BOSMAL Automotive Research and Development Institute Ltd

TESTS

DESIGN & PRODUCTION

SERVICES

BOSMAL® for automotive industry

Automotive Brake Systems Testing - Brake Systems Testing Laboratory Services
2018

45 years on the automotive market  20 years as an Accredited Testing Laboratory AB 128
BOSMAL in brief

Year of foundation: 1972
Scope of activities: complex design & testing services for automotive industry
Legal status: Ltd
Area of premises: 83,000 m²
Indoor area: 24,700 m²
Staff in Poland: about 380 employees (17 professors and/or doctors, 233 engineers and/or masters)
Staff in Italy: ca. 30 employees
Location in Poland: Bielsko-Biała, northern part of the city, in the neighborhood of 1 and S1/S52 crossroad

Decision of the Minister of Transport, Construction and Maritime Economy BOSMAL has obtained the qualifications for type approval of vehicles

Decision of the Minister of Economy, BOSMAL was granted the status of research and development center

Strategically located near several key European engine and vehicle manufacturing centers BOSMAL is a state-of-the-art testing and R&D facility providing comprehensive services in the area of engine and fuel technology, as well as other automotive technologies.
BOSMAL has several representations in Europe, as well as residents at plants in the country and the CNH Płock Customer Service. In addition, the Institute leading testing vehicles in various ground conditions and climate, has a fixed routes outside Poland - in Italy, Spain, Sweden, Ukraine and other European countries.
BOSMAL actively came on stream in the Polish automotive sector in 1972, commencing its operation as engineering and testing-developing back-up facility of the former FSM factory (Small Car Factory) in Bielsko-Biała.

Currently, we provide wide range of R&D services for companies from automotive branch, both domestic and from abroad.

High qualifications and many years of experience of our staff ensure high level of performed services.
BOSMAL in Europe

The nearest car and engine manufacturers

- JELCZ LASKOWICE: TOYOTA engine plant
- POLKOWICE: VW engine plant
- POZNAŃ: VW car assembly plant
- WRZEŚNIA: VW car assembly plant
- GLIWICE: OPEL Manufacturing Poland car assembly plant
- TYCHY: OPEL Poland diesel engine plant
- BIELSKO BIAŁA: FCA Powertrain Poland Diesel /Gasoline engine plants
- ŽILINA: KIA car assembly plant
- OSTRAVA: HYUNDAI car assembly plant
- BRATISLAVA: VW car assembly plant
- SZENTGOTTHARD: OPEL engine plant
- GYŐR: AUDI engine & car assembly plant
- ESZTERGOM: SUZUKI car assembly plant
- KECSKEMET: MERCEDES car assembly plant

The nearest car and engine manufacturers include a variety of well-known brands such as TOYOTA, VW, OPEL, HYUNDAI, FCA, KIA, and MERCEDES. The diagram illustrates the locations of these manufacturers across Europe, indicating their proximity to Poland and other countries in the region.
Automotive brake systems testing

Brake Systems Testing Laboratory Services

45 years on the automotive market  
20 years as an Accredited Testing Laboratory AB 128
 Tradition and experience

We brake since 1978...

1978 – 2015 – Inertia brake dynamometer for brake testing from Greening USA

45 years on the automotive market  20 years as an Accredited Testing Laboratory AB 128
2015 – The new Inertia Brake Dynamometer for brake testing from LINK USA
BOSMAL Automotive Research and Development Institute LTD has over 40 years of experience in testing brakes. During that time we have done tests according to many different standards like: SAE, ISO, JASO or manufacturer norms.

We have tested many braking systems over the years including: OEM, ATE, TRW, Brembo, Bosch, Sumitomo, Tokico, Aisin, Akebono, Girling, Teves, Mando, ABS and from many vehicles like: Porsche, Volvo, Range Rover, Volkswagen, Fiat, Toyota, Suzuki, BMW, Renault, Mercedes-Benz, Alfa-Romeo, Hyundai, Audi, Lancia, Opel, Skoda, Seat, IVECO and many others. We have experience in testing both disc and drum brakes.
Benchmark testing methodology

We are specializing in Research and Development testing methods. We can help you develop your friction material. Using the benchmarking method we can help you understand the performance of your friction material, compare it to other OE or AM material and improve it.

