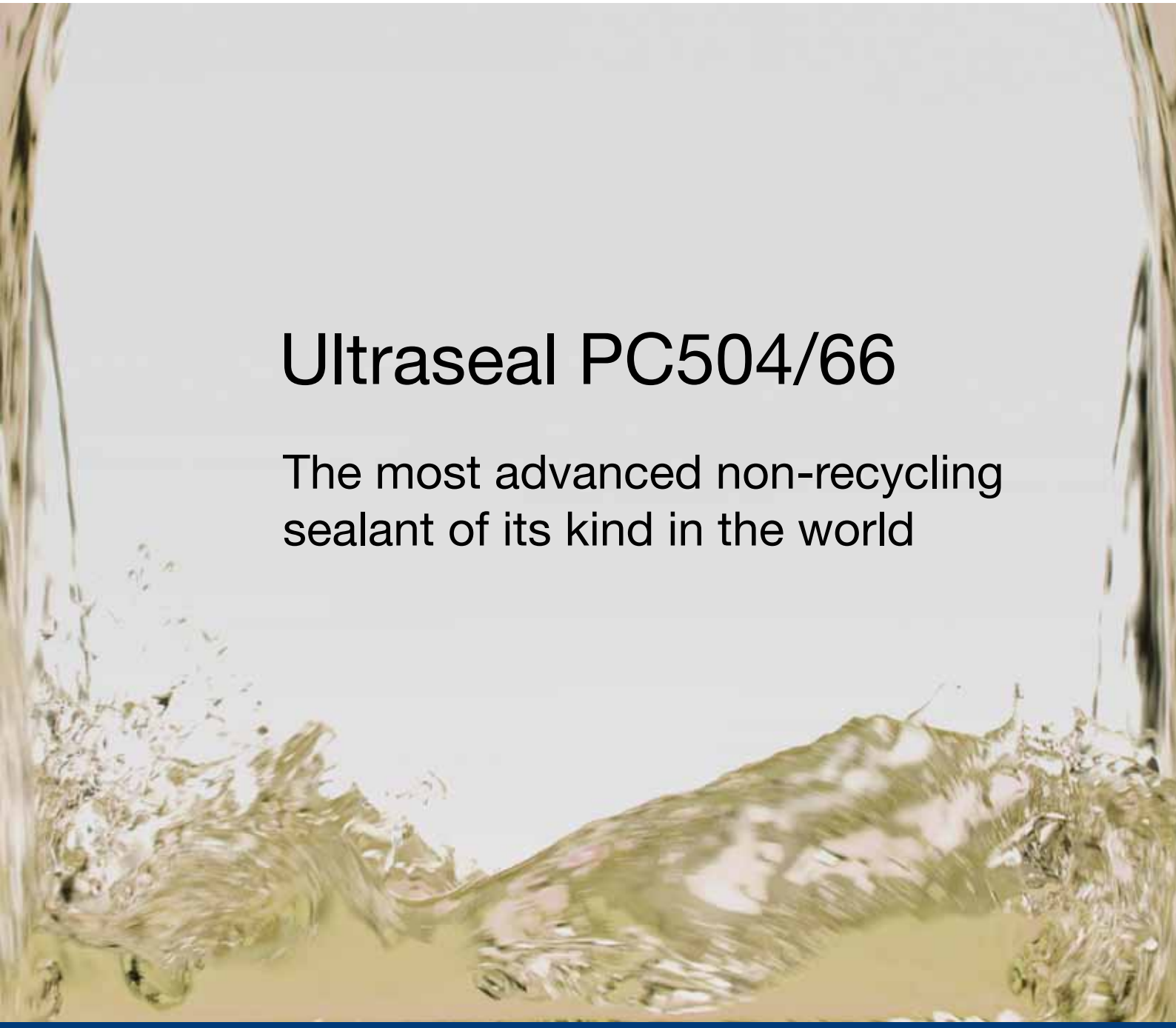
Ultraseal



Ultraseal PC504/66

The most advanced non-recycling sealant of its kind in the world

impregnation sealants

Ultraseal PC504/66 Sealant

Over many decades, Ultraseal International has established a leading position in the world's industrial markets supplying sealants for the impregnation of porosity in metal castings and other components.

