Putting our Barrier Coating Resins to the test.

Properties and evaluation methods explained.

covestro

Testing for sustainable success

Our barrier coating resins are developed to replace current non sustainable water, oil and grease-resistant barriers, such as fluorochemicals and extruded polyethylene. Unlike other fluorine-free alternatives, the base resins we offer can be formulated and tailored to achieve a full range of grease values and water barrier depending on the performance and environmental profile targets of the application.

The methods we use to test our coating resins, and the results they subsequently achieve, prove that they work successfully in the following applications.

Dry food, sugar bags, tea envelopes

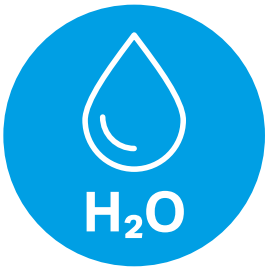
Flexible paper used in sandwich wraps or to hold cheese etc.

Hot food containers

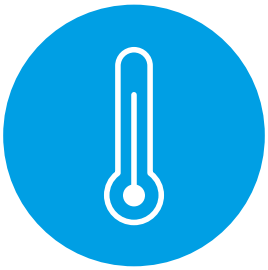
Cold food containers

Recyclable paper pouches replacing secondary plastic packaging

Key application properties of our barrier coating resins



Water barrier

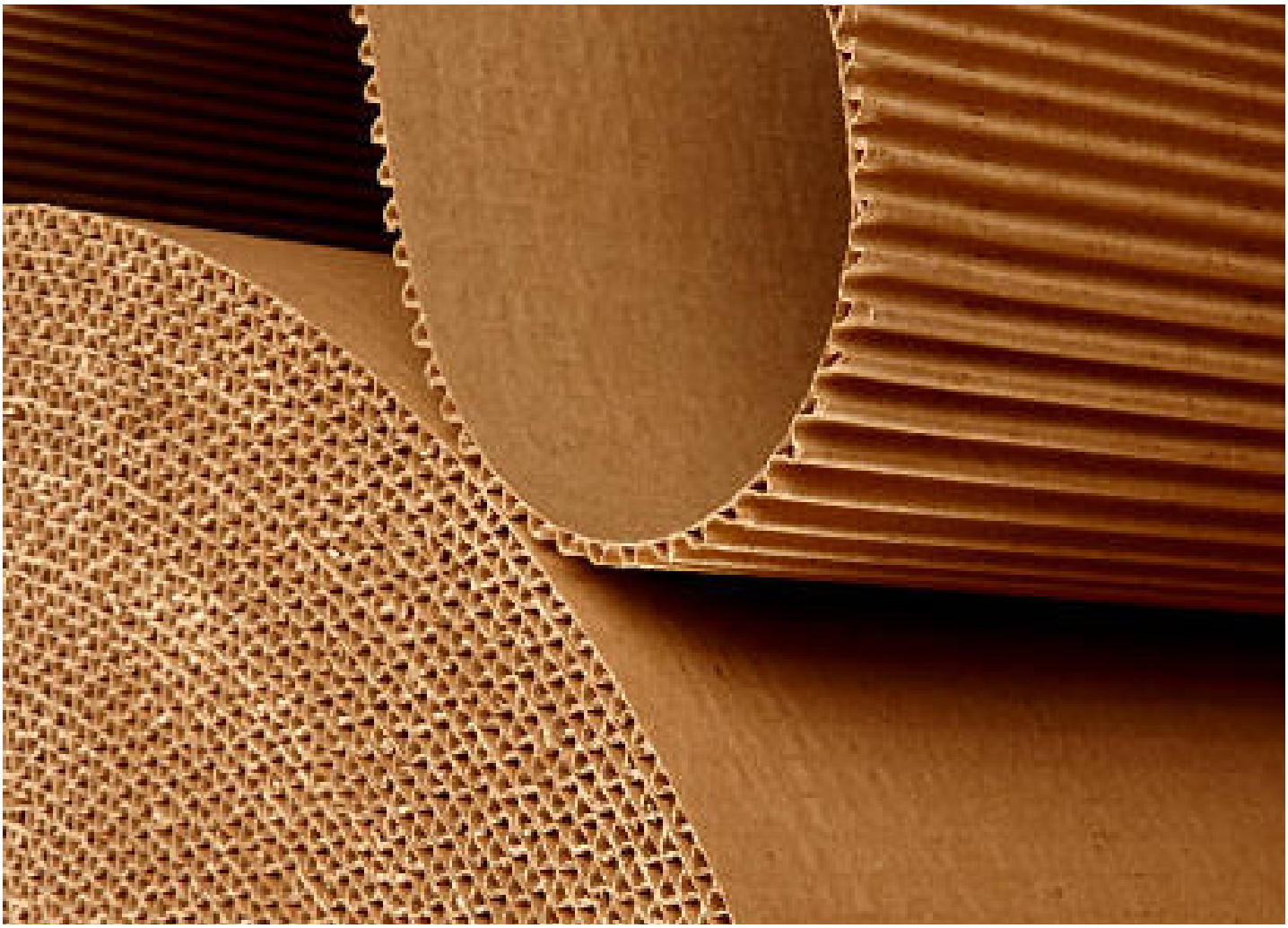


Heat resistance

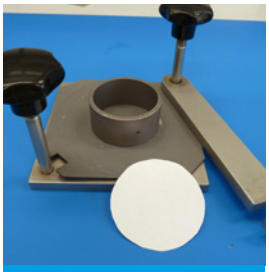
Heat seal

Grease/oil transmission

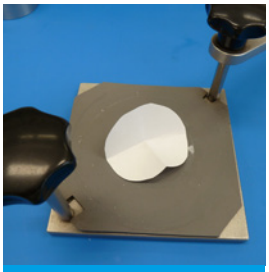
Low odor



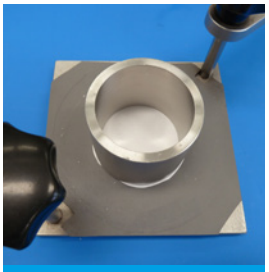
Property: Water barrier



Test tools

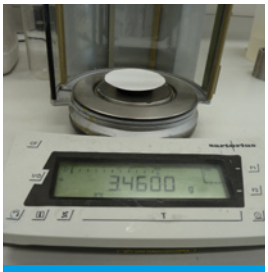


Substrate entered in test tools



Pressure on substrate

Distilled water is added for test



Paper is weighed before and after water is added

Test Method 1 – Cobb Test

Using the Cobb test, we can determine the amount of water absorbed into the surface by paper and cardboard sample in a set period of time, usually 60 or 1800 seconds (Cobb60 or Cobb1800). Water absorbency is quoted in g/m2.

