Threaded Plug Gauge Introduction

1. Product Introduction

1.1 Definition and Function

A threaded plug gauge, also known as a thread plug gauge, is a precision - engineered measuring instrument. Its primary function is to inspect the internal threads of holes. It plays a crucial role in quality control processes across multiple industries, ensuring that the internal threads of components meet the required dimensional and pitch standards. By using a threaded plug gauge, manufacturers can guarantee the proper fit and functionality of parts when assembled with corresponding external - threaded components. For example, in the automotive industry, it is used to check the internal threads of engine block holes where bolts are to be inserted. Incorrectly sized internal threads can lead to issues such as poor fastening, vibration - induced loosening, and potential mechanical failures.

1.2 Working Principle

The working principle of a threaded plug gauge is based on the “go - no - go” method. A typical threaded plug gauge has two main sections: the “go” end and the “no - go” end. The “go” end is designed with a thread profile that matches the minimum acceptable size and pitch of the internal thread being measured. When the “go” end of the threaded plug gauge can be smoothly screwed into the internal thread without excessive force, it indicates that the thread size is at least as large as the minimum required. On the other hand, the “no - go” end has a thread profile corresponding to the maximum allowable size and pitch. If the “no - go” end cannot be screwed into the internal thread (or can only be screwed in for a very short distance, typically not more than two full turns in most industrial standards), it means that the internal thread is not larger than the maximum specified size. Only when the “go” end can be fully inserted and the “no - go” end is blocked is the internal thread considered to be within the acceptable tolerance range.

1.3 Structure and Components

- **Gauge Body**: The gauge body serves as the main structure that holds the “go” and “no - go” threaded sections. It is usually made of high - quality hardened steel, which provides excellent durability and wear resistance. The body is designed to be rigid to ensure accurate measurement. In some cases, it may have a handle or a grip section for easy handling during the measurement process. The handle is often ergonomically shaped to provide a comfortable and secure hold, allowing the operator to apply the right amount of torque when inserting the gauge into the threaded hole.
- **Go Thread Section**: The “go” thread section is precisely machined to the minimum limit of the specified thread size and pitch. The threads on this section are highly polished to reduce friction during insertion into the internal thread. The shape and profile of the “go” thread are carefully crafted to match the standard thread form (such as 60 - degree for metric and unified inch threads, 55 - degree for BSP and BSW threads). This ensures that when the “go” end is inserted, it can accurately assess whether the internal thread meets the minimum size requirements.
- **No - Go Thread Section**: The “no - go” thread section has a larger thread size and pitch compared to the “go” section, corresponding to the maximum allowable limit. Similar to the “go” section, its threads are also polished. The purpose of the “no - go” section is to act as a limit checker. If the “no - go” end can be easily inserted into the

internal thread, it indicates that the internal thread is oversized and does not meet the required standards.

1.4 Applications

- **Mechanical Manufacturing**: In mechanical manufacturing, threaded plug gauges are widely used to inspect the internal threads of various components. They are used in the production of gears, shafts, and housings. For example, when manufacturing a gearbox, threaded plug gauges are used to check the internal threads of the holes where bolts are used to fasten the gearbox components together. This ensures proper assembly and prevents issues like loose connections, which could lead to mechanical failures during operation.
- **Automotive Industry**: The automotive industry heavily relies on threaded plug gauges for quality control. They are used to measure the internal threads of engine components such as cylinder heads, engine blocks, and transmission cases. Accurate internal thread dimensions are crucial for ensuring the proper installation of bolts, studs, and other fasteners. By using threaded plug gauges, automotive manufacturers can improve the reliability and performance of vehicles, reducing the risk of component failures due to incorrect threading.
- **Aerospace Industry**: Precision is of utmost importance in the aerospace industry, and threaded plug gauges play a vital role. They are used to inspect the internal threads of aircraft engine parts, wing structures, and landing gear components. Any deviation from the specified thread dimensions can have serious consequences for flight safety. Threaded plug gauges help aerospace manufacturers maintain the highest standards of quality, ensuring that all threaded connections in critical components are secure and reliable.
- **Electronics Manufacturing**: In electronics manufacturing, threaded plug gauges are used to measure the internal threads of components such as connectors, enclosures, and circuit board mounts. Accurate threading is essential for the proper assembly of electronic devices, as it ensures a secure connection and prevents issues like signal interference due to loose connections. Threaded plug gauges help electronics manufacturers produce high - quality products with consistent and reliable threading.

2. Typical Installation (Usage) Schematic Diagram

1. **Preparation**:
    - Select the appropriate threaded plug gauge for the specific thread size and type (e.g., metric, unified inch, BSP) of the internal thread to be measured.
    - Clean both the threaded plug gauge and the internal thread of the workpiece thoroughly. Use a clean cloth, brush, or appropriate cleaning agent to remove any dirt, debris, oil, or other contaminants. This is crucial as any foreign matter can affect the accuracy of the measurement.
    - Inspect the threaded plug gauge for any signs of damage, such as worn - out threads, dents, or cracks. A damaged gauge can lead to inaccurate measurements.
2. **Insertion of the Go End**:
    - Hold the threaded plug gauge by the handle (if available) or grip it firmly. Align the “go” end of the gauge with the axis of the internal thread.