When Ultraseal launched a methacrylate sealant named PC504 in1977, the impregnation industry began a radical change in the methods employed for sealing leaking porous castings. Prior to Ultraseal PC504, the most common sealants used for impregnation were sodium silicate (water glass), polyester and to a lesser extent anaerobic resins. These processes were inherently labour intensive, suffered from low productivity, had ineffective performance on certain types of porosity and in some cases were hazardous in use.

In contrast Ultraseal PC504 sealant allowed the use of a very simple process that provided the customer with high productivity, significant labour savings, and very good sealing performance. Today the PC504 range of sealants are specified by multinational companies in applications ranging from critical military and aerospace components to high volume automotive engines.

In order to keep ahead of industry's continual drive for high quality and technical performance, Ultraseal International developed a product called PC504/66 Sealant. The world's first 90°C water curing acrylic impregnation sealant, PC504/66 provides a milestone in sealing performance and temperature stability.

High Performance

Ultraseal PC504/66 Sealant has been specially formulated to meet the following demanding criteria:

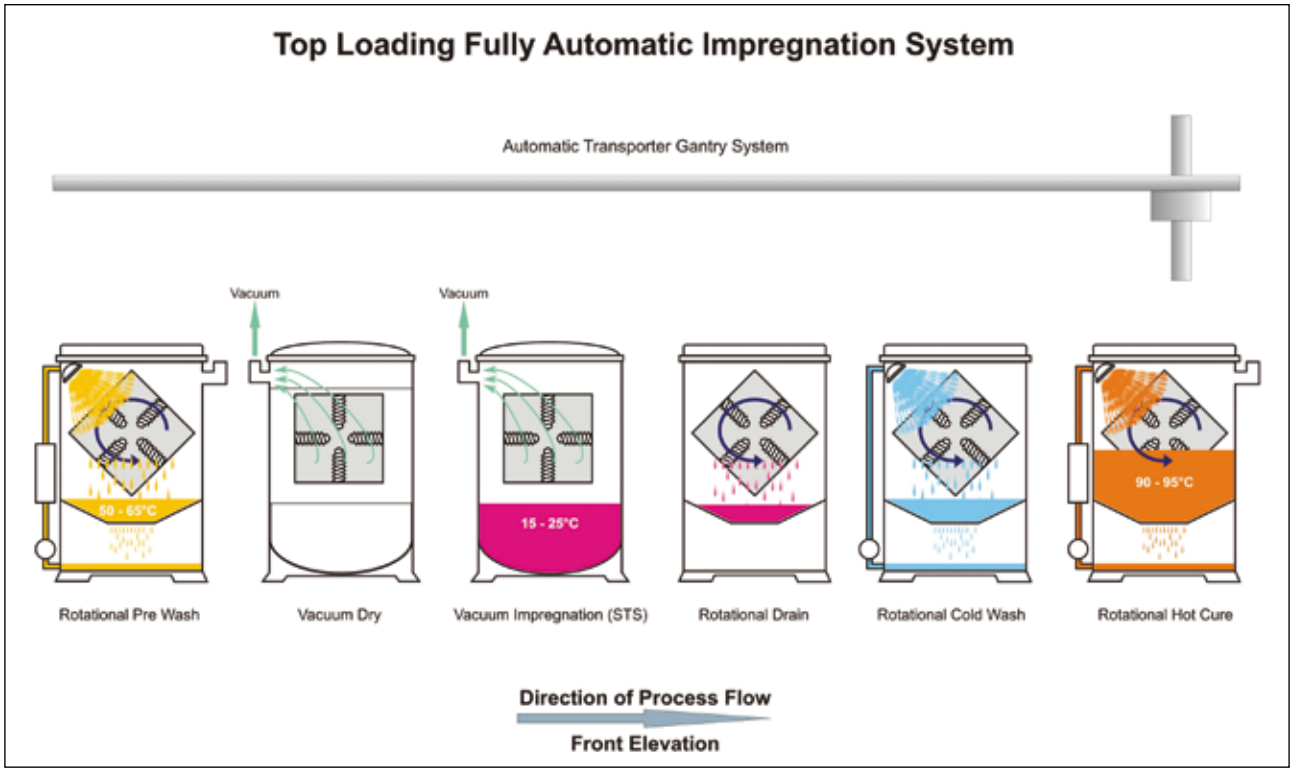
- Achieving the highest possible sealing performance, given the random nature of porosity found in metal castings.
- Conforming to the stringent sealing, temperature and chemical resistance requirements of the US Military Specification US MIL-I-17563C (Class1 and 3) and other international specifications.
- Suitable for operation in the Ultraseal Rotational System and other Standard Batch Systems.

