

TNZ C26: 2003

## **SPECIFICATION FOR THE CLEANING AND RECOATING OF STEELWORK COATED WITH LEAD BASED PAINT**

### **1. CONTRACT INFORMATION**

#### **1.1 Scope**

The maintenance painting of structural steelwork coated with lead-based paint shall be carried out in accordance with this specification. The work shall include the supply of all materials, labour, plant, tools and transport required for the proper completion of the contract.

#### **1.2 Existing Coating System**

The existing coating system contains concentrations of lead greater than 1% by weight, and therefore presents environmental and health risks when the coating system is removed. This may necessitate the use of containment and other special procedures to ensure satisfactory collection and disposal of blast media and debris, in order to comply with the Resource Consent issued for this work and relevant Health and Safety legislation.

#### **1.3 Standards**

This specification sets out the requirements for the protection of steel surfaces from atmospheric corrosion by the reinstatement of a protective coating system, including the standards to which the materials and work shall conform, and the procedures to be followed for the on-site application of paint coatings. **This Specification shall be read in conjunction with AS 4361.1-1995 Guide to lead paint management, Part 1: Industrial applications** and the latest relevant editions of the following standards and test procedures:

NZS/AS 1627.1	Cleaning using liquid solvents and alkaline solutions.
NZS/AS 1627.2	Power tool cleaning.
NZS/AS 1627.4	Abrasive blast cleaning.
NZS/AS 1627.9	Pictorial surface preparation standards (ISO 8501-1 or SIS 05 5900)
AS/NZS 1716	Respiratory protective devices
AS/NZS 2310	Glossary of paint and painting terms
AS/NZS 2312	Guide to the protection of iron and steel against exterior atmospheric corrosion.

AS 2800	Ambient air- Determination of particulate lead- High volume sampler gravimetric collection
NZS/AS 3894.3	Site Testing of Protective Coatings. Method 3: Determinations of dry film thickness.
AS/NZS 3894.6	Method 6: Determination of residual contaminants
NZS/AS 3894.10	Part 10: Inspection report - Daily
NZS/AS 3894.12	Part 12: Inspection report - Coating
NZS 3910	Conditions of Contract for building and civil engineering construction
NZS 4203	General structural design and design loadings for buildings
NZS/BS 4800	Schedule for paint colours for building purposes
NZS 6703	Code of practice for interior lighting design
ISO 2063	Metal spraying of zinc and aluminium

#### 1.4 Definitions

Contained Area:	the area of the structure fully enclosed to contain hazardous dust and debris.
Regulated Area:	the area established at the work site to identify areas, outside of which airborne concentrations of lead are not expected to exceed 30 $\mu\text{g}/\text{m}^3$ TWA.
Bunded Area:	an area enclosed by a wall, moat or other device designed to prevent the escape of spilt materials - generally liquids, into the environment.
Hazardous Waste:	any debris where TCLP testing produces leachate containing lead or chromium in concentrations greater than 5.0 ppm, or the pH is <2.0 or >12.5.
HEPA filter:	High-efficiency particulate air filter (Type 1 Class A filter, refer to AS 1324).
OSH:	Occupational Safety & Health Service of the Department of Labour.
TCLP:	Toxicity characteristic leaching procedure (refer to AS 4361.1).
TPI:	Independent Third Party Inspector. Refer to Clause 5.1.1.
TWA:	Time-weighted average airborne concentration of a particular substance when calculated over a normal eight-hour working day for a five-day working week.

### **1.5 Site Visit**

The Contractor is deemed to have visited the site to determine the extent of the work, local conditions, hours of operation etc, and assessed all difficulties prior to submitting their Tender. The Principal will not consider any claims arising from failure to inspect the site.

### **1.6 Labour and Materials**

The Contractor shall provide all labour, plant (including protective equipment, scaffolding and debris containment), together with all paint, abrasive media, and consumables (including brushes, rollers, cleaners and thinners), required to prepare and coat surfaces in accordance with this specification.

### **1.7 Inspection Equipment and Personnel**

The Contractor shall provide experienced supervisors including a coatings inspector and all equipment necessary to accurately measure wet and dry bulb temperatures and steel surface temperatures wet and dry film thicknesses, coating adhesion and chloride levels. The Contractor shall be responsible for the calibration and maintenance of all measuring and inspection equipment and that personnel are trained in their proper use.

### **1.8 Signage of Hazards**

The regulated area shall be sign posted to show that hazardous work is taking place. Outside this area the TWA shall not exceed  $30 \mu\text{g}/\text{m}^3$  of lead dust in air or other maximum level set by the Regional Council.

