

## รายการอ้างอิง

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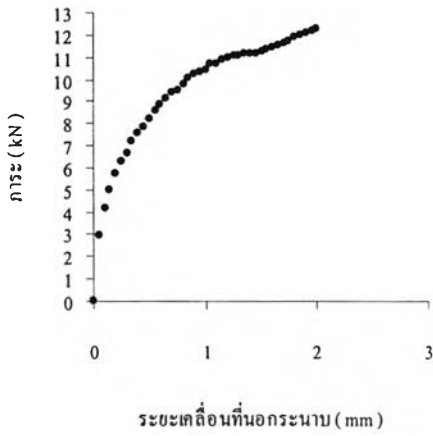
ภาคผนวก

**ภาคผนวก ก**

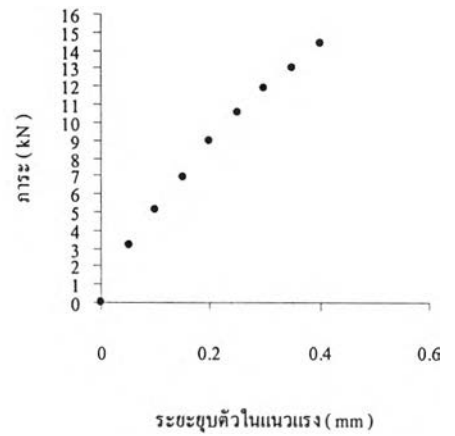
**กราฟสำหรับหาค่าภาระการโค้งงอของแผ่นทดสอบ**

กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 480 x 240 A1

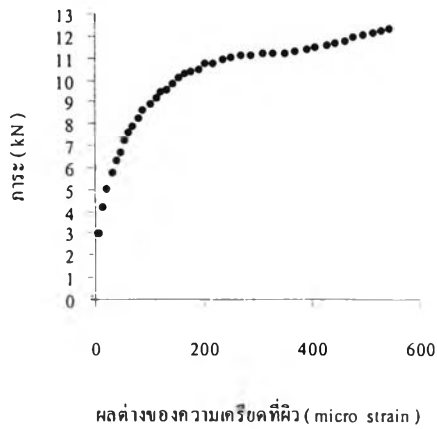
ระยะเคลื่อนที่นอกกระนาบ 480 x 240 A1



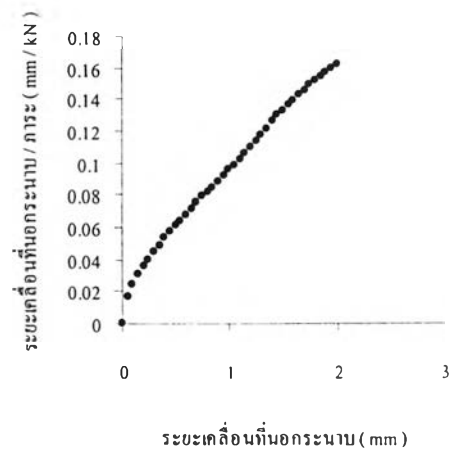
end-shortening 480 x 240 A1



ผลต่างความเครียด 480 x 240 A1

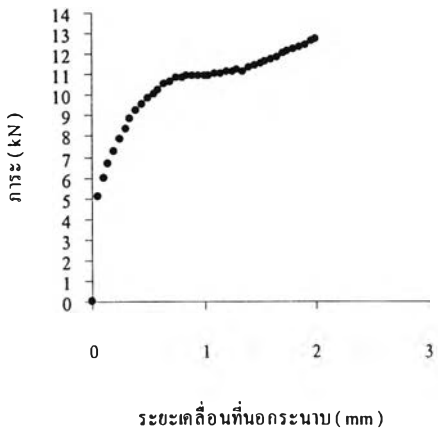


Southwell plot 480 x 240 A1

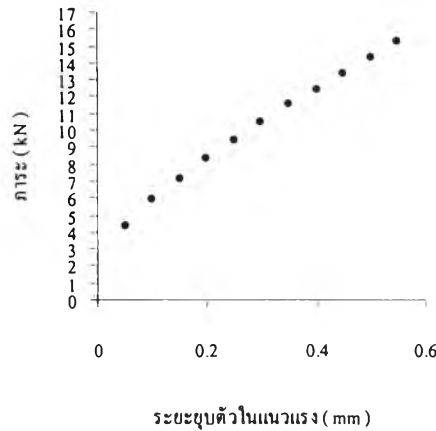


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 480 x 240 A2

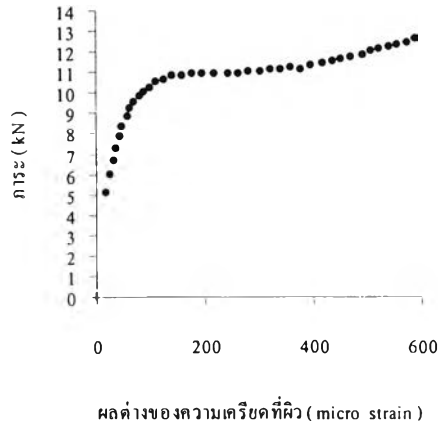
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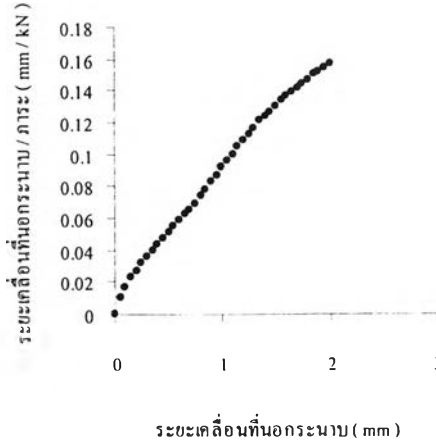
end-shortening 480 x 240 A2



ผลต่างความเครียด 480 x 240 A2

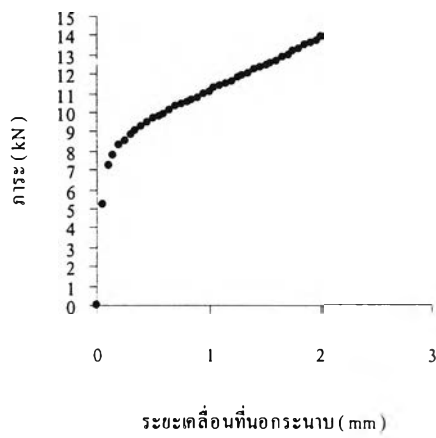


Southwell plot 480 x 240 A2

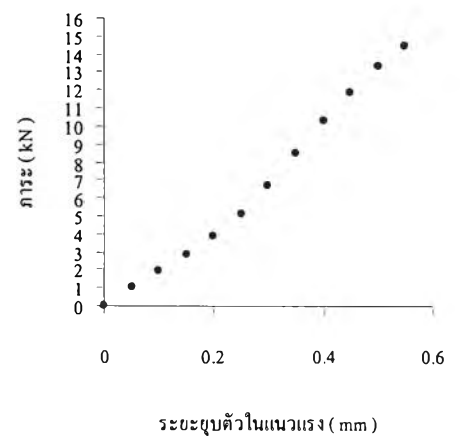


## กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 480 x 240 B1

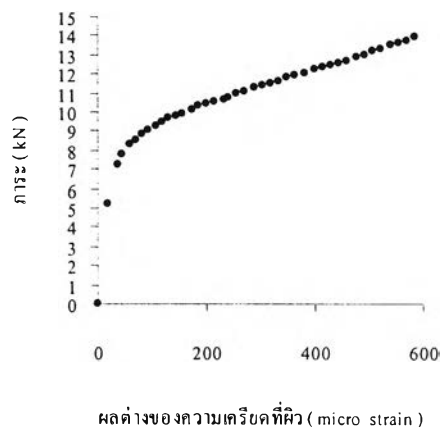
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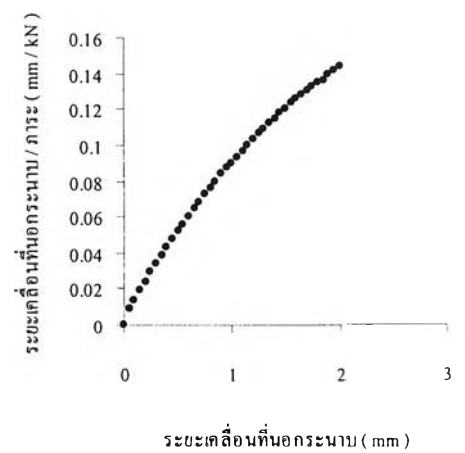
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ผลต่างความเครียด 480 x 240 B1

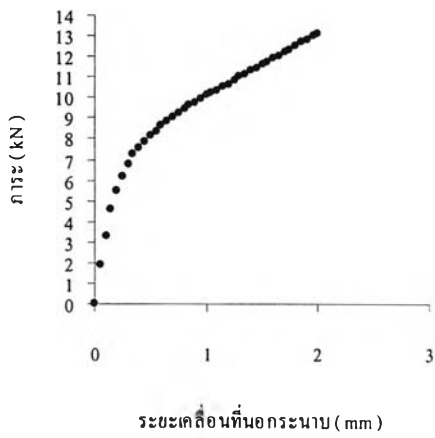


Southwell plot 480 x 240 B1

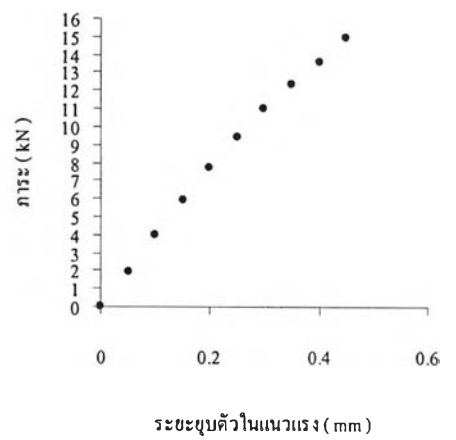


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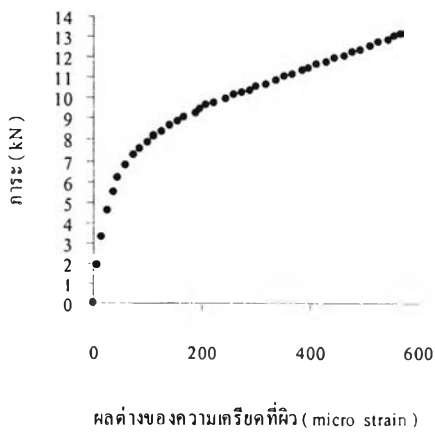
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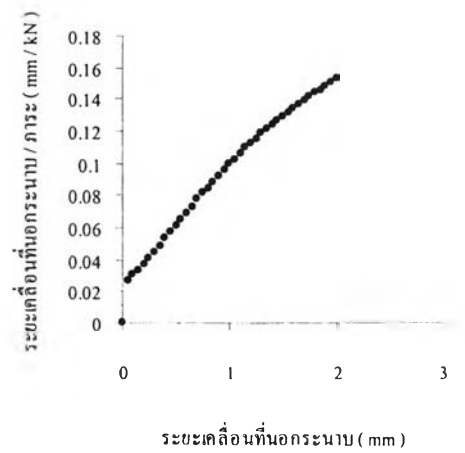
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ผลต่างความเครียด 480 x 240 B2



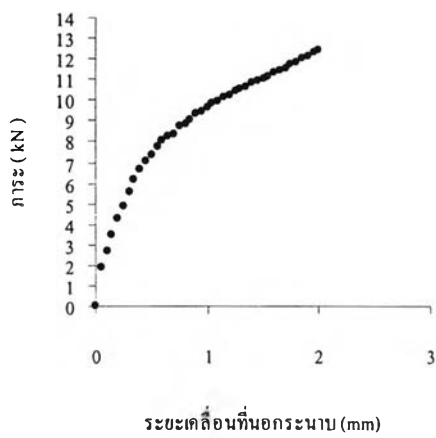
Southwell plot 480 x 240 B2



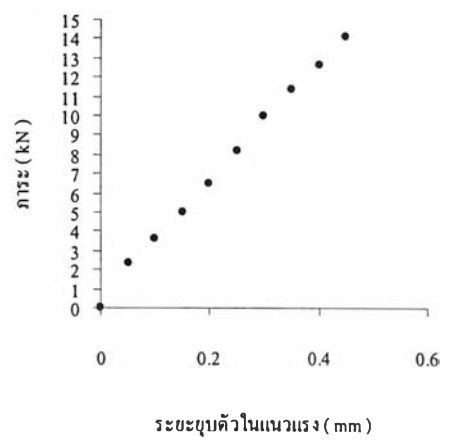


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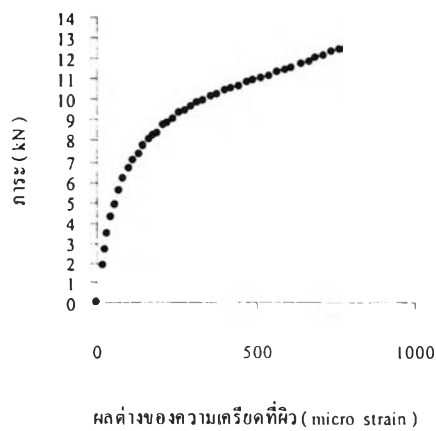
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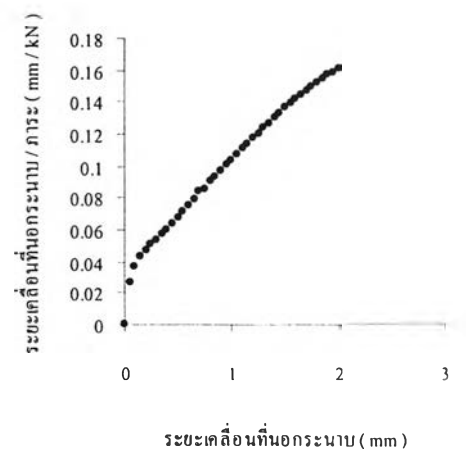
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ผลต่างความเครียด 480 x 240 C1

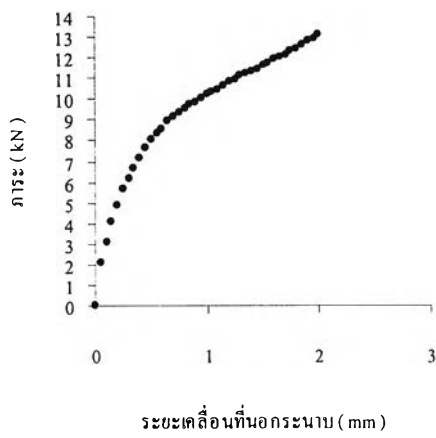


Southwell plot 480 x 240 C1

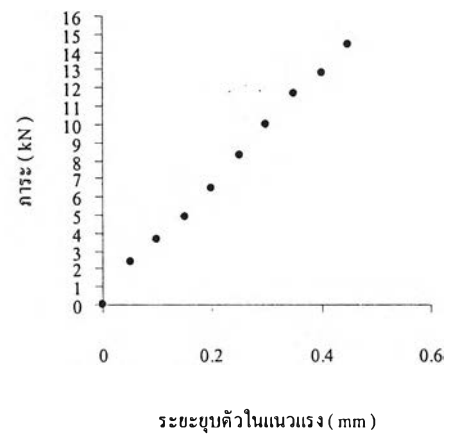


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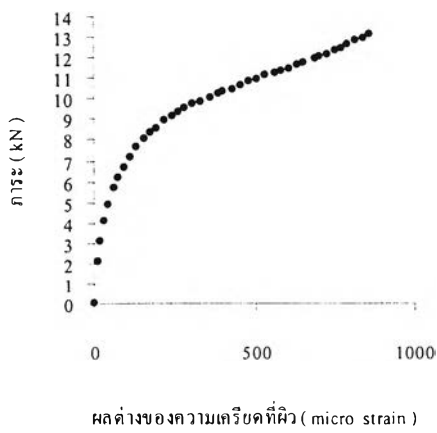
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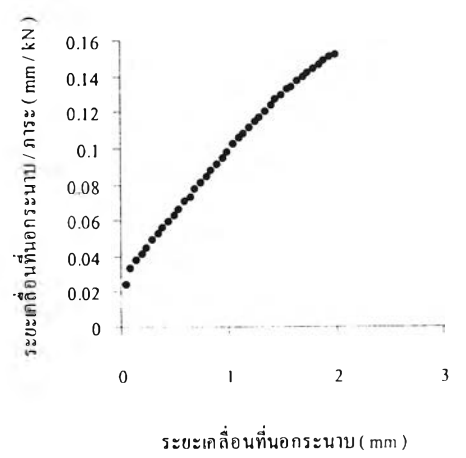
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ผลต่างความเครียด 480 x 240 C2

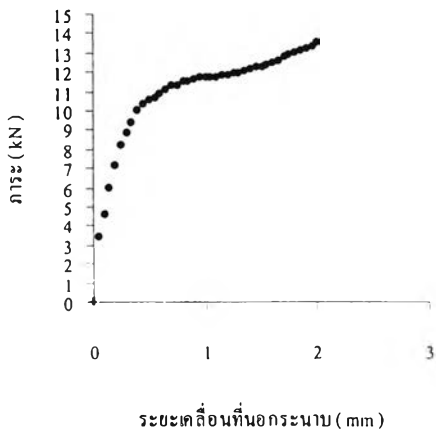


Southwell plot 480 x 240 C2

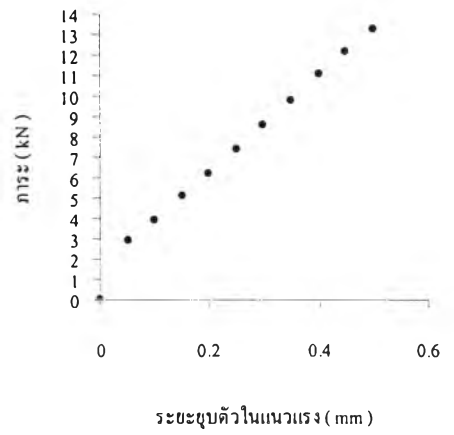


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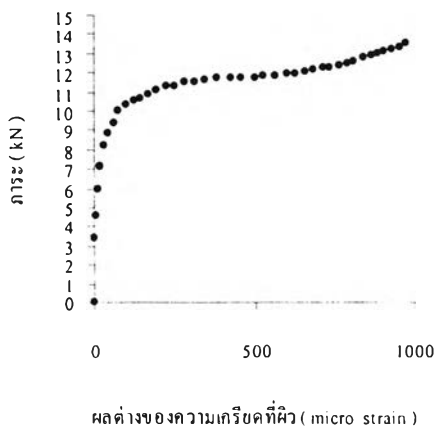
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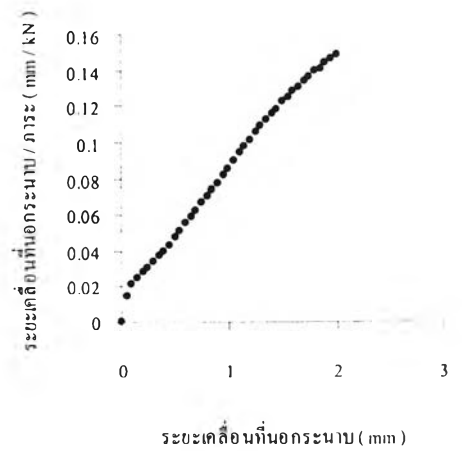
end-shortening 480 x 240 D1



ผลต่างความเครียด 480 x 240 D1

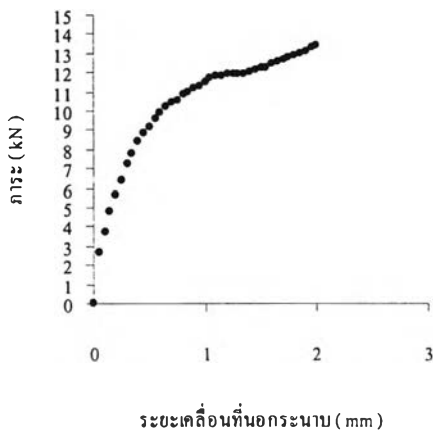


Southwell plot 480 x 240 D1

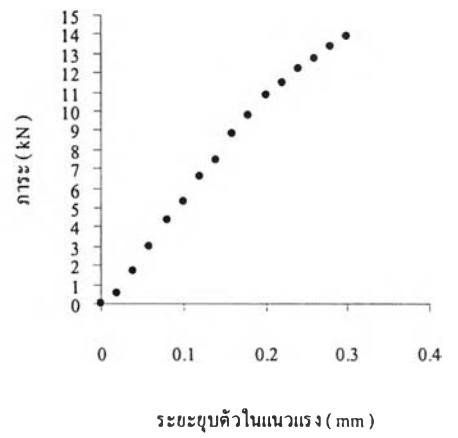


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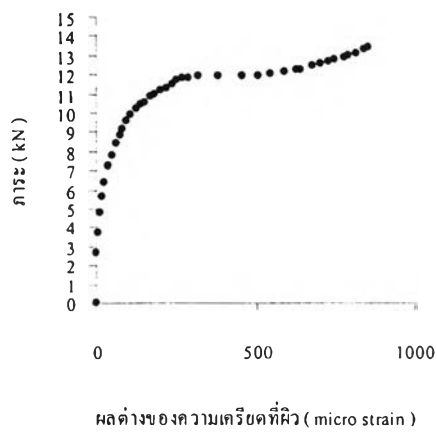
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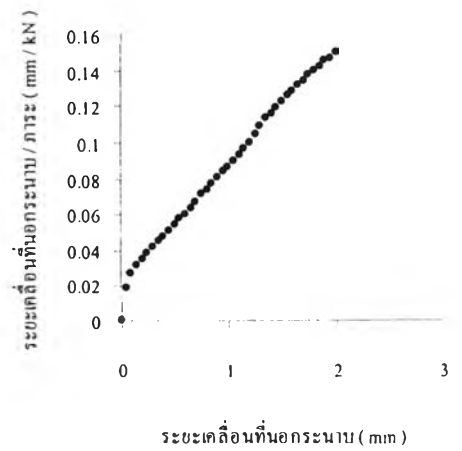
end-shortening 480 x 240 D2



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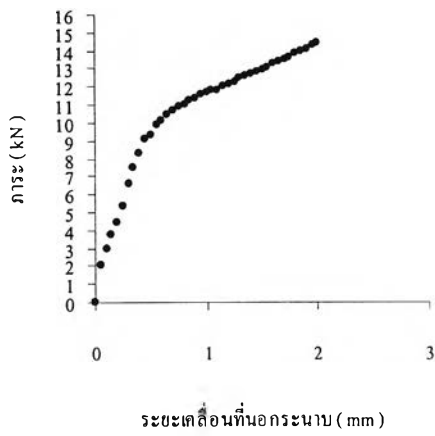


Southwell plot 480 x 240 D2

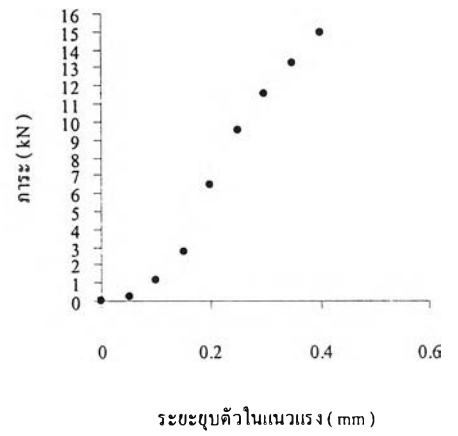


กราฟพฤติกรรมการ โกงงอของแผ่นทดสอบ 360 x 240 A1

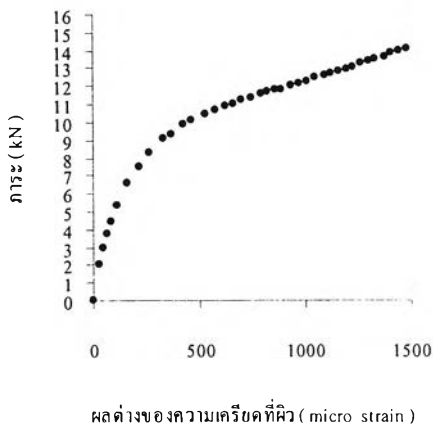
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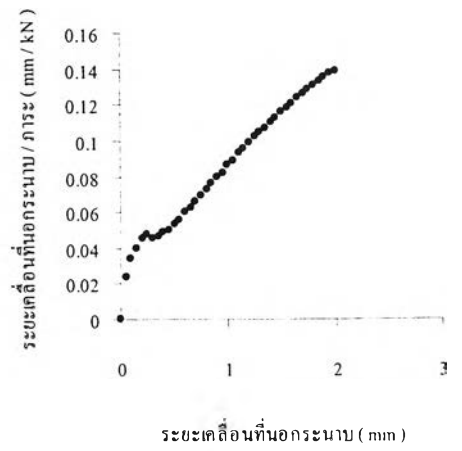
end-shortening 360 x 240 A1



ผลต่างความเครียด 360 x 240 A1

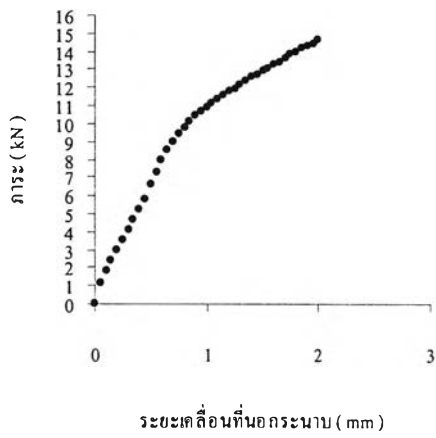


Southwell plot 360 x 240 A1

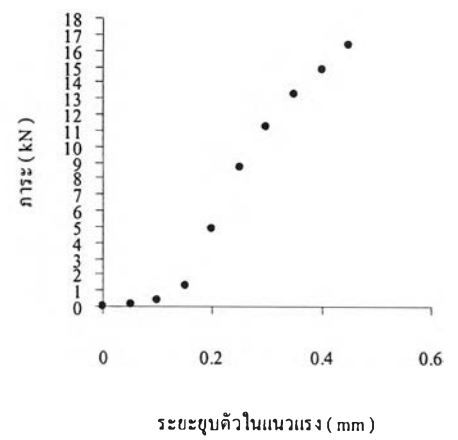


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 360 x 240 A2

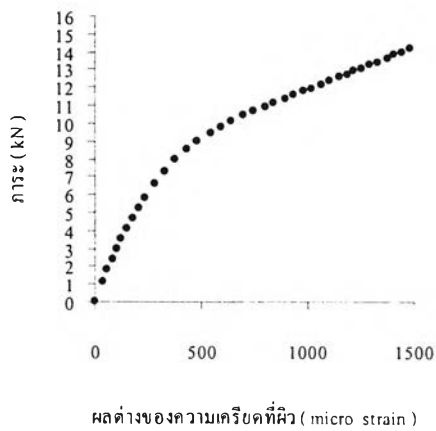
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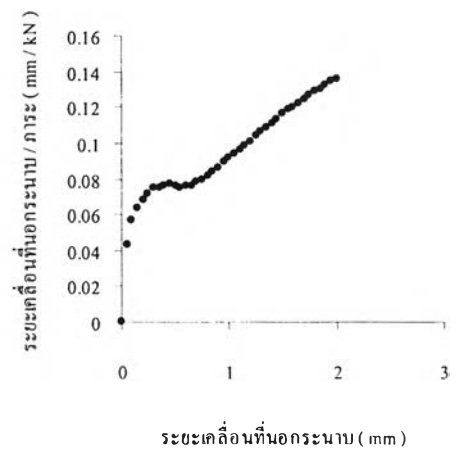
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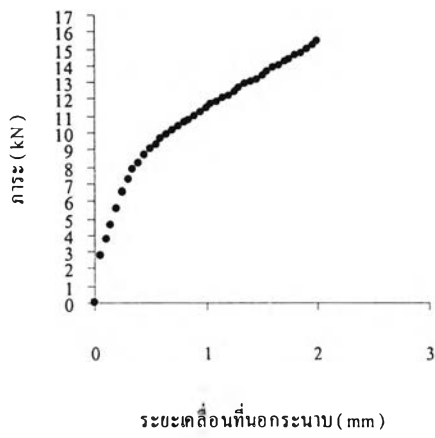


Southwell plot 360 x 240 A2

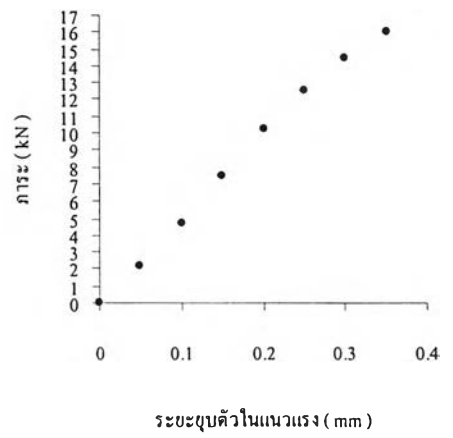


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 360 x 240 B1

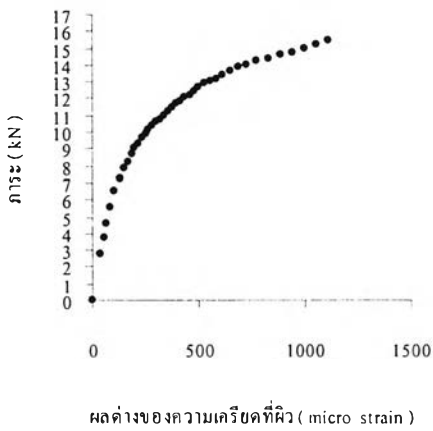
ระยะเคลื่อนที่ออกกระนาบ 360 x 240 B1



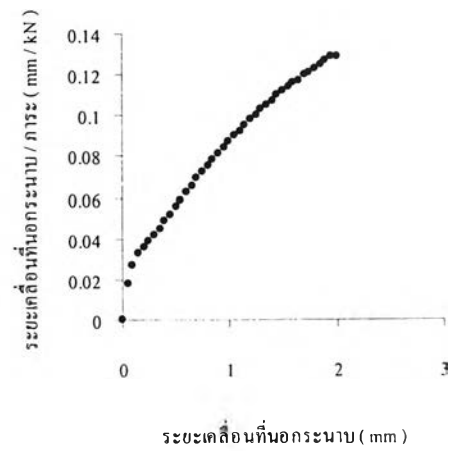
end-shortening 360 x 240 B1



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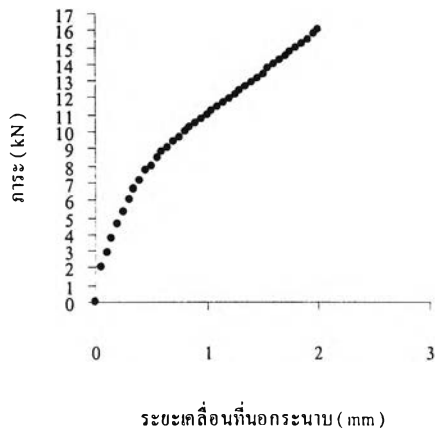


Southwell plot 360 x 240 B1

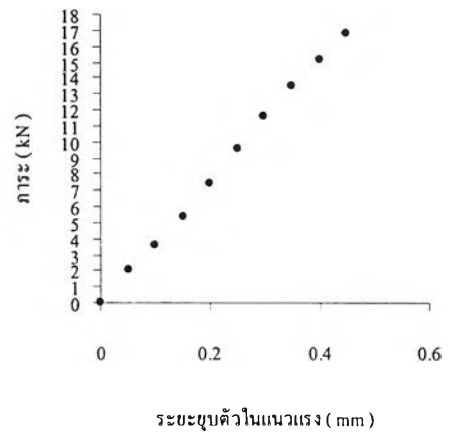


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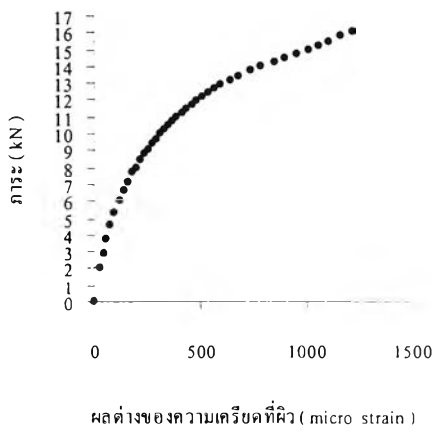
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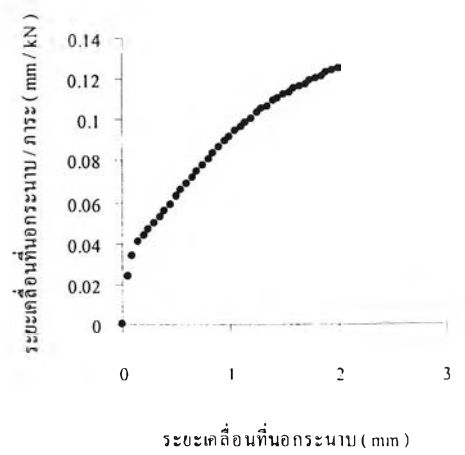
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ผลต่างความเครียด 360 x 240 B2



