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**SEA-WEED WALL AND ROOF CLADDING PANELS 0323**

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**1. GENERAL**

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**1.1. AIMS****Responsibilities**

Requirement: Provide Sea-Weed wall and roof cladding panel construction that continues to perform satisfactorily for a design life of 50+ years.

Selections: Conform to the Selections.

**1.2. CROSS REFERENCES****General**

Requirement: Conform to the *General requirements* work-section.

**Associated Work-sections**

0342 Light Steel Framing

0421 Roofing combined

**1.3. INTERPRETATION****Definitions**

Application: For the purposes of this work section the definitions given below apply:

- Sea-Weed: fragments of terrestrial plants that wash ashore including seaweeds, algae and seagrasses.
- Seagrass: Flowering plants that can live underwater commonly with long grass like leaves.
- Wrack: Wrack refers to the accumulated piles of seaweed, seagrass, and terrestrial plants that is washed ashore naturally from seasonal weather conditions and species behaviour.
- Seagrass panel: compressed rectangular mass of dried wracked seagrass; *Posidonia australis* bound with copper mesh and bio-resin panel
- Bio-resin panel: a panel composite of predominately seagrass strands pressed and formed with a Bio-Epoxy resin
- Mock up: sample of panel assembly including sea-weed, bio-resin panel, copper fixings, structural support and seals.

**1.4. SCOPE OF WORKS**

Supply and instruction of seaweed wall and roof cladding panels as described on architectural drawings:

CD00 REV B. SITE PLAN

CD01 REV B. PLANS AND ELEVATIONS

CD02 REV B. SECTIONS

CD03 REV B. DETAILS

41 No. Wall panels as scheduled

28 No. Roof panels as scheduled

Requirements: Completion of inspection, samples and test panel prior to execution of application of panels in accordance with architectural drawing set.

**1.5. INSPECTION****Notice**

Inspection: Give notice so that inspection may be made of the following to ensure that workmanship meets expectations:

- Sea-weed material condition prior to preparation for panel construction
- Sea-weed compressed test panel
- Bio resin panel fabrication

- Completed and finished bio resin panel
- Completed panel assembly (mock-up)
- Mock up panel site instruction including copper trims, structural support, fixings and seals

**1.6. SAMPLES AND TEST PANELS**

**Sea-weed material condition sample**

Requirement: Submit 5 wracking samples illustrating the range of variation across panel prototypes.

Condition: Bundles of predominantly dried seagrass of adequate length for holding entanglement and compression. Unaffected by decomposition.

**Compressed Sea-weed sample**

Requirement: Submit 3 samples illustrating the range of variation across compression tolerances and to illustrate holding capacity of compressed seaweed.

Performance: bound/ intertwined seaweed that final compression thickness is approx. half of 1/3 the thickness of original quantity.

**Bio-resin panel fabrication sample**

Requirement: Submit samples illustrating the range of variation across sea-weed layering techniques as stabilising fibre set into bio-resin.

Performance: Rigid and durable in accordance with material engineers requirements.

**Completed panel assembly sample**

Including copper trims, structural supports, fixings and seals.

Requirement: Submit 1 completed panel assembly for roof and wall prototypes to illustrate connection.

Performance: Panels secure tightly to structural frame with correct tolerances as per detail set CD03 in accordance with material engineers requirements.

**1.7. TOLERANCES**

**Panel construction tolerances**

Requirement: Conform to the **Tolerances table**.

**Tolerances table**

<b>Property</b>	<b>Tolerance criteria: Permitted deviation (mm)</b>
Thickness of sea-weed material compression	± 10 mm
Thickness of bio-resin panel	± 2 mm
Copper mesh aperture	± 5 mm

**1.8. SUBMISSIONS**

**Bio-resin Panels**

Requirement: Submit certification from a certified materials engineer for the structural adequacy of the 20mm TH bio-resin panels based on structural support and fixing methodology as detailed.

**2.1. MATERIALS**

**Sea-weed: seagrass**

Species: *Posidonia australis*

Sourced from local beach tide lines, Leighton beach and Cottesloe beach

Preparation Process: Collection of fresh wracking from shoreline, submerged fresh water rinse to remove sand and other contaminants. Roughly sort seaweed removing any matter that is not identifiably seagrass.

Drying: hang and air-dry sea-weed, in a dry area away from moisture until bone-dry. Use of damp seaweed in compression process will increase risk of premature degrading.

Compression: re-bundle dried sea-weed and pile into compression moulds that are lined with copper mesh as specified.

Quantity required: To suit final panel thickness as defined

Performance: Exterior cladding, insulation barrier and filtering system.

Weathering: Material will naturally grey overtime with exposure to sun and elements.



**Bio-resin Panel**

Manufacturer: Cecence: Manufacture, Product Development, Design & Engineering

<https://cecence.com>

Resin: Change Climate Bio-Epoxy

<https://www.changeclimate.com.au>

Seaweed component : selected pieces of seagrass strand compressed into flat sheets at 4mm TH.

Composition: Bio farm-waste resin and sheeted seagrass.