Signs, clearly warning of the dangers of airborne dust, shall be erected at the entrances to the site and at the blast site area to redirect vehicular traffic and personnel away from the area when blasting is in progress.

### **1.9 General Duty of Care**

When undertaking this work, the Contractor shall ensure that no damage will occur to the Principal's property, employees and/or any Third Parties, plant, equipment or personnel. The Contractor shall be held responsible to make good any such damage. In particular, the Contractor shall ensure that all drains and waterways are kept free of spent abrasive and paint debris during the work.

### **1.10 Pre-Commencement Meeting**

The Contractor's Site Manager will be required to attend a meeting, one week prior to commencement of work, to discuss aspects of this Contract considered critical to a successful outcome. An agenda will be provided prior to the meeting. The items identified in the Tender Documents (eg Work Programme, Coating Application Plan, Health and Safety Plan, Waste Management Plan) shall be submitted to the Engineer at least two working days prior to this meeting.

### 1.11 Clean-Up of Site on Completion

All equipment and containment enclosures shall be thoroughly cleaned with a HEPA vacuum cleaner prior to dismantling and removal from the site.

On completion of the project, all surplus and waste materials shall be removed from the site, which shall be left clean and tidy to the satisfaction of the Engineer.

## 2. STATUTORY REQUIREMENTS

### 2.1 General

The Contractor shall comply with the following:

- a. Health and Safety in Employment Act 1992 and Health and Safety in Employment Regulations 1995; Construction work notifiable under these regulations (including work at height exceeding 5 metres and where scaffolding is erected or dismantled from which falls of 5 metres or more are possible) shall be notified to OSH 24 hours prior to commencement of the work.
- b. The Resource Management Act 1991 and any consents issued under this Act.
- c. Hazardous Substances and New Organisms Act 1996
- d. Health Act 1956

### 2.2 Resource Management Act

#### 2.2.1 Regional Council Approval

Prior to the commencement of works, the Contractor shall submit to the Engineer evidence that the proposed methods of surface preparation, containment, collection and disposal of debris have been approved in principle by the local Regional Council, as methods which will comply with the requirements of the Resource Consent appended to this Specification. This submission will be a pre-requisite before permission to commence cleaning operations is granted.

#### 2.2.2 Containment

Where containment is required to meet the specified emission control level, it shall comply with the requirements of Section 5.7, unless otherwise agreed with the Engineer.

#### 2.2.3 Waste Disposal

All contaminated liquid and solid waste material, including blast debris, paint, rust, mill scale etc. associated with the work shall be collected, and held in an approved quarantine area prior to disposal, in such a way that:

- a. it is protected from storm water intrusion or flooding,
- b. no contamination of local soil, air or water occurs, and
- c. it is regularly removed to a waste disposal site approved to accept waste of this nature.

All site washing water shall be securely stored, in a bunded location within the regulated area. It shall be tested for lead contamination, and treated as necessary, prior to disposal. The Contractor shall ensure that disposal meets the conditions of the Resource Consent for the project and/or any relevant local authority discharge requirements.

The Contractor will be responsible for the management of all waste. This includes arranging for:

- a. preparation of a Waste Management Plan,
- b. any treatment of the waste that may be required,
- c. removal by a contractor to a site authorised to accept waste of this nature by the relevant Local Authority, and
- d. providing documentation of disposal acceptable to the Engineer (eg a Disposal Verification Form signed by the Contractor and waste receiver).

The Contractor will be responsible to meet any claims arising from poor management and/or control of all waste generated during the removal or refurbishment of the existing coating.

## **2.3 Health and Safety in Employment Act**

### **2.3.1 Health and Safety Plan**

The Contractor shall provide to the satisfaction of the Engineer a project health and safety plan. This plan will specify the measures the Contractor will undertake for this contract, with respect to managing health and safety hazards as required in the above Act. The plan shall specify as a minimum;

- a. Washing facilities that will be provided at the site.
- b. Protective equipment and clothing that will be issued to employees.
- c. A nominated contact person at the site who is responsible for health and safety management.
- d. Measures to be taken to minimise exposure to lead dust, including full details of any containment system, ventilation and frequency of site inspections.
- e. Measures taken to minimise any other health and safety hazards (such as a traffic safety management plan).

- f. Results of employee blood lead tests taken before and after any abrasive blasting, or confirmation from an OSH medical practitioner (or Occupational Physician) that blood lead tests are not required for a contract of this nature.

