



**INCREASED PAVEMENT MARKING PERFORMANCE**

**THE NEW RTA SPECIFICATION R 145**



QA SPECIFICATION R145

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**PAVEMENT MARKING  
(PERFORMANCE-BASED)**

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RNIC-QA-R145

VERSION FOR: DATE:
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## **INTRODUCTION**

The Roads & Traffic Authority New South Wales (RTA) has produced its “**2008 to 2012 RTA Corporate Plan**”.

In this corporate plan the Chief Executive states two important goals that are reflected in this paper and the new R145 specification:

1. *“We must meet the community’s expectations of providing safe and efficient roads...”*
2. *“We must continue to develop. We must assess our performance, define and redefine our goals, and be willing to change. We need to focus on outcomes for the community.”*

A critically important issue to the Roads & Traffic Authority NSW (RTA) is Road Safety. As an integral part of meeting these corporate goals and improving road safety for all road users, the RTA has developed and introduced a number of long term pavement marking maintenance strategies to deliver improved pavement markings.

To support these maintenance strategies RTA has issued and will be progressively implementing a performance based specification – RTA QA R145 “Pavement Marking – Performance Based”.

## **RTA PAVEMENT MARKING MAINTENANCE STRATEGIES**

The RTA has developed 2 strategies for progressive implementation since 2004:

1. RTA Longitudinal Line Marking Strategy (including raised pavement markers)
2. RTA Maintenance Strategy For Transverse Markings

These strategies are long term in nature and summarise minimum performance levels for pavement marking condition before maintenance activity is required i.e. re-mark or re-application of pavement markings. The updates of progressive implementation of these strategies have been presented at the RIAA/RTA forums over the last 3 years.

Additionally, RTA has implemented and reviewed for the past few years the following traffic facilities maintenance specifications that incorporate pavement marking activity, particularly for Performance Based Contracts:

- RTA QA SPECIFICATION M60 MAINTENANCE INTERVENTION REQUIREMENTS (TRAFFIC FACILITY MANAGEMENT)
- RTA QA SPECIFICATION M600 MAINTENANCE RECTIFICATION REQUIREMENTS (TRAFFIC FACILITY MAINTENANCE)

## **BACKGROUND TO AND DEVELOPMENT OF R145**

The decision to move to a performance based specification for all pavement marking works has been made for the following reasons:

- Need to create a performance based specification for the new Performance Specified Maintenance Contract (PSMC) for Sydney North Area – expected to be awarded late in 2008
- Have a consistent pavement marking specification for all the state road network within NSW to align with the above mentioned PSMC
- Facilitate performance based alliance contracts with long term relationships, trust and shared goals, as well as sharing of risks and opportunities
- Improve the performance (standard) of pavement marking throughout the state road network i.e. initial, mid, and long term performance
- Promote innovation in pavement marking materials used
- Promote innovation in pavement marking application technologies
- Deliver value for money to RTA for all pavement marking installed by reducing the whole of life cost

The new performance specification R145 is a development of the existing long term RTA Specification QA R141 (which is an activity based pavement marking specification covering what approved materials were to be used for pavement marking, and how those materials were to be applied).

The new R145 evolved from R141 with the inclusion of performance criteria described and referenced in Australian Standards AS 4049.4 & AS 4049.5. The level of performance required in the new specification was determined from:

- Existing performance levels referenced in the RTA pavement marking maintenance strategies
- Existing performance levels referenced in RTA Maintenance Specifications M60 & M600
- Field experiments over the last 10 years conducted in the ACT in partnership between RTA and industry materials suppliers and application contractors
- Field experiments over the past 3 years by RTA internally
- Monitoring of field performance of pavement marking delivered, throughout NSW, by contractors and the RTA internal pavement marking organisation Rural Linemarking Services (RLS)
- Consideration of practices and performance requirements of pavement markings as indicated and/or published by other Australian and New Zealand state road authorities

The first issue of R145 (Edition 1 Revision 0) sets minimum performance levels required for works undertaken from the implementation date (discussed later in this paper). Future revisions of R145 will include increases in some of the performance requirements for pavement markings. Such increases in performance are also discussed later in this paper.

