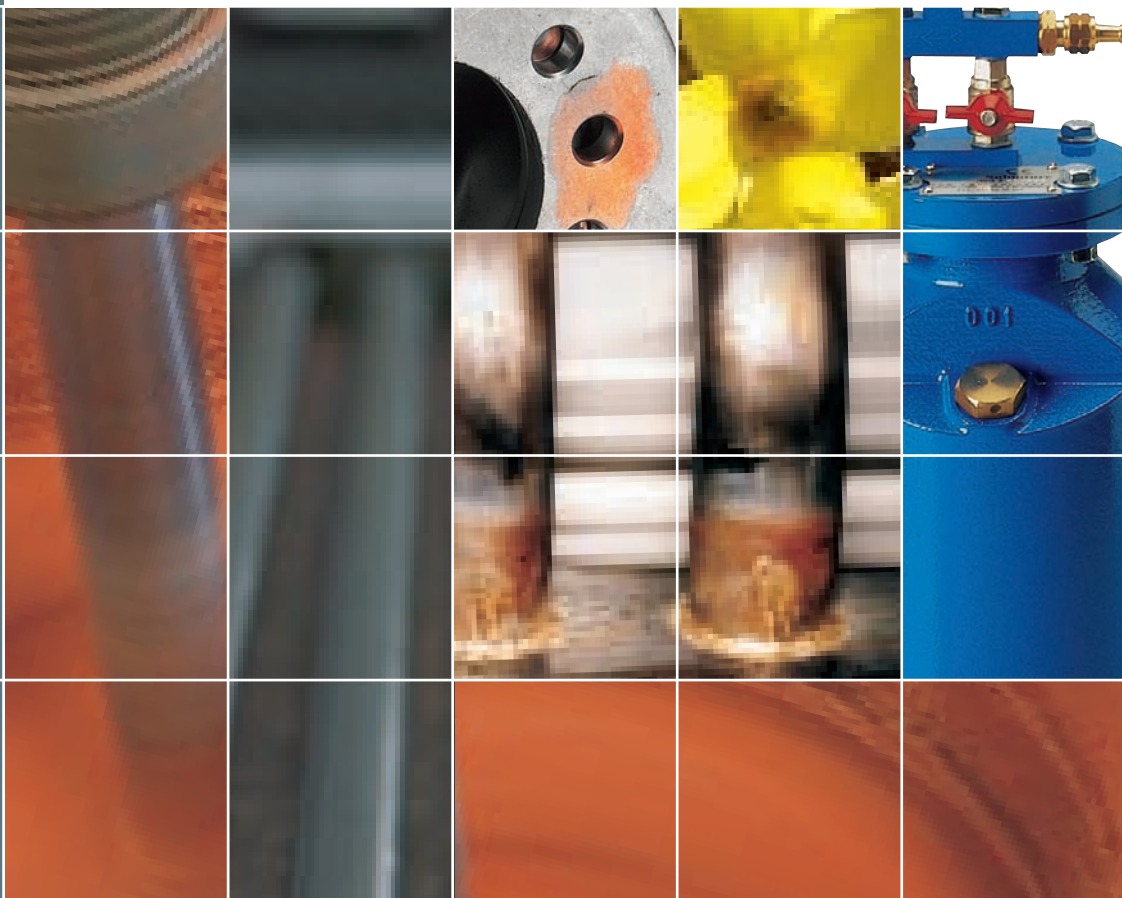




A.V. Saldature s.r.l.



**BRAZING
REFRIGERATOR
CIRCUITS**

CONVENTIONAL

DESCRIPTION

Primary use is for dissimilar metals i.e. copper-steel or all steel joints. Involves wiping the joint, pre-heat, with the flux paste (FH12 EN1044) and then brazing joint using a high silver content filler rod (AG106 & AG306 EN1044).

CONSIDERATION

Expensive filler rod material, flux paste is highly CORROSIVE if not washed off in addition to being HARMFUL and IRRITANT.

Danger of melting components with naked flame.

