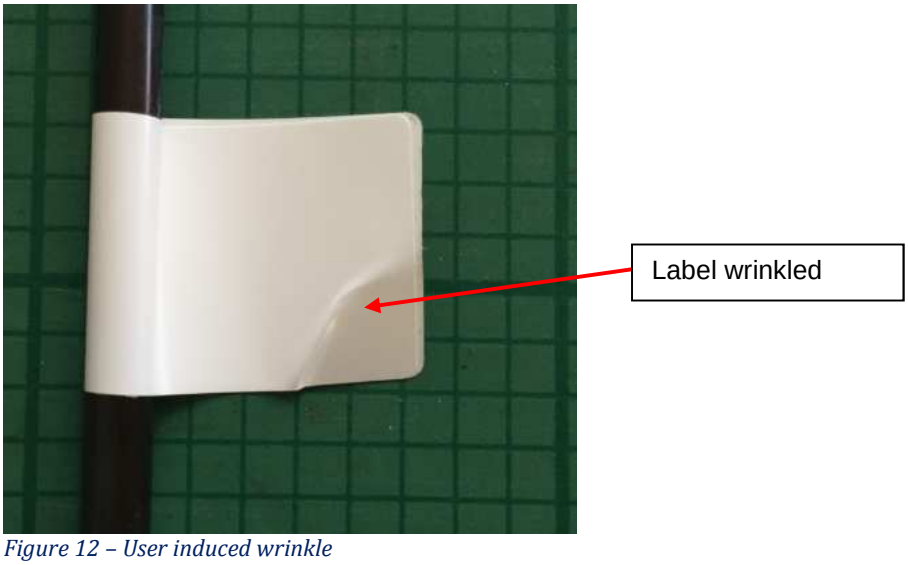

Figure 12 – User induced wrinkle

3.5. Label/Medium Contamination

The following instances are occasions where the label flag may be compromised and fail:

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- If the user overly touches the adhesive surface of the label it is probable that the adhesive properties of the label will be reduced.
- If the adhesive surface of the label comes in contact with dust or fluids the adhesive properties of the label will be reduced.
- If the surface area of the medium intended for flag labelling is contaminated by dust or fluids the adhesive properties of the label will be reduced.

3.6. Pre-split Label Tear

If using pre-perforated / pre-split label products when removing ½ of the release liner DO NOT try and tear along the crease line as this may result in the label surface stretching or tearing.

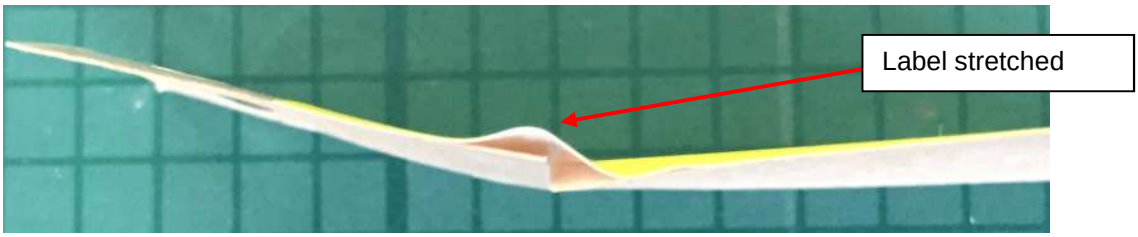

Figure 13 – User induced damage

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4. SELF LAMINATED LABEL FUNDAMENTALS

To achieve optimum service conditions when applying a self-laminated label (with the aim to maximise the adhesive contact area between label and medium), there are key points that must be adhered to:

- Label must be perpendicular to medium (at right angle [90℉]).
- Medium must have NO deformation.
    - Curve or twist of medium will reduce adhesive contact area and increase area where fluid ingress can occur.
- Recommended Maximum Label length[3] = *(diameter of medium * π) x 2*.
- Recommended Minimum Label Length = *(diameter of medium * π) + Label Printable area height*[4]
- Contact by pollutants (skin or other surfaces not intended for contact by label) on adhesive layer must be kept to a minimum.
- Intended contact areas of medium must be free of dust, chemical or other inhibitors that will affect adhesion.
- Post application, exposed adhesive should be kept to a minimum.
- All product should be stored in its original packaging, including any plastic covers which were included during shipping. Stored out of direct sunlight in a clean, dry, dust free, environment. Product should not be stored outside of the designed storage temperature, which is -10℃ (14℉) to 40℃ (104℉) in most cases. Consult TE datasheet for specific details relating to the label type being used.

[3] Optimum label length is where the over-laminate covers all the printed area and wraps once around.

[4] If *Label Printable Area height* is greater than *diameter of medium* * π then there is a probability that the printed mark will be obscured. The formula: *Label Printable area height/π* will give a recommended minimum diameter for the medium being applied to.

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4.1. Recommended Label Length

The ratio of label length to diameter of medium is paramount to having a suitable over-laminate length. If the diameter is too great, then the over-laminate may not cover the printable area and may lead to deterioration of the printed mark. If the label length is too long, then the over-laminate may excessively cover the printable area multiple times which may lead to the printed mark being illegible.

For example: label product SBP/SP/PVF 100143 has a label height of 36.5mm (1.44 inch) and a printable area of 12.7mm (0.5 inch).