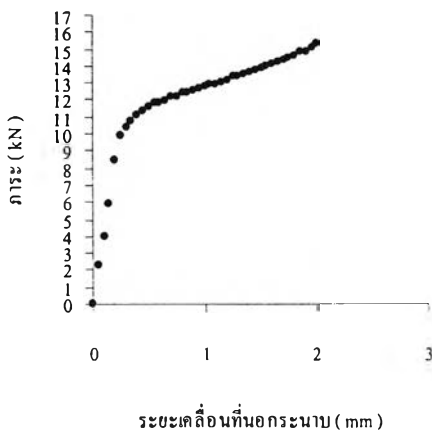
Southwell plot 360 x 240 B2



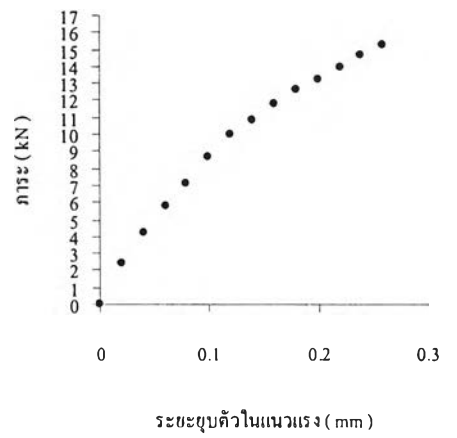


### กราฟพฤติกรรมการ โกงงอของแผ่นทดสอบ 360 x 240 C1

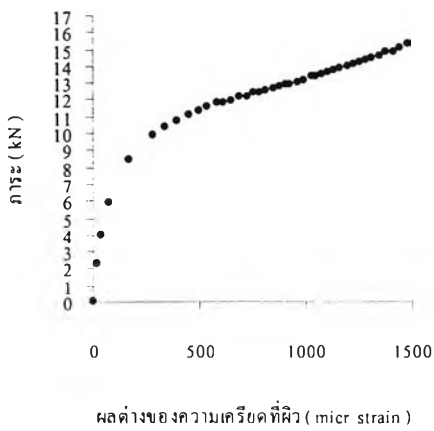
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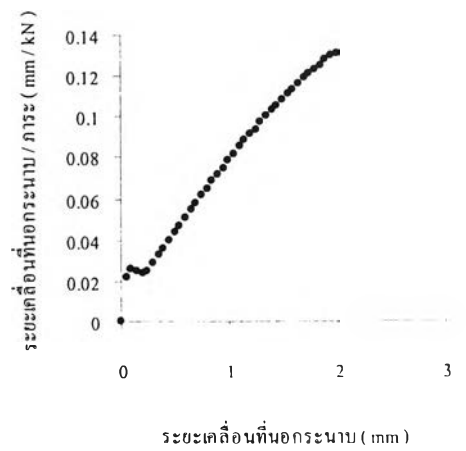
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ผลต่างความเครียด 360 x 240 C1

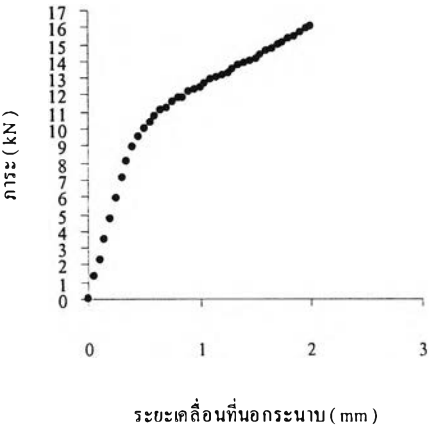


Southwell plot 360 x 240 C1

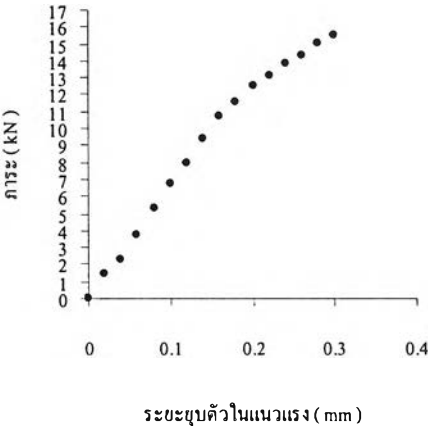


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 360 x 240 C2

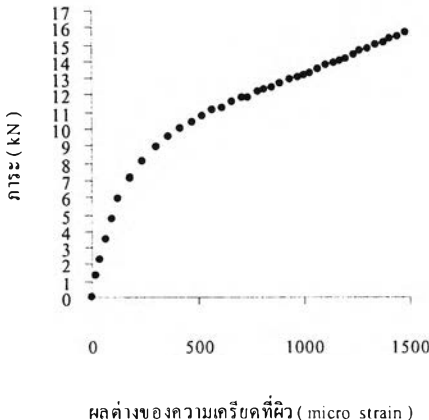
ระยะเคลื่อนที่ออกกระนาบ 360 x 240 C2



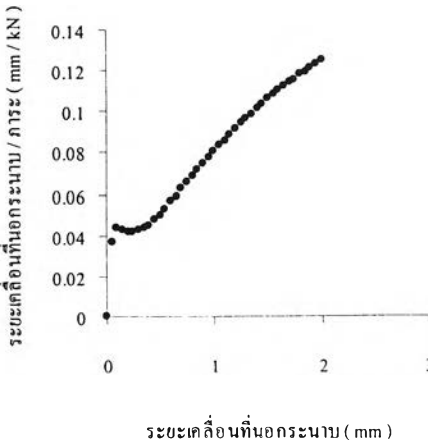
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ผลต่างความเครียด 360 x 240 C2

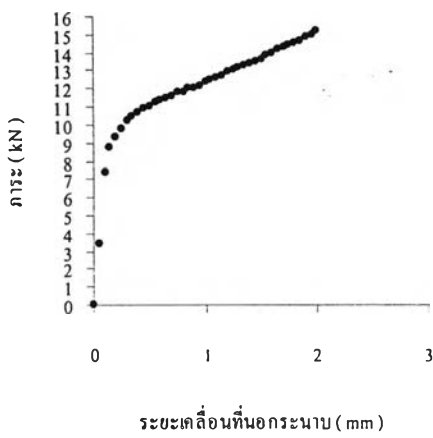


Southwell plot 360 x 240 C2

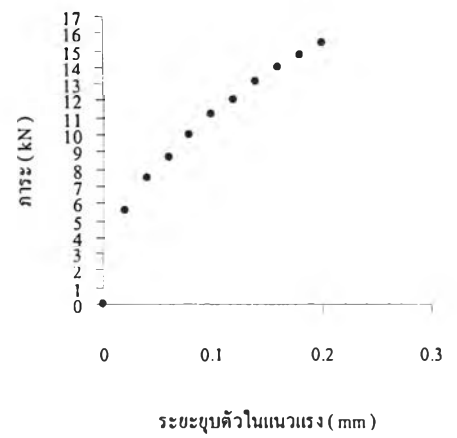


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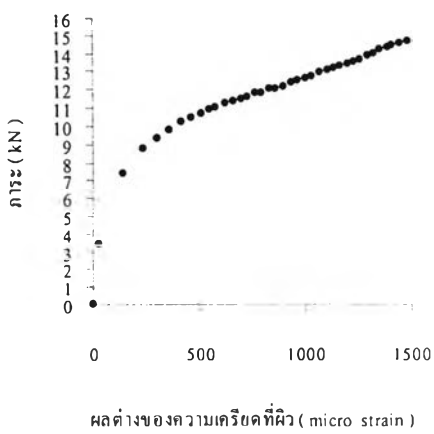
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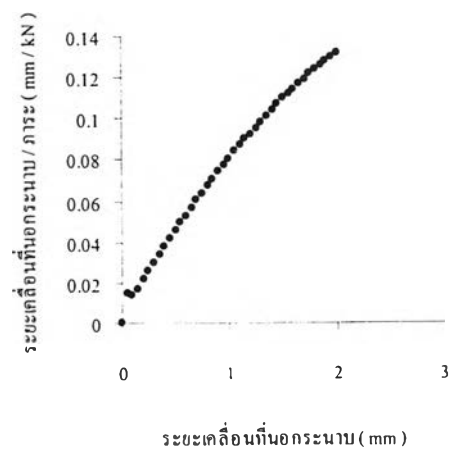
end-shortening 360 x 240 D1



ผลต่างความเครียด 360 x 240 D1

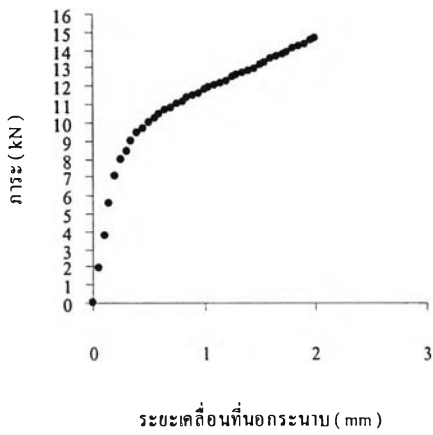


Southwell plot 360 x 240 D1

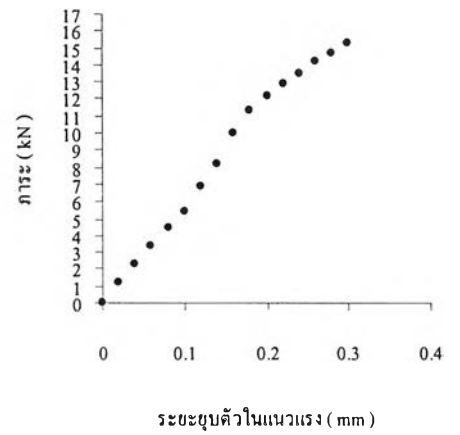


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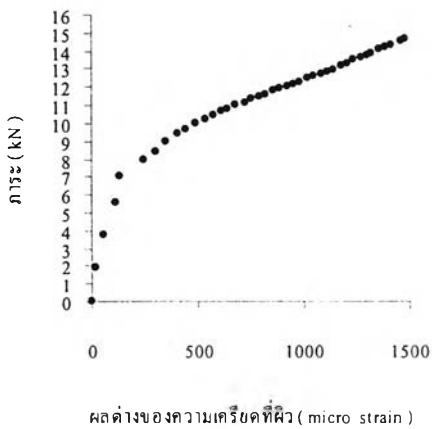
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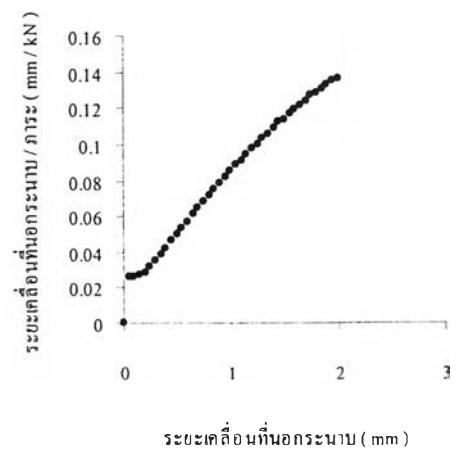
end-shortening 360 x 240 D2



