Grease lubrication of internal roller chains

GIS system for grease lubrication of internal roller chains on industrial conveyors
GIS system

Description

For two-chain conveyors, GIS (Grease Injection System) lubrication systems inject grease inside the internal rollers through the original greaser while the conveyor is running.

These systems adapt to various conveyor configurations and applications while considering sizes and components: grease lubrication of internal roller of “simple” chain (with only one lubrication point per link) or “complex” chain (with several lubrication points per link).

With GIS systems for internal rollers it is possible to lubricate simultaneously both chains.

Applications

- Automotive industry
  - Car surface treatment lines
  - Paint line
  - Assembly line
  - Tightness control lines
- Food and beverage industry
  - Continuous sterilization systems
- Metal industry
  - Aluminum foundry lines
  - Manufactured product transport lines

Chain with different roller sizes

This chain needs a lubrication unit with several pick-up systems to fit the chain design.

Chain with identical rollers

This chain needs a lubrication unit with only one pick-up system.

Chain with large rollers

The chain rollers are larger than the side plates. Different pick-up systems can be used. In some cases, the systems must meet certain conditions.
Operation principle

The GIS lubrication system only works when the conveyor is running. During the lubrication phase, when the roller passes in front of the unit, the pick-up system is triggered to let the injection head couple mechanically with the roller. It follows the chain motion while injecting the correct quantity of grease.

At the end of the injection cycle, the head and pick-up system move backwards. The unit returns to its initial position and is ready for a new injection cycle on the next roller.

Customized solutions

Each industrial conveyor chain is specific due to its design, field of application, conditions of use, etc. The SKF teams have thorough knowledge of the fields of application, combined with numerous years of experience. Many GIS systems are already in service in various industrial sectors throughout the world and have proven their worth.

As a result, SKF teams are capable of satisfying various requests, either by modifying an existing solution or by developing a completely new system. Therefore, the lubrication solution proposed is therefore perfectly adapted to the customer’s needs and unique requirements.

This brochure provides a general description of the GIS lubrication system. Please contact SKF for more detailed information.

Pick-up systems

A special feature of the GIS lubrication units unit is its ability to follow the chain movement in order to lubricate the lubrication points without interrupting the production process. Therefore, the GIS unit catches the chain. There are several ways to do this:

- Pick-up fingers
- Sliding arm with fork
- Capstan

Pick-up fingers

Pick-up fingers come in contact in front of the roller with a swiveling or linear movement. The injection unit is then driven by the roller, which triggers an injection cycle. After the injection, pick-up fingers are disengaged, and the unit comes back to its initial position, ready for a new injection cycle.

Sliding arm with fork

The sliding arm comes on top of the roller. The injection unit is then driven by the roller, which triggers an injection cycle. After the injection, the sliding arm is disengaged, and the unit comes back to its initial position, ready for a new injection cycle.

Capstan

A capstan rotates freely, meshing with rollers. When a roller is detected, a blocking cylinder extends and stops the capstan rotation. The injection unit is then driven by the roller, which triggers an injection cycle. After the injection, the capstan is free to rotate again, and the unit comes back to its initial position.
One system, two lubrication units

SKF offers two different lubrication units for lubrication of internal roller chains: COBRA and GVP.

COBRA
GIS system with COBRA unit is the simple solution for lubrication of internal roller chain, in particular in heavy industry and harsh environment. The movements required for the injection cycle are mechanically and pneumatically driven. With the standard system version activation is manual. But some versions with electrically automated activation are available. It is also possible to add several monitoring functions.

COBRA unit
- Sturdy design
- Manual activation
- System automation in option
- Possibility to add monitoring functions
- Easy installation
- Easy to use
- Pneumatic system
- Volumetric metering

GVP
GIS system with GVP unit is the advanced solution for the lubrication of single internal roller chain. This solution manages and controls lubrication cycles automatically.
GIS system adapts to a broad range of chain speeds as well as various conveyor configurations and roller positions.