Test Method 2 – Water vapor permeability WVTR (MVTR)

Water vapor permeability is the ability of a material to allow moisture to pass through it.

Moisture-sensitive foods and pharmaceuticals often use packaging with controlled vapor permeability, as moisture absorption can cause a loss of quality in the product and can also encourage growth of fungi.

Packaging with reduced/zero permeability helps it achieve the required standards for quality, safety, and shelf life.

Water Vapor Transmission Rate (WVTR) is a measure of how much vapor is transmitted through a material under specific settings (e.g. temperature and humidity). The higher the value of the permeability of the material, the more rapidly vapor can pass through it.

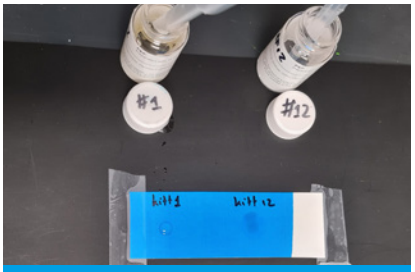
In our lab we use two methods to measure WVTR:

- Gravimetric method – the arbitration method of water vapor permeability testing. This is a good screening method for a broad range of paper substrates with different WVTR values.
- Mocon Permatran W3/33 device. This measures WVTR more accurately and reliably. It is a good method for evaluating paper substrates which have low WVTR values.

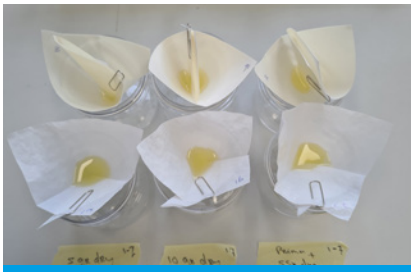
Test location:
Our own lab, where we undertake controlled water absorbency tests to ensure our coatings prevent water uptake by the substrate.

Overview:
The water absorbency of a material can have strong influence on the printability and barrier performance of the final product. Our tests helps determine how much moisture is absorbed into a substrate or passes through a substrate.