Benchmarking method allows to find out how your friction material is performing in comparison with other manufacturers, OE and aftermarket. This information can help you to improve compared to your competitors. We can set up a series of tests for you in order to achieve that.
We have experience in brake testing according to SAE test specifications like:

**SAE-J2521 – „AK-Noise” – Disc and Drum Brake Dynamometer Squeal Noise Test Procedure**

The purpose of the test is to measure the squeal noise generated by the brake assembly. Test imitates braking conditions during which the brake is most likely to emit noise. Test includes forward/backward deceleration braking and drag in different speed, pressure and temperature conditions.

**SAE-J2522 – „AK-Master” – Dynamometer Global Brake Effectiveness**

Test procedure that assesses the effectiveness behaviour of a friction material with regard to pressure, temperature and speed for motor vehicles fitted with hydraulic brake actuation. The main purpose of SAE J2522 is to compare friction materials under the most equal conditions possible. To account for the cooling behavior of different test stands, the fade sections are temperature-controlled.

**SAE-J2707 – Wear Test Procedure on Inertia Dynamometer for Brake Friction Materials**

A Dynamometer test procedure to be used for the measurement of automotive service brake linings and disc brake pads wear.

**SAE-J2784 – FMVSS Inertia Dynamometer Test Procedure for Vehicles Below 4540 kg GVWR**

A Brake Dynamometer procedure to assess the performance of a brake corner assembly during conditions that correspond to the FMVSS 105 and 135 vehicle test procedures.

**SAE-J2928 – Brake Rotor Thermal Cracking Procedure for Vehicles Below 4540 kg GVWR**

Laboratory method and performance criteria to assess brake rotors for crack initiation and crack propagation during high-energy brake applications.

And many other SAE test specifications.

The results of all those tests can be easily compared with results obtained on other friction material: OE or AM.
International Organization for Standardization

We can perform tests with accordance to ISO test specifications:

**ISO 11157 – Road vehicles — Brake lining assemblies —**

**Inertia dynamometer test method**
Dynamometer test method to homologate alternative types of brake linings (including pads) mounted on original equipment, in accordance with UN-ECE Regulation No. 13-09, Annex 15.

**ISO 15484 – Road vehicles — Brake lining friction materials —**

**Product definition and quality assurance**
The procedures apply to disc brake pads and drum brake linings for motor vehicles and describe systematic processes for the quality assurance of such brake linings.

**ISO 26867 – Road vehicles — Brake lining friction materials —**

**Friction behaviour assessment for automotive brake systems**
This International Standard is designed to evaluate the friction behaviour under a wide array of driving speeds, brake temperatures, brake pressure and deceleration levels.
The Standard describes a test procedure for assessing the influence of pressure, temperature, and linear speed on the coefficient of friction of a given friction material in combination with a specific mating component (rotor or drum).

And many other ISO test specifications.

The results of all those tests can be easily compared with results obtained on other friction material: OE or AM.
We can perform tests according to JASO standards including:

**JASO C406 – Passenger car – Braking device – Dynamometer test procedures**
The test procedure for the Dynamometer performance of normally operated service brake device in passenger cars.

**JASO C419 – Passenger cars – Service brake – Structural integrity dynamometer test procedure**
This standard sets forth strength methods on service brakes that normally operate in passenger car through the use of an Inertia Dynamometer

**JASO C427 – Automobile parts – Brake lining and disc brake pad – Wear test procedure on Inertia Dynamometer**
This standard specifies the Dynamometer test procedure for the measurement of wear of brake linings and pads to be used in the service brakes of automobiles.

**JASO C442 – Parking Brake Structural Integrity Dynamometer Test Procedure**
This standard establishes a structural integrity Dynamometer test procedure for parking brakes of automobile.

