MASTER® BUILDERS SOLUTIONS

Application Guide

Chemical Resistant Novalac Coating

MasterShield CHR 360

Contents

GENERAL

This application guide applies to the MB Solutions Australia Ltd Novalac protective system, known as MasterShield CHR. This application guide shall be read in conjunction with all project specifications (including drawings), by others, and the current material technical data sheets (TDS) and safety data sheets (SDS).
The system complies with the Water Services Association of Australia (WSAA) WSA 201 guideline, "Manual for Selection and Application of Protective Coatings".
Classified as a Coating System Type "NOV" in Table 5.2, it is suitable for both steel and concrete substrates in aggressive chemical and mechanical environments, as specified in Tables 5.6 and 8.20.

Products Info

Renamed Brand	Formerly as	
MasterStrength 2525	MasterEmaco 2525	A low-viscosity, solvent free, high-strength epoxy system. It can be extended on-site with suitable aggregates to achieve different application characteristics. This solvent-free system offers rapid hardening, excellent adhesion to both dry and wet surfaces, and is AS 4020:2018 approved.
MasterShield CHR 360	BluRez 333AR	High Build Acid Resistant Coating is an exceptional two-pack solventless, Novalac based coating system suitable for a variety of applications including acid-proofing of floors, walls, containment structures, water and wastewater asset protection. MasterShield CHR 360 provides high level chemical and mechanical protection for concrete, steel, and other prepared surfaces and is AS4020:2018 approved.

System Configuration

- The overall system comprises MasterStrength 2525 epoxy primer, MasterStrength 2525 epoxy render, and three coats of MasterShield CHR 360 Novalac protective coating as first coat, Intermediate coat and topcoat.
- This system configuration is in accordance to tables 5.6 and 8.20 of WSA 201 :2020.
- All products are solvent free so: Wet Film Thickness (WFT) = Dry Film Thickness (DFT)

Product	Nominal DFT	Minimum DFT	Maximum DFT
Primer: MasterStrength 2525	250µm	200µm	300µm
Epoxy Render: MasterStrength 2525 + MasterCoat FIL	2.5 mm	2 mm	5 mm
Novalac Protective coating: MasterStrength CHR 360 (3 coats)	3x 200 µm	3x 150 µm	3x 300 µm

Application Requirements

Trial Application

- In accordance with WSA 201:2020, Item 2.7, a trial application is recommended to validate the effectiveness of this application guide.
- The trial location and extent shall be determined in collaboration with the asset owner and shall encompass:
    - The proposed methods of surface preparation
    - Surface restoration render (if required)
    - Coating application
    - Acceptance testing
- If the trial identifies the need for adjustments to the proposed products, equipment, or work methods, these modifications shall be submitted for approval.
- The contractor is responsible for preparing and submitting a trial report for review and approval before commencing full-scale work.

Quality Assurance

- The application contractor must have a proven track record in concrete remediation and protection and shall employ qualified personnel trained by a representative of the manufacturer. If required, certification shall be provided by Master Builders Solutions.
- Concrete relining and coating systems shall be installed in strict accordance with this Guideline Specification, the relevant Technical Data Sheets (TDS), Safety Data Sheets (SDS), and any applicable project specifications and drawings.

Product Transportation and Storage

- All products and components delivered to the site shall remain in their original, unopened containers, clearly labeled with the following information:
    - Manufacturer's name
    - Product name and code
    - Component code and batch number

    - Color and mix ratio information
    - Expiry or manufacture date (where applicable)
- Products shall be stored under cover in a controlled environment to protect them from extreme temperatures, moisture, and other conditions that may cause deterioration. Solvent drums must remain sealed when not in use to prevent contamination of water and other materials and shall not be taken into confined space environments.

Quality Control Records

- Quality Control records shall be maintained to ensure traceability of materials and workmanship. These records shall include:
    - Inspection reports documenting daily surface and ambient conditions (AS 3894.10).
    - Equipment reports verifying the condition and functionality of equipment used (AS 3894.11).
    - Coating inspection reports detailing application and compliance (AS 3894.12).

