TEKNOS

Paint with Pride

PAINTING METAL
newsletter

NUCLEAR POWER PLANTS
EXTRA 2011


Photo by: TVO Image Gallery

# Nuclear Power Plants
## Require a Great Deal from Paint

**The paints used in nuclear power plants are high-class, special products. Their quality is verified through heavy testing programmes.**


Photo by: Hannu Huovila, TVO

There are over 400,000 m² of concrete surface at OL3. Five Eiffel towers could be built using the iron in OL3's structures.

The number of paint work contractors is ten.

In Finland, the YVL Guide and the STUK-YTO-TR 210 Report, issued by the Radiation and Nuclear Safety Authority (STUK), specify the requirements for paints and coatings used in nuclear power plants. In addition, the plant orderer and plant supplier set their own requirements.

**Teknos as a paint supplier for OL1, OL2 and OL3**

Teknos has long-standing know-how in special industrial coatings for nuclear power plants.

– *We started out in this sector in the 1970s, as a paint supplier for the Loviisa 1 nuclear power plant. This was followed by paint deliveries to Loviisa 2 and the present Olkiluoto plants (OL1 and OL2). In 2010, in addition to paints for OL3, we delivered a special polyurethane coating for the ground-supported floors of OL1's turbine hall. We have delivered paints and coatings for all nuclear power plants in Sweden and for some plants in Russia. The biggest nuclear power plant project is now Olkiluoto 3, currently under construction*, states Research and Development Director **Kurt Blomqvist**.

A nuclear power plant's steel and concrete surfaces are painted almost entirely with two-component epoxy coatings. In addition, some polyurethane and zinc silicate paints are used for elastic floor coatings and outside surfaces.


As a process, R&D on special paints for nuclear power plants stretches over several years, comment Teknos' R&D Director Kurt Blomqvist (left) and R&D Chemist Tero Ojala.


Many pipes and brackets are painted multiple times prior to installation. After installation and inspection, the welded joints are touch-up painted.

## Harsh tests

The suitability of paints and coatings can be demonstrated in many ways, based on a variety of testing methods. Coatings for the containment building's inner structures are subject to the most demanding requirements. Besides their normal protective qualities, these paints are expected to have good radiation resistance, durability in a simulated accident situation, and to be capable of easy decontamination.

When used in nuclear power plants, paints must also provide chemical resistance, sufficient adhesion, wear resistance, as well as fire resistance in the case of floor coatings. Chemical resistance is tested using sulphuric acid, hydrochloric acid, nitric acid, alkali, ethanol and acetone, in other words, with the chemicals used in a power plant's various processes.

A simulated accident situation test, known as a DBA test (Design Basin Accident), is especially heavy. In this test, painted test samples are stressed in an autoclave for a week, at a high temperature and steam pressure. In addition, test samples are exposed to shock cooling. At the end of the test, the coating must still adhere well to the surface.

*– This test is extremely demanding for coatings, especially thick floor coatings. It was quite a challenge for us. However, through intensive research and development work, we found a solution in our special products particularly developed for this purpose*, R&D Chemist **Tero Ojala** reports.

## R&D work is a process lasting several years

The DBA test, as well as radiation resistance, decontaminability and fire resistance tests, are performed at VTT Technical Research Centre of Finland. Teknos performs the chemical resistance, wear resistance and adhesion tests in accordance with the STUK-YTO-TR 210 Report.
*– These tests are no picnic either – some chemical tests can even take half a year*, Blomqvist elaborates.
*– The development and testing of these special paints and coatings takes several years altogether. This process has involved a dozen people. Besides me, R&D Chemist **Ari Vaha** and Sales Manager **Mikko Nihtilä** belonged to the core group handling technical issues. An important part of R&D work was also carried out by laboratory staff. Other employees were involved in producing test bases, painting, measuring film thicknesses, testing, documenting the test results, preparing quality certificates, ensuring product tracking, and everything else required for this kind of elaborate R&D process.*

*– Besides the OL3 reactor building, Teknos is also supplying paints for the main steam turbine plant. These paints have passed the full set of demanding tests,* says Tero Ojala.

**Strong special know-how**

A nuclear power plant is an extra-heavy test location for paint products.

*– When a paint product is approved by a nuclear power plant, this is a sign that the paint is extra high-grade and technically advanced. At Teknos, we have invested strongly in producing such paints, both financially and in terms of hours worked. We can proudly declare that our own products have taken us to the leading edge in this area. In Finland and elsewhere, we are keenly following the start-up of new nuclear power plant projects. We will be ready when the expected renaissance of nuclear power begins in earnest*, Blomqvist envisions.

***Juhani Ikonen***
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TVO, Teollisuuden Voima Oyj is an unlisted public company, founded in 1969 to produce electricity for its shareholders at cost price. Further information: www.tvo.fi

R&D Chemist Ari Vaha reviews DBA test samples at VTT Technical Research Centre of Finland.

# Teknos' Coating Systems for Nuclear Power Plants

Teknos' nuclear power plant coating systems for metal and mineral surfaces meet the latest international standards and requirements, for instance, STUK-YTO-TR 210 (Radiation and Nuclear Safety Authoroty) and TBY (Technical Re-gulations for Surface Treatment).

**References:**

- Loviisa 1 & 2, Olkiluoto 1 & 2, Olkiluoto 3 / Finland
- Ringhals, Oskarshamn, Forsmark / Sweden
- Smolenskaya, Rostovskaya, Kolskaya / Russia
- Tianwan / China
- Kudankulam / India

## Teknos´ Nuclear Power Plant Systems for Mineral Surfaces

| | | |
|---|---|---|
| TEKNOPOX AQUA V Fill A<br>TEKNOPOX AQUA V TIX A<br>TEKNOPOX AQUA V A | filler < 2 mm<br>80 µm<br>80 µm | Walls and ceilings, Controlled areas |
| TEKNOFLOOR AQUA 110F A | 3 x 60 µm | Floors, Controlled areas |
| TEKNOFLOOR 5730 A<br>TEKNOFLOOR 5600 A | Priming<br>2 – 4 mm | Floors outside containment, Controlled areas |
| TEKNOFLOOR 5740 A<br>TEKNOFLOOR 5610 A | Priming<br>2 – 4 mm | Floors inside containment, Controlled areas,<br>(DBA approved) |

## Teknos´ Nuclear Power Plant Systems for Metal Surfaces

| | | |
|---|---|---|
| INERTA PRIMER 5 A<br>INERTA 51 A<br>INERTA 50 A | 80 µm<br>80 µm<br>40 µm | Steel containment inside, Controlled areas<br>Pipes (no condensation) |
| TEKNOPLAST HS 150 A | 3 x 100 µm | Pipes (under continuous condensation), Controlled areas |
| INERTA 160 A | 500 µm | Pipes and tanks immersed in operation medium, Controlled areas |
| INERTA 160 | 2 x 500 µm | Sea water pipes, Non controlled areas |
| INERTA 165 A | 2 x 250 µm | Pipes and tanks immersed in operation medium, Controlled areas |
| INERTA 250 A | 500 µm | Pipes and tanks immersed in operation medium,<br>Controlled areas, Chemical resistance. |
| TEKNOZINC 90 SE A<br>INERTA 51 MIOX A<br>TEKNOPLAST HS 150 A | 50 µm<br>30 µm<br>120 µm | Embedded parts in concrete, Controlled areas,<br>Anchor plates, steel frames |