Thickness: 20mm

Finish, surface and edges: Sanded smooth finish with rounded edge. Pre drilled holes for fixings and supports to architectural drawings.

Performance: Rigid form layer for holding and weather proofing exterior cladding.



**Copper Mesh**

Manufacturer: Aiji <https://www.chickenwiring.com/chickenwire/copper-chicken-wire.html>

Product details: Copper Straight hex mesh roll BWG14-BWG27

Dimensions: 0.5 per 2.54cm mesh size

Fixing to bio resin panel: copper screw fix with bulb seal over compressed seagrass to board.

Performance: securing and maintenance of compression for seagrass panel.

Weathering: Material will naturally patina over application life time.

**Bulb Seal**

Manufacturer: 3M Automotive

Product details: 402 series EPDM double bulb lid seal

Dimensions: 28mm Length x 12.7mm Width

Application Performance: provides sealing and insulation under compressive force between panel and structural supports.

**2.2. COMPONENTS****Panel Support Fixings**

Application: rebooted threaded female fixings to anchor bio-resin panels

Type: KN4 M6 H8.5 Stainless steel Keep-Nut® press-in threaded insert

Extends: to 3N. Horizontal panel support members at MAX 400mm c/c.

**Copper Flashings and damp-proof courses**

Application: All joining roof and wall cladding panels as per *CD03 REV B. DETAILS set*.

Type: 0.7 custom folded copper and *Resitech dampcourse DPC*

Standard: To AS/NZS 2904.

### 3. EXECUTION

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#### 3.1. GENERAL

##### PROTECTION FROM CONTAMINATION

Requirement: Store seagrass above the ground and protect them from rain, ground moisture, contamination and infestations.

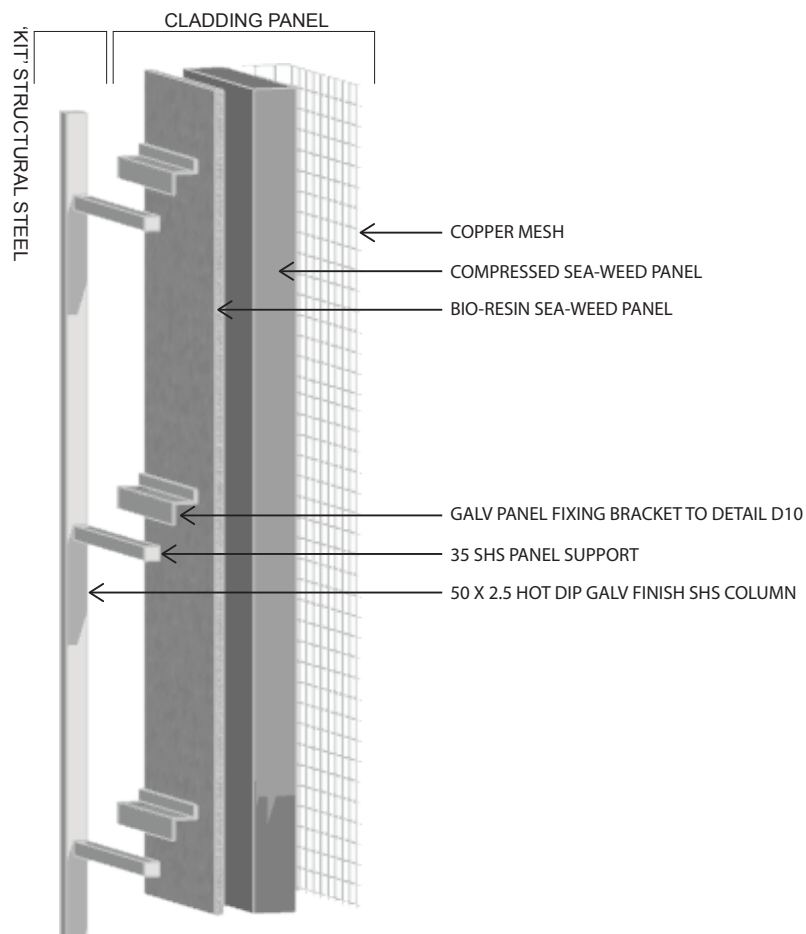
#### 3.2. PANEL COMPOSITION / FABRICATION

1. Collect SEA-WEED
2. Prepare sea-weed material description
3. Create compression moulding for each panel size
4. Lay copper mesh into mould allowing for edging and fixing requirements on sides
5. Pile seaweed into mould
6. Place bio-resin panel onto of seaweed and compressing using chosen methodology
7. Allow too compression for x amount of time.
8. Fix copper mesh to bio-resin board to component description to secure compressed sea-weed to bio resin board
9. Secure supports for application as cladding on structure.

#### 3.3. PANEL MOCK-UP PHOTOS



### 3.4. ASSEMBLY DIAGRAM - SEA-WEED PANEL TO 'KIT' STRUCTURAL STEEL FRAME



### 3.3. FLASHINGS, TRIMS AND PRESSINGS

#### Location

Location: Copper flashings and trims to perimeter of panels as defined.

Extent: Refer to drawings.

#### Installation

Fixing: Copper flashings and trims to be fixed to substrate prior to panel installation. Supply and installation by others.

