CONSTRUCTION EQUIPMENT MAINTENANCE

Comprehensive Technical Guide to BOMAG Single Drum Rollers: Engineering, Maintenance, and Repair Protocols for the BW Series

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In the demanding landscape of heavy civil engineering and infrastructure development, the efficiency of soil and asphalt compaction is a critical determinant of structural longevity. **BOMAG**, a global leader in compaction technology, has established the **BW series** of single drum rollers as the industry benchmark for performance, reliability, and precision. This technical guide provides an exhaustive analysis of the **BW 213, 216, 219, and 226** models, focusing on the DH and PDH variants across generations, including the advanced Generation 5 series. By synthesizing service training data, repair instructions, and engineering principles, we aim to provide senior technicians and fleet managers with a definitive resource for maintaining these complex machines.

The Evolution of Compaction Technology: From Generation 4 to Generation 5

The progression of BOMAG single drum rollers represents a significant leap in hydraulic efficiency and electronic integration. The transition from **Generation 4 (BW 213/216/219/226 DH/PDH-4)** to **Generation 5** has introduced sophisticated control systems that optimize engine output and hydraulic flow. In the context of heavy soil compaction, the **BW 226 DH-5**represents the pinnacle of this evolution, capable of handling massive lift thicknesses while maintaining fuel economy.

Technical specifications for these machines are often categorized by their drum type. The **DH (Smooth Drum)** models are primarily utilized for granular and mixed soils, whereas the **PDH (Padfoot Drum)**models are engineered for cohesive materials such as clay and silt. The "H" designation signifies high-gradeability, achieved through advanced hydrostatic drive systems that allow the machine to navigate inclines of up to 60% depending on the specific soil conditions.

Core Mechanical Architecture

At the heart of the BOMAG single drum roller is a dual-frame design connected by a robust **articulated joint**. This joint allows for oscillation and steering, ensuring that the drum maintains constant contact with uneven terrain. The front frame houses the drum assembly, including the **internal exciter system**, while the rear frame supports the engine, hydraulic pumps, and operator platform.

- Vibration System: Uses a dual-amplitude, single-frequency (or variable frequency) exciter shaft. The rotation of eccentric weights generates the centrifugal force necessary for deep-soil compaction.
- Hydrostatic Drive: A closed-loop hydraulic system drives both the rear wheels and the drum. This ensures synchronous movement and prevents soil shoving.
- Engine Integration: Modern BW rollers utilize Tier 4/Stage V compliant engines, requiring precise maintenance of the Diesel Exhaust Fluid (DEF) and Exhaust Gas Recirculation (EGR) systems.

Engineering Dynamics and Mathematical Models of Compaction

To understand the service requirements of a **BW 219 PDH-4**, one must understand the physics of the compaction

process. The machine applies both static linear load and dynamic forces. The total compaction force (F_{total}) can be simplified as the sum of the static weight (W_{s}) and the centrifugal force (F_{c}) generated by the eccentric weights.

The centrifugal force is calculated using the formula: **F = m × r × ω²** Where: **m:** mass of the eccentric weights **r:** eccentricity (distance from the center of rotation) **ω:** angular velocity (determined by the hydraulic motor speed)

Technicians must ensure that the hydraulic motor speed (RPM) matches the factory specifications. A deviation of even 5% in RPM can lead to a significant loss in centrifugal force, resulting in failure to meet the specified **Proctor Density** on the job site. This is why the **Service Training Bomag Single Rollers** manuals emphasize the calibration of hydraulic pressures during routine maintenance.

Detailed Technical Analysis: Component-Level Repair and Overhaul

The repair of a **BOMAG BW 216 DH** or **BW 219 PDH** requires a systematic approach to dismantling and assembly. According to the **Service Manual BW 219-D5**, the maintenance of the drum assembly is the most labor-intensive yet critical procedure.

The Drum Assembly and Exciter System

The internal exciter system is submerged in oil for cooling and lubrication. Over time, the seals may degrade, leading to oil contamination or leakage. The dismantling process involves: Supporting the front frame and removing the drum drive motor.Extracting the exciter housing from the drum core.Inspecting the **spherical roller bearings** for pitting or heat discoloration.Replacing the large-diameter O-rings and radial shaft seals.

During assembly, it is imperative to use **genuine BOMAG spare parts**. Non-OEM bearings often lack the specific tolerances required to withstand the high-frequency vibrations of a 26-ton roller, leading to premature failure within a few hundred operating hours.

Comparison of BW Series Specifications

The following table provides a technical comparison between key models in the BOMAG single drum lineup, highlighting the differences in weight and compaction capability.

Model	Operating Weight (kg)	Drum Width (mm)	Centrifugal Force (kN)	Static Linear Load (kg/cm)
BW 213 DH-5	12,600	2,130	285 / 196	35.4
BW 216 DH-5	16,000	2,130	331 / 242	51.6
BW 219 DH-5	19,400	2,130	326 / 232	61.5
BW 226 DH-5	26,000	2,130	350 / 250	81.2

As indicated in the table, the **BW 226 DH-5** offers a significantly higher static linear load, making it suitable for thick rock-fill layers, whereas the **BW 213** is more agile for standard road base construction.

Advanced Diagnostics: Hydraulic and Electronic Systems

Modern BOMAG rollers, specifically those from **Generation 5**, utilize the **BOMAG Operation Control (BOC)** system. This electronic architecture integrates engine management with hydraulic control. Troubleshooting often requires the use of the BOMAG Service Tool (BST) to interface with the machine's ECU.