Evidence proves it gives off 10x the amount of fumes as other brazing method.

DISADVANTAGES

All joints should be washed down with sponge/brush and water within 2 minutes of brazing, in order to avoid rusting of the parent material. It is also recommended that the joints be painted post leak testing.



Ecoflux[®] self fluxing

DESCRIPTION

Using **Ecoflux[®] liquid** and SM23 alloy brazing rods, brass rod 2,0 mm diameter and shade 5 glasses.
Suitable for brazing all the joints.

CONSIDERATION

It differs from other systems of brazing in that the flux, that cleans the joint and allows the filler material to flow, is contained in the fuel gas and is not contained within the brazing rod or applied in a paste form. It gives a **very clean** joint that **will not corrode** in the customer's facility and allows for very good leak detection. As it employs no paste flux, there is no residue that leaves unsightly remains upon the track and the pallets.

ADVANTAGES

Due to **reduction in emissions of 90%** compared to flux paste-using methods, the use of **Ecoflux[®]** is considerably **more environmentally friendly**.
The **costs for brazing** have been also **reduced of 10 times**.



ENVIRONMENTAL STUDY ON BRAZING: A COMPARATIVE

COSHH (the control of substances hazardous to health regulations)

COMPLIANCE MONITORING ASSESSMENT OF 2 DIFFERENT BRAZING PROCESSES

Conventional & Ecoflux[®] self fluxing

PROCEDURES

Sampling was undertaken in accordance with current HSE Approved Codes of practice using calibrated instrumentation and using the current HSE approved MDHS methodologies.

RESULTS

CoSHH and Occupational Exposure Standards (EH 40)

The exposure of employees to substances considered to be hazardous to health, is controlled in the UK by the Control of Substances Hazardous to Health (the so called CoSHH) Regulations 2003.

Exposure to chemical compounds, including brazing fumes may occur via inhalation, ingestion or skin absorption or other means, all of these routes are considered by these regulations.

Inhalation is normally the most common and direct route with regard to process-sourced fumes.

The Health and Safety Executive (HSE) has provided a comprehensive list of occupational exposure limits for such chemicals, known as document EH 40. The CoSHH regulations require employers to control their employees' exposures to those compounds contained within EH 40 with the limits detailed therein. Once monitoring has been completed, it is the assessment of the results against the limits defined in document EH 40 that establishes the compliance status of the operators' exposure.

Current operator workplace exposure limits are defined under the CoSHH Regulations and detailed in Document EH 40 "Occupational Exposure Limits 2005". This HSE document details maximum occupational exposure limits (WEL).



RESULTS

The following comparative results were determined.

| PARAMETER | UNITS | Conventional Brazing Station | Self Fluxing Brazing Station | Current EH 40 - 2005 Workplace Exposure Limit - LTEL |
|-------------------------------|-------------------|------------------------------------|------------------------------------|--|
| Operator | — | XXX | XXX | — |
| Total Inhalable Dust TID | mg/m ³ | 1.87 | 1.21 | 10 |
| Respirable Fraction RF | mg/m ³ | 0.54 | 0.32 | 4 |
| Oxygen O ₂ | % | 20.79 | 20.78 | % |
| Carbon Monoxide CO | mg/m ³ | 12.2 | 1.2 | — |
| Oxides of Nitrogen NOx | mg/m ³ | 1.34 | 0.31 | 35 |
| Oxides of Sulphur SOx | mg/m ³ | 0.97 | 0.12 | — |
| Copper Cu | mg/m ³ | < 0.001 | < 0.001 | 0.2 |
| Zinc Zn | mg/m ³ | < 0.001 | < 0.001 | 10 |
| Volatile Organic Compounds | mg/m ³ | < 0.1 | < 0.1 | — |

No personal exposure measured in this study exceeded the limits detailed in HSE document EH 40 however in all cases the exposure was less with the use of the self-fluxing process.

As such this operation reduced the operator impact in accordance with the Control of Substances Hazardous to Health Regulation provisions.

