GTB®

CASE STUDY

AL GHUBRAH POWER & DESALINATION PLANT (GHUBRAH IV)

Al Ghubrah presents an interesting case. The geometry of the exhaust ducts and silencers is representative of an ideal scenario for evaluating the long term durability of GTB® (Gas Turbine Basalt) materials within exhaust silencers, ducts and HRSG's.

Based on the GE France design, the horizontal exhaust transfer ducts and silencers are located in front of the HRSG's. The configuration is such that the exhaust silencers remain operational whether the turbines are operating in by-pass or heat recovery mode.

At the time of construction, detailed design improvements to the ductwork and silencers were undertaken by silencer designer/fabricator SOLOG of France. The systems are packed throughout with pillow-based thermal acoustic materials supplied by MC Resources Ltd (formerly LGF Group) based in Lancaster UK., with the core infill material comprising GTB® basalt mineral fibre.

Al Ghubrah has now being in operation for more than fifteen years. Enquiries have indicated that no significant thermal or acoustic problems have been encountered with the exhaust ductwork and silencers on the two units during the operational life of the plant.

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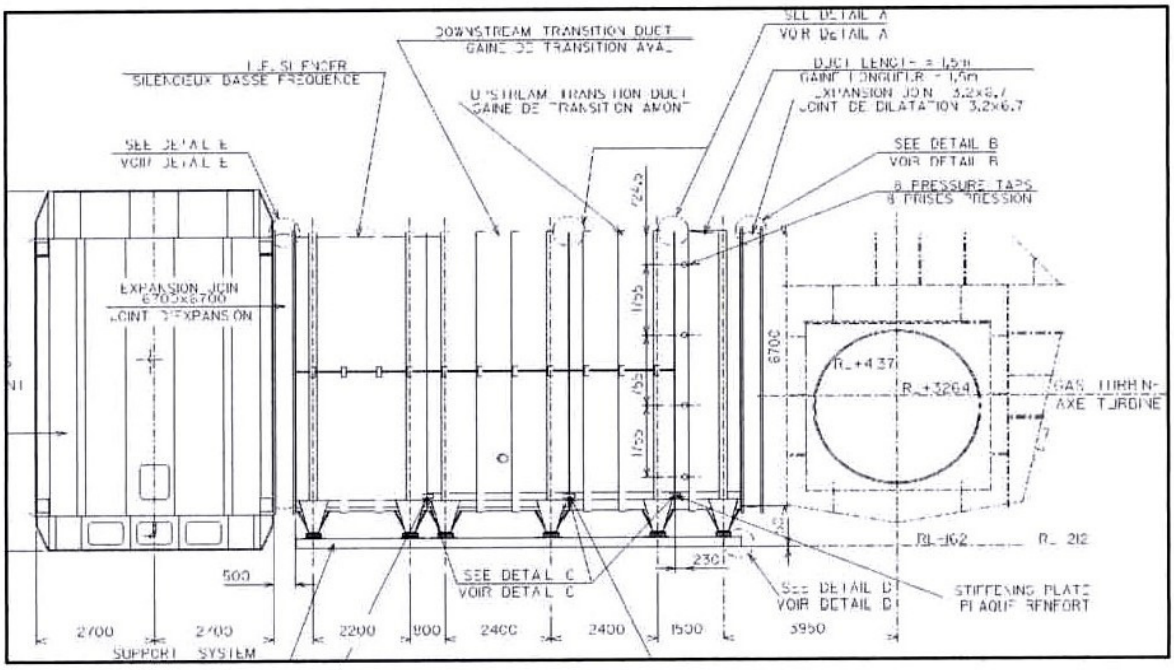
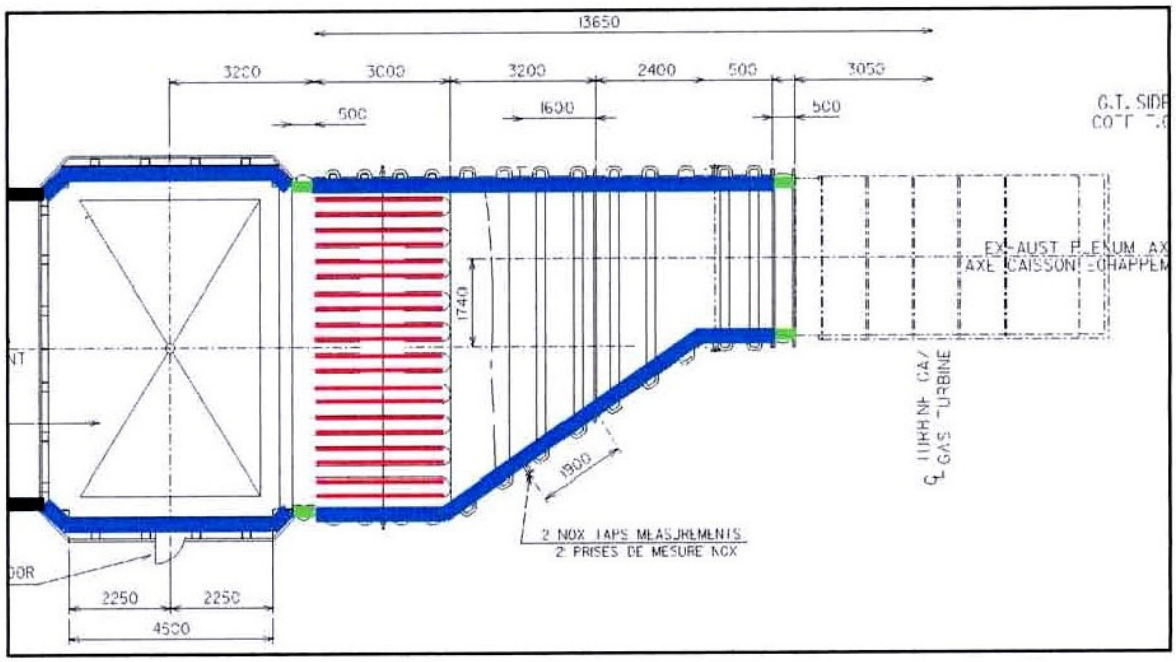
The duct layout is shown below. The location of the thermal acoustic insulation materials is illustrated on the plan view (2nd drawing).





