



MATERIAL SPECIFICATION FOR PAINT COATING SYSTEMS FOR STRUCTURAL STEEL

TABLE OF CONTENTS

1704.01	SCOPE
1704.02	REFERENCES
1704.03	DEFINITIONS
1704.04	DESIGN AND SUBMISSION REQUIREMENTS
1704.05	MATERIALS
1704.06	EQUIPMENT - Not Used
1704.07	PRODUCTION
1704.08	QUALITY ASSURANCE
1704.09	OWNER PURCHASE OF MATERIAL - Not Used

APPENDICES

1704-A	Commentary
--------	------------

1704.01 SCOPE

This specification covers the material requirements of paint coating systems for structural steel. It also covers the procedure to be followed for initial approval and subsequent acceptance testing of paint coatings and paint coating systems.

1704.01.01 Specification Significance and Use

This specification is written as a provincial-oriented specification. Provincial-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of the Ontario Ministry of Transportation.

Use of this specification or any other specification shall be according to the Contract Documents.

1704.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

1704.02 REFERENCES

When the Contract Documents indicate that provincial-oriented specifications are to be used and there is a provincial-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.PROV, unless use of a municipal-oriented specification is specified in the Contract Documents. When there is not a corresponding provincial-oriented specification, the references below shall be considered to be to the OPSS listed, unless use of a municipal-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 911 Coating Structural Steel Systems

ASTM International

A 123/A123M-12	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
B 117-11	Standard Practice for Operating Salt Spray (Fog) Apparatus
D 523-14	Standard Test Method for Specular Gloss
D 562-10	Standard Test Method for Consistency of Paints Measuring Krebs Unit (KU) Viscosity Using the Stormer-Type Viscometer
D 609-00 (2012)	Standard Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products
D 610-08 (2012)	Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces
D 660-93 (2011)	Standard Test Method for Evaluating Degree of Checking of Exterior Paints
D 661-93 (2011)	Standard Test Method for Evaluating Degree of Cracking of Exterior Paints
D 714-02 (2009)	Standard Test Method for Evaluating Degree of Blistering of Paints
D 772-86(2011)	Standard Test Method for Evaluating Degree of Flaking (Scaling) of Exterior Paints
D 1210-05 (2010)	Standard Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage
D 1475-13	Standard test Method for Density of Liquid Coatings, Inks, and Related Products
D1640 -03(2009)	Standard Test Methods for Drying, Curing, or Film Formation of Organic Coatings at Room Temperature

D 1654-08	Standard test method for Evaluation of Painted or Coated Specimens subjected to Corrosive environment
D 2369-10e1	Standard Test Method for Volatile Content of Coatings
D 2371-85(2010)	Standard Test Method for Pigment Content of Solvent-Reducible Paints
D 2621-87(2011)	Standard Test Method for Infrared Identification of Vehicle Solids From Solvent-Reducible Paints
D 3271-87(2012)	Standard Practice for Direct Injection of Solvent-Reducible Paints Into a Gas Chromatograph for Solvent Analysis
D 3723-05(2011)	Standard Test Method for Pigment Content of Water-Emulsion Paints by Low-Temperature Ashing
D 3960-05(2013)	Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paint and Related Coatings
D 4214-07	Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
D 4400-99(2012)e1	Standard Test Method for Sag Resistance of Paints Using a Multinotch Applicator
D 4451-02(2008)	Standard Test Method for Pigment Content of Paints by Low-Temperature Ashing
D 4541-09e1	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
D 4587-11	Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
D 5894-10	Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
D 6386-10	Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting
E 1347-06 (2011)	Standard Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry

ASTM International Manual Series: MNL 17

Paint and Coating Testing Manual, 15th Edition, 2012

The Society for Protective Coatings (SSPC)

