

# **MAINTENANCE PLAN**

*Special double-module pocket wagon with bogies series 4956*

*Sdggmrss*

*“SS” Regime*

## REVISION INDEX

Revision	Date	Description (*)	Prepared by	Checked by	Approved by
00	15/01/2016	First issue	CEMAT	CEMAT	CEMAT
01	23/03/2018	Company name updated	MII	MII	MII
02	02/03/2020	Reference to hitch checks added (Chapter 5)	MII	MII	MII
03	01/06/2020	Updated to agree with rev. 7 of manual FC UT786. Extended G2 travelling interval and harness maintenance interval. Wagon serial numbers and design configuration schedule updated, VPI references updated, STM code removed.	MII	MII	MII

*(\*) The changes made compared to the previous revision are highlighted by a line on the right border of each page*

## 1. Acronyms

ANSF	-	Italian Railway Safety Agency
ECM	-	Entity in Charge of Maintenance
PdM	-	Maintenance Plan
PRC	-	Repair and Checking Plan
STI	-	Technical Interoperability Specifications
EWT	-	European Wheelset Traceability
IO	-	Operating Instruction
MdM	-	Maintenance Manual

## 2. Definitions

### *Entity in Charge of Maintenance (ECM)*

The ECM, or entity in charge of maintenance, is the organisation that coordinates, monitors, and manages the maintenance system, made up of the system management, maintenance development, fleet maintenance management, and maintenance execution departments. The ECM engages directly in management, whereas it may delegate the other tasks to other departments, while retaining coordination and supervision of the same. Irrespective of the modes of outsourcing adopted, the ECM is responsible for the entire system and for the results of the maintenance activities.

### *Repair requisition*

A repair requisition is a document that covers all the works to be carried out, by the same temporal deadline. There are therefore as many repair requisitions as there are programmed deadlines for the rolling stock maintenance.

### *Operating instruction (IO)*

An operating instruction is a document that contains the information and procedures related to how the tasks included in the maintenance schedule are to be executed.

### *Programmed maintenance*

Programmed maintenance includes the series of maintenance tasks that are systematically carried out at predetermined temporal or kilometric intervals, with a view to reducing the probability of a fault or degradation of functioning of a vehicle.

### *Extraordinary maintenance*

Extraordinary maintenance includes all maintenance tasks carried out, other than those indicated in the Maintenance Plan. Extraordinary maintenance also includes corrective actions taken following detection of an anomaly, aimed at reinstating functionality of the wagons, to allow them to be used safely.

### *Maintenance Plan (PdM)*

The Maintenance Plan covers the maintenance schedule and repair requisitions.

### *Maintenance Manual (MdM)*

The Maintenance Manual contains the Operating Instructions and Appendices that contain the information and procedures related to how the tasks included in the maintenance schedule are to be executed.

### *Repair and Checking Plan (PRC)*

The PRC is an operating document prepared by the workshops during maintenance works, and contains detailed information on the various work and checking phases. In this case, the PRC is made up of reports related to the operating instructions or, alternatively, similar forms provided by the workshop itself, and certificates related to the checks done (CND).

### *Maintenance Schedule*

The maintenance schedule is a document that indicates all the physical units subject to maintenance, with a brief definition of the type of maintenance work to be done and related maintenance interval for each of them.

*Job Breakdown Report*

The Job Breakdown Report is the document in which the workshop involved records the tasks necessary in terms of the provisions of the Maintenance Plan, as well as any corrective maintenance tasks required, after doing a thorough general check of the wagon prior to beginning the maintenance works. In this Maintenance Plan, the Job Breakdown Report is made up of the operating instruction report 0.1.1.

**3. Content and field of validity**

This maintenance manual refers to MERCITALIA INTERMODAL type 4956, series: Sdggmrss pocket wagons, unequivocally identified by the following service numbers, described briefly below:

Table 1 – MERCITALIA INTERMODAL Wagons

Wagon series	Service numbers
4956 - Sdggmrss	33854956501-2 to 33854956650-7 33854956801-6 to 33854956950-1 37854956001-9 to 37854956250-2

The MERCITALIA INTERMODAL type 4956 double pocket wagon, built to the T3000e design by Ferriere Cattaneo SA, is designed for transporting containers, swap-body containers, and semi-trailers: for all questions related to correct loading and wagon and load unit compatibility, see the Loading Instructions and Loading Scheme document.

The vehicle is made up of two semi-wagons, each with a lowered Y25 Ls (s) i1 bogie at the ends (hitch side) and sharing a standardised Y25 Ls (s) i1 (f) bogie in the centre of the wagon.

