

# Application and Test of Pneumatic Disc Brake

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**Abstract:** This paper introduces the working principle and advantages of pneumatic brake, the application advantages, requirements and testing of pneumatic brake. In recent years, due to the social and economic progress of our country, the acceleration of road development, and the rapid growth of car ownership, the pollution problem caused by cars has become increasingly obvious. In addition to known as automobile exhaust pollution, study of automobile brake/tires pollution, automobile brake is mainly in the process of acceleration and deceleration braking system particle pollution resulting from the wear and tear each other, the relative motion of the tire is with the road surface and tire, these pollutants will pollution which created to the urban environment.

**Keywords:** Pneumatic brake; Application; Testing

## 1. Introduction

People are constantly pursuing the environmental protection, reliability and safety of the braking system. The good braking performance greatly improves the active safety of the automobile, and at the same time solves the problems of high maintenance cost and serious environmental pollution. In recent years, China's automobile consumption level continues to improve, the country also issued a series of relevant laws and regulations, making this technology through continuous innovation, will get greater development in China, with great potential market value.

## 2. Working Principle of Pneumatic Brake

Pneumatic brake has single push rod and double push rod, it is composed of seven functional parts, respectively: support, guide pin, clamp body, friction block, automatic adjustment mechanism assembly, pressure arm, return spring. The power USES the eccentricity lever of the pressure arm to provide compressed air (generally 0.8mpa) for the air supply system of the automobile, and the amplification output rate is up to about 16 times. The outside friction block is pulled, and the two friction blocks are clamped on the brake disc like clamps, so as to achieve the purpose of slowing down the vehicle. The brake rotates with the wheel and is fixed to the wheel.

## 3. Advantages of Pneumatic Brakes

### 3.1. More efficient

Pneumatic brake has higher efficiency and better performance than traditional brake. High efficiency means easy repair and low cost, simple structure and light weight; Excellent performance means high power and safety. The

pneumatic brake is easier to realize than the drum brake in the function of electronic control anti-lock system, which can not only prevent skidding when accelerating, but also prevent sideslip. According to incomplete statistics, sideslip is the culprit in 25% of vehicle accidents.

### 3.2. Security

Due to its advantageous structure, pneumatic brake is quite suitable for mass production of assembly line, and can effectively control the on-line quality inspection, thus ensuring the high quality of products. The shorter braking response time depends on the compact structure of the transmission chain, and the shorter braking response time means that the braking safety is greatly improved [1].

### 3.3. Sound environmental protection

Pneumatic brake to ensure that there will be no harsh screams, effectively solve the problem of urban noise pollution, pneumatic brake is worthy of environmental protection brake.

### 3.4. Maintenance is convenient

Pneumatic brake maintenance is quite simple, even can be said not to repair, all its operating structure is strictly sealed in the clamp body, in order to extend the service life, also set up a special bearing placed in the friction position. This means that rare repairs involve merely replacing damaged brake discs and friction blocks. Pneumatic brake also has a very powerful advantage in logistics management that cannot be ignored. The same brake disc, clamp body, friction block and other parts have strong universality, which effectively reduces its complexity. In the road test, the pneumatic brake perfectly displays its good braking performance. Some experi-

ments show that pneumatic brake has obvious advantages in vehicle braking.

#### 4. Application of Pneumatic Brake in Bus

China's automobile production and consumption power, especially passenger cars, and with ever increasing development and market concentration, "three dragons on the" more obvious can be used as represented by their coaches in China possessed of more than 50% market share, and can already in 900000 ~ 1.2 million yuan with imported brands on the market competition, also have go abroad at the same time, to the world.

##### 4.1. In passenger cars

Pneumatic brake has become an inevitable mainstream in bus operation, which is due to its excellent performance characteristics. In this short period of several decades, some state-owned enterprises and scientific research institutions have shown great vitality, although they are not very proficient in the research and development and application of this aspect. The country successfully bid for the Shanghai world expo, Shanghai public transport in a relatively stable basis of grade increase year by year, more and more new environmentally friendly public transport on the streets; Cities such as wuhan and jinan have also started using environmentally friendly buses with pneumatic brakes, and their markets are expanding [2].