ผลต่างความเครียด 360 x 240 D2

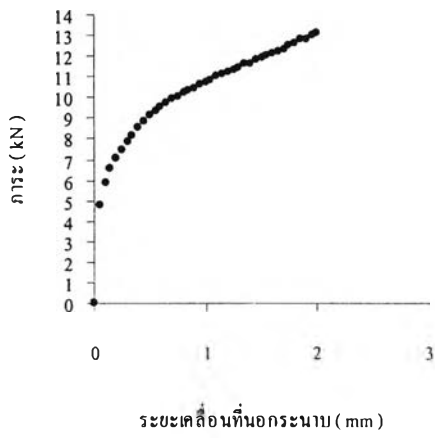


Southwell plot 360 x 240 D2

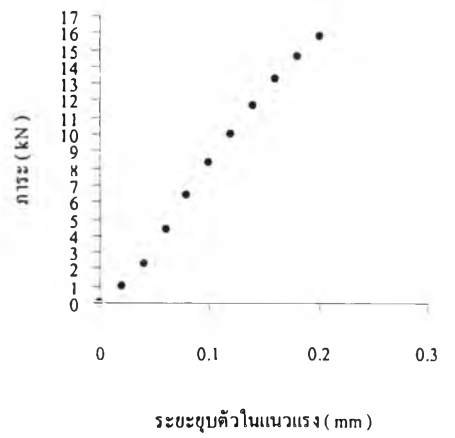


### กราฟพฤติกรรมการ โกงงของแผ่นทดสอบ 240 x 240 A1

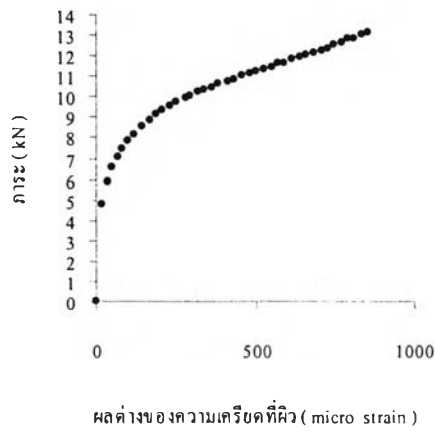
ระยะเคลื่อนที่นอกกระนาบ 240 x 240 A1



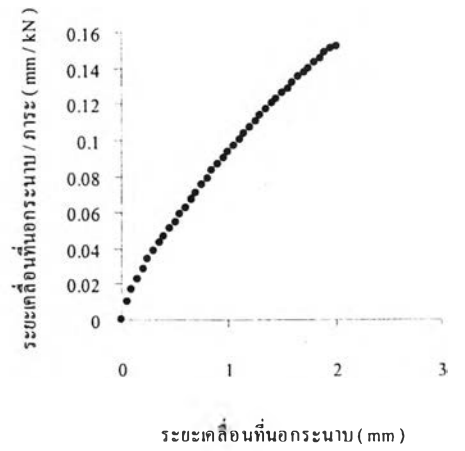
end-shortening 240 x 240 A1



ผลต่างความเครียด 240 x 240 A1

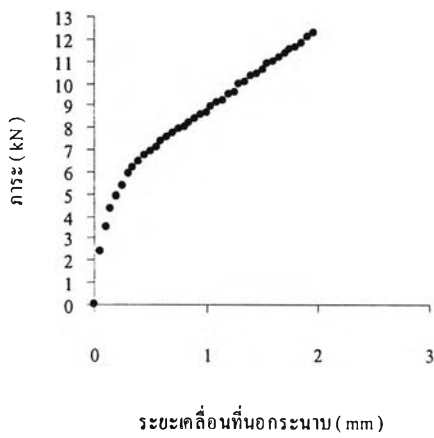


Southwell plot 240 x 240 A1

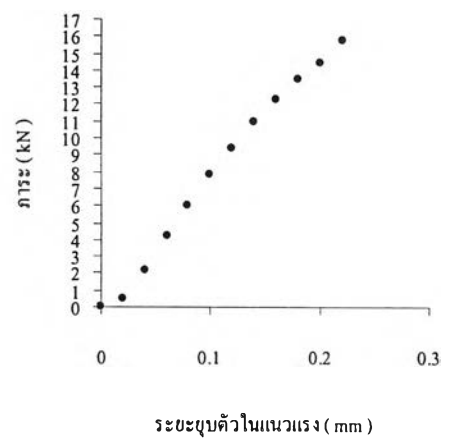


กราฟพฤติกรรมการ โกงงของแผ่นทดสอบ 240 x 240 A2

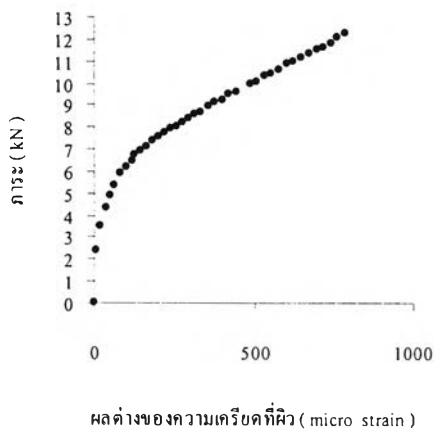
ระยะเคลื่อนที่นอกกระนาบ 240 x 240 A2



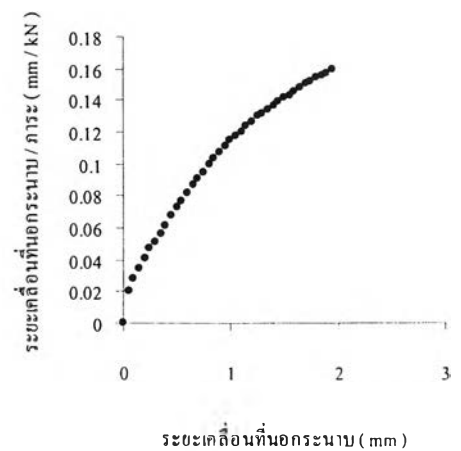
end-shortening 240 x 240 A2



ผลต่างความเครียด 240 x 240 A2

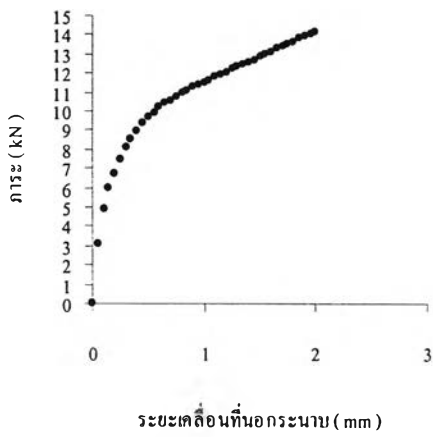


Southwell plot 240 x 240 A2

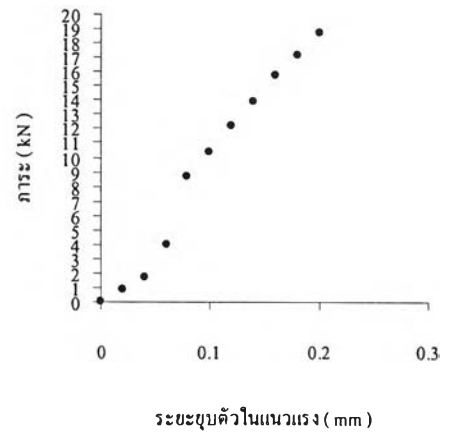


### กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 240 x 240 B1

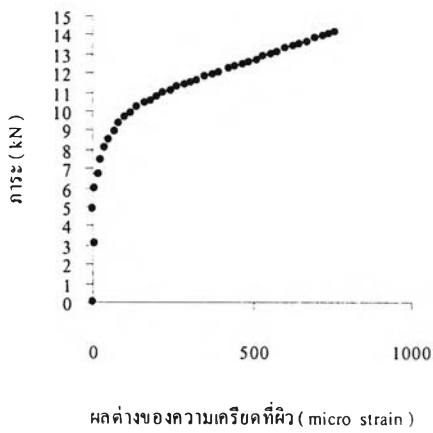
ระยะเคลื่อนที่บนกระดาน 240 x 240 B1



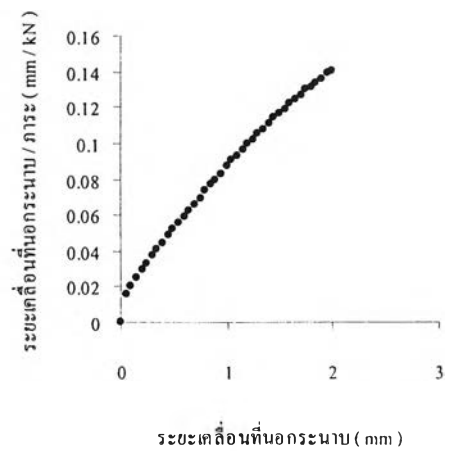
emd-shortening 240 x 240 B1



ผลต่างความเครียด 240 x 240 B1

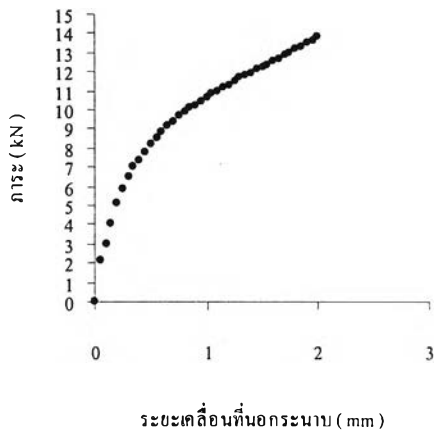


Southwell plot 240 x 240 B1

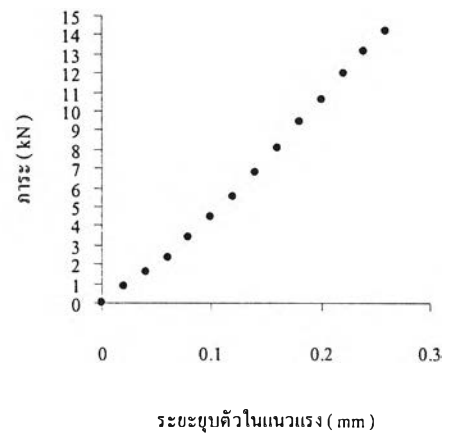


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 240 x 240 B2

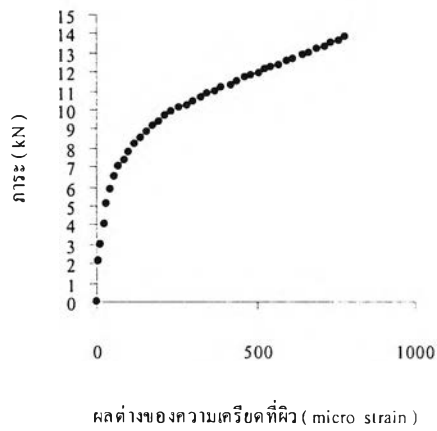
ระยะเคลื่อนที่ของกระดาน 240 x 240 B2



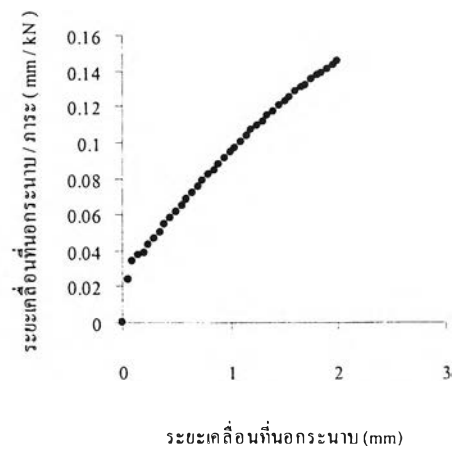
end-shortening 240 x 240 B2



ผลต่างความเครียด 240 x 240 B2



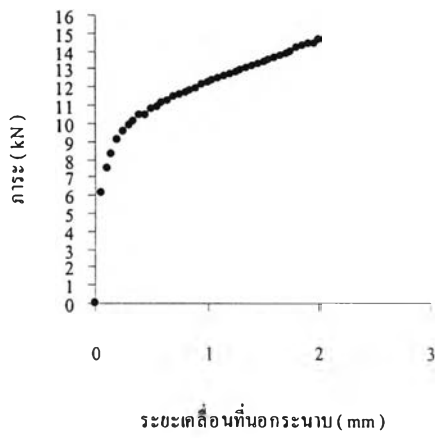
Southwell plot 240 x 240 B2



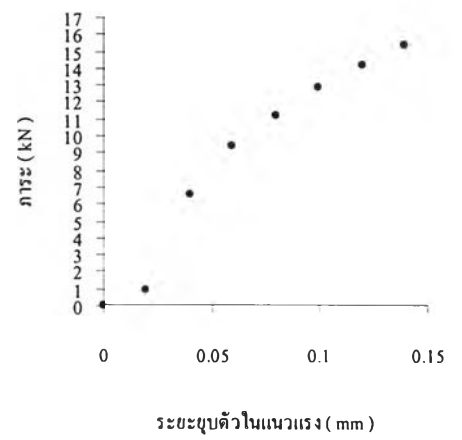


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 240 x 240 C1

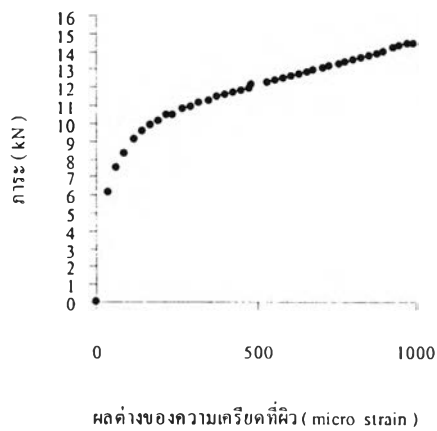
ระยะเคลื่อนที่ของกระดาน 240 x 240 C1



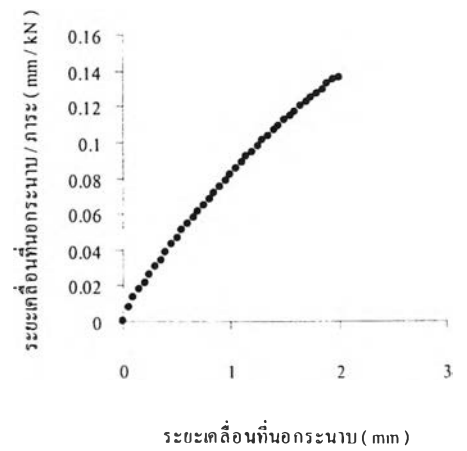
end-shortening 240 x 240 C1



ผลต่างความเครียด 240 x 240 C1

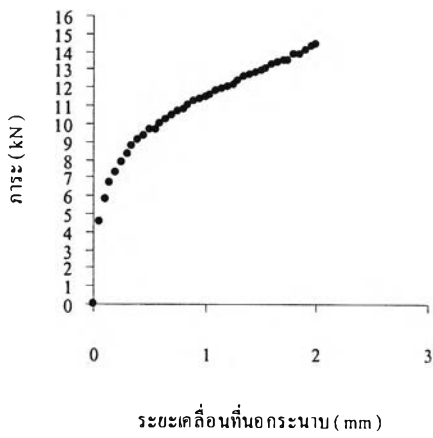


Southwell plot 240 x 240 C1

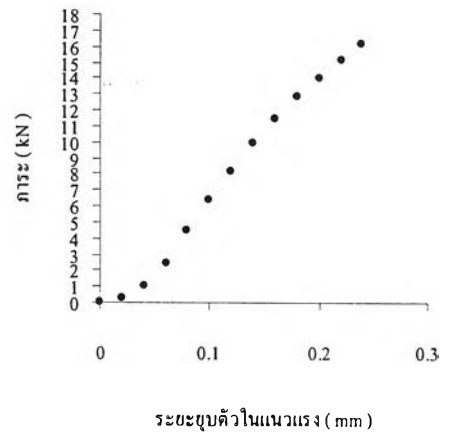


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 240 x 240 C2

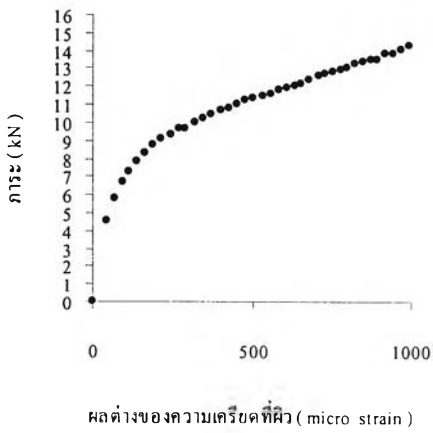
ระยะเคลื่อนที่บนกระดาน 240 x 240 C2



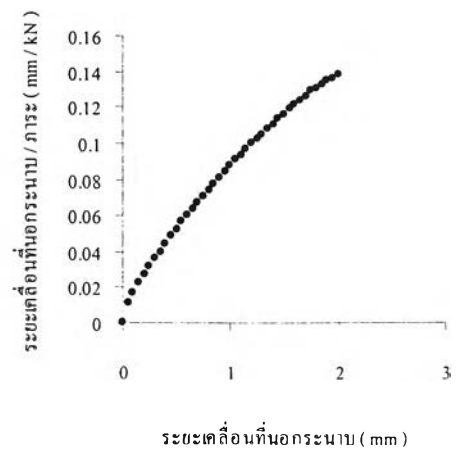
end-shortening 240 x 240 C2



ผลต่างความเครียด 240 x 240 C2

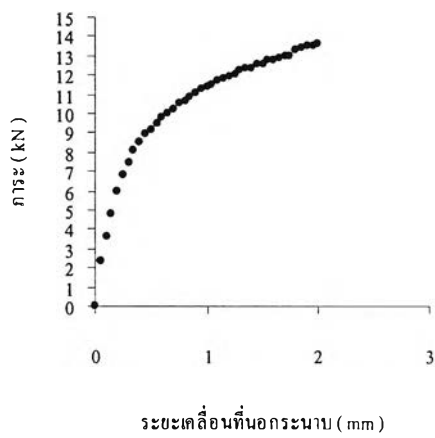


Southwell plot 240 x 240 C2

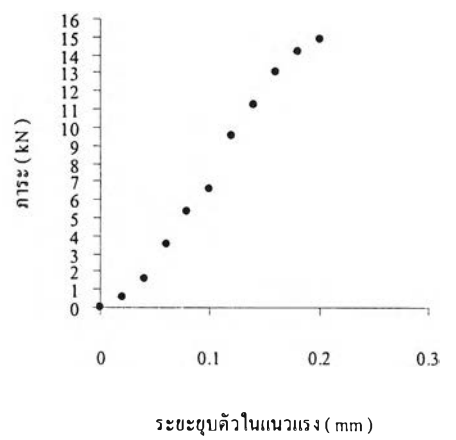


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 240 x 240 D1

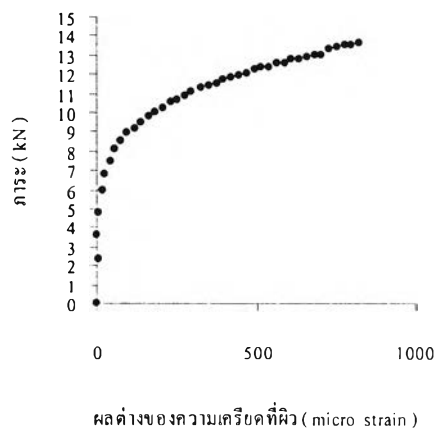
ระยะเคลื่อนที่นอกระนาบ 240 x 240 D1



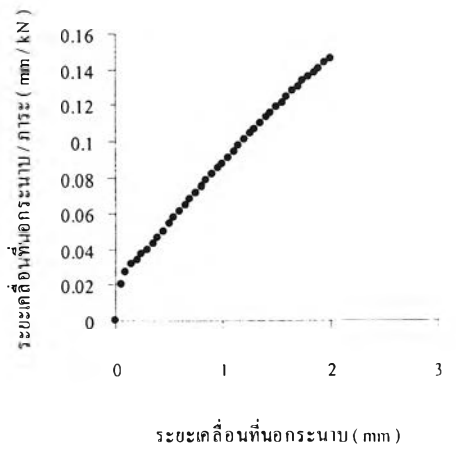
end-shortening 240 x 240 D1



ผลต่างความเครียด 240 x 240 D1

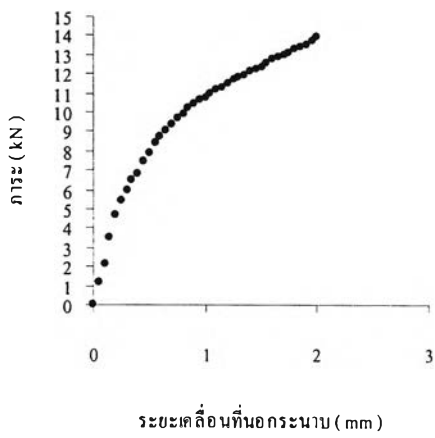


Southwell plot 240 x 240 D1

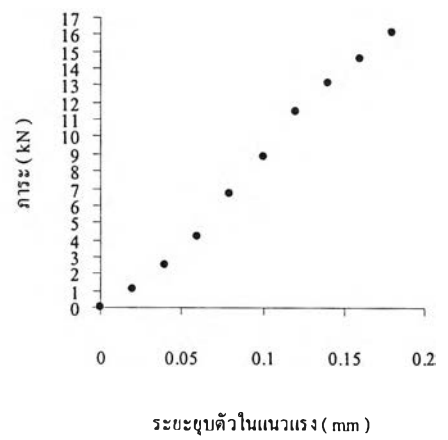


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 240 x 240 D2

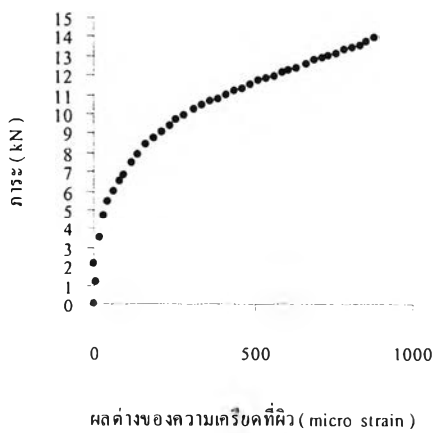
ระยะเคลื่อนที่ของกระบวน 240 x 240 D2



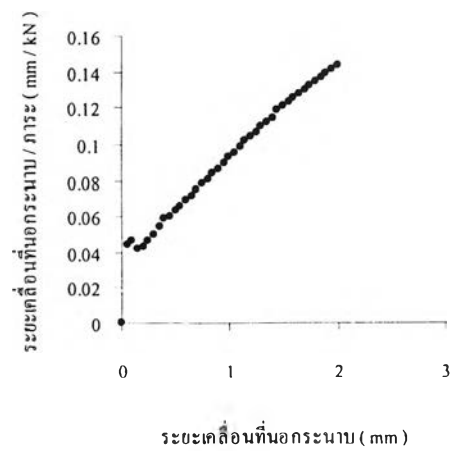
end-shortening 240 x 240 D2



ผลต่างความเครียด 240 x 240 D2

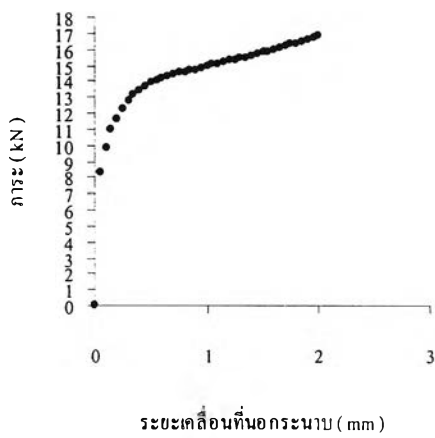


Southwell plot 240 x 240 D2

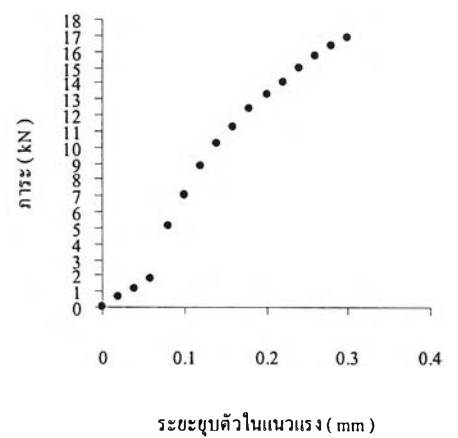


กราฟพฤติกรรมการโก่งของแผ่นทดสอบ 360 x 180 A1

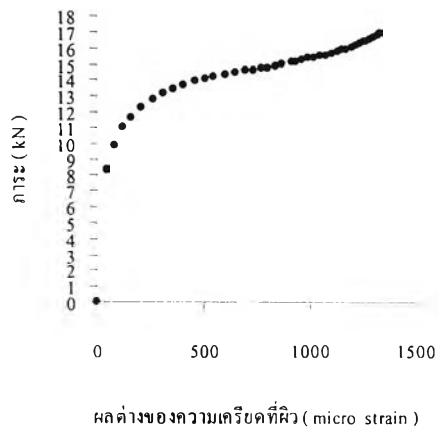
ระยะเคลื่อนที่ออกกระนาบ 360 x 180 A1



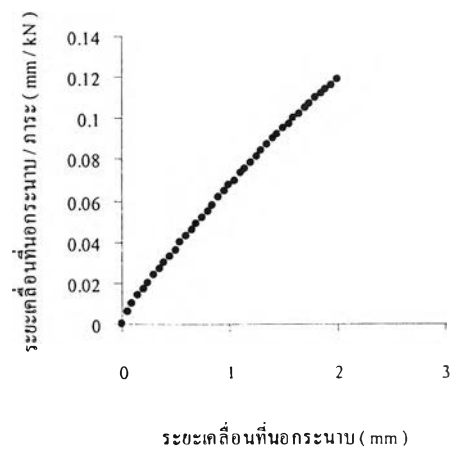
end-shortening 360 x 180 A1



ผลต่างความเครียด 360 x 180 A1

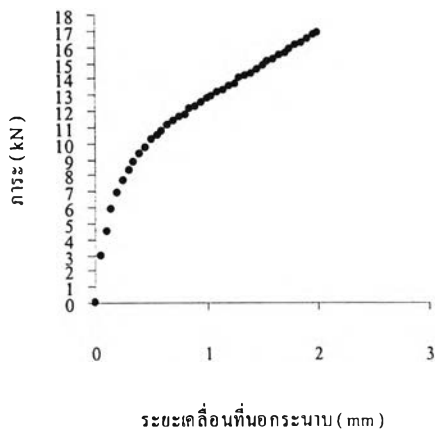


Southwell plot 360 x 180 A1

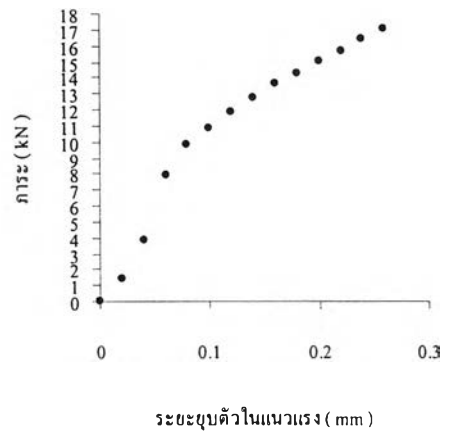


กราฟพฤติกรรมการโก่งของแผ่นทดสอบ 360 x 180 A2

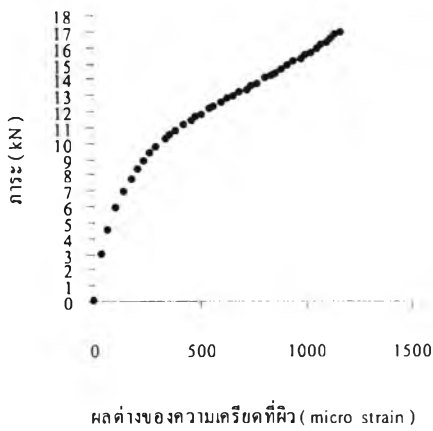
ระยะเคลื่อนที่ออกกระนาบ 360 x 180 A2



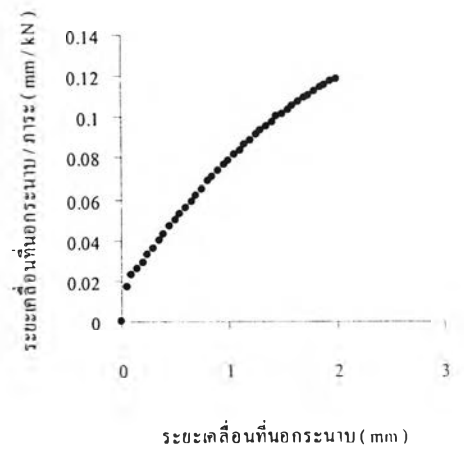
end-shortening 360 x 180 A2



ผลต่างความเครียด 360 x 180 A2

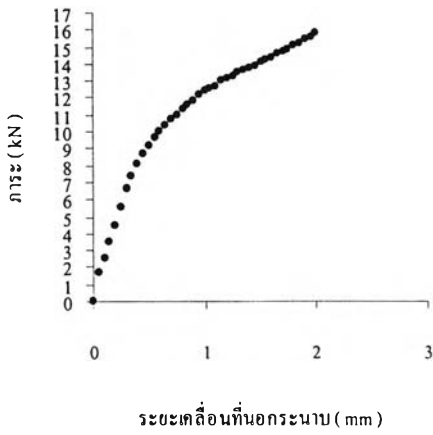


Southwell plot 360 x 180 A2

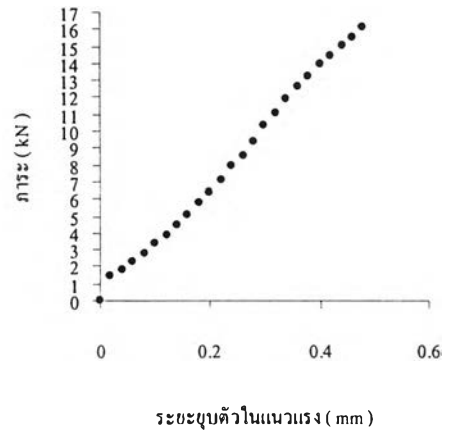


กราฟพฤติกรรมการ โกงงอของแผ่นทดสอบ 360 x 180 B1

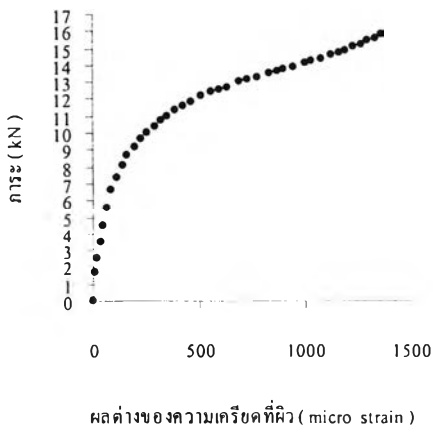
ระยะเคลื่อนที่นอกกระนาบ 360 x 180 B1



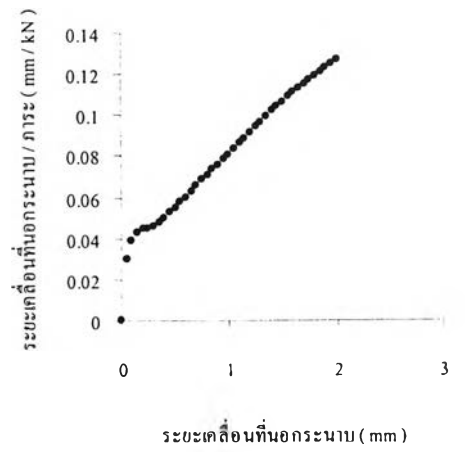
end-shortening 360 x 180 B1



ผลต่างความเครียด 360 x 180 B1

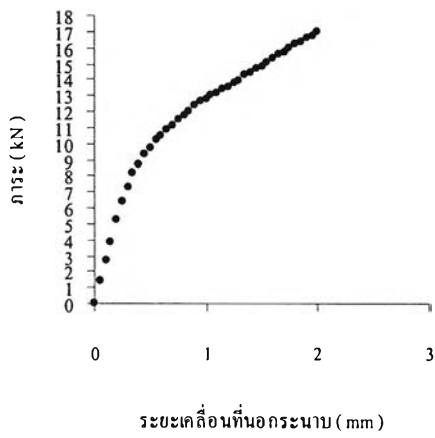


Southwell plot 360 x 180 B1

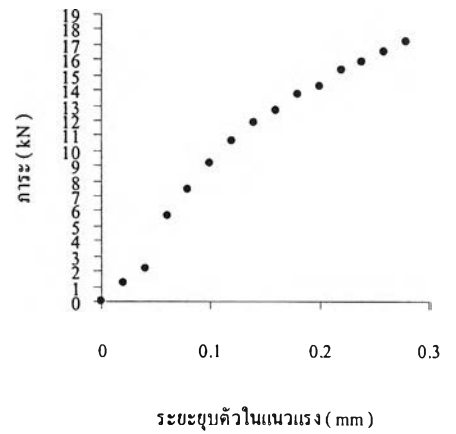


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 360 x 180 B2

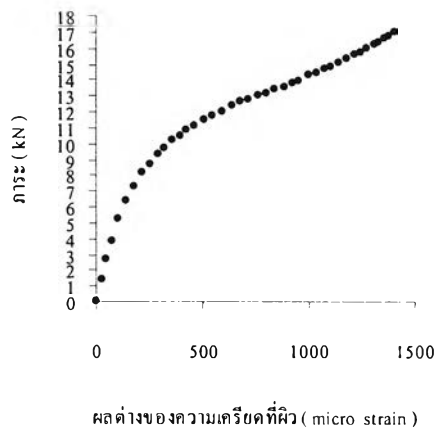
ระยะเคลื่อนที่ออกกระนาบ 360 x 180 B2



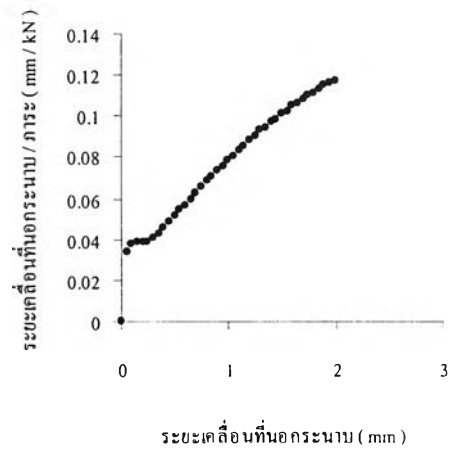
end-shortening 360 x 180 B2



ผลต่างความเครียด 360 x 180 B2



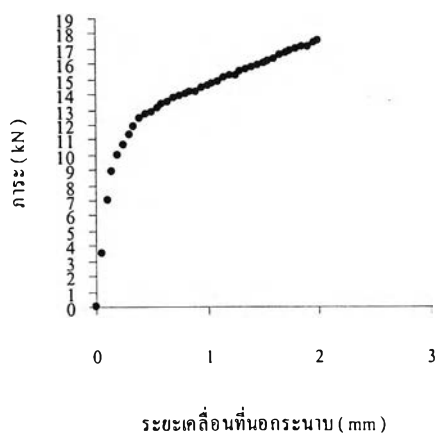
Southwell plot 360 x 180 B2



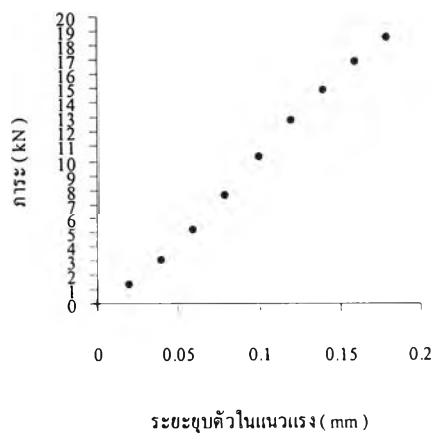


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 360 x 180 C1

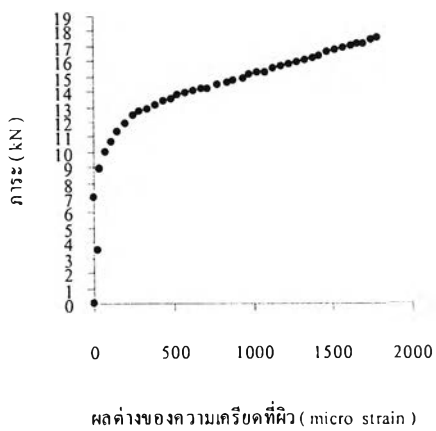
ระยะเคลื่อนที่ออกกระนาบ 360 x 180 C1



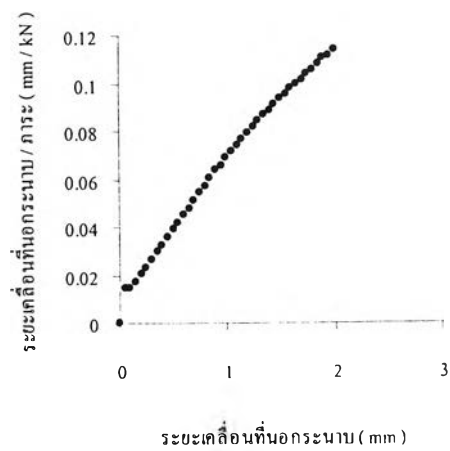
end-shortening 360 x 180 C1



ผลต่างความเครียด 360 x 180 C1

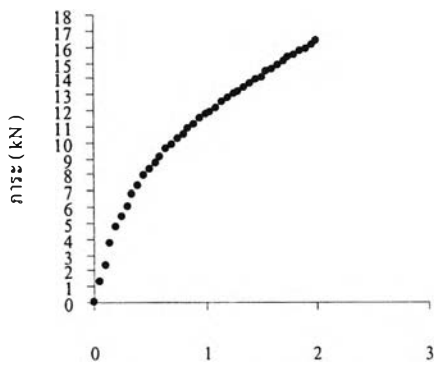


Southwell plot 360 x 180 C1



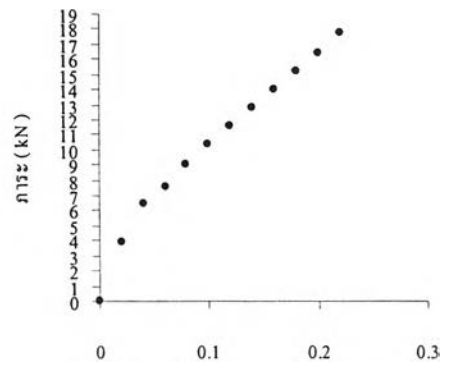
กราฟพฤติกรรมการโก่งของแผ่นทดสอบ 360 x 180 C2

ระยะเคลื่อนที่นอกกระนาบ 360 x 180 C2



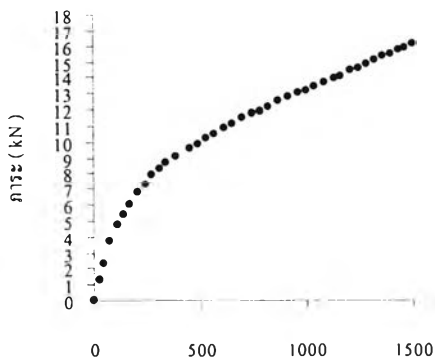
ระยะเคลื่อนที่นอกกระนาบ (mm)

end-shortening 360 x 180 C2



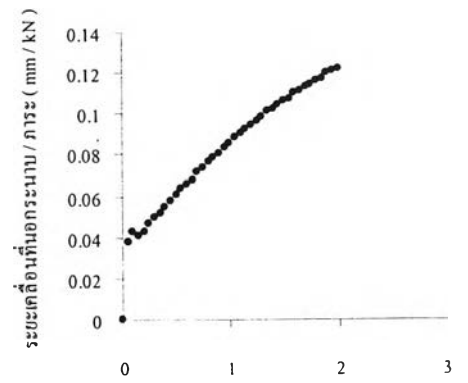
ระยะขยุบตัวในแนวแรง (mm)

ผลต่างความเครียด 360 x 180 C2



ผลต่างของความเครียดที่ผิว (micro strain)

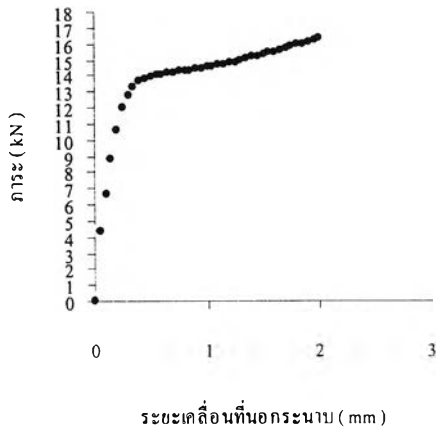
Southwell plot 360 x 180 C2



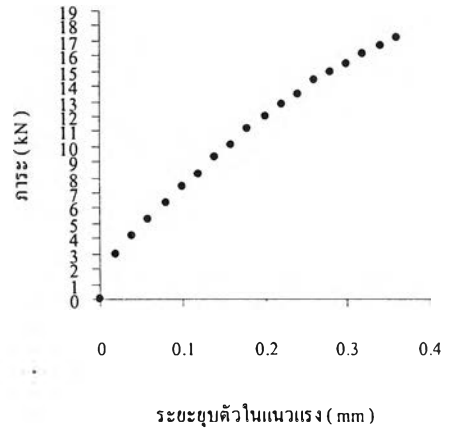
ระยะเคลื่อนที่นอกกระนาบ (mm)

