GENERAL

The ECO-oh! products are a responsible choice, thanks to the three pillars that form the basis of their design and production:

ECONOMICAL

- User-friendly: little or no maintenance needed
- Long service life (minimum of 10 years)
    - Resistant to water and humidity (anti-rot)
    - Frost-resistant
    - Resistant to acids and salts
- Can be handled like wood; no special tools needed

CIRCULAR

- Manufactured completely from recycled plastics, without the use of primary raw materials.

- Finished products with defects, scrap cuttings and other internal waste are ground down and reused as raw material.

- All products can be recycled again into new products in our own plants; this way we close the loop...

ENVIRONMENTALLY FRIENDLY

- Eco-efficient production process

- Safe materials

The quality of our recycling process and of our products is guaranteed by our employees' many years of experience and by external certifications.

MATERIAL PROPERTIES

1. Origin

ECO-oh! products are made of recycled, household plastic waste. The majority of this waste consists of single-use household packaging. For the pre-conditions which apply to the waste that is accepted for use in the production process, see the 'Acceptance Conditions' document.

After reducing the waste plastic in size and washing, drying and removing other contamination from it (organic residues, metal, glass, sand, stones), the different types of plastic are separated into three fractions based on their densities. The resultant raw materials are mixed in the correct proportions, remelted and then processed into end products.

Approximately 95 to 97% of all plastics we receive can be recycled (recycling efficiency).

QA-CER certification

In 2018, the ECO-oh! group obtained a Level 2 QA-CER certificate, awarded by the independent, accredited, certification body BQA. This certification guarantees ECO-oh!'s quality systems in relation to our recycling processes and the use of recycled materials in our products.

The QA-CER system is based on the main principles of the ISO 9001 quality management system, supplemented by requirements from European recycling standards (including requirements for the characteristics of plastic waste flows as listed in EN 15347 and requirements for a traceability system for plastic waste flows as defined in EN 15343).

In the context of this certification, the recyclate is subject, at least 1x per year, to a product control process performed by an external, accredited organisation (BQA). The certificate must be renewed annually.

EuCertPlast certification

In 2016, ECO-oh! obtained a EuCertplast certificate. This accreditation is awarded by Plastic Recyclers Europe, the European federation for plastic recyclers. This certification guarantees that the recycling process and the associated management systems comply with the requirements set down by the certification programme, which is based on the European EN 15343:2007 standard. This standard focuses mainly on the transparency and traceability of post-consumer waste flows and recycled materials.

2. Composition

Depending on the shape, size and application of the end products, varying proportions of the three plastic fractions are used in each product. The main fraction consists of polyolefins (PE and PP) with a concentration varying from 60-99%, depending on the end product. The remaining fraction consists of a mixture of PS, PET and PVC.

3. Colour

The standard colour of ECO-oh! products is grey; this grey is comparable to the colour of bluestone. All ECO-oh! products are unvarnished and unpainted, and they are not treated with impregnating agents or other surface treatments.

Upon request, a colour coating may be applied to a number of products by means of wire flame spraying. This colour coating is not scratch-resistant and is therefore not recommended for use in public spaces.

Some products use moulded-in colour. See the technical data sheets for more information about the colours available.

4. Strength properties

4.1 Flexure strength/E-modulus

Hollow profiles with a wall thickness of 6 x 12 cm were loaded for a three-point flexural test (free support, 1m span, point load in the middle). The following flexures were recorded:

Force (N)	1000	2000	2618-3000
Flexure (mm)	10-11	22-25	37-44

E-modulus (bending): ± 700 N/mm^2
Maximum flexural stress: ± 7.6 N/mm^2

These values are well below those for wood.
Wood reaches at least double this flexure strength and six times this elastic modulus. The flexure under a load will therefore be significantly greater than wood. The warming of the material due to the absorption of solar radiation will also result in the material bending under its own weight, increasing the flexure even more.

For the results of the strength properties testing in accordance with ISO standards 527 (2012) and 179 (2010) performed on our raw material, see the Regranulate 2000 data sheet.

4.2 Creep behaviour

The creep behaviour that is specific to plastic, that is, the flexure under the influence of a constant load, was also investigated. This testing showed that the flexure of a solid profile under a constant load reached its end value after 12 weeks; after that, the material did not creep further.

! For the specific strength properties of the boards and steel-reinforced profiles, see the technical data sheets.

5. Thermal properties

5.1. Heat conduction

The thermal conductivity of the material is 0.27 – 0.29 W/mK (tests VITO 2006). In other words, the material has poor thermal conductivity.

5.2. Shrinkage and expansion behaviour

The linear expansion coefficient of the profiles is 100-200 µ/m°C. (Also see the Regranulate 2000 data sheet.)

