

SYSTEM DESCRIPTION SDB COMPRESSOR WASHING SYSTEM	Respons. dept GPML	Date 040212	Reg. M DB 101
	Prepared Roger Jonsson		YAMAMA CEMENT

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Purpose of the system

The purpose of the compressor washing system is to supply the compressor with detergents and rinsing liquid in such amount that the washing will be sufficient for keeping the gas turbine performance, efficiency and exhaust emission levels.

That is:

- To supply compressor with detergents and rinsing liquids.
- To drain the washing fluids from the machine.
- To heat and control temperature of detergents and rinsing liquid.
- To control the flow and pressure to nozzles.
- To purge system of liquids with instrument air after washing.

- To collect the washing fluids that are drained from the machine.
(B00925/926/927/4516/4518 only)

Rev. a

General description of the system

Refer to P&ID 2046 034.

The system comprise a complete compressor washing system with tanks, heaters and pump installed on a washing unit, and fixed nozzles permanently installed in gas turbine air inlet casing. The washing unit is equipped with wheels, but is normally bolted to the gas turbine skid. A frost guard ensures the temperature inside the washing unit always is above freezing point.

The washing unit is always connected to the gas turbine.

The washing system is operated from a panel located on the washing unit.

A drain tank collects detergents and rinsing liquids drained from the gas turbine when washing. The drain tank is supplied with level indicator and a valve for emptying.
(B00925/926/927/4516/4518 only)

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Main components

- Non-return valve, in drain from air inlet casing
SDB50AA205

The drain from air inlet casing is equipped with a non-return valve preventing fluids being sucked in to the air inlet casing.

- Shut off valve, in drain from low pressure bleed manifold
SDB50AA210

The valve is used for draining the bleed manifold during Off-line washing only.

- Shut off valve, in drain from high pressure bleed manifold
SDB50AA215

The valve is used for draining the bleed manifold during Off-line washing only.

- Shut off valve, in drain from burners casing
SDB50AA220

The valve is used for draining the burners casing and it shall be opened during Off-line washing only.

During operation it is important that the valve is closed to prevent hot gases are led to drain tank.

- Shut off valve, in drain from power turbine casing
SDB50AA225

The valve is used for draining the power turbine casing and it shall be opened during Off-line washing only.

During operation it is important that the valve is closed to prevent hot gases are led to drain tank.

- Shut off valve in drain from exhaust casing
SDB50AA230

The valve is used for draining the exhaust casing and it shall be opened during Off-line washing only.

During operation it is important that the valve is closed to prevent hot gases are led to drain tank.

- Tank, for detergent/rinsing liquid
SDB10BB005
SDB10BB010

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There are two tanks with a volume of 80 litres each. The tanks are equipped with temperature switches, temperature indicators, level switches, level indicators, heaters, drain valves and check valves for external filling.

- Solenoid valve, for detergent/rinsing tank
SDB10AA025
SDB10AA030

The solenoid valves are used for selection of detergent or rinsing liquid tank.

- Temperature indicator, detergent/rinsing tank
SDB10CT005
SDB10CT015

The temperature indicator shows the liquid temperature in respective tank.

- Thermostat, detergent/rinsing tank
SDB10CT010
SDB10CT020

Thermostats for setting of temperature in respective tank. Max temperature is 60 °C.

- Heater, detergent/rinsing tank
SDB10AH005
SDB10AH010

Heats the fluid to the temperature according to SIEMENS washing instruction.

- Level indicator, detergent/rinsing tank
SDB10CL005
SDB10CL015
- Level switch, low level in detergent/rinsing tank
SDB10CL010
SDB10CL020

The level switch switches off the heater at low level in tanks SDB10BB005/010.

- Drain valves, for detergent/rinsing tank
SDB10AA015
SDB10AA020

The drain valves can be used for drainage of detergent and rinsing liquid from the tanks.

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- Non return valve
SDB10AA005
SDB10AA010

Non return valve in the external tank filling connections.

- Suction filter
SDB10AT005

The 500 µm filter protects the pump against dirt.

- Pump
SDB10AP005

The AC motor driven pump, is a reciprocating pump.

- Pressure switch, pump discharge
SDB10CP010

If no pressure occurs after the pump the pressure switch will stop the pump to prevent dry running.

- Pressure regulating valve
SDB10AA205

The pressure-regulating valve is set the outgoing pressure according to SIEMENS's compressor washing instruction. Spill flow is fed back to pump inlet. Pressure is easily adjusted from panel.

- Pressure indicator
SDB10CP005

Indication of the outgoing pressure from the pump.

- High pressure filter
SDB30AT010

The 150 µm high pressure filter protects the nozzle's from dirt and prevents clogging of nozzles.

