

**GMORS**<sup>®</sup>  
*Seals to your heart*

Sealing Solutions for  
Automotive Industry

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## Certified GMORS

GMORS is a leading Taiwan supplier of rubber seals to Tier II and Tier III for light vehicle and heavy truck systems in automotive industry. Developing in automotive industry for 20 years, we provide sealing solutions to customers from Europe, Japan, North America, China, South Korea and Thailand. GMORS produces both non-safety and safety parts, according to IATF 16949:2016 process and customer's requested procedures. GMORS offers professional advice to customer's new vehicle design and market-led seal parts. We listen to all customers' demand, and design compatible rubber material, seal shape and prototype for trial run. We collect customer's test feedback and update our DFMEA (Design Failure Mode and Effects Analysis) for next improvement until customers feel satisfied.



## Mold Design

GMORS owns a mold shop with 3 axial and 5 axial CNC cutting machines to offer high-level seal surface finish. Highly precise cutting guarantees consistent dimension in each cavity. Also, the mistakeproofing device can avoid mismatch and mold operation damage for long molding cycles.



## In-house Laboratory

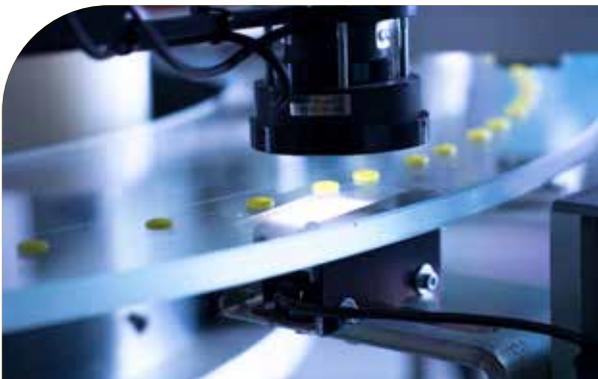
To react promptly to customer's need for research and development, GMORS develops in-house laboratory and chemical engineers to design, mix and test rubber recipe. GMORS laboratory is equipped with advanced testing equipments and knowledgeable engineers. Moreover, GMORS laboratory follows rigorous procedures, which are certified by TAF (ISO17025). According to ASTM requirements, "TGA", "FTIR" and "3 Sigma" standard deviation measures are used to check the performance of mixing quality per batch for quarterly or annual revalidation. GMORS has more than 100 rubber materials that meet automotive specifications and are also certified by automotive customers.



## Quality Assurance

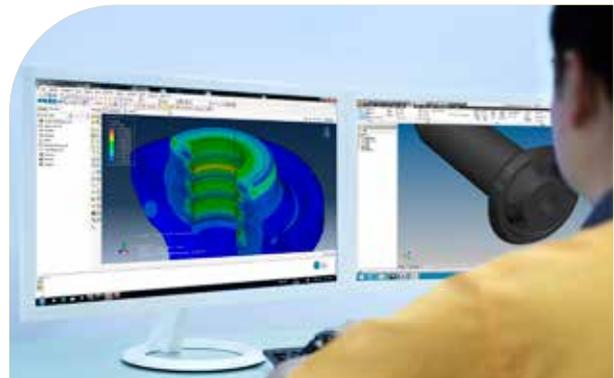
10% lower "gauge R&R" (Repeatability and Reproducibility) measuring equipments are used to make sure all dimension results are right.  $CPK \geq 1.33$  and  $PPK \geq 1.67$  are required and further prove GMORS capability and all records are utilized for constant improvement.

MES (Manufacturing execution system-barcode system), a control system for managing and monitoring work in process on a factory floor, provide reliable traceability.



## Excellent Engineering Team

To meet customer's requirements for the product, GMORS engineering team applies advanced equipment and a variety of design tools. The use of finite element analysis (FEA) helps GMORS to provide optimum sealing solutions for each customer's requests.



## Cost Reduction

PPAP level III is our standard documents for automotive. Except control plan are divided into two sections: non-safety and safety parts. GMORS R&D engineers will design process for non-safety and safety issues according to the details of drawing, material specification and risk coefficient from technical review and analysis with customers. For tracing and PPAP re-submission, PLM (Product Life-cycle Management) software system manages PFEMA, controls and records all "ECN" (Engineer Change Note) and "ECR" (Engineer Change Requirement) which need to be approved by right auditors. "Part Born" and "Process Born" in SAP system can calculate "Run at Rate" to guarantee 100% delivery performance. Via SAP finance system, we analyze actual cost for each process to figure out where the cost is wasting. "6 Sigma" and "TPM projects" can help reduce the defect rate, and therefore, cost reduction is supervised quarterly and annually.

