SOLVAY

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NOCOLOK®

NOCOLOK®
Technical Brazing Center and Technical Service

The NOCOLOK®
Brazing Technical Center

NOCOLOK® flux brazing technology is the industry standard for brazing aluminum heat exchangers and other components.

Solvay Fluor continues to strengthen its technical assistance support in the Brazing Technical Center.

The Technical Center is equipped to fulfill many possible customer requests from cleaning and degreasing, to fluxing and brazing, and on to post braze evaluations such as corrosion testing and metallographic examinations. The Technical Center is at your service for all your NOCOLOK® brazing needs.

Objective

- To meet customer requests in trouble shooting for NOCOLOK® brazing.
- To demonstrate to prospective customers NOCOLOK® flux brazing technology.
- To assist in prototype development.
- Development of new fluxes.

Cleaning

The first step in any successful brazing operation is the removal of residual lubricants and forming oils. With a view towards more environmentally friendly degreasing methods, an aqueous degreasing station is available. Here various cleaning methods and aqueous degreasing agents can be evaluated to suit your particular needs. A drying furnace normally used for predrying fluxed parts can also be used to evaluate thermal degreasing methods.

Controlled Atmosphere Aluminium Brazing in a Laboratory Glass Furnace

Purpose

Testing brazing characteristics and properties for different material combinations and proccess conditions.

Procedure

A standard brazing test configuration consists of an angled Al strip placed on top of a base coupon (25 mm x 25 mm). The test piece is fluxed, dried and brazed in a laboratory glass furnace. The brazing process can be digitally recorded upon request.

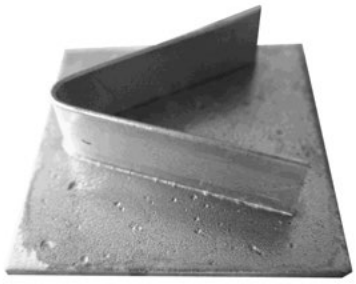
Example for brazing heating profile

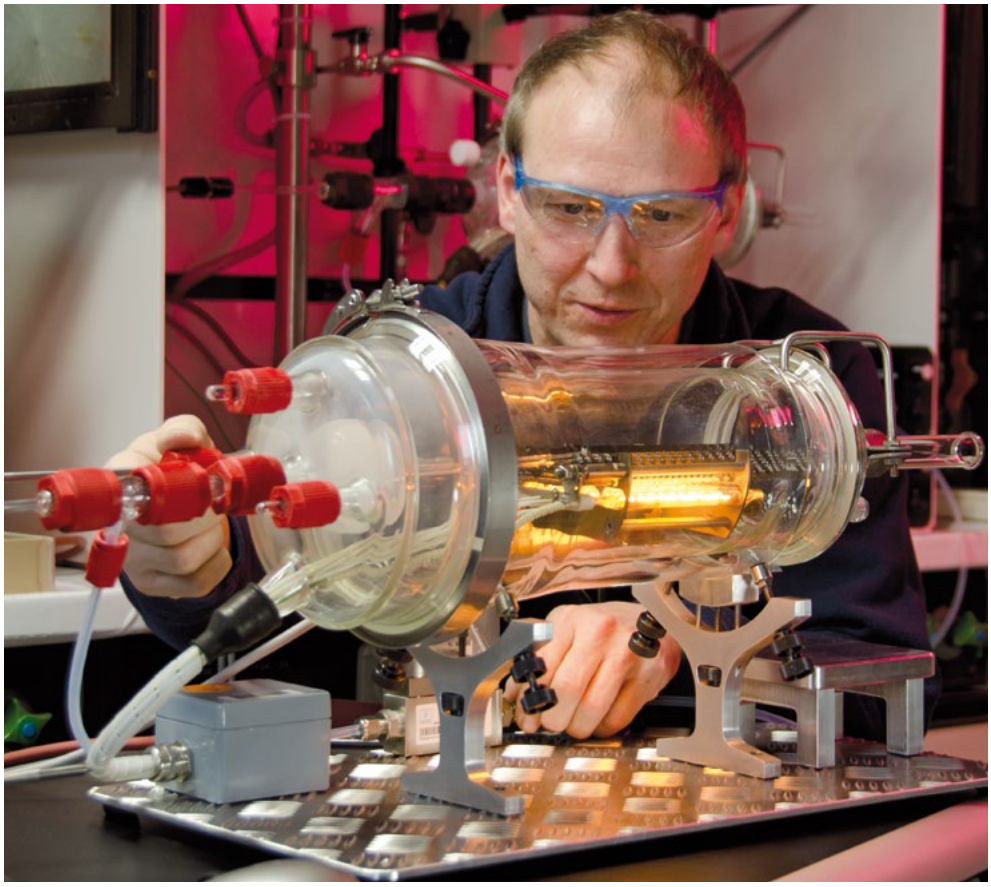
Heating rate – 30 °C/min up to 605 °C
Dwell time – 2 minutes at 605 °C,
Cooling rate – approx. 30 °C/min