GVP unit
- Fully automated system
- Configurable control of lubrication cycles
- Injection frequency adaptable to chain speed
- Operation check
- Failure notification
- Electropneumatic system
- Volumetric metering
GIS system with COBRA unit

- Lubrication point in front of COBRA unit
- Pick-up cylinder extension with fingers

1 Chain movement direction
2 Pick-up finger movement
3 Roller

COBRA lubrication unit
Pneumatic drum pump

Lubricant
Air

COBRA unit

Air valve

Injection
- Pick-up fingers in contact with roller
- Oscillating arms swivel driven, by roller
- Injection head comes into contact with roller grease nipple
- Grease injection into roller

1 Chain movement direction
2 Pick-up fingers blocked against roller
3 Oscillating arms swivel
4 Injection head moves towards roller grease nipple

Return
- Metered quantity of grease injected into roller
- Injection head removed from roller
- Pick-up fingers retract
- Oscillating arms return to initial positions under return spring force

5 Chain movement direction
6 Retraction of pick-up fingers
7 Spring traction direction
8 Oscillating arms swivel
9 Withdrawal of injection head

Pick-up restriction
COBRA unit can be used only with chain internal roller having a diameter of min. 25 mm higher than the side plate.
GIS system with GVP unit

With sliding arm (fork)

Coupling
- Roller passing in front of GVP unit
- Fork comes down in contact with roller

1 Chain movement direction
2 Fork movement direction

Injection
- Fork caught roller
- Injector carriage moves in parallel with chain
- Injector cylinder extends, injection head comes into contact with roller grease nipple
- Injection phase

3 Chain movement direction
4 Fork on roller
5 Extension of injector cylinder

Return
- Lubrication phase is completed. Injector cylinder retracts and injection head is no longer in contact with grease nipple
- Fork goes back up. Unit is no longer in contact with chain.
- Return cylinder retracts and injector carriage comes back to its start position

6 Chain movement direction
7 Fork movement direction
8 Retraction of pick-up cylinder
9 Retraction of return cylinder
GIS system with GVP unit

with capstan

**Coupling**
- Lubrication point in front of GVP unit
- Capstan rotates freely
- Pick-up cylinder extends to block capstan

1. Chain movement direction
2. Capstan (rotating)
3. Extension of pick-up cylinder

**Injection**
- Capstan blocked
- Injector carriage moves in parallel with chain
- Injector cylinder extends, injection head comes into contact with roller grease nipple
- Injection phase

4. Chain movement direction
5. Capstan (blocked)
6. Extension of injector cylinder
7. Injector carriage

**Return**
- Lubrication phase is completed. Injector cylinder retracts and injection head is no longer in contact with grease nipple
- Pick-up cylinder retracts and capstan is free
- Capstan rotates again
- Return cylinder retracts and injector carriage comes back to its start position

8. Chain movement direction
9. Capstan (rotating)
10. Pick-up cylinder retracts
11. Return cylinder retracts
## GIS systems technical data

