

DOCUMENT CONTROL

REPORT NO.: 10
TESTING OF EXTRUDED FLEXIBLE uPVC GUIDE POSTS

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1. INTRODUCTION

This testing of Poly Marketing Pty Limited extruded uPVC flexible Guide Posts was performed in accordance with –

RTA QA SPECIFICATION 3412 - Supply of guide Posts – Non Timber

5.2 Heat Resistance – Flexible Guide Posts

5.3 Cold Resistance – Flexible Guide Posts

5.4 Rigidity

TRANSPORT SA PART 240 Road Side Furniture

Bending and Impact Resistance Tests

(a) Heat Resistance – Flexible Posts

(b) Cold Resistance – Flexible Posts

(c) Resistance to Impact

MAIN ROADS WA Technical Specification 602 Guideposts Issue 3

602.12 Heat Resistance

602.13 Cold Resistance

602.14 Rigidity

602.15 Vehicle Impact

2. INSTRUMENTATION

The following instrumentation was used –

Laboro Temperature Control Oven Cat.No.26GC

Mitutoyo Vernier Height Gauge Cat. No 520-163 (Photograph #1)

Mitutoyo Vernier Gauge

ZEAL 76mm Immersion Thermometer

Lutron TM-901C Digital Thermometer with TP-02A probe (Photo #2)

3. TESTING APPARATUS

Controlled ambient temperature room

Guidepost shaped two-part anchor unit (Photograph #3)

G-clamps

Steel vertical mounting frame (Photograph #4)

50 mm RHS steel floor mounted support units 1000 mm apart

Impact Resistance testing unit with 1500 mm low friction guide (Photo #5)

1 kg steel ball

750 gram weight

900 gram weight

Ice Bath 95 mm x 230 mm x 1700 (14 kgs ice) (Photo #2 Temp probe exposed)

4. DESCRIPTION OF TEST SAMPLE AND MOUNTING

The tests were assembled and mounted as prescribed by the nominated instructions. Sample guideposts were selected at random, from stock.



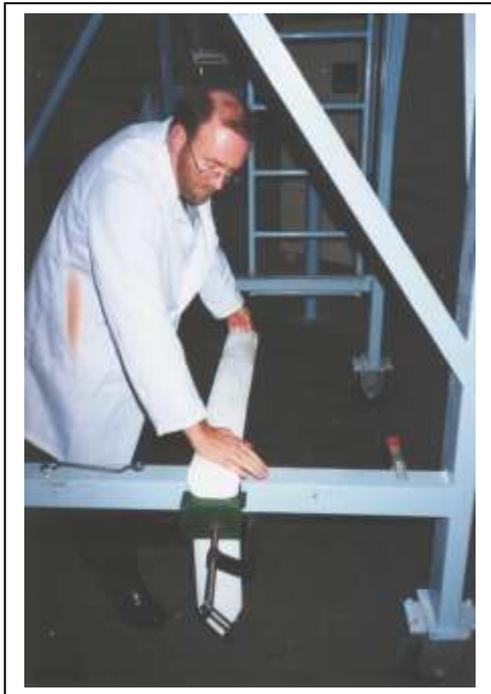
Photograph #1. *Vernier Height Gauge at rest on sample post, ambient temp 23°C*



Photograph #2. *Digital Thermometer / Ice Bath Unit*



Photograph #3. *Guide Post two-part anchor and G Clamps*



Photograph #4.
Vertical Mounting Frame



Photograph #5.
Impact resistance Testing Unit

HEAT RESISTANCE – FLEXIBLE GUIDE POSTS

Flexible guideposts shall be regarded as sufficiently resistant to heat provided that a representative sample passes the following test:

1. Condition the guidepost at 60°C (plus or minus 2°C) for two hours in an oven.
2. Remove the guidepost from the oven, clamp the base so the guide post is vertical with the top of the guidepost protruding 1000 mm. The jaws of the clamp shall be shaped to suit the profile of the guidepost. Bend the conditioned guidepost adjacent to the clamp in the direction of the adjacent traffic flow to form a 90° angle. Then subject the conditioned guidepost to four cycles of bending through 180°, all within two minutes of its removal from the oven, so that it finishes bent in the form of a right angle. Release the guidepost from the bent position immediately after the four cycles of bending.
3. Record the horizontal deflection at the top of the guidepost from a vertical line 30 seconds after release from the bent position. The deflection shall not exceed 50 mm. **Observation: The 30 seconds deflection from the vertical line was 80mm.**

RESULT: Deflection at 30 seconds did not meet the prescribed 50mm but was sufficiently vertical for the reflector to be visible to oncoming traffic.

4. Record the condition of the guidepost. The guidepost shall show no signs of fractures, cracks or splits. **Observation: there were no signs of fractures, cracks or splits in the guidepost, outer edge crimping was observed at the crease line adjacent to the holding clamps.**

RESULT: PASS

COLD RESISTANCE – FLEXIBLE GUIDE POSTS

1. Condition the guide post at 0°C (+/- 2°C) for two hours in an ice bath.
2. Remove the guide post from the ice bath, clamp in a vertical position with the top of the guidepost protruding 1000mm. The jaws of the clamp shall be shaped to suit the profile of the guidepost. Bend the conditioned guidepost adjacent to the clamp in the direction of the adjacent traffic flow to form a 90° angle within 30 seconds of its removal from the ice bath.
3. Manually straighten a semi-flexible guidepost. **This was not required in any of the four tests as the post immediately self returned to the vertical position.**

4. Release the guide post from the clamp 60 seconds after removing it from the ice bath and place the guide post in the ice bath for an additional period of 60 seconds.
5. Repeat 2 and 3 above until the guidepost has been bent for the fourth time. Then immediately release the guidepost from the bent position and record the horizontal deflection at the top of the guidepost from a vertical line 60 seconds after release. The deflection shall not exceed 50mm.

