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Transport Infrastructure Ireland

## TII Publications



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# Maintenance Painting of Steelwork

**AM-STR-06041**

June 2014

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Transport Infrastructure Ireland (TII) is responsible for managing and improving the country's national road and light rail networks.

## About TII Publications

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## Document Attributes

Each document within TII Publications has a range of attributes associated with it, which allows for efficient access and retrieval of the document from the website. These attributes are also contained on the inside cover of each current document, for reference. For migration of documents from the NRA and RPA to the new system, each current document was assigned with new outer front and rear covers. Apart from the covers, and inside cover pages, the documents contain the same information as previously within the NRA or RPA systems, including historical references such as those contained within NRA DMRB and NRA MCDRW.

## Document Attributes

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## NRA DMRB and MCDRW References

For all documents that existed within the NRA DMRB or the NRA MCDRW prior to the launch of TII Publications, the NRA document reference used previously is listed above under 'historical reference'. The TII Publication Number also shown above now supersedes this historical reference. All historical references within this document are deemed to be replaced by the TII Publication Number. For the equivalent TII Publication Number for all other historical references contained within this document, please refer to the TII Publications website.

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## **Maintenance Painting of Steelwork**

**June 2014**

**Summary:**

This Document sets out the Standard requirements for and gives advice on the Maintenance Painting of Steelwork. In addition guidance is given on the appointment and duties of painting inspection firms.

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**VOLUME 3 ROAD STRUCTURES:  
INSPECTION AND MAINTENANCE**

**SECTION 2 MAINTENANCE**

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**PART 1**

**NRA BD 87/14**

**MAINTENANCE PAINTING OF  
STEELWORK**

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# 1. INTRODUCTION

## General

- 1.1 The maintenance painting of steelwork will normally be carried out under contracts incorporating the National Road Authority's Specification for Road Works, Manual of Contract Documents for Road Works Volume 1 Series 1900. In such products conforming to equivalent standards and specification of other Members States (MS) of the European Economic Area (EEA) and tests undertaken in other member states will be acceptable in accordance with the terms of Clauses 104 and 105 (Series 100). Any contract not containing these Clauses shall contain suitable clauses of mutual recognition having the same effect, regarding which advice should be sought.

## Scope

- 1.2 This Standard provides details of the procedures for putting in hand a maintenance painting project for steel in bridges and other road structures.
- 1.3 In addition to providing information on procedures, this Standard contains guidance on the minimum criteria for selection of painting inspection firms.

## Implementation

- 1.4 This Standard shall be used in all future maintenance painting schemes. Maintaining Agents shall confirm its application to particular schemes with the National Roads Authority.

The Maintaining Agent shall be defined as the organisation responsible for the maintenance of a structure, typically the Local Authority, the National Roads Authority or their appointed agent. Many of the duties of the Maintaining Agent are typically contracted out to a separate Specialist Inspector, Design Organisation or the Painting Contractor as appropriate.

## Establishing Need for Maintenance Painting

- 1.5 Generally, the need and timing for routine maintenance painting shall be established during structural inspection in accordance with the National Roads Authority's requirements as described in Reference 1 (see Chapter 4 for references). However, if between structural inspections, instances of deterioration requiring urgent attention have been observed, then the remedying of these failures shall not be delayed.

## Health & Safety and Environmental Restrictions

- 1.6 Certain methods of surface preparation, the contents of the existing protective system or the application of certain types of paint may give rise to health and safety hazards. The Maintaining Agent shall carry out appropriate risk assessments for the work to be undertaken and introduce relevant control procedures with respect to the risks to staff, members of the public and the environment that may be affected by the work.
- 1.7 Health and safety hazards and pollution are important factors which have to be taken into account when selecting methods of surface preparation and the application and type of paint systems. Surface preparation and the application of protective coatings can give rise to conditions which, unless precautions are taken, may be injurious to operatives and others in the vicinity, including animal life. Damage to property including plants, crops and pollution of water may also be caused. The Maintaining Agent and Painting Contractor shall assess the risks to staff, members of the public and the environment that may be affected by the work, to determine the need for personal protective

equipment and any restrictions, protective equipment (breathing equipment), enclosures or monitoring to protect staff, the public and the environment (in accordance with the current relevant legislation).

- 1.8 Consideration shall be given to work restrictions or special requirements for work to structures built on or over internationally protected sites (designated under European or Irish laws) such as those described in the NRA Environmental Assessment and Construction Guidelines.
- 1.9 As part of the Maintaining Agent's risk assessment, the views of the all interested parties, should be considered. Practical guidance is given in 'A short Guide to the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006' by the Health and Safety Authority. Additionally, the information given in Series NG 1900, must be considered when choosing a particular method or type of system to use.

