

## Ring Gauge Introduction

### 1. Product Introduction

#### 1.1 Definition and Function

A ring gauge is a precision measuring instrument primarily utilized for inspecting the external dimensions of cylindrical workpieces, including shafts, rods, and pins. It serves as an indispensable tool in quality control across diverse industries. Its core function is to verify whether the diameter of the measured object complies with the specified tolerance range. In manufacturing, precise control of external dimensions is crucial for ensuring seamless component assembly and optimal functionality. For example, within automotive engine manufacturing, the accurate fit of shafts in bearings depends on precise diameter measurements. Ring gauges play a vital role in confirming that shaft diameters meet the required standards, thereby preventing issues like accelerated wear, performance degradation, or component failure.

#### 1.2 Working Principle

The operation of a ring gauge is grounded in the principle of dimensional comparison. A standard ring gauge typically features two key dimensions: the "go" dimension and the "not - go" dimension. The "go" dimension of the ring gauge corresponds to the maximum allowable diameter of the measured object. When the object can pass smoothly through the "go" ring gauge, it indicates that the object's diameter does not exceed the maximum specified size. Conversely, the "not - go" dimension represents the minimum allowable diameter. If the object cannot pass through the "not - go" ring gauge, it means the object's diameter is no smaller than the minimum required size. Only when the object can pass through the "go" ring gauge but not through the "not - go" ring gauge is it considered to be within the acceptable tolerance range.

#### 1.3 Structure and Components

- **Ring Body:** The ring body constitutes the main structure of the ring gauge, commonly fabricated from high - grade materials such as hardened steel or carbide. These materials offer exceptional durability and wear resistance, ensuring that the gauge can endure repeated usage without significant dimensional alterations. The ring body has a circular shape, with its precisely machined inner diameter corresponding to the "go" and "not - go" dimensions. Its outer surface may be smooth or feature identification markings, including size labels and tolerance specifications. Some ring gauges are equipped with a handle or grip section attached to the ring body, facilitating convenient handling during measurements.
- **Go Ring:** The "go" ring is engineered with an inner diameter equal to the maximum allowable dimension of the object to be measured. Its inner surface is highly polished to ensure a frictionless passage for the object. The meticulous machining of the "go" ring ensures that even a slight deviation in the object's diameter beyond the maximum limit will prevent it from passing through, enabling precise determination of whether the object adheres to the size requirements.
- **Not - Go Ring:** The "not - go" ring has an inner diameter equivalent to the minimum allowable dimension. Similar to the "go" ring, its inner surface is also polished to a

high degree. The primary function of the “not - go” ring is to block objects with diameters smaller than the minimum specified size. If an object can pass through the “not - go” ring, it indicates that the object’s diameter is too small and does not meet the required standards.

## 1.4 Applications

- **Mechanical Engineering:** In the field of mechanical engineering, ring gauges are widely employed for inspecting the dimensions of shafts, axles, and other cylindrical components. Whether in the production of gears, engines, or various machinery parts, accurate measurement of external diameters using ring gauges is essential for ensuring proper fit and reliable operation. For instance, during the manufacturing of a transmission system, ring gauges are used to check the diameters of power - transmitting shafts, ensuring smooth operation and minimizing the risk of mechanical failures caused by improper sizing.
- **Automotive Manufacturing:** The automotive industry heavily relies on ring gauges for quality control of numerous components. From engine crankshafts and camshafts to wheel axles, ring gauges are utilized to verify that the external dimensions of these parts adhere to the strict tolerances necessary for vehicle performance, safety, and longevity. By using ring gauges, automotive manufacturers can ensure precise component fitment, reducing vibrations, noise, and wear, and ultimately enhancing the overall quality of the vehicle.
- **Aerospace Industry:** In the aerospace sector, where precision is of paramount importance, ring gauges play a critical role in measuring the dimensions of essential components. Parts such as turbine shafts, landing gear components, and structural fasteners must be manufactured with extremely tight tolerances. Ring gauges are used to ensure that the external dimensions of these components fall within the specified ranges, guaranteeing the safety and reliability of aircraft during flight.
- **Tool and Die Making:** In tool and die manufacturing, ring gauges are used to measure the dimensions of punches, dies, and other tooling components. Accurate sizing of these parts is crucial for producing high - quality products with consistent dimensions. Ring gauges assist tool and die makers in ensuring that their tools meet the required specifications, facilitating smooth production processes and minimizing the occurrence of defective products.

## 2. Typical Installation (Usage) Schematic Diagram

### 2.1 Preparation

Before using the ring gauge, both the ring gauge and the object to be measured must be thoroughly cleaned. Use a clean cloth or a brush to remove any dirt, debris, oil, or other contaminants from the inner diameter surface of the ring gauge and the outer surface of the object. Inspect the ring gauge for any visible damage, such as scratches, dents, or cracks, which could compromise the accuracy of the measurement.