SOURCES:

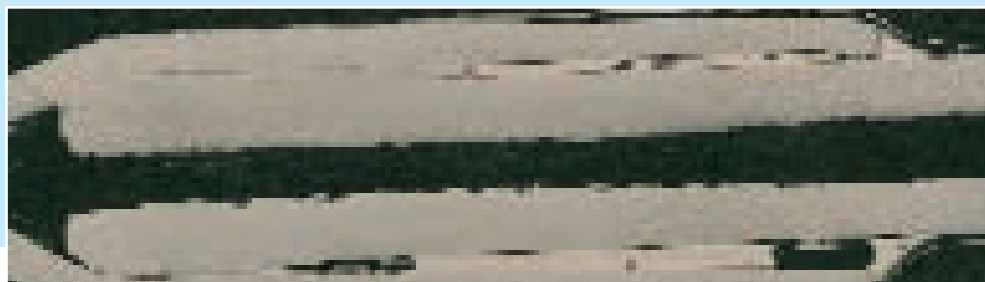
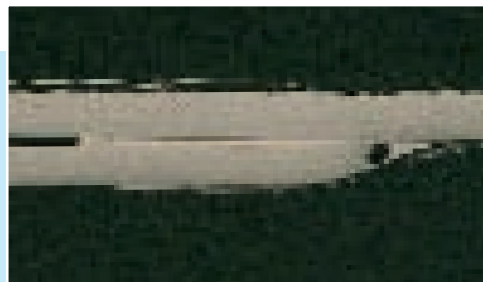
Tim Growcott, Halcyon Environmental Services 29.9.2005

Richard Garner, The indesit company guide to brazing and system care 16.12.2005



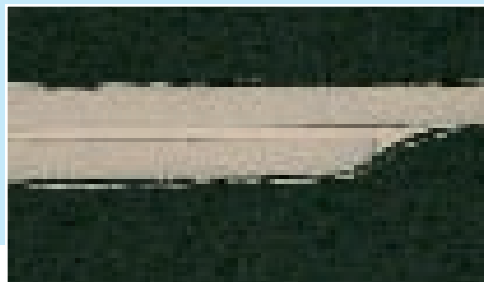
BRAZING
JOINTS' PICTURES TAKEN
WITH AN ELECTRONIC
MICROSCOPE

USING
THE NORMAL SYSTEM
Ag & Cu P ALLOY
PLUS POWDER FLUX



BRAZING
JOINTS' PICTURES TAKEN
WITH AN ELECTRONIC
MICROSCOPE

USING
**THE AV SALDATURE
SELF FLUXING
ECOFLUX[®] SYSTEM**



MATERIAL
DESCRIPTION OF THE
INVOLVED
GOODS IN THE
**ECOFLUX[®] SELF FLUXING
PROCESS**

SM23MR200

Brazing alloy used together with the flux distributed from the vaporizer system through the flame, acquire more fluidity and penetration in the joint, leaving no residues after the brazing.

Ecoflux[®]

Brazing liquid flux for vaporizer systems at high grade of purity, high grade of concentration.

Do not contain methyl-alcohol.



BRAZING ALLOYS MR SERIES

**PRODUCTS FOR BRAZE WELDING:
ALLOYS - DEOXIDANTS -
NORMAL AND SPECIAL BRASS.
MACHINES AND ACCESSORIES FOR
BRAZE WELDING.**