## SPECIFIC R145 PERFORMANCE REQUIREMENTS

The following table summarises the performance requirements:

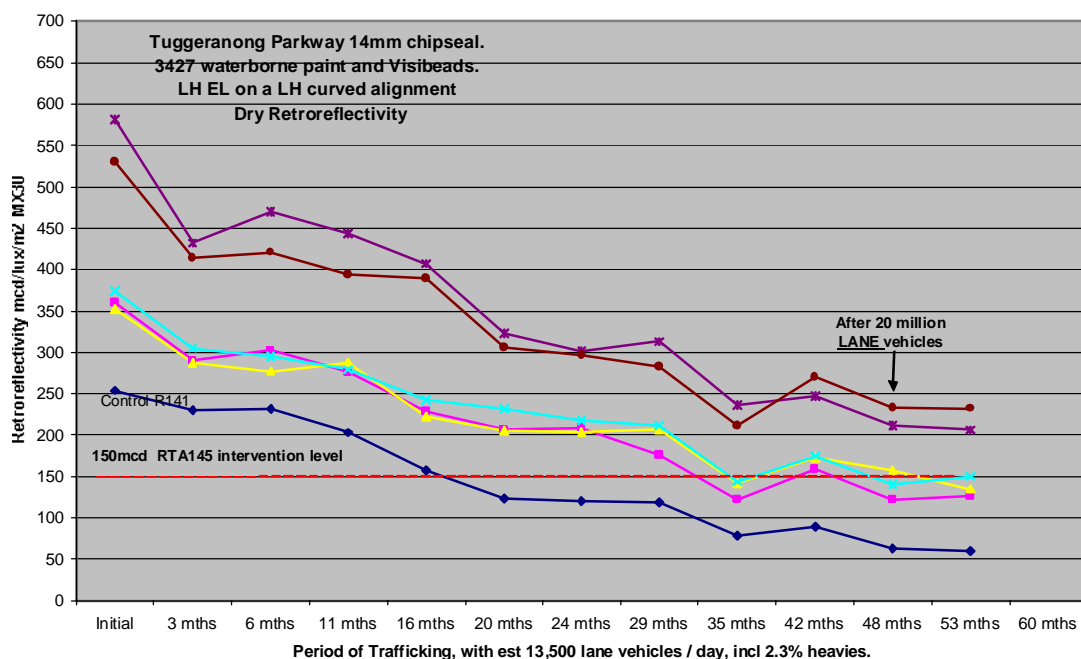
<b><i>Performance Requirement</i></b>	<b><i>Performance Level</i></b>	<b><i>Reference / Comment</i></b>
<b><i>Sampling plan for assessment of performance</i></b>		AS 4049.5 Appendix D
<b><i>Dry Retro-reflectivity</i></b>	$\geq 250$ ( 0 – 20 days traffic) $\geq 200$ (310 – 340 days traffic) $\geq 150$ anytime	AS 4049.4 Table 3 – RD1 & Appendix K
<b><i>Wet Retro-reflectivity</i></b>	$\geq 80$ anytime	AS 4049.4 Table 3 – RW1 & Appendix K
<b><i>Skid Resistance</i></b>	$\geq 40$ BPN	AS 4049.4 Appendix J & RTA field experience
<b><i>Colour</i></b>	White : Y35 Yellow : Y14 Red : R62 Green : G16	AS 4049.4 CI 6.2.2 & Appendix F AS 1580.601.1 AS 2700S Various RTA specs
<b><i>Colour Change</i></b>	Grey scale rating $> 3$	AS 4049.4 CI 6.3.8 & Appendix G
<b><i>Luminance Factor (white material)</i></b>	Lighter than NCS Swatch S 2500-N	AS 4049.4 CI 6.3.7 & Appendix H Method 2
<b><i>Degree Of Wear</i></b>	% area intact $> 70$	AS 4049.4 CI 6.3.4 & Appendix L
<b><i>Thickness (non-profile)</i></b>	$\leq 6$ mm	RTA Spec R141 Ed 5/Rev 3 Table R141.1