## 2. BASIC CONSIDERATION

### General

- 2.1 In order to achieve value for money in present and future maintenance it is essential that, before surface preparation and paint system clauses are drawn up, certain basic considerations are taken into account, viz.:
- i) At the outset, required life and future use of the structure shall be clarified with the National Roads Authority. For structures with a remaining life of less than 20 years, advice on the selection of the most appropriate system shall be sought.
  - ii) In particular the first overall maintenance repaint of newer structures shall be carried out before the condition of the protective systems has deteriorated further than that described as Category II in paragraph 2.5 of this Standard.
  - iii) All structural maintenance work that may affect the protective system, including the remedying of deck leaks and repair of leaking joints, shall be carried out before maintenance painting is put in hand. Where this is not possible approval shall be sought from the National Roads Authority.
- 2.2 When a generally sound protective system requires overall maintenance it shall be borne in mind that if the work is delayed, the engineering works cost of restoring the system to a satisfactory standard may increase rapidly. It is a question of regular inspection and/or localised repair in time, so that a maintenance cycle can be programmed.
- 2.3 There is no valid estimated time for first maintenance of galvanizing or aluminium metal spray plus sealer only systems.
- 2.4 In the case of steelwork protected by a paint system over zinc metal spray, a check shall be made as to the origin of any white deposits on the paint surface; these may be the first signs of breakdown of the zinc. If remedial work is not carried out in the early stages, corrosion of the zinc may well become extensive, and blast cleaning to clean steel will become necessary. Aluminium metal spray is less easily attacked, breakdown being usually because the aluminium has been badly applied in the Works, e.g. dry spray leading to disintegration. Breakdown of paint over galvanizing is often due to the lack of adhesion between the zinc and the paint system. If only a few patches are involved, remedial action can be successful. However, an overall check shall be made and if the lack of adhesion is widespread, painting shall not be attempted until all the loose paint has been removed to a firm edge.

## Categories of Failure

2.5 When the need for maintenance painting has been established, the category of failure of the existing protective system shall be determined as follows:

Category	Description
I	Local failures only. Finishing coat otherwise sound, such that a repaint of the whole structure is not necessary. No corrosion of the steel substrate and/or no sign of deterioration of the metal coating.
II	Normal weathering of finishing coat, e.g. chalking, surface affected by deposits, with some areas of local failure. Adhesion generally sound such that, after cleaning down, the system can accept local build-up of undercoats and overall coating of the whole structure with an undercoat and finish. No corrosion of the steel substrate and/or no sign of deterioration of the metal coating.
III	General failure of the finishing coat at or before the expiry of its expected life. Some local failure of the finishing coat and the undercoats but primers and/or metal coating appearing to be still sound. Some corrosion (1 - 3% of total area) of the steel substrate.
IV	General failure of system, with direct exposure of the steel substrate. Widespread corrosion varying from heavy rusting showing through the paintwork to localised paint breakdown. In some cases considerable areas of white corrosion products may be visible on the surface, possibly due to extensive corrosion of a metal coating or of a zinc rich paint. Localised or general corrosion of the steel substrate (greater than 3%) with breakdown of the protective system.

2.6 The purpose of allocating one of the four categories of failure, is to standardize as far as possible the pre-contract procedure and to some extent the level of maintenance, although the main criteria for the latter will be the accessibility, environment, expected life of the structure and cost, including the road delay user costs and rail access or train delay costs. Consequently, for use of this Standard in Ireland, the Maintaining Agent and/or his Design Organisation shall agree the most appropriate economic parameters with the National Roads Authority.

## Pre-specification Overall Survey

2.7 For all categories of failure, unless otherwise agreed with the National Roads Authority, a comprehensive overall survey shall be carried out, to establish the extent, intensity and methods of surface preparation necessary to ensure satisfactory performance of the maintenance paint system proposed by the Maintaining Agent and/or their Design Organisation.

2.8 In the case of a Category I or II failure, the Maintaining Agent shall arrange for its own staff to carry out the survey providing they understand fully the methods of attaining satisfactory standards of surface cleanliness and have experience in supervising maintenance painting. If not, an independent surveyor with appropriate experience shall be appointed for the work.

2.9 In the case of Category III and IV failures, an independent surveyor shall be appointed to carry out the survey, unless otherwise agreed with the National Roads Authority. The surveyor shall have had proven experience of coatings inspection of steel structures over a period of at least five years and must be familiar with the maintenance painting specification and the types of coatings used in maintenance contracts. The surveyor shall have proven experience in examining samples of existing coatings for the purpose of establishing the reason for failure and for identifying types and levels of contaminants present.

- 2.10 The Maintaining Agent shall instruct the surveyor as to the manner in which he requires the areas to be recorded so that a bill of quantities can be compiled. The surveyor shall report on each main part of the structure separately and may be requested to give the percentage of each method of surface preparation required on each part or he may be requested to state the actual areas.
- 2.11 Means of access such as hoists shall be agreed with the Maintaining Agent.
- 2.12 On completion of his work the surveyor shall submit a full report describing failures, including a draft surface preparation and paint system details on Appendix 19/6 Form BE/P1 (Maintenance) Paint System Sheet, parts 1 to 9 in accordance with NG 1977 and be prepared to discuss his recommendations with the Maintaining Agent.
- 2.13 The Maintaining Agent shall also inform the surveyor as to the extent of the survey to be carried out and any limitations and time constraints which are likely to apply during the maintenance painting contract, e.g. restrictions on methods of surface preparation or access to the structure. In cases such as bridges over motorways, gaining adequate access for surveys (except for safely accessible areas that do not require traffic management) may well be difficult and could cause excessive disruption to traffic. In exceptional circumstances, the Maintaining Agent may decide therefore to instruct the surveyor to estimate surface preparation for mid-span and this may well result in more extensive surface preparation than necessary. The Maintaining Agent will then have to balance the likely extra cost of the work against a saving in survey costs and avoidance of traffic user delay costs. If several bridges are involved it may be worthwhile surveying at least one representative bridge thoroughly.
- 2.14 The Maintaining Agent shall refer to Series NG 1900, for further advice on the selection of method(s) of surface preparation and paints systems. If sufficient information is not provided, the Maintaining Agent shall seek further advice from the National Roads Authority.

