AMENDMENTS TO WSA 201:2020 VERSION 2.2

Overview

This Manual was prepared by a WSA 201 Working Group consisting of members of the WSAA Codes Technical Advisory Group, to superseded WSA 201:2017 Version 2.1.

This Manual is intended for those who are specifying and applying protective coatings and linings for Water Agency facilities and network infrastructure. It may also be applicable to similar assets where corrosion protection is integral to good asset management.

Amendments to the Manual

The Second edition of WSA 201:2020 Manual for Selection and Application of Protective Coatings Version 2.2 has been prepared to take account of the experiences of asset owners that have adopted the Manual. Advice and comments have also been provided by a small number of practitioners as well as contract and asset managers. The Second edition of the Manual now contains a new supplementary section has been added to list any participating Water Agency variations and additions to WSA 201. The supplement also allows participating Water Agency's to list approved protective coating products and recommended colour scheme for painting assets and equipment.

The major changes to this revision include:

- changes made in our members supplementary manuals. Our objective was to minimise the number of variations across Australia and New Zealand;
- changes to address feedback/comments from Users of this manual, and
- a new Supplement where Water Agencies can include reference to their own list of approved protective coating products and Standard Colour scheme.

This edition of the WSA 201 has been published in tekReader, as an E-book using a new on-line template, so they make look different from previous versions. This edition also include a printable PDF version, similar to other WSAA E-Book Codes.

eBook codes/manuals

WSAA has recently changed to an eBook format for the latest editions of our codes and manuals. eBook users benefit from increased interactivity through technical diagrams and pop-up definitions, efficient navigation, quick and easy discovery of content, editing tools such as bookmarks, notes and highlighting, and the ability to send instant feedback straight to the Association. Viewing codes, standards and manuals on any device, especially smartphones or tablets, will improve access for practitioners in the field. It also ensures users are viewing the most up to date versions.

Details of Amendments

ACKNOWLEDGMENTS

Inserted

Adam Glasson	Goulburn Valley Water
Andrew McGrath	Urban Utilities
Flora Kashefizadeh	Logan Water
Geraldine Pedersen	Water Corporation
Colin Paxman	South East Water
Mark Rippon	Taswater

ABBREVIATIONS

Amended

mS/m	millisiemens per metre

Inserted new

NACE	National Association of Corrosion Engineers International

2.5 COATING INSPECTOR

Amend item (b)

(b) National Association of Corrosion Engineers (NACE) NACE International; or

3.3 WORK HEALTH AND SAFETY (WHS) LAWS

Delete 4th paragraph and replace with the following

Information on each jurisdiction's progress in implementing the new laws can be found using the following link: https://www.safeworkaustralia.gov.au/law-and-regulation

For information on the operation of WHS laws in your jurisdiction, please contact your WHS regulator.

SafeWork NSW

Workplace Health and Safety Queensland

Worksafe Victoria

WorkSafe ACT

SafeWork SA

NT WorkSafe

Worksafe WA

WorkSafe Tasmania

3.4 NATIONAL STANDARD FOR CONSTRUCTION WORK

Delete entire section replace with the following

In those jurisdictions that have implemented the harmonisation Work Health and Safety (WHS) laws, the adopted National Standard for Construction Work [NOHSC:1016 (2005)] was superseded by the model WHS Regulations and the Model Code of Practice: Construction Work.

This model Code of Practice has been developed to provide practical guidance to principal contractors and other persons conducting a business or undertaking who carry out construction work on how to meet the health and safety requirements under the WHS Act and Regulations applying in a jurisdiction relating to construction work.

This model Code should be read in conjunction with other codes of practice on specific hazards and control measures relevant to the construction industry including:

a. How to manage and control asbestos in the workplace
b. Managing noise and preventing hearing loss at work
c. Confined spaces
d. How to safely remove asbestos
e. Preparation of safety data sheets for hazardous chemicals
f. Labelling of workplace hazardous chemicals
g. Managing risks of hazardous chemicals in the workplace
h. Abrasive blasting
i. Spray painting and powder coating
j. Welding processes
k. First aid in the workplace
l. Managing the risk of falls at workplaces
m. Hazardous manual tasks
n. Managing the risk of falls in housing construction
o. Safe design of structures
p. Managing electrical risks in the workplace
q. Demolition work
r. Excavation work
s. Work health and safety consultation, cooperation and coordination
t. Managing the work environment and facilities
u. How to manage work health and safety risks
v. Construction work

The model Code should be read in conjunction with other codes of practice on specific hazards and control measures relevant to the construction industry.

