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DO'S AND DON'T'S IN SPRAY PICKLING

Spray pickling is an activity carried out by many metal-processing companies. In practice it is often a major operation to spray pickle a large object efficiently and evenly. The handling of spray pickling agents is also not always that simple. Lumps and thickening often cause blockage in the spraying equipment and it is extremely important to protect yourself and the environment from the vapours and waste that are released during spray pickling. This bulletin gives a few practical tips and sets out several measures and facts.

Preparation

The object to be treated – *Correct placement*

Ensure that the object is placed so that spray pickling agent residues and the water used in rinsing are collected in a water-impermeable container. The object must also be placed in a well-ventilated room. Take account of the fact that the vapours released during spray pickling can react with carbon steel roof constructions for example! The check on the effect of spray pickling on the surrounding constructions must be extra stringent if it is a regular occurrence in a factory hall.

Degreasing – *prevention of staining*

It is of the utmost importance for the object to be completely free of grease before the spray-pickling agent is applied. The pickling agent will not come into sufficient contact with the steel in places where there is grease. This will ultimately result in stains and in the worst case to decreased corrosion resistance. Alkaline degreasers are the most recommended agents for this, for example Vecom Multi Cleaner (bio-degradable) or Vecom Steamclean HPC-NF if the object is heavily polluted. Residues of these degreasers have no detrimental effect if left behind in spite of good rinsing.

Working with spray pickling agents – *Types and processing*

Check the quality of the spray-pickling agent. In most cases you can re-homogenise the emulsion by shaking it well or by stirring it if it is too thick. A thinner based on nitric acid can be used if the spray-pickling agent remains too thick for use in a spray apparatus, for example Vecinox Passivating Liquid L800 from Vecom. The advantage of using such a product instead of water is that it does not decrease the action of the spray-pickling agent. All spray-pickling agents contain 3-5% hydrofluoric acid (HF). There are some manufacturers who say that they supply an "HF" free spray-pickling agent. A close look at the formula will however indicate in all cases that the separate ingredients always react to each other to form HF. There are in general two types of spray pickling agents, the conventional spray-pickling agents and the Low NOx pickling agents. The action of conventional pickling agents will usually be faster than that of Low NOx pickling agents. The percentage of nitrogenous vapours with low NOx pickling agents has however been reduced to 80%, compared with conventional pickling agents. This therefore makes Low NOx pickling



Spray pickling of large objects requires good preparation

agents a good deal more user-friendly. The percentage use of these types of spray pickling agents has been growing for some years at the expense of the conventional pickling agents. The graph on the next page shows the difference in nitrogenous (NOx) vapours from Vecinox Pickling Spray 20E (conventional) and Vecinox Pickling Spray 214 LN (Low NOx).

Spraying & safety equipment – *take no risks!*

Check the spray apparatus. It must be acid resistant. In practice the Matabi sprayers are often used for spray-pickling agents. It is also important to carefully check the condition of the pressure release valve. It can regularly get blocked and is often not well checked. The consequences of a blocked pressure release valve can be seen on the photo alongside - an exploded aerosol can. Spray pickling is not without danger. Always wear liquid-impermeable and acid-resistant overalls with a hood, water-impermeable gloves, and a face mask provided with breathing protection fitted with a filter type BE when working with spray pickling agents. Make sure that HF ointment is always available, so that any HF burns can be treated immediately.





Preferably wear complete facial protection

Once finished, all waste substances, which contain high concentrations of acids and metal, must be removed by a recognized waste processor in accordance with the legislation. These are companies like Vecom or Sita. The liquid could also be neutralized on the spot. A product based on calcium hydroxide must then be added, for example Vecom Edelwit Kalk.

Detailed information about the above topics is given in the Technical Bulletin archive, which you can find on www.vecom-group.com

Spray pickling – apply evenly and without haste

The spray pickling process can begin once all the preparations stated above have been made. The spray-pickling agent must be applied evenly. A thin layer is sufficient for a good reaction. A double layer may be applied on welds. The object can become “stained” if the pickling agent is not applied evenly. “Over-pickling” is not possible in principle if a thin, even layer of spray pickling agent is applied, contrary to what might happen in a pickling bath. The pickling action stops if the hydrofluoric acid is spent by reaction with the stainless steel. It is therefore possible to pickle an object at the end of the day and then to allow it to stand overnight. The advantage of this is that personnel do not come into unnecessary contact with nitrogenous vapours. Once finished, the object must be sprayed clean under high pressure. This can in the first instance be done with tap water, but the presence of chalk and chlorides in this necessitates a further rinse with demineralised water.

We specifically mention:
[TB 2006-08](#): Treatment of injuries due to contact with hydrofluoric acid (HF) and
[TB 2005-09](#): Working safely with stainless steel pickling compounds.

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Post-treatment – the sting can be in the tail

A stainless steel surface is still active after pickling, i.e. it will react extremely vigorously with all external influences. It is ultimately passivated after sufficient contact with oxygen and then forms the rust-resistant chromium oxide skin. If however, in this “active phase”, which lasts about 24 hours, the stainless steel comes into contact with chlorides (salt concentrations present in the air especially in coastal areas) and/or stray iron particles, there will be a very rapid reaction, which will lead to corrosion. To prevent this the object can be “chemically” passivated after rinsing with tap water. This entails spraying a passivation agent over the object so that the active phase of the stainless steel lasts only 1 to 4 hours (depending on the type of stainless steel). A product that can be used for this is for example Vecinox Passivating Liquid L800. The object is rinsed again with demineralised water once the passivation action is finished.

Graph 1: NO_x gases measured during the spray pickling of 316 stainless steel

