S.C. " RULMENTI" S.A. GROUP
BARLAD -ROMANIA

Cylindrical roller bearings for railway axleboxes
WJ + WJP design
1. Description

Double-cylindrical roller bearings WJ/WJP design are manufactured specifically dimensioned ISO bearings and standardized by UIC.

These bearings have a polyamide cage and internal geometry has been optimized to further reduce edge stresses and to improve lubrication and load distribution.

The dimensioning is usually based on a calculated operating life of more than 3 million kilometers.

<table>
<thead>
<tr>
<th>Bearing</th>
<th>Type wagons and locomotives</th>
</tr>
</thead>
<tbody>
<tr>
<td>WJ+WJP 120/240</td>
<td>Gorlitz IV-Germany double-decker wagon</td>
</tr>
<tr>
<td>WJ+WJP 130/240</td>
<td></td>
</tr>
</tbody>
</table>

Cr = 946 kN  
Cor = 1494 kN  
for set  
Pomax = 69.1 kN  
-Speed limit in grease: 2400 min⁻¹  
-Elements are interchangeables

Cr = 951 kN  
Cor = 1620 kN  
for set  
Pomax = 69.1 kN  
-Speed limit in grease: 2200 min⁻¹  
-Elements are interchangeables
Freight wagons with Y25 bogies

Passenger wagons with Minden-Deutz bogies

Postals and stocks wagons
Sleeper wagon 60.50 and 70.50, 19.50, couche 19.50, 20.50, 39.50

Gorlitz -Germany double-decker wagon

Bogies typ Gorlitz , light wagons series 29.20

Bogies typ Gorlitz V , modified sleeper wagons 1983-85
Motorailer on two axleboxes

Locomotive type LDH 450/700 CP (normal way)

WJ+WJP 130/240

Bogies for transposed (large way)

Electrical frame 1870 kW

Electrical frame 2720 kW
3. Marking of cylindrical roller bearings type WJ+WJP

Marking method: chemical or laser.
Marking for WJ+WJP120/240 TNC4:

| Outer ring:          | WJ+WJP120/240TN, URB, ROMANIA, manufacturing month and year code, at 90°. |
| Inner ring WJ:      | WJ120/240TNC4, URB, manufacturing month and year code, at 120°.            |
| Inner ring WJP:     | WJP120/240TNC4, URB, manufacturing month and year code, at 120°.            |
| Thrust washer:      | WJP120/240TNC4, URB, manufacturing month and year code, at 120°.            |

Marking for WJ+WJP130/240 TNC4:

| Outer ring:          | WJ+WJP130/240TN, URB, ROMANIA, manufacturing month and year code, at 90°. |
| Inner ring WJ:      | WJ130/240TNC4, URB, manufacturing month and year code, at 120°.            |
| Inner ring WJP:     | WJP130/240TNC4, URB, manufacturing month and year code, at 120°.            |
| Thrust washer:      | WJP130/240TNC4, URB, manufacturing month and year code, at 120°.            |

Manufacturing month and year is an alphanumeric code group (two letters for month and two digits for year) according to the following tables:

### Manufacturing month code

<table>
<thead>
<tr>
<th>Month</th>
<th>Code</th>
<th>Month</th>
<th>Code</th>
<th>Month</th>
<th>Code</th>
<th>Month</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>IA</td>
<td>April</td>
<td>AP</td>
<td>July</td>
<td>IL</td>
<td>October</td>
<td>OC</td>
</tr>
<tr>
<td>February</td>
<td>FE</td>
<td>May</td>
<td>MI</td>
<td>August</td>
<td>AU</td>
<td>November</td>
<td>NO</td>
</tr>
<tr>
<td>March</td>
<td>MT</td>
<td>June</td>
<td>IN</td>
<td>September</td>
<td>SE</td>
<td>December</td>
<td>DE</td>
</tr>
</tbody>
</table>

### Manufacturing year code

<table>
<thead>
<tr>
<th>Year</th>
<th>Code</th>
<th>Year</th>
<th>Code</th>
<th>Year</th>
<th>Code</th>
<th>Year</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>02</td>
<td>2005</td>
<td>05</td>
<td>2008</td>
<td>08</td>
<td>2011</td>
<td>11</td>
</tr>
<tr>
<td>2003</td>
<td>03</td>
<td>2006</td>
<td>06</td>
<td>2009</td>
<td>09</td>
<td>2012</td>
<td>12</td>
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<tr>
<td>2004</td>
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<td>2007</td>
<td>07</td>
<td>2010</td>
<td>10</td>
<td>2013</td>
<td>13</td>
</tr>
<tr>
<td>2014</td>
<td>14</td>
<td>2015</td>
<td>15</td>
<td>2016</td>
<td>16</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4. Instructions of assembly

Selection and formation of pairs of bearings consideration of radial clearance to make respectively followings regulations:
The difference of radial clearances of two bearings mounted on same axle must not exceed 0.015 mm, with own inner ring. Using standard inner this difference may not exceed 0.01 mm.
In case of measuring the radial clearance directly on the axle the difference may not exceed 0.02 mm.
Bearing inner rings carry circumferential load, therefore they are press-fitted: axle journal p6, housing H7.
Cylindrical roller bearings do not, however, compensate misalignment between axle and bogie frame. Therefore misalignment must be corrected by angular freedom of the housing.

5. Clearances of bearings for axleboxes wagons and locomotives

<table>
<thead>
<tr>
<th>Bearing (set)</th>
<th>Group</th>
<th>Clearances before mounting [x 0.001mm]</th>
<th>Radial clearance reduction [x 0.001mm]</th>
<th>Radial clearances after mounting [x 0.001mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>WJ+WJP130/240 TNC4</td>
<td>C4</td>
<td>125...165</td>
<td>300...780</td>
<td>30...64</td>
</tr>
<tr>
<td>WJ+WJP130/240 TNC4</td>
<td>C4</td>
<td>145...190</td>
<td>660...1190</td>
<td>35...75</td>
</tr>
</tbody>
</table>
6. Methods of measuring and checking
The dimensional checking and measurement radial and axial clearances of bearings are according ISO/TR 9274 and ISO 5753.