Good Painting Practice, SSPC Painting Manual, Volume 1, 4th Edition, 2002

SP 3-82 (2004) Power Tool Cleaning

VIS 1-02 Visual Standard for Abrasive Blast Cleaned Steel

VIS 3-93(2004) Visual Standard for Power and Hand Tool Cleaned Steel

SSPC and National Association of Corrosion Engineers (NACE) Joint Publications

SP 5 / NACE No. 1, Jan 2007 White Metal Blast Cleaning

SP 10 / NACE No. 2, September 2000 Near-White Blast Cleaning

SSPC, American Welding Society (AWS) and NACE Joint Publications

SSPC-CS 23.00 / AWS C2.23M/NACE No.12-2003 Application of Thermal Spray Coatings (metalizing) of Aluminum, Zinc, and Their Alloys and Composites for Corrosion Protection of Steel

Others

U.S. General Services Administration:
Federal Standard 595C Colors, 2008

1704.03 DEFINITIONS

For the purpose of this specification, the definitions in the SSPC, Good Painting Practice Manual Volume 1, 4th Edition; and the following definitions apply:

Coating System means as defined in OPSS 911.

Low Volatile Organic Coating Material means coating material that contains not more than 340 g/L of volatile organic compounds (VOC) when tested according to ASTM D 3960.

Marginally Prepared Surface means a steel surface prepared by power tool cleaning according to SSPC-SP 3.

Paint Coating means as defined in OPSS 911.

Paint Coating System means as defined in OPSS 911.

Pot Life means the length of time a multi-component material is usable after all the components are mixed in the recommended portions.

Seal Coat means as defined in OPSS 911.

Structural Steel means as defined in OPSS 911.

Target Value means the value of various properties listed in OPSF 1704-1 submitted by the supplier with the initial submission of material samples for coating system approval.

1704.04 DESIGN AND SUBMISSION REQUIREMENTS

1704.04.01 Submissions Requirements

1704.04.01.01 Paint Coatings and Paint Coating System Approval

The supplier shall provide samples and a completed OPSF 1704-1 for each component of the paint coating system for approval and material acceptance testing. The sample shall be accompanied by the manufacturer's instructions for use; material safety data sheets; and material information, including documentation on laboratory and field tests carried out to establish the pot life; physical characteristics; and chemical composition as shown in OPSF 1704-1.

1704.05 MATERIALS

1704.05.01 Coating Material

1704.05.01.01 General

The requirements of the paint coating shall be according to the following:

- a) The concentration of lead in the dry film of each coating shall not exceed 0.01% or 100 ppm.
- b) The components shall be homogenous, well-dispersed to a uniform consistency and, when mixed according to manufacturer's instructions, shall be suitable for application by spray equipment.
- c) Each paint coating shall be a low VOC material.
- d) Zinc-rich touch up paint shall contain not less than 87% of zinc by mass of non-volatile matter.

- e) The paint coating system for marginally prepared surfaces shall be suitable for application over existing coatings of alkyd, vinyl, and currently approved low VOC paint coating systems.

1704.05.01.02 Colour

The prime coat shall be of such a colour as to assist the applicator in distinguishing between primed areas and the uncoated cleaned steel or other prepared surfaces.

Each coat shall be formulated to show a distinct colour difference. With the exception of coal tar epoxies, the colour of the finish coat shall be equivalent to 10045 brown for Atmospheric Corrosion Resistant steel, and a colour equivalent to 16307 grey for all other steels, both according to Federal Standard 595C Colors.

1704.05.01.03 Application Requirements

When applied according to the manufacturer's instructions and to the manufacturer's specified thickness, the paint coating shall show good levelling with no runs, sags, or mud cracks. Applied coatings shall have no pin-holes, holidays, bubbles, or craters.

Each coat shall be capable of application by spray, brush, or roller for a temperature range of 5 to 35 °C, without thinning.

After the components have been combined, multiple component paint coating shall have a minimum pot life of 3 hours at 25 °C.

