

Customer reference manual

Duotec® product family

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Introduction

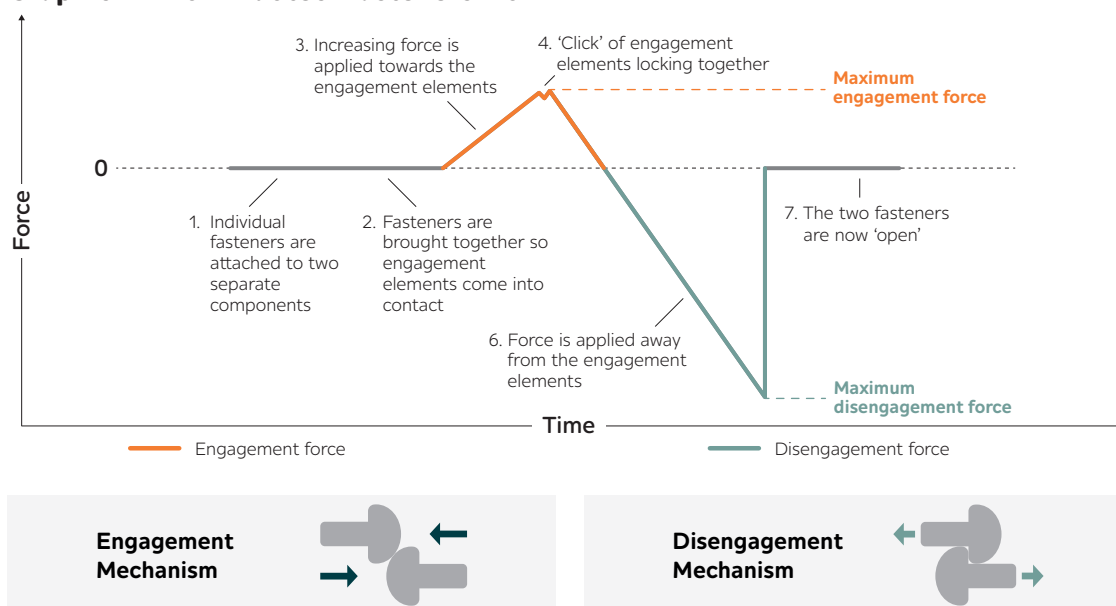
The Duotec® family of self-engaging, reclosable fastening products offers a simple method for mounting one component to another component or surface. This mounting method allows for removal and repositioning of the fastener without the need for special tools/skills or mechanical modification of the component or surface (such as by drilling holes). Duotec® products are specifically designed to provide clear feedback to a user that the fasteners have successfully locked together. Once the fasteners have locked together, the Duotec® products resist disengagement until a defined amount of force is applied in a direction opposite to the engagement direction. See reference graph “How Duotec® fasteners work” below.

Each Duotec® product is typically comprised of an adhesive layer, a base layer and many individual engagement elements. The base layer has two flat faces, with an adhesive layer on one face and the engagement elements on the opposite face. The engaging elements extend outwards and perpendicular from the face of the base layer.

Upon application of sufficient force, the engagement elements come into contact and create initial feedback. As the amount of force increases, the individual engagement elements on both fasteners then slide past one another and retaining features on the ends of each engagement elements (i.e. domed ‘mushrooms’) will then lock one fastener to the other. Please reference the graphic below. This closure and locking of the engagement elements provide a tactile response of the fasteners ‘clicking’ or ‘snapping’ together. Failure to provide sufficient force to achieve the locking of the engagement elements is quite noticeable, even to a first-time user. Similarly, if the fastening faces are not properly aligned, the engagement elements will not lock, despite any reasonable attempt to apply additional force, thus indicating to the user that realignment is required.

When at such a point in time it is desired to open a set of closed, locked fasteners, a sufficient disengagement force must be applied. As the graph below also shows, the disengagement force (unlocking) is significantly higher than the engagement force (locking) due to the profiles of the engagement elements themselves being interlocked and resistant to being pulled out or apart.