**JASO C443 – Road vehicles – Service brake – Dynamometer simulated mountain fade test procedure**
This standard specifies the simulated mountain fade Dynamometer test procedure for normally operating service brakes of automobiles.

**JASO C456 – Test Method for Wear Warning Devices**
This standard specifies the test method for wear warning devices of brake linings and pads used for the service brakes of passenger cars.

**JASO C459 – Truck and Bus – Disc brake caliper bench test procedure**
This standard establishes bench test procedure for service brakes in disc brake caliper assemblies that normally operate in trucks and buses.
We are performing tests and certification according to UN ECE Regulations:

**Regulation No. 13**
Uniform provisions concerning the approval of vehicles of categories M, N and O with regard to braking.

**Regulation No. 78**
Uniform provisions concerning the approval of vehicles of categories L1, L2, L3, L4 and L5 with regard to braking.

**Regulation No. 13-H**
Uniform provisions concerning the approval of passenger cars with regard to braking.

**Regulation No. 90**
Uniform provisions concerning the approval of replacement brake lining assemblies, drum brake linings and discs and drums for power-driven vehicles and their trailers.
### Vehicle Manufacturers Standards

We have done many tests according to car manufacturers standards like FIAT/FCA:

<table>
<thead>
<tr>
<th>Test Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-H3000</td>
<td>Load Proportioning Valve Pressure Regulator – Off-Vehicle Functional/Ambient Fatigue Tests</td>
</tr>
<tr>
<td>7-H4000/PF.90257</td>
<td>Calipers for disc brake – Performance bench tests</td>
</tr>
<tr>
<td>7-H4020/PF.90210</td>
<td>Cast-Iron Automotive Brake Discs – Off-vehicle qualification test</td>
</tr>
<tr>
<td>7-H4030</td>
<td>Cast-Iron Automotive Brake Drums – Off-Vehicle Qualification Test</td>
</tr>
<tr>
<td>7-H8000/PF.90239</td>
<td>Brake Servo/Master Cylinder/Reservoir Assembly – Off-Vehicle Operation and Fatigue Tests</td>
</tr>
<tr>
<td>7-H8050</td>
<td>Pumps For Hydraulic Control of Brakes and Clutch Disengagement</td>
</tr>
<tr>
<td>7-H8070</td>
<td>Rear Drum Brake Shoe Control Cylinder and Assembly Off-Vehicle Tests</td>
</tr>
<tr>
<td>7-H8100</td>
<td>Vacuum Brake Servo Bench Service Tests</td>
</tr>
<tr>
<td>7-H8112</td>
<td>Brake Line Unions – Off-Vehicle Performance Tests</td>
</tr>
<tr>
<td>7-H8200/PF.90290</td>
<td>On-Bench Service Tests - Brake Booster Vacuum Check Valvec</td>
</tr>
</tbody>
</table>


And many other vehicle manufacturer test specification...
Our testing equipment

LINK Model M3000 Brake Dynamometer for brake testing

The dynamometer allows to test the drum and disk brake systems in real scale in range of functional tests and durability:

- friction material: brake pads and shoes
- brake drums
- solid and ventilated brake discs of each type and material.

The test bench is adapted to test:

- Conventional hydraulic systems
- Electro-hydraulic systems (SBC)
- Electro-mechanical systems (EBM)
- Hybrid brakes

Technical specification and capabilities of the Dyno:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC Drive Motor Power</td>
<td>186 kW</td>
</tr>
<tr>
<td>Speed range</td>
<td>0 - 2500 rpm</td>
</tr>
<tr>
<td>Maximum braking torque</td>
<td>5650 Nm</td>
</tr>
<tr>
<td>Minimum simulated inertia</td>
<td>5 kgm²</td>
</tr>
<tr>
<td>Minimum mechanical inertia</td>
<td>42,7 kgm²</td>
</tr>
<tr>
<td>Maximum mechanical inertia</td>
<td>128 kgm²</td>
</tr>
<tr>
<td>Maximum simulated inertia</td>
<td>250 kgm²</td>
</tr>
<tr>
<td>Maximum brake pressure</td>
<td>200 bar</td>
</tr>
<tr>
<td>Maximum pressure ramp rate</td>
<td>1000 bar/sec</td>
</tr>
</tbody>
</table>
Inertia simulation characteristics and velocity

The LINK M3000 brake dynamometer enables the dynamic inertia simulation in the range of 5 kgm$^2$ to 250 kgm$^2$. This means we can test a large range of vehicles from light passenger cars, through heavy SUVs, up to light commercial vehicles. The Dyno can break with braking torque up to 5650 Nm which allows to do 10 m/s$^2$ for all of the mentioned vehicles and much more for some lighter ones.