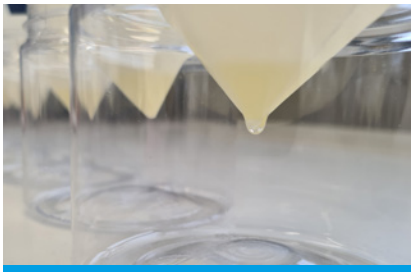
Property: Grease/Oil transmission



Kit test, drop of test liquid, visually judged



Grease resistance test in folded substrate



Example when oil is leaking through folded substrate and therefore not performing well

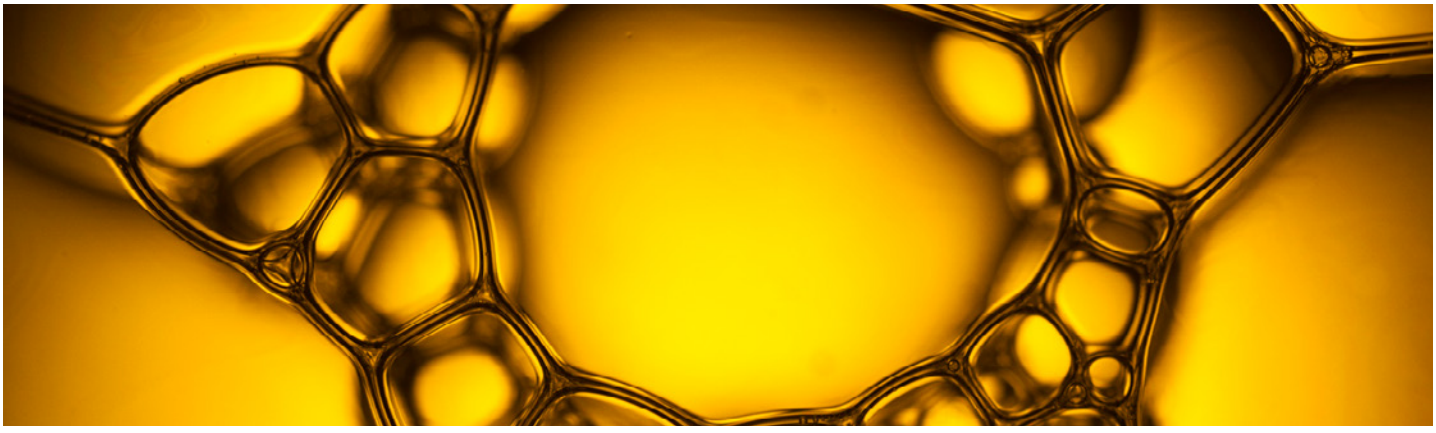
Test Method 1 – Kit test:

Test solutions with varying strengths of castor oil, toluene, heptane and turpentine are used. The highest numbered solution (the most aggressive) that remains on the surface of the paper without causing substrate failure is reported as the "kit rating". A better 'in-market' representation is undertaken in our lab using olive oil, chicken fat and coconut oil. Our coating resins all stand up equally well to the resistance challenge using castor oil, toluene, heptane and turpentine.

Kit No.	Castor oil, g	Toluene, mL	n-heptane, mL
1	969.0	0	0
2	872.1	50	50
3	775.2	100	100
4	678.3	150	150
5	581.4	200	200
6	484.5	250	250
7	387.6	300	300
8	290.7	350	350
9	193.8	400	400
10	96.9	450	450
11	0	500	500
12	0	450	550

Test location:
Our own lab, where we undertake controlled tests to ensure our coating prevents any food's oil or grease from compromising your brand.

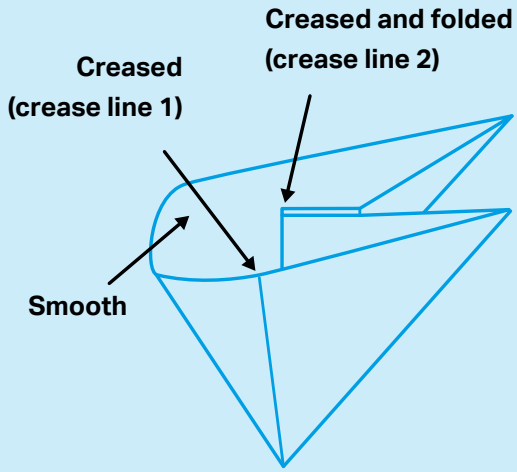
Overview:
These tests measure the degree of repellence (or anti-wicking) of paper and boards which have been treated with our non-formulated coating resins.