#### 2.3.2 Evidence of Training

The Contractor shall provide evidence of training given to employees with respect to the hazards of lead, importance of personal hygiene, correct use and care of respirators, and measures required to minimise exposure to lead. Evidence shall also be provided of other health and safety training given to employees that is relevant to this contract. This shall include dates of training.

### 3. PERSONNEL REQUIREMENTS

#### 3.1 General

Due to the presence of the lead-based paints at this site, a number of special precautions to ensure safety of personnel shall be adopted.

In all instances, compliance with the requirements of Occupational Safety and Health Service of the Department of Labour, the local Regional Council, the relevant Local Authority, and any Acts or Regulations relevant to this contract shall be mandatory.

#### 3.2 Personnel Monitoring

All employees who are likely to enter the regulated area shall be encouraged to take tests in accordance with the requirements of the OSH *Guidelines for the Medical Surveillance of Lead Workers*, unless confirmation has been received by an OSH Medical Practitioner or Occupational Physician that blood lead testing will be of no benefit for a contract of this nature or duration.

#### 3.3 Protective Equipment

All personnel entering the regulated area shall be provided with, trained to use and shall use, respiratory protection equipment that offers suitable protection against lead dust and other contaminants. Respirators shall be rated for use against toxic lead dust and shall comply with AS/NZS 1716. Where disposable respirators are used these shall be rated for toxic dusts and shall have a double head strap.

Suitable overalls and head protection (or disposable coveralls) shall be provided to prevent dust accumulation in clothing and hair. Boots and gloves shall be provided.

All protective clothing, once used, shall remain on the work site until disposed of, or sent for laundering. Contaminated clothes shall be laundered separately from domestic clothing.

### 3.4 Personnel Hygiene

Amenities and facilities shall be provided in accordance with Part 1 of the *Guidelines for the Provision of Facilities and General Safety in the Construction Industry*. All facilities shall be sited in an area where contamination by lead dust is not possible and shall be regularly cleaned during the course of the contract.

The Contractor shall ensure that all personnel understand the need for and observe the personnel hygiene instructions in the Transfund New Zealand Research Report 114 *Code of Conduct for Contractors: Management of Lead-based Paint on Roading Structures*.

A decontamination unit incorporating hot and cold showers for both dirty and clean applications shall be provided. A supply of fresh clean water and 240V/10A minimum electricity supply will be required. The unit shall be made available to the Engineer, TPI, and any other personnel associated with the works.

All site washing water shall be securely stored, in a bunded location. It shall be tested for lead contamination, and treated, as necessary, prior to disposal, in accordance with the requirements of clause 2.2.3.

### 3.5 Lighting

Within any containment structure, the minimum average illuminance over the floor area shall be 40 lux and at the work surface, a minimum of 200 lux. Where necessary, artificial lighting shall be provided as a supplement to any natural lighting present and shall be designed in accordance with NZS 6703.

### 3.6 Vacuum Cleaning

Personnel and equipment, involved in blast cleaning shall be cleaned down by vacuum before exiting the contained area. The vacuum cleaner shall be fitted with a High Efficiency Particulate (HEPA) filter.

## 4. ENVIRONMENTAL CONSIDERATIONS

### 4.1 General

Monitoring of the lead levels in soil, water and air shall be undertaken in accordance with the method given in the relevant Appendix to AS 4361.1, and as required under the conditions of the Resource Consent issued for the work. The type and extent of monitoring required shall be related to the risk potential identified for the project.

If at any time during the Contract, the lead levels increase above what is specified as acceptable, work shall cease until the cause of the increase is identified and rectified to the satisfaction of the Engineer. The Contractor shall bear the costs of any rectification required and any delay to the programme.

Sampling, testing and monitoring shall be arranged by the Engineer and all associated costs shall be reimbursed by the Contractor. All sample analysis shall be carried out by an independent IANZ accredited testing laboratory. Soil and water samples shall be analysed in accordance with the Australian and New Zealand Environment and Conservation Council (ANZECC) *Guidelines for the Analysis of Contaminated Soils* (Methods 14 or 15), the US EPA Method 3050, or other approved equivalent method.

#### **4.2 Soil Testing**

Prior to the commencement, and following the completion of the Contract, samples of soil shall be taken for analysis by the staff from the testing laboratory in accordance with Appendix G of AS 4361.1. An increase of more than 50 ppm or 10% (whichever is the greater) over the initial level will be considered contamination resulting from the work. Any soil that is above 1000 ppm lead and has been contaminated as a result of the project work shall be treated as hazardous waste, and removed and replaced with uncontaminated soil at the Contractor's expense.

