OCEAN INK®

AN OCEANIUM® BRAND

Product Limitations and Disclaimer – OCEAN INK®

In accordance with this Agreement, OCEANIUM shall provide OCEAN INK® to WWF-UK (or WWF-UK's designated third party) in order for such OCEAN INK to be used by respected artists to produce artwork for AFYO. In providing OCEAN INK to such artists WWF-UK shall ensure that the artists are aware of the following product limitations and disclaimers:

"Product Nature and Variability: OCEAN INK® is a fully biodegradable, water-based screen printing ink made primarily from sustainably farmed seaweed. Due to the natural variability of seaweed and its organic composition, slight colour variations between batches may occur.

Storage and Handling Requirements: The performance and shelf life of OCEAN INK® are highly dependent on correct storage and handling. Product recipients must adhere to the following guidelines:

Refrigeration Upon Receipt: Store the ink in a refrigerator immediately upon delivery to maintain stability.

During Use: Keep the container sealed when not in use to minimise air exposure. Return the ink to refrigeration promptly after each use. Avoid prolonged exposure to room temperature or air, as this increases the risk of microbial contamination.

Preservative and Contamination Risks: As OCEAN INK® contains organic matter, it is sensitive to microbial growth after opening, despite the inclusion of preservatives. Complete protection against contamination cannot be guaranteed. Users are advised to inspect the ink for any signs of contamination before use and follow proper hygiene practices, including wearing appropriate personal protective equipment (e.g., nitrile gloves).

Limitations of Use and Guarantees: OCEAN INK® is in the development stage, and no long-term testing has been completed. As such, OCEANIUM cannot guarantee the product's performance or longevity, including resistance to fading or other environmental effects.

OCEAN INK® is not water-fast and is designed as a biodegradable, eco-friendly screen printing ink. As such, it may be prone to smudging, running, or washing off when exposed to moisture or water. OCEANIUM accepts no liability for any issues arising from the use of OCEAN INK® in

applications requiring water resistance. Users are advised to consider the product's natural properties when determining its suitability for their intended purposes.

While the ink's dried form has shown significant durability under in-house testing, OCEANIUM disclaims any responsibility for its long-term performance, particularly when used or stored in conditions that deviate from the recommended guidelines.

Disclaimer of Warranties: OCEAN INK® is provided "as is," without any warranties, express or implied, including but not limited to merchantability or fitness for a particular purpose. OCEANIUM explicitly disclaims all liability for any issues or damages arising from improper storage, handling, or use of the product, as well as from inherent product limitations.

Potential Allergens: Due to the seaweed content, OCEAN INK® may contain traces of fish, molluscs, or shellfish.

Customers should assess suitability before use, particularly if such allergens may be a concern".

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OCEAN INK® is a fully biodegradable, water-based screen printing ink available in two colours: black and gold. Its primary ingredient is sustainably farmed seaweed, which contributes to its eco-friendly profile. Due to the natural variability of seaweed, slight colour variations between batches may occur.

Using OCEAN INK®

Storage and Handling Guidelines for OCEAN INK®

- **Environmental Sensitivity**: **OCEAN INK®** is composed of 70-80% water, with the remaining components derived primarily from natural materials, making it sensitive to environmental conditions.
- **Storage Upon Receipt**: Immediately store the inks in a refrigerator upon arrival to maintain stability.
- **Preparation for Use**: Remove the ink from the refrigerator approximately 1 hour before use to allow it to reach room temperature for optimal performance.
- **Usage Tips:**
    - Keep the lid securely on the pot when not in use to minimise air exposure.
    - Return the ink to the refrigerator promptly after each use to maintain its integrity.
    - Avoid leaving the ink at room temperature for extended periods, particularly when exposed to air, as this can increase the risk of contamination.
- **Preservative Limitations**: As a product containing organic matter, **OCEAN INK®** is vulnerable to microbial growth, particularly after the container is opened. While it contains a natural preservative to help prevent growth when stored and handled correctly, complete protection against contamination cannot be guaranteed. Always inspect the ink before use.
- **Dried Ink**: For microbial growth to occur in the inks, a significant amount of moisture (over 10–15% of the dry ink weight) is needed. Once dry, the ink is highly resistant to growth or signs of biological activity. **OCEANIUM** has stored dried seaweed-based materials for over four years without any issues, and printed samples on cardboard and paper kept in an office environment have remained free of biological contamination for more than two years.
- **Shelf Life**: When stored and handled as outlined, the inks have an expected shelf life of at least three months after opening. Regular checks are recommended to monitor for any signs of contamination. Minor surface contamination can be removed without affecting the ink's performance.