Test Method 2 – Grease folding olive oil test:

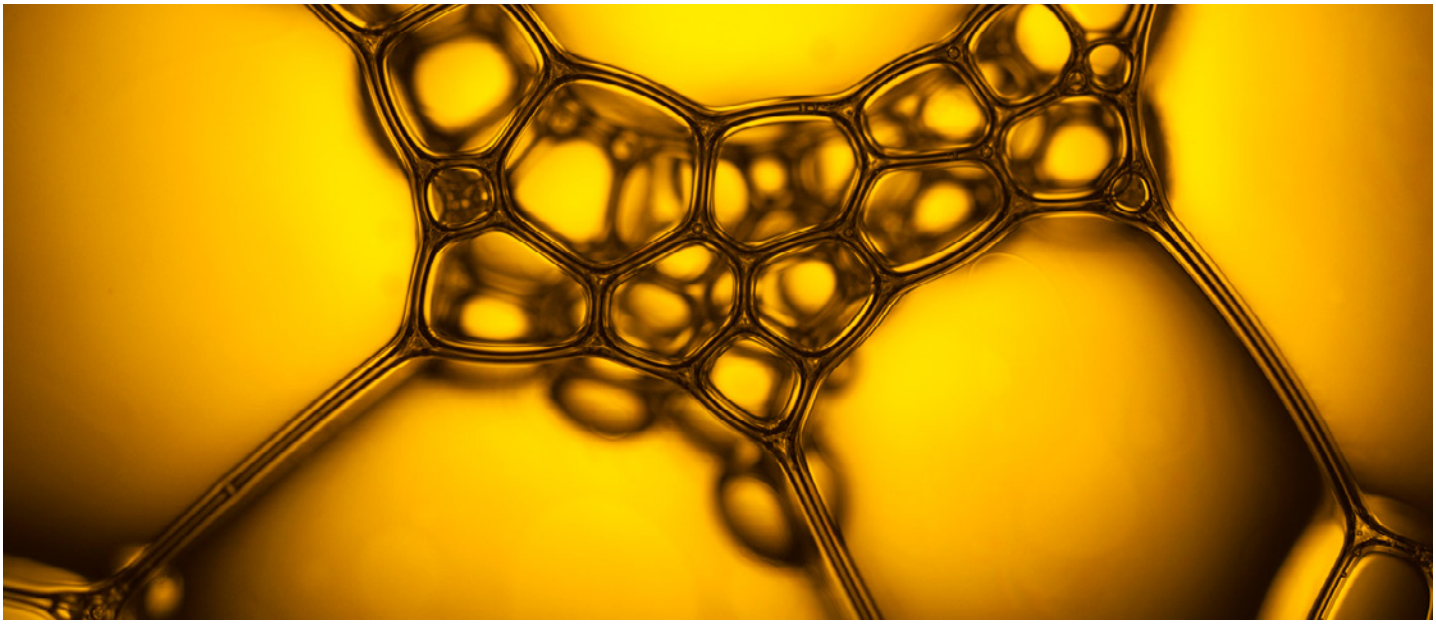
In flexible papers especially, our coating resins all demonstrated that they can stand up equally to the oil/grease resistance challenge for barrier food packaging applications.

The purpose of the test is to determine the oil resistance of coated paper or paperboard. This test is conducted at room temperature using oil then repeated with the oil heated. It can also be conducted using different types of oil and grease, and also at different temperatures. Additionally, pressure can be applied and the paper folded – this helps to replicate the way the packaging is exposed to oil or grease from the product.



Sample preparation

Value	Meaning
5	No grease penetration
4	1-2 small spots
3	3-5 small spots
2	Grease penetrated in bigger area, <50%
1	Grease penetrated in wide area, >50%
0	Grease through in whole area



Property: Low odor

Test Method

Our products are evaluated by a highly-trained panel of sensory experts (n=13) by means of a 'Difference from Control' test and a test ranking.

- For the Difference from Control test, samples are offered to the panelists one-by-one and in a way that will correct any possible scoring differences due to the order in which samples are received.
  - The samples are compared to the reference sample and a degree of difference is identified and recorded on scale of 0 (no difference) to 8 (extreme difference).

- In Ranking tests, panelists receive the same samples as before but with different codes. The panelists are then asked to place the samples in order of odor intensity, from least intense to most intense.
  - This procedure ensures that all the results we receive are statistically proven and reliable.

Test location:
Our own lab, using odor tests to ensure our coatings resins do not influence the organoleptic characteristics of the food contained within packaging.