## MEETING R145 PERFORMANCE REQUIREMENTS

It is considered that the current level of pavement marking performance required in R145 is achievable by industry with minimal change to materials used and application equipment and processes. Field testing, application experience, and laboratory evaluation have indicated that performance gains can be achieved through the use of:

1. Two paint guns angled inwards toward each other in a “V” pattern ( for water-borne paint ) – with both paint streams intersecting just above the road pavement
2. Large Bead (Type D referenced in Australian standard AS 2009) – especially virgin glass Type D bead
3. Static Drop Bead dispenser – at least one of which is commercially available - which fires bead backwards to counter the forward motion of the application truck or device
4. Protecting freshly applied lines from traffic exposure for a specific period ( through coning ) to allow the line to cure sufficiently to hold the glass beads in the line material
5. Using an accelerant (for water-borne paint) which is sprayed into the paint flow before it hits the pavement

The following graph (taken from the RTA / Potters Roadmarking Field Trial AU017) summarises the achieved field test results from ACT using various combinations of the above described glass bead and application changes for waterborne paint.



## EXCEEDING R145 PERFORMANCE REQUIREMENTS

Field testing and experimentation, together with adopting the practices described in the previous section; and choosing the best pavement marking material type for the specific road / pavement condition indicates that performance exceeding that referenced in R145 can be achieved.

Additionally, observation and research and development within the *Engineering Technology Branch* of RTA is focussed on the following areas as a means to continue improving the performance of pavement marking – or “raising the bar”:

1. Particular road condition requirements – for example, a longitudinal edge line marking on a straight section of road with generous lane width will suffer less encroachment of traffic than the same marking on a sharp curve; resulting in different levels of glass bead retention in the line marking
2. Best material for pavement type
3. Ideal dispersion of glass bead and anti-skid element across a line width
4. Best application method for glass bead placement into the line material to ensure optimum embedment
5. Best pavement marking materials to be applied and cured quickly
6. Considering ease of removability of pavement marking as an essential element of pavement marking whole of life cost

## FUTURE R145 PERFORMANCE INCREASES

The following table indicates the first level of the intended performance increases and timeline:

<i>Performance Requirement</i>	<i>Increased Performance Level</i>	<i>Intended Introduction Date</i>
<i>Dry Retro-reflectivity</i>	$\geq 300$ ( 0 – 20 days traffic) $\geq 250$ (310 – 340 days traffic) $\geq 180$ anytime	2012-2013
<i>Wet Retro-reflectivity</i>	$\geq 100$ anytime	2012-2013
<i>Skid Resistance</i>	$\geq 45$ BPN	2012-2013

## IMPLEMENTATION OF R145 BY RTA

The following table shows the implementation plan and timetable for R145 within NSW on state roads under the control of RTA

	Area	Commencement Date	Implementation Period (Full)
<b>Stage 1</b>	Sydney North Performance Specified Maintenance Contract	External contract anticipated to be in late 2008	3 years
<b>Stage 2</b>	All metropolitan areas of Sydney, Newcastle & Wollongong	External contracts called by RTA Sydney Project Services anticipated to be in early 2010	3 years
<b>Stage 3</b>	All remaining (rural) areas	New internal alliance with RTA Rural Line Marking Services anticipated to be in mid - late 2009	6 years

Some rural state roads which are managed by the rural Local Councils will commence the use of R145 in early 2010 as R141 will be replaced then.

Local Government agencies are encouraged to introduce and implement R145 for pavement marking of their road networks by 2011/2012. RIAA can assist the RTA in promoting the use of R145

## CONCLUSION

The RTA has created and will be implementing progressively a new performance based pavement marking specification QA R145.

It is considered that this new specification sets performance levels that are achievable with minimal additional cost and resource implications for the pavement marking industry. The performance levels will be increased over time with the anticipated input and co-operation of the industry.

The introduction of this new specification will result in:

- Improved standards of pavement marking and road safety for all road users
- Ability by materials suppliers and applicators to innovate in product, equipment and application techniques
- Assisting the RTA to meet its 2008-2012 Corporate Plan goals and the expectations of the NSW Government and road users