



## Technical Bulletin

### Subject: Powerwash Guidelines

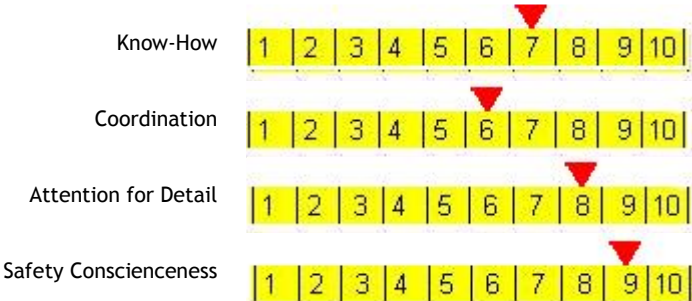
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**Disclaimer:** This Technical Bulletin contains some guidelines for the use and selection of a powerwash, also known as a high pressure cleaner. These guidelines are not strict rules or procedures to be followed and the list of types and models mentioned is not exhaustive. Gryphon Cleaning accepts no responsibility for any damages or misuse that may occur during the use of powerwash equipment by people who are not members of its staff or operating under contractual supervision of Gryphon Cleaning.

#### Scope

The subject of this Technical Bulletin is the selection and use of a powerwash for regular aircraft cleaning. It puts in perspective what the need, benefits and drawbacks are of using a powerwash. These guidelines are complemented by a detailed elaboration on types, technologies and economics during training and/or consultancy.

#### Level of Difficulty



Safety Conscienceness in this context means the amount of time that you need to be actively thinking about safety. Once proper training has been done, most safety aspects of aircraft cleaning are fully implemented automatically.

#### Definitions

- Powerwash: Any device that is made to pump water from a water line or reservoir to a handheld nozzle system. In general, the powerwash consists of a feed line, pump system and pressure line.
- Up-streaming: The incorporation of a chemical/detergent feed system before the pump (in the feed line of the pump).
- Down-streaming: The incorporation of a chemical/detergent feed system after the pump (in the pressure line of the pump or just before the nozzle).

#### Safety

- Always wear safety glasses when working with a powerwash to protect against dirt particles and water or chemicals. Goggles are recommended when working at close range, in

relatively confined spaces (underneath the fuselage and wings) and when spraying onto concavely curved (hollow) surfaces.

- Always use a diverging nozzle in order to obtain a pressure drop with increasing distance from nozzle to surface.
- Always keep a minimum distance of 30cm between the top of the nozzle and the surface.
- Never spray bottom up or back-to-front on the aircraft surfaces. Remember: rains falls top-to-bottom in static conditions and front-to-back during flight.

### Selection of a powerwash

- **Upstreaming**
  - Up-streaming is recommended when the powerwash is to be used for a long period of time and always with the same product. Up-streaming means that the product will travel through part of the feed line, through the pump and through the pressure line.
  - Benefits:
    - Optimal mixing of the detergents
    - Easier to protect against freezing during storage (last rinse with antifreeze).
  - Drawbacks:
    - When the powerwash is idle for prolonged periods of time, the detergents will remain in the pump and may cause deposition, clog the lines or the inside of the pump and may also damage the pump depending on the aggressiveness of the chemicals and the material of the pump.
    - When changing products, there will be a longer change-over time and hence loss of product.
- **Downstreaming**
  - Down-streaming is recommended when the powerwash will be used for short periods and/or when the products to be used will be changed frequently.
  - Benefits:
    - Faster changeover of materials with less waste
    - Less maintenance required
    - Often less expensive than up-streaming powerwashes
  - Drawbacks:
    - Less optimal mixing, especially noticeable when spraying foam
- **Weight and Size**
  - When cleaning aircraft on a grass runway, a heavy powerwash will be difficult to maneuver around the aircraft.
  - Small powerwashes are also easier to take move about and take to other airfields.
  - A small cold water powerwash costs as little as one tenth or less of a larger hot water system and can be just as effective in cleaning an aircraft, making it a sensible solution for occasional cleaning.
- **Availability of spare parts**
  - Whether used occasionally or regularly, a powerwash will always break down on the worse possible time. The fast and easy access to spare parts (or total replacements) is vital in maintaining the aircraft cleaning operation going.
  - Given the general level of quality throughout the established powerwash brands, it is better to compromise on features and select the brand which is most widely represented, especially when your aircraft cleaning operation is mobile or spans various locations.
- **Hot vs. cold water**
  - Cold water systems are usually sufficient to clean aircraft.
  - Hot water systems are recommended when greasy and oily surfaces need to be cleaned. Even though specific detergents are available to degrease aircraft, hot water alone or with some mild detergent can be very effective in this matter.

- When using hot water, the temperature shock to the surface should be kept minimal in order not to cause any secondary damage.

### Use of a powerwash

Aircraft - just as any other object - should be cleaned top to bottom when using a powerwash. This will prevent the removed dirt from sticking to parts of the aircraft that have already been cleaned.

A powerwash is used to cover large surfaces. This can be necessary to wet the aircraft in order for detergents to disperse onto the aircraft or to remove the dust/dirt particles which are attached to its surface (by deposition or by physical bonding).

- Use of pressure
  - Pressure is always a combination of equipment settings and nozzle selection. For aircraft cleaning, high pressure nozzles should not be used.
  - Stubborn dirt and difficult stains should be removed through methods that allow a better control of the surface interaction.
    - Friction (wiping): by selecting the cloth, sponge or pad, the friction can be selected to suit the needs.
    - Chemical removal: specific detergents can be applied locally to eliminate local dirt and stains like insects, clay, grass, chemical toilet dyes, etc.
  - Detergent mixing and dispensing (if your powerwash allows this) is best done at a low pressure setting if a stable and uniform foam is to be created.
  - High pressure settings can destroy the surface, especially when you're cleaning a fabric-covered aircraft. Aerials, static ports and pitot tubes can also be damaged using too much pressure.
- Use of products
  - Most products to clean general aircraft surfaces are alkaline. In concentrated form they can have a very high pH value. It is therefore recommended to rinse the lines with water after use and before storing the powerwash.
  - For downstreaming systems, the nozzle can also be rinsed with water prior to storage.
- Maintenance
  - Winter: rinse after use with antifreeze (upstreaming)
  - Clean the outside of the powerwash after every use. This can be done with a moist cloth which has been used to clean the aircraft.
  - Follow the maintenance instructions provided by your powerwash supplier.