Visual assessment of ground contamination by paint flakes or other debris shall be maintained throughout the project. Unless otherwise agreed by the Engineer, all such contamination shall be removed without recourse to laboratory analysis.

#### **4.3 Water Testing**

Testing of sediment and surface water may be required depending on the circumstances of the project. In fast-moving and/or deep water bodies, water and sediment testing is likely to be difficult and of limited value. For slow moving, shallow bodies of water, sampling of sediment and water may provide meaningful data. In these situations, samples shall be taken prior to commencement and again following the completion of the contract by the TPI (or Engineer) in accordance with Appendix H of AS 4361.1. If the project activities are in the vicinity of a drinking water intake or sensitive environmental receptors such as mussel or oyster beds, additional samples shall be taken at agreed intervals during the Contract.

Samples shall be tested by an independent IANZ accredited laboratory in accordance with the methods listed in Section 4.2. The water body will be considered to be contaminated by the project activities if:

- a. Paint chips or debris are visually evident in the water or sediment,
- b. The lead level of the water increases by 0.5 µg/litre or 10% (whichever is the greater) over the initial level measured, or
- c. The lead level of the sediment increases by 50 ppm or 10% (whichever is the greater) over the pre-project measured level.



#### 4.4 Air Monitoring

If air sampling is required by the Resource Consent, it shall be undertaken by a third party testing organisation that is IANZ accredited. Samples shall be collected and tested in accordance with AS 2800. Air quality monitoring shall be carried out in accordance with procedures given in Appendix F of AS 4361.1.

Where visible dust emissions are not permitted under the Resource Consent, the Contractor shall continuously monitor visually for any emissions from any contained area, and where evident, shall cease operations and effect any modification or repairs necessary to prevent any recurrence. The results of all visual monitoring shall be documented.

#### 4.5 Minimum Level of Monitoring

In all cases the minimum level of monitoring undertaken shall be visual monitoring for air emissions and the presence of paint flakes or dust, or other surface preparation debris on the ground, or adjacent water surfaces or in associated sediment.

### 5. INSPECTION REQUIREMENTS

#### 5.1 General

##### 5.1.1 Third Party Inspection

Unless otherwise agreed, the Contractor shall employ an independent Third Party Inspector (TPI) that holds an approved qualification in coatings inspection and who shall be present for the periods specified during the Contract with the following responsibilities:

- a. To audit daily inspection records maintained by the Contractor.
- b. To sample soil, water and air, as required by this Specification.
- c. To observe and report to the Engineer unsafe work practices or deviations from the health and safety plan.
- d. To report to the Engineer any deviation from the Specification or accepted industry practice.
- e. To advise the Engineer of any problems experienced with the coating system.

##### 5.1.2 Attendance by TPI

The Contractor shall allow for the TPI to be on site during surface preparation and during coating application at a frequency defined elsewhere in the Contract Documents. The Contractor shall be liable for the costs of any additional inspections due to access or lighting not being available, or inspection of rework.

## 5.2 Hold Points

Mandatory hold points for the purpose of the Contract are as follows. Work shall not proceed beyond these hold points unless approved by the Engineer;

- a. Supply of all information required by the Tender documents, eg. details of traffic management, scaffolding, containment, safety plan etc, prior to the commencement of works.
- b. At the completion of the scaffolding and screening or containment, prior to blasting proceeding.
- c. Initial blood tests be taken and results forwarded to Engineer prior to work commencing on site or confirmation of an exemption. Where an operator has history of blood lead level monitoring, the most recent test result shall be supplied.
- d. Lighting shall be shown to comply with clauses 3.5 and 5.4 prior to commencement.
- e. Surface preparation methods and paint materials shall be approved as per clauses 2.2.1 and 6.1 prior to any surface cleaning or painting respectively.
- f. Following the completion of any blast cleaning and prior to the application of primer where within 10 km of the sea.
- g. When any dust emissions are observed coming from the contained area during blasting.
- h. After curing of any primer/paint coat and prior to overcoating.
- i. Vacuuming prior to removal of scaffolding and screening or containment.
- j. Inspection following clean up of the site, prior to issuing completion certificate.

## 5.3 Blow Down

Freshly blast cleaned areas shall be thoroughly blown down or vacuumed prior to an inspection by the Engineer or TPI.

## 5.4 Lighting

The minimum average illuminance over the area under inspection shall be 200 lux. The Contractor shall provide artificial lighting where necessary to facilitate inspection.