| BRAZING ALLOY | CHEMICAL COMPOSITION % | | | | | MELTING RANGE SOLIDUS-LIQUIDUS | FEATURES | | RECOMMENDED DEOXIDANTS | APPLICATIONS |
|---------------|------------------------|-------|----|------|------------------|-----------------------------------|-----------------------------|--------|---|---|
| | Cu | Zn | Ni | Si | Altri | | R daN mm ² | A % | | |
| SM23 MR | 59 | 39,25 | - | 0,15 | Mn 0,8 Sn 0,8 | 880 - 900 | 38 | 25 | L87N L87 Special L88N L90N L89N | MR brazing alloys used together with the flux distributed from the vaporizer system through the flame, acquire more fluidity and penetration in the joint, leaving slight residues of flux after the brazing. |
| ST22 MR | 59 | 39,75 | - | 0,25 | Sn 1 | 800 - 840 | 40 | 25 | | |
| SN32 MR | 57 | 37,85 | 5 | 0,15 | - | 860 - 910 | 45 | 28 | | |
| SN34 MR | 51 | 38,8 | 10 | 0,20 | - | 900 - 930 | 70 | 25 | | |
| SN37A MR | 49 | 40,65 | 9 | 0,2 | Ag 1 Mn 0,15 | 870 - 900 | 75 | 25 | | |
| T28 MR | 55 | 39,8 | - | 0,2 | Ag 5 | 830 - 870 | 41 | 25 | | |
| T68 MR | 45 | 34,8 | - | 0,2 | Ag 20 | 690 - 795 | 45 | 15 | | |

DESCRIPTION: Brazing alloys in rods, wires or preformed superficially impregnated of flux in extremely reduced quantities, ~0,5% in weight, able to leave slight residues of flux after the brazing.

FORMS: **RODS:** Ø = 2-3-500-1000 mm. for manual use;
WIRES on coils or on spools: Ø = 2-3 mm. for automatic feed; **preformed.**

JOINTS: **COPPER-IRON:** pipe-pipe; pipe-fitting.
IRON-IRON: pipe-pipe; pipe-fitting.
COPPER-COPPER: pipe-pipe; pipe-fitting.

USERS: **REFRIGERATION INDUSTRIES:**
complete circuit connections, compressor, capillary, filter, delivery tube, evaporator, with only one alloy type MR.

CONDITIONING INDUSTRIES:
Complete circuit brazing with only one alloy type MR.

STEEL EQUIPMENT INDUSTRIES:
Various connections brazing with only one alloy type MR.



NEWS



A.V. Saldature s.r.l.



APPARECCHI
VAPORIZZATORI
PER ECOFLUX®

VAPORIZER
SYSTEMS
FOR ECOFLUX®



VAPORIZER SYSTEMS FOR ECOFLUX®

| PRODUCT | DESCRIPTION | EN1045 | CHARACTERISTICS |
|-----------------|----------------------------|--------------------|---|
| ECOFLUX® | LIQUID FLUX ECOFLUX | FLUX EN 1045 FH 20 | Liquid flux for vaporizer systems at high grade of purity, high grade of concentration. It does not contain methyl-alcohol. |
| ECOFLUX® MEDIUM | MEDIUM LIQUID FLUX ECOFLUX | FLUX EN 1045 FH 20 | Liquid flux for vaporizer systems at high grade of purity, medium grade of concentration. Do not contain methyl-alcohol. |
| ECOFLUX®89 | LIQUID FLUX ECOFLUX89 | FLUX EN 1045 FH 20 | Liquid flux for vaporizer systems at high grade of purity as well as concentration, low content of methyl-alcohol. |
| ECOFLUX®88 | LIQUID FLUX ECOFLUX88 | FLUX EN 1045 FH 20 | Liquid flux for vaporizer systems at high grade of purity, medium grade of concentration, low content of methyl-alcohol. |
| ECOFLUX®87 | LIQUID FLUX ECOFLUX87 | FLUX EN 1045 FH 20 | Liquid flux for vaporizer systems at high grade of purity, low grade of concentration, low content of methyl-alcohol. |

ALL THE PRODUCTS
OF THE LINE
ECOFLUX®
ARE NOT TOXIC

ECOFLUX® is a registered trade mark of A.V. Saldature S.r.l. owned. Every abuse will be persecuted at rule of law.