### 2.2 Measurement with the Go Ring

Hold the “go” ring gauge by its handle (if available) or grip it firmly. Align the ring gauge with the axis of the object and gently slide the “go” ring over the object. The object should pass through the “go” ring gauge smoothly without applying excessive force. If the object fails to pass through the “go” ring, it indicates that the object's diameter exceeds the maximum

allowable size, and the part does not meet the requirements.

### 2.3 Measurement with the Not - Go Ring

After successfully passing the object through the “go” ring, remove the “go” ring and pick up the “not - go” ring gauge. Repeat the process of aligning and sliding the “not - go” ring over the object. The object should not be able to pass through the “not - go” ring. If the object does pass through the “not - go” ring, it means the object's diameter is smaller than the minimum allowable size, and the part is considered defective.

Step	Action	Expected Outcome
1	Clean the ring gauge and the object	Both are free of contaminants, and the ring gauge is undamaged
2	Slide the go ring over the object	The object passes through smoothly
3	Slide the not - go ring over the object	The object does not pass through

## 3. Maintenance and Troubleshooting

### 3.1 Maintenance

- **Regular Cleaning:** Clean the ring gauge immediately after each use. Use a soft - bristle brush and an appropriate cleaning agent to remove any residues from the inner diameter of the ring. Rinse the ring gauge thoroughly with clean water and dry it carefully using a clean, lint - free cloth. This practice prevents the accumulation of dirt, debris, and corrosive substances, which could otherwise affect the gauge's accuracy over time.
- **Inspection for Damage:** Periodically examine the ring gauge for any signs of damage. Check both the inner and outer surfaces for scratches, dents, cracks, or signs of wear. Even minor damage can lead to measurement inaccuracies. If any damage is detected, the ring gauge should be sent for repair or replaced promptly. Additionally, check for any deformation of the ring body, as this can also result in incorrect measurements.
- **Proper Storage:** Store the ring gauge in a clean, dry environment. It is recommended to use a dedicated storage case or box to protect the gauge from external impacts and contaminants. Avoid storing the ring gauge in areas with high humidity or extreme temperatures, as these conditions can cause corrosion or dimensional changes in the gauge. When storing multiple ring gauges, ensure they are separated to prevent scratching or damage to each other.
- **Calibration:** Regular calibration is essential for maintaining the accuracy of the ring gauge. Calibration should be performed using a master ring gauge or a calibrated reference standard with known and traceable dimensions. The calibration process involves comparing the dimensions of the ring gauge being calibrated with the reference standard. If the ring gauge shows any deviation from the standard, it should be adjusted or repaired by a qualified technician. Calibration intervals may vary

depending on the frequency of use and the criticality of the measurements, but generally, it is advisable to calibrate ring gauges at least once a year.

### 3.2 Troubleshooting

- **Inaccurate Measurements:** If the ring gauge provides inconsistent or inaccurate measurements, first verify that the gauge is clean and undamaged. Re - clean the ring gauge and conduct a thorough inspection for any signs of wear or damage. If the gauge appears to be in good condition, the issue may be related to calibration. Re - calibrate the ring gauge according to the calibration procedure. Additionally, ensure that the operator is using the gauge correctly, applying the appropriate amount of force during the measurement process and following the proper steps.
- **Object Does Not Pass Through the Go Ring:** When the object fails to pass through the “go” ring, it could be because the object's diameter is actually larger than the maximum allowable size. However, it might also be due to dirt or debris on the object's surface or the ring gauge's inner diameter. Thoroughly clean both the object and the ring gauge and retry the measurement. If the problem persists, double - check the calibration of the “go” ring gauge.
- **Object Passes Through the Not - Go Ring:** If the object passes through the “not - go” ring, it indicates that the object's diameter is smaller than the minimum allowable size. Similar to the previous case, first, clean the object and the ring gauge to eliminate any contamination issues. If the measurement result remains the same, verify the calibration of the “not - go” ring gauge. In some cases, the problem may also be caused by improper handling or damage to the ring gauge during use.

### 4. Performance Characteristics

- **High Precision:** Ring gauges are manufactured with exceptional precision, enabling accurate measurement of external dimensions. They can typically achieve tolerances within a few micrometers, making them suitable for applications demanding strict dimensional control. This high level of precision ensures that components meet the most stringent quality standards across various industries.
- **Reliability:** Owing to their robust construction and the use of high - quality materials, ring gauges offer reliable performance over an extended period. They can withstand the rigors of repeated use in manufacturing environments without significant degradation in accuracy or durability. This reliability makes them a trusted tool for quality control professionals.
- **Ease of Use:** Ring gauges feature a simple design and are intuitive to use. The “go - no - go” measurement principle is straightforward, allowing operators to quickly and easily determine whether a part meets the dimensional requirements. Minimal training is required to use ring gauges effectively, reducing the learning curve and enhancing productivity in the manufacturing process.
- **Versatility:** Ring gauges are available in a wide range of sizes and specifications to accommodate diverse objects and measurement requirements. They can be used to measure the diameters of various cylindrical components, from small pins to large shafts. Some ring gauges are specifically designed for measuring tapered or threaded objects, further expanding their application scope in different manufacturing and engineering scenarios.