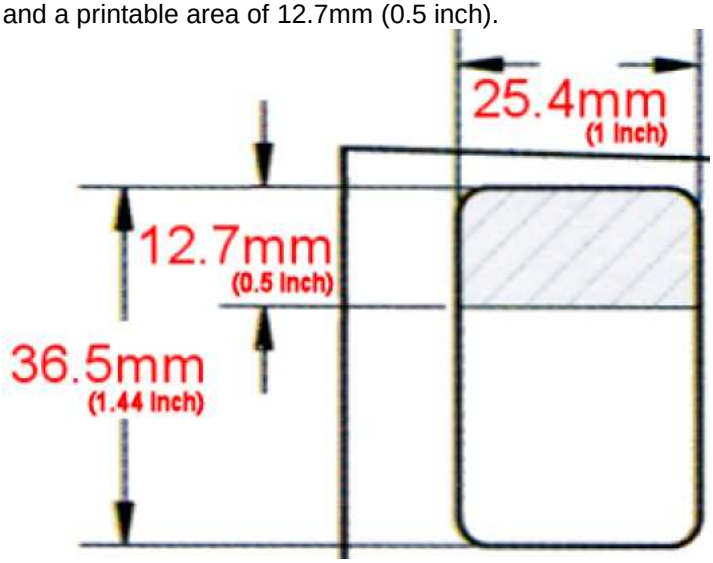

Figure 14 – SBP/SP/PVF 100143

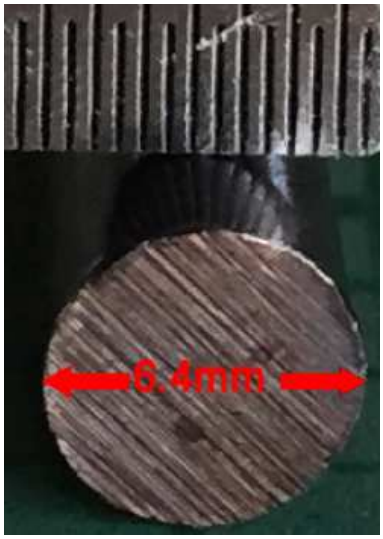

Figure 15 - Medium for over-laminate

If the medium to be applied to has a diameter of 6.4mm then the recommended maximum label length is:

- (6.4 * 3.14) * 2 = 40.21mm[5]

The minimum recommended label length is:
(6.4 * 3.14) + 12.7 = 32.81mm[6]

If the formula *Label Printable area height/π* is used, then a 4.04mm diameter medium can be employed with this label height but if used the label will cover the circumference 2.87 times

The label length of SBP/SP/PVF 100143 is 36.5mm; this is between maximum and minimum recommended lengths and therefore an ideal label to wrap around/over-laminate for this medium.

[5] (0.25″ * 3.14) * 2 = 1.58 inch
[6] (0.25″ * 3.14) + 0.5″ = 1.28 inch

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4.2. Self-Laminated Label

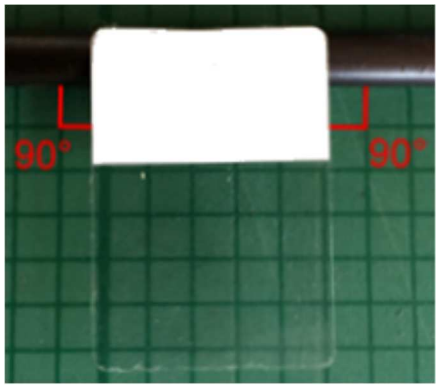

Figure 16 - Label perpendicular to medium

With the label perpendicular to the medium, apply pressure to the printed part of the label in order for it to adhere to the medium. Where possible try and avoid contaminating the adhesive surface as this will degrade the label adhesion.

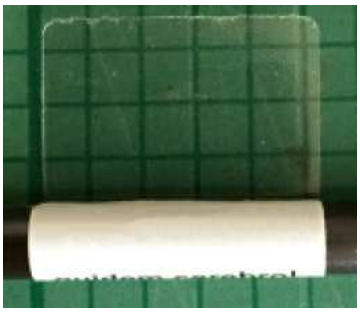

Figure 17 - Wrap label around medium

If possible, rotate the medium whilst keeping constant pressure on the label.

If not possible progressively wrap the label around the medium maintaining even pressure in order to maximise contact to the medium.

Apply pressure to the label to ensure:

- bond of label adhesive
- Maximise contact area to medium.
- Minimise area where potential fluid ingress may occur.

Figure 18 - Over-laminate covers all printable area

If the recommended maximum/minimum length is adhered to then the over-laminate will cover the printed area once to give optimum protection against contaminants.

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5. SELF LAMINATED LABEL FAIL CONDITIONS

5.1. Label NOT Perpendicular

If the label is NOT perpendicular to the medium

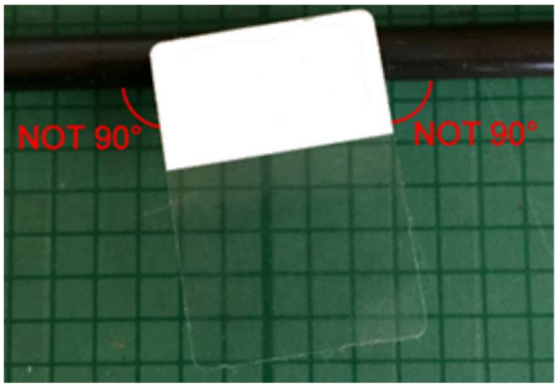

Figure 19 - Label NOT perpendicular to medium

The resulting self-laminated label will be misaligned and printed surface exposed.

Figure 20 - Exposed printed surface

5.2. Length BELOW Minimum Recommended

If the label length is too short for the medium diameter the resulting self-laminated label will have insufficient protection from the over laminate.

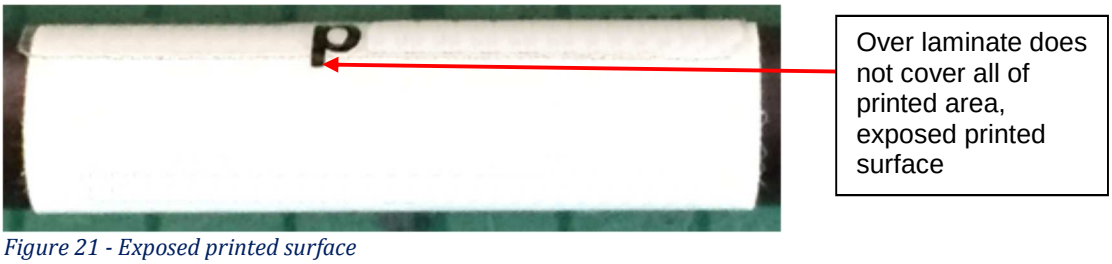

Figure 21 - Exposed printed surface

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5.3. Length ABOVE Maximum Recommended

If the label length is too long for the medium diameter the resulting self-laminated label has the potential to obscure the printable area.