To have legal effect in a jurisdiction, the model Code of Practice must be approved as a code of practice in that jurisdiction. To determine if this model Code of Practice has been approved as a code of practice in a particular jurisdiction, check with the relevant regulator.

Source https://www.safeworkaustralia.gov.au/law-and-regulation

3.6 PRESSURE EQUIPMENT

Delete 3rd paragraph

A mechanical restraint shall be used on all hose-to-hose and all hose-to-equipment connections to prevent accidental disconnection. All blast hose connections shall be pinned with a safety clip.

5.3 EXPOSURE CLASS

TABLE 5.1 EXPOSURE CLASS DETAILS

For exposure classification extreme Reinforced concrete replace Continually subjected to non-ventilated septic sewage atmosphere to Continually subjected to insufficiently ventilated sewage atmosphere

5.4.4 Products in contact with drinking water or recycled water

Replaced 1st paragraph with the following

Any product that is intended for use in contact with drinking water and/or recycled water shall comply with the relevant requirements of AS/NZS 4020 in the form of a test report provided by a certification body or Accredited Testing Laboratory, in accordance with AS/NZS 4020.

Inserted new Note

Inserted new last paragraph

An Accredited Testing Laboratory is a testing laboratory accredited by the National Association of Testing Authorities (NATA), a laboratory accredited by an organisation that has a mutual recognition agreement with NATA, or an organisation recognised as being an Accredited Testing Laboratory under legislation at the time the test was undertaken.

For acceptance, the testing and calibration laboratories and facilities shall be accredited as meeting the requirements of AS/NZS ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories by a signatory member of the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA). The scope of laboratory/facility accreditation shall include the competencies and capabilities required to execute the particular product testing and calibration work to be undertaken.

In Australia, the appropriate signatory member of ILAC MRA is the National Association of Testing Authorities, Australia (NATA)

This requirement also applies to any stage of treatment and at any point in the transfer, storage, distribution and reticulation system of drinking water up to the point of customer connection.

5.6 RECOMMENDED COATING SYSTEMS

TABLE 5.3 RECOMMENDED COATING SYSTEMS FOR WATER RESERVOIRS

The following part of Table 5.3 amended

Replace the recommended systems for Reservoir roof framing, roof supporting structures, roof cladding undersides with: EHB-SF, EHB-SB, GAL

TABLE 5.5 RECOMMENDED COATING SYSTEMS FOR SEWAGE PIPELINES AND ASSOCIATED ITEMS

Table 5.5 internal replace the recommended coating systems for Pipes, tunnels, maintenance structures with concrete substrates (row 4) with:

Pipes, tunnels, maintenance structures	**New and old concrete**	**Immersion & buried**	**Not required[4],[5]**
	New concrete	Extreme	CPL, NOV
	Old concrete	Extreme	CAC, NOV

Add the following notes:

5. Concrete areas that are continuously immersed in sewage or buried in non-corrosive soil are not subjected to corrosion, hence they do not require additional protection.

6. Maintenance holes of gravity sewer systems that are located upstream and received fresh or chemically dosed sewage are typically not subjected to corrosive environment. Verify with the Water Agency.

5.6 RECOMMENDED COATING SYSTEMS FOR TREATMENT PLANTS AND PUMPING STATIONS

Replace the recommended coating systems for various concrete substrates (rows 5 to 8 of the first column) with:

[Internal surfaces of:] Wet-wells, inlet & discharge MH, emergency storage tanks[6]&[6]	New and old concrete	Immersion & buried	Not required [4],[5]

	New concrete	Extreme	CPL
	Old concrete	Extreme	CAC, EUH, PUE

[External surfaces of:] Tanks, vessels, bins, hoppers, thickeners, clarifiers, grit chambers, digesters, walls	Steel	Moderate	GAL, PUR-B, IZS
		High	PUR-A, EHB-A
	Concrete	Low to High	Not required

[Internal surfaces of:] Tanks, vessels containing water or treated/quiescent sewage e.g. clarifiers, primary sedimentation tanks	Steel	Immersion	EHB-SF
	Concrete	Low to immersion	Not Required[4]
[Internal surfaces of:] Tanks, vessels containing agitated sewage, e.g. grit chambers, inlet works, digesters	Steel	Extreme	EUH, VES, NOV
	New and old concrete	Low to immersion	Not required[4,5]

	New concrete	Extreme	Not required[4],[5]
	Old concrete	Extreme	CAC,NOV

Amend Note 4 and 5 and added new Note 8

4 Concrete areas that are 500 mm below the lowest sewage level (continuously immersed) are unlikely to corrode. They do not require additional protection.