PC504/66 Sealant-Process Application

The Ultraseal Rotational System has been specially developed to obtain optimum performance from all Ultraseal Sealants. The company's unique specialisation in impregnation equipment and sealants has enabled Ultraseal Research to develop a Total System concept.

The benefits of the Ultraseal Total System concept are:

- Incorporation of Rotational Pre-Treatment washing and dehydration processes, using Ultraseal Pre-Wash Emulsifier to remove machining contaminants from components prior to impregnation.
- Fast and effective Dry Vacuum Impregnation, using the Ultraseal Vertical Transfer System or Sealant Transfer System.
- Rotational Drain to maximise recovery and re-use of Sealant producing a highly economical system.
- Rotational Cold Wash module which achieves a consistently high level of cleanliness on treated components.
- Final Rotational Hot Water Cure to polymerise the Sealant, whilst maintaining a high level of cleanliness even on intricate and finish machined components.
- The optional addition of Post-Treatment operations such as chromate conversion and phosphating, provided by the multipurpose flexibility of the Rotational System processing module.
- Semi-automated or fully automated systems for integration into the customers manufacturing facilities, allowing virtually labour-free operation.



PC504/66 Product Characteristics

Ultraseal PC504/66 Sealant

The excellent sealing performance of PC504/66 Sealant is derived from the following product characteristics:

- Low shrinkage on polymerisation (curing from a liquid into a solid) giving excellent void filling capability
- Low viscosity for fast and deep penetration into even fine micro porosity
- High vacuums can be utilised during the vacuum impregnation cycle due to the non-solvent/non-volatile nature of the sealant.
- Tough and flexible in polymerised state providing long term resistance to vibration and temperature/ pressure cycling applications.
- Good adhesion to the walls of the cavity
- High tolerance to contamination, which could otherwise affect performance.

The demand for sealants to withstand elevated temperatures for longer periods is becoming of increasing importance with the continuing emphasis by automotive manufacturers on smaller engines with greater power output. Ultraseal PC504/66 Sealant has been developed with this criteria foremost and has already passed stringent temperature trials on aluminium cylinder heads for several manufacturers.

The performance of Ultraseal PC504/66 Sealant is excellent at temperatures ranging from -76°C to +200°C). Further temperature trials carried out by customers in certain applications have shown PC504/66 Sealant to maintain pressure resistance in aluminium castings after being subjected to temperatures in excess of 250°C for 24 hours.

Quality as Standard

Ultraseal puts all products through internationally accepted test conditions. Our rigorous laboratory testing ensures that our sealants deliver substantially superior qualities and also carry the US Military Specification MIL-I-17563C approval, therefore our customers can have the confidence that our quality statements are approved by independent accreditation (outlined in following tables) and we can provide substantiated evidence that our products will work effectively in tough service environments.

US Military Specification MIL-I-17563C Class 1 & 3 Approval

Environment	Time	Temperature	Result
Water	14 days	100ºC (boiling)	No Leak
Oil	14 days	99°C (+/- 2.8°C)	No Leak
Hydrocarbon Fluid	14 days	23°C (+/- 2°C)	No Leak
Carbon Removal Fluid	30 minutes	23°C (+/- 2°C)	No Leak
Lubricating Oil	48 hours	121°C (+/- 2°C)	No Leak
Turbine Fuel	48 hours	23°C (+/- 2°C)	No Leak
Ethylene Glycol	14 days	149°C (+/- 2.8°C)	No Leak
Hydraulic Fluid	14 days	99°C (+/- 2.8°C)	No Leak
Fuel	48 hours	23°C (+/- 2°C)	No Leak
Diester Grease	48 hours	23°C (+/- 2°C)	No Leak
Sulphuric Acid (18%)	2 hours	23°C (+/- 2°C)	No Leak
Stoddard Solvent	48 hours	23°C (+/- 2°C)	No Leak
Ethyl Alcohol	14 days	23°C (+/- 2°C)	No Leak

Impregnated US MIL Test Rings. Test pressure 3.5 bar (3.57kg/cm2)

Ultraseal International Additional Tests

Environment	Time	Temperature	Result
Engine Oil	14 days	150ºC	No Leak
Brake Fluid	14 days	150ºC	No Leak
Ethylene Glycol	14 days	150ºC	No Leak
Hydraulic Fluid	14 days	150ºC	No Leak
Unleaded Petrol	14 days	25ºC	No Leak
Water	14 days	100ºC	No Leak
PAG Oil	14 days	150ºC	No Leak
R134a Refrigerant	6 months	Ambient -10ºC to 35ºC	No Leak
R134a Refrigerant	6 months	150ºC*	No Leak

*test completed by an external global manufacturer of air compressors

Technical Data – Ultraseal PC504/66 Sealant

Liquid Phase:

Appearance	Clear pale straw liquid	**Odour**	Mild methacrylate
Viscosity (20°C Seta Zahn No 1)	32 - 34 seconds	**S.G. 20°C**	1.005 – 1.015
Flash point (Twin Pack (uncatalysed))	96°C	**Gel time** (0.8% DB42, degassed)	80 sec – 180 sec
Contamination tolerance:	Good	**Washability**	Good
Pot life: (Under normal operating conditions)	Indefinite	**Shelf life:** Under normal storage conditions	12 mths (twin pack) 6 mths (single pack)
Temperature range: Cured phase	-76 / +200°C	**US MIL-I-17563C Approved**	Yes

Superior Performance of Ultraseal PC504/66 vs. Competing Products

We consistently monitor our sealants' performance against others on the market. This guarantees that the statements we make about the quality of our products and their performance is proven true. The following test results show how impregnated US MIL-I-17563C test rings performed when subjected to thermal tests, with any leakage being recorded and graded as shown in the chart below.

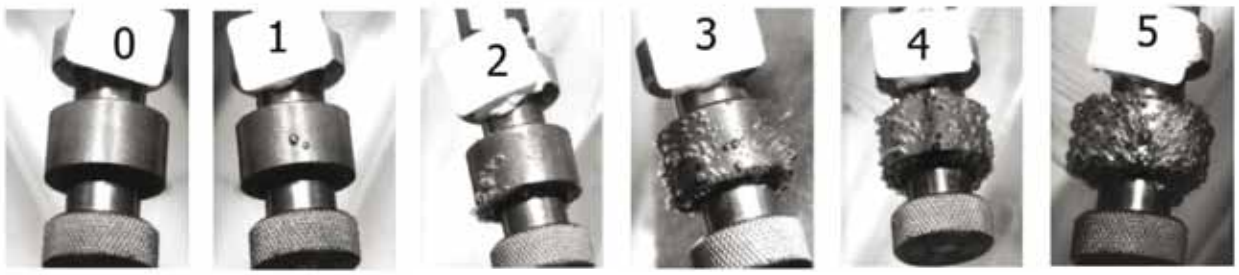
Product	Alternative competitors non-recycling sealant					Ultraseal PC504/66	
Temperature	40°C	100°C	180°C	200°C	220°C	180°C	200°C
Initial Seal	0	0	0	0	0	0	0
0.5 Hours	0	1	2	2	3	0	0
1 Hour	0	2	3	3	3	0	0
4 Hours	1	3	3	3	4	0	0
8 Hours	3	3	4	4	4	0	0
24 Hours	3	4	5	5	5	0	0