Inspection and Testing

- All inspection and testing shall be recorded to maintain traceability of procedures and results.
- The following records are required:
    - Visual inspection for defects such as bubbles, inclusions, sags, runs, or other imperfections.
    - Adhesion testing of both the substrate and applied coating (AS 3894.9).
    - Surface profile assessment (ICRI – CSP).
    - Monitoring of temperature and relative humidity during application.
    - Concrete moisture content testing (ASTM D4263−83).
    - Render and coating wet film thickness measurements (AS 3894.3).
    - Render and coating dry film thickness measurements (ASTM D6132).

Work Planning

- Gather all necessary tools and equipment in advance.
- Confirm power supply locations and set up batching and mixing areas to optimise workflow.
- Protect all work areas from contamination.
- Ensure all surfaces are dry immediately before each application stage.

Mixing Equipment

- Mixing equipment must be adequate for appropriate batch mixing of low to medium viscosity liquid systems to be blended with selected aggregates.
- Additional considerations include portability, the use or incorporation of stands and slow start control.
- Impellers should be designed and used to minimize air entrapment.
- Acceptable equipment includes the Festool MX 1600 2-Gear Stirrer (1500W) with a 160x600 Stirring Rod or equivalent equipment with similar functionality.

Safety

- Review and comply with all applicable Safety Data Sheets (SDS) before commencing mixing and application procedures.
- Avoid skin contact and inhalation of vapors.
- Use appropriate Personal Protective Equipment (PPE), including Gloves, Eye protection (goggles), Long sleeves, Coveralls
- PPE requirements shall align with the current Master Builders Solutions Safety Data Sheets.

Climatic Considerations

Temperature

- All relining and coating materials shall be pre-conditioned between 21°C and 25°C for a minimum of 8 hours prior to installation.
- Primer and coating application should be performed when:
  - Ambient temperature is between 17.5°C and 30°C
  - Concrete surface temperature is between 15°C and 27.5°C
- If temperatures fall outside these ranges, consult Master Builders Solutions.
- During application, the concrete surface temperature must be at least 3°C above the prevailing dew point to prevent condensation.
- Additionally, primer and coating applications should be carried out under conditions of declining temperature within the concrete structure.

Relative Humidity

- Atmospheric relative humidity should be between 0% and 80%. If exceeding 80%, consult Master Builders Solutions.
- Concrete moisture content shall be determined using ASTM D4263-83 – Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method. This method qualitatively indicates the presence of capillary moisture but does not provide precise measurements.
- If excessive capillary moisture is detected, refer to the manufacturer for guidance.

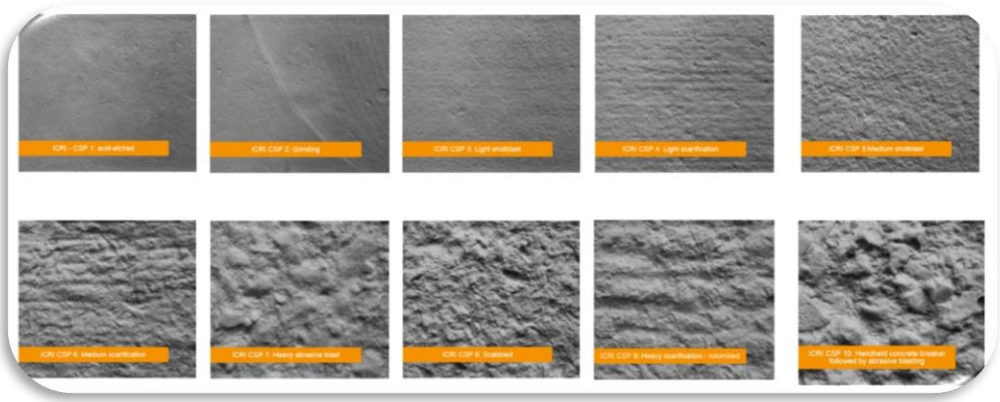
APPLICATION- SUBSTRATE

Surface Preparation

Concrete Substrate

- The existing concrete substrate shall be tested to meet the following requirements. Any results below these thresholds shall be reviewed with the asset owner and Master Builders Solutions.
    - Chemically sound, alkaline, and stable concrete
    - Minimum compressive strength: 25 MPa
    - Minimum adhesion/tensile pull-off strength: 1.5 MPa, tested per AS 3894.9 Method C (pull-off test) using 50 mm diameter test dollies

- All cement laitance, any pre-existing coatings, loosely adhering concrete must be removed prior to application. The surface layer of the concrete shall be removed to expose small particles of sound aggregate such that the minimum roughness or surface profile to be achieved is CSP 3.