This means that the material expands or shrinks between 2.5 – 5 mm per meter at a temperature difference of 30°C.

We recommend taking this property into account when designing constructions. For example: a 2-meter plank can expand up to 1 cm when the temperature rises by 30°C. Therefore, any construction must allow sufficient space for this expansion in order to prevent deformations or it must provide enough counterpressure against the expansion of the material (by securing it, for example).

If temperature differences arise within the material itself, for example, due to warming from solar radiation on only 1 side of the material, the material may warp due to uneven expansion.

Profiles are best stored and processed in areas with a constant ambient temperature.

For the boards, a specific expansion coefficient has been calculated; see the technical data sheet.

5.3. Flammability

According to the EN 13501-1:2007 and A1:2009 standards, ECO-oh! materials are categorized as Class E (minimal reaction-to-fire performance).

6. Physico-chemical effects of chemical substances

The effects of acids, salts and bases on the material have been qualitatively determined by submerging a specimen in these substances for a period of 48 hours at room temperature. The effects were determined on the basis of:
- the measurement of the dimensions (before and after the treatment)
- the determination of the weight (before and after the treatment)
- a visual assessment

The following substances were tested: ethanol and acetone, hydrochloric acid and nitric acid, sodium hydroxide and ammonia.

Substance	Concentration	Result
Ethanol (C2H5OH)	100%	no change observed
Acetone (CH3COCH3)	100%	no change observed
Hydrochloric acid (HCl)	37%	no change observed
Nitric acid (HNO3)	50%	no change observed
Sodium hydroxide (NaOH)	3.85%	no change observed
Ammonia (HN3)	25%	no change observed

7. Adhesion of paints

Given that the materials consist primarily of the oilier plastics, the polyolefins, in particular, most paints adhere very poorly.

8. Water absorption

Upon exposure of the surface of the material to a column of water, the water absorption of the ECO-oh! materials is minimal: 0.03% m/m dry. This value is 10 to 20 times lower than that for wood. Moreover, the material does not rot. This means that the material can be used in marine applications (pontoons, bank reinforcements).

9. Sensitivity to weather

8.1. Weatherometer test

For this test, a time period equivalent to 6 months is simulated. During this time, the influences of UV light and precipitation are checked.

After 4 weeks of exposure, the surface layer affected was shown to be only 1/100 mm thick.

Since all of the ECO-oh! products have sufficiently thick walls, we do not expect this effect to have any influence on the strength properties of the material.

8.2. Temperature and atmospheric humidity

In this test, a natural cycle of 5 years is simulated. The strength properties of the materials were not influenced by these parameters.

8.3. Influence of UV on the colour

The products become lighter in the sun. It may take several years before this discolouration process stabilises.

10. Density

The density of the material varies depending on the product, but on average it is approximately 1g/cm3.

11. Dimensional deviations

The dimensional tolerance of our products is 2% to 3%. More information for specific products can be found on the technical data sheets.

12. Toy directives

The European "Toy directive", EN71, is a directive developed by the European Union which specifies test methods and requirements, including the flammability and the allowable concentrations of potentially harmful substances in toy materials, such as several organic compounds and heavy metals.

The following tests were carried out on various ECO-oh! materials:
EN 71-2 (2011) + A1 (2014) Flammability (surface combustion, flame propagation speed)
EN 71-3 (2013) Determination of heavy metals
EN 71-11 (2005) Determination of organic chemical compounds: formaldehyde, phthalates, polar solvents and non-polar solvents after migration, plasticizers, acrylamide, phenol and bisphenol A.

The materials comply with all of the tests in the directive. Measured concentrations of hazardous substances lie well under the threshold values, and in most cases are even below the detection limits of the test.

13. Processability

ECO-oh! materials can be processed in the same ways as wood; they can be cut, milled, drilled and secured with screws. As a general rule, standard woodworking tools and fasteners may also be used on our profiles. The material does not splinter.

We recommend processing ECO-oh! materials at a constant temperature between 10°C and 30°C. Processing tools should be as sharp as possible; blunt tools will accelerate the production of heat during cutting, which can lead to softening or even melting of the plastic. Grinding dust is best avoided; a build-up of these grindings around the cutter edge may cause the material to melt.

14. Maintenance

Due to the high durability of the plastic, ECO-oh! materials require little maintenance.

The plastic is best cleaned with lukewarm water and non-caustic soap. A high-pressure cleaner at max. 80 bar at room temperature can also be used from a minimum distance of 50 cm.

The use of steel brushes/abrasive sponges or corrosive cleaning agents/solvents (ammonia, bleach, thinner, etc.) is strongly discouraged.

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