Gas turbine life extension

TOPIC: Blown out and damaged flange gasket causing exhaust leakage.

Symptoms:

- Burn marks and discolored insulation cladding
- Heat damages on surrounding equipment
- High turbine enclosure temperature
- Burn marks on expansion bellow soft part
- Flange bolts loosening

Concequences:

- Non-complience with HES Requirements
- Non-complience with Zone Requirements, with risk of fire or explotion if surface hot spots are exposed to hydrocarbons
- Exhaust leakages to suroundings may cause personell injuries
- Heat damages to surrounding equipment like cables, instruments, etc.
- Heat damage to Exspansion Bellow soft part
- Heat damages to surrounding surface protection
- Exhaust leak inside turbine enclosure may cause turbine trip

How to inspect:

- Visual inspection of exhaust system flanges for blown out gasket
- Inspect exhaust system from inside for flange light openings
- Thermography
- Inspect for heat damages to surrounding cables, surface protection, etc.
- Inspect for loose or missing flange bolts

Non-confirmance reasons:

- Flange thermal growth during turbine start crush flange gasket
- Flange bolts with short clamping length yield and loose tension
- Bolt may be bent due to buckled and loosening due to non-parallel flanges
- Incorrect fastener material selection
- Incorrect fastener pre-tension torque and procedure
- Incorrect flange gasket material selection

Corrective actions:

- Separate flanges, remove old gasket and clean flange gasket surface
- Install new gasket type HotSeal™ with Spacer Shim to secure correct gasket compression and a stiff bolt connection with a defined pre-tension stress.
- Install new fasteners type HotBolt™ with extension sleeve
- Pre-tension bolts in 3 steps to avoid embedment relaxation
- Protect HotBolt™ Extension Sleeve from heat radiation

HotSeal™ Flange Gasket™

- Patented by Noble Installation
- Designer for use on buckled and non-parallel duct flanges
- Designed with spacer shim to secure correct bolt pre-tension
- Material selection: Inconel 601 seal rope, Inconel 601 reinforced long fiber Silica jacket
- Inconel AISI 321 Spacer Shim

HotSeal™ Gasket with Spacer Shim for exhaust duct flanges. For 723° C continuous operating temperature.