- The optimum mean surface roughness or profile is 0.5 – 1.0 mm and must expose soundly bonded aggregate with a surface presenting like 60-grit sandpaper to achieve a sound, uniform substrate suitable for protective coatings or lining systems.
- The surface shall not be roughened excessively, or in a manner that will create unnecessary damage to the substrate concrete. Ideal surface preparation methods are grit blasting, shot peening or grinding.
- Expose firmly bonded aggregate within the parent concrete.
- Chase out any cracked concrete areas.
- Present a dry surface for coating application.
- The choice of technique will be determined by the size and depth of the patch. Suitable techniques include:
    - High-pressure water cleaning
    - Ultra-high-pressure water jetting
    - Abrasive blasting

- If existing coatings remain, they shall be: Visually inspected for damage. Tested for adhesion using AS 3894.9 Method C (pull-off test) with 50 mm diameter test dollies. A minimum pull-off strength of 1.5 MPa is required.
- Removed in areas where damage is evident or where tests indicate poor adhesion. These areas shall be stripped back to a sound substrate and prepared for the new lining or coating system.

Steel- Surface Preparation

- The steel substrate shall be mechanically prepared using industry-accepted, safe methods, such as abrasive blasting.
- Any rust shall be removed to AS 1627.4 Class SA 2.5 standard.
- The surface profile shall be 50 to 75 μm, with a sharp and angular texture to ensure proper adhesion.
- Prepared steel surfaces must be contaminant-free and remain clean throughout the application stages, with all dust and loose material thoroughly removed.

Protection

- All prepared surfaces must be adequately protected from contamination and damage.
- Any unprotected areas that become contaminated must be reprofiled to restore an uncontaminated state.
- If uncertainty exists regarding contamination, adhesion pull-off testing shall be conducted as per the specified test methods.

Termination Edge Detail

- The termination point of the coating at leading edges shall include a saw-cut detail to ensure proper adhesion and prevent delamination due to physical or thermal movement.
- The recommended minimum saw-cut dimension is 5 mm x 5 mm.

APPLICATION- PRODUCTS

Priming

- Only batch and mix sufficient MasterStrength 2525 that can be applied within 20 minutes of mixing at 25°C.
- Mix until uniform for 3 – 5 minutes. Take care to avoid air entrapment into the mix Apply a primer coat of MasterStrength 2525 by roller at the nominal dry film thickness (DFT) in "System Configuration" section of this document.
- The applicator should adopt an application process that eliminates the formation of air bubbles prior to curing of the primer.
- During the primer application process, the substrate surface temperature shall be in excess of 3°C greater than the prevailing dew point temperature.
- Test applied primer thickness by ASTM D4414 - 95(2013) - Standard Practice for Measurement of Wet Film Thickness by Notch Gauges. Initially, test every 10 minutes of application time to confirm the process. Determine and report the mean and range of the readings every 30 minutes of application time or more, if out of compliance. In this case, take a reading every 10 minutes until in compliance.

Epoxy Render

- Following surface preparation and priming, the concrete may show imperfections including depressions, semi - hollow areas, bug holes, voids, honeycombs, delamination and broken joint edges. The aim of the reinstatement process after surface preparation is to:
    - Eliminate pathways for water and contamination ingress into the structure
    - Limit the quantity of protective coating required by reducing the effective surface area of the structure to be protected
- If the substrate exhibits surface irregularities (e.g., bugholes) or requires repair following surface preparation or client requirements, apply an epoxy render layer or perform epoxy render repairs.
- The render shall consist of MasterStrength 2525 mixed with MasterCoat FIL aggregates to the desired consistency.
- The following step should follow-on prior to the primer hardening (4 hours at 25°C ambient temperature).
    - As the applicator will be creating the placement qualities required for the various areas of the structure, they will select and nominate the grade of filler to be used to prepare the epoxy render.
    - Details of the applicator selected grades of filler are to be approved by the manufacturer with supplier certification provided prior to the commencement of works.