### กราฟพฤติกรรมการ โกงงอของแผ่นทดสอบ 360 x 180 D1

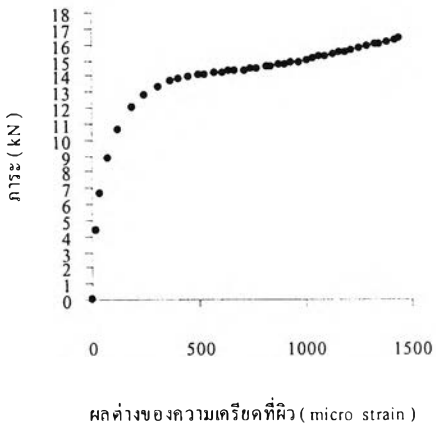
ระยะเคลื่อนที่นอกระนาบ 360 x 180 D1



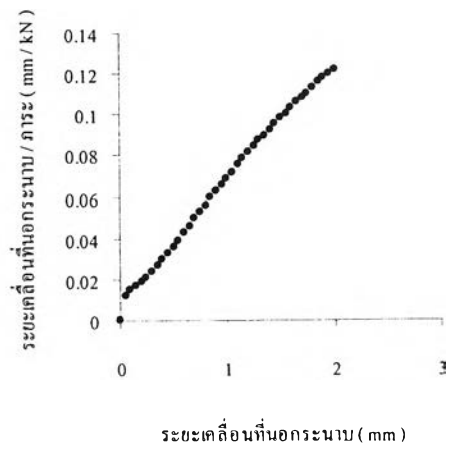
end-shortening 360 x 180 D1



ผลต่างความเครียด 360 x 180 D1

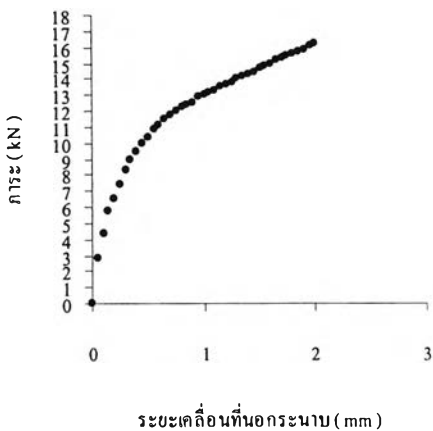


Southwell plot 360 x 180 D1

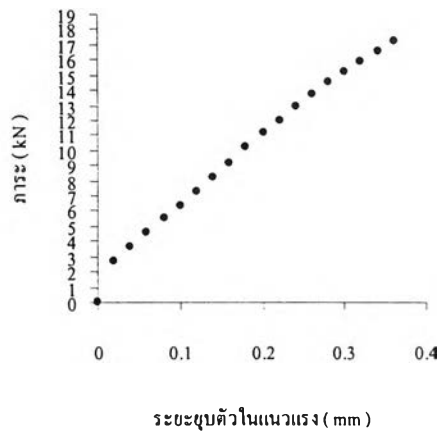


กราฟพฤติกรรมการโค้งงอของแผ่นทดสอบ 360 x 180 D2

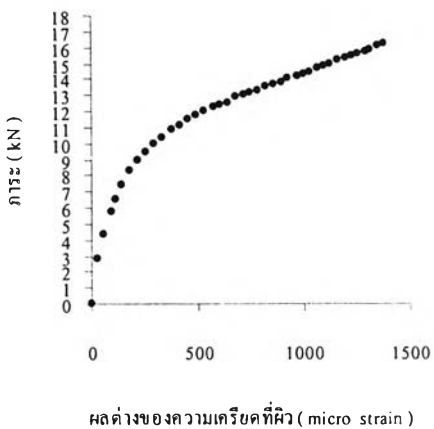
ระยะเคลื่อนที่ที่รองรับ 360 x 180 D2



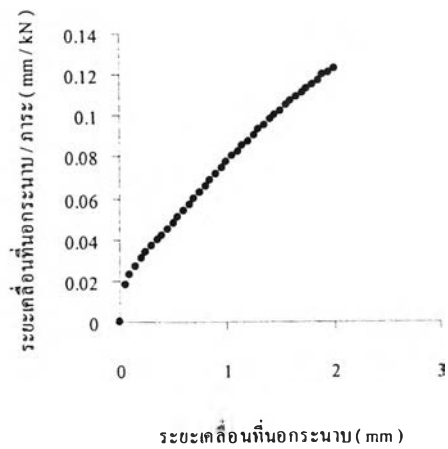
end-shortening 360 x 180 D2



ผลต่างความเครียด 360 x 180 D2

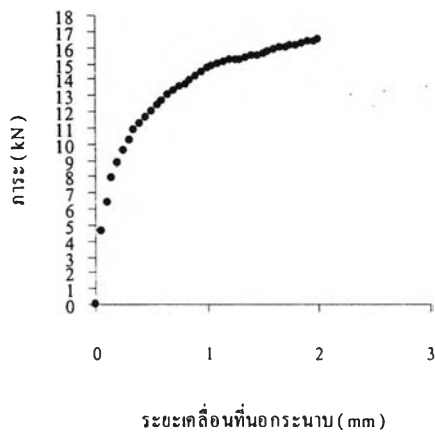


Southwell plot 360 x 180 D2

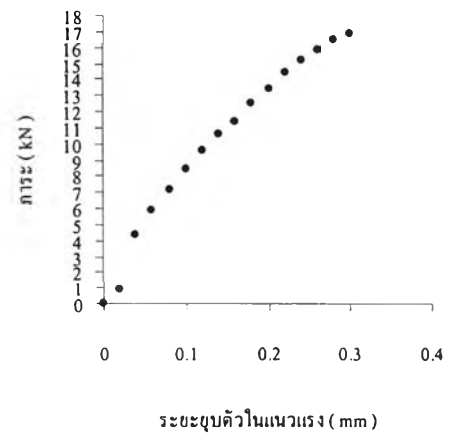


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 270 x 180 A1

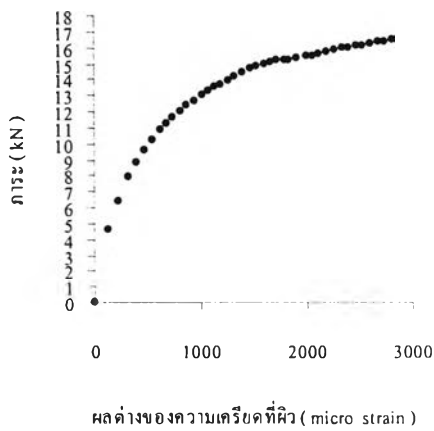
ระยะเคลื่อนที่บนกระดาน 270 x 180 A1



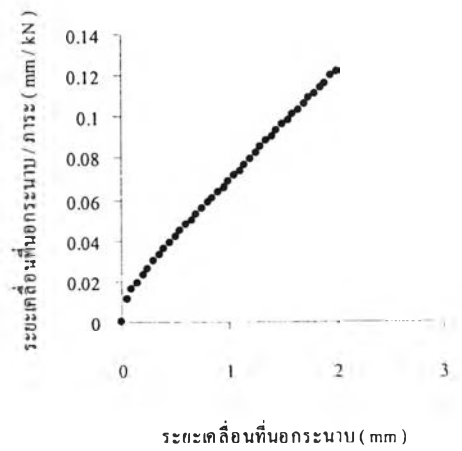
end-shortening 270 x 180 A1



ผลต่างความเครียด 270 x 180 A1

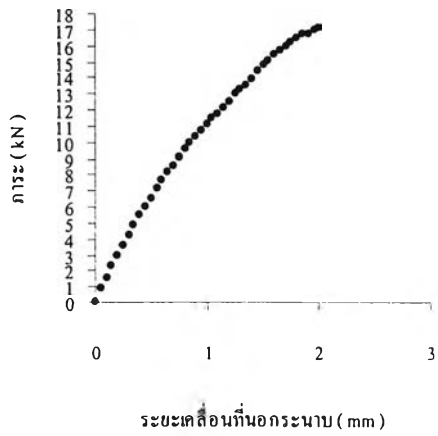


Southwell plot 270 x 180 A1

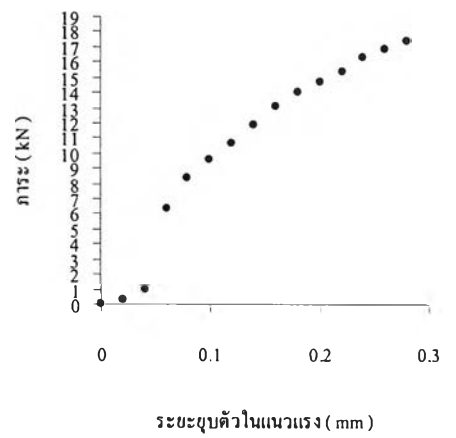


### กราฟพฤติกรรมการโค้งงอของแผ่นทดสอบ 270 x 180 A2

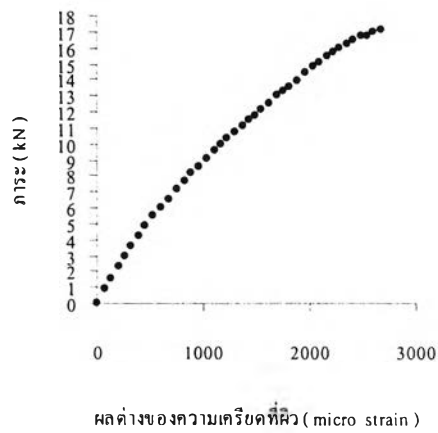
ระยะเคลื่อนที่นอกกระนาบ 270 x 180 A2



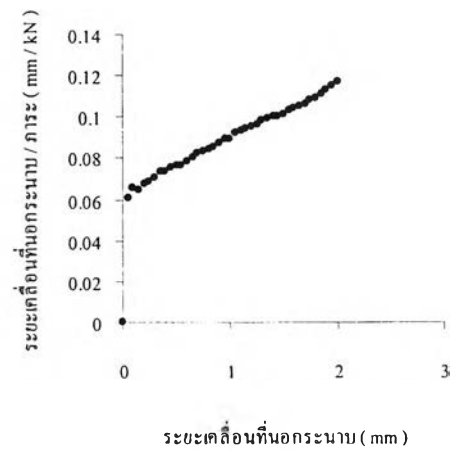
end-shortening 270 x 180 A2



ผลต่างความเครียด 270 x 180 A2

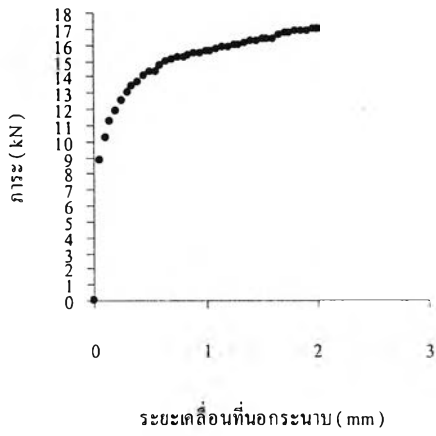


Southwell plot 270 x 180 A2

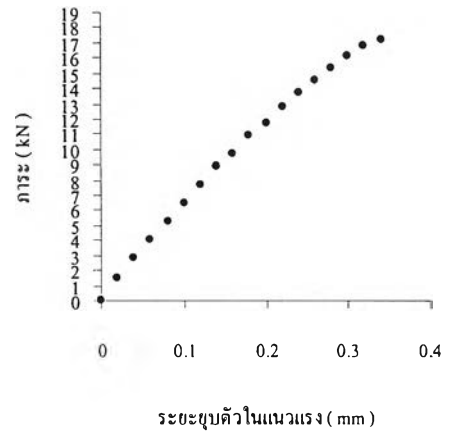


### กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 270 x 180 B1

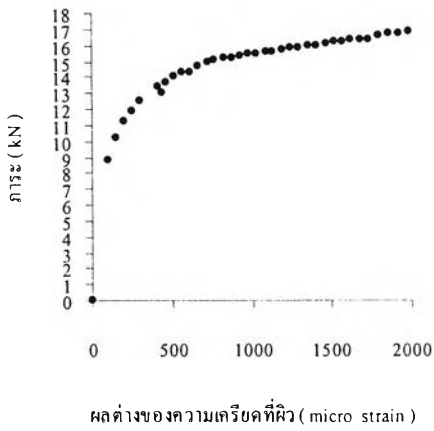
ระยะเคลื่อนที่ของกระดาน 270 x 180 B1



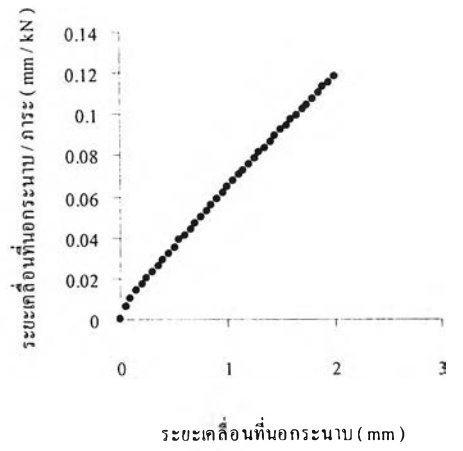
end-shortening 270 x 180 B1



ผลต่างความเครียด 270 x 180 B1

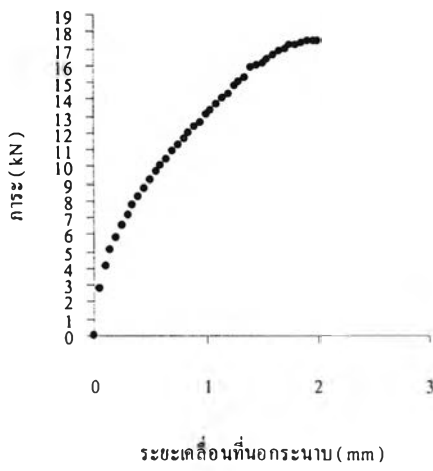


Southwell plot 270 x 180 B1

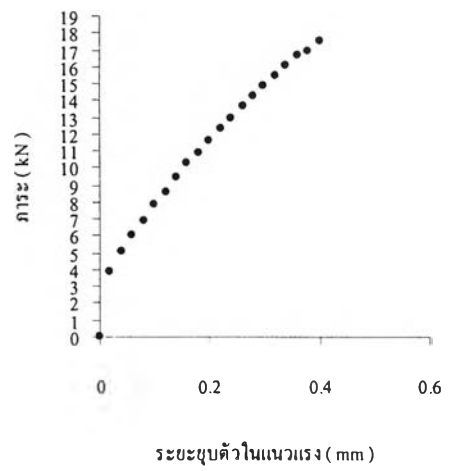


กราฟพฤติกรรมการ โกงงอของแผ่นทดสอบ 270 x 180 B2

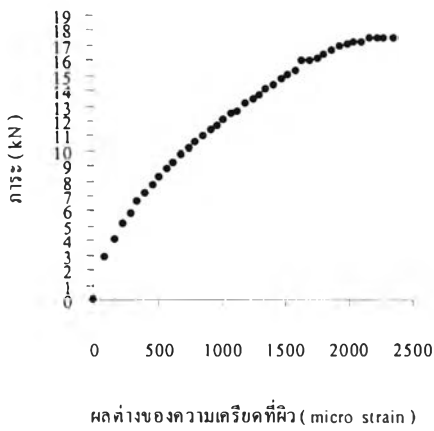
ระยะเคลื่อนที่นอกกระนาบ 270 x 180 B2



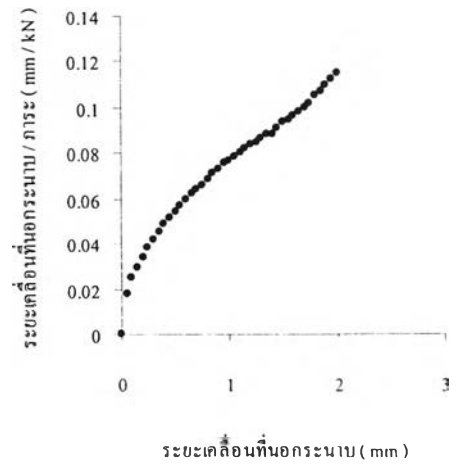
end-shortening 270 x 180 B2



ผลต่างความเครียด 270 x 180 B2



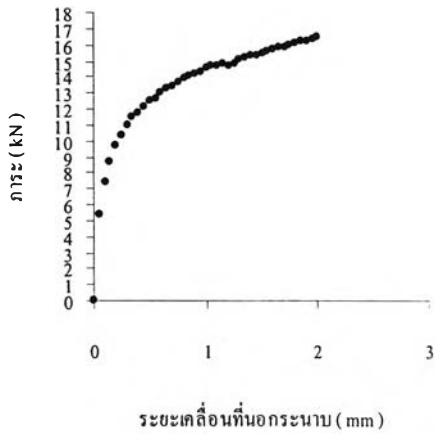
Southwell plot 270 x 180 B2



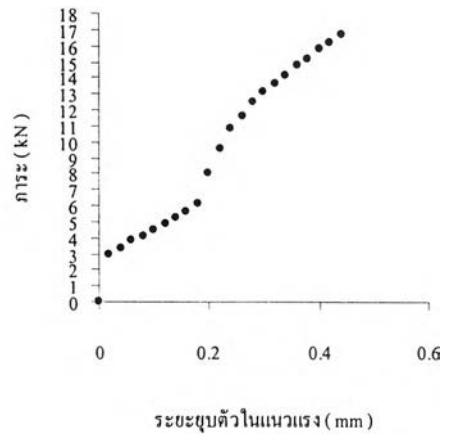


### กราฟพฤติกรรมการ โกงงอของแผ่นทดสอบ 270 x 180 C1

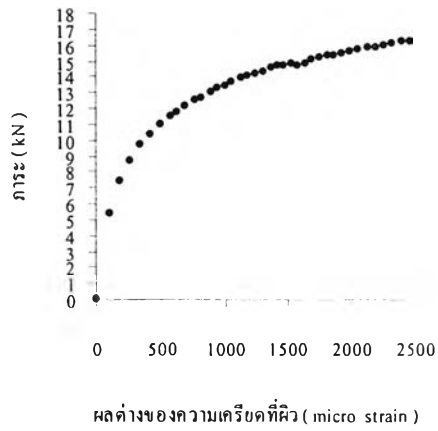
ระยะเคลื่อนที่ที่นอกระนาบ 270 x 180 C1



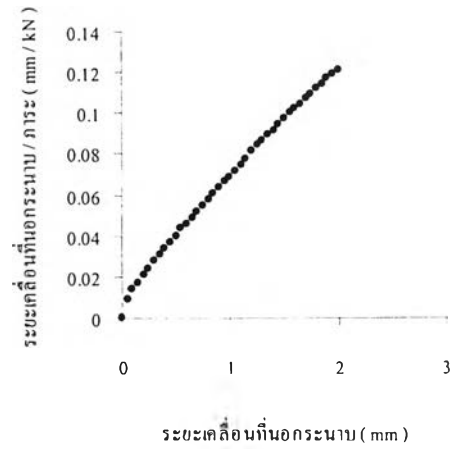
end-shortening 270 x 180 C1



ผลต่างความเครียด 270 x 180 C1

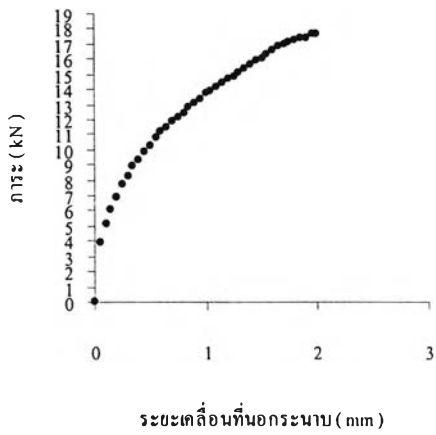


Southwell plot 270 x 180 C1

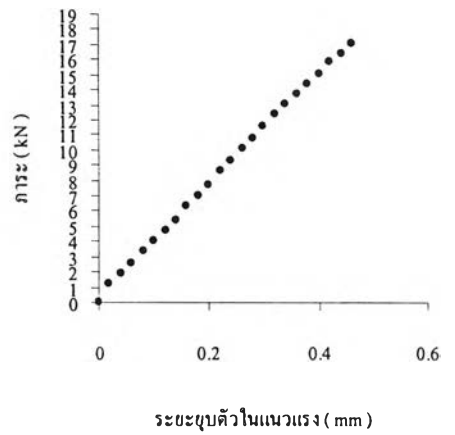


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 270 x 180 C2

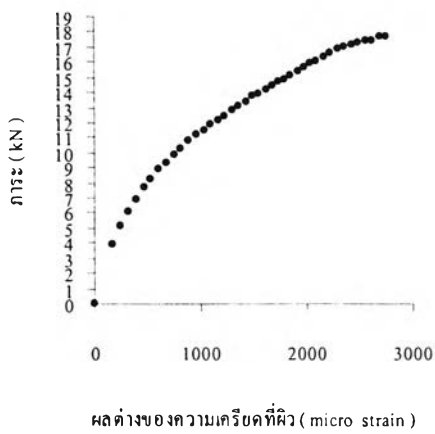
ระยะเคลื่อนที่ออกกระนาบ 270 x 180 C2



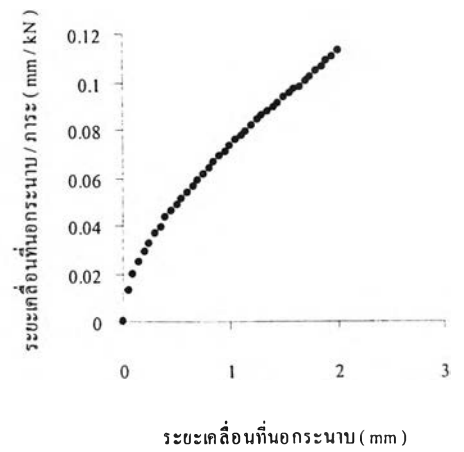
end-shortening 270 x 180 C2



ผลต่างความเครียด 270 x 180 C2

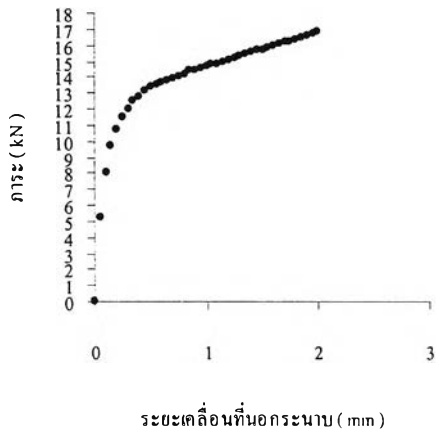


Southwell plot 270 x 180 C2

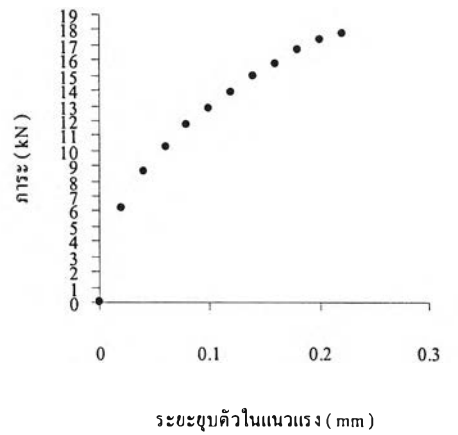


### กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 270 x 180 D1

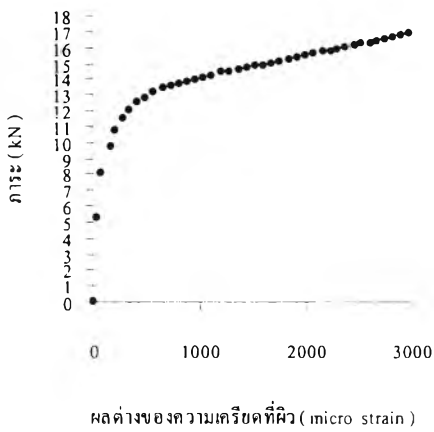
ระยะเคลื่อนที่นอกกระนาบ 270 x 180 D1



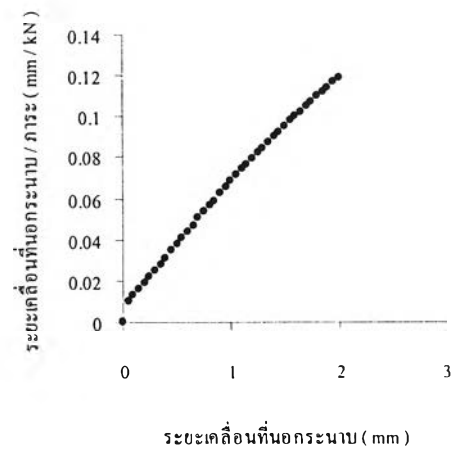
end-shortening 270 x 180 D1



ผลต่างความเครียด 270 x 180 D1

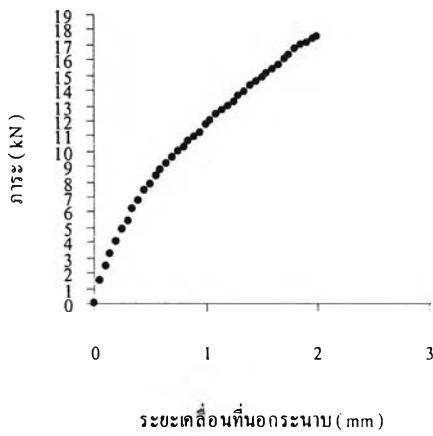


Southwell plot 270 x 180 D1

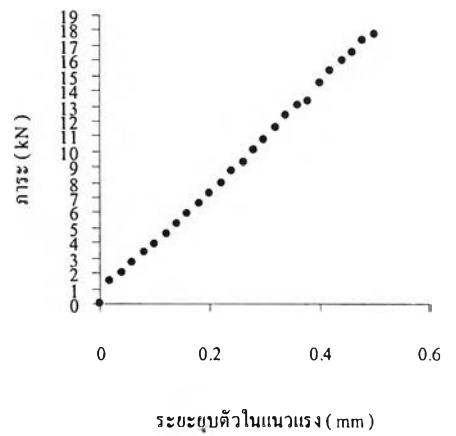


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 270 x 180 D2

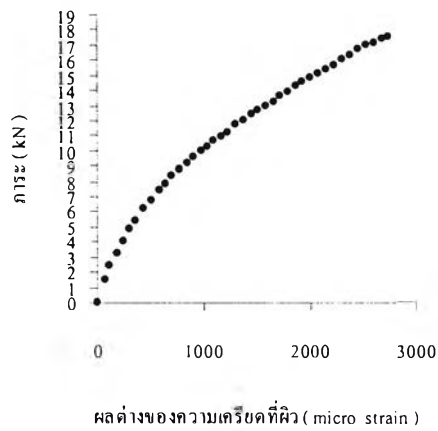
ระยะเคลื่อนที่ของกระนาบ 270 x 180 D2



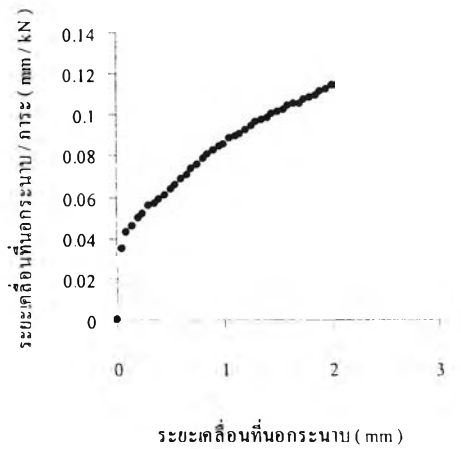
end-shortening 270 x 180 D2



ผลต่างความเครียด 270 x 180 D2



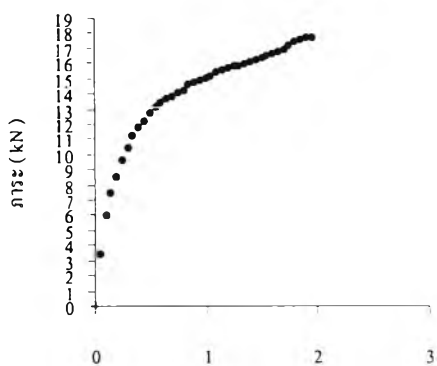
Southwell plot 270 x 180 D2





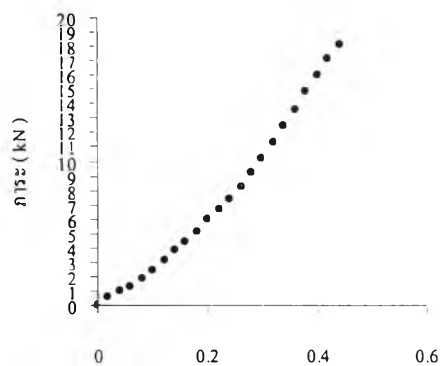
### กราฟพฤติกรรมการ โกงงอของแผ่นทดสอบ 180 x 180 A1

ระยะเคลื่อนที่ของกระนาบ 180 x 180 A1



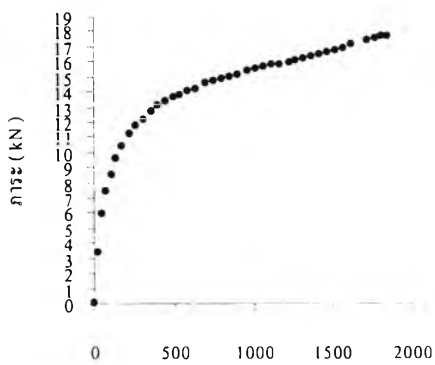
ระยะเคลื่อนที่ของกระนาบ (mm)

end-shortening 180 x 180 A1



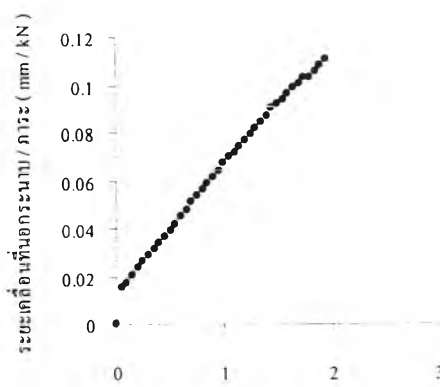
ระยะขยุบตัวในแนวแรง (mm)

ผลต่างความเครียด 180 x 180 A1



ผลต่างของความเครียดที่ผิว (micro strain)

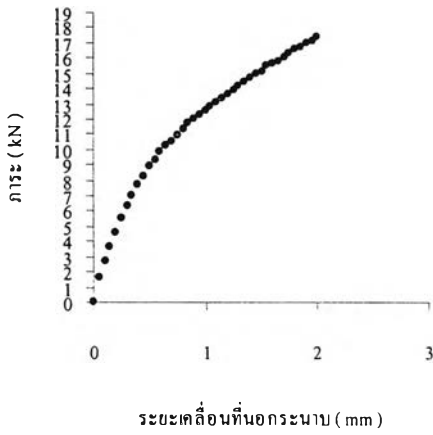
Southwell plot 180 x 180 A1



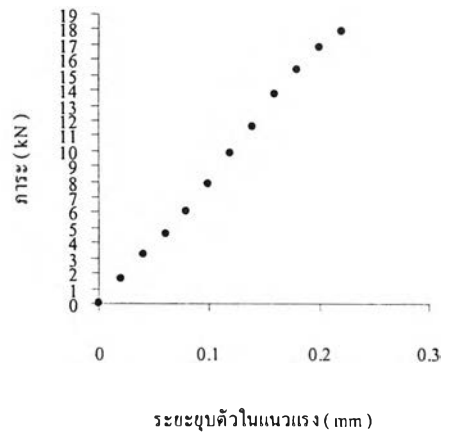
ระยะเคลื่อนที่ของกระนาบ (mm)

กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 180 x 180 A2

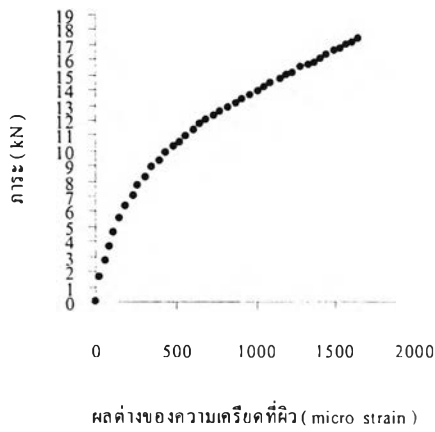
ระยะเคลื่อนที่ของกระนาบ 180 x 180 A2



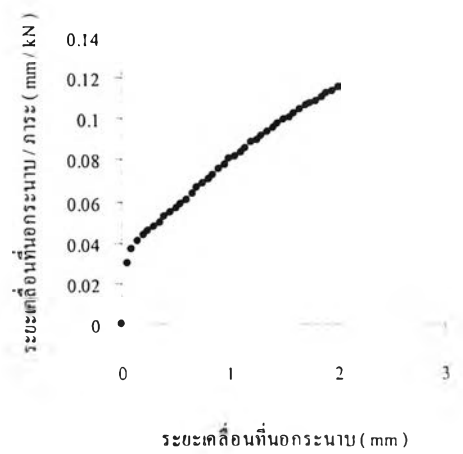
end-shortening 180 x 180 A2



ผลต่างความเครียด 180 x 180 A2

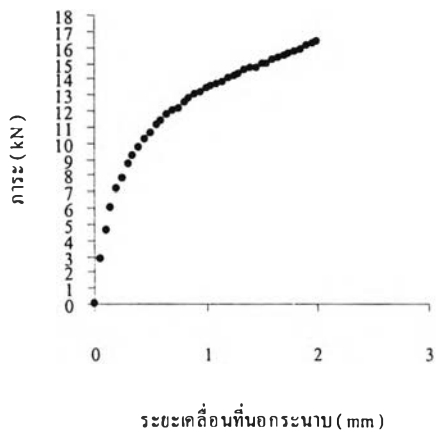


Southwell plot 180 x 180 A2

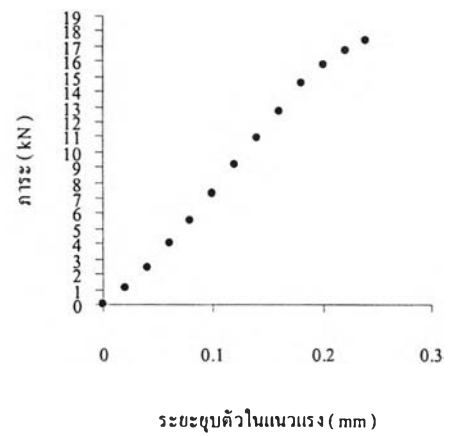


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 180 x 180 B1

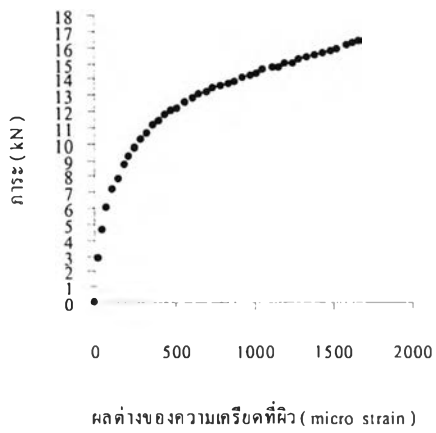
ระยะเคลื่อนที่ออกกระนาบ 180 x 180 B1



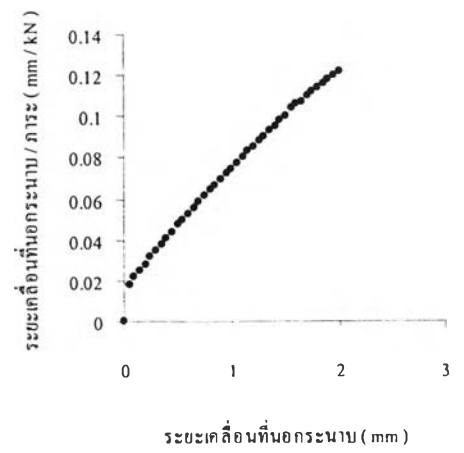
end-shortening 180 x 180 B1



ผลต่างความเครียด 180 x 180 B1

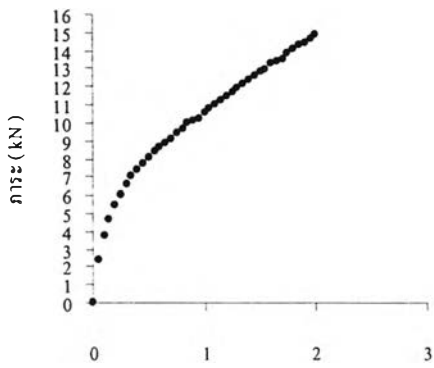


Southwell plot 180 x 180 B1



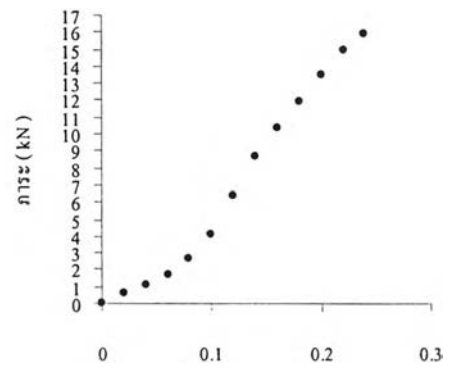
กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 180 x 180 B2

ระยะเคลื่อนที่ออกกระนาบ 180 x 180 B2



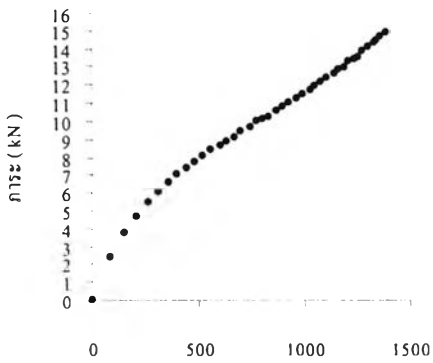
ระยะเคลื่อนที่ออกกระนาบ (mm)

end-shortening 180 x 180 B2



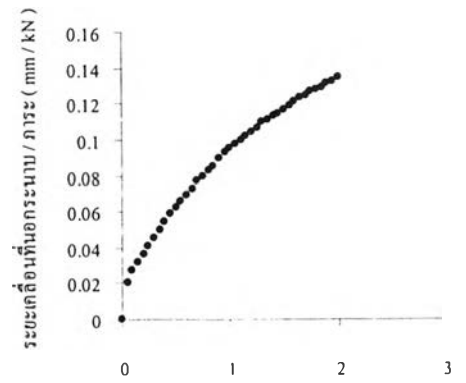
ระยะขยุบตัวในแนวแรง (mm)

ผลต่างความเครียด 180 x 180 B2



ผลต่างของความเครียดที่ผิว (micro strain)

Southwell plot 180 x 180 B2

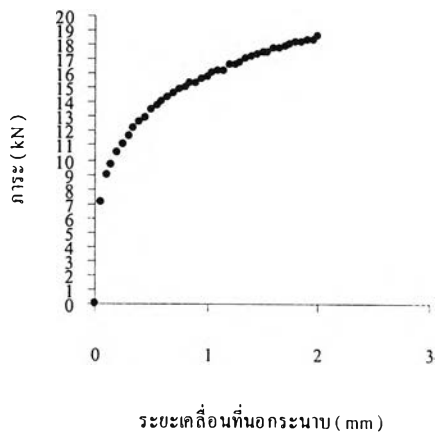


ระยะเคลื่อนที่ออกกระนาบ (mm)

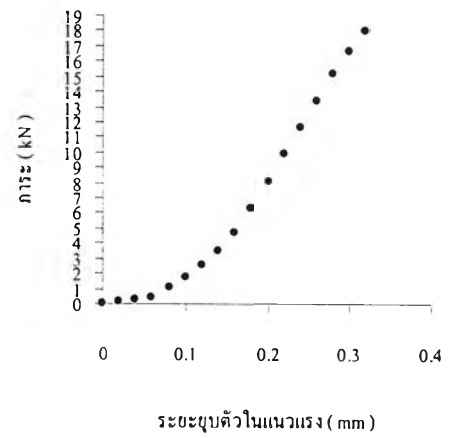


### กราฟพฤติกรรมการโค้งงอของแผ่นทดสอบ 180 x 180 C1

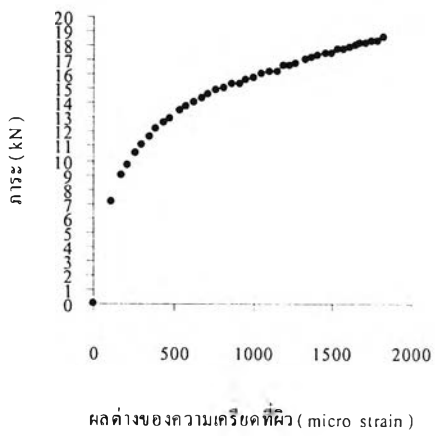
ระยะเคลื่อนที่ของกระนาบ 180 x 180 C1



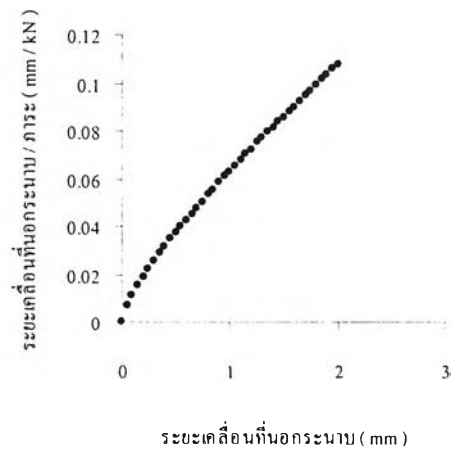
end-shortening 180 x 180 C1



ผลต่างความเครียด 180 x 180 C1

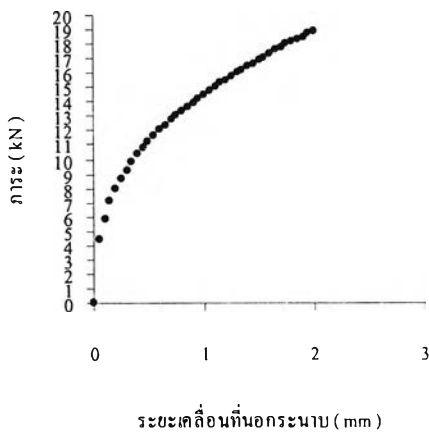


Southwell plot 180 x 180 C1

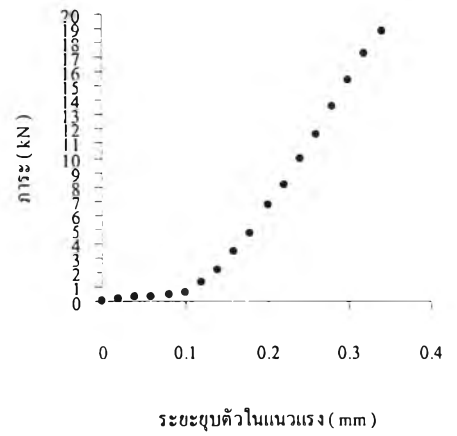


กราฟพฤติกรรมการโก่งงอของแผ่นทดสอบ 180 x 180 C2

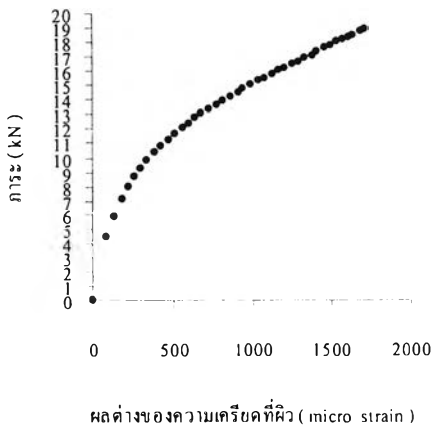
ระยะเคลื่อนที่นอกกระนาบ 180 x 180 C2



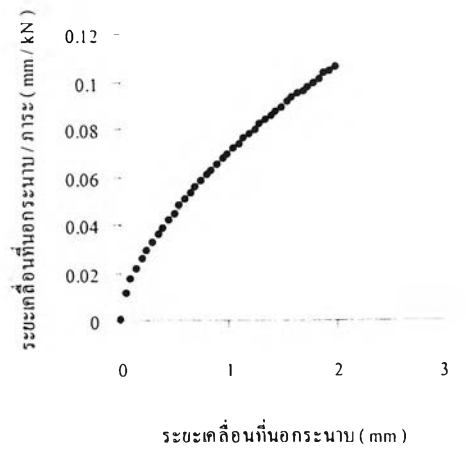
end-shortening 180 x 180 C2



ผลต่างความเครียด 180 x 180 C2

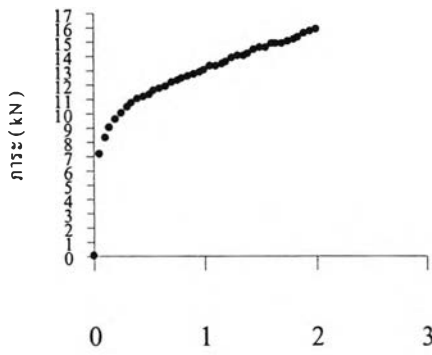


Southwell plot 180 x 180 C2



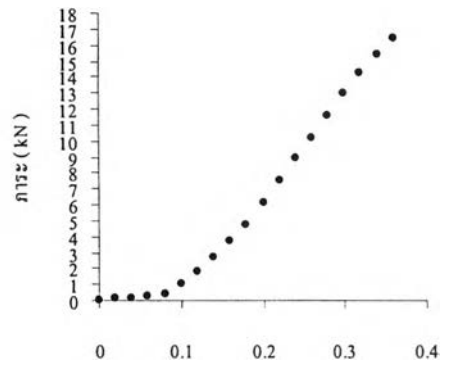
กราฟพฤติกรรมการโก่งของแผ่นทดสอบ 180 x 180 D1

ระยะเคลื่อนที่ของกระนาบ 180 x 180 D1



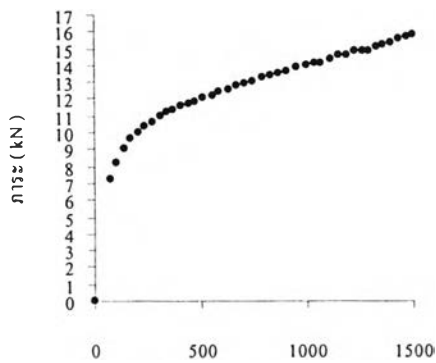
ระยะเคลื่อนที่ของกระนาบ (mm)

end-shortening 180 x 180 D1



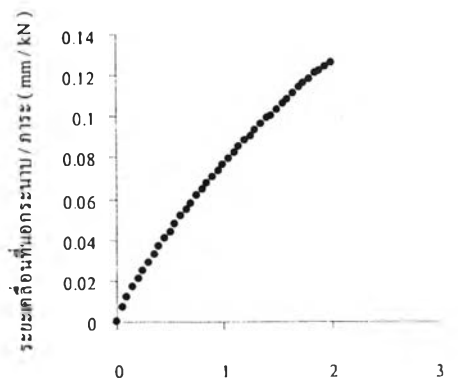
ระยะยุบตัวในแนวแรง (mm)

ผลต่างความเครียด 180 x 180 D1



ผลต่างของความเครียดที่ผิว (micro strain)

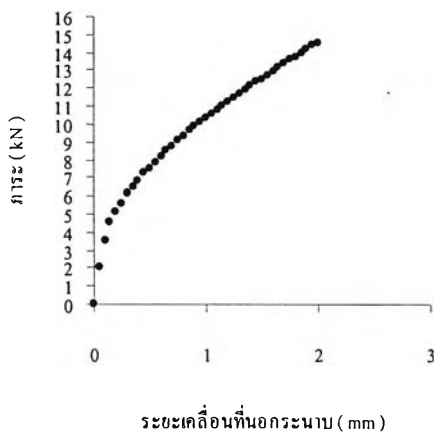
Southwell plot 180 x 180 D1



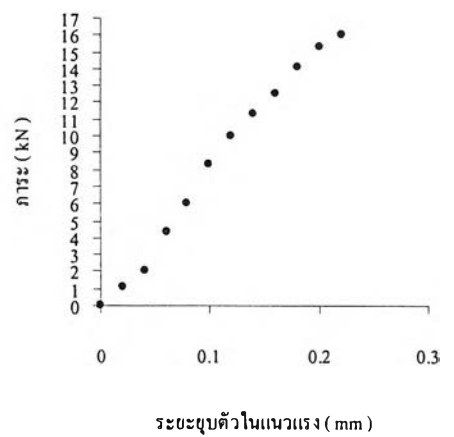
ระยะเคลื่อนที่ของกระนาบ (mm)

กราฟพฤติกรรมการ โกงงอของแผ่นทดสอบ 180 x 180 D2

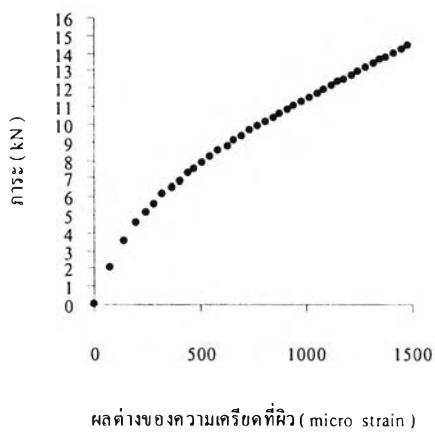
ระยะเคลื่อนที่นอกกระนาบ 180 x 180 D2



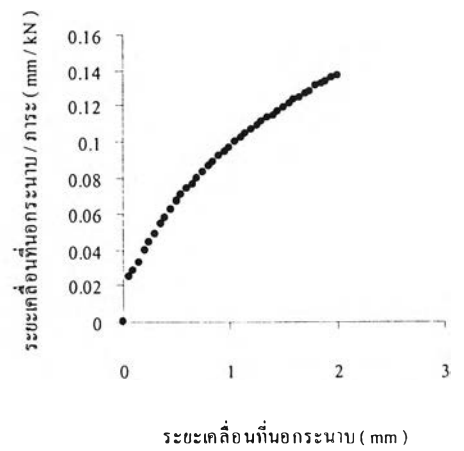
end-shortening 180 x 180 D2



ผลต่างความเครียด 180 x 180 D2



Southwell plot 180 x 180 D2





**ภาคผนวก ข**

**ค่าพารามิเตอร์สำหรับเขียนกราฟพฤติกรรมการโค้งงอ**

## แผ่นทดสอบขนาด 480 มม x 240 มม ตัวอย่าง A

| พารามิเตอร์จากการทดลอง 480 x 240 A1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 480 x 240 A2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -44                                 | -52             | 0.05 | 2.99  | 0.05     | 3.13  | -113                                | -133            | 0.05 | 5.03  | 0.05     | 4.36  |
| -73                                 | -88             | 0.1  | 4.16  | 0.1      | 5.09  | -137                                | -162            | 0.1  | 5.93  | 0.1      | 5.86  |
| -92                                 | -116            | 0.15 | 4.96  | 0.15     | 6.89  | -157                                | -189            | 0.15 | 6.69  | 0.15     | 7.09  |
| -107                                | -139            | 0.2  | 5.69  | 0.2      | 8.96  | -170                                | -206            | 0.2  | 7.29  | 0.2      | 8.26  |
| -119                                | -158            | 0.25 | 6.23  | 0.25     | 10.56 | -183                                | -227            | 0.25 | 7.86  | 0.25     | 9.43  |
| -127                                | -175            | 0.3  | 6.66  | 0.3      | 11.89 | -195                                | -243            | 0.3  | 8.39  | 0.3      | 10.53 |
| -138                                | -193            | 0.35 | 7.16  | 0.35     | 13.09 | -201                                | -259            | 0.35 | 8.83  | 0.35     | 11.53 |
| -145                                | -208            | 0.4  | 7.53  | 0.4      | 14.36 | -208                                | -272            | 0.4  | 9.19  | 0.4      | 12.46 |
| -150                                | -221            | 0.45 | 7.86  |          |       | -215                                | -285            | 0.45 | 9.53  | 0.45     | 13.43 |
| -155                                | -236            | 0.5  | 8.23  |          |       | -215                                | -296            | 0.5  | 9.83  | 0.5      | 14.33 |
| -160                                | -250            | 0.55 | 8.56  |          |       | -217                                | -306            | 0.55 | 10.03 | 0.55     | 15.33 |
| -161                                | -264            | 0.6  | 8.89  |          |       | -217                                | -316            | 0.6  | 10.26 |          |       |
| -161                                | -274            | 0.65 | 9.09  |          |       | -215                                | -326            | 0.65 | 10.49 |          |       |
| -164                                | -286            | 0.7  | 9.36  |          |       | -211                                | -337            | 0.7  | 10.66 |          |       |
| -165                                | -297            | 0.75 | 9.53  |          |       | -205                                | -346            | 0.75 | 10.79 |          |       |
| -165                                | -309            | 0.8  | 9.79  |          |       | -196                                | -355            | 0.8  | 10.86 |          |       |
| -164                                | -318            | 0.85 | 10.03 |          |       | -185                                | -363            | 0.85 | 10.93 |          |       |
| -163                                | -330            | 0.9  | 10.23 |          |       | -175                                | -371            | 0.9  | 10.93 |          |       |
| -160                                | -339            | 0.95 | 10.36 |          |       | -160                                | -379            | 0.95 | 10.96 |          |       |
| -155                                | -348            | 1    | 10.46 |          |       | -143                                | -387            | 1    | 10.93 |          |       |
| -152                                | -357            | 1.05 | 10.66 |          |       | -133                                | -396            | 1.05 | 10.96 |          |       |
| -147                                | -365            | 1.1  | 10.73 |          |       | -121                                | -403            | 1.1  | 10.99 |          |       |
| -138                                | -375            | 1.15 | 10.86 |          |       | -110                                | -412            | 1.15 | 11.03 |          |       |
| -131                                | -382            | 1.2  | 10.96 |          |       | -98                                 | -421            | 1.2  | 11.09 |          |       |
| -119                                | -391            | 1.25 | 11.06 |          |       | -87                                 | -429            | 1.25 | 11.13 |          |       |
| -108                                | -397            | 1.3  | 11.09 |          |       | -78                                 | -436            | 1.3  | 11.19 |          |       |
| -95                                 | -407            | 1.35 | 11.16 |          |       | -64                                 | -442            | 1.35 | 11.16 |          |       |
| -83                                 | -412            | 1.4  | 11.13 |          |       | -57                                 | -453            | 1.4  | 11.29 |          |       |
| -70                                 | -420            | 1.45 | 11.16 |          |       | -46                                 | -463            | 1.45 | 11.43 |          |       |
| -57                                 | -429            | 1.5  | 11.29 |          |       | -36                                 | -473            | 1.5  | 11.49 |          |       |
| -46                                 | -437            | 1.55 | 11.36 |          |       | -27                                 | -479            | 1.55 | 11.59 |          |       |
| -37                                 | -446            | 1.6  | 11.46 |          |       | -17                                 | -488            | 1.6  | 11.73 |          |       |
| -26                                 | -455            | 1.65 | 11.53 |          |       | -6                                  | -499            | 1.65 | 11.86 |          |       |
| -17                                 | -462            | 1.7  | 11.66 |          |       | 0                                   | -507            | 1.7  | 11.99 |          |       |
| -9                                  | -471            | 1.75 | 11.73 |          |       | 8                                   | -513            | 1.75 | 12.09 |          |       |
| 0                                   | -479            | 1.8  | 11.86 |          |       | 19                                  | -522            | 1.8  | 12.23 |          |       |
| 9                                   | -487            | 1.85 | 11.96 |          |       | 27                                  | -529            | 1.85 | 12.33 |          |       |
| 18                                  | -495            | 1.9  | 12.06 |          |       | 37                                  | -537            | 1.9  | 12.46 |          |       |
| 27                                  | -503            | 1.95 | 12.19 |          |       | 45                                  | -543            | 1.95 | 12.59 |          |       |
| 33                                  | -510            | 2    | 12.29 |          |       | 54                                  | -552            | 2    | 12.69 |          |       |