#### **Feasibility Trials of Proposed Methods of Surface Preparation and Proposed Paint System(s)**

- 2.15 After completing an overall survey, or having otherwise determined the exact nature and extent of the work that is necessary, a complete provisional specification shall be drawn up for surface preparation and paint system, using Appendix 19/6 Form BE/P1 (Maintenance) Paint System Sheet, parts 1 to 9, before any feasibility trials are undertaken. (See Clause 1977 and NG 1977). Feasibility trials of the proposed method(s) of surface preparation and painting system shall be carried out for all categories of failure in paragraph 2.5 of this Standard except in the following cases:
  - i) Where the surface preparation has been identified as blast cleaning to clean steel over the whole surface area of the structure.
  - ii) For small section steelwork having ready access where the existing protective system is a Category I, II or III failure.
- 2.16 At least two separate representative areas shall be selected for the trials. The proposed method(s) of surface preparation shall be carried out in each of these representative areas followed by application of one manufacturer's paint system to each representative area. All paints for each representative area must have a current NSAI Agrément Certificate or equivalent.
- 2.17 Except in cases where the whole of the existing protective system is to be removed, it has been found from experience that, in the majority of cases, it has not been possible to specify accurately the full extent or intensity of the surface preparation required, or, to a lesser extent, predict the behaviour of new paints when applied over existing paints, without carrying out feasibility trials. Changes in requirements shown to be necessary during the trials not only prevent delays during the contract but also avoid claims due to inoperable specification clauses. Feasibility trials also provide an opportunity

- to assess the competence of paint contractors.
- 2.18 Feasibility trials are not required in cases where it is proposed to remove the whole of the existing protective system over the entire surface area, where the existing protective system consists of aluminium metal spray and/or paint coats. The removal of aluminium metal sprayed coatings by blast cleaning is now well established and feasibility trials to demonstrate this are unnecessary.
  - 2.19 Zinc metal sprayed and galvanized coatings are generally more difficult to clean to an acceptable standard when atmospheric pollutants have reacted with the zinc to form zinc salts. Where it is proposed to remove entirely or in part a zinc metal coating, feasibility trials should be carried out to determine the best method of surface preparation and degree of cleanliness which can be achieved.
  - 2.20 For small section steelwork having ready access, such as some parapets and some steel lighting columns, where failure of the existing protective system is Category I, II or III, the Maintaining Agent may dispense with feasibility trials where the cost of carrying out such trials is proportionately high, say greater than 15% of the estimated works cost for maintenance painting. In such cases the Maintaining Agent will need to be sure that the risks of incompatibility of the existing protective system with the proposed system are minimal. Where doubts exist about compatibility of systems, advice should be sought from the National Roads Authority.
  - 2.21 For Categories I and II steelwork other than that mentioned in paragraph 2.20, it is worthwhile carrying out feasibility trials to check the application properties of new paints and their compatibility with existing coats. The trials may also show up hitherto unsuspected faults, such as an adhesion weakness in the existing system or underlying corrosion which has not been apparent previously.
  - 2.22 In the case of Categories III and IV, trials of several methods of surface preparation are likely to be necessary; these include wet and/or dry blast cleaning as well as abrading and cleaning down. The paint system feasibility trials will necessarily be more comprehensive than for Categories I and II as paint has to be applied over several types of surface presented by the different methods of preparation.
  - 2.23 The work involved in feasibility trials for Categories I and II, i.e. abrading small areas, washing down and applying a paint system over a number of days can be carried out economically by the Maintaining Agent and this method should be adopted if possible. In the case of Categories III & IV, a specialist contractor shall be appointed.
  - 2.24 During the feasibility trials it will be necessary to check the adhesion of the existing system by testing to confirm that any contamination or corrosion products are being reduced to acceptable levels and that the proposed paints are tolerant of any existing residues. It is particularly important to check compatibility of proposed paints on older bridges which may have been painted with oil based paints, also that any effects of faulty paint technology in the original paint system can be overcome.

### **Ordering Paint for Feasibility Trials**

- 2.25 When the feasibility trials are carried out by the Maintaining Agent, Form BE/P4 'Purchaser's Conditions of Order for Paint' (see Appendix A) must be used for ordering paint for the trials.

### **Colours of Finishing Paints**

- 2.26 Paint colour shall be agreed with the National Roads Authority.
- 2.27 Where the use of paint formulations conforming to technical specifications of other member states of the European Community has been agreed, colours which are a close match to those specified are

acceptable unless there are particular objective reasons why an exact match is necessary.