5 Sewage wet wells and inlet Maintenance Holes (MH) of Sewage Pumping Stations (SPS) that are located upstream e.g. Leaf SPS, and received fresh or chemically dosed sewage are unlikely to corrode, provided that:

i. The SPS catchment is predominately residential,
ii. Flow to the SPS is gravity only,
iii. No trade waste, private pumped system of low-pressure system discharges into SPS catchment,
iv. Flow into wet well and inlet MH is controlled to minimise turbulence and release of hydrogen sulphide gas,
v. Wet well detention time is no longer than 2 hours at Average Dry Weather Flow (ADWF),
vi. Wet well and inlet MH are provided with adequate ventilation, and
vii. The structures are designed to exposure Class C in accordance with AS 3735.

6 Emergency storage tanks that do not share the same air space with the wet-wells are typically not subjected to corrosion, and hence do not require additional protection.

7 Selection of Coating describes each coating system, typical uses, characteristics and performances

8 Leaf SPSs wet wells and inlet MHs do not require coating, provided that:

i. their catchment is predominantly residential,
ii. flow to SPS is by gravity only,
iii. no trade waste, private pumped systems of low-pressure systems discharges into SPS catchment,
iv. flow in wet well and inlet MH controlled to minimise turbulence and release of H_2S,
v. wet well detention time is not too excessive (max. 2 hours at ADWF),
vi. wet well and inlet MH provided with proper natural ventilation,
vii. the above conditions not expected to change during the life of the asset,
viii. wet well and inlet MH are designed to exposure ‘Class C” in accordance with AS 3735.

5.7 RECOMMENDED SYSTEMS FOR CHEMICAL BUNDS AND EQUIPMENT HAVING OCCASIONAL CHEMICAL CONTACTS

Replace the recommended systems for Sodium hypochlorite for Reinforced concrete bunds with:

EPM, PUE, PUR-B

Replace the recommended systems for Aluminium sulphate, Ferric chloride, Ferrous chloride (pickle liquor), Ferric sulphate and Sodium bisulphite for Reinforced concrete bunds with:

SLX, EPM, PUE

Replace the recommended systems for Sodium hypochlorite for Reinforced concrete bunds with:

EPM, PUE, PUR-B

6.2.5.4. Contaminated concrete

Replaced 1st paragraph with the following added new 2nd paragraph.

Concrete surfaces that have been attacked in depth by acids, alkali solutions, oils or other deteriorating substances are to be stripped down to the sound substrate. Sound substrate typically has pH level of 9 or greater. A pH indicator solution may be used to indicate sound concrete. Take appropriate measures to neutralise any residues to prevent any subsequent deterioration of the concrete or coating.

If required, lost concrete to be replaced with fresh concrete.

6.2.5.5 Concrete surface profile

Replace the first sentence of second paragraph with:

Unless otherwise specified by the coating Manufacturer and approved by the Water Agency, concrete surface profile shall be CSP3 or coarser. This requirement overrides concrete surface profile requirements in 8 COATING SYSTEM SPECIFICATIONS. Verify using the ICRI replica profiles.

6.2.5.6 Concrete repairs

Amend first paragraph as follows:

Any corroded concrete, oil, grease, chemical contaminants and existing coatings shall be removed using mechanical means or high pressure water cleaning i.e. greater than 34.47 MPa (5,000 psi). Any drummy or delaminated concrete sections shall be broken out and removed so that only sound substrate remains.

6.2.6.2 Surface preparation of existing coating

Amend 2nd paragraph

Surface preparation of an existing sound coating for overcoating when using Low-Pressure Water Cleaning (LP WC -NACE No. 5/SSPC-SP 12) is to be performed at pressures of 20 MPa (3,000 psi) to 34.47 MPa (5,000 psi).

