

SAFETY IN METAL SPRAYING

Technical Bulletin 5.1.4

Metal Spraying is not a dangerous process, if equipment is treated with care and correct spraying practices are followed. However, as with any industrial process, there are a number of hazards of which the operator should be aware and against which specific precautions should be taken.

Ideally, equipment should be operated automatically in enclosures specially designed to extract fumes, reduce noise levels and present direct viewing of the spraying head. Such techniques will also produce more consistent deposits. However, there are occasions when the type of components being treated or low production levels require manual operation. Under these conditions a number of hazards peculiar to thermal spraying are experienced in addition to those commonly encountered in production or processing industries.

NOISE

Metal spraying equipment uses compressed gases which create noise. Sound levels vary with the type of spraying equipment, the material being sprayed and the operating parameters. Typical sound pressure levels taken 1 metre behind the arc spray or flame spray nozzle are 102-104 db(A). Specially designed enclosures should be used to attenuate these levels. Where this is not possible, operators and passers-by should wear good quality ear defenders. Please refer to the relative Metallisation manual for the generated noise levels of a specific piece of equipment.

LIGHT

Combustion spraying equipment produces an intense flame which may have a peak temperature in excess of 3,100°C and is very bright. Electric arc spraying produces ultra-violet light which may damage delicate body tissues. Spray booths and enclosures should be fitted with ultra-violet absorbent dark glass. Where this is impracticable operators and others in the vicinity should wear protective goggles containing BS grade 6 green glass. Opaque screens should be placed around spraying areas. The nozzle of an arc pistol should never be viewed directly unless it is certain that no power is available to the equipment. For Plasma an even higher level of protection is required typically BS grade 10 green glass.

DUST AND FUMES

The atomisation of molten materials produces a certain amount of dust and fumes. Proper extraction facilities are vital, not only for personal safety, but to minimise entrapment of re-frozen particles in the sprayed coatings. The use of breathing masks fitted with suitable filters is strongly recommended where equipment cannot be isolated.

Certain materials offer specific known hazards.

- All finely divided metal particles are potentially pyrophoric and none should be allowed to accumulate.
- Certain materials e.g. aluminium, zinc and other base metals may react with water to evolve hydrogen. This is potentially explosive and special precautions are necessary in fume extraction equipment.
- Fumes of certain materials, notably zinc and copper alloys are unpleasant to smell, and, in certain individuals, may cause a fever-type reaction. This may occur some time after spraying and usually subsides rapidly. If it does not, medical advice must be sought.
- Several commonly sprayed substances are subject to statutory exposure limits, please refer to the relevant MSDS sheets for the material to be sprayed.

HEAT

Combustion spraying pistols use oxygen and fuel gases. The fuel gases are potentially explosive. In particular, acetylene may only be used under conditions approved by the Health and Safety Authorities. Oxygen, while not explosive, will sustain combustion and many materials will spontaneously ignite if excessive oxygen levels are present. Care must be taken to avoid leakage and to isolate oxygen and fuel gas supplies when not in use.

ELECTRICITY

Electric arc pistols operate at low voltages (below 45 dc) but are relatively high currents. They may be safely hand held. The power supply units are connected to 440 volts AC sources and must be treated with the normal caution afforded to such equipment.

COMPRESSED AIR

The air supply to spraying pistols is at high pressure. It should not be directed towards people. The motor air supply is lubricated and on no account should it be fitted to breathing apparatus. Any breathing equipment used with the thermal spraying process must be supplied with air of breathing quality.

REFERENCE INFORMATION :-

ASM Thermal Spray Society – Designation SG003-03 - Thermal Spray Booth Design Guidelines

TSSEA Thermal Spraying & Surface Engineering Association – Code of Practice for the Safe Operation of Thermal Spraying Equipment.

MSDS – Material Safety Data Sheets - provided by the wire / powder manufacturer.