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## 3. PAINTING INSPECTION FIRMS

### Selection of Painting Inspection Firms

- 3.1 Before appointing a painting inspection firm, the Maintaining Agent shall verify that the firm has the technical competence and resources to undertake inspection. Inspectors shall hold the Institute of Corrosion - Painting Inspector Level 1 qualification, as a minimum, or an equivalent qualification. Senior Supervisory Inspectors shall hold the Institute of Corrosion - Painting Inspector Level 2 or an equivalent qualification. The Maintaining Agent shall obtain full details of the qualifications and experience of the Inspectors to be employed in the Works before the appointment.

### Briefing of Painting Inspection Firms

- 3.2 Following the appointment of the inspection firm, the Maintaining Agent shall specify the role and responsibilities of the inspector in the contract and fully brief the firm on the particular duties the Inspector is required to perform. For this purpose the firm shall be furnished with copies of all relevant Drawings, the Specification for the contract and any other information which may affect the work.
- 3.3 The Maintaining Agent shall establish at the time of the briefing working arrangements and lines of communication with the inspection firm.
- 3.4 The Maintaining Agent shall agree the number of Inspectors to be employed in the Works and the frequency of supervisory visits by the Senior Supervisory Inspector. The Maintaining Agent shall continuously review with the inspection firm the general level of resources required during the period of the Works.
- 3.5 The Maintaining Agent shall establish with the inspection firm the frequency of reporting and requirements for the keeping and forwarding of specific records in the contract.
- 3.6 The Maintaining Agent shall obtain from the inspection firm a quality plan for inspection work in the contract. The quality plan shall include the method of working on site and the role of the inspection firm's support services and personnel in the Contract.

### Health and Safety

- 3.7 The Maintaining Agent shall provide each Inspector with a copy of the assessment carried out in accordance with paragraph 1.9 and draw attention to the practical guidance given in 'A short Guide to the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006' by the Health and Safety Authority.

### Duties of Painting Inspections

- 3.8 Duties suitable for incorporation in terms of appointment are given in Appendix B of this Standard. The duties associated with testing of contract paint samples relate to the standard testing arrangements. They are not wholly applicable in cases where alternative testing arrangements are used.

## 4. REFERENCES

### 4.1 The National Roads Authority

NRA BD 35      Quality Assurance Scheme for Paints and Similar Protective Coatings

NRA Eirspan Bridge Management System

NRA Manual of Contract Documents for Roads Works

Volume 1: Specification for Road Works

Volume 2: Notes for Guidance on the Specification for Road Works

Volume 4: Method of Measurement for Road Works

### 4.2 Irish Standards

IS EN ISO 1513, BS 3900-A2: Paints and varnishes. Examination and preparation of samples for testing

IS EN ISO 8503-1, BS 7079-C1: Preparation of steel substrates before application of paints and related products. Surface roughness characteristics of blast- cleaned steel substrates. Specifications and definitions for ISO surface profile comparators for the assessment of abrasive blast

IS EN ISO 4618: Paints and varnishes. Examination and preparation of test samples

IS EN 22063: Metallic and other inorganic coatings. Thermal spraying. Zinc, aluminium and their alloys

IS EN ISO 12944-1: Paints and varnishes. Corrosion protection of steel structures by protective paint systems. General introduction

IS EN ISO 12944-7: Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Execution and supervision of paintwork

### 4.3 British Standards

BS 4800: Schedule of paint colours for building purposes

BS 2015: Glossary of paint and related terms

### 4.4 Regulations

European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations 2006 (SI No. 74 of 2006)

### 4.5 Acts

Safety, Health and Welfare at Work Act (2005)

The Control of Lead at Work Regulations 2002 (HSE)

### 4.6 Miscellaneous

A short Guide to the European Communities (Control of Major Accident Hazards Involving Dangerous Substances) Regulations, 2006 by the Health and Safety Authority.

## 5. ENQUIRIES

- 5.1 All technical enquiries or comments on this document or any of the documents listed as forming part of the NRA DMRB should be sent by e-mail to [infoDMRB@nra.ie](mailto:infoDMRB@nra.ie), addressed to the following:

“Head of Network Management, Engineering Standards & Research  
National Roads Authority  
St Martin’s House  
Waterloo Road  
Dublin 4”



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Pat Maher  
Head of Network Management,  
Engineering Standards & Research

## APPENDIX A FORM BE/P4

### Form BE/P4

#### PURCHASER'S CONDITIONS OF ORDER FOR PAINT

A.1. The paint(s) described below, subject to our Order No ..... dated ..... must comply with ..... (paint manufacturer's name) a current IAB/BBA HAPAS Road and Bridges Certificates or equivalent and must have the properties stated in Form BE/P2 Paint Data Sheet completed by.....(paint manufacturer's name) or having been agreed in accordance to Departure..... (ID number). (Purchaser to complete under each heading of list.)

Item No.	Registered Desc.	Method of Application	Value of	X% (see A2.iic)
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A.2. In addition the following requirements must apply:

i. Keeping properties:  
When stored in its original sealed container at a temperature between 5°C and 27°C, the paint must retain the original properties for 12 months from date of despatch. During this time the paint must not show hard settling, skinning or tendency to gel when tested in accordance with IS EN ISO 1513.

ii. Application properties:

a. Except for two-pack chemically cured and moisture cured paints, paint(s) must be capable of being applied satisfactorily on suitably prepared surfaces at steel and ambient temperatures above 5°C. Two-pack chemically cured and moisture cured paint(s) must be capable of being applied satisfactorily on suitable prepared surfaces at steel and ambient temperatures advised by the paint's manufacturer. Paints must be overcoatable within the time stated in Form BE/P2 referred to in Paragraph 1.

b. The paint(s) must be supplied ready for use at a viscosity entirely suitable for the method of application.

c. Sag resistance.