## Cleanroom Class & Cleanliness of Components

Cleanroom Class - Class 100,000 Cleaning, Inspection, Package



### Cleanliness of Components

Customer Special Requirement - Cleanliness of components

CCC=A(D14/E12/F9/G6/H3/IJK00)

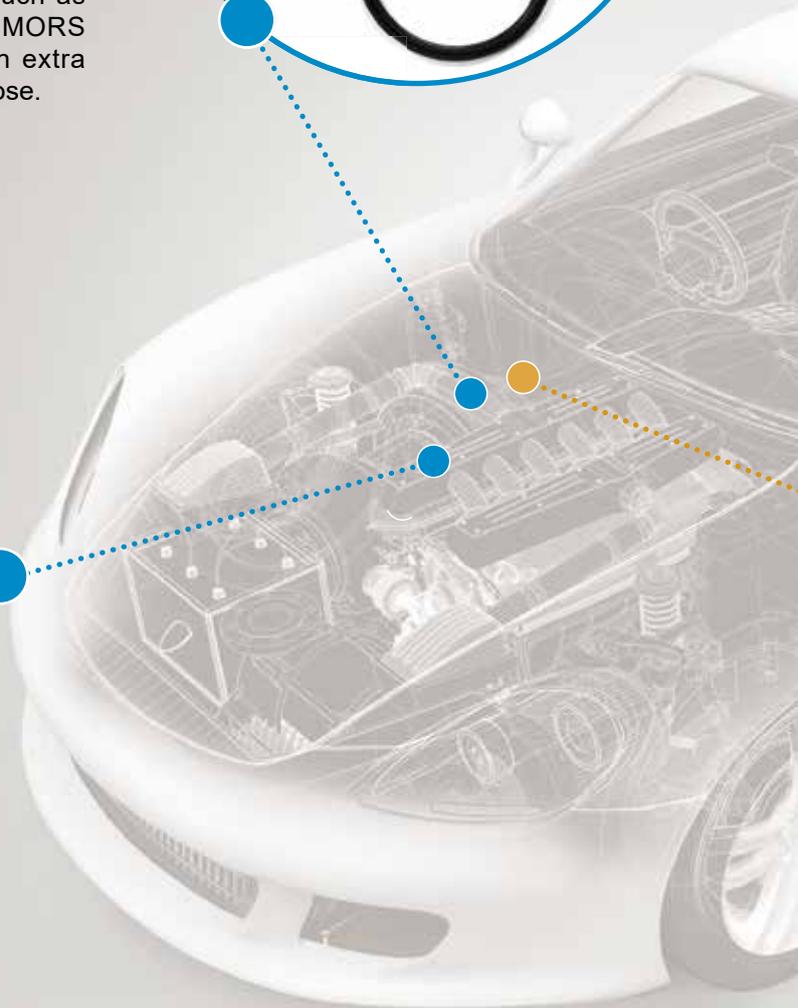
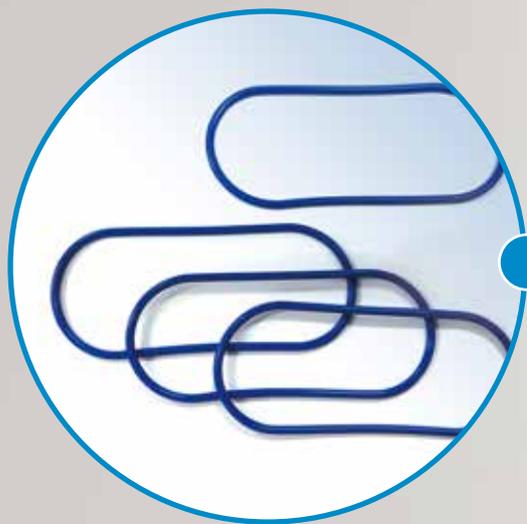
| Code | Particle Size | Contamination Level | Number of particles per |                 |
|------|---------------|---------------------|-------------------------|-----------------|
|      |               |                     | More than               | Up to (include) |
| D    | 25-50         | 14                  | 8,000                   | 16,000          |
| E    | 50-100        | 12                  | 2,000                   | 4,000           |
| F    | 100-150       | 9                   | 250                     | 500             |
| G    | 150-200       | 6                   | 32                      | 64              |
| H    | 200-400       | 3                   | 4                       | 8               |
| I    | 400-600       | 00                  | 0                       | 0               |
| J    | 600-1000      | 00                  | 0                       | 0               |
| K    | >1000         | 00                  | 0                       | 0               |



- Intake and Exhaust System
- Braking System
- Fuel System
- Cooling and Air Conditioning System
- Transmission and Steering System
- Sensor
- Truck and Railway Air Brake System
- Electric Vehicle System

## Intake and Exhaust System

Entering the era of low-carbon emission and sustainability imperative, you need better sealing solutions to withstand an even harsher environment such as in EGR system and turbo intercoolers. In addition to that, GMORS also provides sealing solutions for SCR system (Selective Catalytic Reduction), and for aftertreatment system of diesel exhaust emissions from diesel engines such as AdBlue®. Especially for SCR system, GMORS provide seals in custom compounds with extra reliability to fulfill the complete sealing purpose.



