



## THE JOS / VORTECH VORTEX TYPE ABRASIVE SYSTEM

### Explanation

This system uses selected abrasive, carried by a flow of compressed air to a nozzle at which water is added. The air, abrasive and water combine in a vortex and exit the nozzle through a tapered ceramic sleeve. The aperture size and 'spread' of the sleeve can be changed, one sleeve for another, to direct the mixture toward the substrate in an appropriate concentration. The air pressure, the amount of abrasive in the air and the volume of water are all adjustable by the controls provided.

The system is generally appropriate for the removal of brittle soilings and coatings such as carbon sulphation\*, lime encrustation and lime-wash. Flexible coatings have the ability to deform elastically and are thus abrasion resistant.

When the process is used in conjunction with a superheated water system ('ThermaTechnique'), it is usual to use the ThermaTech first since this will remove the flexible residues with which the VorTech is least effective.

It is normal to start at the uppermost level and work downwards. This will reduce the rinsing needed but also acts to pre-wet and hence pre-soften the areas beneath.

### Description & Specification

**Nozzles** are of two types, 'Jos' and 'VorTech'.

The **Jos** type nozzle is of 'solid' construction and fixed aperture which develops the swirling action by the angled arrangement of ceramic and tungsten carbide tubes within. The 'Piccolo' and 'Micro' are of 3 & 5mm aperture respectively. They are normally fitted with their own 10 metre hose set and are designed for fine detail or localized soiling.

The **VorTech** nozzle creates the swirl effect using a tungsten carbide ring, the blades within which are angled so as to impart a rotation on the mixture passing through. The VorTech may be disassembled to separate the stator, tapered sleeve and seals.

The standard hose set is of 20m length but this may be increased to 30 or 40m by use of extension hose sets.



JOS Piccolo nozzle



VorTech Nozzle

The system requires a significant volume of clean compressed air. For the larger nozzles, this is normally provided by a trailer compressor. The volume of air consumed will depend on the aperture of the nozzle and the pressure setting. The Jos Piccolo (3mm) will require around 10cfm (cubic feet per minute, air volume). A 9.5mm VorTech nozzle at 5 bar will require around 125 cfm.

The VorTech system has been designed to provide precise operation across a range of nozzle sizes from the 3mm Piccolo to VorTech sizes 5-11mm, and within a range of pressure (0.3-5.5bar). In general, even soiling of a flat substrate will permit the use of larger nozzles and higher pressure. Fine detail or localised heavy soiling will require lower pressure and smaller nozzles. The parameters are first determined by undertaking trial panels.

The system can be placed some distance from the compressor. The incoming compressed air is dried using an air cooler supplied with the system, the treated air passing to the 'pressure pot'. The standard 'pot' is of 24 litres capacity and is charged with abrasive, metered in a precise, steady and adjustable flow into the air stream. The incoming air passes through a water trap, to reduce moisture, and then through a regulator to set the air pressure. A valve controlled by the operator at the nozzle,

starts and stops the system. Vibration can be applied to the vessel to help ensure an even flow of abrasive.

The air/abrasive mixture passes through a flexible rubber hose to the nozzle at which water can be added before exiting.



#### **Optional remote pressure adjustment.**

The pressure adjustment can be made by the operator, at the nozzle, during cleaning.

**Remote granulate adjustment** is also available with the special granulate valve and twin regulator. The precise granulate setting is displayed as a gauge reading. This is particularly useful for replicating settings from day to day or indeed from machine to machine

An air operated water pump is provided to pressurize the water. During working, this is normally hung from the side of the pressure pot. The maximum water pressure is 6.5 bar(100psi), sufficient for cleaning and rinsing but not pressure washing.

## **Abrasives**

A range of abrasives are supplied for the system which vary in size, hardness (expressed as a number in 'Mohs', a scale of geological hardness), and particle shape. The choice of abrasive is determined by the thickness, flexibility and hardness of the soiling or coating and the comparative resilience of the substrate. For example; (a) a thin hard coating over a soft substrate will normally require a fine, sharp and hard abrasive (e.g. aluminium silicate <180micron) to provide a more even 'cut' through the coating and thus reducing the tendency for the substrate to be pitted (as would occur with prolonged use of a soft abrasive). (b) Heavy carbon sulphation\* adhering to the surface of terracotta would require a fine, soft abrasive (e.g. Calcite <140micron) but used in two stages with a period of hours between. This makes use of the softening effect the water has on the sulphate during the interval.

#### **Approved abrasives include;**

'Calcite 140'	Hardness 3 Moh's*	Naturally occurring crystalline calcium carbonate
'Dolomite 140'	4 Moh's*	Naturally occurring crystalline calcium magnesium carbonate
'Aluminium Silicate 180'	6.5-7 Moh's*	Synthetically produced aluminium silicate
'Aluminium Silicate 250'	6.5-7 Moh's*	Synthetically produced aluminium silicate

*\*Moh's is a scale of mineral hardness (1-10) where a higher number denotes a greater resistance to scratching. A copper coin equates to around 5 Moh's, window glass 6 & diamond 10.*

*\* Carbon Sulphation is the product of the action of sulphurous & sulphuric acids, generated from the sulphur residues of burnt coal and oil. The acid dissolves calcium carbonate from the mortar joints and masonry, to produce calcium sulphate. Together with carbon, also from the burning of fossil fuel, this deposits as 'Carbon Sulphation'. This sulphate is partially soluble and so collects on sheltered areas of the façade under mouldings and string-courses or other surface detailing. The deposit can vary in thickness from a few microns to several centimetres.*

## **Health and Safety and Documentation**

In addition to this '**Technical Information Sheet**', Restorative has produced a family of documents to support project specification and management. These are for general guidance and include the '**VorTech Risk Assessment**' and '**VorTech Safe Working Procedure**'. These have been written in conjunction with our independent health and safety advisors, the NFU, and are reviewed by them and re-issued on an annual basis. These are available for architects, specifiers and contractors for the use of equipment and products supplied by Restorative Techniques Ltd.

Where applicable, '**Health and Safety Data Sheets**' are issued for products used in conjunction with this equipment such as that for the abrasive particulates.

Restorative can be engaged to produce on-site trials and reports and to aid decision making in specification and implementation.

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