### General specifications

<table>
<thead>
<tr>
<th></th>
<th>COBRA unit</th>
<th>GVP unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Start/Stop</strong></td>
<td>manual or automatic</td>
<td>automatic</td>
</tr>
<tr>
<td><strong>Lubrication cycle</strong></td>
<td>according to option</td>
<td>automatic</td>
</tr>
<tr>
<td><strong>Time configurable</strong></td>
<td>according to option</td>
<td>1 min to 365 d</td>
</tr>
<tr>
<td><strong>Pulse configurable (chain laps)</strong></td>
<td>according to option</td>
<td>1 lap to 999 laps</td>
</tr>
<tr>
<td><strong>Volume injected</strong></td>
<td>0.2 to 2 cm³ *</td>
<td>0.33; 0.5; 0.75 and 1 cm³*</td>
</tr>
<tr>
<td></td>
<td>(factory setting 0.5 cm³)</td>
<td>(factory setting 0.5 cm³)</td>
</tr>
<tr>
<td><strong>Max. injection frequency</strong></td>
<td>1/min</td>
<td>1/4</td>
</tr>
<tr>
<td><strong>Max. distance between injection head and nipple</strong></td>
<td>36.5 mm</td>
<td>max. 20 mm</td>
</tr>
<tr>
<td><strong>Chain position</strong></td>
<td>horizontal</td>
<td>horizontal, indifferent with capstan</td>
</tr>
<tr>
<td><strong>Max. chain speed [m/min]</strong></td>
<td>± 25 mm horizontal; ± 15 mm vertical</td>
<td>± 5 mm horizontal; ± 1 mm vertical</td>
</tr>
<tr>
<td><strong>Max. variation of the chain position</strong></td>
<td>5 °C to 60 °C (41 °F to 140 °F)</td>
<td>5 °C to 55 °C (41 °F to 131 °F)</td>
</tr>
<tr>
<td><strong>Ambient temperature limits</strong></td>
<td>5.5 to 6 bar (80 to 87 psi)</td>
<td>4 to 8 bar (58 to 116 psi)</td>
</tr>
<tr>
<td><strong>Compressed air</strong></td>
<td>quality class 5 according to standard</td>
<td>quality class 5 according to standard</td>
</tr>
<tr>
<td><strong>Air quality</strong></td>
<td>DIN ISO 8573-1</td>
<td>DIN ISO 8573-1</td>
</tr>
<tr>
<td><strong>Power supply</strong></td>
<td>N/A</td>
<td>115 / 230 V AC</td>
</tr>
</tbody>
</table>

### Operating checks

<table>
<thead>
<tr>
<th></th>
<th>according to option</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pneumatic supply pressure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Grease supply pressure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chain displacement during the lubrication phase</strong></td>
<td>according to option</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Carriage departure/return</strong></td>
<td>according to option</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Injector departure/return</strong></td>
<td>according to option</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Monitoring and display of injection pressure</strong></td>
<td>no</td>
<td></td>
</tr>
</tbody>
</table>

### Construction

<table>
<thead>
<tr>
<th></th>
<th>steel, aluminum</th>
<th>steel, aluminum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main materials</strong></td>
<td>460 × 700 × 350 mm</td>
<td>1,000 × 950 × 350 mm</td>
</tr>
<tr>
<td><strong>Dimensions</strong></td>
<td>not included</td>
<td>included</td>
</tr>
<tr>
<td><strong>Attachment support</strong></td>
<td></td>
<td>1, 2, 3 or 4</td>
</tr>
<tr>
<td><strong>Protection cover</strong></td>
<td></td>
<td>pneumatic</td>
</tr>
<tr>
<td><strong>Number of injection heads</strong></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Injection head drive</strong></td>
<td>mechanical/pneumatic</td>
<td>pneumatic</td>
</tr>
</tbody>
</table>

### Lubricant supply

<table>
<thead>
<tr>
<th></th>
<th>up to NLGI grade 2</th>
<th>up to NLGI grade 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Grease</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pressure required</strong></td>
<td>120 to 240 bar (1 740 to 3 480 psi)</td>
<td>150 to 350 bar (2 175 to 5 076 psi)</td>
</tr>
<tr>
<td><strong>Grease flow rate required</strong></td>
<td>120 cm³/min</td>
<td>60 cm³/min</td>
</tr>
<tr>
<td><strong>Grease supply</strong></td>
<td>external with drum pump</td>
<td>external with drum pump</td>
</tr>
<tr>
<td><strong>Grease supply connection</strong></td>
<td>G 3/8</td>
<td>G 3/8</td>
</tr>
</tbody>
</table>

***) The maximal injected volume of lubricant depends on chain speed and pitch, lubricant type, system configuration and surrounding conditions

***) The maximal admissible chain speed depends on injected volume, chain pitch, lubricant type, system configuration and surrounding conditions

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**NOTE**

The technical specifications are as general as possible and are provided only as a guide.