$\varepsilon_a, \varepsilon_b$  คือความเครียดที่ผิวด้านหน้าและหลังตามลำดับหน่วย micro strain

$P_1, P_2$  คือภาระจากการทดลองช่วงที่ 1 และ 2 ตามลำดับหน่วย kN

$w$  คือระยะเคลื่อนที่นอกกระนาบหน่วย mm

$\delta$  คือระยะยุบตัวในแนวแรงหน่วย mm

## แผ่นทดสอบขนาด 480 มม x 240 มม ตัวอย่าง B

| พารามิเตอร์จากการทดลอง 480 x 240 B1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 480 x 240 B2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -84                                 | -64             | 0.05 | 5.19  | 0.05     | 1.06  | -27                                 | -19             | 0.05 | 1.89  | 0.05     | 1.89  |
| -142                                | -106            | 0.1  | 7.23  | 0.1      | 1.96  | -52                                 | -36             | 0.1  | 3.26  | 0.1      | 3.96  |
| -160                                | -117            | 0.15 | 7.76  | 0.15     | 2.89  | -80                                 | -54             | 0.15 | 4.59  | 0.15     | 5.93  |
| -181                                | -122            | 0.2  | 8.26  | 0.2      | 3.86  | -103                                | -67             | 0.2  | 5.49  | 0.2      | 7.73  |
| -192                                | -123            | 0.25 | 8.49  | 0.25     | 5.06  | -123                                | -79             | 0.25 | 6.13  | 0.25     | 9.39  |
| -205                                | -122            | 0.3  | 8.79  | 0.3      | 6.73  | -148                                | -87             | 0.3  | 6.79  | 0.3      | 10.99 |
| -215                                | -122            | 0.35 | 9.03  | 0.35     | 8.56  | -165                                | -90             | 0.35 | 7.23  | 0.35     | 12.36 |
| -227                                | -120            | 0.4  | 9.23  | 0.4      | 10.29 | -178                                | -92             | 0.4  | 7.53  | 0.4      | 13.66 |
| -238                                | -118            | 0.45 | 9.43  | 0.45     | 11.93 | -192                                | -92             | 0.45 | 7.83  | 0.45     | 14.99 |
| -246                                | -116            | 0.5  | 9.63  | 0.5      | 13.36 | -205                                | -93             | 0.5  | 8.13  |          |       |
| -258                                | -112            | 0.55 | 9.83  | 0.55     | 14.48 | -218                                | -92             | 0.55 | 8.39  |          |       |
| -265                                | -108            | 0.6  | 9.93  |          |       | -230                                | -90             | 0.6  | 8.63  |          |       |
| -276                                | -103            | 0.65 | 10.13 |          |       | -242                                | -87             | 0.65 | 8.86  |          |       |
| -284                                | -97             | 0.7  | 10.29 |          |       | -252                                | -84             | 0.7  | 9.06  |          |       |
| -293                                | -93             | 0.75 | 10.39 |          |       | -267                                | -79             | 0.75 | 9.23  |          |       |
| -302                                | -86             | 0.8  | 10.56 |          |       | -272                                | -77             | 0.8  | 9.43  |          |       |
| -312                                | -80             | 0.85 | 10.69 |          |       | -282                                | -73             | 0.85 | 9.63  |          |       |
| -318                                | -76             | 0.9  | 10.76 |          |       | -290                                | -67             | 0.9  | 9.76  |          |       |
| -327                                | -70             | 0.95 | 10.93 |          |       | -300                                | -55             | 0.95 | 9.96  |          |       |
| -335                                | -65             | 1    | 11.09 |          |       | -309                                | -51             | 1    | 10.09 |          |       |
| -345                                | -57             | 1.05 | 11.23 |          |       | -318                                | -44             | 1.05 | 10.23 |          |       |
| -353                                | -51             | 1.1  | 11.36 |          |       | -327                                | -39             | 1.1  | 10.36 |          |       |
| -362                                | -42             | 1.15 | 11.49 |          |       | -335                                | -34             | 1.15 | 10.49 |          |       |
| -371                                | -37             | 1.2  | 11.59 |          |       | -346                                | -27             | 1.2  | 10.66 |          |       |
| -378                                | -31             | 1.25 | 11.76 |          |       | -356                                | -20             | 1.25 | 10.83 |          |       |
| -387                                | -23             | 1.3  | 11.89 |          |       | -365                                | -14             | 1.3  | 10.99 |          |       |
| -397                                | -14             | 1.35 | 12.06 |          |       | -374                                | -6              | 1.35 | 11.13 |          |       |
| -405                                | -6              | 1.4  | 12.19 |          |       | -383                                | 1               | 1.4  | 11.29 |          |       |
| -413                                | 0               | 1.45 | 12.33 |          |       | -392                                | 6               | 1.45 | 11.43 |          |       |
| -422                                | 7               | 1.5  | 12.46 |          |       | -398                                | 14              | 1.5  | 11.59 |          |       |
| -429                                | 15              | 1.55 | 12.56 |          |       | -409                                | 22              | 1.55 | 11.76 |          |       |
| -438                                | 22              | 1.6  | 12.69 |          |       | -417                                | 28              | 1.6  | 11.89 |          |       |
| -447                                | 30              | 1.65 | 12.89 |          |       | -427                                | 36              | 1.65 | 12.06 |          |       |
| -456                                | 37              | 1.7  | 13.03 |          |       | -435                                | 43              | 1.7  | 12.19 |          |       |
| -463                                | 44              | 1.75 | 13.16 |          |       | -442                                | 51              | 1.75 | 12.36 |          |       |
| -472                                | 52              | 1.8  | 13.33 |          |       | -451                                | 59              | 1.8  | 12.53 |          |       |
| -480                                | 61              | 1.85 | 13.53 |          |       | -460                                | 67              | 1.85 | 12.66 |          |       |
| -487                                | 67              | 1.9  | 13.63 |          |       | -469                                | 74              | 1.9  | 12.83 |          |       |
| -496                                | 74              | 1.95 | 13.76 |          |       | -475                                | 80              | 1.95 | 12.99 |          |       |
| -503                                | 81              | 2    | 13.89 |          |       | -481                                | 87              | 2    | 13.09 |          |       |

## แผ่นทดสอบขนาด 480 มม x 240 มม ตัวอย่าง C

| พารามิเตอร์จากการทดลอง 480 x 240 C1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 480 x 240 C2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -42                                 | -24             | 0.05 | 1.86  | 0.05     | 2.29  | -55                                 | -42             | 0.05 | 2.06  | 0.05     | 2.36  |
| -68                                 | -44             | 0.1  | 2.73  | 0.1      | 3.63  | -85                                 | -64             | 0.1  | 3.03  | 0.1      | 3.66  |
| -93                                 | -59             | 0.15 | 3.46  | 0.15     | 4.96  | -117                                | -84             | 0.15 | 4.03  | 0.15     | 4.89  |
| -118                                | -77             | 0.2  | 4.26  | 0.2      | 6.53  | -146                                | -99             | 0.2  | 4.89  | 0.2      | 6.46  |
| -144                                | -88             | 0.25 | 4.89  | 0.25     | 8.16  | -174                                | -113            | 0.25 | 5.66  | 0.25     | 8.23  |
| -169                                | -100            | 0.3  | 5.59  | 0.3      | 9.96  | -196                                | -119            | 0.3  | 6.13  | 0.3      | 10.03 |
| -192                                | -109            | 0.35 | 6.16  | 0.35     | 11.43 | -220                                | -125            | 0.35 | 6.69  | 0.35     | 11.66 |
| -215                                | -115            | 0.4  | 6.66  | 0.4      | 12.63 | -241                                | -129            | 0.4  | 7.13  | 0.4      | 12.86 |
| -232                                | -118            | 0.45 | 7.09  | 0.45     | 14.13 | -264                                | -130            | 0.45 | 7.63  | 0.45     | 14.39 |
| -248                                | -118            | 0.5  | 7.39  |          |       | -285                                | -129            | 0.5  | 8.03  |          |       |
| -264                                | -118            | 0.55 | 7.76  |          |       | -304                                | -126            | 0.55 | 8.36  |          |       |
| -280                                | -118            | 0.6  | 8.03  |          |       | -316                                | -122            | 0.6  | 8.56  |          |       |
| -292                                | -116            | 0.65 | 8.26  |          |       | -335                                | -116            | 0.65 | 8.89  |          |       |
| -301                                | -113            | 0.7  | 8.36  |          |       | -353                                | -110            | 0.7  | 9.13  |          |       |
| -318                                | -111            | 0.75 | 8.73  |          |       | -366                                | -104            | 0.75 | 9.29  |          |       |
| -331                                | -108            | 0.8  | 8.86  |          |       | -382                                | -97             | 0.8  | 9.53  |          |       |
| -344                                | -104            | 0.85 | 9.06  |          |       | -398                                | -87             | 0.85 | 9.69  |          |       |
| -357                                | -98             | 0.9  | 9.29  |          |       | -412                                | -78             | 0.9  | 9.86  |          |       |
| -369                                | -92             | 0.95 | 9.46  |          |       | -429                                | -66             | 0.95 | 10.06 |          |       |
| -381                                | -85             | 1    | 9.63  |          |       | -444                                | -56             | 1    | 10.23 |          |       |
| -395                                | -79             | 1.05 | 9.79  |          |       | -454                                | -49             | 1.05 | 10.29 |          |       |
| -406                                | -73             | 1.1  | 9.93  |          |       | -469                                | -38             | 1.1  | 10.46 |          |       |
| -421                                | -63             | 1.15 | 10.16 |          |       | -484                                | -24             | 1.15 | 10.66 |          |       |
| -431                                | -55             | 1.2  | 10.23 |          |       | -498                                | -12             | 1.2  | 10.79 |          |       |
| -445                                | -44             | 1.25 | 10.43 |          |       | -511                                | 0               | 1.25 | 10.93 |          |       |
| -457                                | -33             | 1.3  | 10.53 |          |       | -525                                | 11              | 1.3  | 11.09 |          |       |
| -469                                | -23             | 1.35 | 10.66 |          |       | -539                                | 24              | 1.35 | 11.23 |          |       |
| -481                                | -12             | 1.4  | 10.79 |          |       | -550                                | 34              | 1.4  | 11.33 |          |       |
| -493                                | -1              | 1.45 | 10.93 |          |       | -562                                | 48              | 1.45 | 11.43 |          |       |
| -506                                | 10              | 1.5  | 11.03 |          |       | -576                                | 62              | 1.5  | 11.63 |          |       |
| -518                                | 23              | 1.55 | 11.16 |          |       | -583                                | 72              | 1.55 | 11.69 |          |       |
| -531                                | 34              | 1.6  | 11.33 |          |       | -601                                | 89              | 1.6  | 11.96 |          |       |
| -544                                | 49              | 1.65 | 11.46 |          |       | -609                                | 98              | 1.65 | 12.03 |          |       |
| -554                                | 59              | 1.7  | 11.56 |          |       | -620                                | 107             | 1.7  | 12.16 |          |       |
| -566                                | 75              | 1.75 | 11.69 |          |       | -633                                | 119             | 1.75 | 12.33 |          |       |
| -579                                | 86              | 1.8  | 11.86 |          |       | -642                                | 130             | 1.8  | 12.46 |          |       |
| -589                                | 97              | 1.85 | 11.99 |          |       | -653                                | 141             | 1.85 | 12.59 |          |       |
| -601                                | 111             | 1.9  | 12.13 |          |       | -663                                | 153             | 1.9  | 12.76 |          |       |
| -612                                | 122             | 1.95 | 12.29 |          |       | -675                                | 165             | 1.95 | 12.93 |          |       |
| -625                                | 135             | 2    | 12.43 |          |       | -685                                | 176             | 2    | 13.13 |          |       |



## แผ่นทดสอบขนาด 480 มม x 240 มม ตัวอย่าง D

| พารามิเตอร์จากการทดลอง 480 x 240 D1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 480 x 240 D2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -87                                 | -85             | 0.05 | 3.39  | 0.05     | 2.86  | -53                                 | -52             | 0.05 | 2.63  | 0.02     | 0.56  |
| -126                                | -120            | 0.1  | 4.59  | 0.1      | 3.86  | -83                                 | -78             | 0.1  | 3.73  | 0.04     | 1.69  |
| -165                                | -155            | 0.15 | 5.93  | 0.15     | 5.09  | -114                                | -103            | 0.15 | 4.76  | 0.06     | 3.03  |
| -209                                | -187            | 0.2  | 7.16  | 0.2      | 6.19  | -142                                | -124            | 0.2  | 5.66  | 0.08     | 4.39  |
| -245                                | -211            | 0.25 | 8.19  | 0.25     | 7.36  | -168                                | -140            | 0.25 | 6.43  | 0.1      | 5.36  |
| -269                                | -224            | 0.3  | 8.83  | 0.3      | 8.56  | -195                                | -157            | 0.3  | 7.19  | 0.12     | 6.59  |
| -292                                | -232            | 0.35 | 9.36  | 0.35     | 9.83  | -216                                | -167            | 0.35 | 7.76  | 0.14     | 7.43  |
| -317                                | -241            | 0.4  | 9.96  | 0.4      | 11.13 | -240                                | -178            | 0.4  | 8.43  | 0.16     | 8.79  |
| -339                                | -239            | 0.45 | 10.33 | 0.45     | 12.19 | -258                                | -185            | 0.45 | 8.86  | 0.18     | 9.76  |
| -356                                | -233            | 0.5  | 10.49 | 0.5      | 13.26 | -271                                | -190            | 0.5  | 9.19  | 0.2      | 10.86 |
| -370                                | -227            | 0.55 | 10.69 |          |       | -288                                | -193            | 0.55 | 9.59  | 0.22     | 11.53 |
| -388                                | -220            | 0.6  | 10.89 |          |       | -304                                | -196            | 0.6  | 9.93  | 0.24     | 12.23 |
| -407                                | -210            | 0.65 | 11.06 |          |       | -322                                | -195            | 0.65 | 10.23 | 0.26     | 12.73 |
| -426                                | -198            | 0.7  | 11.23 |          |       | -330                                | -193            | 0.7  | 10.43 | 0.28     | 13.36 |
| -439                                | -190            | 0.75 | 11.29 |          |       | -343                                | -192            | 0.75 | 10.56 | 0.3      | 13.96 |
| -459                                | -175            | 0.8  | 11.46 |          |       | -357                                | -186            | 0.8  | 10.83 |          |       |
| -473                                | -161            | 0.85 | 11.53 |          |       | -367                                | -182            | 0.85 | 10.99 |          |       |
| -490                                | -143            | 0.9  | 11.59 |          |       | -380                                | -179            | 0.9  | 11.16 |          |       |
| -508                                | -122            | 0.95 | 11.66 |          |       | -391                                | -173            | 0.95 | 11.29 |          |       |
| -526                                | -101            | 1    | 11.69 |          |       | -404                                | -168            | 1    | 11.53 |          |       |
| -538                                | -82             | 1.05 | 11.66 |          |       | -417                                | -163            | 1.05 | 11.66 |          |       |
| -557                                | -57             | 1.1  | 11.66 |          |       | -426                                | -154            | 1.1  | 11.76 |          |       |
| -570                                | -43             | 1.15 | 11.79 |          |       | -439                                | -147            | 1.15 | 11.86 |          |       |
| -588                                | -21             | 1.2  | 11.83 |          |       | -452                                | -134            | 1.2  | 11.96 |          |       |
| -604                                | -2              | 1.25 | 11.89 |          |       | -480                                | -95             | 1.25 | 11.96 |          |       |
| -615                                | 12              | 1.3  | 11.96 |          |       | -511                                | -49             | 1.3  | 11.93 |          |       |
| -629                                | 31              | 1.35 | 12.06 |          |       | -531                                | -21             | 1.35 | 11.93 |          |       |
| -642                                | 45              | 1.4  | 12.13 |          |       | -549                                | 1               | 1.4  | 12.06 |          |       |
| -655                                | 61              | 1.45 | 12.23 |          |       | -567                                | 25              | 1.45 | 12.16 |          |       |
| -663                                | 74              | 1.5  | 12.23 |          |       | -582                                | 45              | 1.5  | 12.23 |          |       |
| -677                                | 89              | 1.55 | 12.39 |          |       | -590                                | 54              | 1.55 | 12.26 |          |       |
| -688                                | 104             | 1.6  | 12.49 |          |       | -608                                | 74              | 1.6  | 12.46 |          |       |
| -697                                | 117             | 1.65 | 12.59 |          |       | -617                                | 87              | 1.65 | 12.53 |          |       |
| -710                                | 131             | 1.7  | 12.73 |          |       | -629                                | 100             | 1.7  | 12.66 |          |       |
| -721                                | 145             | 1.75 | 12.83 |          |       | -638                                | 113             | 1.75 | 12.76 |          |       |
| -729                                | 155             | 1.8  | 12.93 |          |       | -651                                | 128             | 1.8  | 12.89 |          |       |
| -740                                | 168             | 1.85 | 13.13 |          |       | -658                                | 137             | 1.85 | 13.03 |          |       |
| -750                                | 180             | 1.9  | 13.19 |          |       | -668                                | 148             | 1.9  | 13.13 |          |       |
| -761                                | 193             | 1.95 | 13.29 |          |       | -679                                | 161             | 1.95 | 13.29 |          |       |
| -772                                | 205             | 2    | 13.46 |          |       | -687                                | 170             | 2    | 13.39 |          |       |

## แผ่นทดสอบขนาด 360 มม x 240 มม ตัวอย่าง A

| พารามิเตอร์จากการทดลอง 360 x 240 A1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 360 x 240 A2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -45                                 | -19             | 0.05 | 2.06  | 0.05     | 0.19  | -42                                 | -2              | 0.05 | 1.16  | 0.05     | 0.16  |
| -76                                 | -30             | 0.1  | 2.96  | 0.1      | 1.13  | -71                                 | -10             | 0.1  | 1.76  | 0.1      | 0.33  |
| -106                                | -39             | 0.15 | 3.73  | 0.15     | 2.73  | -99                                 | -16             | 0.15 | 2.36  | 0.15     | 1.33  |
| -135                                | -47             | 0.2  | 4.43  | 0.2      | 6.46  | -125                                | -22             | 0.2  | 2.96  | 0.2      | 4.79  |
| -173                                | -57             | 0.25 | 5.29  | 0.25     | 9.56  | -153                                | -27             | 0.25 | 3.49  | 0.25     | 8.73  |
| -232                                | -68             | 0.3  | 6.53  | 0.3      | 11.59 | -179                                | -29             | 0.3  | 4.03  | 0.3      | 11.29 |
| -285                                | -70             | 0.35 | 7.53  | 0.35     | 13.26 | -213                                | -31             | 0.35 | 4.69  | 0.35     | 13.23 |
| -332                                | -64             | 0.4  | 8.29  | 0.4      | 15.03 | -239                                | -32             | 0.4  | 5.23  | 0.4      | 14.86 |
| -379                                | -53             | 0.45 | 9.03  |          |       | -272                                | -32             | 0.45 | 5.83  | 0.45     | 16.36 |
| -410                                | -40             | 0.5  | 9.36  |          |       | -316                                | -30             | 0.5  | 6.59  |          |       |
| -447                                | -22             | 0.55 | 9.83  |          |       | -353                                | -24             | 0.55 | 7.29  |          |       |
| -473                                | -7              | 0.6  | 10.06 |          |       | -395                                | -15             | 0.6  | 7.89  |          |       |
| -509                                | 15              | 0.65 | 10.43 |          |       | -436                                | -2              | 0.65 | 8.49  |          |       |
| -538                                | 35              | 0.7  | 10.69 |          |       | -473                                | 12              | 0.7  | 8.96  |          |       |
| -565                                | 55              | 0.75 | 10.89 |          |       | -512                                | 31              | 0.75 | 9.43  |          |       |
| -587                                | 72              | 0.8  | 11.06 |          |       | -542                                | 48              | 0.8  | 9.76  |          |       |
| -610                                | 91              | 0.85 | 11.23 |          |       | -576                                | 70              | 0.85 | 10.09 |          |       |
| -634                                | 109             | 0.9  | 11.39 |          |       | -604                                | 90              | 0.9  | 10.39 |          |       |
| -661                                | 134             | 0.95 | 11.56 |          |       | -631                                | 111             | 0.95 | 10.63 |          |       |
| -675                                | 149             | 1    | 11.66 |          |       | -663                                | 135             | 1    | 10.89 |          |       |
| -697                                | 166             | 1.05 | 11.79 |          |       | -687                                | 154             | 1.05 | 11.13 |          |       |
| -708                                | 178             | 1.1  | 11.83 |          |       | -716                                | 177             | 1.1  | 11.39 |          |       |
| -735                                | 201             | 1.15 | 12.03 |          |       | -740                                | 198             | 1.15 | 11.63 |          |       |
| -755                                | 219             | 1.2  | 12.19 |          |       | -763                                | 218             | 1.2  | 11.83 |          |       |
| -773                                | 236             | 1.25 | 12.29 |          |       | -782                                | 237             | 1.25 | 11.96 |          |       |
| -795                                | 256             | 1.3  | 12.46 |          |       | -806                                | 258             | 1.3  | 12.19 |          |       |
| -815                                | 276             | 1.35 | 12.63 |          |       | -828                                | 277             | 1.35 | 12.36 |          |       |
| -831                                | 292             | 1.4  | 12.69 |          |       | -851                                | 299             | 1.4  | 12.56 |          |       |
| -852                                | 310             | 1.45 | 12.86 |          |       | -868                                | 317             | 1.45 | 12.73 |          |       |
| -870                                | 330             | 1.5  | 12.99 |          |       | -886                                | 335             | 1.5  | 12.89 |          |       |
| -886                                | 345             | 1.55 | 13.09 |          |       | -901                                | 352             | 1.55 | 13.03 |          |       |
| -905                                | 363             | 1.6  | 13.26 |          |       | -923                                | 374             | 1.6  | 13.26 |          |       |
| -922                                | 380             | 1.65 | 13.39 |          |       | -941                                | 393             | 1.65 | 13.43 |          |       |
| -937                                | 396             | 1.7  | 13.49 |          |       | -962                                | 414             | 1.7  | 13.63 |          |       |
| -957                                | 416             | 1.75 | 13.66 |          |       | -978                                | 431             | 1.75 | 13.79 |          |       |
| -975                                | 434             | 1.8  | 13.79 |          |       | -993                                | 449             | 1.8  | 13.93 |          |       |
| -991                                | 451             | 1.85 | 13.96 |          |       | -1013                               | 469             | 1.85 | 14.13 |          |       |
| -1011                               | 469             | 1.9  | 14.09 |          |       | -1032                               | 488             | 1.9  | 14.33 |          |       |
| -1028                               | 487             | 1.95 | 14.26 |          |       | -1047                               | 504             | 1.95 | 14.46 |          |       |
| -1048                               | 507             | 2    | 14.39 |          |       | -1064                               | 522             | 2    | 14.66 |          |       |

## แผ่นทดสอบขนาด 360 มม x 240 มม ตัวอย่าง B

| พารามิเตอร์จากการทดลอง 360 x 240 B1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 360 x 240 B2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | w    | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | w    | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -39                                 | -4              | 0.05 | 2.83  | 0.05     | 2.13  | -29                                 | -2              | 0.05 | 2.06  | 0.05     | 2.03  |
| -60                                 | -7              | 0.1  | 3.69  | 0.1      | 4.73  | -54                                 | -7              | 0.1  | 2.93  | 0.1      | 3.53  |
| -81                                 | -14             | 0.15 | 4.53  | 0.15     | 7.43  | -77                                 | -16             | 0.15 | 3.73  | 0.15     | 5.36  |
| -114                                | -26             | 0.2  | 5.59  | 0.2      | 10.29 | -103                                | -24             | 0.2  | 4.56  | 0.2      | 7.43  |
| -146                                | -38             | 0.25 | 6.53  | 0.25     | 12.49 | -132                                | -33             | 0.25 | 5.33  | 0.25     | 9.59  |
| -173                                | -44             | 0.3  | 7.23  | 0.3      | 14.43 | -158                                | -39             | 0.3  | 6.06  | 0.3      | 11.63 |
| -198                                | -49             | 0.35 | 7.83  | 0.35     | 15.99 | -182                                | -44             | 0.35 | 6.63  | 0.35     | 13.49 |
| -217                                | -51             | 0.4  | 8.23  |          |       | -208                                | -48             | 0.4  | 7.16  | 0.4      | 15.16 |
| -237                                | -53             | 0.45 | 8.66  |          |       | -230                                | -50             | 0.45 | 7.69  | 0.45     | 16.83 |
| -252                                | -52             | 0.5  | 9.03  |          |       | -247                                | -50             | 0.5  | 7.99  |          |       |
| -269                                | -51             | 0.55 | 9.33  |          |       | -268                                | -49             | 0.55 | 8.43  |          |       |
| -283                                | -49             | 0.6  | 9.59  |          |       | -286                                | -47             | 0.6  | 8.76  |          |       |
| -298                                | -44             | 0.65 | 9.89  |          |       | -301                                | -46             | 0.65 | 9.09  |          |       |
| -310                                | -42             | 0.7  | 10.13 |          |       | -317                                | -42             | 0.7  | 9.36  |          |       |
| -325                                | -38             | 0.75 | 10.36 |          |       | -330                                | -38             | 0.75 | 9.63  |          |       |
| -337                                | -34             | 0.8  | 10.56 |          |       | -348                                | -33             | 0.8  | 9.96  |          |       |
| -350                                | -29             | 0.85 | 10.79 |          |       | -359                                | -29             | 0.85 | 10.19 |          |       |
| -363                                | -24             | 0.9  | 11.03 |          |       | -375                                | -24             | 0.9  | 10.43 |          |       |
| -377                                | -18             | 0.95 | 11.26 |          |       | -389                                | -18             | 0.95 | 10.69 |          |       |
| -390                                | -13             | 1    | 11.43 |          |       | -402                                | -14             | 1    | 10.96 |          |       |
| -404                                | -5              | 1.05 | 11.66 |          |       | -419                                | -6              | 1.05 | 11.19 |          |       |
| -416                                | 1               | 1.1  | 11.86 |          |       | -433                                | 0               | 1.1  | 11.46 |          |       |
| -428                                | 8               | 1.15 | 12.03 |          |       | -450                                | 10              | 1.15 | 11.66 |          |       |
| -442                                | 16              | 1.2  | 12.23 |          |       | -464                                | 19              | 1.2  | 11.96 |          |       |
| -457                                | 24              | 1.25 | 12.46 |          |       | -480                                | 28              | 1.25 | 12.16 |          |       |
| -470                                | 34              | 1.3  | 12.63 |          |       | -497                                | 39              | 1.3  | 12.39 |          |       |
| -485                                | 44              | 1.35 | 12.86 |          |       | -515                                | 53              | 1.35 | 12.66 |          |       |
| -500                                | 58              | 1.4  | 13.06 |          |       | -534                                | 65              | 1.4  | 12.86 |          |       |
| -515                                | 67              | 1.45 | 13.19 |          |       | -556                                | 86              | 1.45 | 13.13 |          |       |
| -532                                | 81              | 1.5  | 13.39 |          |       | -579                                | 103             | 1.5  | 13.39 |          |       |
| -552                                | 96              | 1.55 | 13.63 |          |       | -608                                | 127             | 1.55 | 13.69 |          |       |
| -573                                | 115             | 1.6  | 13.83 |          |       | -634                                | 152             | 1.6  | 13.93 |          |       |
| -595                                | 136             | 1.65 | 14.03 |          |       | -665                                | 180             | 1.65 | 14.23 |          |       |
| -619                                | 156             | 1.7  | 14.19 |          |       | -692                                | 206             | 1.7  | 14.46 |          |       |
| -648                                | 181             | 1.75 | 14.39 |          |       | -722                                | 230             | 1.75 | 14.69 |          |       |
| -675                                | 208             | 1.8  | 14.63 |          |       | -749                                | 256             | 1.8  | 14.99 |          |       |
| -704                                | 235             | 1.85 | 14.76 |          |       | -776                                | 281             | 1.85 | 15.23 |          |       |
| -734                                | 263             | 1.9  | 14.99 |          |       | -803                                | 303             | 1.9  | 15.46 |          |       |
| -763                                | 290             | 1.95 | 15.16 |          |       | -832                                | 332             | 1.95 | 15.76 |          |       |
| -794                                | 318             | 2    | 15.46 |          |       | -856                                | 357             | 2    | 15.99 |          |       |

