

# RENEWWRAP® INSTALLATION MANUAL



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## Introduction

The RenewWrap™ Strand Sheet® FRP Strengthening system may be used to strengthen both concrete and steel structures. Strand Sheet® products are based on technology developed by Nippon Steel & Sumikin Materials Company, Ltd. (NCK). Literature and product labels may include NCK production designations.

RenewWrap™ Product Name	Alternate NCK Product Name	Description
Strand Sheet CF600/HM	Strand Sheet HM600	600 gsm ultra-high modulus strand sheet
Strand Sheet CF900/HM	Strand Sheet HM900	900 gsm ultra-high modulus strand sheet
Primer/Steel (FP-WE7)	FP-WE7	Epoxy primer
Filler Putty (FE-Z)	FE-Z	Epoxy filler/putty
Strand Sheet Adhesive (FB-E7S)	FB-E7S	Epoxy adhesive

## Pre-Installation

- Assemble all tools, equipment, required documents and copy of specifications and project drawings.
- Clear work area providing adequate work space and protect all surfaces not receiving repairs with plastic sheeting.
- Fabric for small installations not requiring use of saturator may be pre-cut and stored flat or on a roll of no less than 4 inch radius (100mm)
- SDS, safety and emergency instructions to be posted at all times.
- Protective clothing and equipment to be worn for duration of job.
- Refer to technical data sheets for environmental conditions.

## Safety

- Wear proper protective gear in various stages of work when handling the Strand Sheets.
- At the work site, wear a helmet, safety shoes, and gloves. At an elevated place, also wear a safety belt.
- During surface preparation, wear a helmet and goggles to prevent injury due to chips scattering from the sander. Also wear a mask to prevent dust inhalation.
- The epoxy resin used in the work could cause eruption on the skin. Avoid exposing the skin to them and protect the eyes with goggles as far as possible.

- When using a material which contains solvent, ventilate the place thoroughly and wear a mask to prevent inhalation of solvent vapor. Use of fire is strictly prohibited.
- If the epoxy resin contacts with eyes, wash them in clean water immediately and consult an eye doctor without delay.

## Application Procedure for Steel Substrates

### Surface Preparation

- (1) Mark the areas and limits to strengthened.
- (2) Use a disk sander to remove and grind the damaged part of the steel (Corroded layer, surface lubricant, paint, etc.).
- (3) Remove grinded dust by acetone with waste cloth.



Using a disk grinder to prepare the surface of the steel



Cleaning surface with acetone

### Application of Primer

- (1) RenewWrap™ Primer/Steel (FP-WE7) is used to prime the surface of steel substrate prior to applying the strand sheets.
- (2) Calculate the approximate mixed resin required to prime the steel surface areas. Assume a coverage rate on steel surfaces of about 0.20 kg/m<sup>2</sup> or 250 SF/gallon. Mix only the amount of resin that you can apply within the resin working time.

- (3) Weigh out the RenewWrap™ Primer/Steel (FP-WE7) resin and hardener in prescribed proportion (2:1 by weight) in a container and mix them by an electric mixer for about 2 minutes until they mix uniformly. Do not dilute resin with solvent
- (4) Use a medium nap paint roller to spread the primer evenly. The recommended coverage rate of primer resin is 0.20 kg/m<sup>2</sup> or 250 SF/gallon.