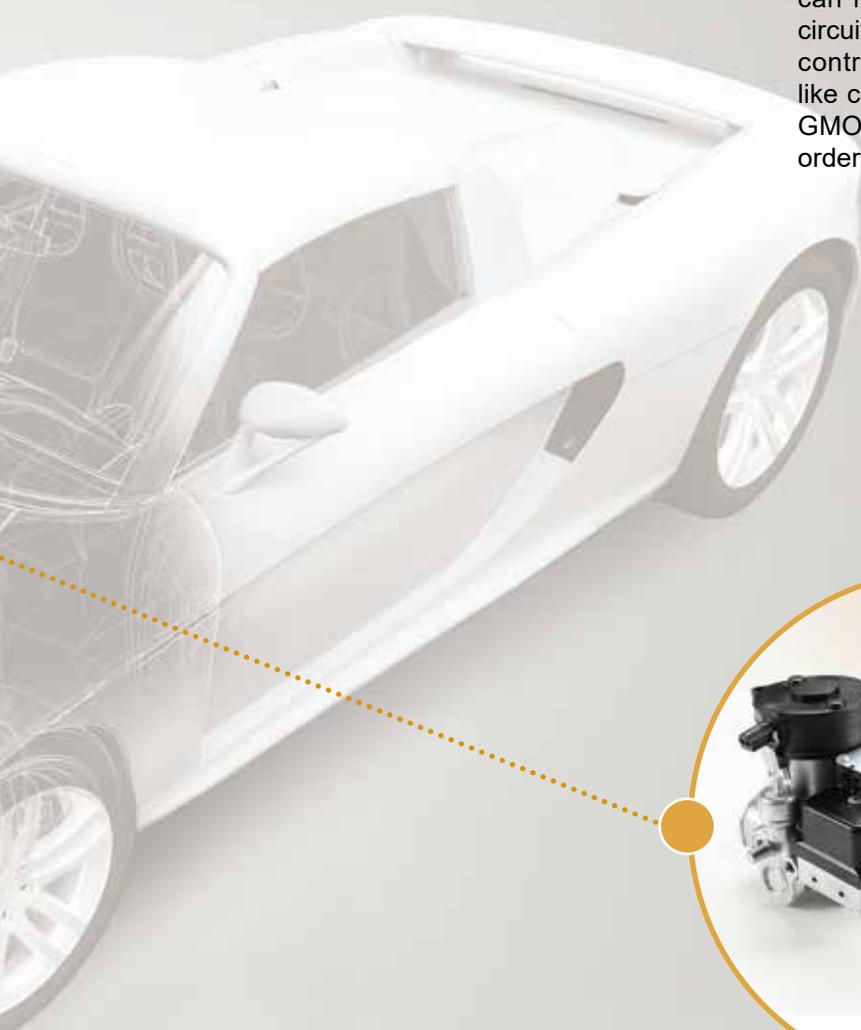
**Table: Intake and Exhaust System**

| Intake and Exhaust System                   | Material                  | Compound                   |
|---|---------------------------|----------------------------|
| Intake manifold                             | Silicone                  | S5012AP                    |
| EGR system<br>(Exhaust Gas Recirculation)   | FKM <sup>1)</sup><br>HNBR | V5731AA、V7014AA<br>H6029AA |
| Exhaust manifold<br>(Blow-By gas / AdBlue®) | HNBR<br>EPDM              | H7019AK<br>E7002AA         |
| O2 sensor                                   | FKM                       | V8040AA                    |

1) GMORS compound have been approved by automotive customers.

## Braking System

Seals in braking system are the most "system critical" automotive components. GMORS understands your concern and need. We ensure you a reliable control of braking function by providing you with optimum sealing solutions. We can meet requirements for hydraulic, pneumatic circuits, and system control. GMORS strict process control is to assure seals of working conditions like compression set, stress, strain, creep and etc. GMORS also increase seal's friction and wear in order to maximize the service life.