At 1130 hrs the ice bath was loaded with 14 kgs of ice. At 1145 hrs the temperature was 0°C and the guidepost was placed in the bath. At 1347 hrs the guidepost surface temperature registered 0.5°C

MINUTES	ACTION	VERTICAL DEFLECTION
120	Condition in 0°C ice bath	Not Applicable
30 secs 1	1 st Clamp & bend to 90° in direction of traffic flow then 90° against traffic direction. Release Clamp	+0.3 mm - 0.2 mm
1	Condition in 0°C ice bath	Not Applicable
30 secs 1	2 nd Clamp & bend to 90° in direction of traffic flow then 90° against traffic direction. Release Clamp	+0.6mm -0.5 mm
1	Condition in 0°C ice bath	Not Applicable
30 secs 1	3 rd Clamp & bend to 90° in direction of traffic flow then 90° against traffic direction. Release Clamp	+1.0 mm - 0.8mm
1	Condition in 0°C ice bath	Not applicable
30 secs 1	4 th Clamp & bend to 90° in direction of traffic flow the 90o against traffic direction. Release Clamp	+2.0 mm - 1.0 mm

Note:- the post immediately self returned to vertical on each test, no manual assistance being required, the final deflection being 2 mm at 1357 hrs.

RESULT - PASS

During testing an additional 7 kgs of ice were added to the bath to maintain 0°C temperature.

6. Again, return the guidepost to the ice bath for a minimum of 60 seconds.
7. Remove the guidepost from the ice bath, and place the guidepost in a horizontal position, securely clamped with a minimum of 1000 mm clear between supports.
8. Drop a steel ball weighing 1 kg for a distance of 1500 mm vertically through a low friction guide so that it impacts the centre of the face of the guidepost that is displayed toward the adjacent traffic flow.

9. Recondition the guidepost in the ice bath for an additional period of 60 seconds. Repeat 7 and 8 above until the steel ball has been dropped for the fifth time.

10. Record the condition of the guidepost. The post shall show no signs of fractures, cracks or splits.

MINUTES	ACTION	IMPACT RESULT
1	Condition in 0°C ice bath	Not applicable
1	Clamp with a minimum 1000mm between supports, 1 st drop ball, release clamps	No sign of fracture, cracks or splits
1	Condition in 0°C ice bath	Not applicable
1	Clamp with a minimum 1000mm between supports, 2 nd drop ball, release clamps	No sign of fracture, cracks or splitting
1	Condition in 0°C ice bath	Not applicable
1	Clamp with a minimum 1000mm between supports, 3 rd drop ball, release clamps	No sign of fracture, cracks or splits
1	Condition in 0°C ice bath	Not applicable
1	Clamp with a minimum 1000mm between supports, 4 th drop ball, release clamps	No sign of fracture, cracks or splits
1	Condition in 0°C ice bath	Not Applicable
1	Clamp with a minimum 1000mm between supports, drop 5 th ball release clamps	No sign of fracture, cracks or splits

RESULT – PASS

RIGIDITY

Guideposts shall be regarded as sufficiently rigid provided that a representative sample passes the following test(s). These tests shall be conducted at 23°C (plus or minus 2°C). The jaws of the clamp shall be shaped to suit the profile of the guidepost and the guidepost shall not be able to rotate in the clamp.

1. Securely clamp the guidepost to a bench in a horizontal position with the top of the guidepost unsupported and protruding 1000 mm.

2. Bend the guide post adjacent to the clamp in the direction of the adjacent traffic flow to 90o and allow it to straighten. Repeat this procedure 10 times allowing a maximum of 3 minutes between procedures.

3. Apply a 0.9 kg mass to a point 50 mm from the top of the post so that the force from the mass is applied in the direction of the adjacent traffic flow. Record the vertical deflection of the top of the guidepost from its initial position. The deflection shall not exceed 130 mm.

Observation (1135 hrs): Initial level 430 mm (at 23°C ambient temperature) the at rest vertical deflection level was 328 mm, a deflection of 102 mm.

Test Result: PASS

4. Remove the mass. The top of the guidepost shall return unassisted to no more than 10 mm from its initial position within 10 minutes of the removal of the mass. Record the final deflection.

Observation (1138 hrs): The top of the guidepost returned unassisted to the initial 430 mm level within 3 minutes.

Test Result: PASS

RESISTANCE TO IMPACT

The guidepost shall be manufactured from an impact resistant material and so designed that a newly installed guidepost is capable of withstanding a series of a minimum of 10 impacts on the broad face from an average passenger sedan travelling at 60 Km/hour.

The flexible guidepost must return to a near vertical position following each impact.

A 1999 model Peugeot 406 V6 Sedan (Reg No. EE 7933) was used for the test.

Date of Test	Thursday 11 December 2003
Location of Test	South Street George Town Tasmania
Weather	Fine
Ambient Temperature	23°C
Road Surface	Dry
Time of Test	1000~1100 hrs

Observation: The test was performed over 27 minutes with the vehicle impacting the convex face of the guidepost at an average of 62 Km/hr over 10 impacts.

Following each impact the guidepost sprang back to vertical and the vehicle returned to re-impact the guidepost.

Test Result: PASS