Ink Dilution Guidelines:

OCEAN INK® is supplied as a thick paste but can be diluted using distilled, softened, or soft tap water. Avoid using hard water (e.g., tap water in London, or areas where appliances such as kettles or coffee machines experience scaling). In contrast, tap water in most of Scotland is typically soft and suitable for dilution. For further assistance, feel free to contact **OCEANIUM** and provide details about your water source.

Please note that adding water will reduce the colour density with each print pass. Higher dilution levels may also cause wrinkling or cockling during drying, particularly with industrial or accelerated drying methods.

When using diluted inks, it's essential to follow the recommended usage protocols as the added water will dilute both the ink components and preservatives.

Mixing with Other Colourants:

OCEAN INK® can be mixed with various natural and synthetic pigments, including powders or water-based liquid dispersions (the latter typically mix more easily). Below are some materials that have been tested:

- Synthetic Water-based Blue Pigment (Hydroflex Blue G4(S) FDA) – Supplier: DVM Pigments
- Synthetic Water-based Yellow Pigment (Hydrotint Yellow 1838) – Supplier: DVM Pigments
- Synthetic Water-based White Pigment (Titanium Dioxide TiO2) – Supplier: DVM Pigments
- Bentonite Clay Powder – Supplier: Merck
- Silica Powder – Supplier: Merck
- Calcium Carbonate (Chalk) – Supplier: [unspecified]
- Turmeric Powder – Supplier: Supermarket
- Spirulina Powder (Algal Blue) – Supplier: Scotbio

These pigments were combined at concentrations of 1.5% to 10% of the ink mass using a high-powered centrifugal mixer. Manual mixing may yield different results.

While it is likely that **OCEAN INK®** can be combined with other water-based inks or paints, **OCEANIUM** cannot recommend specific products or guarantee any particular outcomes.

Printing Settings Tested:
The inks can be printed manually or using automated screen-printing equipment.
Mesh size: 34 threads or 77 threads per centimetre mesh (Others are likely possible but have been not tested higher thread counts will mean thinner layers)
Ink Lay down: ≈30 -50g per square meter per screen pass (as supplied)
Stencil type: Liquid emulsion stencil (Kiwo 2155 for UV, solvent and water based inks)
Squeegee: A 9mm thick: 75 shore hardness with a square profile.

Industrial Drying:
Dryer 8.5m Natgraph Tunnel Dryer with two Infrared Drying Units
One IR Unit at the entrance and one 1.5m further into the tunnel
Drying Temperature: 50°C
Drying Time in Oven: 3 mins-

Manual Drying:
Manual drying is possible at room temperature (typically 18-22°C), taking 24-48 hours to fully dry.

Accelerated Drying:
Drying can be sped up using an air gun or hairdryer. However, extra care is required to avoid wrinkling or cockling, particularly when the inks are diluted.

