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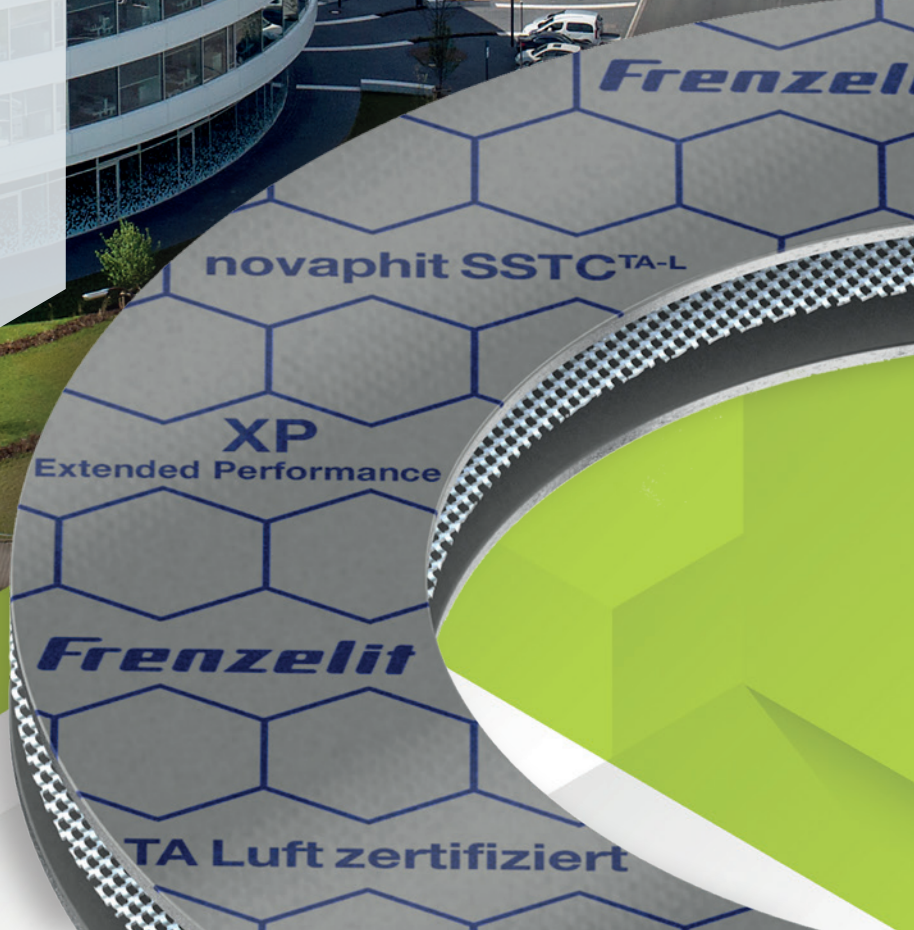
The simple and safe way to remove gaskets

Use scheduled plant downtimes for system optimization



PETROCHEMICALS

INEOS in Cologne
P.J. Schulz



PETROCHEMICAL INDUSTRY:

Downtime is a matter of trust – Solutions for maximum plant reliability

The simple and reliable way to remove gaskets

A number of problems can arise when it's time to switch out the gaskets in large petrochemical plants like the ones in use at INEOS in Cologne. Graphite gaskets frequently get stuck to the flange and have to be removed with sharp tools – a task that is not only cumbersome, but also a potential safety hazard because systems can become damaged and contaminated in the process.

novaphit® SSTC^{TA-L} graphite gaskets with XP technology by Frenzelit have excellent anti-stick properties in all application temperature ranges up to 550 °C. This guarantees simple and reliable removal, which keeps downtime to a minimum and ultimately saves money. Petrochemical companies like INEOS in Cologne are required by law to inspect individual plant components periodically and even shut them down temporarily for this purpose. Turnaround schedules are set in detail years in advance to ensure that downtime is kept to a

minimum (generally a few weeks) and to complete all maintenance, repair and extension work as quickly as possible. As a petrochemical company, INEOS is a bridge between the petroleum and chemical industry. The company's plant in Cologne makes raw materials from light gasoline (naphtha) that the chemical industry uses as a basis for the production of plastics, rubber and fibers. The raw materials are also used in solvents and detergents, varnishes, fertilizers and pesticides – and even in cosmetics and pharmaceuticals.