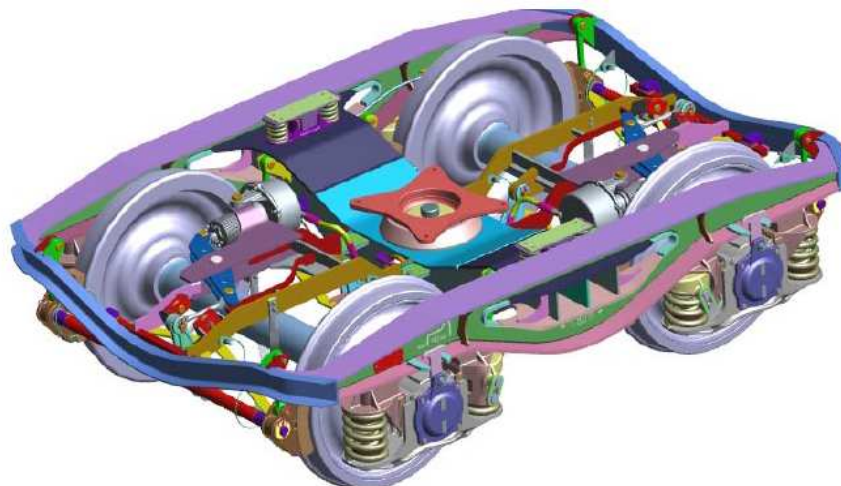


Figure 1 - Y25Ls(s)i1 lowered bogie

The two semi-wagons are coupled by means of a Talbot type articulated joint that conforms to UIC 432 Appendix F – F.1 – prEN 16235 Appendix L.



Figure 2 - Talbot Articulated Joint

The pocket wagon is fitted with ISO twist-locks for containers and swap body containers which, in the case semi-trailers, are tipped and fixed to the outside of the longitudinal beams: in the pocket area, two tippable type ISO twist-locks are available for each side of each semi-trailer, at the external longitudinal beams. These racks are laid out along the wagon, in positions that do not interfere with the clamp sockets for loading the semi-trailers.

The wagon has two MAZ/FAHO 80800 hitches (also referred to as “racks”) positioned at the ends of the carriage, with three height adjustments (88, 98, and 113 mm in relation to the pocket loading level) for loading semi-trailers. These are fixed and secured only by their kingpin. A system is provided for safeguarding the semi-trailer’s kingpin against possible damage, which may result in an accident subsequently, while on the road.



Figure 3 - FAHO 80800 Hitch

The maximum longitudinal and transverse accelerations transmitted to the Semi-Trailer at an impact speed of 7 km/h is limited by means of highly absorbent 1 g buffers (Model: Schwab or SMW/ETQ).

The brake’s safety valve is activated if the controlled deformability elements (hereinafter referred to as *crash elements*) are shortened. In this case, the brake’s general conduit is discharged, and the convoy is subjected to emergency braking.

The PdM contains the programmed maintenance planning to be implemented for MERCITALIA INTERMODAL freight wagons, in order to ensure the expected safety conditions, efficiency, and technical compatibility with the railway infrastructure throughout its working life.

The periodic services, as indicated in this document, as well as the IOs for carrying out the maintenance tasks referred to here and contained in the Mdm must be applied rigorously, in order to achieve an optimum, safe result in operational management of the wagons.

Maintaining the wagons according to the programme contained in this document makes it possible to fulfil all legal obligations in terms of the pertinent requirements of National Railway Safety Agencies. The PdM will be updated constantly over time, so that it always conforms to the legal obligations in relation to railway maintenance. This document may also be updated in light of operating results and the outcomes of any surveys and/or investigations carried out.

This document is issued by MERCITALIA INTERMODAL S.p.A. in their capacity as the ECM in terms of EU Regulation 445/2011.

This document conforms to point 4.5.3 of STI 321/2013 "rolling stock material - freight wagons", in terms of the contents required for the Maintenance Plan.

When carrying out the maintenance tasks, the workshop is to strictly conform to the design configuration of the wagon, without making modifications of any kind. For any parts that need to be replaced, see the specific Spare Parts Catalogue (document: FC "T3000e Anordnungstabelle").

The table shows the main characteristics and some useful information on the design configuration of the wagons covered by this PdM. The information contained in the table below cannot be taken to be exhaustive or to replace the construction drawings, diagrams, spare parts list, and components cards, which define the design configuration of the wagons.

**Table 2 – Design configuration card for the wagons**

	<b>Wagon type 4956 series: Sdggmrss</b>
<b>Number of axles</b>	6
<b>Number of bogies</b>	3
<b>Tare</b>	34,3 t
<b>Bogie</b>	Y25 Ls(s)i1
<b>Wheelsets fitted (*)</b>	LL 306 (thermostable) BA 004 (non thermostable)
<b>Nominal diameter</b>	920 mm
<b>Bushing</b>	TVP 1 (BA386)
<b>Suspension springs</b>	
<b>End traction unit</b>	SMW DZ15NF 2.05.1600.176 (Durel, 1 MN)
<b>Tensioner - end traction</b>	MSV 455.9.400.01.01.2 (850 kN)
<b>Hook - end traction</b>	MSV 455.0.210.01.010 C (EN15556 L=575mm, 1 MN)
<b>End buffer units</b>	SMW 199-30-00-00 1G
<b>Length</b>	665 mm ±2
<b>Stroke</b>	150 mm
<b>Category</b>	L
<b>Intermediate traction unit or joint</b>	Talbot Articulated Joint
<b>Traction shaft - intermediate traction</b>	-
<b>Elastic unit - intermediate traction</b>	-
<b>Double ring or connecting bar</b>	-
<b>Tensioner or connecting device - intermediate traction</b>	-
<b>Brake type</b>	2x DK-GP-A (DAKO)
<b>Distributor</b>	2x CV1ND23-GP (dwg. 90142-165/2303)
<b>Pressure variator</b>	DAKO DSS 428/K
<b>Automatic discharge valve</b>	DAKO OS-1
<b>Weighing valve</b>	3x SL2 (UIC Typ 1)
<b>Automatic play regulator</b>	DRV 10-450H1 (central bogie)
<b>Brake cylinder</b>	4x 10" DK BS 10 J 26* (end bogies) 1x 9" DK TB 9K WBN (central bogie)
<b>Pressure control valve</b>	3x DLV3HL
<b>Handbrake</b>	Fitted (central bogie)
<b>Brake blocks</b>	Jurid 816M Bg (320 mm brake shoes)