There must be no sagging of paints when applied at 130% of the specified maximum wet film thickness.

iii. Dry film properties:

The paint(s) must be capable of being applied by a competent operator, in accordance with the Data Sheet(s), such that:

a. Each coat must be generally free from surface defects, particularly cratering, pinholing, rivelling, sagging, bittiness, dry spray or excessive brush marks and cissing, as defined in BS 2015 and IS EN ISO 4618.

b. Each coat must have a uniform and even appearance and have satisfactory adhesion, checked in accordance with IS EN ISO 4624, ASTM D4541-09 or IS EN 2063 Appendix A method 1, before overcoating with the next coat in the system.

c. Unless otherwise agreed, each coat of paint when applied at the minimum dry film thickness of the range stipulated in the Form HA/P2 must visually obliterate the substrate or the previous coat in a contrasting colour.

- d. Colour and gloss of the finish

The finish coat of paint applied to the structure shall match a coated reference panel provided by the paint manufacturer. The panel must be tinplate 150mm x 100mm.

### A.3. Containers

- i. Paint must be supplied in tins up to 25 litre capacity with completely removable lids.
- ii. The tins must be marked on the side. The marking must include the following:
  - a. Name of manufacturer
  - b. Registered description of the material (inc purpose, e.g. whether primer, undercoat or finish and also the colour)
  - c. Item No
  - d. Paint manufacturer's reference No
  - e. Batch No
  - f. Date of manufacture (as such or in coded form which must be communicated to the purchaser)

For (purchasing authority)

Signature:

Date:

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## **APPENDIX B DUTIES OF PAINTING INSPECTORS**

### **B.1. Health and Safety**

- B.1.1 The Inspection Firm must ensure that the Inspector is aware of the firm's duties as Employer in respect of health and safety of employees and other persons at the workplace. The Inspector shall also be aware of the duties imposed on him as employee by statutory instruments and regulations concerning health and safety.
- B.1.2 The Maintaining Agent shall provide the Inspector with a copy of all Health and Safety assessments carried out in accordance with regulation 4 of the Safety, Health and Welfare at Work (Chemical Agents) Regulations, 2001 (SI No. 619/2001).

### **B.2. Definitions in the List of Duties**

- B.2.1 Where the word 'verify' has been used in the list of duties, the function of the Inspector is to ascertain by enquiry.
- B.2.2 Where the word 'check' has been used in the list of duties, the function of the Inspector is to watch and report.
- B.2.3 Duties which require the Inspector to perform some other task, e.g. testing or measuring specific gravity, are explicitly described.

### **B.3. General Requirements and Duties**

- B.3.1 Painting Inspectors shall be familiar with documents referred to in the Contract including this Standard, harmonised standards, International and European harmonised Standards relevant to the work to be inspected.
- B.3.2 Specific duties of the Inspector are given in sections 4 to 9 of this Appendix. The duties are set out to correspond with stages of a typical maintenance painting contract carried out in accordance with this Standard.
- B.3.3 During the procedure trials, the Inspector shall carry out the duties in sections 6 to 8 which are necessary to establish the Contractor's ability to achieve the standards of surface preparation and protection required in the main work.

### **B.4. Preliminaries at Start of the Contract**

- B.4.1 Verify that the Inspector and the Contractor have identical copies of the Specification.
- B.4.2 Verify that the Contractor has submitted a quality plan for the work in the Contract, and that this has been agreed with the Maintaining Agent.
- B.4.3 Verify with the Maintaining Agent any requirement of the Contractor to liaise with or notify the Health and Safety Authority, Environmental Health Officer, the appropriate Fisheries Board or any other interested party, of any relevant stage of the Contract at the start or during the work.

- B.4.4 Verify with the Maintaining Agent that the programme of work and method of working proposed by the Contractor have been accepted and that the Contractor is aware of any limitations e.g. times of access to carriageways.
- B.4.5 Verify with the Maintaining Agent that the Contractor's proposed access arrangements have been agreed as being suitable for the method of working and inspection.
- B.4.6 Verify with the Maintaining Agent that the Contractor is fully aware of the limitations in the Contract regarding the effect of unfavourable weather conditions on progress of the work, e.g. planned carriageway closures and access.
- B.4.7 Verify with the Maintaining Agent that the Contractor is aware of requirements for the enclosure, collection and disposal of spent abrasive, paint, debris and dust.
- B.4.8 Verify with the Maintaining Agent that the Form BE/P1 (Maintenance) Paint System Sheet has been accepted and that the Inspector and Contractor have identical copies of Forms BE/P2 Paint Data Sheets and health and safety data sheets for each of the paints to be used in the contract.
- B.4.9 Verify that the Contractor is aware of the time needed for testing 'A' samples and that paint is ordered sufficiently early to allow testing and reporting of paint samples before paint from a particular batch is applied (other than painting in the procedure trial).
- B.4.10 Verify that the Contractor is aware of his responsibility for the packaging and prompt despatch of paint samples for testing. Check that the Contractor has provided an adequate number of tins and lids for 'B' samples and lid clips for 'A' and 'B' sample tins.
- B.4.11 Verify with the Contractor the quantity of paint to be used for each coat in the system.