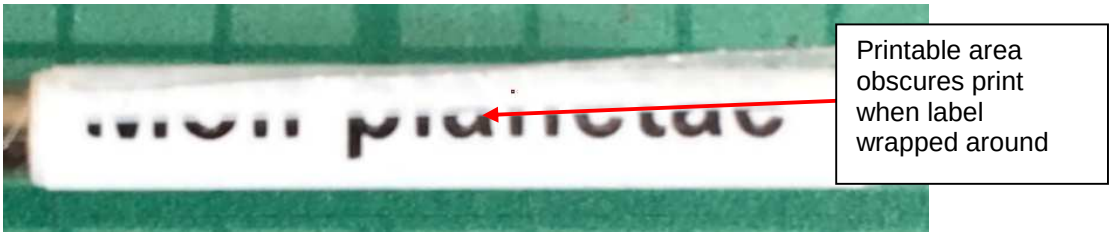

Figure 22 - Printed mark obscured

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6. FLAG LABELLED SELF LAMINATED LABEL FUNDAMENTALS

To achieve optimum service conditions when applying flag labelling a self-laminated label (with the aim to maximise the adhesive contact area between label and medium), there are key points that must be adhered to:

- Label must be perpendicular to medium (at right angle [90℉]).
- Medium must have NO deformation.
    - Curve or twist of medium will reduce adhesive contact area and increase area where fluid ingress can occur.
- Recommended Label length[7] = *(diameter of medium * π) + (Label Printable area height x 3)*.
- Contact by pollutants (skin or other surfaces not intended for contact by label) on adhesive layer must be kept to a minimum.
- Intended contact areas of medium must be free of dust, chemical or other inhibitors that will affect adhesion.
- Post application, exposed adhesive should be kept to a minimum.
- All product should be stored in its original packaging, including any plastic covers which were included during shipping. Stored out of direct sunlight in a clean, dry, dust free, environment. Product should not be stored outside of the designed storage temperature, which is -10℃ (14℉) to 40℃ (104℉) in most cases. Consult TE datasheet for specific details relating to the label type being used.

[7] Optimum label length is where the over-laminate covers all the flagged printed area.

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6.1. Recommended Label Length

The ratio of label length to diameter of medium is paramount to having a suitable over-laminate flag. If the diameter is too great; then the over-laminate flag may not cover the printable area and may lead to deterioration of the printed mark.

The label length must equal:

- *(diameter of medium * π) + (Label Printable area height x 3)*

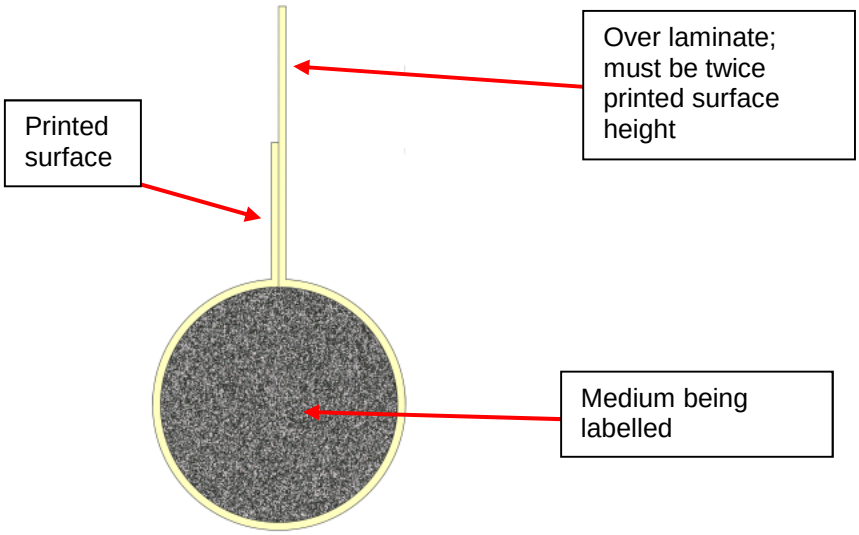

Figure 23 - Label Length

For example; if the medium has a diameter of 6.4mm (0.25 inch) and the printable area was 12.7mm (0.5 inch), the recommended label length would be:

- (6.4 * 3.14) + (12.7 * 3) = 58.2mm[8]

[8] (0.25″ * 3.14) + (0.5″ * 3) = 2.29 inch

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6.2. Flagged Self-Laminated Label

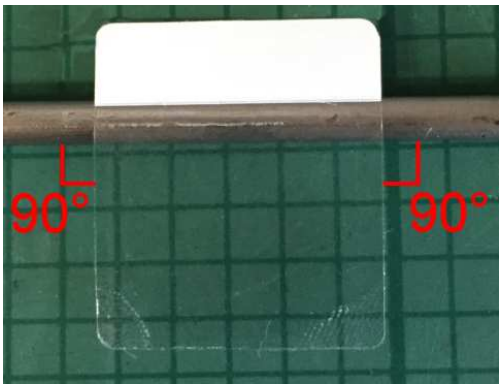

Figure 24 - Label perpendicular to medium

With the label perpendicular to the medium, align the bottom of the printable area to the medium and apply pressure for it to adhere to the medium. Where possible try and avoid contaminating the adhesive surface as this will degrade the label adhesion.