The Hydraulic Workflow

The hydraulic system is divided into three primary circuits: **Travel Circuit:** A closed-loop system using a variable displacement axial piston pump and two motors (one for the rear axle, one for the drum).**Vibration Circuit:** Another closed-loop system that drives the exciter shaft. This system must maintain precise pressure to ensure frequency stability.**Steering and Cooling Circuit:**An open-loop system that provides hydraulic power for the articulated joint and the fan drive.

When a technician encounters a loss of gradeability, the diagnostic steps should involve checking the **charge pressure**. If the charge pressure falls below 20-25 bar, the main pumps will not receive enough pilot oil to tilt the swashplates, resulting in reduced torque. The **BW 216/219/226 DH/PDH-4**service manuals provide specific pressure testing ports for this exact purpose.

Practical Implementation: Field Maintenance Guide

Effective fleet management relies on a proactive maintenance schedule rather than reactive repairs. Below is a summarized **Field Maintenance Guide** for BOMAG single drum rollers.

Daily and Weekly Checkpoints

- Fluid Analysis: Check engine oil, hydraulic oil, and coolant levels. Inspect the drum exciter oil level through the sight glass.
- Structural Integrity: Inspect the rubber buffers (isolators) between the drum and the frame. Cracked or sheared buffers will transmit vibrations to the frame, damaging the hydraulic pumps and operator electronics.
- Air Filtration: In dusty soil environments, the air pre-cleaner must be serviced daily to prevent engine dusting.

Long-Term Service Intervals

- Every 500 Hours: Change engine oil and filters. Replace the hydraulic system breathers.
- Every 1000 Hours: Change the gear oil in the drum drive and wheel drive hubs. Check the articulated joint for play and regrease the bearings.
- Every 2000 Hours: Complete hydraulic oil change. Perform a full system pressure test and recalibrate the

vibration frequency.

Troubleshooting Common Operational Failures

Even with meticulous maintenance, technical failures can occur under heavy duty cycles. Here we analyze common failure modes for the **BW 219** and **BW 226** series.

Problem: Excessive Vibration in the Operator Platform

Diagnosis: This usually indicates a failure of the drum's vibration isolation system. **Solution:**Inspect all rubber buffers. Even if only one buffer is sheared, the unbalanced load will quickly destroy the remaining buffers. Replace the entire set to ensure uniform elasticity.

Problem: Machine Will Not Travel, but Vibration Functions

Diagnosis: This points to an issue specific to the travel circuit. Since the vibration circuit works, the engine-to-pump coupling is intact. **Solution:** Check the solenoid valves on the travel pump. In many **BW 216 PDH-4**models, electrical wire chafing at the articulated joint can lead to a loss of signal to the travel motors.

Problem: Reduced Compaction Performance (Low Amplitude)

Diagnosis: The eccentric weight mechanism may be stuck, or the hydraulic motor is not reaching the required pressure. **Solution:**Verify the hydraulic flow rate using a flow meter. If the flow is correct, the internal "shifter" within the exciter shaft (which changes the amplitude) may be mechanically seized due to contaminated oil.

Optimization of Machine Lifespan and Resale Value

For construction companies, the Total Cost of Ownership (TCO) is heavily influenced by the machine's resale value. Documentation plays a vital role here. Maintaining a detailed service log that references **Service Manual No. 1.00 - 1.05**(as seen in the Generation 5 documentation) ensures that the machine has been serviced according to manufacturer standards.

Furthermore, the use of **BOMAG Telematic** systems allows for remote monitoring of machine health. These systems track idle time, fuel consumption, and upcoming service intervals, allowing the maintenance department to plan repairs during scheduled downtime, thereby avoiding costly field breakdowns.

Synthesizing High-Performance Compaction Management

The complexity of modern single drum rollers like the **BW 219 PDH-4** and **BW 226 DH-5**demands a high level of technical expertise. From the mechanical precision of the exciter bearings to the electronic logic of the hydraulic control systems, every component must function in harmony to achieve the required soil density. By adhering to the step-by-step repair instructions and technical workflows outlined in official service training, technicians can ensure that these machines operate at peak efficiency.

As the industry moves toward **autonomous compaction** and **intelligent soil mapping**(integrated into BVC and DI models), the fundamental requirement for robust mechanical maintenance remains unchanged. A well-maintained BOMAG roller is not just a piece of equipment; it is a precision instrument for engineering the foundations of the modern world. The commitment to using genuine parts and following manufacturer-sanctioned service protocols is the only way to safeguard the immense investment these machines represent and to ensure the safety and stability of the infrastructure they build.

Baca Juga (Artikel Terkait)

- **Comprehensive Technical Guide to the Bobcat 773 Skid-Steer Loader: Maintenance, Repair, and Engineering Specifications**
  URL: http://alaskawriters.com/bobcat-773-service-repair-manual-technical-guide.pdf
- **Comprehensive Guide to the Bobcat 843 Skid Steer Loader: Parts Manuals, Engineering Specifications, and Maintenance Protocols**
  URL: http://alaskawriters.com/bobcat-843-parts-manual-technical-guide.pdf
- **Ultimate Technical Guide to Bobcat X325 and X328 Compact Excavators: Maintenance, Systems, and Service Engineering**
  URL: http://alaskawriters.com/bobcat-x325-x328-excavator-technical-service-guide.pdf
- **The Ultimate Bobcat S160 Skid-Steer Loader Technical Guide: Service, Maintenance, and Operational Excellence**
  URL: http://alaskawriters.com/bobcat-s160-skid-steer-technical-service-maintenance-guide.pdf

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