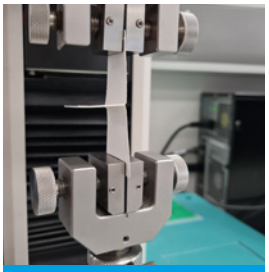
Overview:
Coatings are used as a barrier between food and packaging material so they have to be suitable for food contact. Therefore, it's important that the coating doesn't emit any odors.

Property: Heat sealability

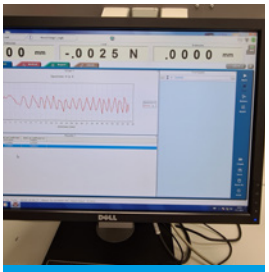
First the substrate is inserted

Then it is sealed

The test settings are input



The seal is tested



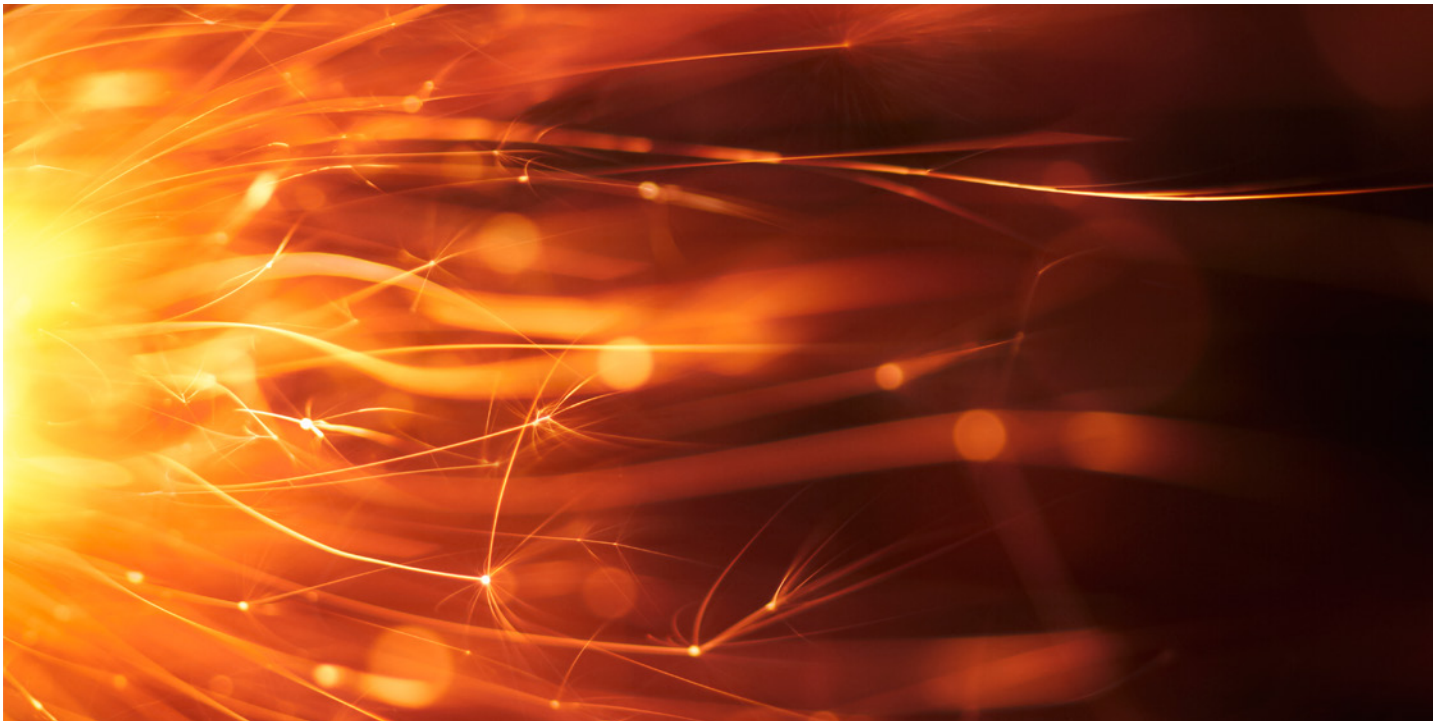
We receive digital results immediately

Test Method

Heat seal settings (temperature, pressure and contact time) will depend on the sealing technique that is used and the strength of the seal that the final packaging needs in order to protect food and keep it fresh.

Test location:
Our own lab, where we undertake heat seal tests to ensure our coatings resins meet market requirements.

Overview:
Tea bags, pouches, chocolate bars…these all require good sealability to prevent oxygen getting into the packaging and compromising the contents.