The single unit test involves the following:

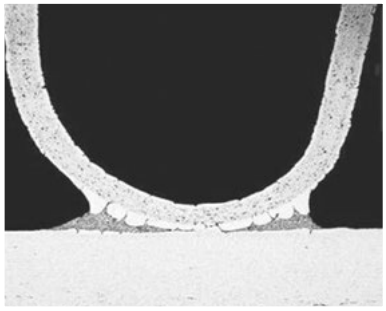
Preparation of the brazing sample (one coupon and one angle), coating of the sample with flux (Solvay and/ or client product can be used), brazing, optional recording in real time and report.

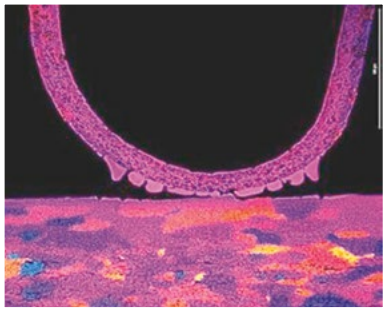
Brazing is evaluated on a scale of 1 to 5 using a set standard of brazing criteria.





Metallographic Examination





Single cross section means examination with several photographs and different etching techniques.

Purpose

To observe under an optical microscope the metallographic features of the test materials, for example to evaluate brazing quality, joint geometry, progress of corrosion, etc.

Procedure

Depending on the sample, an appropriate cross section is chosen and cut either with a band saw or with a high precision cutting wheel machine.

The sections are embedded in epoxy resin and gradually ground and polished to a mirror-like surface.

The cross section can be observed and photographed under either non etched or etched conditions. Optionally, special electrochemical etching can be carried out to reveal the grain structure.

The results of optical microscope observations are summarized in a report including some interpretations of the observed microstructural features.

Flame Brazing

Purpose

Testing the characteristics and properties of different material and flux combinations under flame brazing conditions.

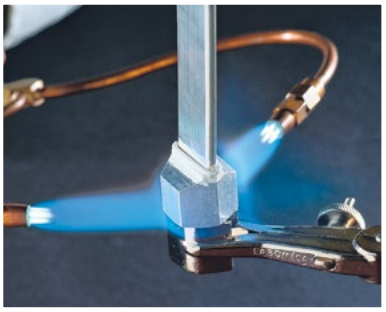
Procedure

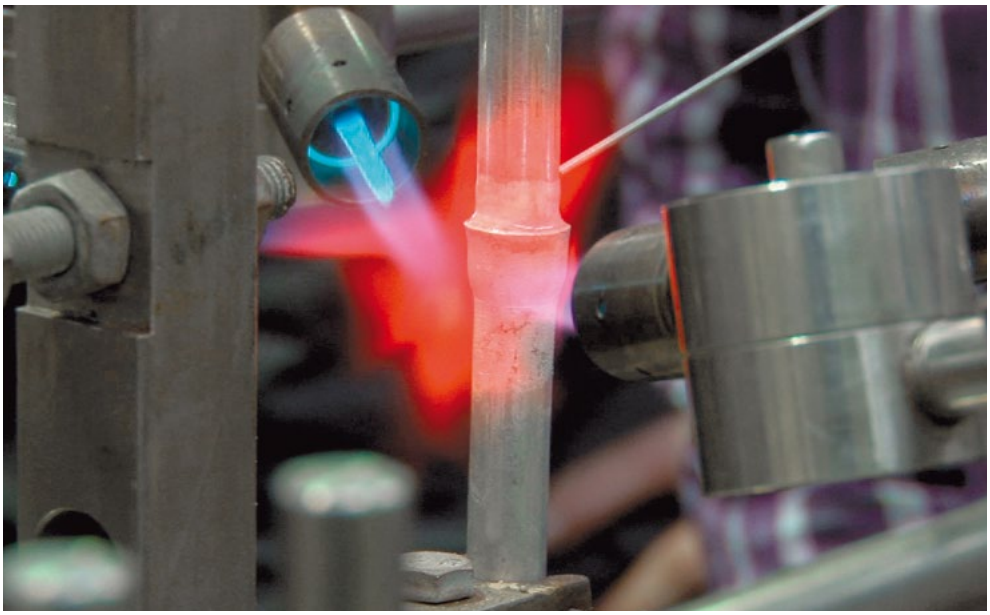
The components to be joined are first cleaned and then assembled and fixtured. Filler alloy is added in the form of brazing paste, brazing rings or brazing wire.