## แผ่นทดสอบขนาด 360 มม x 240 มม ตัวอย่าง C

| พารามิเตอร์จากการทดลอง 360 x 240 C1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 360 x 240 C2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | w    | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | w    | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -55                                 | -34             | 0.05 | 2.33  | 0.02     | 2.46  | -37                                 | -16             | 0.05 | 1.36  | 0.02     | 1.43  |
| -108                                | -66             | 0.1  | 3.93  | 0.04     | 4.23  | -68                                 | -31             | 0.1  | 2.29  | 0.04     | 2.29  |
| -181                                | -102            | 0.15 | 5.96  | 0.06     | 5.79  | -111                                | -49             | 0.15 | 3.49  | 0.06     | 3.76  |
| -300                                | -126            | 0.2  | 8.49  | 0.08     | 7.16  | -156                                | -66             | 0.2  | 4.76  | 0.08     | 5.33  |
| -389                                | -109            | 0.25 | 9.89  | 0.1      | 8.63  | -205                                | -78             | 0.25 | 5.96  | 0.1      | 6.79  |
| -430                                | -91             | 0.3  | 10.39 | 0.12     | 9.99  | -258                                | -81             | 0.3  | 7.09  | 0.12     | 7.93  |
| -468                                | -70             | 0.35 | 10.76 | 0.14     | 10.83 | -314                                | -79             | 0.35 | 8.09  | 0.14     | 9.39  |
| -505                                | -49             | 0.4  | 11.13 | 0.16     | 11.83 | -366                                | -66             | 0.4  | 8.93  | 0.16     | 10.69 |
| -531                                | -32             | 0.45 | 11.33 | 0.18     | 12.63 | -413                                | -50             | 0.45 | 9.53  | 0.18     | 11.56 |
| -556                                | -15             | 0.5  | 11.53 | 0.2      | 13.26 | -447                                | -33             | 0.5  | 9.99  | 0.2      | 12.53 |
| -581                                | 4               | 0.55 | 11.76 | 0.22     | 13.96 | -487                                | -14             | 0.55 | 10.39 | 0.22     | 13.13 |
| -596                                | 16              | 0.6  | 11.83 | 0.24     | 14.66 | -516                                | 3               | 0.6  | 10.69 | 0.24     | 13.83 |
| -618                                | 33              | 0.65 | 11.96 | 0.26     | 15.33 | -547                                | 23              | 0.65 | 11.06 | 0.26     | 14.39 |
| -638                                | 49              | 0.7  | 12.13 |          |       | -571                                | 39              | 0.7  | 11.26 | 0.28     | 15.03 |
| -656                                | 67              | 0.75 | 12.23 |          |       | -601                                | 60              | 0.75 | 11.53 | 0.3      | 15.56 |
| -674                                | 82              | 0.8  | 12.36 |          |       | -627                                | 79              | 0.8  | 11.76 |          |       |
| -689                                | 95              | 0.85 | 12.46 |          |       | -642                                | 91              | 0.85 | 11.86 |          |       |
| -706                                | 110             | 0.9  | 12.53 |          |       | -669                                | 114             | 0.9  | 12.13 |          |       |
| -720                                | 125             | 0.95 | 12.69 |          |       | -686                                | 126             | 0.95 | 12.26 |          |       |
| -738                                | 141             | 1    | 12.79 |          |       | -706                                | 143             | 1    | 12.43 |          |       |
| -752                                | 153             | 1.05 | 12.89 |          |       | -727                                | 162             | 1.05 | 12.66 |          |       |
| -761                                | 165             | 1.1  | 12.93 |          |       | -754                                | 183             | 1.1  | 12.86 |          |       |
| -779                                | 181             | 1.15 | 13.06 |          |       | -772                                | 199             | 1.15 | 13.03 |          |       |
| -794                                | 197             | 1.2  | 13.13 |          |       | -786                                | 214             | 1.2  | 13.16 |          |       |
| -812                                | 215             | 1.25 | 13.36 |          |       | -800                                | 229             | 1.25 | 13.29 |          |       |
| -823                                | 226             | 1.3  | 13.39 |          |       | -822                                | 248             | 1.3  | 13.53 |          |       |
| -838                                | 242             | 1.35 | 13.49 |          |       | -840                                | 264             | 1.35 | 13.73 |          |       |
| -850                                | 254             | 1.4  | 13.59 |          |       | -857                                | 280             | 1.4  | 13.86 |          |       |
| -864                                | 269             | 1.45 | 13.73 |          |       | -875                                | 296             | 1.45 | 14.03 |          |       |
| -880                                | 285             | 1.5  | 13.86 |          |       | -890                                | 311             | 1.5  | 14.16 |          |       |
| -894                                | 302             | 1.55 | 13.99 |          |       | -907                                | 328             | 1.55 | 14.33 |          |       |
| -910                                | 319             | 1.6  | 14.13 |          |       | -924                                | 344             | 1.6  | 14.53 |          |       |
| -925                                | 334             | 1.65 | 14.23 |          |       | -943                                | 362             | 1.65 | 14.76 |          |       |
| -935                                | 345             | 1.7  | 14.29 |          |       | -961                                | 381             | 1.7  | 14.93 |          |       |
| -953                                | 363             | 1.75 | 14.49 |          |       | -980                                | 397             | 1.75 | 15.13 |          |       |
| -969                                | 378             | 1.8  | 14.59 |          |       | -995                                | 413             | 1.8  | 15.26 |          |       |
| -986                                | 395             | 1.85 | 14.79 |          |       | -1013                               | 431             | 1.85 | 15.49 |          |       |
| -1002                               | 413             | 1.9  | 14.89 |          |       | -1032                               | 449             | 1.9  | 15.69 |          |       |
| -1016                               | 426             | 1.95 | 15.03 |          |       | -1050                               | 470             | 1.95 | 15.86 |          |       |
| -1037                               | 446             | 2    | 15.26 |          |       | -1063                               | 482             | 2    | 16.03 |          |       |

## แผ่นทดสอบขนาด 360 มม x 240 มม ตัวอย่าง D

| พารามิเตอร์จากการทดลอง 360 x 240 D1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 360 x 240 D2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -104                                | -73             | 0.05 | 3.43  | 0.02     | 5.53  | -68                                 | -48             | 0.05 | 1.93  | 0.02     | 1.19  |
| -272                                | -128            | 0.1  | 7.39  | 0.04     | 7.49  | -135                                | -82             | 0.1  | 3.79  | 0.04     | 2.29  |
| -356                                | -116            | 0.15 | 8.73  | 0.06     | 8.73  | -211                                | -101            | 0.15 | 5.56  | 0.06     | 3.39  |
| -400                                | -99             | 0.2  | 9.33  | 0.08     | 10.06 | -238                                | -103            | 0.2  | 6.99  | 0.08     | 4.46  |
| -443                                | -80             | 0.25 | 9.79  | 0.1      | 11.23 | -340                                | -94             | 0.25 | 7.93  | 0.1      | 5.46  |
| -474                                | -62             | 0.3  | 10.16 | 0.12     | 12.06 | -380                                | -82             | 0.3  | 8.43  | 0.12     | 6.93  |
| -505                                | -42             | 0.35 | 10.49 | 0.14     | 13.09 | -417                                | -66             | 0.35 | 8.96  | 0.14     | 8.19  |
| -532                                | -24             | 0.4  | 10.69 | 0.16     | 13.93 | -455                                | -48             | 0.4  | 9.43  | 0.16     | 10.03 |
| -554                                | -8              | 0.45 | 10.89 | 0.18     | 14.69 | -478                                | -34             | 0.45 | 9.63  | 0.18     | 11.33 |
| -573                                | 6               | 0.5  | 11.03 | 0.2      | 15.49 | -507                                | -16             | 0.5  | 9.96  | 0.2      | 12.16 |
| -599                                | 25              | 0.55 | 11.19 |          |       | -535                                | 0               | 0.55 | 10.26 | 0.22     | 12.93 |
| -616                                | 40              | 0.6  | 11.36 |          |       | -558                                | 16              | 0.6  | 10.49 | 0.24     | 13.53 |
| -639                                | 57              | 0.65 | 11.49 |          |       | -579                                | 31              | 0.65 | 10.66 | 0.26     | 14.23 |
| -656                                | 74              | 0.7  | 11.63 |          |       | -598                                | 47              | 0.7  | 10.83 | 0.28     | 14.66 |
| -675                                | 89              | 0.75 | 11.76 |          |       | -619                                | 63              | 0.75 | 10.99 | 0.3      | 15.29 |
| -691                                | 103             | 0.8  | 11.83 |          |       | -642                                | 81              | 0.8  | 11.16 |          |       |
| -711                                | 121             | 0.85 | 11.99 |          |       | -660                                | 96              | 0.85 | 11.36 |          |       |
| -725                                | 134             | 0.9  | 12.06 |          |       | -680                                | 112             | 0.9  | 11.49 |          |       |
| -743                                | 151             | 0.95 | 12.19 |          |       | -696                                | 127             | 0.95 | 11.59 |          |       |
| -762                                | 169             | 1    | 12.36 |          |       | -716                                | 143             | 1    | 11.79 |          |       |
| -777                                | 183             | 1.05 | 12.46 |          |       | -732                                | 158             | 1.05 | 11.89 |          |       |
| -796                                | 200             | 1.1  | 12.59 |          |       | -752                                | 177             | 1.1  | 12.06 |          |       |
| -813                                | 216             | 1.15 | 12.73 |          |       | -764                                | 188             | 1.15 | 12.19 |          |       |
| -832                                | 235             | 1.2  | 12.93 |          |       | -777                                | 202             | 1.2  | 12.26 |          |       |
| -850                                | 252             | 1.25 | 13.06 |          |       | -800                                | 223             | 1.25 | 12.53 |          |       |
| -864                                | 266             | 1.3  | 13.19 |          |       | -814                                | 237             | 1.3  | 12.63 |          |       |
| -878                                | 281             | 1.35 | 13.29 |          |       | -831                                | 253             | 1.35 | 12.76 |          |       |
| -896                                | 298             | 1.4  | 13.43 |          |       | -846                                | 266             | 1.4  | 12.86 |          |       |
| -912                                | 314             | 1.45 | 13.56 |          |       | -858                                | 280             | 1.45 | 12.93 |          |       |
| -925                                | 328             | 1.5  | 13.63 |          |       | -877                                | 298             | 1.5  | 13.16 |          |       |
| -944                                | 347             | 1.55 | 13.83 |          |       | -893                                | 314             | 1.55 | 13.29 |          |       |
| -959                                | 360             | 1.6  | 13.96 |          |       | -908                                | 329             | 1.6  | 13.46 |          |       |
| -975                                | 378             | 1.65 | 14.13 |          |       | -924                                | 346             | 1.65 | 13.63 |          |       |
| -992                                | 396             | 1.7  | 14.29 |          |       | -938                                | 362             | 1.7  | 13.76 |          |       |
| -1004                               | 406             | 1.75 | 14.36 |          |       | -949                                | 373             | 1.75 | 13.83 |          |       |
| -1020                               | 426             | 1.8  | 14.49 |          |       | -967                                | 392             | 1.8  | 14.06 |          |       |
| -1038                               | 442             | 1.85 | 14.69 |          |       | -981                                | 407             | 1.85 | 14.16 |          |       |
| -1052                               | 456             | 1.9  | 14.86 |          |       | -995                                | 420             | 1.9  | 14.29 |          |       |
| -1066                               | 472             | 1.95 | 14.99 |          |       | -1021                               | 438             | 1.95 | 14.49 |          |       |
| -1086                               | 491             | 2    | 15.19 |          |       | -1028                               | 456             | 2    | 14.69 |          |       |



## แผ่นทดสอบขนาด 240 มม x 240 มม ตัวอย่าง B

| พารามิเตอร์จากการทดลอง 240 x 240 B1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 240 x 240 B2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -45                                 | -40             | 0.05 | 3.06  | 0.02     | 0.79  | -28                                 | -36             | 0.05 | 2.09  | 0.02     | 0.83  |
| -71                                 | -70             | 0.1  | 4.86  | 0.04     | 1.76  | -40                                 | -55             | 0.1  | 2.96  | 0.04     | 1.59  |
| -90                                 | -98             | 0.15 | 5.99  | 0.06     | 3.99  | -60                                 | -84             | 0.15 | 4.06  | 0.06     | 2.39  |
| -103                                | -119            | 0.2  | 6.73  | 0.08     | 8.63  | -79                                 | -112            | 0.2  | 5.13  | 0.08     | 3.43  |
| -116                                | -142            | 0.25 | 7.49  | 0.1      | 10.36 | -92                                 | -136            | 0.25 | 5.83  | 0.1      | 4.43  |
| -125                                | -165            | 0.3  | 8.09  | 0.12     | 12.19 | -101                                | -158            | 0.3  | 6.49  | 0.12     | 5.56  |
| -131                                | -184            | 0.35 | 8.56  | 0.14     | 13.89 | -107                                | -178            | 0.35 | 6.99  | 0.14     | 6.83  |
| -135                                | -202            | 0.4  | 8.96  | 0.16     | 15.76 | -108                                | -195            | 0.4  | 7.36  | 0.16     | 8.09  |
| -136                                | -219            | 0.45 | 9.33  | 0.18     | 17.13 | -112                                | -212            | 0.45 | 7.76  | 0.18     | 9.43  |
| -136                                | -236            | 0.5  | 9.63  | 0.2      | 18.73 | -115                                | -234            | 0.5  | 8.23  | 0.2      | 10.66 |
| -133                                | -254            | 0.55 | 9.93  |          |       | -113                                | -250            | 0.55 | 8.53  | 0.22     | 12.03 |
| -129                                | -270            | 0.6  | 10.19 |          |       | -112                                | -269            | 0.6  | 8.86  | 0.24     | 13.16 |
| -124                                | -286            | 0.65 | 10.43 |          |       | -109                                | -282            | 0.65 | 9.13  | 0.26     | 14.26 |
| -119                                | -299            | 0.7  | 10.56 |          |       | -106                                | -300            | 0.7  | 9.36  |          |       |
| -112                                | -316            | 0.75 | 10.79 |          |       | -101                                | -317            | 0.75 | 9.63  |          |       |
| -106                                | -329            | 0.8  | 10.93 |          |       | -98                                 | -333            | 0.8  | 9.86  |          |       |
| -98                                 | -341            | 0.85 | 11.09 |          |       | -92                                 | -347            | 0.85 | 10.09 |          |       |
| -91                                 | -354            | 0.9  | 11.26 |          |       | -83                                 | -363            | 0.9  | 10.26 |          |       |
| -83                                 | -371            | 0.95 | 11.43 |          |       | -78                                 | -377            | 0.95 | 10.46 |          |       |
| -73                                 | -380            | 1    | 11.49 |          |       | -69                                 | -395            | 1    | 10.66 |          |       |
| -65                                 | -394            | 1.05 | 11.56 |          |       | -60                                 | -409            | 1.05 | 10.83 |          |       |
| -56                                 | -411            | 1.1  | 11.79 |          |       | -52                                 | -422            | 1.1  | 10.99 |          |       |
| -47                                 | -422            | 1.15 | 11.93 |          |       | -43                                 | -435            | 1.15 | 11.13 |          |       |
| -38                                 | -436            | 1.2  | 12.06 |          |       | -32                                 | -453            | 1.2  | 11.29 |          |       |
| -27                                 | -452            | 1.25 | 12.23 |          |       | -24                                 | -465            | 1.25 | 11.49 |          |       |
| -19                                 | -465            | 1.3  | 12.33 |          |       | -15                                 | -479            | 1.3  | 11.66 |          |       |
| -8                                  | -478            | 1.35 | 12.49 |          |       | -6                                  | -493            | 1.35 | 11.83 |          |       |
| 0                                   | -491            | 1.4  | 12.59 |          |       | 2                                   | -505            | 1.4  | 11.96 |          |       |
| 11                                  | -502            | 1.45 | 12.69 |          |       | 12                                  | -517            | 1.45 | 12.09 |          |       |
| 21                                  | -516            | 1.5  | 12.86 |          |       | 20                                  | -529            | 1.5  | 12.23 |          |       |
| 31                                  | -529            | 1.55 | 12.96 |          |       | 32                                  | -543            | 1.55 | 12.39 |          |       |
| 39                                  | -540            | 1.6  | 13.06 |          |       | 41                                  | -555            | 1.6  | 12.53 |          |       |
| 51                                  | -555            | 1.65 | 13.26 |          |       | 50                                  | -568            | 1.65 | 12.66 |          |       |
| 61                                  | -568            | 1.7  | 13.36 |          |       | 61                                  | -584            | 1.7  | 12.86 |          |       |
| 71                                  | -579            | 1.75 | 13.46 |          |       | 70                                  | -595            | 1.75 | 12.99 |          |       |
| 83                                  | -593            | 1.8  | 13.66 |          |       | 81                                  | -609            | 1.8  | 13.16 |          |       |
| 93                                  | -605            | 1.85 | 13.79 |          |       | 93                                  | -621            | 1.85 | 13.33 |          |       |
| 103                                 | -618            | 1.9  | 13.93 |          |       | 102                                 | -633            | 1.9  | 13.46 |          |       |
| 114                                 | -629            | 1.95 | 13.99 |          |       | 112                                 | -648            | 1.95 | 13.66 |          |       |
| 123                                 | -641            | 2    | 14.16 |          |       | 122                                 | -657            | 2    | 13.79 |          |       |

## แผ่นทดสอบขนาด 240 มม x 240 มม ตัวอย่าง C

| พารามิเตอร์จากการทดลอง 240 x 240 C1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 240 x 240 C2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -139                                | -179            | 0.05 | 6.16  | 0.02     | 0.86  | -97                                 | -139            | 0.05 | 4.49  | 0.02     | 0.26  |
| -165                                | -228            | 0.1  | 7.46  | 0.04     | 6.46  | -123                                | -192            | 0.1  | 5.83  | 0.04     | 1.03  |
| -179                                | -267            | 0.15 | 8.26  | 0.06     | 9.36  | -136                                | -230            | 0.15 | 6.69  | 0.06     | 2.43  |
| -188                                | -306            | 0.2  | 9.09  | 0.08     | 11.23 | -144                                | -260            | 0.2  | 7.29  | 0.08     | 4.46  |
| -187                                | -329            | 0.25 | 9.49  | 0.1      | 12.89 | -148                                | -287            | 0.25 | 7.83  | 0.1      | 6.36  |
| -185                                | -353            | 0.3  | 9.86  | 0.12     | 14.19 | -148                                | -314            | 0.3  | 8.33  | 0.12     | 8.19  |
| -181                                | -374            | 0.35 | 10.13 | 0.14     | 15.46 | -147                                | -338            | 0.35 | 8.73  | 0.14     | 9.93  |
| -175                                | -393            | 0.4  | 10.39 |          |       | -143                                | -358            | 0.4  | 9.03  | 0.16     | 11.43 |
| -165                                | -406            | 0.45 | 10.43 |          |       | -138                                | -381            | 0.45 | 9.33  | 0.18     | 12.86 |
| -159                                | -428            | 0.5  | 10.73 |          |       | -133                                | -401            | 0.5  | 9.59  | 0.2      | 14.03 |
| -149                                | -445            | 0.55 | 10.89 |          |       | -125                                | -417            | 0.55 | 9.69  | 0.22     | 15.13 |
| -141                                | -463            | 0.6  | 11.13 |          |       | -117                                | -437            | 0.6  | 10.03 | 0.24     | 16.23 |
| -132                                | -482            | 0.65 | 11.29 |          |       | -109                                | -458            | 0.65 | 10.26 |          |       |
| -121                                | -500            | 0.7  | 11.43 |          |       | -101                                | -474            | 0.7  | 10.46 |          |       |
| -112                                | -512            | 0.75 | 11.53 |          |       | -93                                 | -494            | 0.75 | 10.69 |          |       |
| -102                                | -531            | 0.8  | 11.69 |          |       | -83                                 | -511            | 0.8  | 10.83 |          |       |
| -93                                 | -546            | 0.85 | 11.83 |          |       | -73                                 | -527            | 0.85 | 11.03 |          |       |
| -82                                 | -560            | 0.9  | 11.93 |          |       | -64                                 | -545            | 0.9  | 11.19 |          |       |
| -71                                 | -557            | 0.95 | 12.09 |          |       | -55                                 | -561            | 0.95 | 11.39 |          |       |
| -60                                 | -592            | 1    | 12.23 |          |       | -42                                 | -574            | 1    | 11.46 |          |       |
| -49                                 | -608            | 1.05 | 12.33 |          |       | -33                                 | -590            | 1.05 | 11.63 |          |       |
| -38                                 | -621            | 1.1  | 12.43 |          |       | -24                                 | -606            | 1.1  | 11.76 |          |       |
| -29                                 | -636            | 1.15 | 12.56 |          |       | -12                                 | -620            | 1.15 | 11.96 |          |       |
| -17                                 | -651            | 1.2  | 12.69 |          |       | -1                                  | -636            | 1.2  | 12.06 |          |       |
| -6                                  | -664            | 1.25 | 12.79 |          |       | 8                                   | -648            | 1.25 | 12.19 |          |       |
| 3                                   | -677            | 1.3  | 12.89 |          |       | 17                                  | -665            | 1.3  | 12.39 |          |       |
| 16                                  | -694            | 1.35 | 13.09 |          |       | 28                                  | -680            | 1.35 | 12.56 |          |       |
| 26                                  | -705            | 1.4  | 13.13 |          |       | 38                                  | -693            | 1.4  | 12.66 |          |       |
| 37                                  | -722            | 1.45 | 13.29 |          |       | 49                                  | -708            | 1.45 | 12.79 |          |       |
| 48                                  | -734            | 1.5  | 13.39 |          |       | 59                                  | -719            | 1.5  | 12.93 |          |       |
| 59                                  | -746            | 1.55 | 13.49 |          |       | 69                                  | -732            | 1.55 | 13.06 |          |       |
| 71                                  | -761            | 1.6  | 13.63 |          |       | 80                                  | -746            | 1.6  | 13.23 |          |       |
| 82                                  | -776            | 1.65 | 13.76 |          |       | 91                                  | -761            | 1.65 | 13.39 |          |       |
| 93                                  | -789            | 1.7  | 13.89 |          |       | 101                                 | -774            | 1.7  | 13.49 |          |       |
| 101                                 | -799            | 1.75 | 13.99 |          |       | 111                                 | -783            | 1.75 | 13.56 |          |       |
| 115                                 | -814            | 1.8  | 14.13 |          |       | 121                                 | -799            | 1.8  | 13.79 |          |       |
| 125                                 | -826            | 1.85 | 14.26 |          |       | 132                                 | -811            | 1.85 | 13.89 |          |       |
| 135                                 | -838            | 1.9  | 14.36 |          |       | 143                                 | -827            | 1.9  | 14.09 |          |       |
| 146                                 | -849            | 1.95 | 14.46 |          |       | 153                                 | -839            | 1.95 | 14.29 |          |       |
| 157                                 | -864            | 2    | 14.63 |          |       | 164                                 | -853            | 2    | 14.39 |          |       |



## แผ่นทดสอบขนาด 240 มม x 240 มม ตัวอย่าง D

| พารามิเตอร์จากการทดลอง 240 x 240 D1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 240 x 240 D2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -24                                 | -18             | 0.05 | 2.39  | 0.02     | 0.56  | -21                                 | -16             | 0.05 | 1.13  | 0.02     | 1.03  |
| -42                                 | -39             | 0.1  | 3.63  | 0.04     | 1.59  | -33                                 | -36             | 0.1  | 2.16  | 0.04     | 2.53  |
| -59                                 | -66             | 0.15 | 4.79  | 0.06     | 3.56  | -50                                 | -67             | 0.15 | 3.56  | 0.06     | 4.23  |
| -82                                 | -99             | 0.2  | 5.96  | 0.08     | 5.39  | -67                                 | -98             | 0.2  | 4.66  | 0.08     | 6.66  |
| -97                                 | -125            | 0.25 | 6.76  | 0.1      | 6.53  | -79                                 | -125            | 0.25 | 5.39  | 0.1      | 8.89  |
| -109                                | -151            | 0.3  | 7.49  | 0.12     | 9.53  | -84                                 | -147            | 0.3  | 5.96  | 0.12     | 11.53 |
| -116                                | -175            | 0.35 | 8.06  | 0.14     | 11.26 | -89                                 | -168            | 0.35 | 6.49  | 0.14     | 13.16 |
| -120                                | -196            | 0.4  | 8.53  | 0.16     | 13.06 | -89                                 | -185            | 0.4  | 6.76  | 0.16     | 14.63 |
| -121                                | -217            | 0.45 | 8.93  | 0.18     | 14.23 | -94                                 | -213            | 0.45 | 7.43  | 0.18     | 16.13 |
| -117                                | -236            | 0.5  | 9.19  | 0.2      | 14.89 | -96                                 | -237            | 0.5  | 7.89  |          |       |
| -115                                | -255            | 0.55 | 9.46  |          |       | -95                                 | -261            | 0.55 | 8.36  |          |       |
| -112                                | -274            | 0.6  | 9.79  |          |       | -93                                 | -279            | 0.6  | 8.73  |          |       |
| -108                                | -290            | 0.65 | 10.03 |          |       | -89                                 | -302            | 0.65 | 9.09  |          |       |
| -102                                | -309            | 0.7  | 10.26 |          |       | -84                                 | -324            | 0.7  | 9.39  |          |       |
| -97                                 | -328            | 0.75 | 10.53 |          |       | -80                                 | -341            | 0.75 | 9.63  |          |       |
| -91                                 | -343            | 0.8  | 10.69 |          |       | -73                                 | -358            | 0.8  | 9.89  |          |       |
| -84                                 | -358            | 0.85 | 10.86 |          |       | -65                                 | -380            | 0.85 | 10.16 |          |       |
| -76                                 | -373            | 0.9  | 11.06 |          |       | -57                                 | -395            | 0.9  | 10.39 |          |       |
| -66                                 | -393            | 0.95 | 11.23 |          |       | -49                                 | -412            | 0.95 | 10.59 |          |       |
| -56                                 | -408            | 1    | 11.43 |          |       | -39                                 | -431            | 1    | 10.79 |          |       |
| -47                                 | -425            | 1.05 | 11.53 |          |       | -31                                 | -446            | 1.05 | 10.99 |          |       |
| -39                                 | -438            | 1.1  | 11.69 |          |       | -20                                 | -463            | 1.1  | 11.16 |          |       |
| -28                                 | -450            | 1.15 | 11.76 |          |       | -13                                 | -478            | 1.15 | 11.29 |          |       |
| -19                                 | -465            | 1.2  | 11.89 |          |       | -2                                  | -495            | 1.2  | 11.49 |          |       |
| -8                                  | -479            | 1.25 | 12.03 |          |       | 7                                   | -509            | 1.25 | 11.69 |          |       |
| 1                                   | -495            | 1.3  | 12.19 |          |       | 17                                  | -525            | 1.3  | 11.83 |          |       |
| 11                                  | -506            | 1.35 | 12.29 |          |       | 28                                  | -538            | 1.35 | 11.96 |          |       |
| 22                                  | -521            | 1.4  | 12.39 |          |       | 37                                  | -555            | 1.4  | 12.16 |          |       |
| 33                                  | -534            | 1.45 | 12.53 |          |       | 49                                  | -563            | 1.45 | 12.21 |          |       |
| 44                                  | -545            | 1.5  | 12.56 |          |       | 58                                  | -578            | 1.5  | 12.39 |          |       |
| 53                                  | -560            | 1.55 | 12.73 |          |       | 69                                  | -596            | 1.55 | 12.56 |          |       |
| 64                                  | -572            | 1.6  | 12.79 |          |       | 80                                  | -611            | 1.6  | 12.73 |          |       |
| 75                                  | -583            | 1.65 | 12.86 |          |       | 91                                  | -623            | 1.65 | 12.86 |          |       |
| 86                                  | -597            | 1.7  | 12.99 |          |       | 100                                 | -637            | 1.7  | 12.99 |          |       |
| 98                                  | -609            | 1.75 | 13.03 |          |       | 111                                 | -649            | 1.75 | 13.13 |          |       |
| 108                                 | -623            | 1.8  | 13.26 |          |       | 123                                 | -663            | 1.8  | 13.29 |          |       |
| 119                                 | -638            | 1.85 | 13.36 |          |       | 134                                 | -677            | 1.85 | 13.43 |          |       |
| 131                                 | -649            | 1.9  | 13.46 |          |       | 147                                 | -689            | 1.9  | 13.56 |          |       |
| 141                                 | -659            | 1.95 | 13.56 |          |       | 156                                 | -702            | 1.95 | 13.76 |          |       |
| 152                                 | -670            | 2    | 13.66 |          |       | 167                                 | -714            | 2    | 13.89 |          |       |

## แผ่นทดสอบขนาด 360 มม x 180 มม ตัวอย่าง A

| พารามิเตอร์จากการทดลอง 360 x 180 A1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 360 x 180 A2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -261                                | -212            | 0.05 | 8.29  | 0.02     | 0.63  | -81                                 | -47             | 0.05 | 2.89  | 0.02     | 1.43  |
| -336                                | -254            | 0.1  | 9.86  | 0.04     | 1.19  | -147                                | -81             | 0.1  | 4.46  | 0.04     | 3.86  |
| -401                                | -277            | 0.15 | 10.99 | 0.06     | 1.76  | -213                                | -110            | 0.15 | 5.83  | 0.06     | 7.96  |
| -444                                | -282            | 0.2  | 11.59 | 0.08     | 5.13  | -265                                | -128            | 0.2  | 6.83  | 0.08     | 9.86  |
| -493                                | -282            | 0.25 | 12.29 | 0.1      | 6.99  | -314                                | -139            | 0.25 | 7.69  | 0.1      | 10.83 |
| -535                                | -275            | 0.3  | 12.76 | 0.12     | 8.79  | -355                                | -147            | 0.3  | 8.36  | 0.12     | 11.89 |
| -574                                | -264            | 0.35 | 13.13 | 0.14     | 10.16 | -385                                | -148            | 0.35 | 8.75  | 0.14     | 12.73 |
| -607                                | -247            | 0.4  | 13.36 | 0.16     | 11.26 | -416                                | -148            | 0.4  | 9.29  | 0.16     | 13.66 |
| -640                                | -231            | 0.45 | 13.63 | 0.18     | 12.33 | -442                                | -146            | 0.45 | 9.66  | 0.18     | 14.33 |
| -674                                | -211            | 0.5  | 13.86 | 0.2      | 13.26 | -477                                | -142            | 0.5  | 10.16 | 0.2      | 15.06 |
| -700                                | -193            | 0.55 | 13.99 | 0.22     | 14.09 | -499                                | -137            | 0.55 | 10.43 | 0.22     | 15.76 |
| -726                                | -176            | 0.6  | 14.13 | 0.24     | 14.99 | -523                                | -132            | 0.6  | 10.76 | 0.24     | 16.46 |
| -754                                | -154            | 0.65 | 14.26 | 0.26     | 15.66 | -549                                | -122            | 0.65 | 11.09 | 0.26     | 17.06 |
| -780                                | -132            | 0.7  | 14.43 | 0.28     | 16.29 | -573                                | -115            | 0.7  | 11.36 |          |       |
| -807                                | -109            | 0.75 | 14.56 | 0.3      | 16.86 | -590                                | -107            | 0.75 | 11.56 |          |       |
| -824                                | -92             | 0.8  | 14.59 |          |       | -606                                | -99             | 0.8  | 11.73 |          |       |
| -846                                | -74             | 0.85 | 14.69 |          |       | -634                                | -89             | 0.85 | 12.09 |          |       |
| -862                                | -57             | 0.9  | 14.73 |          |       | -650                                | -80             | 0.9  | 12.26 |          |       |
| -880                                | -40             | 0.95 | 14.83 |          |       | -670                                | -69             | 0.95 | 12.49 |          |       |
| -897                                | -25             | 1    | 14.89 |          |       | -693                                | -58             | 1    | 12.76 |          |       |
| -917                                | -6              | 1.05 | 15.03 |          |       | -708                                | -48             | 1.05 | 12.93 |          |       |
| -928                                | 5               | 1.1  | 15.06 |          |       | -728                                | -36             | 1.1  | 13.19 |          |       |
| -943                                | 19              | 1.15 | 15.16 |          |       | -746                                | -23             | 1.15 | 13.33 |          |       |
| -959                                | 35              | 1.2  | 15.26 |          |       | -762                                | -15             | 1.2  | 13.56 |          |       |
| -973                                | 50              | 1.25 | 15.33 |          |       | -778                                | -2              | 1.25 | 13.69 |          |       |
| -985                                | 65              | 1.3  | 15.43 |          |       | -797                                | 10              | 1.3  | 13.99 |          |       |
| -998                                | 79              | 1.35 | 15.49 |          |       | -814                                | 21              | 1.35 | 14.19 |          |       |
| -1010                               | 90              | 1.4  | 15.56 |          |       | -829                                | 31              | 1.4  | 14.36 |          |       |
| -1023                               | 105             | 1.45 | 15.69 |          |       | -843                                | 43              | 1.45 | 14.53 |          |       |
| -1034                               | 117             | 1.5  | 15.79 |          |       | -862                                | 56              | 1.5  | 14.79 |          |       |
| -1043                               | 130             | 1.55 | 15.89 |          |       | -877                                | 67              | 1.55 | 15.03 |          |       |
| -1055                               | 140             | 1.6  | 15.99 |          |       | -895                                | 82              | 1.6  | 15.23 |          |       |
| -1063                               | 150             | 1.65 | 16.09 |          |       | -909                                | 91              | 1.65 | 15.43 |          |       |
| -1074                               | 161             | 1.7  | 16.19 |          |       | -923                                | 102             | 1.7  | 15.63 |          |       |
| -1081                               | 172             | 1.75 | 16.29 |          |       | -939                                | 115             | 1.75 | 15.83 |          |       |
| -1086                               | 180             | 1.8  | 16.36 |          |       | -953                                | 127             | 1.8  | 16.06 |          |       |
| -1096                               | 190             | 1.85 | 16.53 |          |       | -965                                | 135             | 1.85 | 16.26 |          |       |
| -1102                               | 199             | 1.9  | 16.63 |          |       | -976                                | 145             | 1.9  | 16.43 |          |       |
| -1108                               | 209             | 1.95 | 16.73 |          |       | -990                                | 156             | 1.95 | 16.66 |          |       |
| -1111                               | 216             | 2    | 16.83 |          |       | -1003                               | 168             | 2    | 16.86 |          |       |