The inertia brake test station LINK Model 3000 is equipped with a DC drive motor that allows to reach a wide range of rotational speeds up to 2500 revolutions/min which allows to test a wide range of vehicles up to theirs top speed, in some cases it is 350 km/h or even more.
### Data acquisition

The LINK M3000 test station allows to record in real time on time line the following signals:

- Braking torque
- Rotational speed
- Linear speed
- Deceleration
- The pad/shoe temperature
- The disc/drum temperature
- The brake pressure
- Acceleration
- Fluid displacement
- Actual inertia
- Cooling air temperature
- Cooling air flow
- Image from the HD camera
- DTV - disc thickness variation
- Noise peak level
- Noise peak frequency
- Noise peak duration
- and many more

### Table: Data acquisition

<table>
<thead>
<tr>
<th>Signal Type</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braking torque</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>Rotational speed</td>
<td>m/s</td>
<td></td>
</tr>
<tr>
<td>Linear speed</td>
<td>m/s</td>
<td></td>
</tr>
<tr>
<td>Deceleration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pad/shoe temperature</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Disc/drum temperature</td>
<td>°C</td>
<td></td>
</tr>
<tr>
<td>Brake pressure</td>
<td>kPa</td>
<td></td>
</tr>
<tr>
<td>Acceleration</td>
<td>m/s²</td>
<td></td>
</tr>
<tr>
<td>Fluid displacement</td>
<td></td>
<td></td>
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<tr>
<td>Actual inertia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooling air temperature</td>
<td>°C</td>
<td></td>
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<tr>
<td>Cooling air flow</td>
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<tr>
<td>Image from HD camera</td>
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<tr>
<td>DTV - disc thickness</td>
<td></td>
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<tr>
<td>Noise peak level</td>
<td></td>
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### Notes:

- The LINK M3000 test station allows to record in real time on time line the following signals:
  - Braking torque
  - Rotational speed
  - Linear speed
  - Deceleration
  - The pad/shoe temperature
  - The disc/drum temperature
  - The brake pressure
  - Acceleration
  - Fluid displacement
  - Actual inertia
  - Cooling air temperature
  - Cooling air flow
  - Image from the HD camera
  - DTV - disc thickness variation
  - Noise peak level
  - Noise peak frequency
  - Noise peak duration
  - and many more
Data acquisition and analysis

All the signals can be recorded in real time and on timeline. The signals can be stored with the frequency up to 1000 Hz. We offer a full support in analysing the results and comparing them with data obtained on other friction material.
Brake noise emission research

We are performing the SAE-J2521 „AK-Noise” and other brake noise emission tests.
UN ECE Regulation 90

We can perform the R90 in the following range:

- Dividing the brake discs/drums into types & groups
- Choosing the worst case scenario
- Choosing the representative for the vehicle test
- Brake Dynamometer tests
- Vehicle tests
- Geometric checks
- Issuing the E20 certificate of homologation
- COP
The Dynamometer is equipped with a camera which allows to store an HD quality video image. We also have thermographic test solutions.
We also do the Hydraulic pressure pulse tests (pressure change) of the various brake components

**Pressure range:**
- 0 - 200 bar
- > 200 bar - to be agreed

**Temperature range:**
- from – 40°C to + 180°C and ambient to 300°C

**Pulse shape:**
- practically arbitrary – to be agreed with Client
- high accuracy of tracking the required pulse shape
- testing several objects simultaneously (up to 5 items.)