OCEAN INK®

100% biodegradable ink derived from sustainably sourced seaweed

Functional, water-based ink

- ✓ Fully biodegradable (100%)
- ✓ Replaces harmful solvent-based inks
- ✓ Good oil & oxygen barrier for screen printing
- ✓ Available in black and natural gold colour
- ✓ High-quality and vibrant printing
- ✓ Natural gold replaces the need for embossing
- ✓ Printing for packaging & promotional material
- ✓ Screen printing for fabrics in development
- ✓ Other printing techniques in development

Excellent Provenance &Traceability

- ✓ Natural origin – sustainably sourced seaweed
- ✓ Water-based, green processing
- ✓ Non-toxic - safe for humans, environment & wildlife
- ✓ End-to-end traceability & provenance
- ✓ Meets consumer demand for sustainable products
- ✓ Helps brands achieve sustainability targets
- ✓ Enables the transition to circular fashion models
- ✓ Can be created to wash away after use

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OCEAN INK®

OCEANIUM®

100% Biodegradable Ink.

	Solvent-Based Inks	Water-Based Inks	OCEAN INK™
Biodegradable			✓
Enables the transition to circular fashion models	X	X	✓
Sourced from regenerative, non-resource-intensive materials	X	X	✓
Positively impact ocean health and biodiversity	X	X	✓
Waste reduction	X	X	✓
Safe for soil, water and the environment	X	**Sometimes**	✓
No harmful effects on people	X	✓	✓
No significant levels of Volatile Organic Compounds (VOCs) which can affect air quality and health	X	✓	✓

OCEAN INK®

Replacing Harmful Inks.

Harmful Solvent-Based Inks

- Traditional solvent inks sometimes contain persistent synthetic chemicals including, alcohols and acetates which can cause pollution when released into the environment, contaminating air, water and soil.
- Solvent-based inks produce hazardous substances that cause skin and eye irritation. When inhaled, ink fumes and odors may cause asthma, and respiratory problems.

Water-Based Inks

- Traditional water-based inks are a more sustainable alternative to solvent-based inks.
- Water-based inks usually still contain acrylic resins or other synthetic binders, pigments, and others.
- These synthetic components e.g. surfactants are not fully biodegradable or recyclable and therefore still can be harmful to the environment, soil and water

OCEAN INK™

- Contains 100% fully biodegradable components, including its own natural pigments and binders meaning it does not contaminate water or soil.
- Contains no significant VOCs or harmful chemicals, making it safer for the environment and people.
- Derived from sustainable seaweed, a regenerative resource that requires no freshwater or harmful chemicals to grow.

OCEAN INK™ Specifications.

Botanical name	Saccharina latissima
Common name	sugar kelp, kombu, sukkertare
Origin of seaweed	Sustainably farmed seaweed
Ingredients	Water, Seaweed (*Saccharina latissima*), Biodegradable polymers, Preservative
Extraction process	Water-based, green chemistry
Storage	Store refrigerated when received and between uses. Aim to use within one month of opening
Shelf life	One month from opening
Certified	Vegan, vegetarian
Food Use	Not currently approved for food use
UV Colour	UV stability testing underway
	Available in the natural seaweed gold/bronze colour and black. The black colour contains a pigment from recycled wood waste. There may be naturally occurring variability in the colour as seaweed is the natural raw material.

OCEANIUM®

OCEANIUM develops and makes innovative, functional seaweed ingredients to catalyze the seaweed industry for **People Health** and **Ocean Health.**

Certified vegan

Certified vegetarian

Natural origin

100% biodegradable

Screen Printing Settings (Manual and Automatic)

- **Ink Dilution:** Mix well with a pallet knife before using. Manually dilute with a small amount of water if needed. Avoid using hard water for dilution and avoid over-diluting to prevent wrinkling as **OCEAN INK®** dries. Dip brush with **OCEAN INK®** in water or dilute to use as a watercolour.
- **Mesh Size:** 34 or 77 threads per cm (adjust for higher mesh).
- **Stencil:** Liquid emulsion stencil (Kiwo 2155 for UV, solvent, and water-based inks).
- **Squeegee:** 9mm thick, 75 shore hardness, square profile.
- **Drying:** 8.5m Natgraph Tunnel Dryer with two Infrared Units. One IR Unit at the entrance and one 1.5m into the tunnel.
- **Drying Settings:** Temperature: 50°C. Time: 3 minutes
- **Notes:** Avoid air entrainment with.

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