Plant turnaround: Every flange gasket needs to be replaced

“ The expectations for the new novaphit® gasket material with XP technology were fully met. ”

Dr. Christof Riewenherm | INEOS in Cologne



© Image: INEOS in Cologne

INEOS has 183 locations in 26 countries and is one of the largest petrochemical companies in the world; it is the third largest industrial employer in Cologne.

Challenge: Gasket removal

Turnaround is scheduled downtime of a plant to perform various tasks such as verifying the wall thicknesses of pipelines, checking vessels for corrosion and identifying material fatigue. Replacing gaskets is a key component of plant turnaround or pipeline inspection and maintenance work. All opened areas must be properly sealed again when the plant is recommissioned. It is catastrophic if leaks occur during recommissioning due to residue from old gaskets or because of damage to flanges from scraping off the gaskets. This can have serious environmental impacts. In addition, production downtime and financial loss result every time a plant is shut down or its recommissioning delayed.

INEOS in Cologne has been using Frenzelit novaphit® graphite gaskets throughout the plant since 2005; they are designed for a wide range of application temperatures from -196°C to $+550^{\circ}\text{C}$ and suitable for a large variety of media.

One of the problems of conventional graphite gaskets encountered when the sealing points are opened is that they are literally burned to the steel flange due to the high level of compression and the influence of media and temperature after years of use. They are extremely difficult to remove – and the sealing points are often located in hard-to-reach places at great heights. Tools are usually needed to scrape off gasket residue from the flange, which can leave a permanent “mark” on sensitive surfaces like stainless steel. In the worst cases, flanges need to be replaced or surfaces must be machined in a way that eliminates any leakage risk. Another drawback: Graphite particles can fall into the pipeline when scraping the gasket and contaminate later products.



Wall thicknesses need to be checked in pipelines, vessels inspected for corrosion and material fatigue identified. All opened areas must be properly sealed again when the plant is recommissioned.



Frenzelit gaskets with anti-stick properties

Frenzelit specifically addressed this problem in the development of its XP technology. However, the proven sealing properties of novaphit® had to be kept without any modifications or limitations. XP technology gives the material anti-stick properties that make it very easy to remove the gaskets throughout the entire application temperature range up to 550 °C. This is possible thanks to deep passivation, which is more than just a superficial coating; XP technology goes through the entire graphite cross section. A nanoscale ceramic coating is applied to each individual graphite particle within and covers the entire particle. Nanoscale is important because the ceramic in the gaskets shouldn't make them stiff, but should make them extremely resistant instead. Frenzelit creates a barrier between the graphite material and the steel flange to prevent

direct contact between the two. This keeps the gasket from sticking to the flange and significantly improves its ability to be removed. In addition to media resistance and temperature stability, XP technology also increases the oxidation stability of the graphite material. The carbon in the graphite no longer comes into contact with oxygen and can't burn – despite the high temperatures. This makes the gaskets last even longer.

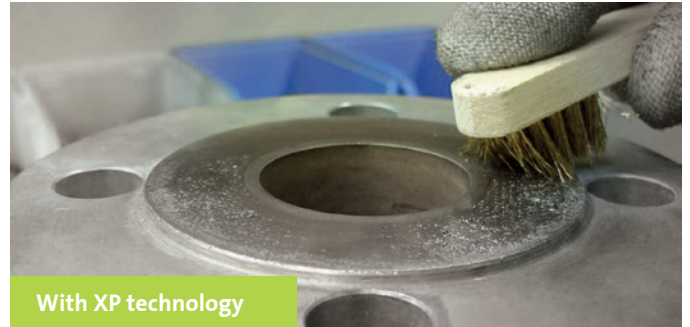
Another approach used in competitor products to improve the removability of gaskets is to apply PTFE as an anti-stick agent. But it has one major disadvantage: This conventional anti-stick version only works in a very limited temperature window and loses its function at temperatures above 250 °C. In fact, harmful decomposition products can even arise when PTFE is used at higher temperatures.