#### **B.5. Procedure Trials**

- B.5.1 Verify with the Maintaining Agent the location and steelwork area where the procedure trials are to be carried out.
- B.5.2 Record names of personnel and details of equipment used in the trials and check that surface preparation and painting equipment proposed are suitable for the method of working and standards required in the specification.
- B.5.3 Check the efficiency of the equipment used in the trials, including any enclosures or monitoring, and that the standards of surface preparation and painting required in the main work are achieved. Check that adequate lighting, heating, ventilation and access equipment are used.
- B.5.4 Where hand power tools are used for abrading, check that the Contractor is using the correct technique and that surfaces are not left with a burnished appearance caused by the polishing in of old paint, rust or dirt.
- B.5.5 Check that the Contractor is capable of detecting and removing unsound coatings and that feathered edges of coatings have satisfactory adhesion.
- B.5.6 Check that the Contractor is able to identify chemical and visible surface contaminants and that he is able to remove these as required in the specification. Test surfaces for freedom from chemical contaminants.
- B.5.7 Check that the Contractor is capable of applying the protective coatings in accordance with the

specification, including film thickness and that each coat is free from surface defects including cratering, pinholing, rivelling, sagging, bittiness, cissing and dry spray, and that the finished system has an even and uniform appearance. Check that wet and dry paint film thicknesses measured by the Contractor as painting progresses, are comparable with measurements taken by the Inspector.

B.5.8 Where required by the Maintaining Agent, check that the Contractor applies all the paints (including stripe coats) stepped back, including the finish coat of paint, to a 150 x 100 mm tinplate panel, to ensure that the coats are applied in the correct order and to be used as a reference for shade and gloss of the finish coat later in the work.

B.5.9 Notify and seek approval from the Maintaining Agent any adjustment required to tins of paint.

Note: Any adjustment to paint should be made at the paint manufacturer's works and the Inspector should verify that the Contractor has confirmed with the Maintaining Agent that revised formulations are registered with the National Roads Authority before paints are offered for use in the Works.

B.5.10 Check that any unsatisfactory application is rectified before the start of the main painting.

## **B.6. Surface Preparation**

B.6.1 Check that the type and grade of abrasive is the same as that used in the procedure trial and that the abrasive is clean, dry, free from oversize particles and contaminants detrimental to the surface to be prepared.

B.6.2 Verify that any chemical cleaning to be used has been agreed by the Maintaining Agent.

B.6.3 Check that surfaces contaminated by oil or grease have been cleaned with a suitable cleaning material before being finally rinsed with clean water.

B.6.4 Before blast cleaning, check surfaces of steelwork for severe corrosion and/or contamination, e.g. prolonged damage caused to coating system from a leaking deck joint, and note these areas for close examination after blast cleaning. Record the position of these areas in the structure for future reference.

B.6.5 Check that only clean water is used in wet blast cleaning, wet cleaning down and for rinsing.

B.6.6 Check that surface defects revealed as surface preparation proceeds are remedied by the Contractor. Areas of surface defects, e.g. hackles, internal discontinuities, etc., which have been remedied should be recorded and notified to the Maintaining Agent before overcoating. Some defects may be remedied after primer application, with mechanical preparation being allowed through the blast primer and the primer re-applied locally by brush.

B.6.7 Check for the presence of sharp edges, burrs, weld spatter, etc. and record and report these areas to the Maintaining Agent if these have not been removed by fettling or grinding and any final blast cleaning which may be necessary.

B.6.8 Check that any loose particles of embedded abrasive in the cleaned surface are removed before overcoating.

- B.6.9 Where wet/abrasive blast cleaning methods are used, check that prepared surfaces have been dry blast cleaned to remove any subsequent light rusting in accordance with the specified standard of surface preparation. Check that finally prepared steel and metal coated surfaces are overcoated within the specified time and in accordance with clause 7.2.
- B.6.10 Check that excessive burnishing of the substrate through prolonged or faulty application of rotary power abrading tools, particularly rotary wire brushes, is avoided and that any visible peaks and ridges produced by mechanical cleaning tools are removed before overcoating.
- B.6.11 In areas where existing coats have been feathered back, check that all edges are firmly adhering.
- B.6.12 Record any areas of unnecessary damage to sound existing metal coatings which are not required to be removed during surface preparation.
- B.6.13 Check that sealants which have been raked or cleaned out between plies and gaps are replaced with a type agreed by the Maintaining Agent.
- B.6.14 Check finally that the specified standard of surface preparation has been achieved for each of the areas to be overcoated.
- B.6.15 Check at the start of every shift that the any sheeting used for enclosure is effective in preventing dust, etc. escaping into the atmosphere. Also ensure that any damage to the enclosure is repaired immediately.

