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## SPECIFICATION FOR COMPRESSOR CLEANING PRODUCTS AND WATER QUALITY

### 1. General

This directive specifies limits to properties of the cleaning agent in order to protect the compressor blading and hot gas path of gas turbines as well as the environment from adverse impact. Due to lack of methodology, no cleaning efficiency test is yet specified. ALSTOM recommends to use water based products. Only for pertinacious organic deposits, a solvent based solution may be applied. The recommendations of the supplier for proper dosage and waste treatment shall be adhered to.

### 2. Safety Requirements

The cleaner product shall not contain toxic ingredients and shall be fully biodegradable in accordance to OECD-302B. Further, it shall not require to be treated as hazardous waste. The Flash Point (Pensky-Martens) shall be above 60°C if solvent based.

### 3. Storage

The compressor cleaning compound shall be storable adequately in original containment as per recommendation of manufacturer. The shelf life shall be at least 18 months without product property changes.

### 4. Low temperature serviceability

The cleaner product shall show no separation, layering or precipitation when mixed with water according to manufacturer's recommendation. Furthermore, the cleaner shall be compatible and applicable with antifreeze compounds such as ethanol or isopropanol (test data required).

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## 5. Required properties and purity

The compressor cleaning compound in its pure state must satisfy the requirements stipulated in table 1. When mixed with water as recommended by cleaner manufacturer, it shall comply with water specification for on-line and off-line compressor washing as stipulated in table 2.

Table 1: Specification for pure cleaner product

Total alkali metals	ppm, max.	25
Magnesium plus Calcium	ppm, max.	5
Vanadium plus Lead	ppm, max.	1
Other Metals	ppm, max.	1
Sulphur	ppm, max.	50
Chlorine	ppm, max.	40
Ash content	ppm, max.	100

No organometallic compounds (soaps etc.) nor caustic soda nor nonylphenyl type of detergents (non biodegradable) are allowed.

Table 2: Specification for water and detergent solution, ready to use

		OFF-LINE	ON-LINE
Sodium plus Potassium	ppm, max.	25	1.5
Heavy metals	ppm, max.	1	0.5
Total dissolved solids (TDS)	ppm, max.	50 - 500 *	5
pH value		6.5 - 8.0	6.5 - 8.0

\*) Depending on type and concentration of dissolved solids and GT type. For complete evaluation of water quality, a water analysis has to be sent to ALSTOM.

In addition, the following properties of detergent solution have to be considered:

- it shall contain no undissolved solids,
- the product shall be removable by water,
- must not form sticky surfaces after rinsing with water,
- shall meet immersion corrosion test requirements according to US military specification MIL-C-85704 B.

### Organic solvents

The emulsion in waste water shall be breakable to separate organic solvent portion in oil separator.

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