Tests may apply to:
- Brake Master Cylinders
- Brake Calipers
- Wheel Brake Cylinder
- Brake lines
- Brake hoses

Medium:
- Brake fluid
- Hydraulic oil
- Water
- Glycol
- other media, to be agreed

Data acquisition:
Pressure and temperature data acquisition throughout the entire test
Braking system components high pressure testing

We can perform the Pressure Burst Tests of the various brake components

**Pressure range:**
- 0 - 1100 bar
- > 1100 bar - to be agreed

**Temperature range:**
- from –40°C to +180°C

**Pulse shape:**
- practically arbitrary – to be agreed
- high accuracy of tracking the required pulse shape

**Tests may apply to:**
- Brake Master Cylinders
- Brake Calipers
- Wheel Brake Cylinder
- Brake lines
- Brake hoses

**Medium:**
- Brake fluid
- Hydraulic oil
- Water
- Glycol
- other media, to be agreed

**Data acquisition:**
Pressure and temperature data acquisition throughout the entire test

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**Example Burst Test**

<table>
<thead>
<tr>
<th>Pressure [bar]</th>
<th>Time [s]</th>
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<td>0</td>
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</tbody>
</table>

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45 years on the automotive market  20 years as an Accredited Testing Laboratory AB 128
Braking system components mechanical testing

We can perform mechanical tests on many brake parts

- Parking brake functional and durability tests
- Shear tests
- Compression tests
- Hardness testing
- Geometrical measurements

Example Durability Parking Brake Test

Example Force/Pressure Test

Example Compression Test
In summary:

- Over 40 year of experience in brake systems Research and Development,
- New LINK M3000 Brake Dynamometer,
- Competent and experienced Staff will assist you through tests selection process,
- Performed testing of many braking systems and from many vehicles,
- Research and Development specialists – we can help you improve your brake components,
- Experience in many tests according to SAE, ISO, JASO and many more,
- Full data analysing and results comparison support,

We are performing the certification according to UN ECE R90
According to the decision No TD-5i-027-17(4)/13 of Polish Ministry of Transport, Construction and Maritime Economy of 14th October 2013, BOSMAL Automotive Research and Development Institute Ltd is entitled to perform the following actions:

1. in scope of approval:
   a) performing EC-type approval tests of vehicles or category M, N, O or T vehicle type approval tests,
   b) performing the approval tests of parts or equipment for category M, N, O or T vehicles,
   c) performing approval tests related to the installation process of gas retrofit systems adapting vehicles of category M or N to use gaseous fuels,
   d) performing:
      • Conformity of Production of vehicle, parts or equipment for category M, N, O or T vehicles,
      • Conformity of Production of installation of gas retrofit systems adapting vehicles of category M or N to use gaseous fuels,

2. in scope of Individual Vehicle Approval of category M or N vehicles: performing the tests confirming the fulfillment of relevant acts of law requirements or technical features, leading to introducing the vehicle into the road traffic,

3. in scope of EC Individual Vehicle Approval: performing the tests confirming the fulfillment of relevant acts of law requirements or technical features, leading to introducing the vehicle into the road traffic.
BOSMAL - Type Approval

Scope of authorization to carry out type approval tests of the equipment or parts of category M, N, O, T vehicles - according to the Decision of the Director of Transportation Technical Supervision No. TDT.H-1030-24310-5/17 of 20.09.2017 (short list):


- **for vehicles in categories: M, N, O and T according to UN ECE Regulations:** No 3, No 4, No 6, No 7, No 13, No 13H, No 23, No 24, No 27 (exc. A5 p. 10), No 38, No 39, No 43 (exc. A3 p.: 3.2, 6.1-6.3), No 46 (exc. p. 6.2 i A10), No 48, No 49, No 51, No 55 (A5.1; A5.2; A7), No 58, No 59, No 61, No 68, No 69, No 70, No 73, No 77, No 83, No 85, No 87, **No 90**, No 91, No 101, No 102 (S.I.5, S.II.13), No 103, No 104, No 107, No 115, No 118, No 119.
BOSMAL - Type Approval