(\*) all the wheelsets mounted on the wagon must be of the same type (6x LL306 or 6x BA004)

#### 4. Planned maintenance activities

This Maintenance Plan refers to the maintenance system known as *VPI Unterhaltsleitfaden* (Guidelines for *VPI maintenance*, hereinafter abbreviated to *VPI-EMG*) that is widely recognised and used in Europe. In addition to this and in order to allow for the wagon's particular features, specific Operating Instructions have been provided.

Three levels of programmed maintenance are envisaged for the wagon:

- Complete overhaul, code G4.0
- Intermediate overhaul code G4.2
- Light overhaul, code G2

The programmed maintenance tasks must be carried out at specialist, VPI approved workshops. The programmed maintenance task cycle is as shown in figure 1.

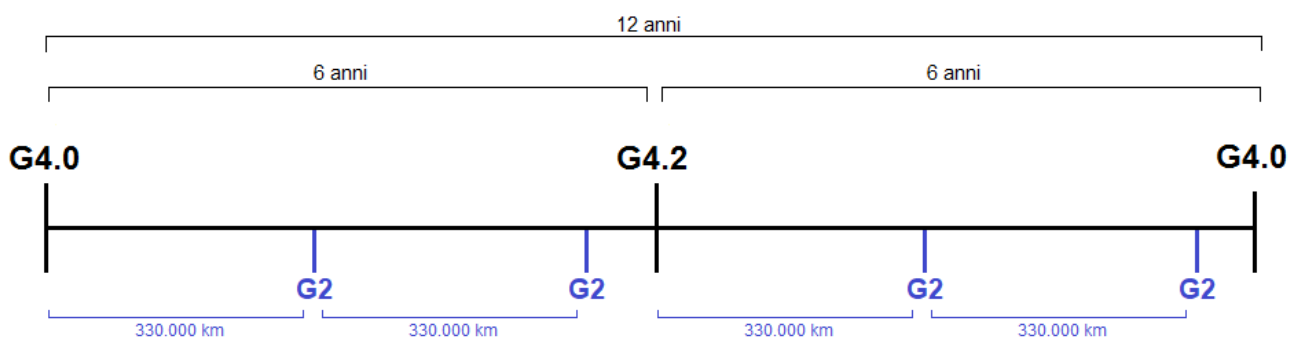


Figure 4 – Planned maintenance cycle

The interval between G4 overhaul is established on a time basis, of 6 years. The duration of G4.0 and G4.2 overhaul can be extended for a period of 3 months, in compliance with the provisions contained in point 1.3.1 of Annex C to the GCU.

The interval between G2 overhauls is determined according to the distance travelled, that is 330,000 km, and is based on feedback from experience in operating wagons of the same type, that cover an average of about 100,000 km per year. MERCITALIA INTERMODAL monitors the distance travelled by each wagon and removes them from service when that value is reached, with a tolerance of  $\pm 30.000$  km.

The minimum maintenance tasks to be carried out during programmed maintenance are indicated in paragraph 10, which refers to the reference documents.

Further tasks required are established during the general inspection and stripping, when the maintenance works begin.

During G4 overhaul, any anomalies encountered must be indicated in the stripping report using the relevant form. During G2 overhauls, the workshop is required to inform MERCITALIA INTERMODAL of the same in writing.

If abnormalities on or damage to the wagon is noted, it indicates inappropriate loading and unloading methods or overloading of the wagon, and the workshop is to inform MERCITALIA INTERMODAL of the same in writing.

In addition to the maintenance intervals indicated above, the wagon's 2 hitches must undergo maintenance at least annually, in compliance with the Hitch MAZ 80800 Maintenance Manual.