    - The applicator will also nominate and document the epoxy binder / filler volumetric mix ratios that are proposed for application to the walls, columns, floor and for surface reinstatement where required. The epoxy binder / filler volumetric mix ratio should never exceed 1:4 parts by volume.
    - The applied render is to be protected and allowed to harden for a period of 24 hours at 25°C.
    - Enable an accurate assessment of the protective coating dry film thickness achieved across the surfaces of the structure
- Apply a saturating sealer coat of MasterStrength 2525 over the newly applied render if required.
- The necessity of this coat depends on the porosity of the render layer, which is influenced by the selected quartz aggregate and mix ratio.
- the sealing application process, the surface temperature shall be in excess of 3°C or greater than the prevailing dew point temperature.
- The finished epoxy render may be sealed with freshly mixed MasterStrength 2525 at a variable rate determined by the applicator to saturate the applied epoxy render.
- Protect the applied epoxy render sealer and allow to harden for 24 hours at 25°C.

High Build Novalac Protective Coating

- The system selected will be three coats of MasterShield CHR 360 applied at the nominal dry film thickness (DFT) in "System Configuration" section of this document.
- Observing the re-coat window of 8 – 16 hours at 25°C ambient temperature between each MasterShield CHR 360 application.
- The use of smaller mixes and pre-conditioning is to be considered should ambient temperatures exceed 30°C.
- MasterShield CHR 360 is available in two factory colours, N35 Light Grey and N44 Bridge Grey.
- It is recommended that contrasting colours be chosen for successive coats to assist visual recognition.
- Select a slow speed (400 rpm) mechanical mixer and ensure thorough mixing. Mix until uniform for 3 – 5 minutes.
- Mix ratios are: One volume Part B to three volumes of Part A .
- Only batch and mix sufficient MasterShield CHR 360 that can be applied within 20 minutes at 25°C.
- Assuming no soakage (epoxy render is sealed to saturation), DFT will equal applied WFT.
- Apply the first coat of MasterShield CHR 360 within 24 hours of the application of the MasterStrength 2525 primer / render / render sealer.
- Take care to avoid air entrapment into the mix and apply to provide a nominal dry film coating thickness of 200μm.
- Test WFT by way of ASTM D4414 - 95(2013) Standard Practice for Measurement of Wet Film Thickness by Notch Gauges. Initially, test every 10 minutes of application time to confirm the process.

- Determine and report the mean and the range of the readings every 30 minutes of application time or more, if out of compliance. In this case take a reading every 10 minutes until in compliance.
- Recoat within 8 - 16 hour time frame at 25°C ambient temperature.
- Allow the completed system to cure fully over a period of 7 days prior to commissioning.

General Recoat Considerations

Regarding re-coating, the exposure to sunlight works against and reduces extended recoat windows, our recommendations are as follows:

MasterStrength 2525 over MasterStrength 2525

- Minimum: Re-application of MasterStrength 2525 may be done wet-on-wet (whilst the material is still tacky to touch) or if unsure, wait 12 hours at 25°C.
- Maximum: The latest time that re-application of MasterStrength 2525 can be achieved before the first coat has become contaminated or weathered (if outside), is 24 hours at 25°C.
- Other time frames may be considered based on discussions with Master Builders Solutions.

MasterShield CHR 360 over MasterStrength 2525

- Minimum: The earliest time that re-application of MasterShield CHR 360 can be achieved is when the MasterStrength 2525 is tack free, without physically interfering with the first coat. If unsure, wait 12 hours at 25°C.
- Maximum: The latest time that re-application of MasterShield CHR 360 can be achieved before the first coat has become contaminated or weathered (if outside), is 24 hours at 25°C.

MasterShield CHR 360 over MasterShield CHR 360

- Minimum: The earliest time that re-application of MasterShield CHR 360 can be achieved is when the MasterShield CHR 360 is tack free, without physically interfering with the first coat. If unsure, wait 8 hours at 25°C.
- Maximum: The latest time that re-application of MasterShield CHR 360 can be achieved before the first coat has become contaminated or weathered (if outside), is 16 hours at 25°C.

Final Inspection

Prior to commissioning, the finished render and coating is to be visually inspected and defects (pin holes, blisters, bubbles, runs etc) logged for repair.