##### 4.2. A vast market

The domestic pneumatic brake market is still very broad, there are only three manufacturers, namely wuhan youfin, zhejiang wan 'an and wuhan wanxiang, three manufacturers produced is just a drop in the ocean. However, not all manufacturers can carry out production. The project is quite demanding in terms of infrastructure, production capacity, technical strength, technical strength and testing, etc., and the participation of general strength is really out of reach. Such harsh conditions further aggravate the sterility of the market. With the deepening of international trade integration, pneumatic brake products export is a good choice, the prospect is very good. However, it is clear that there is a considerable market waiting to be tapped, both at home and abroad.

#### 5. Inspection of Pneumatic Brake

In recent years, pneumatic brake occupies a more and more important position in the market. At the same time, the regulations and requirements on pneumatic brake have been issued, and the technical standards of pneumatic brake testing have been improved as far as possible. And this series of regulations for the pneumatic brake market brought a lot of life.

Jti094-2016 safety technical conditions for operating

Passenger cars issued by the ministry of communications took effect on January 1, 2017, and stipulated in article 4.3 and article 2 that all wheels of operating passenger cars should be equipped with pneumatic brakes. Moreover, it is stipulated that bus manufacturers should increase research and development efforts to make all the buses they operate jti094-2016 standard.

The law, issued by the transportation department, is mandatory and must not be ignored. It also means that all passenger cars after January 1, 2018 are equipped with pneumatic brakes.

General administration of quality supervision, inspection and quarantine also released GB7258-2017 "motor vehicle safety technical conditions" is a revolution of the truck industry in China. It is also mandatory, and the standard covers a wider range of vehicles than others.

With these perfect laws and regulations as the background, only to ensure the health of the market. And now, after cooperation and mutual learning with foreign capital, the technology of domestic manufacturers is constantly improved. In order to meet people's requirements on comfort, safety and environmental protection, domestic enterprises continue to improve the overall performance, in order to meet people's requirements, and gradually step on the road of high-speed development. This also stimulated the development of domestic auto parts processing industry. After nearly 10 years of development, the domestic pneumatic brake has basically occupied the domestic market.

The testing items of disc brakes in enterprises include :

Brake noise test (NVH2 noise, vibration, comfort), and testing standards include sae. J2521 "determination of screaming noise value of disc brake dynamometer" and AK "determination of brake noise standard".

The test standard of brake disc thickness variation experiment (DTA) includes GMW14926 "brake disc thickness wear variation" and "front and rear brake disc DTV test procedure".

Automotive industry standards are compiled by China first automobile group corporation. The new standards are named QC/ t479-201x "technical requirements and bench test methods for brake for commercial vehicles".

With the development of society, the country also attaches more importance to safety issues, coupled with the consumption of people's concept has also changed a lot, the installation of pneumatic brakes on cars is the general trend, and this is fully in line with the economic and practical standards.

In terms of large passenger cars, pneumatic brakes have good prospects and market test and are absolutely reliable. Some western countries even tried to install pneumatic brakes on large buses in the 1990s. Although our country starts in this aspect a little late, but in recent years, the air pressure brake localization process is unceasingly advances. Bus companies in first-tier cities

such as Hangzhou, Beijing and Shanghai have installed buses with pneumatic brakes. Facts have proved that this is the right choice. The excellent performance displayed by pneumatic brakes has been paid attention to by other small and medium cities, and has been equipped with pneumatic brakes on buses. This creates a virtuous circle. In terms of heavy buses, pneumatic brakes also have an irresistible advantage and a broad prospect.

## **6. Conclusion**

After so many years of market training and upgrading, the pneumatic brake has finally become mature and advanced. Its excellent safety and environmental protection make it more and more preferred by users. It is reported

that the car industry conservative estimate, when to 2020, the domestic car market demand will break through in the past, when the time comes, the demand for pneumatic brake will reach a large number of blowout requirements. The prospect of pneumatic brake is very promising.

## **References**

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