BRAZING

Brazing is a welding process, which produces coalescence of materials by heating them to a suitable temperature and by using a filler metal having melting point above 450°C. The filler metal is distributed between closely fitted surfaces of the joint by capillary action.

The placement of the filler metal affects the quality of the joint. For normal lap joints, the filler metal should be supplied from one end only and allowed to flow completely through the joint by capillary action.

The correct fluxing material must be used. The placement of the flux also affects the quality of the brazed joint. Paste flux is the most common from and is usually spread over the surfaces to be joined. It is also painted on the pre-placed brazing filler materials.

For some of the brazing methods a special atmosphere is used instead of flux, which is selected based on the metals being joined. When atmospheres are used flux may not be required. The atmosphere is the product of the combustion of the flame. The neutral or reducing flame is usually used. A slightly oxidising flame may be used for certain other materials. The general guideline for selection of flames is given below:

Base Metal	Flame type
Aluminiums	Slightly reducing
Brasses	Slightly oxidising
Bronzes	Slightly oxidising
Copper	Neutral
Cupro-nickel	Reducing
Inconel	Slightly reducing
Cast Iron	Neutral
Wrought Iron	Neutral
Monel	Slightly reducing

RUPATAM 2

Brazing of copper and copper alloys

SPECIAL FEATURES

- Strong clean ductile joints in copper and copper alloys without flux.
- Flame should be slightly oxidizing on copper and neutral on alloys.

APPLICATIONS

Extensive employment of the alloy in electrical engineering for joints in motor windings, wires and cables, braided conductor, system and other conductor assemblies where any risk of corrosion by flux must be avoided.

FLUX

No flux for brazing of copper. In other cases use Rupatam A.

PROPERTIES

Melting Range 638 - 694^{O}C

Available DIA - (mm) - 1.6, 2.5, 3.15

RUPATAM 14

Brazing of brass, bronze, molybdenum and silver

SPECIAL FEATURES

- Rupatam 14 is used for obtaining strong, clean, and high tensile brazed joints in brasses, bronzes. It also effectively joins silver and molybdenum.
- It is not recommended for ferrous metals or alloys of high nickel content due to the possibility brittle phosphide formation.
- Flame should be slightly oxidizing on Cu and neutral on Cu alloys.
- The deposit obtained has a high tensile strength.

APPLICATION

Extensive employment of the alloy in electrical engineering for joints in motor windings, wires and cables, braided conductor and other conductor assemblies where any risk of corrosion by flux constituents must be avoided.

FLUX

No flux for brazing of Cu. In other cases use Rupatam A.

PROPERTIES

Melting Range : 643-802^{o}C

Available DIA - (mm) - 1.6, 2.5, 3.15

RUPATAM 35

Brazing joints having non-uniform clearances

SPECIAL FEATURES

- It can be used in operations requiring a slightly higher brazing temperature.
- The alloy is a free-flowing one with melting range for ensuring a good joint for joints where clearances are not even uniform.

APPLICATION

It is an alloy suitable for general purpose work on engineering metals with excellent capillary flow with better ductility for filling gaps.

FLUX

Rupatam A

PROPERTIES

Melting Range : 607-702°C

Available DIA - (mm) - 1.6, 2.0, 2.5, 3.15

RUPATAM 43

Single brazing alloy for a range of applications

SPECIAL FEATURES

- This alloy can be used in brazing operation requiring a low temperature giving a quick and complete penetration.
- It produces neat joints of very high strength that need little or no finishing.
- It is essentially for use on joints that are closely fitted.

APPLICATION

Rupatam 43 can be used in brazing steel, copper, brass, gunmetal, tin bronzes, aluminium and magnesium bronzes, copper nickel alloys and nickel silver of all varieties.

FLUX

Rupatam A

PROPERTIES

Melting Range : 608-617°C

Available DIA - (mm) - 1.6, 2.5, 3.15

RUPATAM 50

Brazing tungsten carbide tips

SPECIAL FEATURES

- This alloy has a wide wetting range, hence the solid and the liquid portions do not separate.
- Good corrosion resistance - brazing stainless steels.
- Rupatam 50 is ideal for bridging gaps.

APPLICATION

This alloy is ideally suited and used extensively for brazing carbide tool tips to tool shanks as it wets the tip beautifully. It is also suitable for brazing stainless steels.

FLUX

Rupatam A

PROPERTIES

Melting Range : 632-688^{O}C

Available DIA - (mm) - 1.6, 2.5, 3.15

RUPATAM 60

Brazing alloy for joints requiring high electrical conductivity

SPECIAL FEATURES

- For brazing in applications needing high degree of electrical conductivity.
- Good colour match on silver.
- It is essentially for use on joints that are closely fitted.

APPLICATION

This alloy is ideally suited and used extensively for brazing electrical components requiring high electrical conductivity.

FLUX : Rupatam A

PROPERTIES

Melting Range :690-735^{O}C

Available DIA - (mm) - 1.6, 2.5, 3.15

ESAB SILICON BRONZE

Economic high strength brazing alloy

SPECIAL FEATURES

- Economy brazing for ferrous metals, copper and copper alloys.
- Exceptional joint strength.

APPLICATION

Esab Silicon Bronze is an alloy that is ideally suited for brazing tubular and sheet metal joining of steel, copper, galvanized iron. Also used for fusion welding of brass and bronze. Use an oxidising flame.

FLUX

Brazotectic

PROPERTIES

Melting Point (approx.) : 875°C

UTS : 42-48 kg/mm^2

Available DIA - (mm) - 1.6, 2.0, 2.5, 3.15, 4.0, 5.0

ESAB RUF-KUT

Rugged overlay alloy with tungsten carbide particles for maximum abrasion resistance

SPECIAL FEATURES

- Angular carbides, varied in size, resist extensive stresses and impact.
- Good tinning qualities.
- High tensile and shear strength – shock absorption.

Esab Ruf-Kut deposits hard tungsten carbide in a tough but ductile nickel-silver matrix that results in maximum abrasion and impact resistance from media like sand, earth, gravel and other minerals. This gives rise to a superior cutting action. The carbides are angular and varied in size embedded in the matrix, which resists extensive compressive stresses and impact loading.

High tensile strength and shear strength provides shock-absorbing characteristics. Good tinning qualities.

APPLICATIONS

'Widely used in oil, earth moving, agriculture, dredging, brick and cement industries to overlay drills, reamers, stabilizers, core bits, augers, mill hammers, plough shares, dredge bucket lips, crusher rolls, mixer blades and pipe forming shoes.

TYPICAL PROPERTIES

Carbide hardness : 1500 VHN

Matrix hardness : 200 VHN

PROCEDURE

- The surface should be cleaned and degreased.
- The surface is to be pre-tinned using the pure matrix end.
- A very large tip size to be used and the flame adjusted to neutral for heating the tinned area.
- The carbide-bearing end is introduced into the flame and the alloy is allowed to melt and flow on to the substrate. The temperature of bonding is 750-800°C.
- The carbide deposition to be uniformly maintained by rotating the rod.
- The work should be continued to heat, slightly ahead of the overlay.
- Overheating is to be avoided.
- Cooling should be slow and the flux residue has to be removed.

CARBIDE MESH SIZES

-3.2 mm to +1.5 mm; -5.0 mm to +3.2 mm

-6.0 mm to +5.0 mm; -10.0 mm to +6.0 mm