Since each COBRA and GVP unit meets the specific requirements of the application, these specifications may vary.
AEP3 control unit
GVP standard
- Configurable control of lubrication and pause phases (time, pulse, lubrication ratio)
- Depending on the version, up to three separate lubrication cycles for three different chain lubrication points
- Operation control
- Failure history
- Multilingual touch screen
- VisioLub (option)

LMC2 control unit
COBRA option
- Control of lubrication and pause phases (pulse)
- Operation check
  - hydraulic and pneumatic pressures
  - lubricant level

LMC2 main technical specifications
- Operating voltage: 24 V AC / 230 V DC
- Current: 4 A / 4 A
- Protection class: IP 54
- Operating temperature: -30 °C to +70 °C (-20 °F to 158 °F)
- Fault output:
  - chain running contact
  - lubricant point sensor
  - left system fault
  - right system fault
  - lubrication phase
  - Pause phase

AEP3 main technical specifications
- Operating voltage: 110 V AC and 230 V DC
- Protection class: IP 65
- Operating temperature: 0 °C to 60 °C (32 °F to 140 °F)
- Fault output:
  - chain stopped
  - air pressure
  - lubricant pressure
  - chain start/stop
  - lubrication point identification
  - trolley departure and return
  - injector departure and return
  - lubrication phase
  - Pause phase

LMC2 main technical specifications
- Operating voltage: 110 V AC and 230 V DC
- Current: 10 A / 4 A
- Protection class: IP 54
- Operating temperature: -10 °C to +70 °C (10 °F to 158 °F)
- Fault output:
  - min. drum pump level
  - chain running contact
  - air pressure
  - lubricant pressure
  - chain start/stop
  - lubrication point identification
  - trolley departure and return
  - injector departure and return
  - lubrication phase
  - Pause phase

Drum pump
COBRA and GVP
The GIS unit can be supplied with grease by an SKF transfer pump or other pump adapted for standard commercially available drums.
This pump requires the minimum technical specifications shown in the table opposite.

Drum pump specifications required
- Air pressure: 3 to 7 bar (53 to 168 psi)
- Lubricant outlet pressure: 150 to 300 bar (2 176 to 4 448 psi)
- Minimum flow rate: 300 g/min
- Grease type: NLGI 1 and 2
- Drum volume: 25 kg (standard) or 50 kg according to supplier’s delivery
- Electrical level switch: min. (option)

Integrated pump
GVP option
The Integrated supply pump results in an all-in-one lubrication system of compact size that is easy to install and use.
The pump is driven pneumatically and has one or several level checks.
The pump reservoir must be filled under pressure.

Integrated pump technical specifications
- Pneumatic inlet: 5 to 8 bar (73 to 116 psi)
- Flow rate: 3 cm³/ stroke
- Grease type: NLGI 1 and 2
- Reservoir: transparent plastic
- Electrical level switch: min. (standard), alert and max. (option)
- Reservoir:
  - Capacity: 8 or 10 kg
  - Material: PMMA (acrylic)
SKF VisioLub

With the SKF VisioLub program, lubricant pressure inside the injector can be monitored in real time during lubrication. The aim is to identify possible anomalies on the lubrication system or at the lubrication points (chain pins and/or rollers) by analyzing the pressure changes during the injection phase.

An analog pressure sensor continuously measures the pressure. The SKF VisioLub program carries out three measure probes corresponding to three different phases of the injection – the reload, the maximum pressure and the injection end. These probes are compared with three reference pressure ranges corresponding to the three phases. If the pressure measured goes beyond the lower or upper limit of these phases, an anomaly is then indicated.

The later analysis of the recorded anomalies, their nature, frequency and importance enables determination of failure on one or several lubrication points or of the lubrication system itself. The localization of the anomaly – injection phase where the anomaly has been signaled – also helps to determine the type of failure.

Technical data

- Real-time display of injection phase pressure curve
- Possibility of analyzing pressure of up to 6 injectors max.
- Several curves can be displayed at same time
- Three measurement points
- Analysis report with lubrication points presenting anomalies

The ability to integrate and use the SKF VisioLub program with the AEP3 control unit depends on different parameters specific to each application (chain, lubricant, system). Contact the SKF Service Centre to confirm its use.

For further information about the AEP3 control unit and the SKF VisioLub program, please see brochure 17141-EN