## 5.5 Site Testing

The dry film thickness shall be measured in accordance with AS 3894.3. Measurements shall be taken in accordance with a Sampling Plan that shall be submitted one week prior to the commencement of works for approval by the Engineer.

When the structure is located in a “High” or “Very high marine” corrosivity category as defined by AS/NZS 2312, representative surfaces shall be checked before priming, for salt contamination in accordance with Method A of

AS/NZS 3894.6. Chloride ion levels shall be less than 100 mg/m<sup>2</sup> or other maximum value recommended by the coating manufacturer and agreed in writing by the Engineer.

## 5.6 Scaffolding

The Contractor shall be responsible to provide all necessary scaffolding and/or access equipment to allow for the structure to be safely prepared, coated and inspected. The scaffolding shall be erected and constructed in accordance with Regulation 22 of the Health and Safety in Employment Regulations and the OSH *Approved Code of Practice for the Safe Erection and Use of Scaffolding*. A certificated scaffolder shall erect all scaffolding. Scaffolding shall be designed to resist all expected load combinations including wind on any screens or containment.

The Contractor shall submit at the Pre-commencement Meeting a detailed Scaffolding Plan and drawings, showing dimensions, clearances, and the access arrangements for the proposed method of scaffolding.

A Scaffolding Register shall be maintained and inspections undertaken as stated in the OSH Code of Practice.

Scaffolding shall not be removed until all the final coat surfaces have cured sufficiently to enable the dry film thickness readings to be checked by the TPI.

## 5.7 Containment Requirements

### 5.7.1 General

The containment design shall be such that all dust and debris generated during the Contract is sufficiently contained to meet at all times, the conditions given in the Resource Consent and this Specification. The design of scaffolding and work platforms shall be such that the floor area is sealed to prevent uncontrolled leakage of washing water and/or dust and debris.

Note: Guidance on the design of containment and ventilation systems is given in Appendix E of AS 4361.1.

### 5.7.2 Design Certificate

Before work commences, the Contractor shall supply to the Engineer a Design Certificate from a suitably qualified designer stating that the containment has been designed to the relevant design codes to carry the loadings given in NZS 4203, without exceeding the allowable wind loading and structural loads on the bridge or any of its components.

### 5.7.3 Containment Material

Unless otherwise agreed, the containment material used shall be reinforced clear plastic such as Monarflex<sup>®</sup> or similar approved and, where required to meet the specified emission category, shall be fully sealed at all joints.

### 5.7.4 Drainage

Where bridge drains are located within the containment, temporary drainage pipe or hose shall be used to direct water away from the work area.

### 5.7.5 Containment Entry and Ventilation

Where a fully sealed containment method is required, the contained area shall be fitted with an airlock entryway. This shall consist of an inner area equipped with vacuum equipment (HEPA filters) for cleaning of personnel's clothing prior to exit from containment.

The entryway shall be fitted with internal and external doors that cannot be opened at the same time by a single person.

The ventilation system shall ensure that the following criteria are met;

- a. The containment shall be provided with a mechanical dust collection system to collect and remove airborne dust and debris generated during the paint removal process.
- b. The ventilation system shall provide an average air movement of greater than 0.5 m/sec. in the area immediately surrounding operators within the containment.
- c. The dust collector shall be greater than 95 percent efficient for particles of 0.3 micrometre in diameter.
- d. The ventilation system shall provide sufficient air movement to provide a continuous concave shape to unsupported containment material.

### 5.7.6 Compliance with Statutory Requirements

These clauses provide requirements for containment design considered to be essential to the successful control of contamination resulting from this work. The Contractor shall ensure that the design and operation of the containment system complies with all OSH requirements and any other relevant statutory requirements.

## 5.8 Documentation

### 5.8.1 As-built Report

Prior to any maintenance painting commencing, the Contractor shall document the location of areas requiring spot priming. Prior to abrasive blasting the rusted areas shall be recorded on a sketch, together with dry film thicknesses measured after final preparation and prior to the spot priming of all areas requiring maintenance. On completion of painting, final coating thicknesses in these same locations shall be measured and added as an "as-built" record of maintenance.

### 5.8.2 Daily Inspection Report

The Contractor shall complete a daily inspection report of an approved format (eg. AS 3894.10) detailing the type of surface preparation and environmental conditions for each work area. A report (eg AS 3894.12) shall also record paint system, dry film thicknesses, paint batch numbers and quantities used. Copies shall be supplied to the TPI at the end of each week, and forwarded to the Engineer at the end of each month.