Graphic 1 – How Duotec® fasteners work

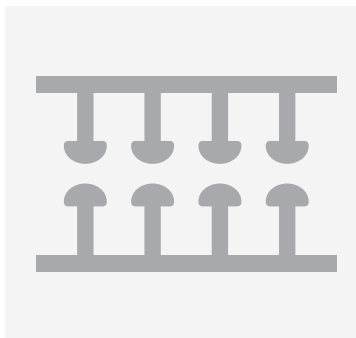


Unique performance

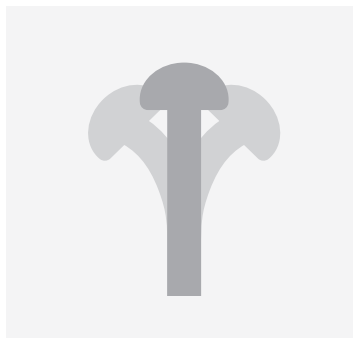
The textile nature of Duotec® offers performance attributes that differentiate it from extruded-type self-engaging reclosable fasteners. Binder utilises three-dimensional weaving to ultimately obtain a structure of engagement elements with inherent elastic, or spring-like, behaviour. This behaviour offers two key advantages: resilience and alignment tolerance. Resilience to vibration and shock is provided by the ability of the individual engagement elements to move both up and down and side to side during the attachment of two pieces together and pieces are in a locked or closed condition. Alignment tolerance of engagement elements is a result of the spring-like stem structure that can extend and compress on the basis of stress applied to the fasteners. This tolerance is applicable to both the engagement of the fasteners together when there is misalignment of the faces of the fasteners to one another, as well as resistance to disengagement when the locked or closed pieces are subject to misaligned momentary forces.

Graphic 2 – Structure of extruded and woven fastener engagement elements

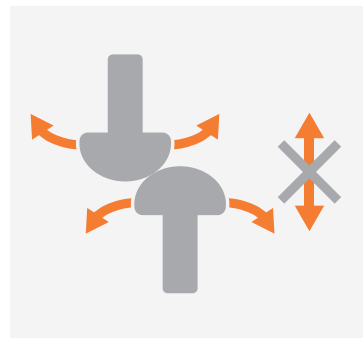
Extruded self-engaged reclosable fastener



Two fastener pieces brought into face-to-face alignment

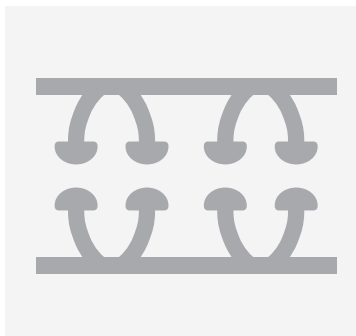


Deflection of engagement element introduces stress in stem base, possible failure point



Engagement elements deflect to sides and resist compression or extension

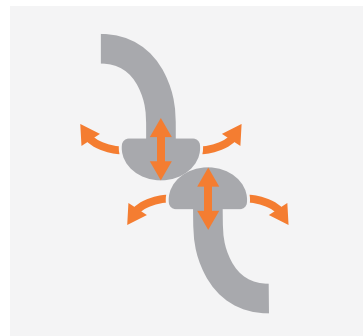
Duotec® woven self-engaged reclosable fastener