Flux paste is applied manually in the joint area.

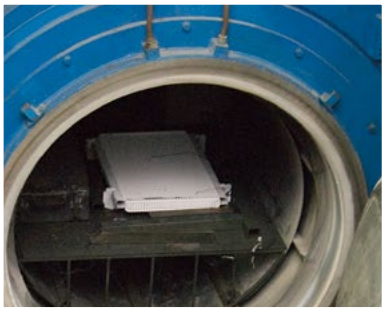
After fluxing, the parts are heated with an open propane-butane flame. Operation of the flame is manual.

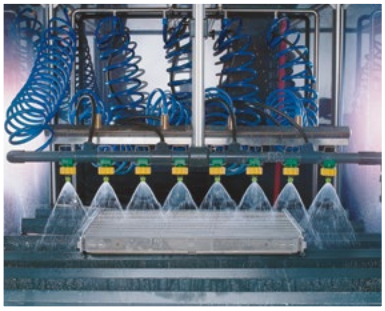
Several different materials to be brazed like Al-Al, Al-Cu, Al-Steel and various fluxes are possible.





Controlled Atmosphere Aluminium Brazing in Batch Type Furnace





Purpose

Brazing trials for single or small numbers of units, e.g. prototypes or mock up components. It offers a means of simulating the whole production process starting with part assembly, fluxing (wet and electrostatic methods are possible) and brazing.

The size of the brazing chamber and other equipment makes it possible to braze standard-size heat exchangers.

Procedure

The components are cleaned by aqueous washing, then assembled and fluxed in either a wet spray or electrostatic chamber. Other fluxing alternatives like pre-fluxing with a mixture of flux and binder are also possible. The details of the fluxing process are individually chosen depending on the part design and customer requirements.

Brazing is performed under nitrogen atmosphere in a batch type furnace. The length of time the parts are heated closely matches typical heating rates seen in industry.

Scanning Electron Microscopy Energy Dispersion X-ray Examination and Mapping

Purpose

To investigate sample surface morphology and to determine presence and distribution of different chemical elements.

Procedure

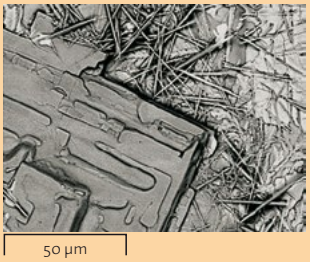
Procedure covers: preparation of the sample (cutting), electron microscope analysis, element mapping, report

The scanning electron microscope (SEM) is a type of electron microscope that images the sample surface by scanning it with a high-energy beam of electrons in a raster scan pattern. SEM-EDX is the name of the energy-dispersive X-ray spectroscopy analysis conducted by means of SEM.

Energy dispersive X-ray spectroscopy (EDS, EDX or EDXRF) is an analytical technique used for the elemental analysis or chemical characterization of a sample.

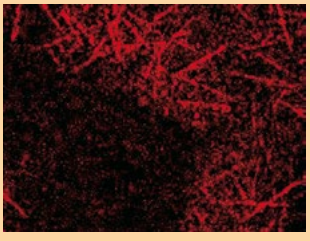
Post braze flux residue SEM/EDX analysis elemental mapping (Al, Mg, Si, F, K).

SEM image

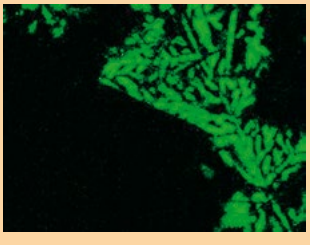


Aluminum

Magnesium



Silicon



Fluorine

Potassium

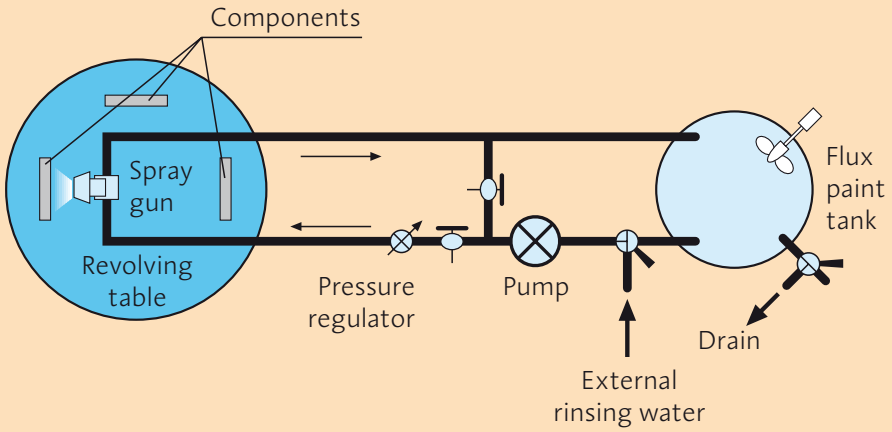
Pre-fluxing by the Atomized Spray Method

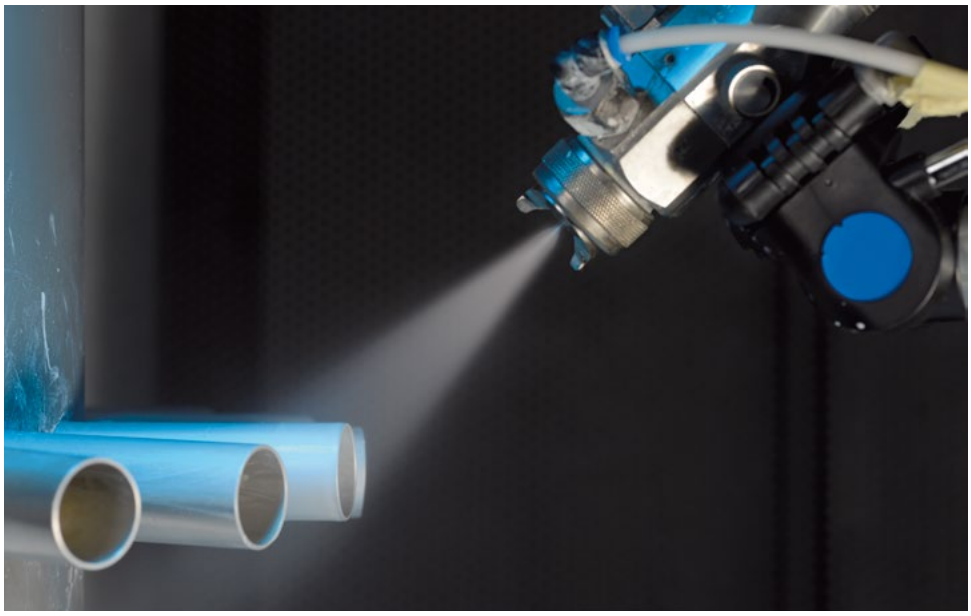
Purpose

To pre-flux sample parts – either on the complete surface or selected surface areas. Different types of flux and binder mixtures can be used. Manual and semi-automated pre-fluxing is possible. Optimal binder and mixture compositions for customer specific parts and brazing configurations can be evaluated.

Procedure

The components are pre-fluxed using manual or semi-automatic equipment which ensures uniform coating and control of the load. By changing the table's rotational speed, the spraying time for the parts can be varied, thus changing the paint load. Constant rotational speed and a fixed setting of the spray gun ensure repeatability during testing. The design of the equipment makes it possible to paint large quantities of parts, even up to a few hundred per working day.





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