## 6. COATING MATERIALS

### 6.1 Material Specifications

Paint shall comply with the requirements of the relevant specification as listed below. Unless otherwise agreed with the Engineer, material supplied shall have been approved by the Australian Paint Approval Scheme (APAS).

<i>Generic Type</i>	<i>Standard Spec.</i>	<i>APAS Spec.</i>
Inorganic Zinc Silicate (IZS)	AS/NZS 3750.15/4	2908
Inorganic Zinc Silicate ("High ratio")	AS/NZS 3750.15/6	2908
Zinc Rich Epoxy (ZnE)	AS/NZS 3750.9/2	2916
Epoxy Primer (EPP)	AS/NZS 3750.13	2971
Zinc Phosphate Alkyd Primer (ZPA)	AS 4089	2921
HB Epoxy (HBE)	AS/NZS 3750.14	2973
Alkyd MIO (MIOA)	AS/NZS 3750.12	2910
Epoxy Mastic (EM)	AS 3750.1	0156
Acrylic Latex (ACL)	AS/NZS 3750.5	2901
Polyurethane (PU)	AS/NZS 3750.6	2911
Moisture cure urethane (MCU)	AS 3750.18	2930

## 6.2 Packaging and Labelling

All paints and thinners used in a system shall be from the same paint manufacturer. Materials shall be delivered to the site in the manufacturer's containers, unopened and with the label intact. The following information shall be legibly and durably marked on each container:

- a. the name or registered mark of the manufacturer,
- b. the paint or thinner type,
- c. the colour identification,
- d. product identification together with appropriate description of each component, eg. base, hardener, reducing solvent, etc,
- e. production or batch numbers on packs of 4 litre capacity and above, and
- f. information required by statutory regulations.

In addition to the project coating specification, the Contractor shall have on site available for reference by the Engineer and the Contractor's employees the following information for each product used (including thinners);

- g. the manufacturer's technical data sheet with instructions for use, including (where relevant) the mixing ratio of the component parts, the induction time, the pot life, and recommended methods of storage, mixing, and application.
- h. the manufacturer's Material Safety Data Sheet (MSDS).

## 6.3 Safety Precautions

The Contractor shall comply with all recommendations provided on the paint manufacturer's safety data sheets and any other specified requirements contained elsewhere in the Contract Documents.

## 6.4 Deviations from Manufacturer's Data Sheets

Any deviations from the manufacturer's printed data sheet(s) or their project coating specification shall first be authorised in writing, by the paint manufacturer. Copies of such authorisation shall be forwarded to the Engineer.

## 6.5 Sampling and Quality Assurance

Not later than two weeks prior to the commencement of coating application, the Contractor shall submit to the Engineer:

- a. A list of the proposed coatings to be used including brand names and generic type,
- b. Name of the coating manufacturer and their nominated local representative with contact details, and
- c. Evidence of approval of the proposed brands by APAS (where available).

The Engineer reserves the right to take any samples, including samples from the painter's pot, which the Engineer may require for testing purposes during the Contract.

Where non-APAS approved products are proposed for use, the Contractor shall provide documentary evidence (eg. an IANZ or NATA endorsed test certificate) that each batch of paint supplied complies with the relevant material specification (refer clause 6.1).

## **6.6 Bunding**

Unless otherwise agreed with the Engineer, all hazardous substances shall be stored in accordance with the Hazardous Goods Regulations within one or more bunded areas. These shall be provided with an impervious floor and shall be covered to prevent collection of rainwater. The capacity of each bunded area shall be equal to the volume of hazardous substances stored, plus 20%. The volume of stored material shall not exceed this calculated volume.

The Contractor shall submit details of the bunding and volumes of materials to be stored (or his alternate hazardous materials storage proposals) at the Pre-commencement Meeting.

## **6.7 Mixing and Thinning**

All paints, thinners, solvents and any other liquids likely to contaminate land or water shall be stored and mixed within bunded areas.

All paints shall be thoroughly mixed before use and if required shall be agitated during application to keep the paint homogeneous. Catalysts, curing agents or hardeners, which are separately packaged, shall be added and mixed with the base paint in accordance with the manufacturer's written recommendations. All two-part material shall be folded in from the outer edge of the container with a flat spatula during mixing to ensure it is fully catalysed.

Only sufficient paint for prompt use shall be catalysed at one time. Unused portions of mixed catalysed paints shall be discarded at the end of the manufacturers recommended pot life and shall not be added into freshly mixed paint.