- Slowly and gently start to screw the “go” end into the internal thread. Apply a consistent, moderate amount of torque. The “go” end should be able to be screwed into the internal thread smoothly without excessive force. If the “go” end cannot be inserted, it indicates that the internal thread is smaller than the minimum allowable size, and the part does not meet the requirements.

3. **Insertion of the No - Go End**:
    - After successfully inserting the “go” end, remove it from the internal thread. Then, take the “no - go” end of the threaded plug gauge and attempt to screw it into the same internal thread.
    - The “no - go” end should not be able to be screwed into the internal thread. In some standards, it may be allowed to enter up to two full turns, but if it can be screwed in further, it means that the internal thread is larger than the maximum allowable size, and the part is considered defective.

The following is a simple tabular representation of the usage process:

Step	Action	Expected Outcome
1	Prepare the gauge and the workpiece	Gauge and workpiece are clean, and the gauge is undamaged
2	Insert the go end	It can be screwed in smoothly
3	Insert the no - go end	It cannot be screwed in (or only up to a limited extent as per standards)

3. Maintenance and Troubleshooting

3.1 Maintenance

- **Regular Cleaning**: After each use, clean the threaded plug gauge immediately. Use a soft - bristle brush and a suitable cleaning agent to remove any residues, such as metal shavings, dirt, or oil, from the threads of both the “go” and “no - go” ends and the gauge body. Rinse the gauge thoroughly with clean water and dry it with a clean, lint - free cloth. This helps prevent the accumulation of contaminants that could affect the accuracy of the gauge over time.
- **Inspection for Damage**: Periodically inspect the threaded plug gauge for any signs of damage. Check the threads of the “go” and “no - go” ends for wear, such as flattened or chipped threads. Look for dents or cracks on the gauge body. Even minor damage can cause inaccurate measurements. If any damage is detected, the gauge should be repaired or replaced.
- **Proper Storage**: Store the threaded plug gauge in a clean, dry place. Use a protective case or storage box to prevent the gauge from being damaged during storage. Avoid storing it in an environment with high humidity or extreme temperatures, as these conditions can cause corrosion or dimensional changes in the gauge. When storing

multiple gauges, keep them separated to prevent them from scratching or damaging each other.

- **Calibration**: Regular calibration is essential to maintain the accuracy of the threaded plug gauge. Calibration should be carried out using a master gauge or a calibrated reference standard with known and traceable dimensions. The calibration process involves comparing the dimensions of the “go” and “no - go” ends of the gauge being calibrated with the reference standard. If the 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 recommended to calibrate threaded plug gauges at least once a year.

3.2 Troubleshooting

- **Inaccurate Measurements**: If the threaded plug gauge provides inconsistent or inaccurate measurements, first check if the gauge is clean and undamaged. Re - clean the gauge and perform a detailed 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 gauge as per the calibration procedure. Additionally, ensure that the operator is using the gauge correctly, applying the right amount of torque during insertion and following the proper measurement steps.
- **Go End Does Not Enter**: When the “go” end of the threaded plug gauge does not enter the internal thread, it could be because the internal thread is actually smaller than the specified minimum size. However, it could also be due to dirt, debris, or burrs in the internal thread blocking the entry. Thoroughly clean the internal thread and try the measurement again. If the problem persists, re - check the gauge for any damage or calibration issues. It is also possible that the thread - cutting tool used to create the internal thread was worn or incorrectly set, resulting in an undersized thread.
- **No - Go End Enters**: If the “no - go” end enters the internal thread, it indicates that the internal thread is oversized. Double - check the measurement process to ensure that the gauge is being used correctly. If the measurement is correct, the part may need to be reworked or rejected depending on the manufacturing process and quality control standards. Check if there were any issues with the thread - cutting process, such as incorrect feed rates, spindle speeds, or tool wear, that could have caused the internal thread to be larger than specified.

4. Performance Characteristics

- **High Precision**: Threaded plug gauges are manufactured with extremely high precision. They are designed to measure internal threads with tolerances in the order of micrometers. This high precision ensures that components with internal threads meet the strictest quality standards, especially in industries where precise fit and functionality are critical, such as aerospace and high - precision mechanical engineering.
- **Reliability**: Due to their robust construction using high - quality hardened steel and strict manufacturing processes, threaded plug gauges offer reliable performance. They can withstand repeated use in industrial environments without significant degradation in accuracy or durability. The reliable operation of threaded plug gauges

is essential for consistent quality control in manufacturing processes.

- **Ease of Use**: Threaded plug gauges are relatively easy to use, even for operators with limited experience. The “go - no - go” measurement principle is straightforward and intuitive. This simplicity in use reduces the learning curve for operators and allows for quick and efficient inspection of internal threads, increasing productivity in manufacturing.
- **Versatility**: Threaded plug gauges come in a wide variety of sizes and thread types to accommodate different applications. They can be used to measure metric, unified inch, BSP, BSW, and many other types of internal threads. Some gauges are also designed for specific applications, such as measuring tapered internal threads or threads with special profiles. This versatility makes threaded plug gauges a valuable tool in multiple industries.