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Test Procedures Developed by PFPNet

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‘Standard’ Tests

- PFPNet has developed 2 test procedures:
  - A high heat flux (HHF) jet fire test
  - A critical process control equipment (CPCE) fire test
- Both are published by PFPNet, and are currently in the process of standardisation via ISO and UL.
- This presentation gives a brief overview of the forthcoming standards

High Heat Flux JF Test

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- The original draft was developed by a group of labs with experience of HHF testing, regulators, and Equinor
- It was based on the method developed by RISE: increasing radiation to the specimen via use of a compartment.
- The draft underwent full PFPNet membership review and further changes were made prior to submission to ISO.

Photo courtesy of PPG

HHF test vs ‘standard’ JF

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Standard JF test (ISO 22899-1)	HHF JF test (ISO 22899-3)
Limited specimen shapes/sizes can be tested	An increased range of specimens can be tested (larger panels/divisions and CPCE equipment)
All tests use a 1.6m x 1.6m x 0.5m box as part of, or behind, the specimen	Test specimens can be in back-wall or in compartment centre
Test conditions standardised. No in-test measurement	Test temperatures must be measured each test to confirm 350 kW/m^2.
Labs have no flexibility on test parameters	Labs given minor flexibility to ensure conditions met

HHF test summary

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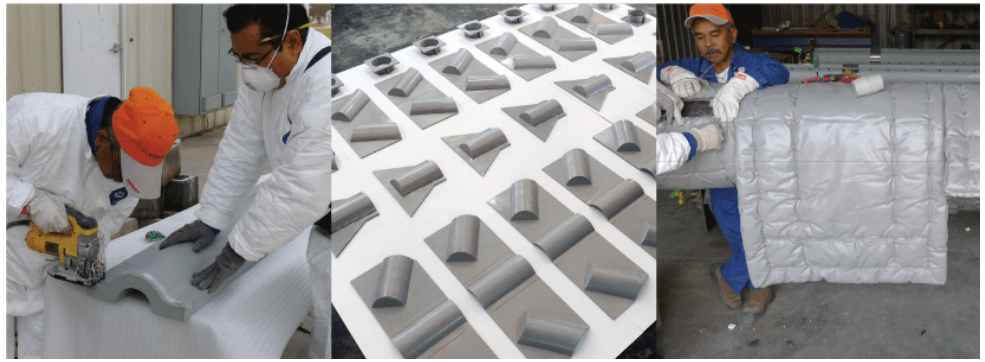
- Very few surprises for those who have done previous HHF tests
- Backwards compatibility maintained where possible
- The procedure is current at the ISO working draft stage, draft international standard ballot expected in Q3 2023.
- Assessment methodology also being consider by ISO.

CPCE

- Critical process control equipment PFP test standard



Images taken from TDI UK, Gardyon and Darchem websites

CPCE test

- PFPNet published the CPCE test procedure in 2021.
- It is a test procedure of CPCE protected with PFP. It is not intended as a test for CPCE alone.
- It is a HC test but it does not prescribe the furnace control – instead it references existing test standards. It is concerned with specimen design, instrumentation and measurement.
- It was originally intended to be compatible with UL1709. A later revision extended it to the EN/ISO HC curve

CPCE test

- Development of the procedure was difficult, as two fundamentally different approaches have been used in the past:
  - Functional test
  - Non-functional testing

- Each has pros and cons. It was decided to include both in the PFPNet document.

CPCE Test Approaches

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Functional Testing

Tests are of the CPCE and PFP in combination

Failure criteria based on operability of the equipment

PFP can be characterised in terms of temperature response of substrate (optional)

Classification for operability and, optionally, insulation. Generally limited to CPCE equipment tested

Non functional Testing

Tests are of the PFP, the substrate can be either CPCE or a representative specimen

Failure criteria based on temperature response of the substrate

PFP characterised in terms of temperature response of substrate

Classification for insulation only. Wider applicability to CPCE when the Tcrit is known

CPCE Test Specimens

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Functional Testing

Functional specimen
CPCE equipment operated throughout test

Classification for operability
Classification for insulation

Non functional Testing

Non-functional specimen
CPCE equipment NOT operated throughout test

Characteristic specimen
A steel specimen of similar shape and known mass

Classification for insulation only

Thermal evaluation specimen
Structural steel of known mass

Supplementary info only!
Cannot be the basis of classification

CPCE Test Summary

- The document is with the UL1709 STP awaiting issue as a proposal
- The PFPNet version is published
- Although complicated, the test procedure gives a path to certification for a wide range of products

Summary of test standard developments

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- ISO 22899-1: Updated 2021 (changes to pipe penetrations testing)
- ISO 20902-1: Divisions testing for offshore facilities (published 2019)
- ISO 20902-2: Penetration and cable transit seals (published 2022)
- ISO 21843: PFP for pressure vessels (revised 2022)

- CPCE: UL1709-3 expected in 2023
- HHF JF: ISO 22899-3 expected in late 2023/2024
- ISO 22899-2: JF assessment methodology expected in late 2023/2024