

Risks and hazardous conditions

The surface preparation of the materials to be bonded creates many of the most important health and safety associated to adhesive bonding. However, pre-treatments of substrate materials, have quite different specifications, which will inevitably lead to different safety measures. Each case must be analysed according to the specifications of the material and equipment used. It should be noted that close contact with suppliers can be an excellent practice, since most of the time they provide highly specific training aimed at answering safety questions.

To better understand the potential risks associated with surface preparation we will consider three main groups: risks and perilous situations related to chemical substances, materials to be bonded and machinery. However, please note that there are risks that are transversal to all activities carried out in surface preparation, such as exposure to noise, ignorance or non-compliance with ergonomic rules, risks associated with the impact of objects. In brief, general risks and perilous situations commonly associated with an active industrial environment.

One of the most hazardous phases in surface preparation is the degreasing of the surfaces to be bonded. Various chemicals (depending on the method used and the material of the parts to be cleaned) are used in the degreasing processes. They could be mainly categorized as acidic solutions (sulphuric, nitric, etc.), solvents (trichloroethane, chloroform, carbon tetrachloride, trichloroethylene, etc.) and alkaline solutions (cyanides, borax, sodium silicates, etc.). You should carefully review the data sheet of each reagent.

Regarding the risks associated with chemical substances, we draw the reader's attention to the issues associated with handling of harmful chemicals (skin contact with substances), insufficient or wrongful ventilation of workstations and projections of hazardous liquids due to large component immersion speed (manual or automatic) in treatment tanks.

The materials that compose the surfaces to be prepared also require special attention in their handling. Thus, it is also extremely important to be aware of the hazardous characteristics and safety precautions required by the materials to be joined. Polyester plates, for example, can emit styrene vapours which can be highly irritating. Another example are the plasticizers that can be released from some polymeric materials with ecological and functional complications. If solvent based adhesives are used on polystyrene parts, there is also the possibility that the solvents will attack the polystyrene.

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When metals are the subject of the work, electrostatic baths are often required for surface preparation or for corrosion protection. When adhesives are applied prior to this process, the adhesive must not contaminate the bath. This is a very common case in the automotive industry.

In this case we highlight the potential risks associated with thermal exposure, vibration, and the risks associated with cutting, bruising and crushing.

Handling heavy machinery can also pose risk for the operator in many circumstances, especially in mechanical preparations of the surface in preparations that require an active physical-chemical alteration of the surfaces. The specifications of each machine should be carefully analysed, and close contact with suppliers is recommended, as previously highlighted. In addition to the risks previously presented, these activities can also expose the workers to dangerous amounts of dust (silica, metal particles). This risk can be mitigated by following regulations on particle size and exposure times which are crucial to ensure the well-being of users both in the short and the long term.

Main risks	Hazardous Conditions
<ul style="list-style-type: none">• Exposure to chemical contaminants (organic solvents, acids, alkalis)• Noise exposure• Associated with lighting• Thermal hazards• Exposure to vibrations• Risk of cutting, crushing• Fluid projection• Risks of shock or impact• Falls, slip• Electrical hazards• Disregard for ergonomic principles	<ul style="list-style-type: none">• Manual placement of parts on brackets• Manual (or automatic) immersion of the brackets, with the parts, in the tanks• Handling of chemical contaminants (skin contact with chemicals)• High immersion speed of parts in tanks• Insufficient or poorly sized workspace ventilation• Insufficient job sites lighting• Presence of static electricity• Contact with active parts• Incorrect and forced work postures• Manual handling of loads• Poor job site sizing

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Chemical preparation can be done through the use of acidic or basic solutions, where the chemicals used vary depending on the material of the parts to be treated.

Main risks	Hazardous Conditions
<ul style="list-style-type: none">• Exposure to chemical contaminants (acids, alkalis) (exposure to fumes, gases and vapours released)• Noise exposure• Associated with lighting• Thermal hazards• Risk of cutting, crushing• Fluid projection• Risks of shock or impact• Falls, slip• Electrical hazards• Disregard for ergonomic principles	<ul style="list-style-type: none">• Manual placement of parts on brackets• Transport of large parts on the crane• Manual (or automatic) immersion of the brackets, with the parts, in the tanks• Handling of chemical contaminants (skin contact with chemicals)• High immersion speed of parts in tanks• Insufficient or poorly sized workspace ventilation• Insufficient job sites lighting• Presence of static electricity• Contact with active parts• Incorrect and forced work postures• Manual handling of loads• Poor job site sizing

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The parts treated by sand jets are placed on hangers and then treated by projecting sand. In the blasting method the parts are placed inside their own equipment.

Main risks	Hazardous Conditions
<ul style="list-style-type: none">• Exposure to dust (silica, metal particles)• Noise exposure• Associated with lighting• Contact with surfaces at extreme temperatures• Exposure to vibrations• Risk of cutting, crushing• Fluid projection• Risks of shock or impact• Falls, slip• Electrical hazards• Disregard for ergonomic principles	<ul style="list-style-type: none">• Manual placement of parts on brackets• Manual projection of sand jets• Handling parts at high temperatures• Insufficient or poorly sized workspace ventilation• Insufficient job sites lighting• Presence of static electricity• Contact with active parts• Incorrect and forced work postures• Manual handling of loads• Poor job site sizing