

FAG Gearbox Bearings in a Zermatt-Rack Railway Train



Examples of Application Engineering

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Rack railway train HGM 2/2, No. 75: Developed and built by Stadler Bussnang AG, Switzerland

Courtesy of Stadler Bussnang AG

The former Brig-Visp-Zermatt railway company (BVZ), now Matterhorn-Gotthardbahn (MG-Bahn), ordered this locomotive in 2000 for service on adhesion and rack routes from Stadler Bussnang AG. Stadler is considered the number

one supplier of rack railway vehicles worldwide. The locomotive is used for service trains (construction and contact wire maintenance), snow removal and emergency missions in the event of power failures.

Moreover, it is used on the Gornergratbahn routes to an elevation of over 3000 metres above sea level, negotiating gradients as steep as 200 per thousand.

All bearings for the wheelset drive were supplied by FAG Kugelfischer AG.

Vehicle data, technical data

Wheel arrangement:	B0
Gauge	1,000 mm
Max. gradient	200 ‰
Drive wheel diameter	790/770 mm
Gearwheel reference diameter	687.55 mm
Continuous power on wheel	450 kW
Starting tractive power	120 kN
v_{\max} rack:	
uphill	25 km/h
downhill	18 km/h (gradient of 125 ‰)
downhill	14 km/h (gradient of 200 ‰)
v_{\max} in adhesion operation	65 km/h
Gear ratio in:	
-rack-and-pinion operation	$i = 1:6.587$
-adhesion operation	$i = 1:7.497$

Rack-and-pinion drive

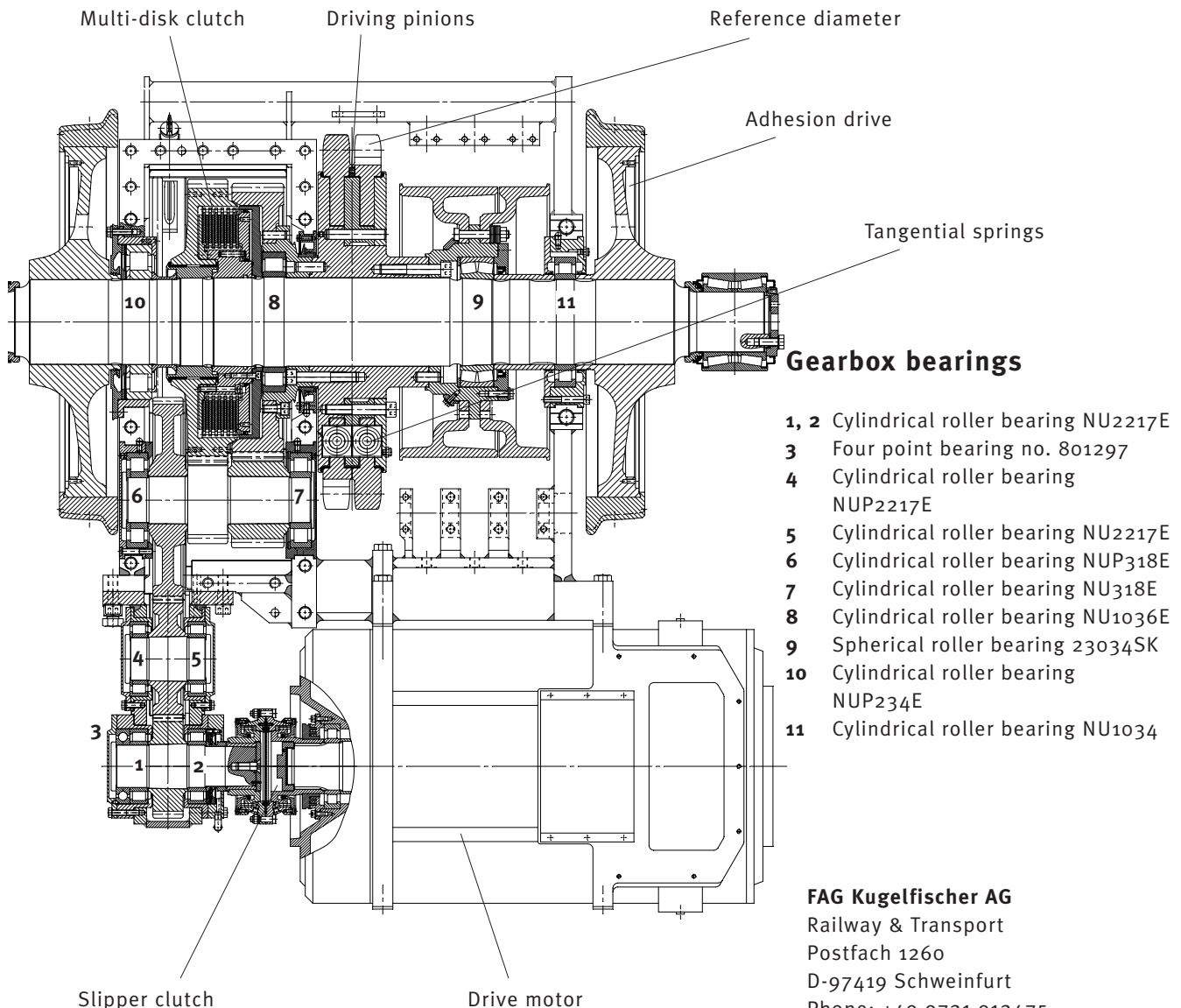
Drive motor and rack-and-pinion drive form a unit which is supported on the drive shaft via two cylindrical roller bearings and is suspended from the bogie frame near the middle of the locomotive.

A slipper clutch at the gearbox input transmits the torque of the drive motor. It limits the torque and protects the axle drive.

The driving pinion and the drive wheels for adhesion operation are driven via two gear steps.

To avoid excessive wear, the drive wheels of the adhesion drive are disengaged on the rack stretches by means of a multi-disk clutch.

In addition, tangential springs in the driving pinions compensate for any rack pitch errors.



- 1, 2 Cylindrical roller bearing NU2217E
- 3 Four point bearing no. 801297
- 4 Cylindrical roller bearing NUP2217E
- 5 Cylindrical roller bearing NU2217E
- 6 Cylindrical roller bearing NUP318E
- 7 Cylindrical roller bearing NU318E
- 8 Cylindrical roller bearing NU1036E
- 9 Spherical roller bearing 23034SK
- 10 Cylindrical roller bearing NUP234E
- 11 Cylindrical roller bearing NU1034

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