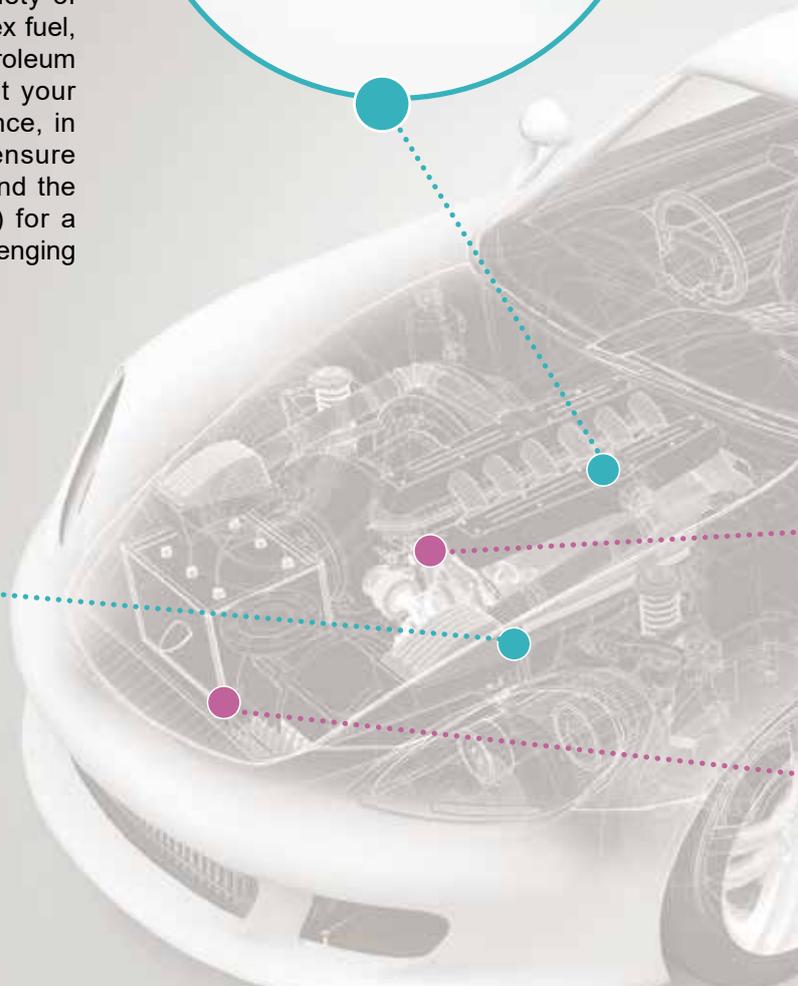
**Table: Braking System**

| Braking System        | Material           | Compound                    |
|-----------------------|--------------------|-----------------------------|
| Fluid brake DOT#3,4,5 | EPDM <sup>1)</sup> | E7905AA \ E7005AA \ E8005AA |
| Braking system        | EPDM               | E6935AA \ E8105AA \ E8005AA |

1) GMORS compound have been approved by automotive customers.

## Fuel System

Seal application in fuel system is regarded as safety critical with challenging requirements. Therefore, in early stage of development, GMORS is able to design compounds according to kinds of sealing considerations, and test under harsh environments, such as volume expansion, erosion-resistance, and different additives. GMORS sealing solutions apply to a variety of biodiesel, rapeseed methyl ester (RME), flex fuel, compressed natural gas (CNG), liquid petroleum gas (LPG) and so on. We can also meet your need for new fuel alternatives. For instance, in highpressure diesel systems, GMORS ensure sealing solution of the low permeability and the high sealing reliability (such as injector) for a successful function of engine even in challenging working environments.



**Table: Fuel / LPG Injector**

| Type of Gasoline              | Material 4)                                  | Compound                     |
|-------------------------------|--|------------------------------|
| Unleaded fuel                 | FKM 1) 2)                                    | V6015AA 、 V7000AA 、 V7015AA  |
| Diesel                        | FKM 1) 2)                                    | V6015AA 、 V7000AA 、 V7015AA  |
| Biodiesel                     | FKM  | V7000AA 、 V7817AA            |
| Biofuel                       | FKM 1) 2)                                    | V7000AA                      |
| LPG (liquefied petroleum gas) | Fluorosilicone 1) 3)<br>NBR <sup>5) 6)</sup> | F7004AO<br>N7060AA 、 N7017AA |

- 1) GMORS compounds have been approved by automotive customers.
- 2) GMORS has general compound (-20°C~200°C) and low temperature compound (-40°C~200°C).
- 3) Fluorosilicone service temperature is -70°C~200°C.
- 4) Surface coating is available to reduce assembly friction.
- 5) UL157 certification.
- 6) EN549 certification.



## Cooling and Air Conditioning System

When water temperature of the engine is increased to a greater mobility of the fuel oil, leading to better fuel economy, the seal has to be able to withstand a higher temperature cooling environment. GMORS high-performance materials with good compression set and stress relaxation property. Excellent property materials meet the latest regulations on refrigerants and the environments, and suit applications of condenser, evaporator, compressor, various valves, and sensors. GMORS offers perfect sealing solutions to stand the conditions such as permeability, chemical resistance, and control of volume expansion. And according to your system's refrigerant, GMORS sealing solutions can help prevent and control the refrigerant loss from the circuit.



**Table: Cooling System**

| Cooling System | Material | Compound        |
|----------------|----------|-----------------|
| Radiator       | EPDM     | E6502AA、E5002AA |
| Thermostat     | HNBR     | H6509AR         |

**Table: Air Conditioning System**

| Air Conditioning System Medium              | Material           | Compound                |
|---|--------------------|-------------------------|
| Freon R-134a <sup>2)</sup> , HFO-1234yf     | HNBR               | H7013AA、H7000AA、H6915AA |
| Freon R-134a <sup>2)</sup> , PAG(lubricant) | EPDM <sup>1)</sup> | E7579AH、E6935AA         |
| R744(CO <sub>2</sub> )                      | HNBR<br>EPDM       | H7013AA<br>E7679AH      |
| Freon R-12, R-22                            | Neoprene/ CR       | C7100AA                 |

1) Rubber materials have been approved by VOLKSWAGEN TL 524 32.  
2) Freon R-134a and synthetic lubricant with PAG or POE.