## 5. Structure of the Maintenance Plan

Besides this document, the Maintenance Plan is made of up:

- VPI-EMG.
- Operating Instructions to cover the specific features of the wagon, not covered by the VPI-EMG, or developed based on feedback from experience.
- Construction drawings and spare parts list.
- Additional documents issued by the manufacturers of the individual parts:
  - **Fitted wheelsets type BA 004 (non thermostable)**– Bonatrans – Technical Specification F.C. of 08.02.2012. Details of the type of construction for this fitted wheelsets are defined in the VPI-EMG 04 themselves.
  - **Fitted wheelsets type LL306 (thermostable)** – Lucchini RS – Details of the type of construction for this fitted wheelset are defined in the VPI-EMG 04 themselves.
  - **2 x DK-GP-A-K Max 108 t (72 t + 36 t)** – DAKO braking system for T3000e double pocket wagons – doc. ZB 1272.
  - **Y25Ls(s)i1 N-860 TVP** – bogie at the end of the wagon, with main cross beam lowered, and mechanical brake on the bogie (cylinder on the bogie) – doc. TVP 4267-11.
  - **Y25Ls(s)i1f N-849-02 TVP** - bogie in the centre with mechanical brake and handbrake on the bogie (cylinder in the bogie)
  - **Railcar Trailer Hitch with 3 heights MAZ/FAHO 80800** - doc. SB MAZ/FAHO 80800 Instructions for Use

Paragraph 10 contains the repair job sheets for G4.0 and G 4.2 tasks, as well as G2 tasks.

## 6. Instruments and tools

The checking and measuring instruments used when engaging in maintenance tasks must be suitable for their specific use. Only checking and measuring instruments that are suitably calibrated and set at pre-established systemic intervals, may be used. The instruments are to be calibrated by certified, accredited bodies, unless agreed otherwise with Mercitalia Intermodal. The checking and measuring instruments' calibration certificates must be kept by the workshop for at least 13 years after the wagon has been put back into service after maintenance services.

The checking and measuring instruments must be suitably protected against damage and deterioration, which may occur while being moved, maintained, and stored. Each checking and measuring instrument must have its own Use and Maintenance Manual or, alternatively, suitably prepared replacement procedures. Instruments are to be maintained in compliance with the Use and Maintenance Manual or replacement procedures. The workshop is responsible for adequately instructing their personnel on the use of the checking and measuring instruments, and any related risks.

Calibration certificates, use and maintenance manuals, and any procedures related to the checking and measuring instruments must be kept by the workshop and, when requested, a copy must be made available to MERCITALIA INTERMODAL for consultation.

## 7. Responsibilities and tasks

The maintenance workshop:

- Must be authorised and approved for carrying out the programmed maintenance tasks.
- Must do the general check of wagons, and find any anomalies before starting the maintenance tasks.
- Must ensure compliance with the contents of the PdM or the IOs referred to therein.
- Must document the tasks carried out during maintenance, and complete the reports on the required maintenance tasks and checks (Repair and Checking Plan), and send them to MERCITALIA INTERMODAL.
- May carry out modifications as part of the programmed maintenance tasks, only if tasked with doing so in writing by MERCITALIA INTERMODAL.
- Must inform MERCITALIA INTERMODAL of any damage of significance for the safe circulation of wagons, or frequently encountered defects or abnormalities.
- Must inform MERCITALIA INTERMODAL in writing of any damage or abnormalities that make them suppose that the wagon has been loaded and unloaded inappropriately, has carried freight for which it is not suitable, or that the wagon has been overloaded.
- Must notify MERCITALIA INTERMODAL if any damage to the wagon occurs during repairs.
- Must notify MERCITALIA INTERMODAL if during extraordinary maintenance done with the wagon loaded, the latter gets damaged.
- Must provide the elements required for assessing the damage or abnormalities encountered during programmed maintenance but not covered by the same, in order to allow MERCITALIA INTERMODAL to make decisions related to further maintenance and repair tasks.
- Must ensure that their personnel are instructed on the contents of the PdM, the VPI-EMG, and the IOs referred to therein.
- Must guarantee qualification of personnel used to do maintenance work on the railway vehicles, in compliance with the current normative and legislative situation, and, especially in the case of maintenance work done in Italy, compliance must be ensured in relation to ANSF Decree n° 4/2012 and ANSF Guidelines n° 2/2012.
- Must guarantee that components and spare parts conform to national and/or international standards, and are such that they do not alter the wagons' design configuration.
- Must guarantee that the components and materials are stored, handled, and transported in such a way as to prevent wear and damage.
- Must have plants, tools, and instruments that are adequate and suitable to allow the maintenance tasks to be carried out, guaranteeing that this is done in safety, and safeguarding the health and safety of personnel, while ensuring ergonomics and health protection by using the necessary PPE.
- Must have suitable in-house checking procedures, for guaranteeing that maintenance is done in compliance with the provisions of the PdM.
- Must be certified for “carrying out maintenance” in terms of EU Regulation 445/2011 (and subsequent updates), and be approved by VPI for carrying out G4.0 and G4.2 maintenance tasks.
- Must have adequate skills in-house, in relation to welding and bonding techniques, non-destructive testing, final testing of rolling stock following servicing, maintenance of braking systems, maintenance tasks on the wheelsets fitted, and maintenance on the traction and pushing devices.
- Must notify MERCITALIA INTERMODAL of completed servicing of wagons and their regular returning to service.