PLANT TURNAROUND:

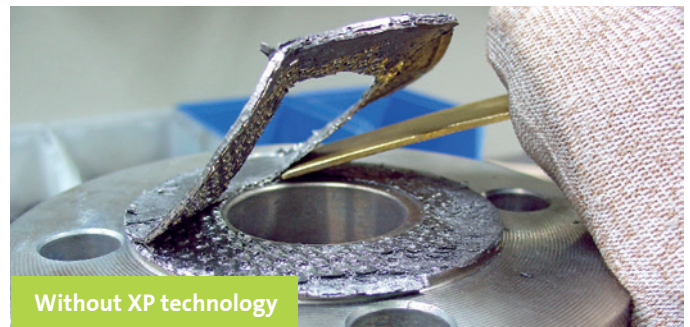
An entire plant was retrofitted with novaphit® during scheduled downtime.

Pilot test with novaphit® featuring XP technology from 2013

“Our goal is to minimize startup risks and improve flange assembly quality,” says the head of Central Asset Service (ZAS) at INEOS in Cologne, Dr. Christof Riewenherm, explaining the objective of the shutdown to perform inspection and maintenance work. “One way to support this is to use novaphit® with XP technology,” adds Riewenherm. Under his leadership, INEOS in Cologne decided to take a bold step after successfully completing the compulsory laboratory tests: As part of a pilot test, an entire plant was retrofitted with novaphit® featuring XP technology during scheduled downtime in 2013. INEOS in Cologne went to great lengths to meticulously document the procedure and ensure that the installation was practical. After all, the pilot project was designed for the entire turnaround period, i.e. five years of test operation. The gaskets in the test plant are exposed to various media such as condensate, steam, C4, C5, C6 hydrocarbons, aromatics and even solvents including toluene and NMP in a wide temperature and pressure range.



With XP technology



Without XP technology

2019: novaphit® gaskets become the factory standard



“ Sticking of graphite residue on the flange was reliably prevented in nine out of ten cases. ”

Thorsten Bertram | Plant engineer at INEOS in Cologne

INEOS in Cologne experienced the promised benefits of Frenzelit’s new gasket material during the plant turnaround in 2018.

“Removal went smoothly over 90 percent of the time,” report plant engineers Thorsten Bertram and Ralph Leder (technician) at INEOS in Cologne who were responsible for the turnaround in 2018. Sticking of graphite residue on the flange was reliably prevented in nine out of ten cases. Gasket replacement went smoothly without any rework or damage to the flanges. The plant was restarted without any leaks or faults following the downtime.

After all of the company’s expectations regarding the new gasket material had been fulfilled, Dr. Christof Riewenherm met with the respective working group in early 2019 and spoke in favor of using novaphit® with XP technology as the main graphite material for the entire Cologne plant and making it the factory standard. This would benefit all system components going forward.



© Image: INEOS in Cologne

Out of the comfort zone!

Deciding to perform an extensive pilot test on a specific plant can be risky business because there is no guarantee that the material will actually deliver what it promises. Repeated shutdowns due to leakage points can have serious environmental consequences and be extremely expensive – each stoppage day costs hundreds of thousands. Dr. Christof Riewenherm did pioneering work for INEOS in Cologne that can lead the way for the entire industry:

“It’s natural for plant engineers to want to stay in their comfort zone and work with existing standards and conventional materials, but they may miss an opportunity for advancement and innovation. XP gaskets let them restart a plant quicker and more precisely while cutting costs. Taking a chance to leave the comfort zone is worth it.”