Where 0 = pressure tight (leak free) and 5 = bad leakage

The results in this table were generated from tests with a standard batch of competitors' sealant and Ultraseal PC504/66.

Even when exposed to relatively low temperatures (40°C), the competitors' sealant performance is found to suffer after only short periods of time. By comparison, Ultraseal PC504/66 retains a perfect ring seal even after 24 hours at 200°C.

Ultraseal would always recommend that the most reliable method for evaluating the performance of an impregnation sealant is through the testing of impregnated test rings, as established by the international standards and recognised test procedures. By doing so, results that reflect "in use" product performance are generated, and in this instance they indicate very clearly the superior thermal resistance of Ultraseal PC504/66 over alternatives.



Ultraseal PC504/66 Global Approvals

Importance of Approvals

Quality doesn't only apply to the delivered product, it also means recognition in terms of international approvals in respect of product performance for a specific application. Ultraseal believes that by being awarded with many International Approvals for its products, this reflects their global application and acceptance and will provide its current and future customers with the confidence to specify Ultraseal products in their impregnation applications.

Approval Types

Ultraseal PC504/66 has a large number of approvals and a small number of examples are shown below:

- Automotive
- Aerospace
- LPG
- Marine
- Natural Gas
- Water

Customer Approvals

Customer Approvals are critical in all the market segments that Ultraseal serves and provides quality assurance worldwide.

Customer approvals certify that the Ultraseal range of impregnation sealants and equipment has been rigorously tested and proves that Ultraseal products consistently perform in the specified applications across the globe.

As OEMs and the associated supply chain expand their manufacturing footprints across the world, the importance of approvals is proving to be invaluable. Ultraseal's market longevity and impregnation process experience and knowledge have attracted a wealth of blue chip company application approvals.

Our customers have a competitive advantage because they are able to replicate impregnation processes at plants worldwide, safe in the knowledge that their global quality standards will be maintained and improved.

GLOBAL LEADERS IN IMPREGNATION TECHNOLOGY

Ultraseal International
Godiva Place
Coventry
CV1 5PN

t: +44 (0) 24 7625 8444
f: +44 (0) 24 7625 1402
e: sales@ultraseal.co.uk
w: www.ultraseal.co.uk

Ultraseal Shanghai Limited
1999 Jia An Gong Lu
Jiading District
Shanghai
China, 201821

t: +86 (0) 21 6916 0313
f: +86 (0) 21 6916 0380
e: kevin@ultrasealshanghai.com
w:www.ultrasealshanghai.com

Ultraseal (India) Pvt Limited
43/1 D-2 Block, Telco Road
MIDC Chinchwad
Pune 411019
India

t: +91 2747 4500/2747 7390
f: +91 20 2747 2432
e: useal@vsnl.com
w: www.ultrasealindia.com

Ultraseal Japan
Surface Technology plc
Twin 21 MID Tower 23F
2-1-61 Shiromi
Chuo-ku, Osaka City
540-6123, Japan

t:+81 06 6944 3433
f: +81 06 6944 3434
e: kashiwa@ultraseal.co.jp
w: www.ultraseal.co.uk

Ultraseal America Inc
4343 Concourse Drive
Suite 340
Ann Arbor. MI 48108

t: 001 734 222 9478
f: 001 734 222 9479
e: sales@ultrasealamerica.com
w: www.ultrasealamerica.com