



Certificate No: MNDE/REP/0073/03

**Metalock Engineering UK Ltd**  
**UnitH5, Pilgrims Walk,**  
**Prologis Park, Coventry,**  
**CV6 4QG, UK**

has as a member of the Midroc-Metalock AB Group been approved in accordance with the requirements of Lloyd's Register for the **"In-Situ" annealing and re-machining of crankshafts** installed in marine diesel engines.

The annealing process described in the Metalock Engineering work procedure 'Heat-treatment process description' has been developed to reduce the hardness of damaged/heat affected crankpins. Application is limited to one piece forged crankshafts made of tempering steel that have not been surface hardened by induction hardening or nitriding.

Before heat treatment is undertaken the material specification, ideally including the tempering process, must be known so as to ensure the annealing temperature used does not exceed that of the original tempering. After annealing the surface hardness of the annealed area must be within the range given by the original engine manufacturer.

Machining, in accordance with Metalock Engineering process description 'Machining of crankpins' dated 03.07.2013, is to result in satisfactory surface finish within original engine manufacturer tolerances. Final inspection to include the following: magnetic particle inspection, surface hardness, dimension, run-out, surface finish and crank web deflection.

Before any repair is undertaken, Lloyd's Register is to be informed and their agreement obtained.

This approval is subject to compliance with the requirements of Lloyds Register. Each repair must be undertaken to a written repair procedure that has been accepted by the attending Surveyor. All work is to be completed by fully trained and authorised personnel to the Surveyor's satisfaction.

This Certificate is issued to the above contractor and is valid until the date given below.

Valid until: 25 January 2021  
Date of issue: 24 April 2017

A handwritten signature in blue ink, appearing to read "Colin Waylen", written over a horizontal line.

**Colin Waylen**

Principal Specialist to Lloyd's Register EMEA  
A member of the Lloyd's Register group