Gasket solutions and application consulting by P. J. Schulz on site



In reality, the material is not automatically set in every plant. This is especially true in the chemical industry, where responsibilities are high. Ultimately, every operation within a company and every plant engineer responsible for a system component decides independently on the parts and materials to be used. Factory standards are certainly a valuable guide, but they are non-binding. This is where P. J. Schulz comes in with compelling solutions for the use of novaphit® with XP technology.

P. J. Schulz (PJS) is a third-generation privately owned company that is highly specialized in gasket technology. “We were founded in 1938 in Cologne by Peter Josef Schulz. Today PJS has some 50 employees at its location in Bergisch Gladbach. We started as a dealer for technical industrial products and evolved into a system integrator with our own extensive production range,” says Martin Schulz, one of the two managing directors. PJS’s reputation as an expert with extensive consulting expertise in challenging gasket technology related areas is backed by a team of seasoned employees and ambitious young talents. Their services are highly valued by both domestic and international business partners.

The PJS team was on site with its own service container for the entire turnaround to provide support. They worked hand in hand with the respective plant engineers and technicians at INEOS and ensured that all required materials were available at all times –



P. J. Schulz company building

especially novaphit® with XP technology. Detailed coordination and a high level of trust are essential to meet or even exceed the target time for the turnaround. An integrated gasket shop guaranteed short routes, direct exchange and rapid implementation. Through constant exchange of information and coordinated logistics between INEOS in Cologne and PJS or the on-site gasket shop, they mastered even the most difficult challenges such as those posed by unplanned special gaskets or custom gasket connection designs. Or, as Herbert Schulz puts it: “A highly professional level of turnaround management!”

“PJS uses and recommends gaskets equipped with XP technology out of deep conviction for the property profile. And the practical experience gained from numerous other installations at INEOS Cologne and other chemical sites tells us we are on the right path.” (Herbert and Martin Schulz, P.J. Schulz)

This is how novaphit® with XP technology is gradually becoming the standard solution throughout the entire INEOS site in Cologne.

Your solution partners



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Frenzelit

creating hightech solutions



© Image: INEOS in Cologne

INEOS in Cologne

INEOS was founded in 1998 and is the third largest chemical company in the world. 22,000 employees in 18 divisions generate \$60 billion in sales annually. INEOS in Cologne is the largest chemical company in Cologne and the city's third largest industrial employer. With 2,500 employees in four divisions, INEOS in Cologne is the flagship of the INEOS Group.

ADVANTAGES AT A GLANCE

novaphit® with XP technology

- ✓ High-quality gasket in terms of TA Luft / VDI 2440; blow-out resistant even without inner eyelet
- ✓ Does not bond with glass and ceramics
- ✓ Very good anti-stick properties
- ✓ Cost-effective installation
- ✓ Made from in-stock sheet material for availability on very short notice
- ✓ Reliably seals gases and liquids
- ✓ Excellent micro sealing
- ✓ Chemically resistant to nearly all media
- ✓ Superior resistance to temperature changes
- ✓ Physically harmless; unlimited shelf life



OUR RESPONSIBILITY

to people and the environment.

As a company with a rich tradition, we care about long-term success and the satisfaction of our customers. Quality is always a top priority for us – as is our commitment to the environment, society and our employees.

We also pride ourselves on always considering our customers' present and future needs, something that is apparent in our application consulting, training seminars and installation services. A development partnership with us is an excellent opportunity for you to optimize products that are already a success – and a great way to get your new developments to the market even faster. We help you modify products or support you in implementing innovative material concepts – and create real added value for you.



GASKET MATERIALS

-  **novapress®**
approx. -100 to 200 °C
-  **novatec®**
approx. -100 to 250 °C
-  **novaflon®**
approx. -200 to 260 °C
-  **novaphit®**
approx. -200 to 550 °C
-  **novamica®**
approx. -200 to 1000 °C

INSULATION MATERIALS

-  **isoplan®**
approx. -100 to 1100 °C



novadisc.de
ONLINE Design Software

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Frenzelit is here to serve you in over **65 countries** around the world. Find your contact in our global network of subsidiaries, sales, service and logistics partners:

