Successful brazing with amorphous metal foils VITROBRAZE

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VACUUMSCHMELZE GmbH & Co.KG

VACUUMSCHMELZE (VAC) is one of the world's leading manufacturers of advanced magnetic and special materials and value added products.

Headquarter	Hanau, Germany
Production sites	Slovakia, Finland, Malaysia, China
Employees	4 500
Annual sales	320 million Euro (2008)
Website	www.vacuumschmelze.com

Products & Markets

VACUUMSCHMELZE products will be used in
- Automotive and Transportation applications
- Drive technology
- Installation and Telecommunication
- Medical technology

Materials Division of VAC supplies
- Soft-magnetic alloys
- Hard and semi hard magnetic alloys
- Amorphous and nanocrystalline materials
- Spring alloys
- Sealing alloys
- Brazing alloys

Brazing filler materials of VAC: VITROBRAZE

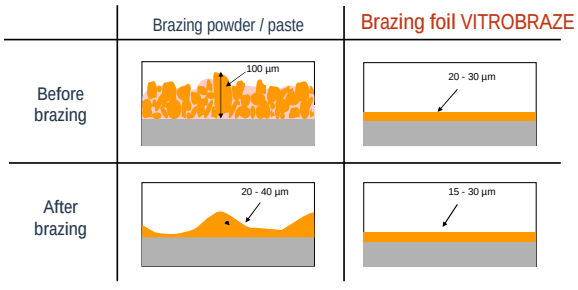
VAC is the leading supplier of Ni-, Fe-, and Cu-based brazing foils VITROBRAZE for joining mainly stainless steel and Cu-alloys

Typical application of VITROBRAZE
- Exhaust gas recirculation cooler, metallic exhaust gas catalysts and particle filter for automobiles, trucks and off-road vehicles
- Plate type heat exchanger for industrial and domestic applications
- Cuprobraze radiators and charge air coolers for trucks, off-road vehicles and locomotives

VITROBRAZE brazing foils

- Production by "Rapid solidification Technology"
- Only manufacturing route to make the Cuprobraze brazing alloys in form of a foil
- VITROBRAZE properties:
  - Completely metallic
  - Completely dense
  - No organic components
  - Ductile and bendable
- Forms of VITROBRAZE: Foil / Strip / Sheet / Preform

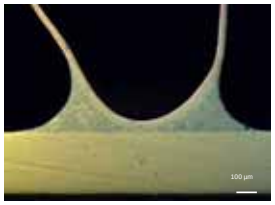
Benefits of amorphous brazing foils



Benefits of VITROBRAZE brazing foils

- Ductile foil with a homogenous thin thickness of 20 – 40 µm
- Organic free brazing / No contaminating residues
- Homogenous and consistent brazing results
- Precise metering of the brazing material
- Only little shrinkage of the brazing layer during brazing
- Unlimited storage possible

Cuprobraze brazing joints using VITROBRAZE



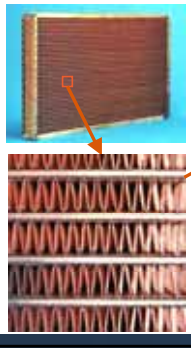
VITROBRAZE generates

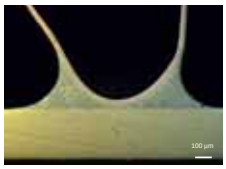
- High quality, complete dense joints without any defect
- Consistent, high performance brazing joints

- Brazing foil and paste can be used together in one brazing procedure
- Best brazing results with the foil and paste will be reached at a brazing temperatures of 650-660°

Cuprobraze applications using VITROBRAZE VZ2250 / VZ2255

Cuprobraze radiators using VITROBRAZE

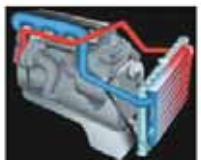




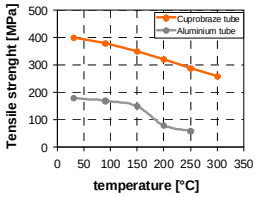
VITROBRAZE:

- Easy handling of the brazing material
- Easy assembling of the core
- High quality brazing joint
- Consistent brazing results

Cuprobraze charge air coolers using VITROBRAZE



Benefit of Cuprobraze versus Aluminium



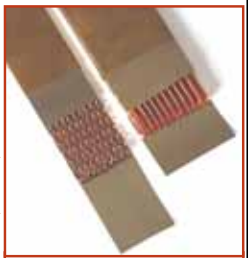
Cuprobraze charge air coolers / oil coolers:

- Inner/internal fins for improved integral strength and pressure resistance

Cuprobraze charge air cooler using VITROBRAZE

Different tube and inner fin designs

VITROBRAZE brazing foil



VITROBRAZE is an excellent solution for inner fin brazing

Charge air cooler in-tube brazing with VITROBRAZE

VITROBRAZE brazing foil generates complete dense, high performance in-tube brazing joints

Cuprobraze Locomotive application using VITROBRAZE

Big multi tube Cuprobraze radiators

Multi-tube radiator to be brazed with one strip of brazing foil

VITROBRAZE: Easy brazing with consistent results for big radiators

Cuprobraze Locomotive application using VITROBRAZE

Cuprobraze Locomotive cooling module

Photographs courtesy Young Touchstone

Cuprobraze cooling module save weight versus a traditional locomotive plate fin radiator

Cuprobraze Locomotive application using VITROBRAZE

Cuprobraze Locomotive Air to Air After Cooler (ATAAC)

Photographs courtesy Young Touchstone

Cuprobraze square wave fin design offers excellent properties relating robustness and durability

Motivation using VITROBRAZE foil /Customer statements

- VITROBRAZE generates homogeneous and consistent brazing results
- By using VITROBRAZE we do not need invest in equipment ("investment friendly solution")
- Our volume at the moment will not justify the investment in equipment
- VITROBRAZE provides maximum flexibility for our low and mid volume production
- We reach excellent brazing results even without long term experience in brazing

Summary

- VITROBRAZE brazing foil is an advantageous brazing material for Cuprobraze
- Foil form offers manifold advantageous for handling and assembling
- VITROBRAZE generates high quality consistent brazing joints
- VITROBRAZE is an excellent solution for in-tube brazing
- VITROBRAZE is an established brazing material for Cuprobraze radiators and charge air coolers especially for trucks, off-road vehicles and locomotives

Customer service for VITROBRAZE / Cuprobraze

VAC offer full support with sampling, analysis and technical advice during prototype, ramp-up and mass production phase

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