### 3.4. REPAIR

#### Damaged wall and roof panels

Replacement: Recompress panels that drastically deformed or replace panels that have prematurely degraded.

### 3.5. MAINTENANCE

#### Spare material

Spare panels: Supply 1 No. Spare seagrass panel of each type/ size.

Execution: Allow to attend site over duration of defects liability period to maintain and repair panels

4. SELECTIONS

4.1. SCHEDULE: SEA-WEED PANEL AND COPPER PRESSING SCHEDULE

LOCATION	NO.	SIZE (quadrilateral) equal lengths x width	TRIMMING (copper to detail)	NOTES
SAWROOF 1	SGP1.0	5700 x 1540 x 1200	CP01 to all joining roof panels to detail D01.	slanted panel to specified M/S structural framing angle  copper mesh, compressed seagrass and seagrass bioresin board to spec.  CP05, CP06, CP07 copper pressing to flash all glazing, gutter stormwater connection and sawroof head around roof panels to detail
	SGP1.1	5700 x 1370		
	SGP1.2	5700 x 1370		
	SGP1.3	5700 x 1540 x 1200		
SAWROOF 2	SGP2.0	1710 x 1660 x 1560		
	SGP2.1	1710 x 1370		
	SGP2.2	1710 x 1370		
	SGP2.3	1710 x 1470 x 1420		
SAWROOF 3	SGP3.0	1710 x 1770 x 1670		
	SGP3.1	1710 x 1370		
	SGP3.2	1710 x 1370		
	SGP3.3	1710 x 1500 x 1470		
SAWROOF 4	SGP4.0	1710 x 1890 x 1790		
	SGP4.1	1710 x 1370		
	SGP4.2	1710 x 1370		
	SGP4.3	1710 x 2090 x 2030		
SAWROOF 5	SGP5.0	1710 x 2010 x 1910		
	SGP5.1	1710 x 1370		
	SGP5.2	1710 x 1370		
	SGP5.3	1710 x 2130 x 1090		
SAWROOF 6	SGP6.0	1710 x 2120 x 2020		
	SGP6.1	1710 x 1370		
	SGP6.2	1710 x 1370		
	SGP6.3	1710 x 2190 x 2130		
SAWROOF 7	SGP7.0	1710 x 2250 x 2140		
	SGP7.1	1710 x 1370		
	SGP7.2	1710 x 1370		
	SGP7.3	1710 x 2250 x 2190		

LOCATION	NO.	SIZE (quadrilateral) lengths x width	TRIMMING (copper to detail)	NOTES
WEST WALL	SGP8.0	3250 x 840	CP00, CP01	vertical panels to specified M/S structural framing members.  copper mesh, compressed seagrass and seagrass bioresin board to spec.  CP03, CP04 copper pressing to flash top and bottom of all panels to detail
	SGP8.1	950 x 990	CP01	
	SGP8.2	3250 x 990	CP01	
	SGP8.3	3250 x 990	CP01	
	SGP8.4	3250 x 850	CP01	
	SGP8.5	3250 x 850	CP01, CP02	
	SGP8.6	3250 x 850	CP01, CP02	
	SGP8.7	3250 x 850	CP01, CP02	
	SGP8.8	3250 x 850	CP01, CP02	
	SGP8.9	3250 x 850	CP01, CP02	
	SGP8.10	3250 x 850	CP01, CP02	
	SGP8.11	3250 x 850	CP01, CP02	
	SGP8.12	3250 x 850	CP01, CP02	
	SGP8.13	3250 x 850	CP01, CP02	
	SGP8.14	3250 x 850	CP01, CP02	
	SGP8.15	3250 x 850	CP01, CP02	
	SGP8.16	3250 x 850	CP01, CP02	
SGP8.17	3250 x 850	CP01, CP00		
SOUTH WALL	SGP9.0	3250 x 900	CP00, CP01	
	SGP9.1	3250 x 500	CP01, CP00	
EAST WALL	SGP10.0	3250 x 920	CP00, CP01	
	SGP10.1	3250 x 920	CP01	
	SGP10.2	3250 x 990	CP01	
	SGP10.3	3250 x 990	CP01	
	SGP10.4	3250 x 990	CP01	
	SGP10.5	3250 x 990	CP01	
	SGP10.6	3250 x 1060	CP01	
	SGP10.7	3250 x 1060	CP01, CP00	
	SGP10.8	3250 x 700	CP01	
	SGP10.9	2500 x 990	CP01	
	SGP10.10	3250 x 990	CP01	
	SGP10.11	3250 x 990	CP01	
	SGP10.12	1120 x 990	CP01	
	SGP10.13	3250 x 990	CP01	
	SGP10.14	3250 x 990	CP01	
	SGP10.15	3250 x 990	CP01	
	SGP10.16	1100 x 990	CP01	
SGP10.17	3250 x 850	CP01, CP00		
NORTH WALL	SGP11.0	3250 x 380	CP00, CP01	
	SGP11.1	850 x 4070	CP01	
	SGP11.2	3250 x 380	CP01, CP02	