## **B.7. Paints**

### **B.7.1 General**

- (i) Before paints are delivered to site, verify that the Contractor has available a suitable site lock-up store where paints can be kept at between 5°C and 27°C until required for use.
- (ii) Check that all paints delivered to site are in sealed containers and are clearly marked with the name of the manufacturer, registered description, item number, batch number, manufacturer's reference number and date of manufacture.
- (iii) Check that the first delivery of each paint to site consists of at least 10 tins from the same batch, where samples are required to be despatched to the testing authority for checking.
- (iv) Verify that the Contractor has confirmed with the paint manufacturer that the paint data sheets, including health and safety data sheets, cover the conditions under which the paints are to be applied, e.g. temperature, humidity, use in confined spaces, etc.
- (v) Verify that the Contractor's paint application programme allows for overcoating within the minimum and maximum timescale range recommended by the paint's manufacturer.

### **B.7.2 Application of paints**

- (i) Check that all painting is carried out using equally qualified and experienced personnel and equipment used in the procedure trial.
- (ii) Check that paints are used in strict rotation of manufacture and are used within the declared shelf life.
- (iii) Check that no addition of solvent to the paint is carried out on site.
- (iv) Check that 2-pack paints are mixed thoroughly (in the correct ratio) in accordance with the paint manufacturer's data sheet and that paints with a limited 'pot life' are not used after

- the expiration of the pot life. Check that other tins of paint with more than 10% ullage are discarded at the end of the working day and not returned to the paint store.
- (v) Check that adjacent surfaces which are not to be painted are masked or protected from overspray or paint splashes.
  - (vi) Check that painting, other than in the procedure trial, is not started until results of satisfactory testing of the first 'A' samples have been reported to the Contractor by the Maintaining Agent.
  - (vii) Check that paint is not applied under the following conditions:
    - (a) When the ambient temperature falls below 5°C or the relative humidity rises above 90% or, for types of paints in Series 1900 sub-Clause 1981.13, outside the temperatures and humidities recommended by the paint manufacturer.
    - (b) During rain, snow, fog, mist or in a dust- laden atmosphere.
    - (c) When the amount of moisture likely to be deposited on the surface by condensation or rain before or after painting, may have a harmful effect on the paint.
    - (d) When wind borne dust may have a harmful effect on the paint.
    - (e) When the steel temperature is less than 3°C above dew point.
  - (viii) Check immediately before the application of each coat of paint, that surfaces to be overcoated still comply with the specified standard(s) of surface preparation.
  - (ix) Check that stripe coats of paint in contrasting colour to the previous overall coat are applied in the correct sequence in accordance with the specification and that the colours of the same Item number are applied in the agreed order.
  - (x) Check that the dry film thickness of each coat of paint, and of the applied system, is in accordance with the specification. Verify that the Contractor is aware of any reduction in dry film thickness of coatings and the overall system resulting from curing/drying, particularly for paints with slow evaporating solvents.
  - (xi) Check that each coat of paint is free from surface defects including cratering, pinholing, rivelling, sagging, bittiness, cissing holidays and dry spray, and that the finished system has an even and uniform appearance.
  - (xii) Where applicable, check that the shade and gloss of the finish coat is the same as applied to the reference panel in the procedure trial.

### B.7.3 Paint Testing

- (i) Immediately on delivery of paint and any reconstituted paint to site, verify that it is for the use specified and carry out the following tests:
  - (a) Specific gravity. Samples which fail to comply with the following tolerances must be rejected and not sent to the testing authority:
    - paints with a specific gravity less than or equal to 1.4: + or - 3 %
    - paints with a specific gravity greater than 1.4: + or - 4 %
  - (b) Wet to dry film thickness ratio (volume solids).
  - (c) Sag resistance to ASTM D4400-99.
  - (d) Opacity.

- (e) Drying time.
- (ii) Following satisfactory site testing by the Inspector, and where required by the Specification, select the first set of 'A' samples of unopened tins of each type of paint and hand to the Contractor for packing, addressing and despatch to the testing authority.
- (iii) Immediately after the 'A' samples are despatched by the Contractor, record the despatch date in the completed Form BE/P3, Paint Sample Despatch List and send one copy to the testing authority and, together with Form BE/P1 (Maintenance) Paint System Sheet, one copy to the National Roads Authority. The Inspector must retain one copy of each Form BE/P3 as inspection records.
- (iv) Ensure that subsequent sets of 'A' samples are despatched for testing by the Contractor in accordance with the Specification in sufficient time to allow for testing and reporting of samples before the paints are used in the Works.
- (v) Take 'B' control paint samples before use at intervals as instructed by the Maintaining Agent from painters' kettles or from airless spray gun nozzles, with a minimum of one batch in three being sampled. Check the specific gravity of 'B' samples immediately samples are taken. If the specific gravity is found to be incorrect, the Inspector must record areas painted with that paint and report immediately to the Maintaining Agent.
- (vi) Following satisfactory checks on 'B' samples, clip down tin lids and mark tins B1, B2, etc. and hand to the Contractor for packing, addressing and despatch to the testing authority in accordance with the Maintaining Agent's instructions, given on Form BE/P3.
- (vii) Immediately after the 'B' samples are despatched by the Contractor, record the despatch date in the completed Form BE/P3 and send one copy to the testing authority, one copy to the National Roads Authority and retain one copy for the Inspector's records.

