|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SI-HVC-0000 | Maintenance Schedule | | | | | | | | | | | | | | | | | | | | | |
|  |  | | P | | C | | | Pages | | | | | | 4 | | | | | | | | |
| Subjected chargers | HVC | | X | | X | | | Version | | | | | | 1.3 | | | | | | | | |
|  |  | | | | | | | Date | | | | | | 05-12-2018 | | | | | | | | |
| Procedure: | | | | | | | | | | | | | | | | | | | | | | |
| **I**nspection (visual inspection and required maintenance action if needed) | | | | | | | | | | | | | | | | **I** | | | | | | |
| **P**erformance of on-site work (commissioning, tests, measurements or other activities) | | | | | | | | | | | | | | | | **P** | | | | | | |
| **R**eplacement of component (see related service instruction) | | | | | | | | | | | | | | | | **R** | | | | | | |
|  | | Years from start up | | | | | | | | | | | | | | | | | | | | |
| **0** | | **1** | | **2** | **3** | | **4** | **5** | **6** | **7** | **8** | | **9** | | **10** | **11** | **12** | **13** | **14** | **15** |
| **Start-up / Commissioning** | | P | |  | |  |  | |  |  |  |  |  | |  | |  |  |  |  |  |  |
| **SERVICE** | | | | | | | | | | | | | | | | | | | | | | |
| RCD tests | |  | | P | | P | P | | P | P | P | P | P | | P | | P | P | P | P | P | P |
| RMS measurement (Country dependent) | |  | | P | | P | P | | P | P | P | P | P | | P | | P | P | P | P | P | P |
| Isolation measurements (Country dependent) | |  | | P | | P | P | | P | P | P | P | P | | P | | P | P | P | P | P | P |
| Grounding system measurement | |  | | P | | P | P | | P | P | P | P | P | | P | | P | P | P | P | P | P |
| Visual inspection | |  | | P | | P | P | | P | P | P | P | P | | P | | P | P | P | P | P | P |
| Improvements Based on Service Letters | |  | | I | | I | I | | I | I | I | I | I | | I | | I | I | I | I | I | I |
| **MAIN CABINET** | | | | | | | | | | | | | | | | | | | | | | |
| FILTER INLET KIT | |  | | I | | R | I | | R | I | R | I | R | | I | | R | I | R | I | R | I |
| FILTER OUTLET KIT | |  | | I | | I | I | | I | R | I | I | I | | I | | R | I | I | I | I | R |
| FAN POWER MODULE | |  | | I | | I | I | | I | R | I | I | I | | I | | R | I | I | I | I | R |
| FAN CABINET | |  | | I | | I | I | | I | R | I | I | I | | I | | R | I | I | I | I | R |
| AC FUSE / BREAKERS | |  | | I | | I | I | | I | R | I | I | I | | I | | R | I | I | I | I | R |
| CCB | |  | | I | | I | I | | I | I | I | I | I | | I | | R | I | I | I | I | I |
| POWER SUPPLY;24VDC;240W (2X) | |  | | I | | I | I | | I | R | I | I | I | | I | | R | I | I | I | I | R |
| POWER MODULE | |  | | I | | I | I | | I | I | I | I | I | | I | | R | I | I | I | I | I |
| HVC HMI Assy 7” | |  | | I | | I | I | | I | R | I | I | I | | I | | R | I | I | I | I | R |
| **DEPOT BOX** | | | | | | | | | | | | | | | | | | | | | | |
| Connector holders | |  | | I | | I | I | | I | R | I | I | I | | I | | R | I | I | I | I | R |
| CCB | |  | | I | | I | I | | I | I | I | I | I | | I | | R | I | I | I | I | I |
| CPI COMBO CCS | |  | | I | | I | I | | I | I | I | I | I | | I | | R | I | I | I | I | I |
| IMI COMBO CCS | |  | | I | | I | I | | I | I | I | I | I | | I | | R | I | I | I | I | I |
| POWER SUPPLY;24VDC;120W (2X) Single Phase | |  | | I | | I | I | | I | R | I | I | I | | I | | R | I | I | I | I | R |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **POLE ACM** | | | | | | | | | | | | | | | | |
|  | Years from start up | | | | | | | | | | | | | | | |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| Fan |  | I | I | I | I | R | I | I | I | I | R | I | I | I | I | R |
| CCB |  | I | I | I | I | I | I | I | I | I | R | I | I | I | I | I |
| CPI COMBO CCS |  | I | I | I | I | I | I | I | I | I | R | I | I | I | I | I |
| IMI COMBO CCS |  | I | I | I | I | I | I | I | I | I | R | I | I | I | I | I |
| POWER SUPPLY;24VDC;480W; |  | I | I | I | I | R | I | I | I | I | R | I | I | I | I | R |
| POWER SUPPLY;24VDC;120W; (2x) Tri-phase |  | I | I | I | I | R | I | I | I | I | R | I | I | I | I | R |
| **Pantograph (Stemmann)** | | | | | | | | | | | | | | | | |
| **Cycles per day up to 70** | Years from start up | | | | | | | | | | | | | | | |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| Tooth belt |  |  |  |  |  |  |  |  | R |  |  |  |  |  |  |  |
| Plug-in relays, 2 changer |  |  |  |  |  |  |  |  | R |  |  |  |  |  |  |  |
| bridging strand |  | I | I | I | I | I | I | I | R | I | I | I | I | I | I | I |
| connection cable set |  | I | I | I | I | I | I | I | R | I | I | I | I | I | I | I |
| flat spring + plastic plate + Pin |  | I | I | I | I | I | I | I | R | I | I | I | I | I | I | I |
| Slide Bearing |  | I | I | I | I | I | I | I | R | I | I | I | I | I | I | I |
| Electric motor |  | I | I | I | I | I | I | I | R | I | I | I | I | I | I | I |
| Contact rails |  | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R |
| **Cycles per day up to 140** | Years from start up | | | | | | | | | | | | | | | |
| **0** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** |
| Tooth belt |  |  |  |  | R |  |  |  | R |  |  |  | R |  |  |  |
| Plug-in relays, 2 changer |  |  |  |  |  |  | R |  |  |  |  |  | R |  |  |  |
| bridging strand |  | I | I | I | I | I | R | I | I | I | I | I | R | I | I | I |
| connection cable set |  | I | I | I | I | I | R | I | I | I | I | I | R | I | I | I |
| flat spring + plastic plate + Pin |  | I | I | I | I | I | R | I | I | I | I | I | R | I | I | I |
| Slide Bearing |  | I | I | I | I | I | R | I | I | I | I | I | R | I | I | I |
| Electric motor |  | I | I | I | I | I | R | I | I | I | I | I | R | I | I | I |
| Contact rail |  | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R |
| Overhaul / Main Inspection\* |  |  |  |  |  |  |  |  |  |  |  |  | R |  |  |  |