Detailed scope of authorization to carry out type approval tests of the equipment or parts of category M, N, O, T vehicles - according to the Decision of the Director of Transportation Technical Supervision No. TDT.H-1030-24310-5/17 of 20.09.2017:

1. For motor vehicles and their trailers (M,N,O):
   • 70/157/EEC Permissible sound level
   • 70/221/EEC (A2) Rear protective devices
   • 70/222/EEC Rear registration plate space
   • 71/320/EEC Braking
   • 76/114/EEC Statutory plates
   • 76/756/EEC Installation of lighting and light signaling devices
   • 76/757/EEC Retro reflectors
   • 76/758/EEC End-outline, front-position (side), rear-position (side), stop, side marker, daytime running lamps
   • 76/759/EEC Direction indicators
   • 76/760/EEC Rear registration plate lamps
   • 77/538/EEC Rear fog lamps
   • 77/539/EEC Reversing lamps
   • 77/540/EEC Parking lamps
   • 80/1269/EEC Measurement of engine power
   • 89/297/EEC Lateral protection
   • 91/226/EEC, 109/2011 Spray-suppression systems
   • 92/21/EEC, 1230/2012, 97/27/EC Masses and dimension
   • 92/22/EEC Safety glazing
   • 94/20/EC (A.V.1, A.V.2) Couplings (COUPLING BALLS AND TOWING BRACKETS, COUPLING HEADS
   • 95/28/EC Flammability
   • 97/27/EC Masses and dimensions
   • 2001/85/EC Buses and coaches
   • 2003/97/EC Indirect vision device
   • 2005/55/EC Emissions (Euro IV and V) heavy duty vehicles
   • 715/2007 Emissions (Euro 5 and 6) light duty vehicles/ access to information
   • 595/2009 Emissions (Euro VI) heavy duty vehicles/ access to information
   • 672/2010 Windscreen defrosting and demisting systems
   • 1003/2010 Space for mounting and fixing rear registration plates
   • 19/2011 Manufacturer’s statutory plate and vehicle identification number
   • 109/2011 Spray suppression systems
   • 458/2011 Installation of tyres
   • 130/2012 Vehicle access and manoeuvrability
   • 1230/2012 Masses and dimensions

2. For agricultural tractors (T):
   • 76/452/EEC Breaking devices
   • 2009/60/EC maximum design speed of and load platforms(A1.1 maximum design speed, A1.2 load platforms)
   • 2009/144/EC Certain components and characteristics (A1 Dimensions and towable masses, A2 Speed governor and protection of drive components, projections and wheels, A3 Windscreen and other glazing Equipment (exc A3A p.8.1.3.3 Resistance-to-radiation test))
   • 2001/85/EC Buses and coaches

3. For vehicles in categories: M, N, O and T according to UN ECE Regulations:
   • No 3 Retro-reflecting devices for power-driven vehicles and their trailers
   • No 4 Illumination of rear-registration plates of power-driven vehicles and their trailers
   • No 6 Direction indicators for power-driven vehicles and their trailers
   • No 7 Front and rear position lamps, stop-lamps and end-outline marker lamps for motor vehicles and their trailers
   • No 13 Braking of vehicles and trailers
   • No 13 H Braking of passenger cars
   • No 23 Reversing lights for power-driven vehicles and their trailers
   • No 24 Visible pollutants, measurement of power of C.I. engines (Diesel smoke)
   • No 27 (exc. A5 p.10) Advance warning triangles exc. Test of stability against wind
   • No 38 Rear fog lamps for power-driven vehicles and their trailers
   • No 39 Speedometer equipment including its installation
   • No 43 (exc. A3 p.: 3.2, 6.1-6.3) Safety glazing materials and their installation on vehicles exc. Headform test with deceleration measurement, Resistance-to-radiation test
   • No 46 (exc. p.6.2, A10) Devices for indirect vision and their installation exc. Devices for indirect vision other than mirrors, Calculation of the detection distance for CMS of Classes V and VI
   • No 48 Installation of lighting and light-signaling devices on motor vehicles
   • No 49 Measurements against the emission of gaseous and particulate pollutants
   • No 51 Noise emissions
   • No 118 Burning behaviour of materials used in the interior construction of certain categories of motor vehicles
   • No 119 Cornering lamps
   • No 90 Replacement braking parts
   • No 91 Side-marker lamps for motor vehicles and their trailers
   • No 101 CO2 emission/fuel consumption
   • No 102 (S.I.5, S.II.13) Close-coupling device (CCD); fitting of an approved type of CCD - Specifications, Requirements concerning the fitting of an approved CCD
   • No 103 Replacement pollution control devices
   • No 104 Retro-reflective markings
   • No 107 M 2 and M 3 vehicles
   • No 115 LPG and CNG retrofit systems
   • No 118 Burning behaviour of materials used in the interior construction of certain categories of motor vehicles
   • No 119 Cornering lamps