## **B.8. Records and Reporting to the Maintaining Agent**

- B.8.1 Record and report progress and compliance with the programme at intervals agreed with the Maintaining Agent.
- B.8.2 Record and report immediately to the Maintaining Agent non-compliance with the approved method of working, statutory requirements regarding health and safety and environmental protection, or other health and safety hazards or infringements which may affect the Contractor's workforce or third parties.
- B.8.3 Keep and submit records of the work as required.
- B.8.4 Record and report immediately sub-standard work.
- B.8.5 Keep records of all tests required for the contract and submit reports of all tests and inspections as required.
- B.8.6 Record details of equipment and materials used in the procedure trials and in the main work. Check and retain material consumable certificates and certificates of conformity issued by the Contractor. Record type of scaffolding or other access and details of screening and working conditions throughout the work.
- B.8.7 Record steel temperature, air temperature, relative humidity and paint temperature, prior to use, at each area to be painted before and at intervals during painting using suitable calibrated instruments.
- B.8.8 Record date of blast cleaning of each area and note if any re-blasting was required and the reason.

Record action taken to remedy surface defects.

- B.8.9 Record date and time of application of each paint coat, atmospheric conditions and area covered by each batch of paint.
- B.8.10 Keep record copies of all Forms BE/P1 and BE/P3 sheets. Also retain copies of Paint Sample Analyses Reports if so required by the Maintaining Agent.
- B.8.11 Where authorised to issue certificates of completion in respect of any part of the Works, forward copies immediately to the Maintaining Agent and retain copies for the Inspector's records.
- B.8.12 On completion of the Works, forward one copy of the completed Form BE/P5, Maintenance Painting Scheme Summary Sheet, together with Form(s) BE/P1 to the National Roads Authority, where required, one copy to the Maintaining Agent.
- B.8.13 On completion of the Works check that all records have been forwarded.

### **B.9. Record Sheets, Tables and Equipment**

- B.9.1 The inspection firm must provide the Inspector with all necessary record sheets and tables, including the following:
- i) Inspector's daily record sheets.
  - ii) Inspection firm's instructions and data sheets for carrying out checks for contaminants.
  - iii) Tables or disk calculator for calculating relative humidity or suitable digital instrument.
  - iv) Tables for calculating specific gravity after adding solvent.
- B.9.2 The inspection firm must provide the Inspector with all suitably calibrated equipment necessary for the Inspector to carry out his duties.

Inspection equipment must be calibrated at intervals recommended by the equipment manufacturer in accordance with the manufacturer's requirements or other national, international or European standards. Calibration records and certificates must be retained by the inspection firm and, where required, copies provided to the Maintaining Agent.

The inspection firm must provide the Inspector with the following minimum inspection equipment:

- i) Steel and air temperature thermometers or probes.
- ii) Surface profile gauge conforming to IS EN ISO 8503 Part 1.
- iii) Wet film thickness gauges.
- iv) Dry film thickness gauge to BS 3900-C5, method 6A and 7.
- v) Pull-off adhesion tester.
- vi) Metal spray adhesion tester.
- vii) Telescopic mirror.
- viii) Equipment to measure relative humidity.

- ix) Equipment to measure specific gravity.
- x) Equipment to detect and measure surface chemical contaminants.
- xi) X10 illuminated magnifying glass or pocket microscope.
- xii) Wet sponge holiday detector or spark tester as appropriate.

# APPENDIX C FORM BE/P5

## Form BE/P5

### MAINTENANCE PAINTING SCHEME SUMMARY SHEET

[On completion of the Works, Inspector to forward one copy of completed Form BE/P5 with Forms BE/P1 to: National Roads Authority, Waterloo Road, Dublin 4.]

Contract Title.....

Structure No/Name.....

1. Date of original construction, where known.....
2. Date of last major repaint, where known.....
3. Category of failure of previous Coating system (see definitions in NRA BD 87) please tick

I	II	III	IV
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

4. Details of previous protective system, where known:

	Description	Item No.
	Metal coat:.....	.....
1 <sup>s</sup>	Paint coat:.....	.....
2 <sup>nd</sup>	Paint coat:.....	.....
3 <sup>r</sup>	Paint coat:.....	.....
4 <sup>th</sup>	Paint coat:.....	.....
5 <sup>th</sup>	Paint coat:.....	.....
6 <sup>th</sup>	Paint coat:.....	.....

Total minimum dft of paint system  microns

No. of stripe coats.....

5. Protective system for this Contract Type.....
6. Date of paint survey, where known.....
7. Date of feasibility trial, where known.....
8. Have "A" or "B" paint samples been sent for testing for this contract? Yes No

- 
9. Has maintenance painting been major, i.e. affecting greater than 10% of the surface area of the steelwork?
10. If yes, has minor maintenance painting been undertaken since the last major repaint or, where this is the first major repaint since completion of construction?
11. Has work in the maintenance painting contract been carried out as part of a hybrid maintenance scheme, i.e. in conjunction with other highway or structure maintenance?
- If yes, please give a brief description of the other work. ....
12. Have carriageway/lane restrictions been specially required to carry out work in the maintenance painting contract?
13. Has work in the maintenance painting contract been carried out at night?
14. If you have any constructive comments to make regarding the maintenance painting specification, either general or in relation to work in this contract, please include them on a separate sheet and forward to the National Roads Authority with this form.

Inspecting Firm.....





Bonneagar Iompair Éireann  
Transport Infrastructure Ireland



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Stráid Gheata na Páirce,  
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