Two fastener pieces brought into face-to-face alignment



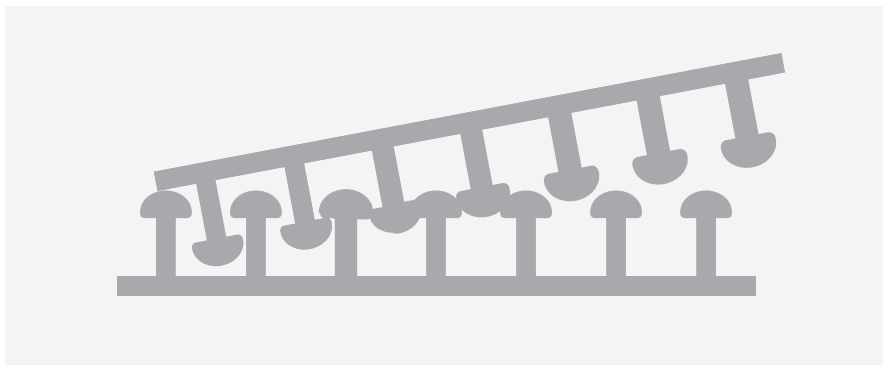
Flexibility in stem structure



Engagement elements deflect to sides and allow for compression or extension

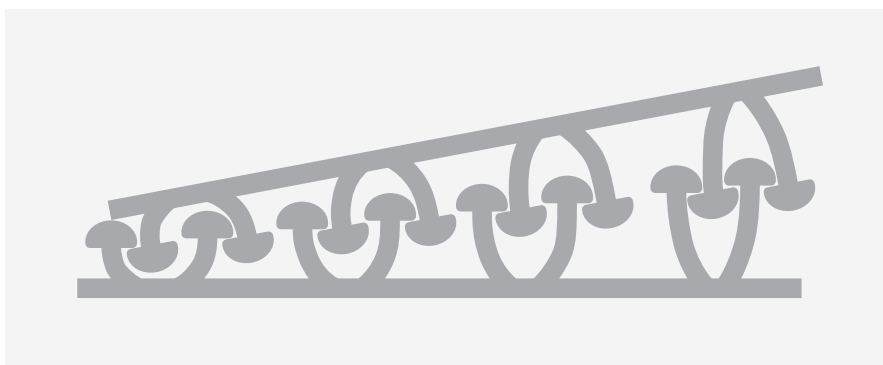
Graphic 3 – Alignment tolerance of extruded and woven fastener engagement elements

Extruded self-engaged reclosable fastener



Limited ability to engage and avoid disengagement when pieces are out of face-to-face, parallel alignment

Duotec® woven self-engaged reclosable fastener



Flexibility in the engagement element stems allows for compression/extension while maintaining positive locking behaviour. Allows for greater out of parallel performance.

General guidelines

Points for consideration – Self-engaging reclosable fasteners

- Allow for mounting or joining of either similar or dissimilar materials to one another, such as combining two materials without pre-forming holes, mounts or other special structures
- Aesthetics can be enhanced by removing holes, notches, lumps and ripples in the mounted surface
- Retention of integral structure of surfaces and components by avoiding the creation of holes or slots that can admit dirt, moisture or liquids
- Support the fixation of large or complicated materials using blind attachments (fastener is not visible to the casual observer/consumer)
- Create a simplified means of disassembly/repositioning/maintenance of mounted materials (i.e. temporary removal of headliners or access panels)
- No special tools or advanced training required for correct usage of the Duotec® family of products
- No special tools or advanced training required for correct installation of the Duotec® family of products
- Allow for in-production placement on one or both surfaces to compensate for variances in shape and tolerances
- Wide range of standard engagement heights allows for finely tuned fitment of panels or pieces compared to depth or for gap filling
- Significantly reduce noise, vibration and thermal transfer through the Duotec® fastener
- Positive feedback (feel/sound) for work force, thus confirming that the fasteners have properly aligned and locked
- Whether used with an adhesive or with mounting clips/profiles, components/surfaces can be attached to one another quickly without creating dust, filings or other contaminants requiring further clean-up
- Lightweight systems with high performance have the potential to reduce the number of fixation points which is particularly useful in applications where minimising weight above a vehicle's centre of gravity is of value

Design basics

The following guidelines will help select and use the proper attachment method for a given application. The performance of the final product is influenced by a number of factors, including the substrate and its surface characteristics, the chosen fastener, the application method and the environmental conditions under which it will be used. Given that these factors are within the users' control and knowledge, it is imperative that users evaluate the Binder product to ensure it is suitable for their specific purpose and application method.