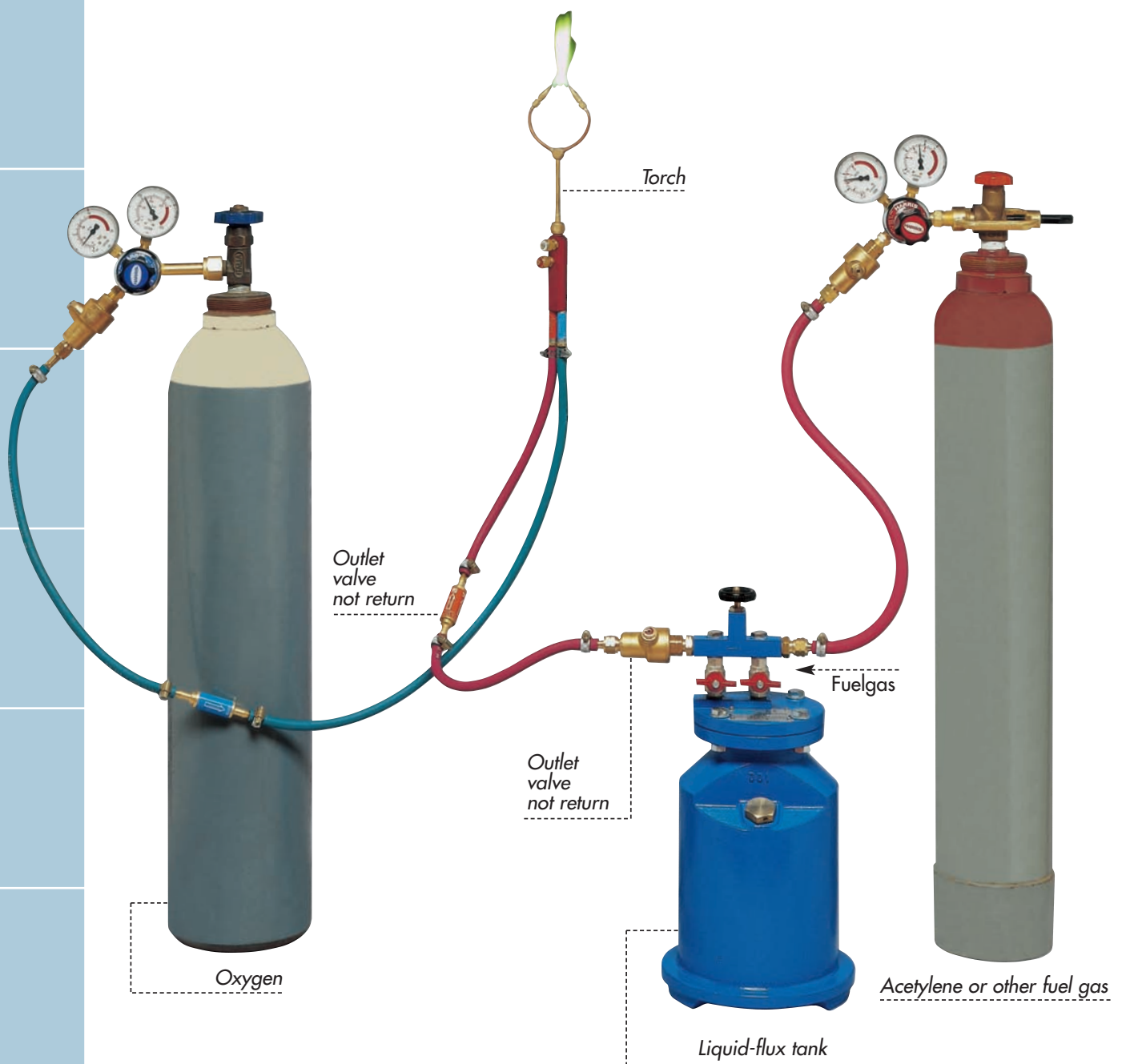
ALL THE PRODUCTS OF THE LINE "ECOFLUX®" ARE NOT TOXIC.

ECOLOGICAL LIQUID FLUX FOR THE BRAZING WITH THE FLAME. USEFUL WITH ALL THE GAS TYPES. A.V. SALDATORE S.R.L. SUGGESTS THE USE OF ITS OWN VAPORIZER SYSTEMS, THE ONLY THAT ARE TESTED FOR THE CORRECT FUNCTIONING OF THE LIQUID ECOFLUX®.