Figure 25 - Wrap label around medium

Apply pressure to the over laminate and progressively wrap around the medium maintaining even pressure until the adhesive faces of the labels contact and bond to form the flag.

Apply pressure to the label to ensure:

- bond of label adhesive
- Maximise contact area to medium.
- Minimise area where potential fluid ingress may occur.

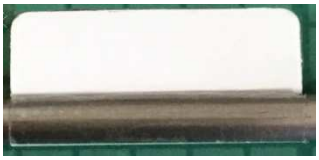

Figure 26 – Self Laminated Flag

Fold the over laminate over the exposed printed surface to give optimum protection against contaminants.

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7. SELF LAMINATED FLAG FAIL CONDITIONS

7.1. Label NOT Perpendicular

If the label is NOT perpendicular to the medium:

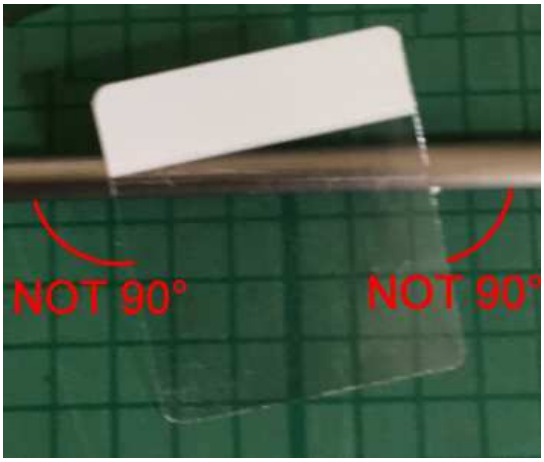

Figure 27 - Label NOT perpendicular to medium

The resulting self-laminated flag label will be misaligned and printed surface exposed.

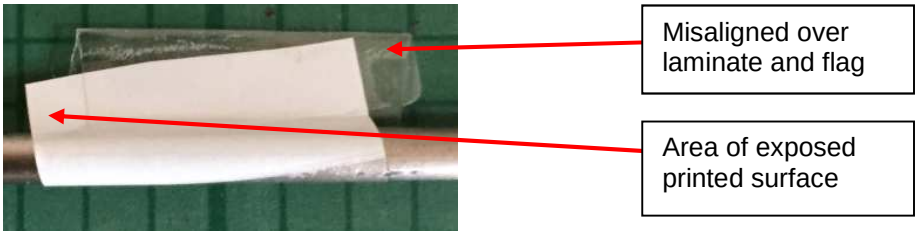

Figure 28 - Exposed printed surface

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7.2. Length BELOW Minimum Recommended

If the ratio of printable area height to label length is insufficient for the medium being applied to:

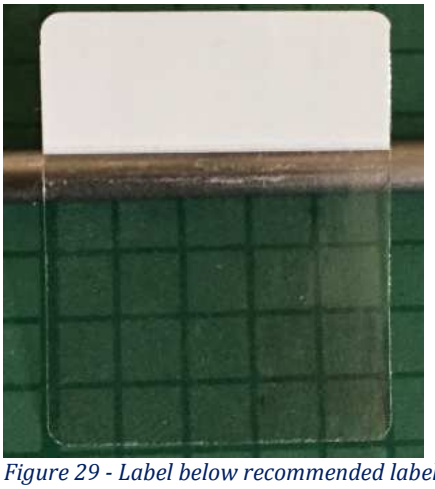

Figure 29 - Label below recommended label height

The resulting self-laminated flag label will have part or all of the printed surface exposed.

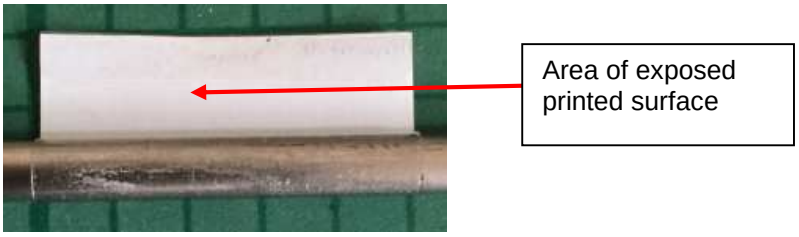

Figure 30 - Exposed printed surface

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APPENDIX

Optimum Medium Sizes for TE Self-Laminating Products

The diameter of the medium is the key to defining which TE self-laminating product is suitable.

Based upon the formula:

- *Printable area height/π = Minimum recommended medium diameter*

The minimum recommend medium diameter can be calculated; for example, SBP/SP/PVF 050100 has a printable area height of 8.5mm (0.33 inch), this equates to:

- 8.5/π = 2.71mm[9]

The printable area of SBP/SP/PVF 050100 would wrap completely around a 2.71mm diameter medium with no overlap of the printable area.

SBP/SP/PVF 050100 has a label height of 25.4mm (1 inch). A 2.71mm diameter medium has a circumference of 8.51mm, the SBP/SP/PVF 050100 label would therefor wrap around the medium 2.9 times giving the printable area an over-laminate of 1.9 times.

Based upon the formula:

- *(Label height – Printable area height)/π = Maximum recommended medium diameter*

The maximum recommend medium diameter can be calculated; for example, SBP/SP/PVF 050100 has a label height of 25.4mm (1 inch) and a printable area height of 8.5mm (0.33 inch), this equates to:

- (25.4 - 8.5)/π = 5.38mm[10]

A 5.28mm diameter medium has a circumference of 16.5mm, the SBP/SP/PVF 050100 label would therefor wrap around the medium 1.54 times giving the printable area an over-laminate one time and would extend beyond the printable area by 0.4mm.