Typical modes of use of Duotec® products

1. Pre-engaged fastener mounting: Two pieces or lengths of selected Duotec® fastener are brought into general alignment (parallel and within proximity of each respective), then fully engaged. A releasable liner on the adhesive layer on one side of the pre-engaged fasteners is removed and the adhesive layer attached to a first required and suitable surface or part. The remaining releasable liner of the pre-engaged fasteners is then removed and the corresponding adhesive layer attached to a second required and suitable surface or part. Refer to 'How to use' section in this manual.
2. Individual fastener mounting: A selected length of Duotec® fastener is properly attached to a suitable surface of a first part using the adhesive layer. A hand roller covered with the same Duotec® fastener is used to apply downward force to the fastener, thus pushing the fastener uniformly onto the surface or part. The roller is then moved in the machine direction of the fastener, thus engaging and disengaging the two Duotec® pieces as the roller turns. A second matching Duotec® fastener is attached to a second part, using either the roller method if a length of fastener is used or applying individual pieces, clips or profiles. The two components with fixed lengths of fastener are then brought into general alignment (parallel and within proximity of each respectively) and properly engaged. Refer to 'How to use' section in this manual.
3. Fastener on clip or profile: Individual pieces of a selected Duotec® fastener are pre-attached to a pre-formed injection-moulded clip or to an extruded profile at the Binder factory. The mounted pieces can then be inserted or attached to predefined surfaces, such as punched recesses or moulded gaps in an assembly subframe. A second piece of the same Duotec® fastener is then properly attached to a second required and suitable surface or part. The two components are brought into general alignment (parallel and within proximity of each respective) and then properly engaged. Refer to 'How to use' section in this manual.

Note – Duotec® fasteners can be readily combined as continuous lengths, cut pieces, clips and profiles to achieve maximum customer flexibility in the design, fabrication and maintenance processes.

* Data provided represents indicative performance attributes based on Binder test protocols. These test protocols are derived from integration of standards (ASTM, ISO, DIN), industry practices and practical experience. Suitability of using Binder products for any given customer's application is to be determined through that customer's own evaluation. The customer is obligated to carry out necessary inspections and tests of the products himself.

Considerations

- Fastener width: All Duotec® products are intended to be engaged with the same product type. The performance of the product in a particular application is dependent upon the dimensions, angles, gaps and loads experienced by the fastening system. Widths down to about 12.7 mm (1/2") can be used once confirmation of the required performance is assessed by the customer respective to their intended application.
- Edge management: To prevent edge lifting or catching, attention should be paid to reducing exposure of the edge to shearing and perpendicular impact forces. Such means for reducing edge exposure include recessing the fastener into the mounting surface, rounding off 90° corners and providing protective extensions that reduce or prevent physical interaction with the product edges or corners. Use of physical retainers can also be considered, such as rails and channels, that limit edge to environment interaction.
- Engagement recommendations: Duotec® fasteners can be self-engaged as strips, cut pieces and/or pre-defined clips and profiles. This family of fasteners is not limited to any engagement dimensions above the minimum specified above, as long as the physical performance and removal/replacement limitations are considered by the customer. Further, Duotec® fasteners can be combined with Binder loop products such as 15244, 53248 and 90298 and Velour products 88293 and 88297 to create Duotec® contact closures with high retention strength and low noise.

Engagement heights

Base thickness – Single fastener

Duotec® product	Approx. thickness (without adhesive backing)*
Duotec® 50	3.1 mm
Duotec® 42	2.9 mm
Mididuotec®	1.6 mm
Microduotec®	0.6 mm

Base thickness – Engaged fasteners

Duotec® product	Approx. thickness (without adhesive backing)*
Duotec® 50	4.5 mm
Duotec® 42	4.0 mm
Mididuotec®	2.3 mm
Microduotec®	1.5 mm

Standard engagement thickness modifiers (per fastener)

Approx. thickness change*	Synthetic rubber	Acrylic transparent
+ 0.3 mm	X (flame-retardant "FR")	–
+ 0.5 mm	–	X
+ 1.0 mm	X	X
+ 1.5 mm	–	X
+ 2.0 mm	–	X

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How to use

Typical modes of use of Duotec® products

The Duotec® family of products use self-engaging technologies designed for durable fixation of items where high retention and intermittent or occasional opening/closing cycles are expected. These products involve a length or piece of chosen fastener tape to be attached directly to a supporting surface (the 'mounting area') and a similar length or piece of the same or compatible Duotec® fastener tape is attached to an outer face of an object to be attached (the 'object surface'). Given that the Duotec® products are reclosable/locking type fasteners, it is important that the two engaging pieces are firmly affixed to the mounting area and the object surface to ensure proper function.