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<ul style="list-style-type: none"> • Nozzles SDB30BP005 SDB30BP010 SDB30BP015 SDB30BP020 <p>The nozzles discharge the fluid into the compressor.</p> <ul style="list-style-type: none"> • Shut off valve, instrument air SDB25AA005 <p>The valve shall be opened for purging of the hose and nozzles with instrument air after compressor washing.</p> <ul style="list-style-type: none"> • Non-return valve, instrument air SDB25AA010 • Frost guard SDB10AH015 <p>The 200 W frost guard keeps temperature inside the washing unit above freezing point.</p> <ul style="list-style-type: none"> • Drain tank (B00925/926/927/4516/4518 only) Rev. a SDB60BB005 <p>Tank to collect drained detergents and rinsing liquids from the gas turbine.</p> <ul style="list-style-type: none"> • Shut off valve, drain tank (B00925/926/927/4516/4518 only) Rev. a SDB60AA205 <p>The shut off valve is used for emptying of the drain tank.</p> <ul style="list-style-type: none"> • Level indicator, drain tank (B00925/926/927/4516/4518 only) Rev. a SDB60CL005 			
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Function

For operating and maintenance instructions please see manufacturers instruction. For washing instructions please see SIEMENS's compressor washing instructions.

Start up

During start up of the gas turbine no compressor washing should take place.

Continuous operation

During operation of the gas turbine no washing is allowed.

Shut down

Off-line washing may be carried out when the cooling down period has passed and the gas turbine is on barring. The cooling down period shall be according to SIEMENS's compressor washing instruction.

Standstill

No washing is allowed with gas turbine at standstill.

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Disturbances

Gas turbine trip

A gas turbine trip does not affect the system.

Generator breaker trip

Washing may continue if the generator circuit breaker trips.

Loss of power supply

Compressor washing can not be performed when there is no power supply.

System faults

- Clogged nozzles
No or less detergents or rinsing liquid through nozzles. Washing not to be performed.
- Pump failure
Washing not to be performed.
- Clogging of high pressure or suction filter
No or less detergents or rinsing liquid through nozzles. Washing not to be performed.
- Tank heater failure
Washing can be performed. Please see SIEMENS 's compressor washing instructions.
- Low level switch failure
Could cause damage to heaters. Washing can be performed. Please see SIEMENS 's compressor washing instructions.
- Thermostat failure
No setting of temperature in tanks can be set. Washing can be performed. Please see SIEMENS 's compressor washing instructions.
- - Drain tank is full (B00925/926/927/4516/4518 only)
Off-line washing can not be performed.

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Other system faults

The system is a stand alone system. Other systems failure, except power supply, does not affect the compressor washing system.

Washing should not be performed if the barring system is down. If the instrument air system is down, washing can be performed if the temperature is over freezing point, otherwise the rinsing water could freeze in nozzles and hoses when purging can't be completed.

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Technical specification

Dimensioning data

Washing Unit

Design pressure:	100 bar(g)
Design temperature:	60 °C
Max flow:	21 l/min
Power supply:	400 VAC, 50 Hz

Drains

Plenum:	Atm/80 °C
LP bleed manifold:	8 bar(g)/235 °C
HP bleed manifold:	8 bar(g)/235 °C
Burners casing	14 bar(g)/400 °C
Power turbine casing:	8 bar(g)/235 °C
Exhaust casing:	1 bar(g)/200 °C

- Volume drain tank: 580 l (B00925/926/927/4516/4518 only)
- | | | |
|---------------------|------------|--------|
| Design pressure: | Atmosphere | Rev. a |
| Design temperature: | 80 °C | |

Emergency power supply

The system is not connected to emergency power.

Installation

The compressor-washing unit is installed on the frame of the gas turbine. The unit is connected to a power source via a wall socket and a pipe leads to the nozzles. After washing the pipe and nozzles are connected to the instrument air system for purging. The nozzles and the high pressure filter are mounted on the gas turbine air inlet casing.

Drain tank is located under the left entrance to the turbine room. (B00925/926/927/4516/4518 only)

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Materials

The cabinet in steel and powder coated on zinc primer.

Pump house in brass. Suction filter, high pressure filter and tanks in stainless steel SS2333. Hoses (suction and drain) in reinforced PVC, 20 bar rating. High pressure hoses rated for 400 bar.

Stainless steel pipe between washing unit and nozzles.

Drain tank is made of stainless steel. (B00925/926/927/4516/4518 only)

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Component data

See the system lists

Testing and service

Testing during normal operation

During washing the operator always must ascertain himself that the system is working properly. This is done by looking inside the air inlet casing trough the glass.

Normally no testing of the complete system is done.

Although a check can be done of the unit. Please see further information in the manufacturers instruction manual.

Accessibility during normal operation

The compressor washing system is a stand alone system. It is always available for maintenance according to manufacturers maintenance manual.

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