Tables 1 and 2 are a guide to recommended maximum and minimum medium diameter[11]

	Printable Area - A[12]		Label Height - B[12]		Maximum medium diameter		Minimum medium diameter	
SBP/SP/PVF	mm	inches	mm	inches	mm	inches	mm	inches
050100	8.50	0.33	25.40	1.00	5.38	0.21	2.71	0.11

[9] 0.33/ π = 0.11 inch
[10] (1 - 0.33)/ π = 0.21 inch
[11] Data supplied is a mathematical guide and users should confirm the suitability of the self-laminating product against their target medium. TE accepts no liability for discrepancies between self-laminating product and target medium.
[12] See Figure 31

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050143	12.70	0.50	36.50	1.44	7.58	0.30	4.04	0.16
075094	9.50	0.38	23.90	0.94	4.58	0.18	3.02	0.12
080150	12.70	0.50	38.10	1.50	8.09	0.32	4.04	0.16
100143	12.70	0.50	36.50	1.44	7.58	0.30	4.04	0.16
100225	19.10	0.75	57.20	2.25	12.13	0.48	6.08	0.24
100375	25.40	1.00	95.30	3.75	22.25	0.88	8.09	0.32
100594	38.10	1.50	151.00	5.94	35.94	1.41	12.13	0.48
100743	38.10	1.50	188.90	7.44	48.00	1.89	12.13	0.48
190319	19.10	0.75	81.00	3.19	19.70	0.78	6.08	0.24
190594	38.10	1.50	151.00	5.94	35.94	1.41	12.13	0.48
200143	12.70	0.50	36.50	1.44	7.58	0.30	4.04	0.16
200225	19.10	0.75	57.20	2.25	12.13	0.48	6.08	0.24
200375	25.40	1.00	95.30	3.75	22.25	0.88	8.09	0.32
200743	38.10	1.50	188.90	7.44	48.00	1.89	12.13	0.48

Table 1 - SBP/SP/PVF Labels

	Printable Area - A[12]		Label Height - B[12]		Maximum medium diameter		Minimum medium diameter	
KMT	mm	inches	mm	inches	mm	inches	mm	inches
KMT-02513V-9	6.00	0.24	25.00	0.98	6.05	0.24	1.91	0.08
KMT-03423V-9	14.00	0.55	34.00	1.34	6.37	0.25	4.46	0.18
KMT-03518V-9	9.00	0.35	35.00	1.38	8.28	0.33	2.86	0.11
KMT-04023V-9	10.00	0.39	40.00	1.57	9.55	0.38	3.18	0.13
KMT-05123V-9	13.00	0.51	51.00	2.01	12.10	0.48	4.14	0.16
KMT-07323V-9	18.00	0.71	73.00	2.87	17.51	0.69	5.73	0.23
KMT-07332V-9	18.00	0.71	73.00	2.87	17.51	0.69	5.73	0.23
KMT-09832V-9	26.00	1.02	98.00	3.86	22.92	0.90	8.28	0.33
KMT-15032V-9	30.00	1.18	150.00	5.91	38.20	1.50	9.55	0.38