The radial clearance for bearings according 1A risk class is checked with passive control devices.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Apparatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bore diameter (d)</td>
<td>Passimeter with division value 0.001 mm</td>
</tr>
<tr>
<td>Outside diameter (D)</td>
<td>Passimeter or with division value 0.001 mm</td>
</tr>
<tr>
<td>Width (B)</td>
<td>Passimeter or with division value 0.001 mm</td>
</tr>
<tr>
<td>Radial clearance</td>
<td>Feeler gauges</td>
</tr>
<tr>
<td>Axial clearance</td>
<td>Passimeter or with division value 0.001 mm</td>
</tr>
</tbody>
</table>

7. Recommended greases

<table>
<thead>
<tr>
<th>Grease</th>
<th>Producer</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARRIER LZS-2EP</td>
<td>MOL-Ungaria</td>
</tr>
<tr>
<td>SHELL Alvania 2760 B</td>
<td>SHELL</td>
</tr>
<tr>
<td>INA LIS EP2</td>
<td>INA - Zagreb Croatia</td>
</tr>
<tr>
<td>Eldon's Letonia LR-2 EP</td>
<td>Eldon's Latvia</td>
</tr>
</tbody>
</table>

8. Axial and radial loads
These bearings are particularly suitable for supporting high radial loads with special internal constructions and polyamide cages.
The dimensioning is usually based on a calculated operating life of more than 3 million kilometers.

a) Radial loads:
- Static axle load : 160 kN;
- P-equivalent bearing load, kN;
- \( P = 0.5 \times f_0 \times f_1 \times G \) for two bearing axleboxes; \( P = 104 \text{ kN} \)

where:
- \( f_0 \) - factor to the variation in payload and can be set at \( f_0 = 0.9 \) to 1, for passenger rolling stock;
- \( f_1 \) - factor of summarises the influence of the radial and axial dynamic loads, the values being determined by running speed, track conditions, wheel suspension and unsprung mass.
- \( f_1 = 1.2 \) to 1.4 for passenger rolling stock;
- \( G \) - maximum static axlebox load in kN; \( G = 80 \text{ kN} \);

b) Axial loads:
For WJ+WJP130/240:
- \( F_{ap} \) - maximum permissible axial load, kN; \( F_{ap} = 11.8 \text{ kN} \) for a constant axial load, for short periods the values may be multiplied by 2;
  \( F_{a\text{ max.}} \) - axial limiting load, kN; \( F_{a\text{ max.}} = 69.1 \text{ kN} \)

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  \( F_{a\text{ max.}} \) - axial limiting load, kN; \( F_{a\text{ max.}} = 69.1 \text{ kN} \)

9. Laboratory test
Test is named Accelerated Life Test. The results are evaluated according to 90% criterion of reliability. Test schedule is applied to a lot of 30 brgs., from which are tested 20 brgs. The test is running until 8/10/20 fatigue failures (pitting on raceways) occurs, and the results are statistical estimated with the maximum-likelihood method. Test parameters (speed, lubrication, load) are calculated theoretically for each type of brg.
The rigs can test the performance and durability of two bearings simultaneously under identical conditions. The radial load can be applied by hydraulic pistons.
In our laboratory make followings types tests:
- tests for confirmation of basic dynamic load rating or rating life estimation for bearings from currently manufacture;
- tests of rating life required by customers;
10. Dismounting of the inner ring
Dismounting the inner ring of bearings may be achieved by heating, followed by conduction heating.
For this particular bearing and application, non-adjustable induction heaters are designed.

11. Instrumentation and tools for mounting and dismounting of the bearings
- heating equipment;
- extraction devices;
- high-pressure pumps for hydraulic methods;
- fitting devices;
- multi-plate presses;

12. Preservation
The preservation of bearings can be performed according to SF 24006/2008 using Castrol Rustilo DWX33
solvent with a 2-year protective period.
A high-quality soft film rust preventive, on evaporation of the solvent, leaves a powerful protective film.
Before preservation, the bearings must be washed with Shell Callina 2402, petroleum solvent.

13. Utilizable standards
EN 12080 - Railway applications - Axleboxes - Rolling bearings;
EN 12081 - Railway applications - Axleboxes - Lubricating greases;
EN 12082 - Railway applications - Axleboxes - Performance testing;
UIC 510-1 - Wagons - Running gear - Normalisation;
UIC 510-2 - Trailing stock: wheels and wheelsets. Conditions concerning the use of wheels of various diameters;
UIC 510-3 - Wagons - strength testing of 2 and 3 axle bogies on test rig;
UIC 515 - Passenger rolling stock - Trailer bogies - Running gear;
UIC 814 - Technical specification for the official testing and supply of greases intended for the lubrication of railway vehicle roller bearing axleboxes;
14. Certificates

The main target of our company is to meet our customers requirements, offering high quality products at competitive prices. We have a set of advanced scientific management system, advanced bearing production equipment, ISO 9001 and ISO 14001 certification with TUV Thuringen Germany.
S.C. "RULMENTI" S.A. GROUP

The company was set-up on May 1953 and it has a long tradition in manufacturing of bearings over 50 years, being one the important bearing producers in the Central and South-East Europe.

We manufactured and trade under URB, KRS brands or on customer request, a wide range of bearings utilized in automobiles, steel mills, electric motors, speed reducers, mining industry, construction machinery.

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