1704.05.01.03.01 Two-Coat Zinc Rich Rapid Deployment Coating System

In order to qualify as a primer for a rapid deployment coating system, zinc rich coating material shall cure or dry sufficiently to be top coated within 3 hours at 15 °C when applied at a wet film thickness required for a DFT of 100 µm.

The coatings to be used as the top coat material shall cure or dry to touch within 4 hours when applied at a wet film thickness required for a DFT of 125 µm.

1704.05.01.04 Performance Requirements

1704.05.01.04.01 General

The entire coating system shall be tested on test panels for adhesion, weathering resistance, and corrosion resistance performance. Testing shall be as shown in Table 1.

1704.05.01.04.02 Accelerated Weathering

After 5,000 hours of exposure, the coating system on the test panel for abrasive blast cleaned surfaces shall exhibit none of the characteristics of the paint failure as described in the Coating Failures chapter of the SSPC Good Painting Practice Manual, except for characteristics noted below. Chalk rating shall be 7 or higher, and the colour difference shall not exceed 6 units.

After 2,500 hours of exposure, the coating system on the test panel for marginally prepared surfaces shall exhibit none of the characteristics of the paint failure as described in the Coating Failures chapter of the SSPC Good Painting Practice Manual, except for characteristics noted below. Chalk rating shall be 7 or higher and the colour difference shall not exceed 6 units.

After 5,000 hours of exposure, the coating system on the galvanized test panel shall exhibit none of the characteristics of the paint failure as described in the Coating Failures chapter of the SSPC Good Painting Practice Manual, except for characteristics noted below. Chalk rating shall be 7 or higher and the colour difference shall not exceed 6 units.

After 5,000 hours of exposure, the coating system on the metallized test panel shall exhibit none of the characteristics of the paint failure as described in the chapter "Causes and Prevention of Paint Failure" in SSPC Vol. 1. Chalking shall be 7 or higher, and the colour difference shall not exceed 6 units when measured as shown in Table 1.

1704.05.01.04.03 Cyclic Corrosion Resistance Testing

After 12 cycles of exposure, the coating system on the test panel for abrasive blast cleaned surfaces shall exhibit none of the characteristics of the paint failure as described in the Coating Failures chapter of the SSPC Good Painting Practice Manual, except for characteristics noted below. There shall not be any corrosion, except along the score lines. The average value of the rust creepage of all the scored panels tested shall not be more than 4 mm. However, the rust creepage on any individual panel may exceed 4.0 mm, but shall be below 5.0 mm. Chalk rating shall be 7 or higher and the colour difference shall not exceed 6 units.

After 6 cycles of exposure, the coating system on the test panel for marginally prepared surfaces shall exhibit none of the characteristics of the paint failure as described in the Coating Failures chapter of the SSPC Good Painting Practice Manual, except for characteristics noted below. There shall not be any corrosion, except along the score lines. The average value of the rust creepage of all the scored panels tested shall not be more than 4 mm. However, the rust creepage on any individual panel may exceed 4.0 mm, but shall be below 5.0 mm. Chalk rating shall be 7 or higher and the colour difference shall not exceed 6 units.

After 12 cycles of exposure, the coating system on the galvanized test panel shall exhibit none of the characteristics of the paint failure as described in the Coating Failures chapter of the SSPC Good Painting Practice Manual, except for characteristics noted below. There shall not be any corrosion, except along the score lines. The average value of the rust creepage of all the scored panels tested shall not be more than 4 mm. However, the rust creepage on any individual panel may exceed 4.0 mm, but shall be below 5.0 mm. Chalk rating shall be 7 or higher and the colour difference shall not exceed 6 units.

After 12 cycles of exposure, the seal coatings on the metallized test panel shall exhibit none of the characteristics of the paint failure as described in the chapter "Causes and Prevention of Paint Failure" in SSPC Vol. 1. There shall not be any corrosion, except along the score lines where the total width of rust creepage shall not be more than 1.0 mm. Chalking shall be 7 or higher and the colour difference shall not exceed 6 units when measured as shown in Table 1.