Table 2 - KMT Labels

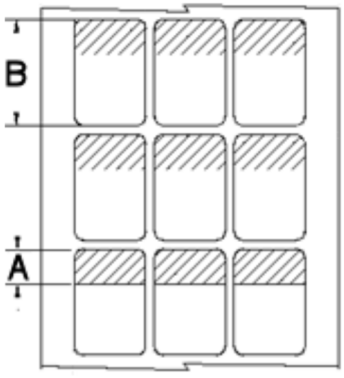

Figure 31 – Label/Table Reference

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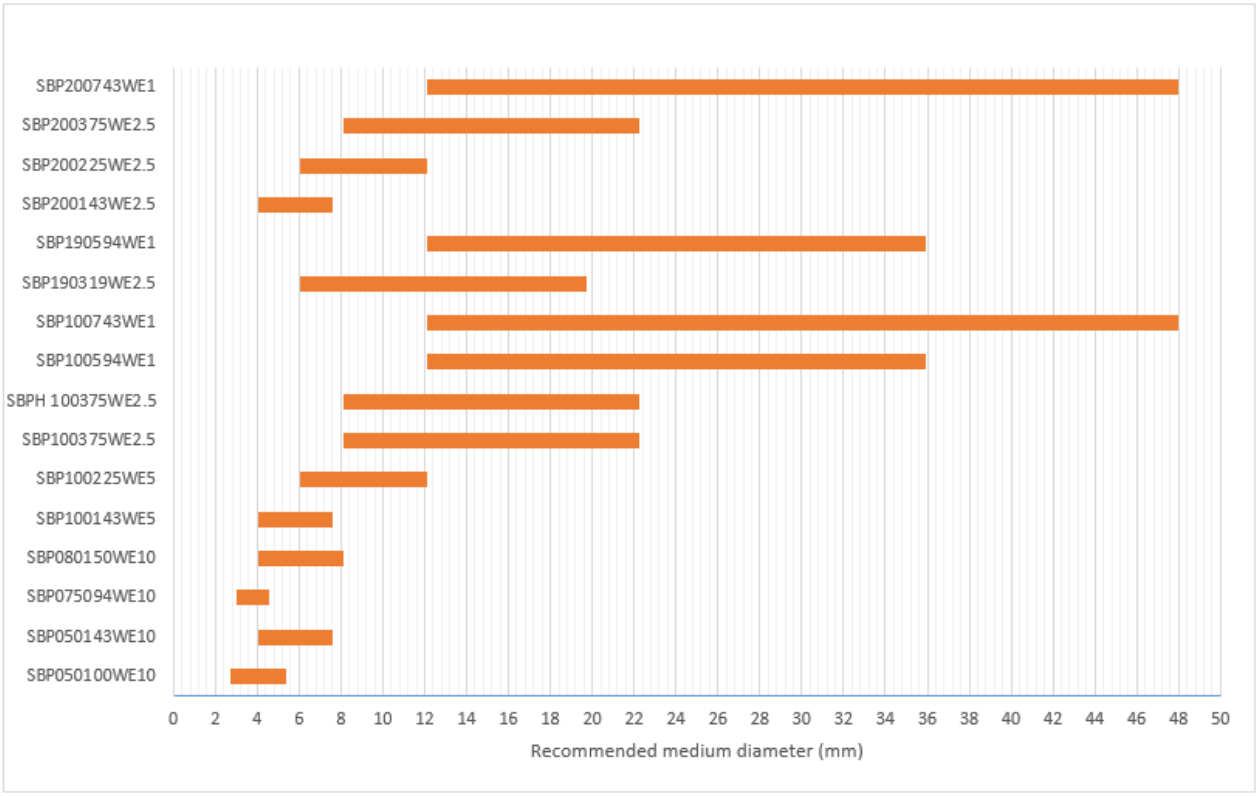
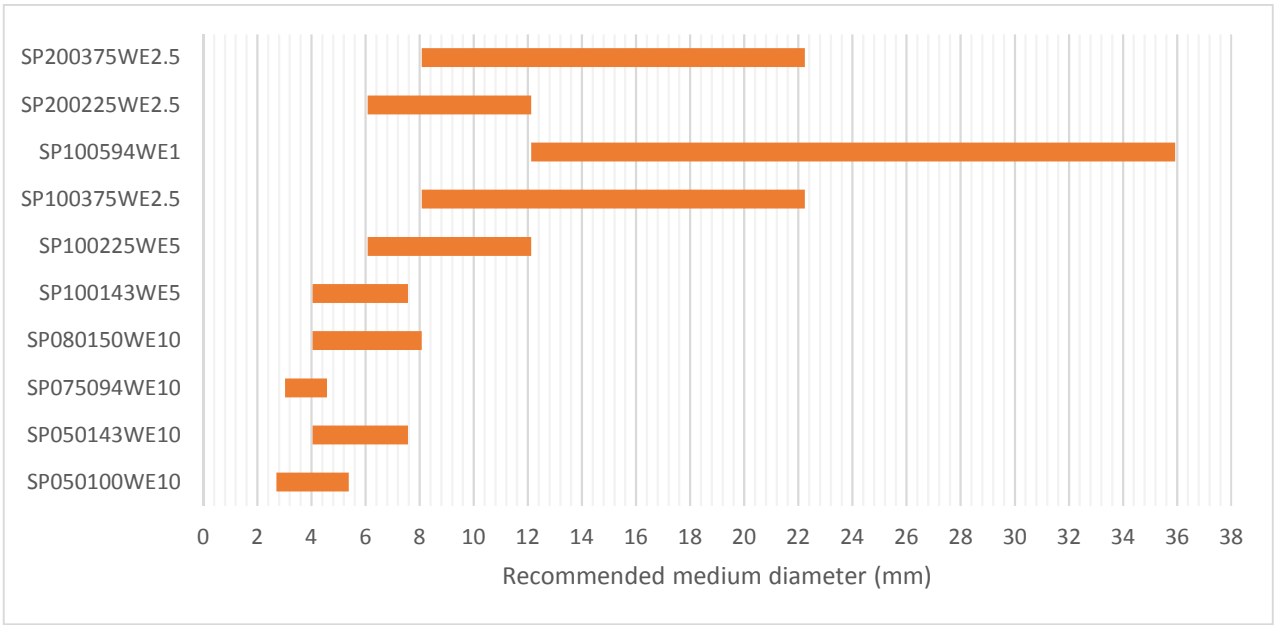
Range of Medium Sizes for TE Self-Laminating Products





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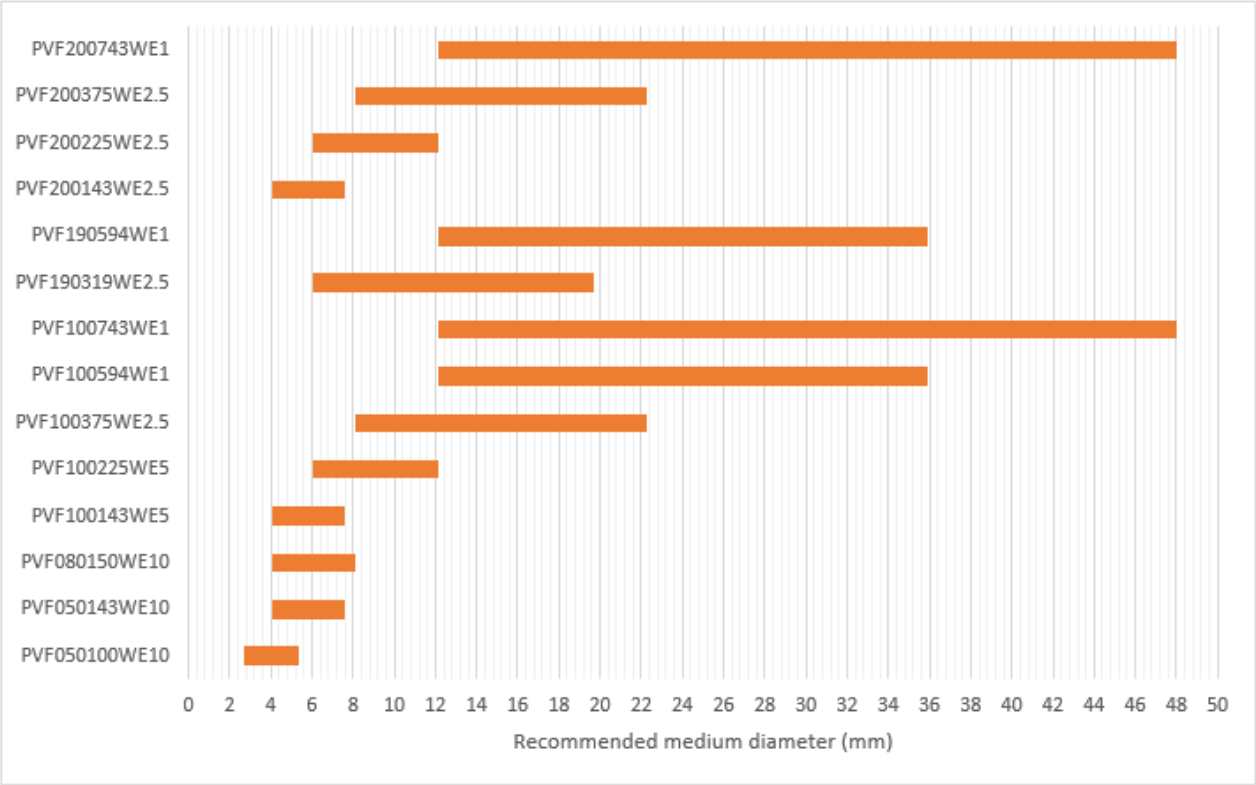