## แผ่นทดสอบขนาด 360 มม x 180 มม ตัวอย่าง B

| พารามิเตอร์จากการทดลอง 360 x 180 B1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 360 x 180 B2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -50                                 | -38             | 0.05 | 1.69  | 0.02     | 1.39  | -63                                 | -35             | 0.05 | 1.46  | 0.02     | 1.19  |
| -86                                 | -66             | 0.1  | 2.59  | 0.04     | 1.76  | -115                                | -68             | 0.1  | 2.66  | 0.04     | 2.09  |
| -126                                | -92             | 0.15 | 3.53  | 0.06     | 2.29  | -170                                | -99             | 0.15 | 3.86  | 0.06     | 5.69  |
| -167                                | -122            | 0.2  | 4.46  | 0.08     | 2.79  | -232                                | -130            | 0.2  | 5.23  | 0.08     | 7.46  |
| -219                                | -154            | 0.25 | 5.59  | 0.1      | 3.36  | -294                                | -153            | 0.25 | 6.39  | 0.1      | 9.16  |
| -269                                | -180            | 0.3  | 6.59  | 0.12     | 3.89  | -346                                | -169            | 0.3  | 7.33  | 0.12     | 10.63 |
| -310                                | -196            | 0.35 | 7.39  | 0.14     | 4.49  | -393                                | -177            | 0.35 | 8.13  | 0.14     | 11.86 |
| -348                                | -208            | 0.4  | 8.06  | 0.16     | 5.03  | -430                                | -180            | 0.4  | 8.73  | 0.16     | 12.63 |
| -380                                | -215            | 0.45 | 8.63  | 0.18     | 5.73  | -469                                | -181            | 0.45 | 9.33  | 0.18     | 13.69 |
| -414                                | -219            | 0.5  | 9.13  | 0.2      | 6.39  | -501                                | -178            | 0.5  | 9.76  | 0.2      | 14.33 |
| -446                                | -220            | 0.55 | 9.59  | 0.22     | 7.16  | -531                                | -173            | 0.55 | 10.16 | 0.22     | 15.33 |
| -477                                | -221            | 0.6  | 10.03 | 0.24     | 7.96  | -562                                | -166            | 0.6  | 10.53 | 0.24     | 15.86 |
| -505                                | -216            | 0.65 | 10.39 | 0.26     | 8.59  | -588                                | -159            | 0.65 | 10.86 | 0.26     | 16.63 |
| -531                                | -212            | 0.7  | 10.73 | 0.28     | 9.46  | -613                                | -148            | 0.7  | 11.13 | 0.28     | 17.23 |
| -556                                | -206            | 0.75 | 10.99 | 0.3      | 10.33 | -647                                | -135            | 0.75 | 11.49 |          |       |
| -583                                | -197            | 0.8  | 11.29 | 0.32     | 11.09 | -672                                | -122            | 0.8  | 11.76 |          |       |
| -614                                | -185            | 0.85 | 11.59 | 0.34     | 11.89 | -701                                | -107            | 0.85 | 12.03 |          |       |
| -640                                | -175            | 0.9  | 11.86 | 0.36     | 12.66 | -728                                | -90             | 0.9  | 12.33 |          |       |
| -670                                | -158            | 0.95 | 12.13 | 0.38     | 13.29 | -750                                | -75             | 0.95 | 12.58 |          |       |
| -699                                | -139            | 1    | 12.39 | 0.4      | 13.99 | -777                                | -57             | 1    | 12.79 |          |       |
| -718                                | -127            | 1.05 | 12.53 | 0.42     | 14.46 | -802                                | -37             | 1.05 | 12.99 |          |       |
| -744                                | -109            | 1.1  | 12.69 | 0.44     | 15.13 | -822                                | -21             | 1.1  | 13.19 |          |       |
| -776                                | -85             | 1.15 | 12.99 | 0.46     | 15.59 | -844                                | -3              | 1.15 | 13.39 |          |       |
| -798                                | -67             | 1.2  | 13.13 | 0.48     | 16.13 | -868                                | 17              | 1.2  | 13.59 |          |       |
| -824                                | -47             | 1.25 | 13.29 |          |       | -888                                | 32              | 1.25 | 13.83 |          |       |
| -850                                | -23             | 1.3  | 13.49 |          |       | -904                                | 47              | 1.3  | 13.96 |          |       |
| -870                                | -3              | 1.35 | 13.59 |          |       | -929                                | 67              | 1.35 | 14.26 |          |       |
| -887                                | 12              | 1.4  | 13.73 |          |       | -950                                | 87              | 1.4  | 14.46 |          |       |
| -913                                | 35              | 1.45 | 13.89 |          |       | -972                                | 108             | 1.45 | 14.69 |          |       |
| -937                                | 60              | 1.5  | 14.06 |          |       | -986                                | 121             | 1.5  | 14.86 |          |       |
| -954                                | 78              | 1.55 | 14.23 |          |       | -1006                               | 139             | 1.55 | 15.09 |          |       |
| -974                                | 99              | 1.6  | 14.36 |          |       | -1021                               | 154             | 1.6  | 15.26 |          |       |
| -999                                | 121             | 1.65 | 14.59 |          |       | -1043                               | 175             | 1.65 | 15.56 |          |       |
| -1017                               | 140             | 1.7  | 14.76 |          |       | -1058                               | 189             | 1.7  | 15.73 |          |       |
| -1033                               | 158             | 1.75 | 14.89 |          |       | -1072                               | 204             | 1.75 | 15.93 |          |       |
| -1053                               | 177             | 1.8  | 15.06 |          |       | -1088                               | 219             | 1.8  | 16.19 |          |       |
| -1071                               | 193             | 1.85 | 15.23 |          |       | -1099                               | 230             | 1.85 | 16.36 |          |       |
| -1086                               | 210             | 1.9  | 15.39 |          |       | -1111                               | 244             | 1.9  | 16.56 |          |       |
| -1102                               | 226             | 1.95 | 15.59 |          |       | -1122                               | 254             | 1.95 | 16.76 |          |       |
| -1117                               | 242             | 2    | 15.76 |          |       | -1134                               | 268             | 2    | 17.03 |          |       |

## แผ่นทดสอบขนาด 360 มม x 180 มม ตัวอย่าง C

| พารามิเตอร์จากการทดลอง 360 x 180 C1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 360 x 180 C2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -135                                | -162            | 0.05 | 3.56  | 0.02     | 1.33  | -76                                 | -50             | 0.05 | 1.33  | 0.02     | 3.96  |
| -282                                | -277            | 0.1  | 6.99  | 0.04     | 3.03  | -131                                | -83             | 0.1  | 2.36  | 0.04     | 6.43  |
| -373                                | -330            | 0.15 | 8.86  | 0.06     | 5.16  | -195                                | -116            | 0.15 | 3.66  | 0.06     | 7.59  |
| -431                                | -355            | 0.2  | 9.93  | 0.08     | 7.46  | -251                                | -141            | 0.2  | 4.69  | 0.08     | 9.09  |
| -478                                | -366            | 0.25 | 10.69 | 0.1      | 10.23 | -290                                | -152            | 0.25 | 5.36  | 0.1      | 10.43 |
| -526                                | -370            | 0.3  | 11.36 | 0.12     | 12.83 | -330                                | -162            | 0.3  | 6.06  | 0.12     | 11.63 |
| -562                                | -366            | 0.35 | 11.86 | 0.14     | 14.96 | -374                                | -168            | 0.35 | 6.73  | 0.14     | 12.79 |
| -608                                | -357            | 0.4  | 12.36 | 0.16     | 16.83 | -411                                | -170            | 0.4  | 7.29  | 0.16     | 14.03 |
| -641                                | -346            | 0.45 | 12.69 | 0.18     | 18.53 | -446                                | -171            | 0.45 | 7.86  | 0.18     | 15.23 |
| -668                                | -331            | 0.5  | 12.86 |          |       | -479                                | -167            | 0.5  | 8.29  | 0.2      | 16.46 |
| -702                                | -313            | 0.55 | 13.13 |          |       | -508                                | -164            | 0.55 | 8.69  | 0.22     | 17.73 |
| -732                                | -296            | 0.6  | 13.36 |          |       | -541                                | -157            | 0.6  | 9.09  |          |       |
| -761                                | -275            | 0.65 | 13.53 |          |       | -589                                | -140            | 0.65 | 9.56  |          |       |
| -787                                | -256            | 0.7  | 13.69 |          |       | -617                                | -130            | 0.7  | 9.86  |          |       |
| -815                                | -233            | 0.75 | 13.83 |          |       | -645                                | -119            | 0.75 | 10.16 |          |       |
| -840                                | -214            | 0.8  | 13.96 |          |       | -676                                | -106            | 0.8  | 10.53 |          |       |
| -870                                | -190            | 0.85 | 14.16 |          |       | -705                                | -93             | 0.85 | 10.83 |          |       |
| -885                                | -173            | 0.9  | 14.13 |          |       | -732                                | -80             | 0.9  | 11.13 |          |       |
| -925                                | -143            | 0.95 | 14.43 |          |       | -763                                | -64             | 0.95 | 11.43 |          |       |
| -954                                | -117            | 1    | 14.59 |          |       | -789                                | -48             | 1    | 11.69 |          |       |
| -978                                | -94             | 1.05 | 14.73 |          |       | -814                                | -32             | 1.05 | 11.93 |          |       |
| -1007                               | -68             | 1.1  | 14.89 |          |       | -837                                | -16             | 1.1  | 12.16 |          |       |
| -1028                               | -49             | 1.15 | 15.03 |          |       | -868                                | 3               | 1.15 | 12.49 |          |       |
| -1057                               | -22             | 1.2  | 15.16 |          |       | -893                                | 20              | 1.2  | 12.73 |          |       |
| -1079                               | -2              | 1.25 | 15.29 |          |       | -919                                | 40              | 1.25 | 12.99 |          |       |
| -1106                               | 21              | 1.3  | 15.46 |          |       | -943                                | 57              | 1.3  | 13.19 |          |       |
| -1133                               | 47              | 1.35 | 15.59 |          |       | -963                                | 72              | 1.35 | 13.39 |          |       |
| -1164                               | 73              | 1.4  | 15.79 |          |       | -993                                | 95              | 1.4  | 13.69 |          |       |
| -1187                               | 95              | 1.45 | 15.86 |          |       | -1016                               | 113             | 1.45 | 13.93 |          |       |
| -1214                               | 118             | 1.5  | 16.06 |          |       | -1036                               | 128             | 1.5  | 14.09 |          |       |
| -1241                               | 143             | 1.55 | 16.23 |          |       | -1059                               | 147             | 1.55 | 14.39 |          |       |
| -1260                               | 162             | 1.6  | 16.36 |          |       | -1076                               | 165             | 1.6  | 14.56 |          |       |
| -1289                               | 187             | 1.65 | 16.53 |          |       | -1100                               | 183             | 1.65 | 14.83 |          |       |
| -1314                               | 210             | 1.7  | 16.73 |          |       | -1122                               | 201             | 1.7  | 15.03 |          |       |
| -1336                               | 231             | 1.75 | 16.83 |          |       | -1143                               | 220             | 1.75 | 15.29 |          |       |
| -1363                               | 255             | 1.8  | 17.03 |          |       | -1159                               | 234             | 1.8  | 15.46 |          |       |
| -1385                               | 274             | 1.85 | 17.13 |          |       | -1180                               | 253             | 1.85 | 15.73 |          |       |
| -1406                               | 297             | 1.9  | 17.16 |          |       | -1196                               | 267             | 1.9  | 15.86 |          |       |
| -1432                               | 318             | 1.95 | 17.43 |          |       | -1215                               | 285             | 1.95 | 16.09 |          |       |
| -1453                               | 336             | 2    | 17.56 |          |       | -1235                               | 303             | 2    | 16.36 |          |       |

## แผ่นทดสอบขนาด 360 มม x 180 มม ตัวอย่าง D

| พารามิเตอร์จากการทดลอง 360 x 180 D1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 360 x 180 D2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | w    | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | w    | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -107                                | -127            | 0.05 | 4.33  | 0.02     | 2.93  | -61                                 | -94             | 0.05 | 2.83  | 0.02     | 2.73  |
| -181                                | -222            | 0.1  | 6.69  | 0.04     | 4.23  | -102                                | -161            | 0.1  | 4.36  | 0.04     | 3.63  |
| -245                                | -318            | 0.15 | 8.86  | 0.06     | 5.19  | -134                                | -224            | 0.15 | 5.69  | 0.06     | 4.56  |
| -287                                | -410            | 0.2  | 10.59 | 0.08     | 6.29  | -156                                | -271            | 0.2  | 6.53  | 0.08     | 5.49  |
| -306                                | -493            | 0.25 | 11.99 | 0.1      | 7.36  | -172                                | -318            | 0.25 | 7.43  | 0.1      | 6.36  |
| -305                                | -551            | 0.3  | 12.73 | 0.12     | 8.26  | -186                                | -366            | 0.3  | 8.26  | 0.12     | 7.29  |
| -294                                | -601            | 0.35 | 13.29 | 0.14     | 9.29  | -191                                | -406            | 0.35 | 8.89  | 0.14     | 8.23  |
| -277                                | -643            | 0.4  | 13.63 | 0.16     | 10.09 | -195                                | -450            | 0.4  | 9.49  | 0.16     | 9.16  |
| -263                                | -665            | 0.45 | 13.73 | 0.18     | 11.16 | -194                                | -488            | 0.45 | 9.99  | 0.18     | 10.19 |
| -243                                | -695            | 0.5  | 13.89 | 0.2      | 11.93 | -189                                | -520            | 0.5  | 10.39 | 0.2      | 11.13 |
| -225                                | -723            | 0.55 | 14.03 | 0.22     | 12.83 | -181                                | -557            | 0.55 | 10.83 | 0.22     | 12.03 |
| -212                                | -741            | 0.6  | 14.09 | 0.24     | 13.53 | -172                                | -584            | 0.6  | 11.13 | 0.24     | 12.93 |
| -190                                | -765            | 0.65 | 14.16 | 0.26     | 14.36 | -162                                | -617            | 0.65 | 11.46 | 0.26     | 13.76 |
| -173                                | -786            | 0.7  | 14.23 | 0.28     | 14.93 | -151                                | -643            | 0.7  | 11.73 | 0.28     | 14.56 |
| -159                                | -802            | 0.75 | 14.26 | 0.3      | 15.53 | -140                                | -669            | 0.75 | 11.96 | 0.3      | 15.26 |
| -145                                | -817            | 0.8  | 14.29 | 0.32     | 16.19 | -125                                | -697            | 0.8  | 12.23 | 0.32     | 15.96 |
| -122                                | -842            | 0.85 | 14.33 | 0.34     | 16.73 | -113                                | -721            | 0.85 | 12.43 | 0.34     | 16.63 |
| -111                                | -854            | 0.9  | 14.39 | 0.36     | 17.29 | -100                                | -741            | 0.9  | 12.56 | 0.36     | 17.26 |
| -94                                 | -870            | 0.95 | 14.46 |          |       | -85                                 | -768            | 0.95 | 12.83 |          |       |
| -74                                 | -892            | 1    | 14.56 |          |       | -69                                 | -790            | 1    | 12.96 |          |       |
| -61                                 | -905            | 1.05 | 14.59 |          |       | -58                                 | -807            | 1.05 | 13.09 |          |       |
| -46                                 | -920            | 1.1  | 14.63 |          |       | -43                                 | -828            | 1.1  | 13.33 |          |       |
| -30                                 | -938            | 1.15 | 14.73 |          |       | -29                                 | -849            | 1.15 | 13.49 |          |       |
| -16                                 | -951            | 1.2  | 14.76 |          |       | -11                                 | -870            | 1.2  | 13.66 |          |       |
| 4                                   | -972            | 1.25 | 14.86 |          |       | 2                                   | -890            | 1.25 | 13.83 |          |       |
| 18                                  | -987            | 1.3  | 14.96 |          |       | 17                                  | -910            | 1.3  | 13.99 |          |       |
| 34                                  | -1003           | 1.35 | 15.03 |          |       | 38                                  | -931            | 1.35 | 14.13 |          |       |
| 49                                  | -1019           | 1.4  | 15.13 |          |       | 50                                  | -947            | 1.4  | 14.29 |          |       |
| 62                                  | -1032           | 1.45 | 15.19 |          |       | 66                                  | -965            | 1.45 | 14.46 |          |       |
| 82                                  | -1052           | 1.5  | 15.33 |          |       | 82                                  | -982            | 1.5  | 14.63 |          |       |
| 96                                  | -1066           | 1.55 | 15.39 |          |       | 96                                  | -999            | 1.55 | 14.76 |          |       |
| 111                                 | -1082           | 1.6  | 15.49 |          |       | 109                                 | -1016           | 1.6  | 14.89 |          |       |
| 125                                 | -1095           | 1.65 | 15.56 |          |       | 128                                 | -1036           | 1.65 | 15.13 |          |       |
| 143                                 | -1113           | 1.7  | 15.69 |          |       | 142                                 | -1052           | 1.7  | 15.29 |          |       |
| 160                                 | -1131           | 1.75 | 15.83 |          |       | 158                                 | -1070           | 1.75 | 15.46 |          |       |
| 178                                 | -1148           | 1.8  | 15.93 |          |       | 171                                 | -1085           | 1.8  | 15.59 |          |       |
| 192                                 | -1161           | 1.85 | 15.99 |          |       | 187                                 | -1101           | 1.85 | 15.73 |          |       |
| 208                                 | -1175           | 1.9  | 16.09 |          |       | 201                                 | -1114           | 1.9  | 15.86 |          |       |
| 226                                 | -1199           | 1.95 | 16.26 |          |       | 215                                 | -1132           | 1.95 | 16.06 |          |       |
| 240                                 | -1207           | 2    | 16.36 |          |       | 231                                 | -1148           | 2    | 16.26 |          |       |

## แผ่นทดสอบขนาด 270 มม x 180 มม ตัวอย่าง A

| พารามิเตอร์จากการทดลอง 270 x 180 A1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 270 x 180 A2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -255                                | -121            | 0.05 | 4.59  | 0.02     | 0.89  | -84                                 | -12             | 0.05 | 0.83  | 0.02     | 0.29  |
| -371                                | -149            | 0.1  | 6.43  | 0.04     | 4.29  | -144                                | -14             | 0.1  | 1.53  | 0.04     | 0.96  |
| -472                                | -160            | 0.15 | 7.86  | 0.06     | 5.89  | -211                                | -8              | 0.15 | 2.33  | 0.06     | 6.39  |
| -552                                | -157            | 0.2  | 8.86  | 0.08     | 7.19  | -264                                | -2              | 0.2  | 2.96  | 0.08     | 8.29  |
| -611                                | -148            | 0.25 | 9.53  | 0.1      | 8.43  | -321                                | 6               | 0.25 | 3.63  | 0.1      | 9.59  |
| -674                                | -134            | 0.3  | 10.23 | 0.12     | 9.56  | -379                                | 18              | 0.3  | 4.26  | 0.12     | 10.59 |
| -732                                | -116            | 0.35 | 10.79 | 0.14     | 10.59 | -424                                | 31              | 0.35 | 4.79  | 0.14     | 11.86 |
| -776                                | -106            | 0.4  | 11.19 | 0.16     | 11.39 | -483                                | 49              | 0.4  | 5.46  | 0.16     | 13.03 |
| -824                                | -80             | 0.45 | 11.63 | 0.18     | 12.53 | -533                                | 66              | 0.45 | 5.99  | 0.18     | 13.96 |
| -867                                | -60             | 0.5  | 11.99 | 0.2      | 13.39 | -586                                | 86              | 0.5  | 6.56  | 0.2      | 14.73 |
| -911                                | -37             | 0.55 | 12.36 | 0.22     | 14.39 | -645                                | 111             | 0.55 | 7.16  | 0.22     | 15.36 |
| -953                                | -15             | 0.6  | 12.63 | 0.24     | 15.13 | -692                                | 133             | 0.6  | 7.66  | 0.24     | 16.29 |
| -1004                               | 12              | 0.65 | 13.03 | 0.26     | 15.86 | -737                                | 154             | 0.65 | 8.13  | 0.26     | 16.79 |
| -1043                               | 36              | 0.7  | 13.29 | 0.28     | 16.46 | -779                                | 175             | 0.7  | 8.53  | 0.28     | 17.33 |
| -1079                               | 60              | 0.75 | 13.49 | 0.3      | 16.83 | -827                                | 202             | 0.75 | 9.03  |          |       |
| -1109                               | 81              | 0.8  | 13.66 |          |       | -878                                | 229             | 0.8  | 9.53  |          |       |
| -1154                               | 111             | 0.85 | 13.96 |          |       | -917                                | 251             | 0.85 | 9.93  |          |       |
| -1192                               | 137             | 0.9  | 14.23 |          |       | -955                                | 274             | 0.9  | 10.29 |          |       |
| -1237                               | 168             | 0.95 | 14.46 |          |       | -995                                | 298             | 0.95 | 10.69 |          |       |
| -1272                               | 195             | 1    | 14.63 |          |       | -1041                               | 328             | 1    | 11.13 |          |       |
| -1307                               | 221             | 1.05 | 14.79 |          |       | -1075                               | 352             | 1.05 | 11.43 |          |       |
| -1346                               | 250             | 1.1  | 14.99 |          |       | -1108                               | 374             | 1.1  | 11.76 |          |       |
| -1380                               | 277             | 1.15 | 15.06 |          |       | -1152                               | 403             | 1.15 | 12.16 |          |       |
| -1414                               | 304             | 1.2  | 15.16 |          |       | -1191                               | 430             | 1.2  | 12.56 |          |       |
| -1455                               | 335             | 1.25 | 15.23 |          |       | -1235                               | 462             | 1.25 | 12.96 |          |       |
| -1480                               | 359             | 1.3  | 15.2  |          |       | -1266                               | 485             | 1.3  | 13.23 |          |       |
| -1521                               | 391             | 1.35 | 15.29 |          |       | -1304                               | 513             | 1.35 | 13.59 |          |       |
| -1569                               | 425             | 1.4  | 15.43 |          |       | -1343                               | 545             | 1.4  | 13.96 |          |       |
| -1599                               | 449             | 1.45 | 15.49 |          |       | -1387                               | 577             | 1.45 | 14.39 |          |       |
| -1633                               | 476             | 1.5  | 15.59 |          |       | -1425                               | 607             | 1.5  | 14.76 |          |       |
| -1672                               | 508             | 1.55 | 15.76 |          |       | -1456                               | 632             | 1.55 | 15.03 |          |       |
| -1720                               | 545             | 1.6  | 15.86 |          |       | -1498                               | 663             | 1.6  | 15.39 |          |       |
| -1758                               | 576             | 1.65 | 15.93 |          |       | -1531                               | 691             | 1.65 | 15.69 |          |       |
| -1788                               | 599             | 1.7  | 15.96 |          |       | -1567                               | 719             | 1.7  | 15.96 |          |       |
| -1831                               | 632             | 1.75 | 16.09 |          |       | -1604                               | 752             | 1.75 | 16.23 |          |       |
| -1864                               | 661             | 1.8  | 16.13 |          |       | -1641                               | 781             | 1.8  | 16.46 |          |       |
| -1912                               | 696             | 1.85 | 16.26 |          |       | -1678                               | 810             | 1.85 | 16.66 |          |       |
| -1947                               | 727             | 1.9  | 16.33 |          |       | -1708                               | 837             | 1.9  | 16.73 |          |       |
| -1982                               | 756             | 1.95 | 16.29 |          |       | -1743                               | 866             | 1.95 | 16.93 |          |       |
| -2018                               | 787             | 2    | 16.43 |          |       | -1779                               | 897             | 2    | 17.09 |          |       |

## แผ่นทดสอบขนาด 270 มม x 180 มม ตัวอย่าง B

| พารามิเตอร์จากการทดลอง 270 x 180 B1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 270 x 180 B2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -216                                | -314            | 0.05 | 8.83  | 0.02     | 1.43  | -16                                 | -115            | 0.05 | 2.83  | 0.02     | 3.89  |
| -243                                | -391            | 0.1  | 10.16 | 0.04     | 2.89  | -24                                 | -193            | 0.1  | 4.06  | 0.04     | 5.03  |
| -256                                | -457            | 0.15 | 11.19 | 0.06     | 4.09  | -25                                 | -262            | 0.15 | 5.09  | 0.06     | 6.03  |
| -256                                | -512            | 0.2  | 11.89 | 0.08     | 5.29  | -22                                 | -315            | 0.2  | 5.83  | 0.08     | 6.93  |
| -254                                | -562            | 0.25 | 12.56 | 0.1      | 6.53  | -15                                 | -367            | 0.25 | 6.56  | 0.1      | 7.86  |
| -245                                | -686            | 0.3  | 13.03 | 0.12     | 7.63  | -6                                  | -413            | 0.3  | 7.13  | 0.12     | 8.63  |
| -232                                | -644            | 0.35 | 13.39 | 0.14     | 8.83  | 5                                   | -461            | 0.35 | 7.73  | 0.14     | 9.43  |
| -218                                | -685            | 0.4  | 13.69 | 0.16     | 9.76  | 16                                  | -501            | 0.4  | 8.19  | 0.16     | 10.23 |
| -204                                | -718            | 0.45 | 13.99 | 0.18     | 10.86 | 31                                  | -545            | 0.45 | 8.73  | 0.18     | 10.86 |
| -187                                | -755            | 0.5  | 14.26 | 0.2      | 11.79 | 47                                  | -589            | 0.5  | 9.23  | 0.2      | 11.63 |
| -170                                | -783            | 0.55 | 14.36 | 0.22     | 12.79 | 64                                  | -628            | 0.55 | 9.69  | 0.22     | 12.29 |
| -149                                | -818            | 0.6  | 14.66 | 0.24     | 13.69 | 83                                  | -669            | 0.6  | 10.09 | 0.24     | 12.99 |
| -129                                | -853            | 0.65 | 14.89 | 0.26     | 14.53 | 101                                 | -704            | 0.65 | 10.46 | 0.26     | 13.69 |
| -110                                | -881            | 0.7  | 15.03 | 0.28     | 15.36 | 120                                 | -742            | 0.7  | 10.86 | 0.28     | 14.33 |
| -86                                 | -910            | 0.75 | 15.13 | 0.3      | 16.13 | 141                                 | -782            | 0.75 | 11.29 | 0.3      | 14.86 |
| -63                                 | -940            | 0.8  | 15.13 | 0.32     | 16.79 | 161                                 | -816            | 0.8  | 11.63 | 0.32     | 15.46 |
| -40                                 | -967            | 0.85 | 15.26 | 0.34     | 17.23 | 180                                 | -847            | 0.85 | 11.99 | 0.34     | 16.06 |
| -16                                 | -1000           | 0.9  | 15.39 |          |       | 200                                 | -883            | 0.9  | 12.36 | 0.36     | 16.66 |
| 8                                   | -1028           | 0.95 | 15.43 |          |       | 221                                 | -912            | 0.95 | 12.56 | 0.38     | 16.99 |
| 31                                  | -1058           | 1    | 15.59 |          |       | 248                                 | -953            | 1    | 13.06 | 0.4      | 17.53 |
| 53                                  | -1085           | 1.05 | 15.59 |          |       | 268                                 | -984            | 1.05 | 13.36 |          |       |
| 79                                  | -1115           | 1.1  | 15.69 |          |       | 289                                 | -1015           | 1.1  | 13.66 |          |       |
| 102                                 | -1145           | 1.15 | 15.79 |          |       | 312                                 | -1048           | 1.15 | 14.03 |          |       |
| 126                                 | -1174           | 1.2  | 15.86 |          |       | 335                                 | -1081           | 1.2  | 14.33 |          |       |
| 151                                 | -1206           | 1.25 | 15.93 |          |       | 363                                 | -1119           | 1.25 | 14.73 |          |       |
| 175                                 | -1233           | 1.3  | 15.99 |          |       | 383                                 | -1147           | 1.3  | 14.96 |          |       |
| 201                                 | -1265           | 1.35 | 16.13 |          |       | 407                                 | -1177           | 1.35 | 15.26 |          |       |
| 225                                 | -1292           | 1.4  | 16.16 |          |       | 431                                 | -1207           | 1.4  | 15.86 |          |       |
| 248                                 | -1323           | 1.45 | 16.23 |          |       | 458                                 | -1240           | 1.45 | 15.93 |          |       |
| 273                                 | -1353           | 1.5  | 16.29 |          |       | 482                                 | -1273           | 1.5  | 16.09 |          |       |
| 299                                 | -1383           | 1.55 | 16.39 |          |       | 505                                 | -1305           | 1.55 | 16.33 |          |       |
| 325                                 | -1414           | 1.6  | 16.39 |          |       | 535                                 | -1340           | 1.6  | 16.59 |          |       |
| 349                                 | -1445           | 1.65 | 16.56 |          |       | 560                                 | -1370           | 1.65 | 16.79 |          |       |
| 379                                 | -1480           | 1.7  | 16.69 |          |       | 587                                 | -1403           | 1.7  | 16.99 |          |       |
| 406                                 | -1513           | 1.75 | 16.73 |          |       | 614                                 | -1437           | 1.75 | 17.16 |          |       |
| 439                                 | -1552           | 1.8  | 16.83 |          |       | 640                                 | -1465           | 1.8  | 17.16 |          |       |
| 463                                 | -1579           | 1.85 | 16.86 |          |       | 671                                 | -1503           | 1.85 | 17.36 |          |       |
| 487                                 | -1607           | 1.9  | 16.79 |          |       | 698                                 | -1535           | 1.9  | 17.39 |          |       |
| 516                                 | -1644           | 1.95 | 16.93 |          |       | 723                                 | -1563           | 1.95 | 17.39 |          |       |
| 539                                 | -1671           | 2    | 16.96 |          |       | 758                                 | -1598           | 2    | 17.43 |          |       |

## แผ่นทดสอบขนาด 270 มม x 180 มม ตัวอย่าง C

| พารามิเตอร์จากการทดลอง 270 x 180 C1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 270 x 180 C2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -155                                | -260            | 0.05 | 5.33  | 0.02     | 2.89  | -68                                 | -235            | 0.05 | 3.86  | 0.02     | 1.23  |
| -194                                | -389            | 0.1  | 7.39  | 0.04     | 3.33  | -75                                 | -328            | 0.1  | 5.09  | 0.04     | 1.89  |
| -207                                | -478            | 0.15 | 8.69  | 0.06     | 3.79  | -75                                 | -397            | 0.15 | 6.09  | 0.06     | 2.53  |
| -206                                | -559            | 0.2  | 9.66  | 0.08     | 4.09  | -70                                 | -461            | 0.2  | 6.89  | 0.08     | 3.33  |
| -198                                | -625            | 0.25 | 10.39 | 0.1      | 4.46  | -59                                 | -524            | 0.25 | 7.63  | 0.1      | 4.03  |
| -185                                | -685            | 0.3  | 10.96 | 0.12     | 4.83  | -48                                 | -583            | 0.3  | 8.26  | 0.12     | 4.73  |
| -167                                | -741            | 0.35 | 11.46 | 0.14     | 5.26  | -31                                 | -642            | 0.35 | 8.89  | 0.14     | 5.43  |
| -150                                | -783            | 0.4  | 11.79 | 0.16     | 5.63  | -15                                 | -685            | 0.4  | 9.29  | 0.16     | 6.29  |
| -130                                | -827            | 0.45 | 12.13 | 0.18     | 6.19  | 5                                   | -742            | 0.45 | 9.86  | 0.18     | 6.99  |
| -108                                | -875            | 0.5  | 12.49 | 0.2      | 8.03  | 26                                  | -789            | 0.5  | 10.29 | 0.2      | 7.69  |
| -90                                 | -909            | 0.55 | 12.69 | 0.22     | 9.56  | 52                                  | -843            | 0.55 | 10.76 | 0.22     | 8.59  |
| -65                                 | -955            | 0.6  | 13.03 | 0.24     | 10.79 | 76                                  | -891            | 0.6  | 11.16 | 0.24     | 9.33  |
| -42                                 | -993            | 0.65 | 13.29 | 0.26     | 11.66 | 98                                  | -931            | 0.65 | 11.49 | 0.26     | 10.09 |
| -17                                 | -1028           | 0.7  | 13.46 | 0.28     | 12.49 | 124                                 | -978            | 0.7  | 11.86 | 0.28     | 10.76 |
| 2                                   | -1058           | 0.75 | 13.63 | 0.3      | 13.13 | 149                                 | -1021           | 0.75 | 12.19 | 0.3      | 11.53 |
| 30                                  | -1098           | 0.8  | 13.86 | 0.32     | 13.69 | 174                                 | -1057           | 0.8  | 12.46 | 0.32     | 12.36 |
| 54                                  | -1133           | 0.85 | 14.06 | 0.34     | 14.22 | 205                                 | -1101           | 0.85 | 12.83 | 0.34     | 13.03 |
| 76                                  | -1165           | 0.9  | 14.16 | 0.36     | 14.79 | 229                                 | -1134           | 0.9  | 13.06 | 0.36     | 13.76 |
| 102                                 | -1200           | 0.95 | 14.36 | 0.38     | 15.23 | 259                                 | -1177           | 0.95 | 13.39 | 0.38     | 14.43 |
| 129                                 | -1237           | 1    | 14.56 | 0.4      | 15.79 | 286                                 | -1212           | 1    | 13.69 | 0.4      | 15.09 |
| 153                                 | -1264           | 1.05 | 14.63 | 0.42     | 16.23 | 311                                 | -1245           | 1.05 | 13.93 | 0.42     | 15.86 |
| 176                                 | -1292           | 1.1  | 14.69 | 0.44     | 16.66 | 337                                 | -1279           | 1.1  | 14.16 | 0.44     | 16.46 |
| 203                                 | -1322           | 1.15 | 14.83 |          |       | 367                                 | -1318           | 1.15 | 14.46 | 0.46     | 17.16 |
| 227                                 | -1343           | 1.2  | 14.73 |          |       | 390                                 | -1347           | 1.2  | 14.66 |          |       |
| 256                                 | -1376           | 1.25 | 14.86 |          |       | 416                                 | -1377           | 1.25 | 14.86 |          |       |
| 280                                 | -1409           | 1.3  | 15.03 |          |       | 443                                 | -1413           | 1.3  | 15.13 |          |       |
| 306                                 | -1440           | 1.35 | 15.16 |          |       | 470                                 | -1448           | 1.35 | 15.39 |          |       |
| 335                                 | -1480           | 1.4  | 15.26 |          |       | 498                                 | -1484           | 1.4  | 15.69 |          |       |
| 356                                 | -1507           | 1.45 | 15.36 |          |       | 526                                 | -1518           | 1.45 | 15.93 |          |       |
| 382                                 | -1538           | 1.5  | 15.43 |          |       | 552                                 | -1550           | 1.5  | 16.09 |          |       |
| 410                                 | -1573           | 1.55 | 15.53 |          |       | 579                                 | -1584           | 1.55 | 16.29 |          |       |
| 440                                 | -1611           | 1.6  | 15.66 |          |       | 609                                 | -1622           | 1.6  | 16.56 |          |       |
| 471                                 | -1650           | 1.65 | 15.79 |          |       | 639                                 | -1659           | 1.65 | 16.79 |          |       |
| 496                                 | -1684           | 1.7  | 15.86 |          |       | 668                                 | -1692           | 1.7  | 16.96 |          |       |
| 527                                 | -1722           | 1.75 | 15.96 |          |       | 702                                 | -1730           | 1.75 | 17.13 |          |       |
| 558                                 | -1758           | 1.8  | 16.06 |          |       | 732                                 | -1766           | 1.8  | 17.26 |          |       |
| 587                                 | -1798           | 1.85 | 16.19 |          |       | 761                                 | -1797           | 1.85 | 17.36 |          |       |
| 617                                 | -1835           | 1.9  | 16.23 |          |       | 788                                 | -1828           | 1.9  | 17.43 |          |       |
| 651                                 | -1874           | 1.95 | 16.39 |          |       | 823                                 | -1870           | 1.95 | 17.63 |          |       |
| 681                                 | -1911           | 2    | 16.49 |          |       | 854                                 | -1906           | 2    | 17.69 |          |       |