Repair of Defects

Coating Repair

- Where the existing coating is predominantly sound, it may be possible to patch repair any exposed substrate & feathered areas with the coating system specified without overcoating remaining areas.
- Wash the area, 100 mm beyond, with clean water and allow to dry.
- Mechanically prepare to achieve a minimum surface profile of ICRI CSP2. Remove dust and contamination.
- Then topcoat with MasterShield CHR 360 in accordance with the guidelines provided for the general application.

Coating and Render Repair

- If the final coating and the epoxy render has been damaged from physical impact or other mechanical action, repair using the following procedure:
- Clean the area, and 150 mm beyond, with clean water and allow to dry.
- Diamond grind to achieve a minimum surface profile of ICRI CSP2. Remove dust and contamination.
- Prime with MasterStrength 2525.
- Fill the depression with a mix of MasterStrength 2525 and filler.
- Seal the area with MasterStrength 2525 if required.
- Then topcoat with MasterShield CHR 360 in accordance with the guidelines provided for the general application.

Adhesion Testing Repair

- Areas that have been subjected to adhesion pull-off tests, should be reprofiled, re-primed with MasterStrength 2525, filled with MasterStrength 2525 epoxy render, sealed and then top coated with MasterShield CHR 360in accordance with the guidelines provided for the general application.

Pinhole Remediation

- If pinholes or bubbles appear on the surface of the applied protective coating, the following procedure is to be adopted for the repair process:
- Mix MasterStrength 2525 with fumed silica /quartz to make a suitable paste if required for rheology control.
- Place mixed material into the pinhole with spatula
- Allow applied material to tack off
- Overcoat with MasterShield CHR 360 in accordance with the guidelines provided for the general application.

General Hardening Phase

- Protect the finished coated areas from rain, dust, contamination, and operational exposure for a period of 24 hours.
- If the rendered and coated surfaces will be exposed to other construction trades following completion of application, cover with plastic (polyethylene) sheeting and fiberboard during all other construction works until commissioning.
- Allow 7 days full cure of the applied systems prior to commissioning.

Maintenance

- Regular inspections are recommended a full inspection on the anniversary of completion of the coating works is required to identify damage from operational abuse can be repaired promptly.
- Contamination can permeate the subsurface of the applied coating and render via open gouges or other un-repaired damages, causing deterioration and undermining of the surfacing system.
- Mechanical qualities can also be re- evaluated at regular inspection intervals.

OVERVIEW

Chemical Resistant System for WWW Plants

- The overall system comprises of MasterStrength 2525 epoxy primer, MasterStrength 2525 epoxy render, and three coats of MasterShield CHR 360 Novalac protective coating.
- The system complies with the Water Services Association of Australia (WSAA) WSA 201 guideline, "Manual for Selection and Application of Protective Coatings", Classified as a Coating System Type "NOV" in Table 5.2.
- This system is suitable for both steel and concrete substrates in aggressive chemical and mechanical environments, as specified in Tables 5.6 and 8.20.
- This system is suitable for a variety of applications including acid-proofing of floors, walls, containment structures, water and wastewater asset protection.
- MasterShield CHR 360 provides high level chemical and mechanical protection for concrete, steel, and other prepared surfaces and is AS4020:2018 approved.

Other products application guide

- **MasterCrete: "Cementitious Concrete Repair"** Application Guide
- **MasterFlux: "Cementitious Grouts"** Application Guide
- **MasterFlux ER**: "**Epoxy grouts**" Application Guide
- **MasterStrength**: "**Epoxy Crack Repair Systems**" Application Guide
- **MasterFill PR: "Polyurethane injection resin**" Application Guide
- **LAM/FIB/BAR/ANC: "CFRP structural strengthening"** Application Guide
- **MasterJoint CHR**: "**Joint sealants**" Application Guide
- **MasterJoint 910: "Hydro-swelling waterbars for construction joints"** Application Guide
- **MasterJoint 930: "FPO tape for joint waterproofing"** Application Guide
- **MasterShield AKS**: "**Chemical resistant HDPE liner**" Application Guide
- **MasterShield AC**: "**Anti-carbonation coatings**" Application Guide
- **MasterShield CI**: "**Impregnants and corrosion inhibitors**" Application Guide
- **MasterShield CP**: "**Galvanic cathodic protection systems**" Application Guide
- **MasterGeo**: "**Geotechnical Soil nails and anchors**" Application Guide

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