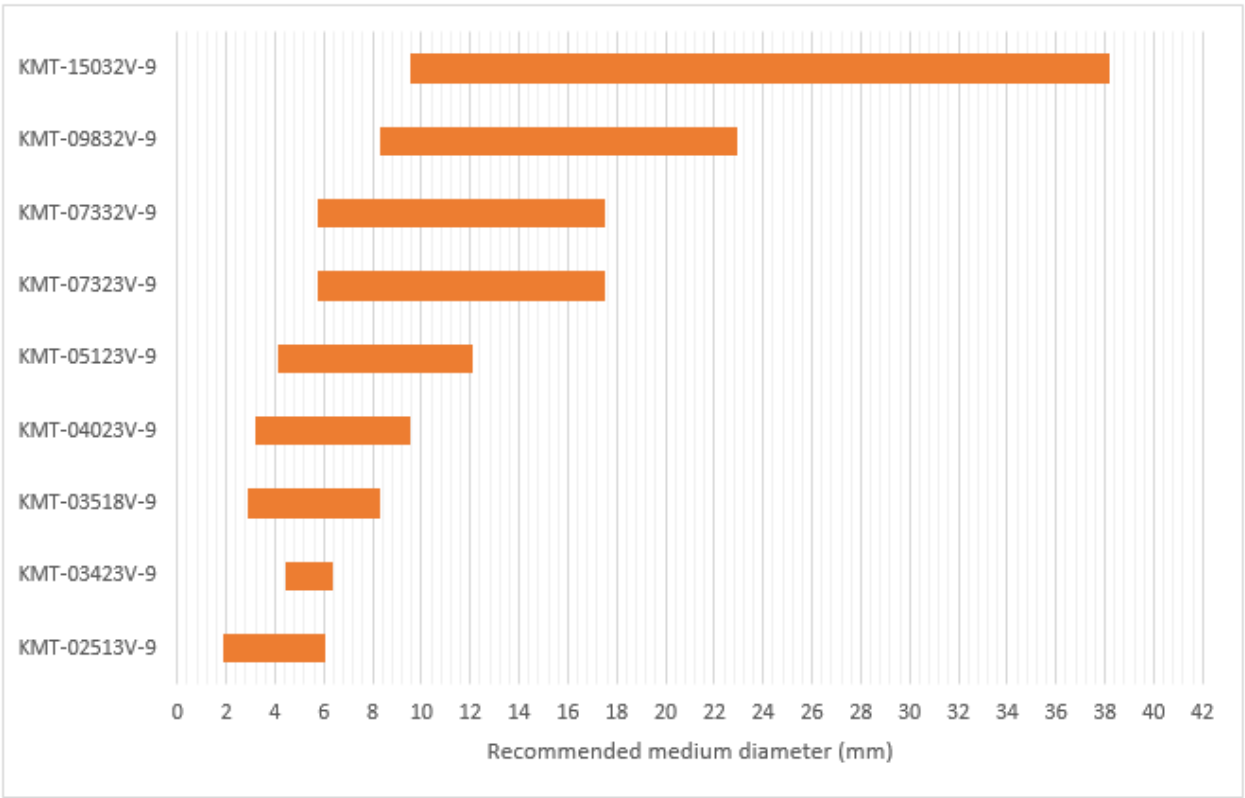

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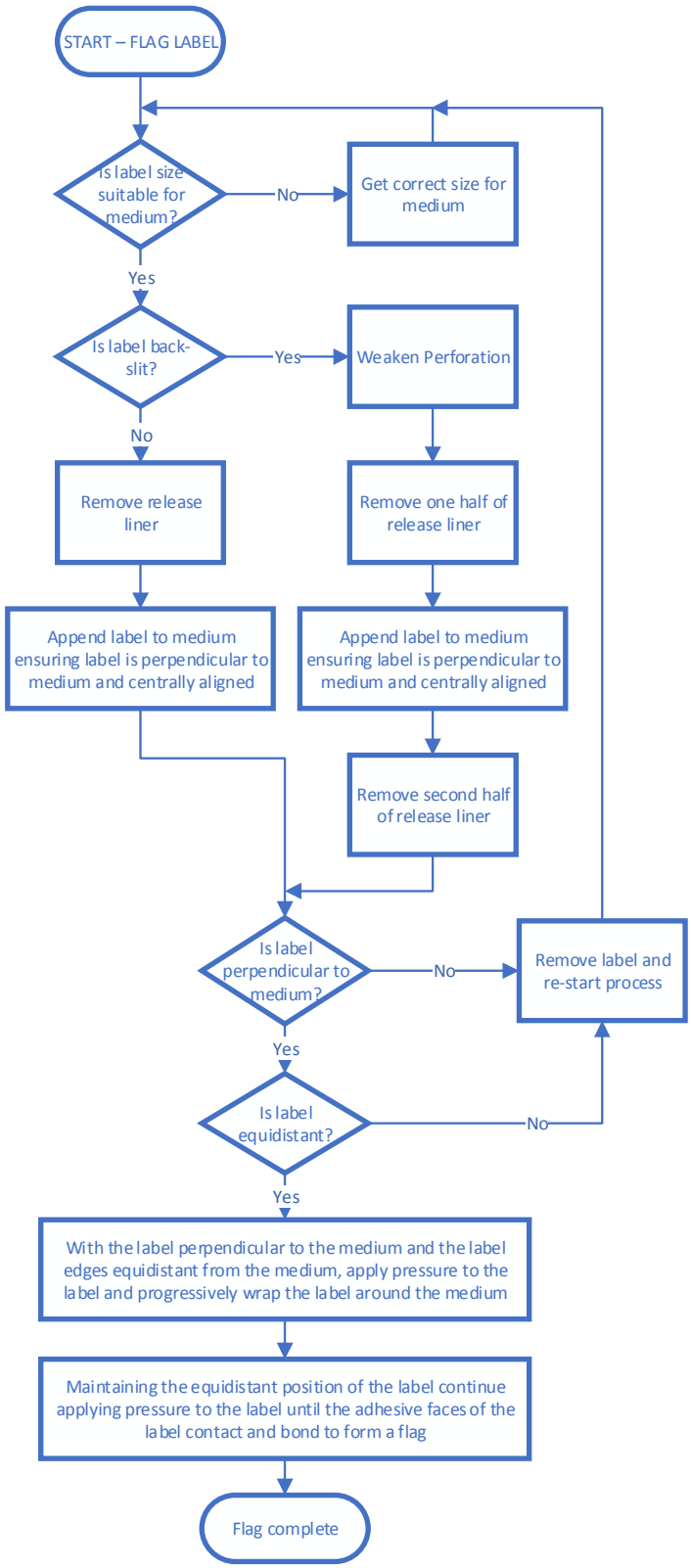
Flag Label – Process Flow Chart