## แผ่นทดสอบขนาด 270 มม x 180 มม ตัวอย่าง D

| พารามิเตอร์จากการทดลอง 270 x 180 D1 |              |      |       |          |       | พารามิเตอร์จากการทดลอง 270 x 180 D2 |              |      |       |          |       |
|-------------------------------------|--------------|------|-------|----------|-------|-------------------------------------|--------------|------|-------|----------|-------|
| $\epsilon_a$                        | $\epsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\epsilon_a$                        | $\epsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0            | 0    | 0     | 0        | 0     | 0                                   | 0            | 0    | 0     | 0        | 0     |
| -225                                | -187         | 0.05 | 5.19  | 0.02     | 6.16  | -94                                 | -23          | 0.05 | 1.43  | 0.02     | 1.43  |
| -356                                | -274         | 0.1  | 7.99  | 0.04     | 8.66  | -157                                | -35          | 0.1  | 2.36  | 0.04     | 2.03  |
| -485                                | -315         | 0.15 | 9.66  | 0.06     | 10.29 | -224                                | -42          | 0.15 | 3.29  | 0.06     | 2.69  |
| -545                                | -331         | 0.2  | 10.76 | 0.08     | 11.76 | -283                                | -44          | 0.2  | 4.06  | 0.08     | 3.39  |
| -610                                | -334         | 0.25 | 11.49 | 0.1      | 12.86 | -346                                | -41          | 0.25 | 4.86  | 0.1      | 3.93  |
| -664                                | -328         | 0.3  | 11.99 | 0.12     | 13.86 | -395                                | -34          | 0.3  | 5.36  | 0.12     | 4.59  |
| -731                                | -312         | 0.35 | 12.53 | 0.14     | 14.96 | -466                                | -23          | 0.35 | 6.23  | 0.14     | 5.26  |
| -783                                | -291         | 0.4  | 12.79 | 0.16     | 15.76 | -519                                | -10          | 0.4  | 6.79  | 0.16     | 5.96  |
| -831                                | -270         | 0.45 | 13.09 | 0.18     | 16.69 | -574                                | 4            | 0.45 | 7.39  | 0.18     | 6.59  |
| -893                                | -237         | 0.5  | 13.39 | 0.2      | 17.33 | -621                                | 19           | 0.5  | 7.86  | 0.2      | 7.23  |
| -940                                | -209         | 0.55 | 13.53 | 0.22     | 17.79 | -670                                | 37           | 0.55 | 8.33  | 0.22     | 7.93  |
| -986                                | -180         | 0.6  | 13.66 |          |       | -721                                | 57           | 0.6  | 8.76  | 0.24     | 8.76  |
| -1034                               | -149         | 0.65 | 13.83 |          |       | -765                                | 77           | 0.65 | 9.19  | 0.26     | 9.36  |
| -1084                               | -116         | 0.7  | 13.96 |          |       | -809                                | 97           | 0.7  | 9.53  | 0.28     | 10.09 |
| -1129                               | -85          | 0.75 | 14.06 |          |       | -852                                | 120          | 0.75 | 9.93  | 0.3      | 10.73 |
| -1171                               | -53          | 0.8  | 14.19 |          |       | -891                                | 140          | 0.8  | 10.26 | 0.32     | 11.59 |
| -1230                               | -14          | 0.85 | 14.39 |          |       | -933                                | 163          | 0.85 | 10.59 | 0.34     | 12.33 |
| -1274                               | 17           | 0.9  | 14.43 |          |       | -977                                | 186          | 0.9  | 10.96 | 0.36     | 13.09 |
| -1320                               | 49           | 0.95 | 14.59 |          |       | -1014                               | 209          | 0.95 | 11.23 | 0.38     | 13.39 |
| -1367                               | 83           | 1    | 14.66 |          |       | -1063                               | 238          | 1    | 11.66 | 0.4      | 14.56 |
| -1414                               | 117          | 1.05 | 14.79 |          |       | -1104                               | 265          | 1.05 | 11.93 | 0.42     | 15.33 |
| -1458                               | 149          | 1.1  | 14.86 |          |       | -1152                               | 298          | 1.1  | 12.36 | 0.44     | 15.99 |
| -1500                               | 180          | 1.15 | 14.99 |          |       | -1189                               | 324          | 1.15 | 12.66 | 0.46     | 16.59 |
| -1538                               | 209          | 1.2  | 15.03 |          |       | -1234                               | 354          | 1.2  | 12.99 | 0.48     | 17.33 |
| -1594                               | 249          | 1.25 | 15.19 |          |       | -1269                               | 382          | 1.25 | 13.26 | 0.5      | 17.83 |
| -1640                               | 284          | 1.3  | 15.33 |          |       | -1310                               | 409          | 1.3  | 13.56 |          |       |
| -1684                               | 316          | 1.35 | 15.43 |          |       | -1350                               | 440          | 1.35 | 13.89 |          |       |
| -1728                               | 348          | 1.4  | 15.56 |          |       | -1393                               | 472          | 1.4  | 14.23 |          |       |
| -1779                               | 387          | 1.45 | 15.66 |          |       | -1430                               | 501          | 1.45 | 14.49 |          |       |
| -1821                               | 418          | 1.5  | 15.69 |          |       | -1469                               | 532          | 1.5  | 14.79 |          |       |
| -1858                               | 447          | 1.55 | 15.83 |          |       | -1512                               | 566          | 1.55 | 15.13 |          |       |
| -1897                               | 477          | 1.6  | 15.93 |          |       | -1549                               | 598          | 1.6  | 15.39 |          |       |
| -1949                               | 515          | 1.65 | 16.06 |          |       | -1590                               | 630          | 1.65 | 15.69 |          |       |
| -1989                               | 546          | 1.7  | 16.16 |          |       | -1636                               | 666          | 1.7  | 16.09 |          |       |
| -2035                               | 582          | 1.75 | 16.26 |          |       | -1674                               | 697          | 1.75 | 16.36 |          |       |
| -2071                               | 609          | 1.8  | 16.36 |          |       | -1718                               | 732          | 1.8  | 16.66 |          |       |
| -2113                               | 641          | 1.85 | 16.46 |          |       | -1757                               | 765          | 1.85 | 16.93 |          |       |
| -2156                               | 674          | 1.9  | 16.59 |          |       | -1801                               | 802          | 1.9  | 17.16 |          |       |
| -2197                               | 707          | 1.95 | 16.69 |          |       | -1837                               | 835          | 1.95 | 17.36 |          |       |
| -2240                               | 740          | 2    | 16.79 |          |       | -1875                               | 867          | 2    | 17.46 |          |       |

## แผ่นทดสอบขนาด 180 มม x 180 มม ตัวอย่าง A

| พารามิเตอร์จากการทดลอง 180 x 180 A1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 180 x 180 A2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -168                                | -146            | 0.05 | 3.33  | 0.02     | 0.53  | -98                                 | -67             | 0.05 | 1.66  | 0.02     | 1.66  |
| -304                                | -252            | 0.1  | 5.89  | 0.04     | 0.96  | -165                                | -108            | 0.1  | 2.73  | 0.04     | 3.23  |
| -386                                | -308            | 0.15 | 7.36  | 0.06     | 1.26  | -226                                | -141            | 0.15 | 3.69  | 0.06     | 4.63  |
| -455                                | -347            | 0.2  | 8.53  | 0.08     | 1.86  | -285                                | -168            | 0.2  | 4.63  | 0.08     | 6.03  |
| -520                                | -378            | 0.25 | 9.56  | 0.1      | 2.39  | -347                                | -193            | 0.25 | 5.53  | 0.1      | 7.76  |
| -579                                | -397            | 0.3  | 10.39 | 0.12     | 3.09  | -404                                | -210            | 0.3  | 6.36  | 0.12     | 9.83  |
| -638                                | -411            | 0.35 | 11.23 | 0.14     | 3.76  | -454                                | -220            | 0.35 | 7.06  | 0.14     | 11.63 |
| -684                                | -415            | 0.4  | 11.76 | 0.16     | 4.36  | -496                                | -227            | 0.4  | 7.63  | 0.16     | 13.69 |
| -726                                | -415            | 0.45 | 12.19 | 0.18     | 5.13  | -544                                | -231            | 0.45 | 8.26  | 0.18     | 15.39 |
| -770                                | -411            | 0.5  | 12.66 | 0.2      | 5.93  | -588                                | -231            | 0.5  | 8.83  | 0.2      | 16.79 |
| -810                                | -402            | 0.55 | 13.06 | 0.22     | 6.73  | -631                                | -231            | 0.55 | 9.33  | 0.22     | 17.93 |
| -845                                | -392            | 0.6  | 13.29 | 0.24     | 7.39  | -672                                | -228            | 0.6  | 9.83  |          |       |
| -878                                | -380            | 0.65 | 13.56 | 0.26     | 8.29  | -710                                | -222            | 0.65 | 10.23 |          |       |
| -912                                | -365            | 0.7  | 13.79 | 0.28     | 9.19  | -739                                | -216            | 0.7  | 10.56 |          |       |
| -947                                | -351            | 0.75 | 14.03 | 0.3      | 10.23 | -772                                | -208            | 0.75 | 10.93 |          |       |
| -979                                | -335            | 0.8  | 14.19 | 0.32     | 11.29 | -810                                | -198            | 0.8  | 11.29 |          |       |
| -1019                               | -315            | 0.85 | 14.49 | 0.34     | 12.53 | -843                                | -187            | 0.85 | 11.66 |          |       |
| -1051                               | -296            | 0.9  | 14.69 | 0.36     | 13.59 | -872                                | -176            | 0.9  | 11.93 |          |       |
| -1082                               | -277            | 0.95 | 14.83 | 0.38     | 14.89 | -909                                | -162            | 0.95 | 12.29 |          |       |
| -1110                               | -250            | 1    | 14.93 | 0.4      | 16.06 | -930                                | -151            | 1    | 12.49 |          |       |
| -1144                               | -236            | 1.05 | 15.13 | 0.42     | 17.16 | -970                                | -136            | 1.05 | 12.83 |          |       |
| -1179                               | -215            | 1.1  | 15.33 | 0.44     | 18.13 | -998                                | -122            | 1.1  | 13.13 |          |       |
| -1210                               | -191            | 1.15 | 15.46 |          |       | -1028                               | -106            | 1.15 | 13.39 |          |       |
| -1240                               | -171            | 1.2  | 15.59 |          |       | -1056                               | -91             | 1.2  | 13.63 |          |       |
| -1273                               | -148            | 1.25 | 15.76 |          |       | -1089                               | -73             | 1.25 | 13.93 |          |       |
| -1299                               | -123            | 1.3  | 15.83 |          |       | -1118                               | -58             | 1.3  | 14.16 |          |       |
| -1331                               | -103            | 1.35 | 15.96 |          |       | -1143                               | -43             | 1.35 | 14.43 |          |       |
| -1358                               | -83             | 1.4  | 16.09 |          |       | -1176                               | -25             | 1.4  | 14.69 |          |       |
| -1380                               | -61             | 1.45 | 16.13 |          |       | -1200                               | -8              | 1.45 | 14.93 |          |       |
| -1411                               | -39             | 1.5  | 16.29 |          |       | -1226                               | 7               | 1.5  | 15.13 |          |       |
| -1443                               | -17             | 1.55 | 16.49 |          |       | -1256                               | 25              | 1.55 | 15.43 |          |       |
| -1468                               | 3               | 1.6  | 16.59 |          |       | -1286                               | 43              | 1.6  | 15.63 |          |       |
| -1495                               | 23              | 1.65 | 16.73 |          |       | -1306                               | 60              | 1.65 | 15.83 |          |       |
| -1525                               | 47              | 1.7  | 16.89 |          |       | -1327                               | 76              | 1.7  | 16.03 |          |       |
| -1552                               | 66              | 1.75 | 17.06 |          |       | -1356                               | 94              | 1.75 | 16.33 |          |       |
| -1611                               | 109             | 1.8  | 17.43 |          |       | -1383                               | 112             | 1.8  | 16.56 |          |       |
| -1638                               | 132             | 1.85 | 17.56 |          |       | -1403                               | 128             | 1.85 | 16.73 |          |       |
| -1660                               | 152             | 1.9  | 17.63 |          |       | -1425                               | 146             | 1.9  | 16.96 |          |       |
| -1679                               | 169             | 1.95 | 17.69 |          |       | -1449                               | 160             | 1.95 | 17.16 |          |       |
|                                     |                 |      |       |          |       | -1470                               | 178             | 2    | 17.36 |          |       |

## แผ่นทดสอบขนาด 180 มม x 180 มม ตัวอย่าง B

| พารามิเตอร์จากการทดลอง 180 x 180 B1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 180 x 180 B2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | w    | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | w    | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -64                                 | -35             | 0.05 | 2.76  | 0.02     | 1.09  | -112                                | -23             | 0.05 | 2.39  | 0.02     | 0.59  |
| -119                                | -69             | 0.1  | 4.56  | 0.04     | 2.43  | -178                                | -26             | 0.1  | 3.73  | 0.04     | 1.09  |
| -181                                | -100            | 0.15 | 5.96  | 0.06     | 3.99  | -230                                | -27             | 0.15 | 4.66  | 0.06     | 1.66  |
| -238                                | -125            | 0.2  | 7.09  | 0.08     | 5.56  | -285                                | -24             | 0.2  | 5.49  | 0.08     | 2.63  |
| -285                                | -139            | 0.25 | 7.83  | 0.1      | 7.23  | -328                                | -18             | 0.25 | 6.06  | 0.1      | 4.06  |
| -333                                | -150            | 0.3  | 8.63  | 0.12     | 9.16  | -367                                | -13             | 0.3  | 6.56  | 0.12     | 6.43  |
| -374                                | -159            | 0.35 | 9.19  | 0.14     | 10.96 | -403                                | -4              | 0.35 | 6.99  | 0.14     | 8.63  |
| -413                                | -164            | 0.4  | 9.73  | 0.16     | 12.73 | -436                                | 3               | 0.4  | 7.39  | 0.16     | 10.36 |
| -453                                | -166            | 0.45 | 10.26 | 0.18     | 14.49 | -465                                | 13              | 0.45 | 7.69  | 0.18     | 11.99 |
| -487                                | -165            | 0.5  | 10.59 | 0.2      | 15.79 | -499                                | 23              | 0.5  | 8.06  | 0.2      | 13.56 |
| -523                                | -163            | 0.55 | 11.06 | 0.22     | 16.76 | -528                                | 33              | 0.55 | 8.36  | 0.22     | 14.93 |
| -561                                | -158            | 0.6  | 11.36 | 0.24     | 17.43 | -555                                | 45              | 0.6  | 8.66  | 0.24     | 15.89 |
| -595                                | -152            | 0.65 | 11.69 |          |       | -580                                | 54              | 0.65 | 8.89  |          |       |
| -629                                | -145            | 0.7  | 11.96 |          |       | -602                                | 65              | 0.7  | 9.09  |          |       |
| -656                                | -136            | 0.75 | 12.19 |          |       | -628                                | 73              | 0.75 | 9.39  |          |       |
| -694                                | -126            | 0.8  | 12.46 |          |       | -657                                | 86              | 0.8  | 9.69  |          |       |
| -727                                | -116            | 0.85 | 12.73 |          |       | -677                                | 97              | 0.85 | 9.93  |          |       |
| -762                                | -104            | 0.9  | 12.99 |          |       | -695                                | 105             | 0.9  | 10.06 |          |       |
| -791                                | -92             | 0.95 | 13.16 |          |       | -713                                | 115             | 0.95 | 10.23 |          |       |
| -825                                | -79             | 1    | 13.36 |          |       | -740                                | 127             | 1    | 10.53 |          |       |
| -853                                | -66             | 1.05 | 13.49 |          |       | -761                                | 138             | 1.05 | 10.76 |          |       |
| -887                                | -50             | 1.1  | 13.69 |          |       | -781                                | 148             | 1.1  | 10.99 |          |       |
| -916                                | -38             | 1.15 | 13.83 |          |       | -806                                | 160             | 1.15 | 11.26 |          |       |
| -950                                | -20             | 1.2  | 14.06 |          |       | -821                                | 169             | 1.2  | 11.46 |          |       |
| -980                                | -5              | 1.25 | 14.16 |          |       | -843                                | 181             | 1.25 | 11.73 |          |       |
| -1008                               | 7               | 1.3  | 14.33 |          |       | -859                                | 192             | 1.3  | 11.86 |          |       |
| -1037                               | 23              | 1.35 | 14.49 |          |       | -876                                | 202             | 1.35 | 12.09 |          |       |
| -1074                               | 40              | 1.4  | 14.66 |          |       | -893                                | 213             | 1.4  | 12.33 |          |       |
| -1097                               | 56              | 1.45 | 14.73 |          |       | -914                                | 224             | 1.45 | 12.59 |          |       |
| -1129                               | 71              | 1.5  | 14.89 |          |       | -929                                | 233             | 1.5  | 12.83 |          |       |
| -1154                               | 88              | 1.55 | 14.89 |          |       | -942                                | 243             | 1.55 | 12.99 |          |       |
| -1184                               | 102             | 1.6  | 15.13 |          |       | -958                                | 252             | 1.6  | 13.23 |          |       |
| -1218                               | 120             | 1.65 | 15.36 |          |       | -971                                | 261             | 1.65 | 13.39 |          |       |
| -1246                               | 138             | 1.7  | 15.49 |          |       | -981                                | 269             | 1.7  | 13.56 |          |       |
| -1274                               | 156             | 1.75 | 15.56 |          |       | -996                                | 279             | 1.75 | 13.79 |          |       |
| -1306                               | 172             | 1.8  | 15.76 |          |       | -1013                               | 290             | 1.8  | 14.06 |          |       |
| -1331                               | 187             | 1.85 | 15.86 |          |       | -1027                               | 301             | 1.85 | 14.29 |          |       |
| -1371                               | 211             | 1.9  | 16.13 |          |       | -1032                               | 308             | 1.9  | 14.39 |          |       |
| -1395                               | 225             | 1.95 | 16.23 |          |       | -1045                               | 317             | 1.95 | 14.63 |          |       |
| -1422                               | 241             | 2    | 16.33 |          |       | -1058                               | 327             | 2    | 14.86 |          |       |

## แผ่นทดสอบขนาด 180 มม x 180 มม ตัวอย่าง C

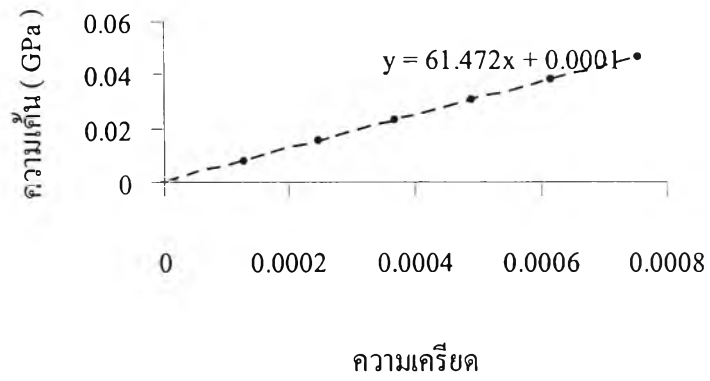
| พารามิเตอร์จากการทดลอง 180 x 180 C1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 180 x 180 C2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -333                                | -214            | 0.05 | 7.03  | 0.02     | 0.13  | -230                                | -136            | 0.05 | 4.46  | 0.02     | 0.13  |
| -433                                | -258            | 0.1  | 8.89  | 0.04     | 0.23  | -311                                | -176            | 0.1  | 5.83  | 0.04     | 0.23  |
| -484                                | -269            | 0.15 | 9.69  | 0.06     | 0.43  | -391                                | -204            | 0.15 | 7.13  | 0.06     | 0.33  |
| -539                                | -277            | 0.2  | 10.56 | 0.08     | 1.03  | -446                                | -216            | 0.2  | 7.96  | 0.08     | 0.46  |
| -581                                | -278            | 0.25 | 11.09 | 0.1      | 1.69  | -489                                | -224            | 0.25 | 8.63  | 0.1      | 0.63  |
| -624                                | -278            | 0.3  | 11.66 | 0.12     | 2.59  | -531                                | -228            | 0.3  | 9.23  | 0.12     | 1.23  |
| -668                                | -272            | 0.35 | 12.23 | 0.14     | 3.46  | -574                                | -229            | 0.35 | 9.83  | 0.14     | 2.06  |
| -705                                | -265            | 0.4  | 12.63 | 0.16     | 4.76  | -620                                | -228            | 0.4  | 10.39 | 0.16     | 3.43  |
| -736                                | -256            | 0.45 | 12.93 | 0.18     | 6.39  | -656                                | -223            | 0.45 | 10.79 | 0.18     | 4.73  |
| -781                                | -244            | 0.5  | 13.43 | 0.2      | 8.13  | -690                                | -217            | 0.5  | 11.26 | 0.2      | 6.63  |
| -812                                | -232            | 0.55 | 13.73 | 0.22     | 9.99  | -724                                | -210            | 0.55 | 11.63 | 0.22     | 8.09  |
| -849                                | -218            | 0.6  | 14.09 | 0.24     | 11.79 | -760                                | -199            | 0.6  | 11.99 | 0.24     | 9.96  |
| -882                                | -201            | 0.65 | 14.39 | 0.26     | 13.53 | -792                                | -190            | 0.65 | 12.39 | 0.26     | 11.69 |
| -907                                | -188            | 0.7  | 14.56 | 0.28     | 15.23 | -825                                | -180            | 0.7  | 12.73 | 0.28     | 13.56 |
| -943                                | -171            | 0.75 | 14.86 | 0.3      | 16.69 | -853                                | -168            | 0.75 | 12.99 | 0.3      | 15.46 |
| -970                                | -153            | 0.8  | 15.03 | 0.32     | 18.03 | -885                                | -155            | 0.8  | 13.33 | 0.32     | 17.26 |
| -1001                               | -134            | 0.85 | 15.26 |          |       | -917                                | -141            | 0.85 | 13.63 | 0.34     | 18.89 |
| -1028                               | -115            | 0.9  | 15.39 |          |       | -943                                | -129            | 0.9  | 13.89 |          |       |
| -1054                               | -98             | 0.95 | 15.56 |          |       | -976                                | -111            | 0.95 | 14.19 |          |       |
| -1088                               | -77             | 1    | 15.79 |          |       | -1007                               | -95             | 1    | 14.49 |          |       |
| -1116                               | -57             | 1.05 | 15.96 |          |       | -1030                               | -81             | 1.05 | 14.69 |          |       |
| -1144                               | -38             | 1.1  | 16.16 |          |       | -1062                               | -63             | 1.1  | 14.99 |          |       |
| -1169                               | -18             | 1.15 | 16.23 |          |       | -1091                               | -45             | 1.15 | 15.26 |          |       |
| -1197                               | 0               | 1.2  | 16.53 |          |       | -1116                               | -31             | 1.2  | 15.49 |          |       |
| -1217                               | 16              | 1.25 | 16.59 |          |       | -1143                               | -14             | 1.25 | 15.76 |          |       |
| -1241                               | 33              | 1.3  | 16.76 |          |       | -1168                               | 1               | 1.3  | 15.96 |          |       |
| -1273                               | 55              | 1.35 | 16.96 |          |       | -1192                               | 18              | 1.35 | 16.16 |          |       |
| -1299                               | 77              | 1.4  | 17.16 |          |       | -1218                               | 34              | 1.4  | 16.39 |          |       |
| -1321                               | 94              | 1.45 | 17.26 |          |       | -1241                               | 52              | 1.45 | 16.63 |          |       |
| -1340                               | 113             | 1.5  | 17.39 |          |       | -1267                               | 70              | 1.5  | 16.89 |          |       |
| -1360                               | 131             | 1.55 | 17.49 |          |       | -1292                               | 87              | 1.55 | 17.09 |          |       |
| -1385                               | 149             | 1.6  | 17.66 |          |       | -1312                               | 103             | 1.6  | 17.29 |          |       |
| -1407                               | 168             | 1.65 | 17.76 |          |       | -1337                               | 121             | 1.65 | 17.53 |          |       |
| -1424                               | 187             | 1.7  | 17.86 |          |       | -1358                               | 138             | 1.7  | 17.76 |          |       |
| -1446                               | 206             | 1.75 | 17.99 |          |       | -1382                               | 157             | 1.75 | 17.99 |          |       |
| -1451                               | 223             | 1.8  | 18.09 |          |       | -1402                               | 174             | 1.8  | 18.19 |          |       |
| -1469                               | 238             | 1.85 | 18.16 |          |       | -1422                               | 190             | 1.85 | 18.36 |          |       |
| -1494                               | 259             | 1.9  | 18.26 |          |       | -1433                               | 203             | 1.9  | 18.43 |          |       |
| -1507                               | 273             | 1.95 | 18.33 |          |       | -1462                               | 224             | 1.95 | 18.76 |          |       |
| -1533                               | 291             | 2    | 18.56 |          |       | -1475                               | 237             | 2    | 18.93 |          |       |

## แผ่นทดสอบขนาด 180 มม x 180 มม ตัวอย่าง D

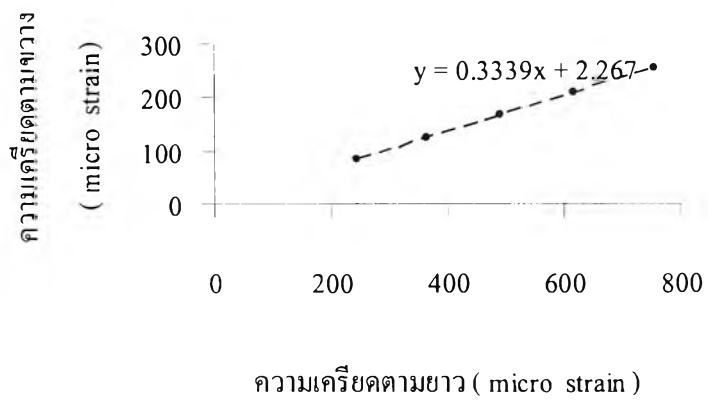
| พารามิเตอร์จากการทดลอง 180 x 180 D1 |                 |      |       |          |       | พารามิเตอร์จากการทดลอง 180 x 180 D2 |                 |      |       |          |       |
|-------------------------------------|-----------------|------|-------|----------|-------|-------------------------------------|-----------------|------|-------|----------|-------|
| $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ | $\varepsilon_a$                     | $\varepsilon_b$ | $w$  | $P_1$ | $\delta$ | $P_2$ |
| 0                                   | 0               | 0    | 0     | 0        | 0     | 0                                   | 0               | 0    | 0     | 0        | 0     |
| -279                                | -206            | 0.05 | 7.19  | 0.02     | 0.09  | -105                                | -31             | 0.05 | 1.99  | 0.02     | 1.13  |
| -336                                | -230            | 0.1  | 8.23  | 0.04     | 0.19  | -188                                | -45             | 0.1  | 3.49  | 0.04     | 1.99  |
| -389                                | -246            | 0.15 | 9.03  | 0.06     | 0.26  | -252                                | -51             | 0.15 | 4.56  | 0.06     | 4.33  |
| -426                                | -252            | 0.2  | 9.59  | 0.08     | 0.43  | -294                                | -51             | 0.2  | 5.09  | 0.08     | 6.03  |
| -463                                | -256            | 0.25 | 10.03 | 0.1      | 0.99  | -330                                | -49             | 0.25 | 5.59  | 0.1      | 8.33  |
| -496                                | -258            | 0.3  | 10.39 | 0.12     | 1.79  | -370                                | -45             | 0.3  | 6.09  | 0.12     | 10.03 |
| -526                                | -254            | 0.35 | 10.66 | 0.14     | 2.73  | -404                                | -36             | 0.35 | 6.49  | 0.14     | 11.36 |
| -558                                | -249            | 0.4  | 10.99 | 0.16     | 3.73  | -439                                | -33             | 0.4  | 6.86  | 0.16     | 12.56 |
| -585                                | -244            | 0.45 | 11.19 | 0.18     | 4.76  | -469                                | -27             | 0.45 | 7.23  | 0.18     | 14.09 |
| -606                                | -236            | 0.5  | 11.33 | 0.2      | 6.09  | -495                                | -20             | 0.5  | 7.49  | 0.2      | 15.29 |
| -635                                | -228            | 0.55 | 11.59 | 0.22     | 7.59  | -524                                | -13             | 0.55 | 7.83  | 0.22     | 16.09 |
| -659                                | -217            | 0.6  | 11.69 | 0.24     | 8.89  | -556                                | -5              | 0.6  | 8.19  |          |       |
| -679                                | -209            | 0.65 | 11.83 | 0.26     | 10.23 | -585                                | 2               | 0.65 | 8.49  |          |       |
| -712                                | -198            | 0.7  | 12.09 | 0.28     | 11.59 | -615                                | 14              | 0.7  | 8.76  |          |       |
| -737                                | -185            | 0.75 | 12.23 | 0.3      | 12.99 | -641                                | 24              | 0.75 | 9.03  |          |       |
| -760                                | -175            | 0.8  | 12.39 | 0.32     | 14.33 | -667                                | 35              | 0.8  | 9.29  |          |       |
| -790                                | -160            | 0.85 | 12.56 | 0.34     | 15.49 | -694                                | 46              | 0.85 | 9.59  |          |       |
| -816                                | -148            | 0.9  | 12.73 | 0.36     | 16.46 | -717                                | 57              | 0.9  | 9.83  |          |       |
| -845                                | -135            | 0.95 | 12.89 |          |       | -743                                | 67              | 0.95 | 10.09 |          |       |
| -867                                | -123            | 1    | 13.03 |          |       | -766                                | 79              | 1    | 10.33 |          |       |
| -898                                | -109            | 1.05 | 13.23 |          |       | -788                                | 91              | 1.05 | 10.56 |          |       |
| -924                                | -95             | 1.1  | 13.33 |          |       | -811                                | 101             | 1.1  | 10.79 |          |       |
| -953                                | -81             | 1.15 | 13.49 |          |       | -834                                | 114             | 1.15 | 11.03 |          |       |
| -976                                | -66             | 1.2  | 13.63 |          |       | -855                                | 125             | 1.2  | 11.23 |          |       |
| -1006                               | -51             | 1.25 | 13.83 |          |       | -879                                | 138             | 1.25 | 11.49 |          |       |
| -1037                               | -35             | 1.3  | 13.99 |          |       | -900                                | 152             | 1.3  | 11.69 |          |       |
| -1058                               | -22             | 1.35 | 14.06 |          |       | -921                                | 165             | 1.35 | 11.93 |          |       |
| -1079                               | -10             | 1.4  | 14.16 |          |       | -945                                | 178             | 1.4  | 12.16 |          |       |
| -1109                               | 6               | 1.45 | 14.39 |          |       | -961                                | 189             | 1.45 | 12.36 |          |       |
| -1135                               | 20              | 1.5  | 14.53 |          |       | -980                                | 200             | 1.5  | 12.53 |          |       |
| -1156                               | 33              | 1.55 | 14.63 |          |       | -1004                               | 215             | 1.55 | 12.76 |          |       |
| -1182                               | 49              | 1.6  | 14.79 |          |       | -1021                               | 226             | 1.6  | 12.93 |          |       |
| -1200                               | 61              | 1.65 | 14.89 |          |       | -1042                               | 239             | 1.65 | 13.16 |          |       |
| -1213                               | 75              | 1.7  | 14.89 |          |       | -1064                               | 253             | 1.7  | 13.39 |          |       |
| -1237                               | 89              | 1.75 | 15.03 |          |       | -1082                               | 266             | 1.75 | 13.59 |          |       |
| -1259                               | 101             | 1.8  | 15.19 |          |       | -1100                               | 279             | 1.8  | 13.73 |          |       |
| -1280                               | 115             | 1.85 | 15.33 |          |       | -1122                               | 293             | 1.85 | 13.96 |          |       |
| -1307                               | 131             | 1.9  | 15.53 |          |       | -1145                               | 307             | 1.9  | 14.23 |          |       |
| -1324                               | 145             | 1.95 | 15.66 |          |       | -1164                               | 321             | 1.95 | 14.36 |          |       |
| -1345                               | 159             | 2    | 15.83 |          |       | -1183                               | 333             | 2    | 14.56 |          |       |

ภาคผนวก ค

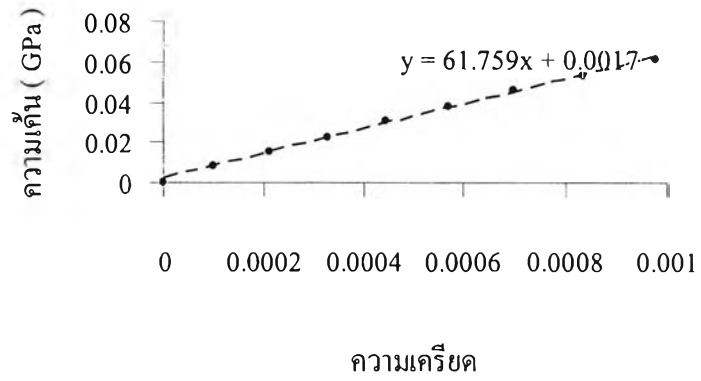
กราฟแสดงคุณสมบัติทางกลของแผ่นทดสอบ



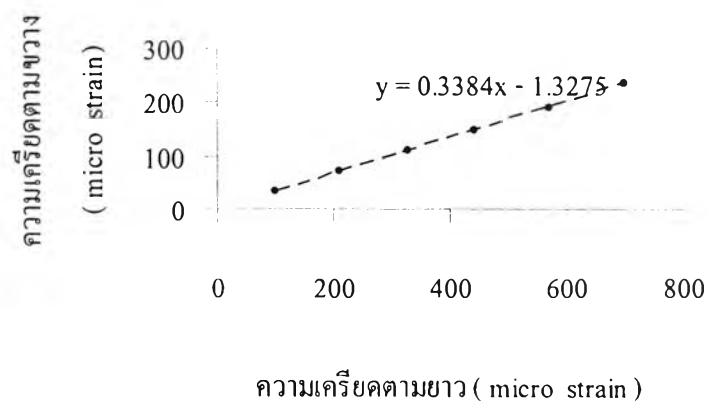
รูปที่ ค.1 กราฟความเค้น-ความเครียดของอะลูมิเนียมจากการทดลองครั้งที่ 1



รูปที่ ค.2 กราฟความเครียดตามขวาง-ตามยาวของอะลูมิเนียมจากการทดลองครั้งที่ 1



รูปที่ ค.3 กราฟความเค้น-ความเครียดของอะลูมิเนียมจากการทดลองครั้งที่ 2



รูปที่ ค.4 กราฟความเครียดตามขวาง-ตามยาวของอะลูมิเนียมจากการทดลองครั้งที่ 2





## ประวัติผู้เขียนวิทยานิพนธ์

นายชวนนท์ สุภาศักดิ์ เกิดเมื่อวันที่ 12 มีนาคม 2523 ที่จังหวัดกรุงเทพมหานคร สำเร็จการศึกษาปริญญาวิศวกรรมศาสตรบัณฑิต สาขาวิศวกรรมเครื่องกล จากภาควิชาวิศวกรรมเครื่องกล คณะวิศวกรรมศาสตร์ มหาวิทยาลัยเกษตรศาสตร์ เมื่อปีการศึกษา 2544 และเข้าศึกษาต่อในหลักสูตรวิศวกรรมศาสตรมหาบัณฑิต ภาควิชาวิศวกรรมเครื่องกล คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2545