6.3.3 Abrasive blast cleaning

Delete the followimg 3rd and 4th paragraph as follows:

Copper slag and other mineral slag abrasives that may contain various forms of heavy metals shall not be used. Slag abrasives that are demonstrated to be free from heavy metals (less than 100 ppm lead) may be used as an abrasive for initial blasting of heavy coating films. However, the final blast cleaning shall be performed using new garnet or steel grit abrasive.

If abrasive is to be recycled, remove all inspirable dust, contaminants, surface preparation debris and toxic contaminants prior to their reuse. Water Agency's approval shall be sought before reusing any abrasive.

8.3 CAC (CALCIUM ALUMINATE CEMENT)

Amend as follows and add new Note 7.

Item	Description	Nominal DFT	Minimum DFT	Maximum DFT
Spray Coat	Calcium aluminate cement mortar with aluminate clinker [C12]	N/A	See Note 7	75 mm
Total DFT	per coat	N/A	See Note 7	755

NOTES

7 The minimum thickness of the CAC coating application for a service life of 50 years, over and above any surface restoration or filling surface irregularities, shall be calculated using the following formula.

$T = 0.3835 [H_2S] + 32$

where;

T = CAC coating thickness (mm) [rounded to the nearest 5mm]

$[H_2S]$ = average concentration of gaseous H_2S in the sewer atmosphere (ppm)

Sydney Water shall advise the methodology to determine the average concentration of gaseous H_2S the sewer atmosphere where the works are to be undertaken.

8.13 EUH (EPOXY ULTRA HIGH BUILD)

Replace the Primer for concrete substrate with: Concrete epoxy primer [P4] (200 µm nominal)

8.14 EWB (EPOXY WATER BASED)

Replace the Primer note for concrete, other metals, timber plastics, previous coatings substrates with the following:

Consult supplier

8.20 NOV (NOVOLAC EPOXY)

Replace the primer note for concrete substrate with the following: Epoxy mortar [P7] (20 mm nominal)

Delete the requirements for First coat and Intermediate coat for Concrete Substrate

8.30 VES (VINYL ESTER)

Replace the coating thickness requirements (rows 5 to 8 of the table) with the following:

Item	Nominal DFT	Minimum DFT	Maximum DFT
Primer			
Intermediate Coat	500µm	375 µm	750 µm
Topcoat	500 µm	375 µm	750 µm
Total DFT	1000 µm	750 µm	1500 µm

9 PRODUCT SPECIFICATIONS

The relevant Product Specifications for T9 and T10 have be amended as follows

Code	Description	Relevant Product Specifications
T9	Petrolatum / bitumen / visco-elastic tape wrap	WSA PS 335 or Polymeric tapes shall comply with AS 4822 Type 1B and Petrolatum tapes shall comply with AS 4822 Type 1A
T10	Heat shrinkable sleeve polyolefin coatings	WSA PS 336 or AS 4822 Type 2A-1

10.3.12 Adhesion of new coating (bond test)

Replace the first sentence with the following:

At the completion of the coating for any given area, the level of adhesion of the coating to the substrate shall be determined as described in Section 6.2..6.1

11 EXAMPLE OF INSPECTION AND TEST PLAN

The following tables have been updated

TABLE 11.1 EXAMPLE OF INSPECTION AND TEST PLAN FOR STEEL RESERVOIR LINING WITH EHB-SF

TABLE 11.2 EXAMPLE OF INSPECTION AND TEST PLAN FOR A SEWAGE PUMPING STATION WET-WELL LINING WITH EUH

12 DOCUMENT HISTORY

New document history table added

No	Date	Description
1	September 2013	Version 1.1
2	July 2017	Version 2.1
3	November 2020	Version 3.1

13 SUPPLEMENTS

Provision of Water Agency Supplements added

13.1 SYDNEY WATER

13.2 AMENDMENTS

TABLE 13.1 List of amendments to WSA 201 (2020-2.2 edition)

13.1.2 APPROVED PROTECTIVE COATING PRODUCTS

TABLE 13.2 List of Approved Protective Coating Products

13.1.3 STANDARD COLOURS

TABLE 13.3 Recommended colours for asset and equipment

TABLE 13.4 Colour scheme for pipes, conduit and ducts in treatment facilities

TABLE 13.5 Common chemicals and contents and their designated pipework colours