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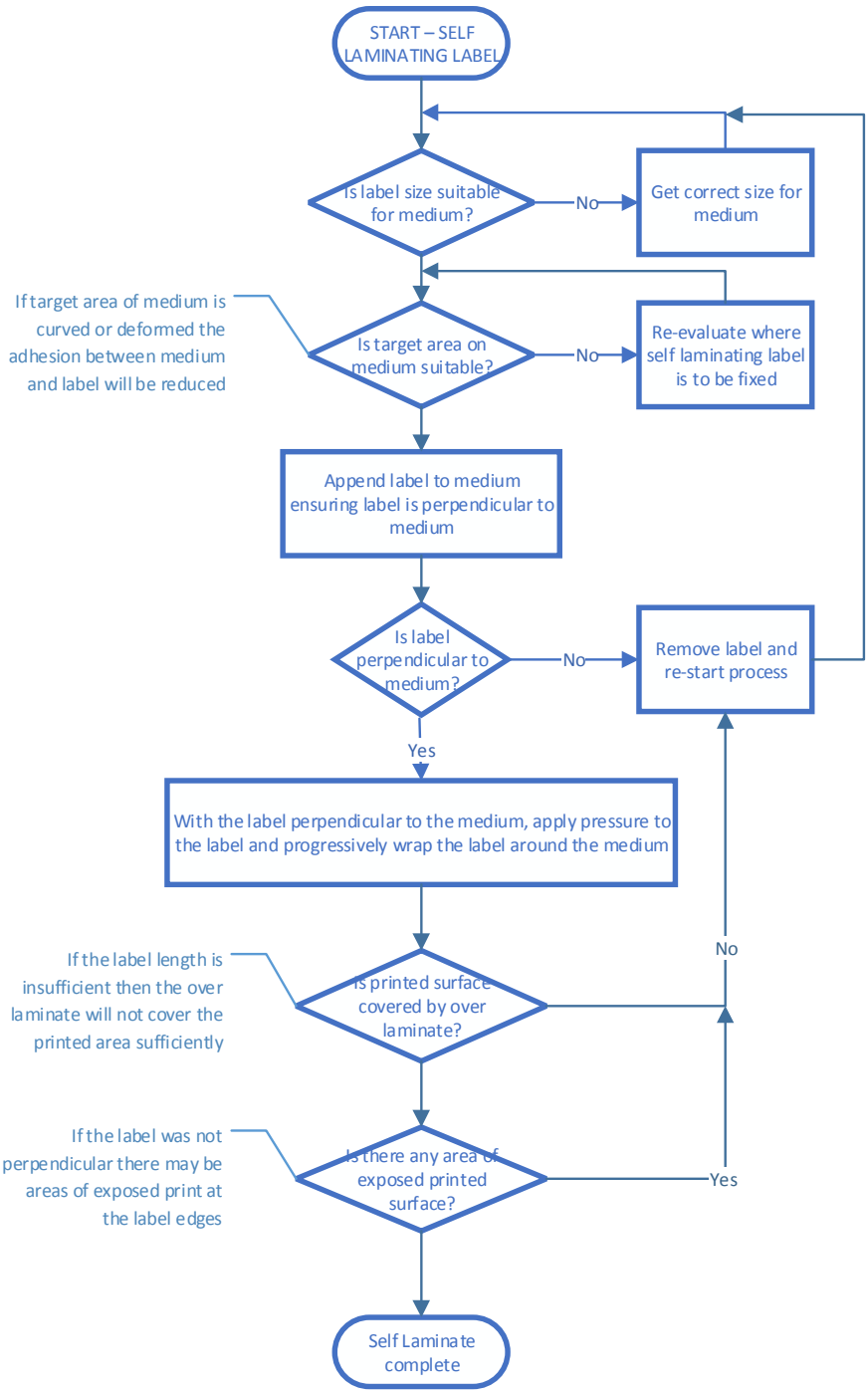
Self-Laminating Label – Process Flow Chart



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