1704.05.01.04.04 Salt Spray Resistance Testing

Salt spray resistance testing of zinc-rich touch up paint coated test panels shall be conducted according to ASTM B117 for 720 hours. There shall not be any corrosion, except along the score lines where the total width of rust creepage shall not be more than 1.00mm.

1704.05.01.05 Recoat Time

At an ambient temperature of 23 °C and a relative humidity of 80%, a paint coating shall dry or cure sufficiently to receive the next coat satisfactorily within 16 hours of application. It shall remain recoatable for a minimum of 30 Days.

1704.07 PRODUCTION

1704.07.01 Quality Control

1704.07.01.01 Physical Tests and Paint Coating Composition

The results for physical tests and paint coating composition of production batches shall be within the tolerances as shown in Table 2, when the results of testing are compared to the respective test results of the sample submitted for the coating system approval.

1704.07.01.02 Chemical Analysis

When the product from production batches of paint coatings is analyzed for chemical composition, the test results shall not vary by more than:

- a) \pm 5% from the value of the original submission, if the amount of ingredient is greater than 50% by weight of the product.
- b) \pm 10% from the value of the original submission, if the amount of the ingredient is from 5 to 50% by weight of the product.

1704.07.01.03 Infrared Analysis

The infrared spectrum of the product or any product fraction of production batches of paint coatings shall match the corresponding spectrum from the sample submitted for coating system approval.

1704.07.01.04 Gas Chromatogram of Volatiles

The gas chromatogram of production batches of paint coatings shall show the identical volatile components present in the same proportions as in the sample submitted for coating system approval.

1704.07.01.05 Colour Difference

Colour difference of production batches of paint coatings shall be within the tolerances as shown in Table 2. The reference colour for the finish coat shall be the appropriate colour specified in the Material section. For all other coats, the reference colour shall be the colour of the sample submitted for paint coating system approval.

1704.07.02 Packaging and Delivery

The paint shall be delivered in the manufacturer's originally sealed containers.

Containers shall be leak-free and constructed so that the contents can be thoroughly and completely mixed. They shall be provided with triple-tight lids. Containers 4 litres or larger shall have wire bail handles.

Each container and shipping case shall be marked to show the following information:

- a) Identification of the paint coating system.
- b) The contents of container (i.e., prime coat, second coat, third coat, or fourth coat).
- c) The colour and colour code.
- d) The manufacturer's name and address.

- e) The quantity of the contents in litres.
- f) The date of filling the container (i.e., yyyy-mm-dd).
- g) The manufacturer's code and coating batch numbers.

The markings shall be permanent and the coating batch number shall be prominently displayed.

1704.07.02.01 Certificate of Compliance

A certificate of compliance from the manufacturer indicating that the physical properties and chemical composition of the material supplied complies with the requirements of this specification shall be included with each shipment of paint.

1704.08 QUALITY ASSURANCE

1704.08.01 Test Panels

1704.08.01.01 Testing General

For the following tests, the number of panels specified below shall be made for the paint coating system being evaluated and the panels for the approved paint coating system to be used for reference purposes during paint coating operations.

1704.08.01.02 Weathering Resistance and Corrosion Resistance Testing

1704.08.01.02.01 Panel Preparation

1704.08.01.02.01.01 Abrasive Blast Cleaned Surfaces

Panels shall be cold-rolled carbon steel according to ASTM D 609, measuring 75 x 150 x 2.6 mm with rounded edges. Panels shall be blast cleaned to the requirements of SP 10/NACE NO. 2. The pictorial standards as shown in SSPC-VIS 1 shall be used to check conformance of the panel preparation in conjunction with SP 10/NACE NO. 2. The height of the surface profile shall be a minimum of 25 µm and a maximum of 75 µm.