The Duotec® fastener with adhesive layers firmly attaches to both the mounting area and the object surface using various methods (reference 'Typical modes of use for Duotec® products'), where pressure-sensitive adhesive layers is the most common. These adhesive layers are affixed to the fastener during the manufacturing process with a removable protective covering in the form of a releasable liner. Optimum application conditions are 20 °C to 27 °C (68 °F and 80 °F) and relative humidity (RH) of between 40 and 60%. After ensuring that the required contact points of the mounting area and object surface are free of dusts, oils, water and other environmental contaminants, the releasable liner is then removed, and the sticking face of the adhesive is applied to the contact point using a force of at least 10 N/cm² (15 psi) across the full fastener width and length.



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Adhesive application – Releasable liner

1. Clean and dry the substrate surface, according to the type and amount of contaminants present. When using solvents, extinguish all ignition sources and adhere to the manufacturers' safety guidelines.
2. Remove the liner from the adhesive while taking care to avoid touching the exposed (tacky) side of the adhesive itself.
3. Apply the adhesive to the surface using light finger pressure.
4. Roll down the fastener to ensure good contact between the adhesive and substrate.

Adhesive bonding

The pressure-sensitive adhesive used in Duotec® products bonds on contact, allowing immediate handling. The bond strength increases with time, pressure and temperature. For best results, please allow a minimum of 24 hours of curing time before applying a load or repeatedly disengaging parts. Maximum bonding strength is usually achieved after 72 hours at 20 °C to 27 °C (68 °F and 80 °F) and at RH of 50 ±10 %.

Optimising adhesion of fasteners to surfaces

Selection of the correct pressure-sensitive adhesive is important to ensure proper performance of the fastener and under various environmental effects which will stress the fastener. Addressing conditions such as the composition of both the mounting area and the object surface, the minimum/maximum temperatures that the fasteners could be exposed to, the rate of temperature change of the contact points and the space inbetween as well as the amount of static/dynamic forces that the fastener could experience will suggest which adhesives are best suited to your application. Please contact your Binder sales representative for more information.

Fastener performance attributes

Construction components

Duotec® 42, 50:

- Engagement elements – Polypropylene monofilament
- Base layer – Woven polyamide monofilament
- Backing – Polyurethane

Microduotec®:

- Polypropylene extrusion

Shelf life

Duotec® product from date of manufacture. Stored at 20 °C ±2 °C and 50 % ±10 % RH in original shipment packaging

Duotec® product	Acrylic PSA	Synthetic rubber PSA
Mididuotec®, Microduotec®, Duotec® 42, 50	24 months	12 months

Engagement element/backing stability

	Duotec® product	Exposure tolerance*
Minimum temperature	Mididuotec®, Microduotec®, Duotec® 42, 50	-30 °C / -22 °F
Maximum temperature	Mididuotec®, Duotec® 42, 50	+150 °C / 302 °F
	Microduotec®	+90 °C / 195 °F
Resistance – water ¹	Mididuotec®, Microduotec®, Duotec® 42, 50	High
Resistance – solvents ²	Mididuotec®, Microduotec®, Duotec® 42, 50	High

1: Distilled water

2: Isopropyl alcohol

Adhesive performance

General information

Standard liner colours

Adhesive	Standard liner colour
Synthetic rubber	Transparent
Acrylic	Red
Arcylic foam	Red
Low surface energy acrylic foam	Dark red
Flame-retardant	Transparent
Easy peel	Red (acrylic) / White (synthetic rubber)

Adhesive stability

Condition	Adhesive backing	Exposure tolerance – after setting no load
Minimum temperature	Synthetic rubber	-30 °C / °F
	Acrylic (transparent)	-30 °C / °F
	Acrylic (black)	-40 °C / °F
Maximum temperature (softening point)	Synthetic rubber	+90 °C / °F
	Acrylic (transparent)	+160 °C / °F
	Acrylic (black)	+160 °C / °F
Resistance – water ¹	Synthetic rubber	High
	Acrylic (transparent)	High
	Acrylic (black)	High
Resistance – solvents ²	Synthetic rubber	Medium
	Acrylic (transparent)	High
	Acrylic (black)	High