45 years on the automotive market 20 years as an Accredited Testing Laboratory AB 128
BOSMAL - Certificates

AQAP 2110:2009 Certificate
Quality Management System

In the following scope of activities:
Research, laboratory testing, development and implementation, engineering services, technical consulting, training, design, development, manufacture, distribution and service in the field of transport and their equipment,
And in conformance with the standards STANAG 4107

Accreditation Certificate of Testing Laboratory No. AB 128

Accredited activity is defined in the Scope of Accreditation No. AB 128

Certificate of Approval No. 40222010 L

On conducting tests a range listed enclosure for:
certification body TDT-CERT
fulfilling the criteria of the standard PN-EN ISO/IEC 17025:2005

TÜV Certificate

Certificate of Integrated Management System
Quality * OH&S * Environment

No. JBS - 199/2/2015
System in the following scope of activities:
design, piece and small lot production of automotive components, vehicles' equipment, stands and testing-manufacturing tools
is in conformance with the standards
PN-EN ISO 9001:2009, PN-EN ISO 14001:2005
and PN-N-18001:2004

Certificate of Management System OH&S

No. B - 21/2/2015
System in the following scope of activities:
design, piece and small lot production of automotive components, vehicles' equipment, stands and testing-manufacturing tools
is in conformance with the standard
OHSAS 18001:2007

IQNet and PCBC Certificate
Integrated Management System

No. PL - JBS - 199/2/2015
In the following field of activities:
design, piece and small lot production of automotive components, vehicles' equipment, stands and testing-manufacturing tools
System fulfills the requirements of the following standards
PN-EN ISO 9001:2009, PN-EN ISO 14001:2005

Certificate of Management System OH&S

No. PL - B - 21/2/2015
In the following field of activities:
design, piece and small lot production of automotive components, vehicles' equipment, stands and testing-manufacturing tools
System fulfills the requirements of the following standard
OHSAS 18001:2007
**BOSMAL - Certificates**

**Recommendations**
- **Fiat Chrysler Automobiles**
  Tests in range of qualitative qualification of parts and assemblies to final assembly in Fiat Auto Poland

- **TÜV Rheinland / Berlin**
  Tests for compliance with demands of EEC Directives/ECE Regulations

- **International Technical Development Center**
  Tests of parts and assemblies in range of evaluation of OPEL/GM suppliers

**References**
- CNH
- DELPHI
- ENI
- EXXON MOBIL
- FIAT CHRYSLER AUTOMOBILES
- GENERAL MOTORS
- LUBRICANTS UK LTD
- MAGNETI MARELLI
- SHELL
- STATOIL
- TI POLAND
- UMICORE
- VALEO
- VISTEON

**Laboratory Accreditations**
- VOLVO Car Corporation
  Federal Office for the Environment (FOEN)

**Membership**
- Klub Polskich Laboratoriów Badawczych (POLLAB)
- Polish Scientific Society of Combustion Engines (PKN)
- Polski Komitet Normalizacyjny (PKN)
  VOLKSWAGEN Group
Thank you for your attention. We invite your co-operation.

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45 years on the automotive market  20 years as an Accredited Testing Laboratory AB 128