## 8. Specific indications related to maintenance tasks

Any welding operations required during programmed maintenance, to reinstate the wagon's capacity to circulate safely, must be done in compliance with EN 15085.

Damaged or missing screwed connections must, of necessity, be replaced according to the indications contained in the original drawings and, in any case, in the applicable standards. Unless indicated otherwise, steel screws with a strength class of 8.8, and nuts with a strength class of 8 must be used.

Personnel assigned to doing Non-Destructive Testing must be qualified in accordance with the EN ISO 9712 standard and, in addition, for checks done in Italian workshops, they must also be qualified in accordance with ANSF Guidelines n° 2/2012.

## 9. Programme for wagon maintenance activities

The maintenance tasks to be carried out during programmed maintenance are indicated below.

For each of these, the VPI-EMG references that contain all the information and recommendations for carrying out the tasks are indicated.

### - **Light Overhaul G2**

After 330,000 km of travel from new (or since the last G4 or G2 overhaul), a G2 overhaul must be done, during which reprofiling of all the wheelsets used on the wagon is to be done, according to level VPI IS1.

The job sheets for the tasks to be carried out in a Light Overhaul, are shown below in table 3.

The Repair and Checking Plan, with details of the tasks to be carried out, to be completed by the workshop, is contained in document: "*MII\_PRC\_4956\_G2 - PRC Revision G2 - Wagon 4956*".

### - **Intermediate Overhaul G4.2 and Complete Overhaul G4.0**

After 6 years from new or from the last G4.0 overhaul, a G4.2 overhaul must be done.

After 12 years from new or from the last G4.0 overhaul, a G4.0 overhaul must be done.

All the tasks to be carried out during a complete overhaul (G 4.0) or an intermediate overhaul (G 4.2) on a wagon that does up to 100,000 km per year, are defined in VPI-EMG 01 - Appendix 5.

Details of the tasks to be carried out by the workshop, are shown in table 4 below.

Table 3 - Tasks to be carried out during a G2 overhaul

	Description	Ref.
1	Wagon: visual and integrity check.	VPI-EMG 01 - Annex 19
2	Brake pads: visual check and thickness measuring, replacement of shoes that are damaged or have a total thickness of less than 25 mm.	CUU - Annex 10 paragraph 3.8. Replacement of shoes with a total thickness of less than 25 mm.
3	Wheelsets: visual check and measuring of wheel levels. Technical examination of the wheelsets fitted (Checking frequency as for group “C – kilometres travelled $\geq$ 50,000 km/year”) Completion of Maintenance Sheet VPI-EMG 04 annex 26, sheet 2. Profiling of the wheelsets in position, or disassembly of the wheelsets and replacement with new profiled wheelsets.	VPI-EMG 01 – Appendix 21 VPI-EMG 04 - Annex 26-2
4	Wagon and hitches: lubricate	VPI-EMG 01 - Appendix 12 MAZ-Lubrication schedule for Railcar Trailer Hitch 80800
5	Brake: functional check Br 0, including testing of handbrake.	VPI-EMG 07
6	Fifth wheel bearings: visual check and thickness measuring.	
7	Slides: visual check and measuring of thickness of elements subject to wear.	
8	Hitches: visual check and functional test. <ul style="list-style-type: none"> <li>- The railcar trailer hitch must not have any missing, deformed, damaged, slackened, or corroded parts.</li> <li>- Check correct fixing and releasing of the pin.</li> <li>- Adjust the height of the hitch from 88 cm to 113 cm and vice-versa, in sequence, checking that the movement is easy.</li> </ul>	MAZ- Railcar Trailer Hitch 80800
9	Crash elements: visual and functional checking: <ul style="list-style-type: none"> <li>- Absence of play and longitudinal deformations. It must not be possible to rotate the crash element by hand.</li> <li>- Check tightening of the fixing elements.</li> </ul>	
10	Hitch safety valves (brake control): visual check and measuring of play between the railcar trailer hitch’s cover and base plate, in the hole, longitudinally (minimum 3 mm).	
11	Spigots; visual and functional check (move the racks and check correct functioning of the locking \ releasing device).	
12	Intermediate supports (small and large) for mobile crates: visual and functional check (check that the movement is easy)	
13	Talbot Articulated Joints: visual check and checking tightening of the M36 screws. Visual check and checking of wear on the plastic inserts (absence of contact between metal parts and/or movement of the sliding plate), and checking of minimum play: 2 mm during maintenance / 0,5 mm in service.	

