How to Correctly Specify

Epoxy Passive Fire Protection

Over the years, from real life experience of passive fire protection (PFP) on offshore and onshore installations, it has been clearly demonstrated that there can be significant differences in performance and life expectancy of various epoxy materials. In worst cases, degradation of materials has required costly and time consuming rectification of failing products.

"Owners and engineers should take care when specifying epoxy PFP for use in the oil and gas industry to ensure that products used have clear qualification to all elements of the most demanding standards applicable" said AkzoNobel's Senior Market Manager for Oil and Gas.

There are two key standards that epoxy PFP should fully comply with: NORSOK M501 Rev 6 System 5A and ISO22899-1.

ISO22899-1

Until recently, epoxy PFP assessment for jet fires was inconsistent, done on an ad hoc assessment basis using various technical reports and test set-ups.

With the introduction of the first and only internationally recognized jet fire standard ISO22899-1 and the soon to be published ISO TR22899-2, the oil and gas industry now has a formal procedure to accurately assess and reliably rate epoxy PFP jet fire performance.

ISO22899-1 is also the only jet fire standard for which many classification societies (currently giving type approvals for passive fire protection) will give type approval certificates (TACs). The type approval brings greater quality control using audit testing and factory production control assessments which were not required in previous technical reports.

The ISO22899-1 standard gives guidance on how to assess epoxy PFP jet fire resistance at different temperatures and assessment of the data may show lower critical core temperatures require more protection for the same jet fire duration.

The type approval should state the critical core temperature for which the TAC is valid so that it is clear under what conditions the thicknesses have been determined. This is the only way to ensure that specifications are correct for the required jet fire duration.

Critically, it is also important that the epoxy PFP systems maintain their fire performance after weathering. The industry accepts that if after weathering the steel temperature is higher than the original design critical core temperature (typically 400ºC) by a value of 10% or less when exposed to a hydrocarbon fire then an acceptable insulation is maintained for structural stability.

AkzoNobel's epoxy PFP Chartek® 7 is fully compliant with both the NORSOK M501 Rev 6 System 5A and with type approval certification based upon ISO22899 standards.

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NORSOK M501 Rev 6

"Given that for most of its life epoxy PFP acts as an anticorrosive system, it is important that it has excellent durability and corrosion protection properties" stated AkzoNobel's Worldwide Director for Fire and Insulation Coatings.

The most accepted accelerated corrosion test standard in the oil and gas industry is ISO20340 "Performance requirements for protective paint systems for offshore and related structures" because it most closely reflects the cyclic wet/dry weather environments faced by coatings in the oil and gas onshore and offshore markets. Furthermore, the ISO20340 test method also shows similar coating breakdown mechanisms to those observed in the field for Chartek.

The ISO20340 standard is used by NORSOK M501 Rev 6 System 5A to pre-qualify passive fire protection systems. The standard assesses epoxy PFP systems after exposure to 25 weeks of QUV/condensation, continuous salt spray and -20ºC freeze cycles.

The System 5A pre-qualification requirements recognize that in the real world top coats may not always be present on epoxy PFP and so cannot be relied on to ensure that the epoxy PFP coating system remains mechanically robust and able to provide both optimum corrosion protection and fire performance. For this reason the standard expects the epoxy PFP coating system to pass System 5A without a topcoat. This means that the epoxy PFP coating system must demonstrate mechanical integrity by having a pull off value greater than 3MPa and a corrosion creep value less than 3mm when using a zinc primer. Epoxy PFP materials with a high retained pull off value tend to correlate well with products having a low water absorption and high hardness retention whereas the reverse is the case if water absorption is high.

Chartek 7 is extensively certified and has been used to protect many onshore and offshore oil and gas facilities around the world against both hydrocarbon pool and jet fires for the past 40 years.

In summary therefore it is only by ensuring that products meet all elements of these test standards, particularly fire performance after NORSOK cycle exposure, that selection of proven and durable fire protection can be made.

AkzoNobel