1: Distilled water, sea water

2: Isopropyl alcohol

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Standards compliance

Flammability testing

Duotec® specifications	50B4.5	50B4.5FR	40W4.0	40W4.0FR
FMVSS-302	Confirmed	Confirmed	Confirmed	Confirmed
FAR §25.853(a) App. F, Part I (a)(1)(v) 15 Second Horizontal Burn Test	Confirmed	Confirmed	Confirmed	Confirmed
FAR §25.853(a) App. F, Part I (a)(1)(ii) 12 Second Vertical Burn Test	X	X	Under evaluation	Under evaluation

OEKO-TEX® Standard 100 Annex 4 Compliance

Per edition 03.2021

For Duotec® 10, 40 and 50

Condition	Result
pH value	4.0-7.5
Formaldehyde law 112	≤ 75 mg/kg
Extractable heavy metals	Product class II
Heavy metals total content	Product class II
Pesticides	Product class II
Chlorinated phenols	Product class II
Phthalates	≤ 0.05 [w-%]
Organic tin compounds	Product class II
Other chemical residues	Product class II
Colourants – Cleavable carcinogenic arylamines	≤ 20 mg/kg
Colourants – Cleavable aniline	≤ 50 mg/kg
Colourants – Carcinogens	≤ 50 mg/kg
Colourants – Allergens	≤ 50 mg/kg
Chlorinated benzenes	≤ 1 mg/kg
Polycyclic aromatic hydrocarbons (PAHs)	Product class II
Biological active products	None

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Condition	Result
Flame retardant products (Note - FR products separately reviewed)	None
Solvent residues – NMP, DMAc, DMF	≤ 0.05 mg/kg
Solvent residues – Formamide	≤ 0.02 mg/kg
Surfactant, wetting agent residues, alkyl phenols	Product class II
PFCs, per- and polyfluorinated compounds	Product class II
UV stabilisers	≤ 0.1 mg/kg
Chlorinated paraffins	≤ 50 mg/kg
Siloxanes	≤ 0.1 mg/kg
N-nitrosamines	≤ 0.5 mg/kg
N-nitrostable substances	≤ 5 mg/kg
Colour fastness – Water	Score: 3
Colour fastness – Acidic perspiration	Score: 3-4
Colour fastness – Alkaline perspiration	Score: 3-4
Colour fastness – Dry rubbing	Score: 4
Emission of volatiles	Product class II
Organic cotton fibres	Not used
Determination of odours	No abnormal odours
Determination of odours – SNV 195 651 (Modified)	Score: 3
Banned fibres	Not used

European regulations

EU REACH: This product is classified as an article with no intended release of chemical substances under Regulation No. 1907/2006 of the European Parliament and the Council (REACH). It is not considered a chemical preparation and thus is not subject to (pre-)registration or the registration process, nor does it require a safety data sheet.

EU REACH Binder Duotec® product family: This product and its components do not have any Substance of Very High Concern (SVHC) above 0.1% by weight, as identified in Article 59 of REACH. This declaration reflects the substances on the candidate SVHC list, effective January 2024.

EU RoHS: This product complies with the maximum concentration values (MCVs) set under EU Directive 2011/65/EU (RoHS recast/RoHS 2), as specified in Annex II of that directive. Each homogeneous material within this product has less than: (a) 0.1% (by weight) of lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers; and (b) 0.01% (by weight) of cadmium.

EU RoHS phthalates: This product complies with the phthalate concentration limits set under EU Directive 2011/65/EU (RoHS recast/RoHS 2), amended by EU 2015/863. For products in categories 1-7 and 10-11, compliance is required by 22 July 2019, and for categories 8 and 9 by 22 July 2021. Each homogeneous material within this product has less than 0.1% (by weight) of DEHP, BBP, DBP and DIBP.