Table 4 - Tasks to be carried out during a G4 overhaul

Component	Ref.	G4.0	G4.2
Fitted wheelsets BA 004 and LL306	VPI-EMG 04 - Appendix 5 table 1 (use class C – kilometres travelled $\geq$ 50.000 km/year)	Visual inspection of the fitted heelsets to determine the degree of maintenance required: IS2 or IS3	
Y25 Bogies	VPI-EMG 02 - Appendix 10. Additional documents: TVP4267-11 TVP4047-12 TVP4060-12	IS D3 Servicing with complete working of the bogies	IS D2 Servicing with partial working of the bogies
DAKO braking system	VPI-EMG 07 - Appendix 3. Additional documents: DAKO ZB1272 TVP 4267-11 TVP4047-12 TVP4060-12	Br 3 Servicing of the braking system with inspection of the braking equipment, with disassembly of the mechanical brake.	Br 2 Servicing of the braking system with inspection of the braking equipment, without disassembly of the mechanical brake.
Buffers	VPI-EMG 06B - paragraph 2.4 and annex 1,2 (VPI 01 annex 5)	Disassemble the buffers from the wagon, check the characteristic curves, and refit the buffers. If there are oil leaks, the buffer must be disassembled.	Inspection according to procedures and limits indicated in the documents quoted.
Traction device	VPI-EMG 06A – Appendix 4,5	The traction devices are disassembled from the wagon and the characteristic curves are checked.	Inspection according to procedures and limits indicated in the documents quoted.

Component	Ref.	G4.0	G4.2
Crash elements 170 [0 +30] kN	-	<p>Check fixing of the crash elements on the wagon: there must be no longitudinal deformation, there must be no longitudinal play, and the safety device to prevent the screws from unscrewing must be tightened to the plate.</p> <p>The crash elements must be disassembled from the wagon, and their total length measured (limiting value for programmed maintenance L = 470 ± 5 mm)</p>	<p>Check fixing of the crash elements on the wagon: there must be no longitudinal deformation, there must be no longitudinal play, and the safety device to prevent the screws from unscrewing must be tightened to the plate.</p> <p>If anomalies are found, the crash elements must be disassembled from the wagon, and their total length measured (limiting value for programmed maintenance L = 470 ± 5 mm).</p>
Hitch	<p>FAHO Lfd. no. 37.5 MAZ- Railcar Trailer Hitch 80800 MAZ-Lubrication schedule for Railcar Trailer Hitch 80800</p>	<p>The hitches must be disassembled from the wagon.</p> <p>Functional check of the hitch (upper locking device and height adjustment): adjust the height from 88 cm to 113 cm and vice-versa, checking that the movement is easy.</p> <p>Visual inspection of the hitch</p> <p>2 emergency valves: visual inspection - no play - play between hitch cover and base plate, in the hole, in a longitudinal direction (minimum 3 mm).</p> <p>The hitches must be disassembled (upper part, lower part, levers). The levers must be disassembled and checked.</p> <p>The individual components must be checked and replaced in the following cases: components deformed or damaged; screws, nuts, or bolts damaged or worn.</p> <p>The following components must be replaced: all the chains, all the springs, and the composite plates underneath the bogie.</p>	<p>Functional check of the hitch (upper locking device and height adjustment): adjust the height from 88 cm to 113 cm and vice-versa, checking that the movement is easy.</p> <p>Visual inspection of the hitch</p> <p>2 emergency valves: visual inspection - no play - play between hitch cover and base plate, in the hole, in a longitudinal direction (minimum 3 mm).</p> <p>The individual components must be checked and replaced in the following cases: components deformed or damaged; screws, nuts, or bolts damaged or worn.</p>



- **Container support spigots** as per drawing 12.9320-1: the spigots' support surface when the wagon is empty must be at a maximum incline in relation to horizontal of 3 mm (limit value for programmed maintenance). Greater differences must be compensated for using thicknesses at the container support, in the chassis at the prepared position.