HOW TO INSTALL THE ECOFLUX[®] SELF FLUXING ONTO THE LINE

VAPORIZER SYSTEM INSTALLATION PLAN



MIXTURE OF GAS-OXYGEN AND GAS-AIR

| COMBUSTIBLE GASES | OXYGEN OR AIR NECESSARY FOR BURNING 1 M ³ OF GAS IN M ³ | | Maximum obtainable temperature °C | Net Heat Value K Cal | | Specific Power Kw/cm ² of surface | Density in reference to air =1 |
|--|---|---------|-----------------------------------|----------------------|---------------------------------------|--|--------------------------------|
| | O min | AIR min | | Per 1 Kg | at 0 °C at 1 atm per 1 m ³ | | |
| Hydrogen H₂ | 0,5 | 2,39 | 2830 | 28700 | 2570 | 8,5 | 0,07 |
| Acetylene C₂ H₂ | 2,5 | 11,95 | 3170 | 11600 | 13600 | 18 | 0,899 |
| Propane additives (LPG) | 5,5 | 26 | 2940 | 11000 | 21700 | 5,5 | 1,56 |
| Mehtane CH₄ | 2 | 9,56 | 2790 | 11900 | 8550 | 5,5 | 0,554 |
| Propane C₃ H₈ | 5 | 23,9 | 2850 | 11050 | 22350 | 4,5 | 1,52 |

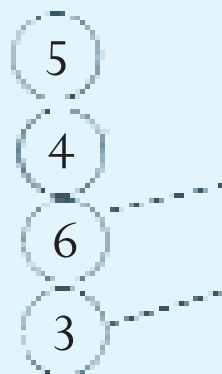
Source: A.V. Saldature QS Dept.



REFRIGERATOR CIRCUIT DIAGRAMS

BRAZING REFRIGERATOR CIRCUITS

- 1) Compressor (delivery) connection
- 2) Compressor suction (intake) connection
- 3) Compressor load intake connection
- 4) Filter-condenser connection
- 5) Capillary-filter connection
- 6) Condenser with anticondensation connection