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US regulations

SDS (US OSHA): This product is classified as an article and is therefore exempt from the US Occupational Safety and Health Administration's (OSHA) Hazard Communication Standard 29 CFR 1910.1200(b)(6)(v), which requires the provision of a Safety Data Sheet (SDS).

CONEG: This product adheres to the US CONEG (Coalition of Northeastern Governors) Model Toxics in Packaging Legislation, as it does not have intentionally added lead, cadmium, hexavalent chromium or mercury, and the total concentration of these substances does not exceed 100 ppm by weight.

Conflict Minerals: According to the US Securities and Exchange Commission (SEC) definition, this product does not contain Conflict Minerals (gold, columbite-tantalite (coltan), cassiterite, wolframite or their derivatives — tin, tantalum or tungsten) or these minerals are not essential to its functionality or production, as defined in the SEC's Conflict Minerals Rule, 77 Fed. Reg. 56274 (Sept. 12, 2012).

International regulations

China RoHS: This product or its components comply with the maximum concentration values (MCVs) specified in China RoHS GB/T 26572-2011. Each homogeneous material within this product has less than: (a) 0.1% (by weight) of lead and its compounds, mercury and its compounds, hexavalent chromium, and its compounds, polybrominated biphenyls or polybrominated diphenyl ethers; and (b) 0.01% (by weight) of cadmium and its compounds.

Content data

Biosource content: This product does not have biosourced polymer or modifier content unless otherwise specified.

Fluorinated greenhouse gas: This product does not intentionally include any Fluorinated Greenhouse Gas (F-Gas) listed in Annex I and II of Regulation (EU) No. 517/2014.

Halal: This product has not been evaluated for Halal certification.

Halogens – IEC 61249-2-21: This product complies with the IEC 61249-2-21 standard for non-halogenated materials, having less than 900 ppm bromine, less than 900 ppm chlorine and less than 1500 ppm total bromine and chlorine.

Kosher: This product has not been evaluated for Kosher certification.

Recycled content: This product does not have recycled content unless otherwise specified.

TSCA section 6: This product does not contain the following chemicals: 2,4,6-Tri-tert-butylphenol (CAS 732-26-3), decabromodiphenyl ether (Deca-BDE) (CAS 1163-19-5), hexachlorobutadiene (HCBd) (CAS 87-68-3), pentachlorothiophenol (PCTP) (CAS 133-49-3), or phenol, isopropylated, phosphate (3:1) (PIP (3:1)) (CAS 68937-41-7).

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Chemicals and/or compounds of interest:

- Gallium (CAS 7440-55-3): Not known to contain.
- Germanium (CAS 7440-56-4): Not known to contain.
- Materials of human origin: Not known to contain.
- Mica: Not known to contain.
- Rare Earth Elements (REE) or Rare Earth Metals (REM): Not known to contain.

Per- and polyfluoroalkyl substances (PFAS):

- PFAS: Not intentionally added.
- Perfluorohexane sulfonate (PFHxS): Not intentionally added.
- Perfluorohexanoic acid (PFHxA) (CAS 307-24-4): Not intentionally added.
- Perfluorooctanesulfonic acid (PFOS) (CAS 1763-23-1): Not intentionally added.
- Perfluorooctanoic acid (PFOA) (CAS 335-67-1): Not intentionally added.

Definitions:

1. 'By-product'

A chemical substance formed or resulting without targeted intent during the manufacture, processing, use or disposal of required chemical substance or mixture.

2. 'Contains'

Reasonably expected to be found in the product based on information disclosed by vendors, converters, compounders or as identified during laboratory testing.

3. 'Impurity'

A chemical substance unintentionally presents itself with another chemical substance (e.g. residuals, catalysts, process solvents).

4. 'Not known to contain'

Analytical measurement for presence is currently unavailable.

5.1. If measurement is possible:

5.2. The material has not been identified or disclosed to Binder,

5.3. The material has not been specifically quantified or detected, or

5.4. Based on information from raw material or component suppliers, converters or compounders, potential impurity or resulting by-product at or below regulatory thresholds (e.g., 0.01% w/w).

5. "Not intentionally added"

No known or suspected elements or materials have been used in the manufacture of the Duotec® product family.

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