General Technical Terms and Conditions
Cooling systems for rail vehicles
Date June 2008

1 General Information

1.1 Validity
This document contains general technical terms and conditions that apply unless other written agreements have been made.

1.2 Quality Guarantees
Quality guarantees based on §§ 443, 444, 639 of the German Civil Code are only valid if expressly identified as quality guarantees based on §§ 443, 444, 639 of the German Civil Code. This applies both for the technical data included in this document and other documents mentioned therein.

2 Technical Specifications

2.1 Design, Dimensions, Ambient Conditions
The design is based on the information specified in the data sheet. The customer bears sole responsibility for compliance with the original data specified in the data sheet.

2.2 Mechanical Requirements
Based on DIN EN 61373 (category 1, class A), all components fitted to rolling stock should be designed to withstand vibrations and impacts experienced during normal rail transport operations. Verification or inspections stipulated in DIN EN 61373 are not included in the scope of services.

2.3 Packaging, Transport and Storage
Voith is responsible for selecting suitable packaging.
If components are shipped in special reusable packaging, this packaging must be returned to Voith as specified in a separate agreement.
Delivered parts must always be stored in their original packaging in dry closed rooms and protected from dust.
Storage facilities must meet the following requirements:

- Storage temperature +5 to +35 °C
- Max. relative air humidity 70%
- No ozone emissions in the room
- No permanent vibrations
- Maximum fluctuation in temperature +/- 5 K
- No aggressive chemicals open to the air inside the room
- No direct exposure to UV rays

The parts may be stored under the aforementioned conditions for a maximum of 6 months from the delivery date without the need for additional measures. Contact Voith if you wish to store the components for longer periods.
When storing coolers and systems fitted with coolers, the regulation "Storage of Aluminium and Nonferrous Metal Coolers 70.2216.10" always applies.

2.4 Installation and Taking into Service
The units and components installed in the vehicle are usually flexible. Pipe connections leading to and from the unit and components must be laid loosely and should not be twisted.
Observe the general "Instructions for Installation and Taking Into Service 3.285-548" and specific "Technical product documentation".
General installation guidelines for individual components are available before the "Technical product documentation". It may be necessary to request these separately.

2.5 Operating Resources
All operating resources must fulfil the requirements stipulated in the relevant Voith specifications. The customer is responsible for checking the suitability and compatibility of operating resources with system parts not included in the Voith scope of delivery.

2.6 Operation
The customer bears responsibility for parts of the overall system that do not include components supplied by Voith.
The following conditions should be observed:

- Unless the complete cooling circuit is included in the Voith scope of delivery, the customer is responsible for ensuring that the entire circuit is ventilated correctly.
- Obstructions on the vehicle that block or redirect the flow of cooling air are not permitted. If such obstructions are unavoidable, Voith must be informed immediately.
- The flow of warm cooling air back into the vehicle must be prevented. If this is unavoidable, Voith must be informed immediately.
- Make sure that the air can flow to and from the cooling unit on the vehicle over the entire cross section with an even speed distribution. Voith should be informed immediately of any significant differences in air pressure (e.g. when driving at high speed).
- The cooler must be cleaned sufficiently to ensure that the agreed dirt quantities are not exceeded.
- Suitable measures must be taken to ensure that all cooling and hydrostatic circuits are clean before they are operated. The customer is responsible for all operating faults caused by dirt generated during operation.
- Unless the complete cooling circuit is included in the Voith scope of delivery, the customer is responsible for ensuring that the coolant flows at the specified rate.
- Sharp fluctuations in temperature in the cooling circuit are not permitted. The customer must ensure that the overall system maintains an even temperature under all operating conditions.
- The unit is designed according to the nominal values. Special operating conditions and special start and stop conditions are only considered if agreed separately.

2.7 Corrosion Prevention, Surface Coatings

The coating consists of a 2-component epoxy resin base coat (thickness 60 µm) and a 2-component polyurethane resin top coat (thickness 50 µm), colour shade pebble grey/RAL 7032. The materials correspond with DB -TL 918 300.
Coatings are not applied to parts with rustproof surfaces such as stainless steel, aluminium, zinc coatings, etc.
The texture and colour shade of coatings on standard parts such as pumps, motors, heat exchangers, catalogue parts, etc. may differ from standard component specifications.

2.8 Fire Prevention

The requirements stipulated in DIN 5510 "Preventive Fire Protection in Railway Vehicles" apply.

2.9 Welding

Welded parts should be designed and manufactured according to DIN 6700 "Welding Rail Vehicles and Vehicle Parts".

3 Technical Product Documentation

The "Technical product documentation" includes information on installation, commissioning, operation, maintenance, error diagnosis, decommissioning, preservation and storage as well as a spare parts catalogue and drawings. The documentation is available in PDF file format on CD-ROM in German or English. Documentation for follow-up orders in printed form or in other languages is not included in the standard scope of delivery.

4 LCC, RAMS

Voith standard specifications for RAMS/LCC values are exclusive non-binding prognosis values that can be provided on request from the customer.

5 Quality Assurance

5.1 QM System, Certification

Voith Turbo GmbH & Co. KG Marktbereich Schiene, Heidenheim branch uses a certified quality management system that meets the requirements stipulated in ISO 9001:2000 and IRIS Rev. 01.

5.2 Series Test Program

The components and parts included in the program are always subject to a certified quality assurance inspection. If an order is placed, an inspection plan is compiled listing all of the inspections that have been performed. The following inspections are usually performed if the corresponding parts are included in the scope of delivery:

- Inspection of the most important installation and interface dimensions
- Leak inspection on all fluid circuits, providing closed circuits or their components are already fitted on delivery.
- Electrical wiring inspection
- Check of the direction of the fan and ease of movement
- Check to ensure the fan is functioning correctly and running smoothly

If appropriate, Voith reserves the right to perform these inspections at random on a certain number of parts scheduled for delivery.
An inspection certificate 3.1 - EN 10204 has been issued for the series test program.

5.3 Type Approval, Acceptance

Type approval or inspection of the Voith scope of delivery is not included in the scope of services and must be agreed separately.

5.4 Installation Check

An installation check or inspection is not included in the scope of services and must be agreed separately.

5.5 Commissioning, Vehicle Measurement

Assistance or services related to commissioning or measurements require a separate agreement and are not included in the scope of services.