1704.08.01.02.01.02 Marginally Prepared Surfaces

The panels shall be prepared as specified in the Abrasive Blast Cleaned Surfaces clause and then be subjected to 72 hours of salt spray according to ASTM B 117, after which, the rusted panels shall be power-tool cleaned to SSPC SP 3 condition by power wire brush. The pictorial standards as shown in SSPC-VIS 3 shall be used to check conformance of the panel preparation in conjunction with SSPC SP3.

1704.08.01.02.01.03 Paint Coating on Galvanized Surfaces

As the first step, cold-rolled carbon steel panels, measuring 75 x 150 x 5 mm with rounded edges shall be hot dip galvanized according to ASTM A123/A123M. Galvanized panel surfaces shall then be prepared according to ASTM D 6386. Thick edges due to excess zinc run-off, high spots, and rough edges shall be removed by power tools. Surface preparation shall be performed by sweep blasting to roughen the surface using an abrasive of a hardness that does not damage the galvanized coating.

1704.08.01.02.01.04 Seal Coating on Metallized Surfaces

As the first step, cold-rolled carbon steel panels measuring 75 mm x 150 mm x 2.6 mm, and shall be blast cleaned to the requirements of SP5/NACE NO. 1. The height of the surface profile shall be a minimum of 50 µm and a maximum of 75 µm. The blast cleaned panels shall then be coated on both surfaces and the edges with 85% zinc / 15% aluminum alloy by thermal metal spraying according to SSPC-CS 23.00 / AWS C2.23M/NACE No.12. The dry film thickness of the metallized coating shall be between 75 µm and 110 µm. The metallized panels shall be vacuum sealed or stored in a vacuum desiccator to prevent oxidation until the seal coat material is ready to be spray applied.

1704.08.01.02.02 Paint Coating and Seal Coating Application

The paint coating system shall be spray applied on both faces of the prepared test panels according to the manufacturer's recommendations and to the manufacturer's recommended thickness. When the painted faces are hard dry, the edges of the panels shall be covered with the same coating applied by brush. After the final coat, the panels shall be dried and cured for 7 Days prior to any further handling.

The coating on the panels intended for scoring shall be scored according to ASTM D1654.

1704.08.01.02.03 Test Method for Accelerated Weathering

Test panels shall be prepared and coated as specified in the Panel Preparation clause and the Paint Coating and Seal Coating Application clause.

Seven unscored panels shall be prepared for each cleaning requirement for each coating system. One panel from each set shall be set aside as reference for comparison purposes. The other panels from each set shall undergo exposure testing as shown in Table 1. Evaluation shall be done at 500 hour intervals of exposure to the maximum of 5,000 hours for coating systems on abrasive blast cleaned surfaces and galvanized surfaces, seal coating on metallized surfaces, and 2,500 hours for coatings on marginally prepared surfaces.

1704.08.01.02.04 Test Method for Cyclic Corrosion Resistance of Coatings

Test panels shall be prepared, coated, and scored as specified in the Panel Preparation clause and the Paint Coating and Seal Coating Application clause.

Eleven panels shall be prepared for each cleaning requirement for each coating system. One panel from each set shall be set aside as reference for comparison purposes. The other panels, 5 unscored and 5 scored from each set, shall undergo exposure testing as shown in Table 1. Evaluation shall be done after each cycle of exposure. At the completion of testing, the coating between the score lines on the bottom half of the scored panels shall be stripped and the mean rust creepage in millimetres for each panel shall be determined according to ASTM D 1654. The average rust creepage shall be calculated from the mean rust creepage values of the individual panels of the respective paint system.

1704.08.02 Coating System Approval

1704.08.02.01 General

Approval shall only be given for a complete paint coating system and for paint coating to be used as a seal coat for thermal spray metal coating.

Testing shall be performed by the Owner or by an independent laboratory chosen by the Owner.

When an independent laboratory is used, the paint manufacturer shall arrange for testing by the independent laboratory. The independent laboratory shall obtain samples of the approved paint coating and paint coating system to be used for comparison purposes from the Owner.