Intake and Exhaust System

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Cooling and Air Conditioning System

Transmission and Steering System

Sensor

Truck and Railway Air Brake System

Electric Vehicle System

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Transmission and Steering System

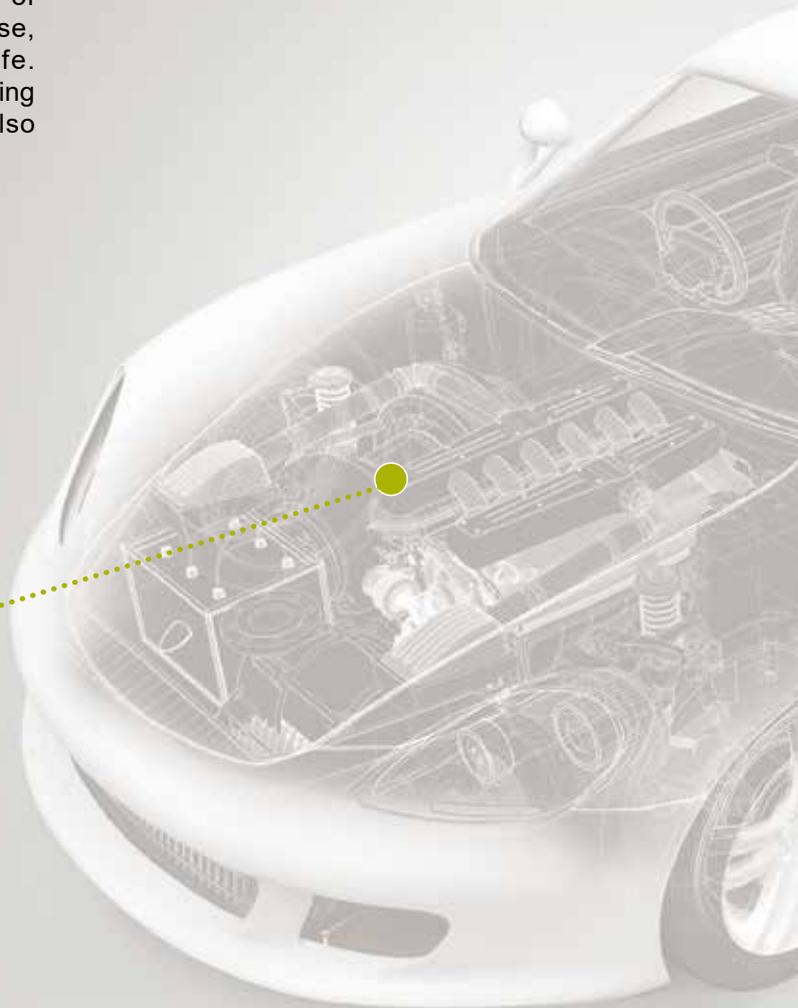
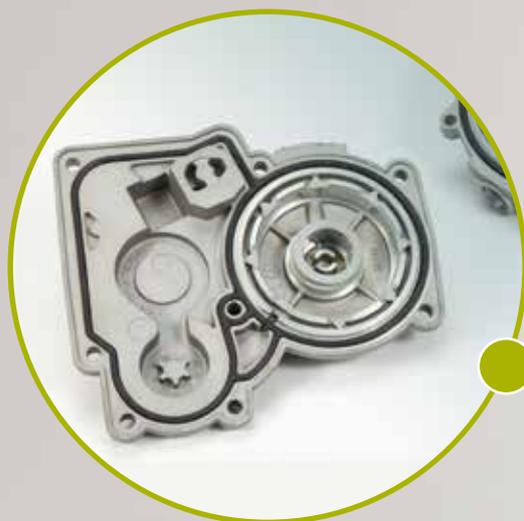
Sensor

Truck and Railway Air Brake System

Electric Vehicle System

## Transmission and Steering System

Designers of transmission and steering system are usually challenged to improve the system performance, such as by reducing size, integrating application structure and enhancing system efficiency. Therefore, seal with multi-function feature is required. GMORS engineering team can meet your request for the design and development of new series, providing seals with low noise, low friction / wear, and long service life. Under high pressure and high speed working environments, a total sealing solution also helps to eliminate noise vibration.