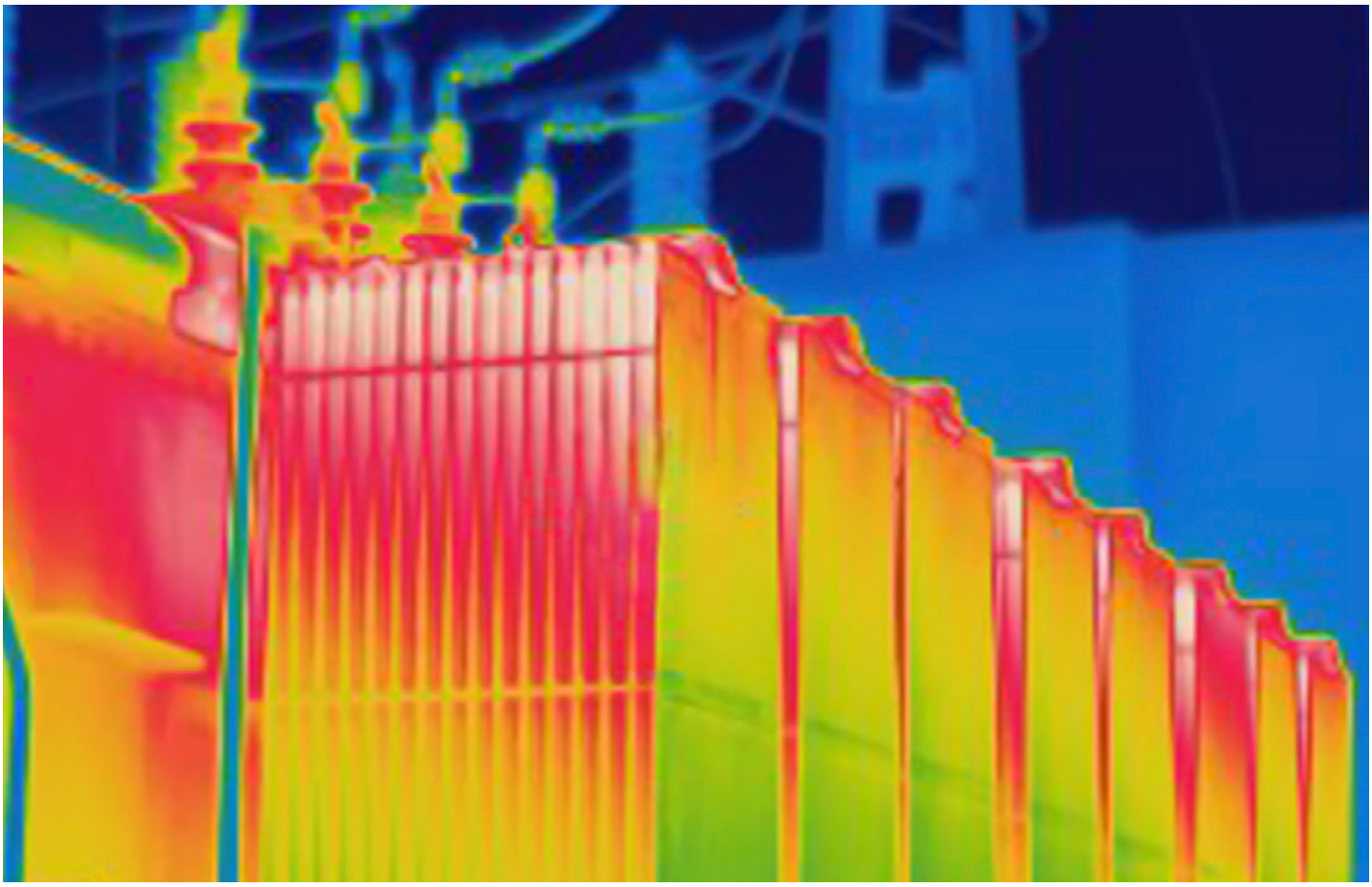
Property: Heat resistance

Test Method

Heat seal settings (temperature, pressure and contact time) will depend on the sealing technique that is used and the strength of the seal that the final packaging needs in order to protect food and keep it fresh.

Test location:
Our own lab, where we measure heat resistance in a controlled environment to ensure our coatings resins meet market requirements.

Overview:
When the coating used on food packaging is exposed to heat during processing and when in use, it must be able to withstand high temperatures before it starts melting or degrading.



Covestro Deutschland AG
Kaiser-Wilhelm-Allee 60
51373 Leverkusen
Germany

www.covestro.com

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