\*Overhaul / Main Inspection cannot be performed on site and must be carried out in a suitable work shop, we recommend obtaining a spare pantograph for replacement during the maintenance and/or considering redundant charging poles in the project.

Pantograph: Periodic maintenance and cleaning

Every 3 Months - Contact rails:

* Functional testing / Visual inspection of the rail, cleaning, sanding or replacing if needed.
* Recommended interval, this may vary based on usage, weather conditions and bus design.
* Failing to inspect and cleaning the Contact rails may cause additional wearing that requires an early replacement.
* Earlier need to perform this action can be monitored remotely via ABB tools by analyzing the increase in disconnection during charging sessions.
* The wear of the contact rails is expected during the operation and therefore must be monitored by the operator acc. to their operational experience.

The contact rails have to be replaced if one of any following condition are present:

* + - Minimum height of copper of 3mm over the whole length
    - Deformation or damages due to arcs

Every 6 Months - Testing and greasing:

* Check of spring force and contact force
* Cycle time and cleaning
* Greasing as per service instruction
* Recommended interval, this may vary based on usage, weather conditions and bus design.

Notes:

Air Filter:

Environment characteristic and number of charging sessions may require additional replacement of the air filter during the life time of the charger.

Power Cabinet:

The Maintenance Schedule was defined based on the following charging cycle options:

A) ambient temperature=25°C and every day 8 consecutive hours charging at full load  
B) ambient temperature=25 °C and cycles of 6 minutes charging at full load every 15 minutes for 8 hours a day

\*Apart from the time related maintenance there are a number of components which wear with the use. At this moment this use is not counted or calculated.

|  |  |
| --- | --- |
| **Consumables** | **Notes** |
| Cables with connectors (CCS, Chademo and AC) | Replace after 10.000 mattings |
| Gunholders | Yearly inspection, replace after 5 years |
| Contact rails | Inspection every 3 months / Cleaning / Replacing |

Consumables are parts that will degrade faster based on weather, number of charging sessions and customer handling. They are not covered under warranty unless approved after RMA.