The materials are identified by the following colours: -

BLUE GTB Basalt-based exhaust duct wall pillows (located to all surfaces within the areas shown.

RED GTB Basalt-based silencer splitter (baffle) pillows.

GREEN GTB Basalt-filled bolster pillows in first and second expansion joints.

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In Ghubrah IV, the GTB fibrous infill provides the following functionality: -

1) As an **acoustic absorber** under heat-soak conditions in the silencer baffles.

2) As a **combination thermal and acoustic material** in the silencer duct wall panels.

3) As a **thermal insulator, acoustic absorber and vibration damper** within the transfer duct walls. This application is significantly more arduous than a typical duct wall or HRSG application. The silencer baffles and duct walls have linings comprising 30% open area perforated sheeting, enabling added acoustic benefit.

GENERAL DETAILS

Operational	1995	**GT's**	2 x GE9001E
Location	Sultanate of Oman	**Design Temp**	600'C
Operator	Al Ghubrah Power & Desalination Co SAOC	**Design Velocity**	56m/s
Contractor	John Brown Engineering, Scotland, UK	**Output Rating**	2 x 95MW

Exhaust ductwork and silencer designer	GE France (Belfort)
Exhaust ductwork and silencer builder	SOLOG France.
Thermal acoustic infill supplier	MC Resources Ltd, Lancaster, UK (formerly LGF Group, Lancaster, UK)

SCOPE OF SUPPLY **Total System – Ducts & Silencers.**

DUCTWORK & SILENCER CASING: Horizontal rectangular exhaust transfer and silencer ductwork with internal insulation behind 6% open area steel sheeting (transfer duct) and 30% open area steel sheeting (silencer casing). Packed with pillow specification 600-01 (core material of GTB Basalt Mattress 4005GWM @ 128 kg/m3 with an outer envelope of 2004 fabric).

EXHAUST SILENCER BAFFLES: Exhaust baffles located in horizontal hot gas duct between GT and HRSG. Vertical splitters faced with 30% open area perforated plate and packed with pillow specification 600-05 (core material of GTB Basalt Mattress 4005SWM @ 128kg/m3 faced with 800gsm s/s needlefelt on gas faces with outer envelope of porous E-glass fabric).

EXHAUST DUCT COMPENSATORS: Packed with bolster pillows, specification 600-02 (core materials of GTB Basalt Mattress 4005GWM @ 128 kg/m3 covered with 6mm Thermal 650 E Glass needlemat with outer envelope of 2004 fabric).

Note: Basalt is a naturally occurring volcanic rock. Consequently, basalt rock deposits differ significantly in composition and do not all provide suitable source rock for the production of fibres for use in gas turbine applications. With a proven track record in GT applications, Lancaster GTB® (Gas Turbine Basalt) fibrous materials are manufactured by MCF Resources from 100% basalt melt with no added flux or binder, using source rock known to be stable in air-rich gas turbine exhaust streams. All GTB® products are unclassified under EU Directive 97/69EC.