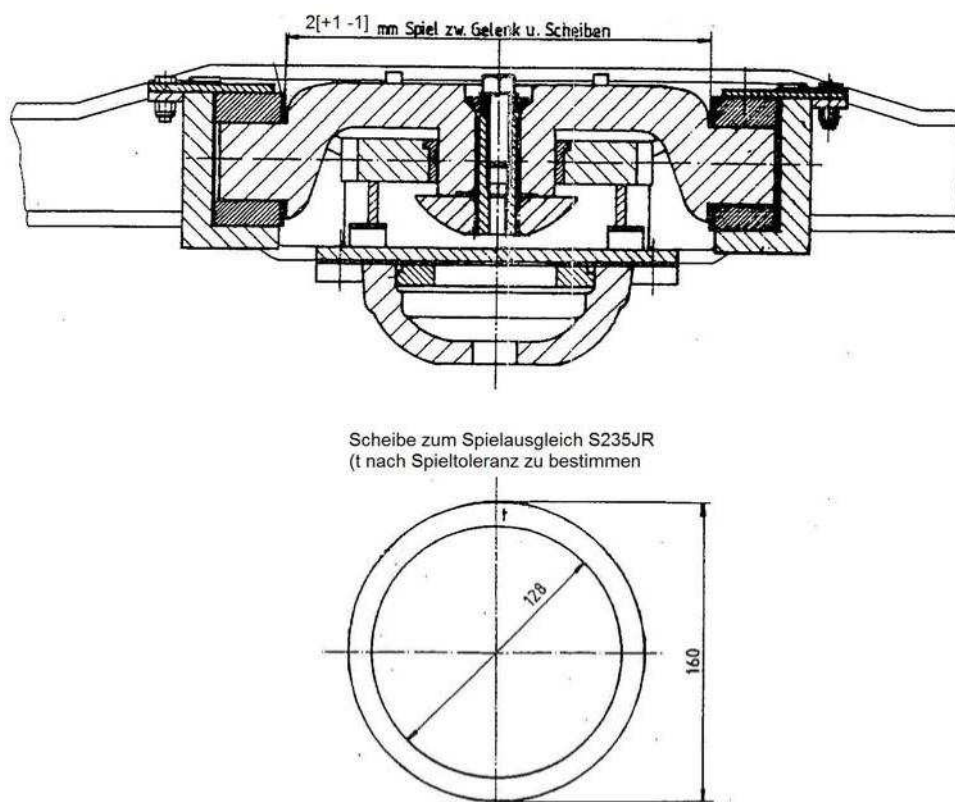


Figure 5 - Horizontal reference plane (limit value 3 mm downwards, with the wagon empty)

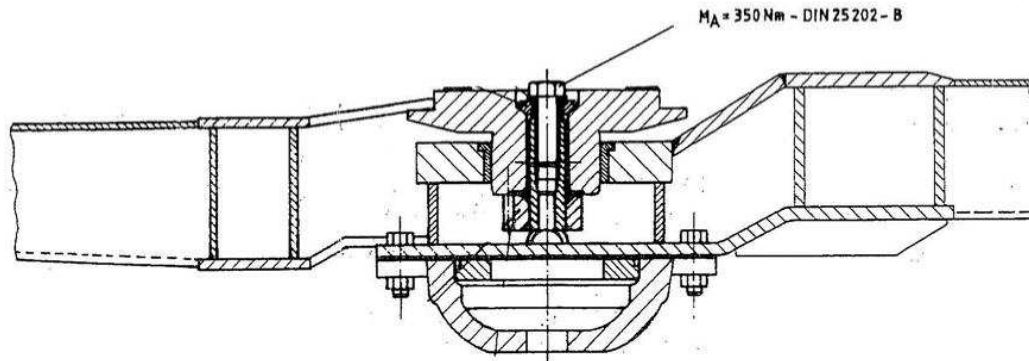
**Articulated joint** (Talbot drawing 06.47379 or equivalent): the following maintenance tasks must be carried out:

1. Check the play between the joint and the side bearing.

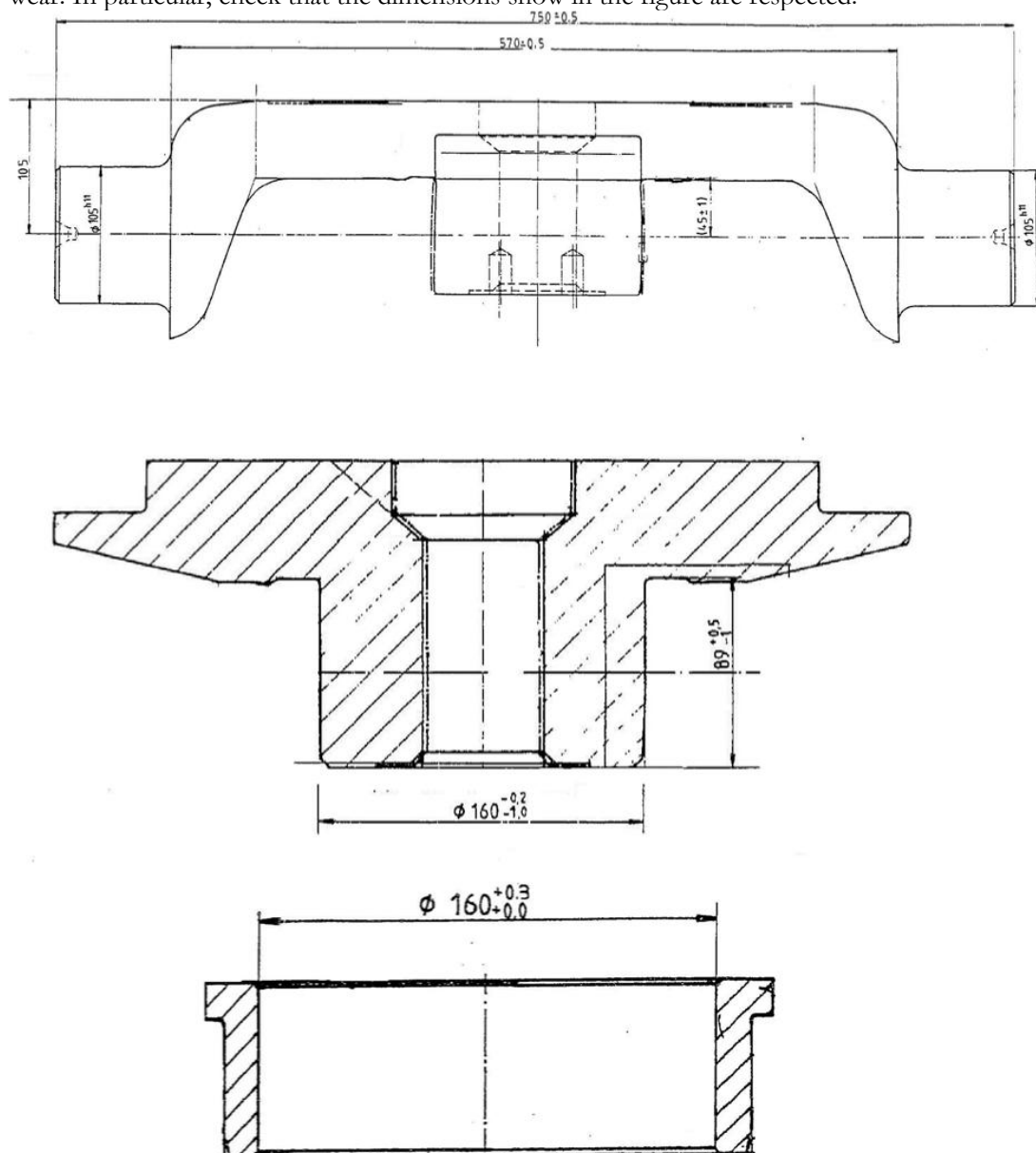
Repair dimensions: 1,5 mm on each side. If not within tolerance, replace the spacers in the figure, in order to maintain the transverse play.