REFRIGERATOR CIRCUIT

DIAGRAMS

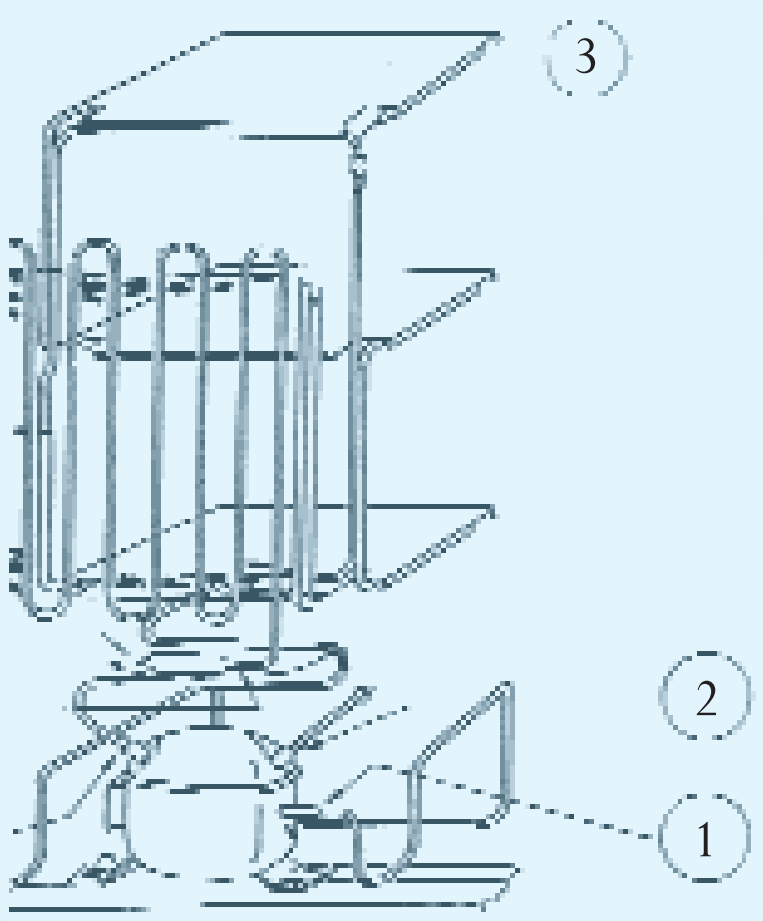
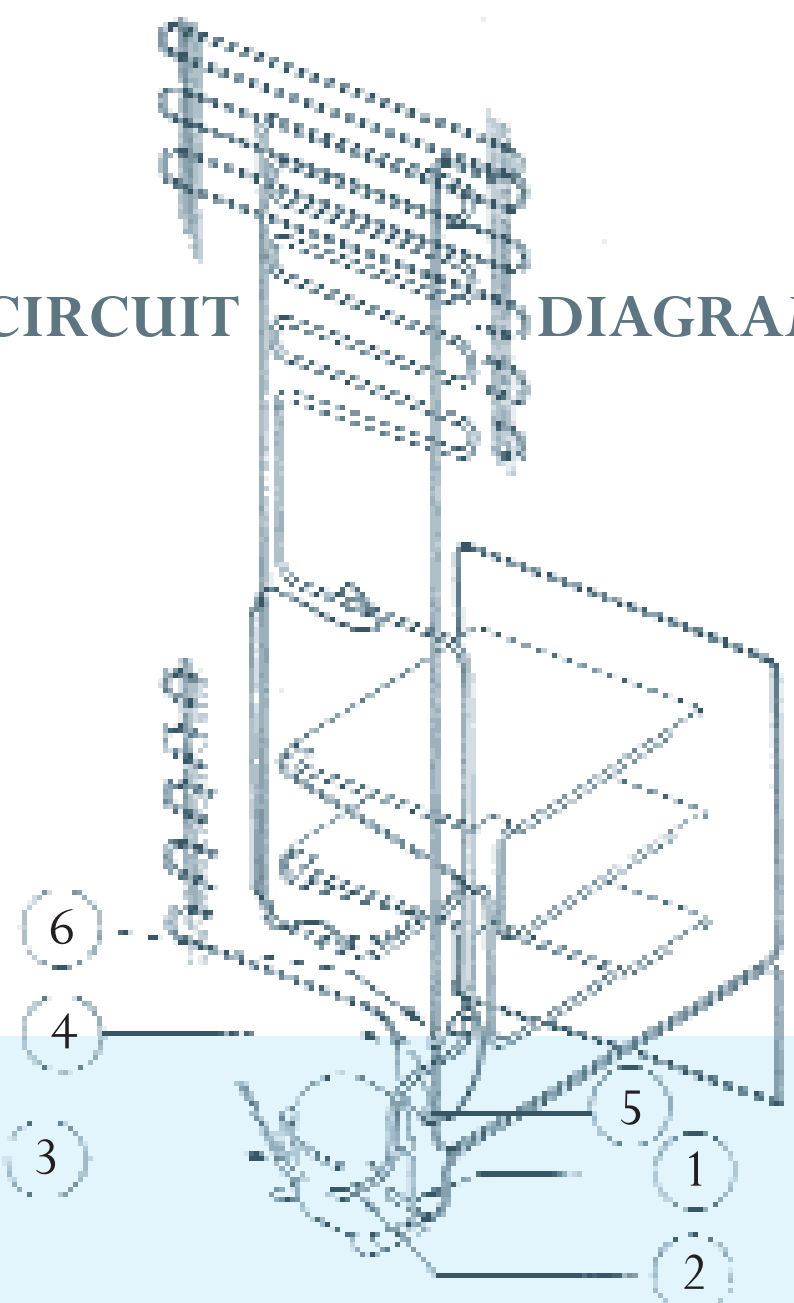




Foto e grafici: Studio Giudicianni - Mezzago -

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