1704.08.02.02 Testing by Owner

When testing is carried out by the Owner for initial approval, the supplier shall be notified of the sample size, date, labelling, and other details regarding submission of samples, including cost.

1704.08.02.03 Testing for Coating System Approval and Approval of Subsequent Batches

The initial submission shall be evaluated for approval based on the requirements specified in the Materials section, using the testing methods as shown in Tables 1 and 2, and the data submitted on the completed OPSF 1704-1.

For comparison, an approved system from the Owner's list of approved coatings shall be subjected to the tests for accelerated weathering and cyclic corrosion resistance concurrently with the system under evaluation. Where possible, coatings of the same generic type shall be used for comparison.

When the testing is done by the approved independent laboratory, the Owner shall review the test results and may repeat any of the tests.

Subsequent batches of material shall be tested for acceptance as specified in the Quality Assurance section.

1704.08.02.05 Acceptance or Rejection

1704.08.02.05.01 Initial Approval

Approval shall only be given to paint coatings and paint coating systems satisfying the requirements of the Materials section.

1704.08.03 Sampling at Work Site

Samples of material for quality assurance testing shall be taken by the Owner from material delivered to the work site.

1704.08.03.01 Acceptance or Rejection on Site

Testing shall be done by the Owner according to the methods as shown in Table 2.

Acceptance shall be based on the testing requirements and allowable tolerances as shown in Table 2, when compared to the results of the testing conducted by the Owner on the initially approved material.

Failure to conform to the requirements of the Material section and the tolerances as shown in Table 2, changes made in the formulation after approval, inability to maintain production quality, and unsatisfactory field performance of paint coatings or paint coating systems shall be a cause for rejection.

TABLE 1
Performance Tests for Paint Coating Systems

Type of Test	ASTM Method	Requirements
Pull-Off Adhesion	D 4541	2.75 MPa minimum
Accelerated Weathering using Fluorescent UV - Condensation Light- and Water-Exposure Apparatus for evaluation of: Paint coating system on abrasive blast cleaned test panels Paint coating systems on hot dip galvanized test panels Seal coating on metallized test panels Paint coating system on marginally prepared test panels	D 4587 Test Condition D	Exposed to: 5,000 hours maximum 5,000 hours maximum 5,000 hours maximum 2,500 hours maximum
Cyclic Corrosion Resistance Testing by Alternating Exposures in a UV/Condensation Cabinet and a Salt Fog/Dry Cabinet for evaluation of: Paint coating system on abrasive blast cleaned test panels Paint coating systems on hot dip galvanized test panels Seal coating on metallized test panels Paint coating system on marginally prepared test panels	D 5894	Exposed to: 12 cycles maximum (Note 1) 12 cycles maximum (Note 1) 12 cycles maximum (Note 1) 6 cycles maximum (Note 1)
Evaluation of Test Panels After Accelerated Weathering Test / Cyclic Corrosion Resistance Test for: Gloss Colour Difference (ΔE) Chalking Checking Cracking Flaking Blistering Rusting Rust Creepage	D 523 E 1347 D 4214 D 660 D 661 D 772 D 714 D 610 D 1654	Test Method for Accelerated Weathering and the Test Method for Cyclic Corrosion Resistance of Coatings clauses (Note 2)
Notes: 1. One cycle represents a total exposure of 336 hours which comprises 168 hours or 1 week of exposure of test panels in the fluorescent UV condensation cabinet, followed by 168 hours of exposure of the test panels in the cyclic salt fog or dry exposure cabinet. 2. Clauses in this specification.		