Any paint that has exceeded the manufacturer's recommended shelf life or is in anyway suspect shall not be used, unless the manufacturer's representative confirms suitability of that batch in writing.

Thinning of paint and cleaning of equipment shall be carried out in strictly in accordance with the manufacturer's written recommendations. Re-refined solvent (eg 'gunwash') shall not be used unless in a cleaning procedure specifically approved by the coating manufacturer. Cleaning solvents shall be thoroughly flushed from all lines and equipment with the recommended thinner prior to application.

## 6.8 Tinting

Where successive coats of the same colour have been specified, alternate coats shall be tinted offshade sufficiently to produce enough contrast to indicate complete coverage of the surface. No site tinting of the finish coat will be permitted which shall be factory tinted using milled pigments.

## 7. SURFACE PREPARATION

### 7.1 Preliminary Cleaning

Weld spatter, surface irregularities and sharp edges shall be removed by mechanical means to provide a minimum radius of 2 mm. Heavy deposits of contaminants or encrustations of rust shall be removed by chipping, scraping or use of impact tools. Any re-entrant pits shall be opened out with a suitable grinder.

Deposits of oil and grease shall be removed by solvent cleaning in accordance with AS 1627.1 or by washing using a non-ionic detergent. After any cleaning with detergent, the treated surface shall be thoroughly rinsed with clean water.

All surfaces to be painted shall first be thoroughly cleaned by high-pressure water washing with potable water to remove all remaining surface contamination. Surface contamination is deemed to include soluble chloride salts, weld fluxes, bird droppings, fungal growth, soot, dirt, deteriorated and loose paint, loose scale, embedded iron particles and corrosion products. The cleaning pressure and flow rate shall be sufficient to reduce residual levels of chloride to below that specified (refer clause 5.5). Use of an approved chloride solubilising agent (eg 'Chlor\*Rid') in the washing water is recommended in coastal or marine environments.

Washing water shall be collected as detailed in the Waste Management Plan and passed through a 250 micron filter or sediment trap before being discharged, or treated as required by the conditions of the Resource Consent.

### 7.2 Final Cleaning

Corroded steelwork shall be thoroughly cleaned back to the metal, removing all mill scale, weld slag, poorly adherent paint, contaminants or any other extraneous material in accordance with the relevant part of NZS/AS 1627 and to the standard of cleanliness specified for the coating system.

All electrical or telecommunication cables and fittings, data plates, and galvanized steel items shall be adequately protected to ensure they are not damaged during any abrasive blasting.

All waste material including blasting media, rust, paint debris and mill scale shall be contained and disposed of in accordance with the requirements of the Resource Consent, the Waste Management Plan for the project, and the relevant trade waste/landfill discharge standards of the local authority concerned.



Cleaning after abrasive blasting shall be carried out as specified in AS 1627.4, clause 6.3. The first coat of the protection system shall be applied within six hours of final preparation or before deterioration occurs, whichever is the sooner. In the event of the surface becoming contaminated between final cleaning and applying the first coat, it shall be re-prepared.

### **7.3 Abrasive**

The abrasive blast media to be used shall be clean, dry and free from extraneous material such as dirt, gravel and organic matter. For dry blasting, the media shall contain less than 5% free silica and the maximum permissible level of total dissolved salt in the media shall be 0.015% when determined in accordance with BS 812: Part 117.

Where media used in dry blasting needs to be cleaned and recycled this shall be carried out on site, and all waste extracted shall be contained for later disposal.

### **7.4 Blast Cleaning Equipment**

The compressed air supply used for blasting shall be free of water and oil. Adequate separators and traps shall be provided and these shall be kept emptied of water and oil. Accumulations of oil and moisture shall be removed from the air receiver by regular purging.

Where specifically approved to control the generation of dust, potable water may be injected into or sprayed from the blasting nozzle, or high- or ultrahigh-pressure water jetting equipment may be used in accordance with SSPC-SP 12/NACE 5. Approved corrosion inhibitors may be used where agreed with the Engineer and the coating manufacturer.

Unless otherwise specified or approved, the surface profile after blast cleaning shall be a minimum of 25 microns and a maximum of 75 microns, when measured to AS/NZS 3894.5.

## **8. COATING APPLICATION**

### **8.1 Coating System**

The Contractor shall apply the coating system, which has been specified elsewhere in the contract documents.

### **8.2 Climatic Conditions**

All paints shall be applied in accordance with the manufacturer's written recommendations.

