



Fasteners

Rotech is a UKAS accredited metallurgical test laboratory to BS EN ISO 17025 - see www.UKAS.com for our Schedule of Accreditation, which lists all our accredited tests. We have two laboratory locations in the Midlands; at Wednesbury (principal laboratory) and Aldridge (weld testing laboratory). We have many years' experience in fastener testing and fastener failure investigations and are fully equipped to meet your specific needs and requirements within the demanding 'high end' quality fastener sector.

Rotech Laboratories can help you

If you are involved in any way with fasteners, whether as a manufacturer, stockist/distributor or a fastener end user, we have the skills and experience to perform the most popular and less well known testing on bolts, nuts, screws and washers made from all materials.

We have considerable experience in testing full size (i.e. unmachined) as well as tests on machined test pieces. The latter may be prepared from either sacrificial parts or 'overs'. We also test feedstock material in bar form for subsequent use in the manufacturing of fasteners whether by cold heading, cold or hot upset forging, thread rolling or bright turned or machined finishes. Fastener failure investigations are another important aspect of our work which often includes the use of our own Scanning Electron Microscope (SEM) equipped with EDS (EDAX). Hydrogen embrittlement is a major cause of steel fastener failure causing reduced ductility and strength and in certain cases, hydrogen induced cracking. It usually occurs in various manufacturing operations, but can also occur in operational use under particular service conditions. Rotech's experience can help identify hydrogen embrittlement using the SEM. Reference documents to consider for the de-embrittlement processes and other useful applicable information are, BS 7371 Pt1 (other parts are useful re fasteners in general), BS EN ISO 4042, BS EN ISO 15330 (preloading test for the detection of hydrogen embrittlement), BS EN ISO 898-1 and BS EN ISO 898-2.

We test to well-known company standards including Aker, BP, Cameron, Clyde Union, DEF Stan, Dresser Rand, FMC, GE, NES, Norsok, One Subsea, Shell, Statoil, Total, VGS, Wellstream and others.

Fastener mechanical tests include proof load of bolts and nuts, wedge tests for head soundness, tensile test (on full size or machined samples), proof/yield stress, total elongation, reduction in area and standard or micro hardness (surface and core). We also perform torque tests (not UKAS accredited). The popular 24-hour hardness test including heat treatment (the heat treatment is not UKAS accredited) on nuts to ASTM A194 is routinely performed. Metallurgical tests on fasteners are increasingly more important and include phase distribution, decarburisation/carburisation tests, microstructural assessment including banding, segregation and the use of micro hardness to determine phase hardness e.g. martensite, ferrite, bainite etc.

Longitudinal sectioning and macro etching is carried out to delineate forging flow lines at the bolt head-shank interface and helps reveal structural integrity along the bolt length from head to shank end.

Chemical analysis of fasteners and/or starting material is clearly of fundamental importance. If the start material or semi-finished fastener bears the right chemistry, there is every chance that optimum subsequent downstream processing will result in specification compliance and satisfactory strength (including fatigue strength if applicable), ductility, impact and corrosion resistance. We use a variety of analytical techniques including spark-OES, ICP-OES, combustion carbon, nitrogen and oxygen (not UKAS accredited).

Rotech may be able to offer small batch specialized solution heat treatment and precipitation hardening or ageing (not UKAS accredited) of common nickel based super alloys used in fastener manufacture.

Principle Fastener Product and Test Specifications

ASTM A193, ASTM A194, BS EN ISO 3506-1, BS EN ISO 3506-2, BS EN SO 898-1, BS EN SO 898-2, ASTM F606/M, ASTM A962, ASTM F738, ASTM A370, BS EN ISO 898-6

Fastener Materials

The most frequent fastener material we test are carbon, low alloy, boron and stainless steels including duplex/super duplex, alloys 625, 718 and 825, nickel aluminium bronzes, Monels, Inconels, Waspalloy and titanium alloys.

Elevated Temperature Tensile Testing and Fastener Surface Testing

From a design and use point of view, these can be of importance depending on the end use application. We can perform elevated temperature tensile testing on machined fastener feed stock or machined fasteners to ASTM E21 and BS EN SO 6892-2. Any inorganic coating (e.g. plating, galvanising, sherardising) or organic coating (e.g. painting, plastic coating, Xylan, Dacromet coating) can be salt spray tested to ASTM B117/BS EN ISO 9277 and we can also offer plating/coating thickness measuring to BS EN ISO 1463, BS EN 1254 and coating mass determination to BS EN 10346, 10152 and 12329 (withdrawn).

Finally, we can test fastener surfaces for the presence of hexavalent chromium (Cr6/CrVI) on suspect or designed chromate treated surfaces.



If you have any issues, concerns or questions, we can provide advice/technical support (not UKAS accredited) for all aspects of fastener testing.

Manufacturing Areas Covered

The principal manufacturing sectors and services for fastener testing are: - energy, power (including turbine and power generation), pipeline, petro-chemical, aerospace, automotive, rail, marine, security and construction.