2. Check the tightening torque of the M36 screws, according to the values in the figure.



3. During a G4.0 overhaul the joint must be disassembled and checked to ensure there is no damage / wear. In particular, check that the dimensions show in the figure are respected:



- **Upper side slide** (drawing F.C. 03.12180-2): if one of the composite material plates is worn (limit value for programmed maintenance: 2 mm in height between the metal support and composite plate), replace the complete upper side slide.

N.B.: only Jurid 148 composite plates may be used.

## 10. VPI maintenance system for fitted wheelsets

For the fitted wheelsets, this PdM fully adopts the VPI EMG 04 maintenance system. The adoption of a specific maintenance system for the fitted wheelset means that, when necessary, the maintenance tasks may be carried out independently from those laid down for the wagon.

All the rules and procedures for carrying out the maintenance tasks on the fitted wheelsets, are contained in the following documents:

- VPI-EMG 04, for general rules for maintaining the wheelsets and axle boxes.
- VPI-EMG 09, for procedures for doing non destructive testing.

In addition to the provisions of VPI-EMG 04, for maintenance of the BA004 wheelsets, the provisions contained in Technical Note MII 04 apply.

The VPI-EMG 04 maintenance system comprised five levels, based on the type of maintenance tasks called for and the checks done. The table below contains a brief overview of the maintenance levels and corresponding tasks called for.

Table 4 - Maintenance levels and tasks called for

<i>Level</i>	<i>Tasks called for</i>
IS0	Inspection with visual checking of the axle according to EVIC, of the state of the rolling circle, and of the integrity of the wheel and the bushing. Dimensional check of the internal and external gauge, width of the crown, dimensions of the rolling profile ( $Q_r$ dimension, border thickness and height), and radial oscillation of the rolling circle. These checks must be done with the wheelsets working on the wagon.
IS1	IS0 with additional dimensional checks and reprofiling of the wheels. Carrying out an IS1 type task on the wheelset implies carrying out all the applicable tasks and checks required for IS0.
IS2	IS1 with non destructive testing of the integrity of the axle, and possibly of the wheels to check their tensile state near the rolling circle. IS2 wheelset servicing is associated systematically with servicing of the IL bushing. Carrying out an IS2 type task on the wheelset implies carrying out all the applicable tasks and checks required for IS0 and IS1.
IS3	IS2 with replacement of the wheels but without reprofiling. Carrying out an IS3 type task on the wheelset implies carrying out all the applicable tasks and checks required for IS0, IS1 and IS2.
IL	Servicing of the bushing out of its working environment, with removal of bearing keys. IL bushing servicing is systematically associated with IS2 type wheelset tasks.

The table below shows the maximum time / distance interval between two IS2 maintenance tasks on the wheelsets, with the addition of servicing of the IL for axle boxes. The maintenance tasks must be carried out when the first of the distance or time limits is reached. The maximum time interval between two IS2+ILIL maintenance sessions is set at 8 years, or the wheelsets working on the wagon are classified as belonging to group C.

The programme of the maintenance tasks for the wagon, include doing the checks and measuring indicated in IS0, and depending on the outcomes, the maintenance tasks necessary are evaluated as provided for in VPI-EMG 04.

Table 5 - Maximum time and distance intervals between two maintenance sessions

<i>Type of wheelset</i>	<i>IS2 + IL</i>	
	<i>Maximum kilometres travelled [km]</i>	<i>Maximum time used [years]</i>
BA 004 LL 306	600,000	8

**Each time a wagon is in a Workshop for planned, running, or corrective maintenance or special repairs, it must be systematically undergo IS0 level inspection.** The outcome of the checks called for in IS0 will determine whether or not to proceed with IS1, IS2m IS3, or IL maintenance levels.

The fitted heelsets with a storage time in the warehouse of more than two years from the last check, must be systematically subjected to servicing of the axle boxes (IL).