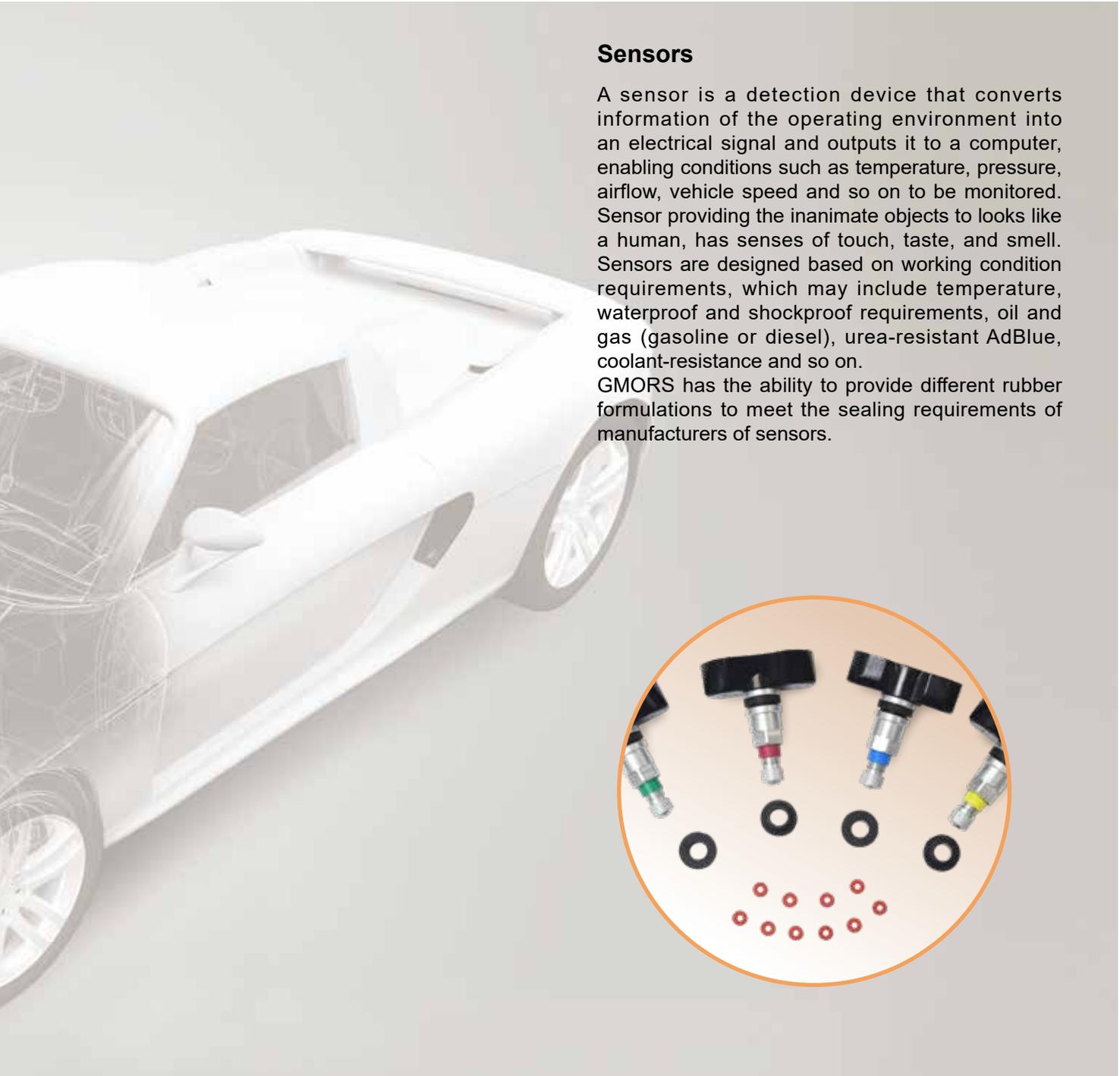
**Table: Transmission System**

| Transmission Fluid Resistance |           | Material | Compound                    |
|-------------------------------|-----------|----------|-----------------------------|
| DEXRON III                    | DEXRON VI |          |                             |
| V                             |           | FKM      | V7500AA 、 V7500AB 、 V7531AA |
| V                             | V         |          | V7544AA                     |
| V                             | V         | VAMAC    | G7506AA 、 G7105AA 、 G7513AA |
| V                             | V         | ACM      | P7000AA                     |

**Table: Steering System**

| Steering System | Material                                | Compound           |
|-----------------|---|--------------------|
| Columns         | HNBR <sup>1)</sup>                      | H7518AA            |
| Half shaft      | HNBR <sup>1)</sup><br>NBR <sup>1)</sup> | H7026AA<br>N8369AA |
| Hose            | HNBR <sup>1)</sup>                      | H8024AA            |
| Int Gear        | HNBR <sup>1)</sup><br>NBR <sup>1)</sup> | H7315AA<br>N8369AA |
| Pump            | HNBR <sup>1)</sup>                      | H8000AA            |
| RP Gear         | HNBR <sup>1)</sup>                      | H9024AA            |

1) Rubber materials have been approved by automotive customers.



## Sensors

A sensor is a detection device that converts information of the operating environment into an electrical signal and outputs it to a computer, enabling conditions such as temperature, pressure, airflow, vehicle speed and so on to be monitored. Sensor providing the inanimate objects to looks like a human, has senses of touch, taste, and smell. Sensors are designed based on working condition requirements, which may include temperature, waterproof and shockproof requirements, oil and gas (gasoline or diesel), urea-resistant AdBlue, coolant-resistance and so on.

GMORS has the ability to provide different rubber formulations to meet the sealing requirements of manufacturers of sensors.

Intake and Exhaust System

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**Table: Sensor**

| Sensor                   | Material       | Compound  |
|--------------------------|----------------|---|
| Engine                   | EPDM           | E4000AA、E6935AA   |
|                          | Fluorosilicone | F6004BU   |
|                          | HNBR           | H6915AA、H7036AA、H7500AA、H7500AB   |
| Exhaust after-treatment  | NBR            | N4006AA、N5071AA、N7000AA、N7000AP、N7027AA、N7034AA、N7577AA、N9026AA、N7000AA   |
| Transmission             |                | S5006BU、S7000AA、S7000AB、S7000AD、S7000AF、S7000AN、S7000AU、S7017AB   |
| Tire pressure monitoring | Silicone       | V6017AA、V7000AE、V7000AG、V7000AR、V7082AA、V7500AA、V7500AB、V7500AC、V7500AG、V7544AA、V7582AC、V8040AA、V8081AA、V8184AA、V9082AB |
| Air conditioning         |                |   |
| Electronic stability     | FKM            |   |