Applying primer using roller

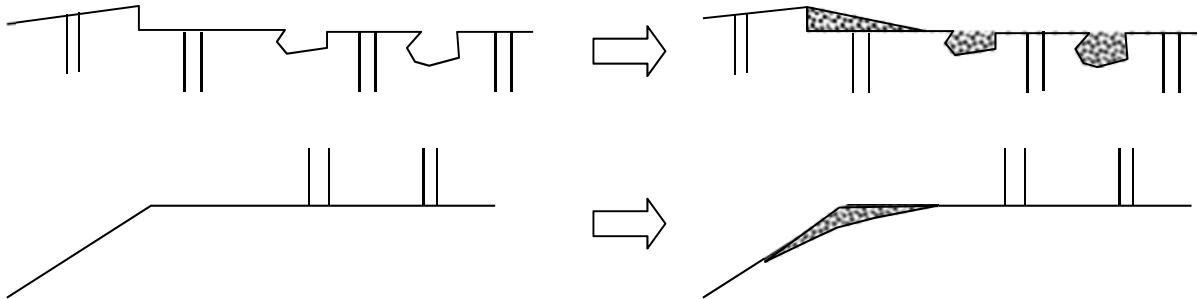


Primed surface curing before application of Strand Sheets

### Correction of Irregular Surface or Construction of Fillets

- (1) RenewWrap™ Filler Putty (FE-Z) is used to smooth surfaces of steel substrates and to fill pits and small voids prior to applying the RenewWrap™ Strand Sheet reinforcement. RenewWrap™ Filler Putty (FE-Z) is also used to construct fillets prior to wrapping RenewWrap CF300/HM Ultra-high modulus reinforcing fabrics.
- (2) Calculate the approximate mixed resin required to smooth the surface or construct fillets. Mix only the amount of resin that you can apply within the resin working time.
- (3) Weigh out the RenewWrap™ Filler Putty (FE-Z) resin and hardener in prescribed proportion (2:1 by weight) in a container and mix them by an electric mixer for about 2 minutes until they mix uniformly. Do not dilute resin with solvent.

- (4) Use a trowel or putty knife to fill in concave parts, blowholes and honeycombs with filler putty.



- (5) Where a fillet is required at a web/flange interface, apply filler putty into inside corners (web/flange interface) and use a circular tool to create a 2" (50 mm) radius fillet.



Creating a fillet with the filler putty



Completed fillet ready for fabric reinforcement



## Application of Strand Sheets

- (1) Allow primer and any filler putty material to tack up prior to applying strand sheets. Typically, strand sheets can be applied 8-12 hours after applying the primer and filler putty.
- (2) Cut Strand Sheet to prescribed sizes using a disk grinder or a tin snips. Strand sheets may be slit to narrower widths using a utility knife.



Cutting Strand Sheets with grinder



Cut strand sheets stacked ready for installation

- (3) RenewWrap™ Strand Sheet Adhesive (FB-E7S) is used to bond RenewWrap™ Strand Sheet reinforcement to steel or concrete substrates.
- (4) Calculate the approximate mixed resin required for the quantity of strand sheets to be applied. Mix only the amount of resin that you can apply within the resin working time. Do not use a batch of which pot life has been expired.



- (5) Weigh out the RenewWrap™ Strand Sheet Adhesive (FB-E7S) resin and hardener in prescribed proportion (4:1 by weight) in a container and mix them by an electric mixer for about 2 minutes until they mix uniformly. Do not dilute resin with solvent.



Mixing RenewWrap Strand Sheet Adhesive (FB-E7S)



Applying Adhesive to primed steel surface

- (6) Apply the strand sheet adhesive the surface using a trowel or putty knife to achieve an approximate coverage rate of 2.5 kg/m<sup>2</sup> to 3.0 kg/m<sup>2</sup> (19-23 SF/gallon).
- (7) If there are large concave areas, strand sheet adhesive may be used to fill in those areas before application of the strand sheets.

- (8) Place Strand Sheet onto adhesive coating the steel surface. Push the Strand Sheet into the adhesive using a plastic fin roller until coated adhesive soaks through the gaps between CFRP strands.



Placing Strand Sheet onto surface



Facilitating impregnation with fin roller

- (9) Smooth resin impregnated strand sheets with a trowel or a putty knife. Apply and spread additional resin on Strand Sheet surface at resin “dry spots”.
- (10) When more than 2 plies are required, steps (6) through (9) are repeated. In this case, it is possible to apply an additional Strand Sheet over previously applied layer before the adhesive has cured.
- (11) Overlap length for strand sheets is 4” (100 mm) for steel structures and 8” (200 mm) for concrete structures.



## Curing and Finishing

- (1) In the case of outdoor, cover the surface of area where FRP is attached with plastic sheet in order to prevent rainwater or dust from sticking at least 24 hrs. The plastic sheet should not be touched to FRP surface.
- (2) Before mechanical testing, the specimen is required curing period of one week.
- (3) If coating, you may broadcast a fine sand onto the wet epoxy of the final layer to help promote good adhesion with the applied coating.

## Appendix: Equipment List

1. Scale to measure the resin components
2. SDS and all required safety and technical documents
3. Surface preparation tools
4. Plastic sheeting
5. Work tables
6. Mixing pots and buckets
7. Brushes, rollers and roller trays
8. Trowels, plastic and metal
9. Scissors & utility knives
10. Solvent and cleaning cloths
11. Garbage containers and bags
12. Disposable gloves (latex and rubber)
13. Disposable outer suits
14. Safety glasses
15. Safety equipment as per installer's policy
16. Disposable and NIOSH respirators
17. First aid kit
18. Non-toxic hand cleaner (citrus based)
19. Marking pens
20. Note pads & production forms
21. Grinders and grinding discs
22. Electric drills
23. Mixing sticks and mixing fixture for drill
24. Power source or portable generator
25. All needed electrical cords
26. Hand tools
27. Temperature and humidity meter
28. Tape measures
29. Ladders and scaffolding as needed