TABLE 2
Test Methods for Physical Testing and Compositional Analysis of Paint Coatings
and Acceptance Criteria for Field Samples and Production Batches

	ASTM	Acceptance Criteria (Note 1)	
		Tolerance (Note 2)	Others
Physical Tests on Mixed Coating:			
Density	D 1475	5%	-
Consistency, Krieb Units (KU)	D 562	± 10 or 25% (Note 3)	-
Dry Time:			
To Touch	D1640	± 30%	-
Hard Dry	D1640	± 30%	-
Hiding Power Determination Using Pfund Black and White Cryptometer	Paint and Coating Testing Manual	± 1.5 (Note 4)	-
Skimming	-	-	-
Fineness of Grind, Hegman Units (HU)	D 1210	± 2	-
Sag Resistance	D 4400	± 20%	-
Coating Composition:			
Pigment Content by % mass	D 4451, D 2371, D 3723	± 5%	-
Vehicle Solids Content by % mass @ 24 hours	-	± 5%	-
Volatile Content by % mass @ 2 hours and 24 hours	D 2369	± 5%	-
Pigment Composition by Chemical and Instrumental Analysis	-	-	Chemical Analysis clause (Note 5)
VOC Content	D 3960	± 10% but the total not exceeding 340 g/L (Note 6)	-
Vehicle Solids Identification by Infrared Analysis	D 2621	-	Infrared Analysis clause (Note 5)
Determination of Paint Volatiles Composition by Gas Chromatography	D 3271	-	Gas Chromatogram of Volatiles clause (Note 5)
Determination of Thinner Composition by Gas Chromatography	D 3271	-	Gas Chromatogram of Volatiles clause (Note 5)
Tests on Cured Paint Coating:			
Gloss	D 523	± 30%	-
Colour Difference (ΔE)	E 1347	± 4 units	-
IR Fingerprinting	Paint and Coating Testing Manual	-	Infrared Analysis clause (Note 5)
Notes:			
<ol style="list-style-type: none"> Acceptance criteria for field samples and production batches. Allowable tolerance for field samples or production batches based on the Owner's test results for the initially approved paint coating material. Whichever is less. Pfund black and white cryptometer, wedge #3.5. Clause in this specification. VOC content of Zinc -rich touch up paint shall not exceed 500g/L. 			

PAINT COATING DATA FORM

A. MANUFACTURER INFORMATION

Name:
Address:
Telephone:
Fax:
Email:

B. SAMPLE IDENTIFICATION

Manufacturer's Code No.:	Coating Batch No.:
Colour of Coating:	Production Date:

C. TEST DATA OF MIXED COATING

	Test Method	Manufacturer's Test Results
Density, kg/L	ASTM D 1475	
VOC, g/L	ASTM D 3960	
Viscosity, KU	ASTM D 562	
Pot Life, hours @ 25 °C	Manufacturer's Procedure	
Sag Resistance, mm	ASTM D 4400	
Dry Time, hours @ 25 °C		
To touch	ASTM D1640	
Hard dry	ASTM D1640	

D. COMPOSITION OF MIXED COATING

	Test Method	% by Mass
Pigment and Fillers	ASTM D 2371, D 4451, D 3723	
Non Volatile	-	
Volatile	ASTM D 2369	

E. COMPOSITION OF PIGMENTS AND FILLERS IN EACH COMPONENT % BY MASS - List % lead to three decimal places

	Component A	%	Component B	%	Component C	%
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

F. PAINT VOLATILE COMPOSITION BY GAS CHROMATOGRAPHY - Attach chromatogram with peaks identified

	Chemical Name	%
1		
2		
3		
4		
5		

G. COMPOSITION OF THINNER BY GAS CHROMATOGRAPHY - Attach chromatogram with peaks identified

	Chemical Name	%
1		
2		
3		
4		
5		

H. VEHICLE SOLIDS IDENTIFICATION by Infrared Analysis - Attach spectrum with major peaks identified

I. MIXING RATIO OF COMPONENTS A, B, and C by weight _____

J. IR FINGERPRINT OF MIXED, CURED COATING - Attach Spectrum with major peaks identified

**Appendix 1704-A, November 2014
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS**

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

No information provided here.

Related Ontario Provincial Standard Drawings

No information provided here.