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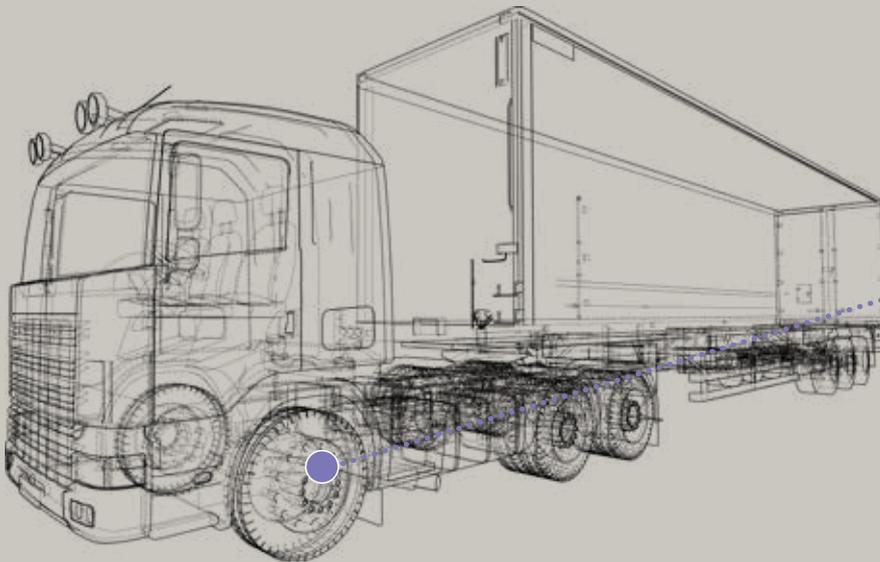
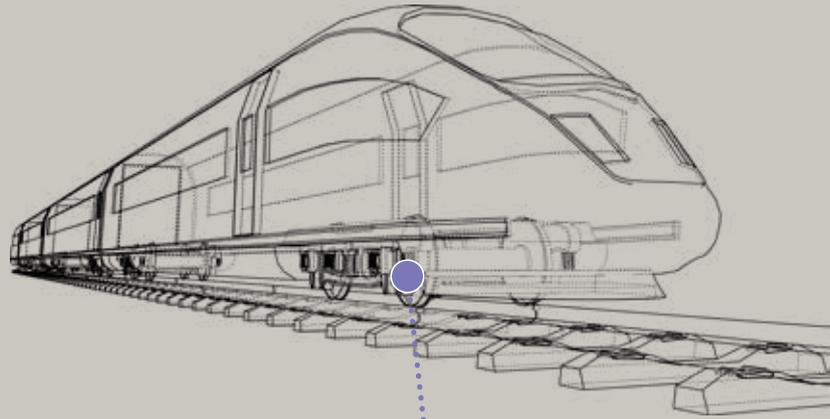
Sensor

Truck and Railway Air Brake System

Electric Vehicle System

## Trucks and Railway Air Brake System

The components of an air brake system consists of an air storage tank, safety valve, low pressure indicator, a compressor, pressure governor and release valve, brake valve, relay valve, quick release valve and brake chamber. The air brake system makes use of air intake and exhaust at high pressure to generate braking efficiency for trucks and trains. The rubber material that is used is generally NBR. General product design is rubber sintered with copper. While the working environment under high pressure, GMORS Seals are designed to perform under conditions of high pressure through a process of sintering with materials like copper and fabric.



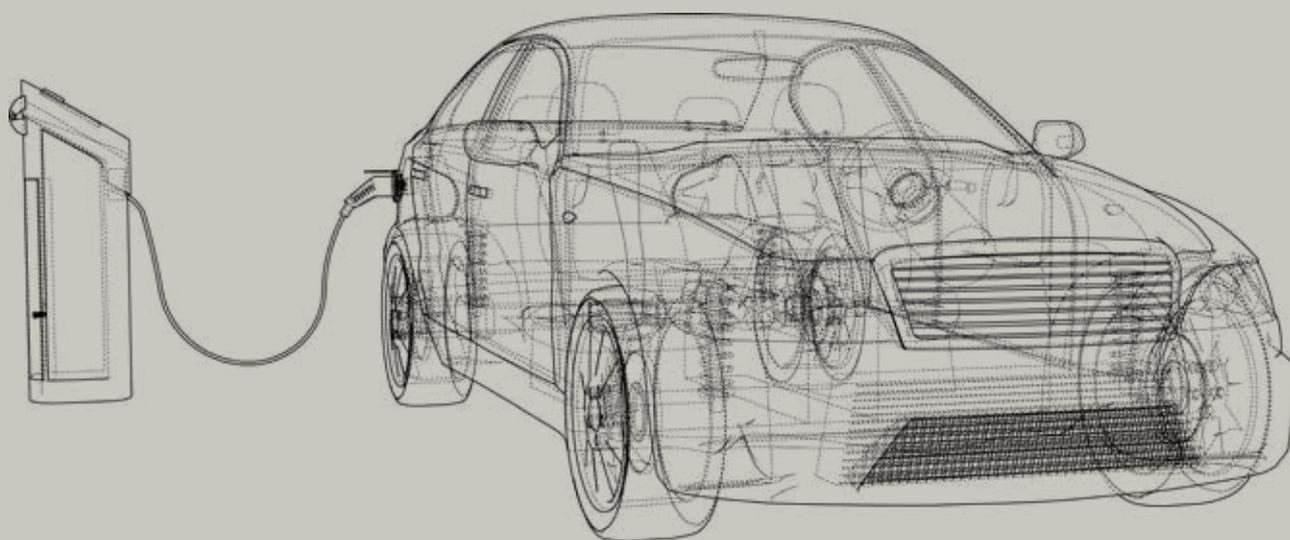
**Table: Air Braking System**

| Air Brake Systems | Material | Compound |
|-------------------|----------|----------|
|                   | NBR      | N8088AA  |