Unless expressly permitted by the manufacturer's written recommendations (Clause 6.2g), paint or metal spray shall not be applied when:

- a. The steel surface temperature is less than 3°C above dew point or more than 35°C,
- b. The ambient air temperature is below 5°C,
- c. The relative humidity exceeds 85% (unless special precautions are taken to ensure that the steel surface is at least 3°C above the temperature of the surrounding air), except for ethyl silicate based inorganic zinc silicate and moisture cure urethane when up to 95% RH will be permitted,
- d. There is moisture or ice visible on the surface of the steel,
- e. The wind speed exceeds 7m/sec (for spray application), or
- f. The environmental conditions are expected to deteriorate.

All atmospheric measurements shall be taken in the paint application area.

### **8.3 Priming**

On surfaces not cleaned by abrasive blasting or water jetting, or where pit depths exceed 2 mm, the first coat of priming paint shall be applied by brush and well worked onto the steel surface. Subsequent coats may be applied by brush, roller or spray.

### **8.4 Spray Painting**

Before spraying the intermediate and final coats, all areas such as corners, edges, welds, small brackets, bolts, nuts, rivets, and crevices shall be pre-coated by brush as a stripe coat.

The Contractor shall provide painters with wet film gauges that shall be used to ensure that the specified film thicknesses are achieved.

The Contractor shall take all reasonable precautions to prevent damage by drifting spray to other property, buildings and vehicles. Any such damage shall be fully and promptly repaired at the Contractor's expense. The Engineer may require that the remaining paint be applied by brush or roller, rather than spray, if "overspray" damage occurs. In this event, the Contractor will not be entitled to any additional payment. Any conditions required by the Resource Consent shall also be complied with.

### **8.5 Cover coats**

Whenever wind speeds have exceeded 10 km/hr from a seaward direction, all newly prepared or painted external surfaces within 5 km of the coast shall be washed with potable water prior to applying the next coat.

Cover coats shall be carried over adjacent painted surfaces to give a minimum overlap of 25 mm.

## 8.6 Application Plan

The Contractor shall provide a coating Application Plan for discussion at the Pre-commencement Meeting. This plan shall be paint manufacturer specific and shall include; contact details of their local technical representative, Material and Safety Data Sheets, details of cleaning, application and inspection equipment to be used, sequence of operations, and procedures for the repair of any defects or damage.

Throughout the duration of the Contract the paint manufacturer's nominated representative shall be available to attend meetings and also to visit the site should problems occur.

## 9. REPAIR OF DEFECTS

### 9.1 General

Before application of any further coat of material, all damage to previous coat shall be repaired. Sagging, dimpling, or curtaining not exceeding 1% of coated surface areas that are visible to the public, or 5% of non-visible areas shall not be considered as a defect requiring repair.

### 9.2 Incorrect Thickness

Areas with an inadequate coating thickness shall be thoroughly cleaned and where necessary, additional coats applied until the specified thickness for each layer or area is achieved. Under-thickness of inorganic zinc silicate shall be repaired with zinc rich epoxy. Areas of excessive thickness of inorganic zinc thickness, which results in 'mudcracking' that penetrates to the substrate, shall be totally removed by abrasive blasting. When not used as a single coat system, the specified IZS primer thickness may be re-established with zinc rich epoxy where less than 5% of primed surface is affected. Larger areas shall be completely re-prepared and re-primed with the correct thickness of inorganic zinc silicate.

### 9.3 Contaminated Surfaces

Surfaces to be overcoated that become contaminated shall be thoroughly cleaned by washing with water to remove soluble contaminants (eg. salts), solvent to remove organic material, and/or hand sanding or lightly brush blasting as required before application of the overcoat.

### 9.4 Damaged Surfaces

After cleaning, the coating around the damaged area shall be feathered to ensure continuity of the patch coating and the full system reinstated.

## 10. SYSTEM IDENTIFICATION

Information on the coating system applied shall be recorded by neatly painting in contrasting colour (and with compatible paint) onto the steelwork in 50 mm high letters so it is easily visible. If possible this shall be done near an abutment on the left-hand side when looking in the direction of increasing route distance, and in a position difficult to deface with graffiti. The information shall include:

- a. Date of completion of paint application, e.g. MAY 2003,
- b. Surface preparation, eg; S/W = Scrape and wirebrush, HPWJ = High pressure water jetting,
- c. Priming coat(s) and dry film thickness (DFT) specified,
- d. Cover and finish coats with DFT.

eg. a system based on power tool clean with a zinc phosphate alkyd primer and two build coats of micaceous alkyd, all of 50 microns each, would be shown as:

PT      St2  
ZPA     1/40  
MIOA   2/40