## Electric Vehicle System

The automotive industry is moving towards a watershed. With the innovation of new technologies, automotive components are becoming increasingly diversified. Compared with traditional fuel-driven vehicles, the key components of electric vehicles (EV) comprise of batteries and batteries thermal management systems (BTMS).

Batteries that power today's electric vehicles and hybrid vehicles have significantly higher amperages and energy volumes, and have to be more robust and of higher quality than those used in consumer applications. Batteries for electric vehicles operate under more demanding temperature and pressure conditions, and also have to be protected against the ingress of dust and moisture from the environment. GMORS Elastomeric seals contribute toward extending the batteries service life under such tough service conditions.



**Table: Electric Vehicle System**

| Electric Vehicle System Components | Material               | Compound   |
|------------------------------------|------------------------|--|
| Battery pack application           | Silicone <sup>1)</sup> | S7023AA  |
| Thermal management system          | Silicone<br>EPDM       | S5556AA<br>E4031AA · E5010AA · E6935AA · E6031AA |
| Cooling system                     | EPDM                   | E7070AI · E6002AA                                |
| Air conditioner fittings           | EPDM                   | E7170AA01  |
| Temperature Sensor                 | Silicone               | S4012AB  |
| Car suspension                     | EPDM                   | E8331AA  |

1) GMORS Compounds Meet Requirement of the UL 94 V-0.

# MEMO

A series of horizontal dotted lines for writing.

## O-Ring Master

GMORS O-Ring Master provides international standard size lookup for rubber sealing rings. With this APP, you can operate it without an internet connection. In addition to O-rings, you can also find the size of X-rings and reinforcement rings (back-up rings). You can also search for the appropriate O-ring based on the groove size of the installed cylinder.

## Material Master

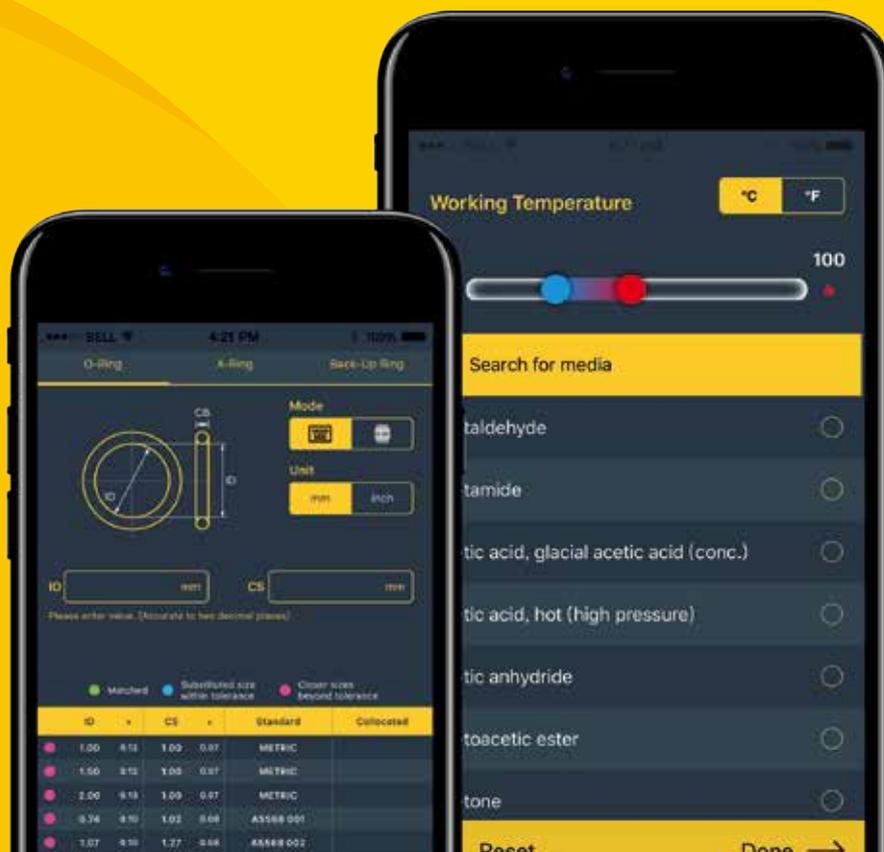
GMORS Material Master provides material recommendations based on the application environment of your rubber seal products, such as "temperature" and "media". We provide nearly a thousand types of media to compare the compatibility of materials.



Android



iOS



Android



iOS



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