

Medical Bed Test Tools and Fixtures

IEC 60601-2-52 Related Test Tools | GB 9706.252-2021 / YY 9706.252 Compliant



Standards: IEC 60601-2-52, GB 9706.252-2021, YY 9706.252

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Product Overview

The KingPo Medical Bed Test Tools and Fixtures are a professional set of precision test implements designed for mechanical safety evaluation of medical beds in accordance with IEC 60601-2-52 and related national standards (GB 9706.252-2021 / YY 9706.252). The set includes specialized tools for entrapment risk assessment, gap measurement, standardized loading application, pressure loading, and footboard force application.

These tools enable repeatable, standards-compliant test conditions through precisely defined dimensions, weights, surface finishes, and materials. They are essential for medical bed manufacturers, R&D teams, third-party testing laboratories, and quality control departments working with hospital beds, nursing beds, care beds, and rehabilitation beds. The tools support product development verification, internal quality control, and third-party compliance testing.

Key Advantages

- **Standards-Aligned Precision Tooling**

Engineering: Each tool is manufactured to exact dimensions, weights, and surface roughness (Ra 1.6) as specified in GB 9706.252-2021 / YY 9706.252 figures and clauses corresponding to IEC 60601-2-52 requirements.

Benefit: Ensures direct compliance with specific test clauses for entrapment evaluation, gap assessment, loading application, and mechanical safety verification, facilitating acceptance of test data by certification bodies.

- **Comprehensive Test Coverage for Medical Bed Safety**

Engineering: The set includes five specialized tools covering entrapment risk (cone tool), gap measurement (cylindrical tool), standardized loading (loading pad), pressure application (pressure plate), and footboard force testing (pneumatic device).

Benefit: Provides a complete toolkit for evaluating critical mechanical safety aspects of medical beds, reducing the need for multiple suppliers and ensuring consistent test methodology across different laboratories.

- **High-Quality Materials and Repeatable Conditions**

Engineering: Tools are constructed from aluminum or stainless steel with precisely controlled weights (± 0.05 kg tolerance where applicable), defined surface finishes, and robust designs for long-term laboratory use.

Benefit: Delivers consistent, repeatable test conditions over thousands of test cycles, minimizing measurement uncertainty and improving the reliability of safety evaluations.

- **Flexible Configuration — Individual or Complete Set**

Engineering: Tools are available individually or as a complete set. Custom configurations and fixture adaptations can be provided based on specific test items, standard versions, and medical bed structures.

Benefit: Allows laboratories and manufacturers to acquire only the tools needed for their current test programs while maintaining the option to expand to a full compliance toolkit as requirements evolve.

- **Traceable Quality and Laboratory Support**

Engineering: Each tool undergoes factory verification of dimensions, weight, and surface condition. Optional calibration documentation and custom test report formats are available.

Benefit: Supports laboratory traceability requirements and audit readiness, with technical support available for tool selection, application guidance, and integration into existing test workflows.

Technical Specifications

3.1 Tool Set Overview

Model	Tool Name	Standard Reference	Primary Use
KP-61521	Cone Tool / Entrapment Test Tool	GB 9706.252 Figure 201.103a	Entrapment-related evaluation
KP-61522	Cylindrical Tool	GB 9706.252 Figure 201.103b	Gap and opening evaluation
KP-61523	Loading Pad	GB 9706.252 Figure 201.104	Standardized loading application
KP-61525	Pressure Plate	GB 9706.252 Figure 201.112 / 201.9.4.2.2	Pressure and loading evaluation
KP-61526	Footboard Force Application Device	GB 9706.252 Clause 201.15.4.7.1	Footboard force application test

3.2 Detailed Tool Specifications

Model	Key Specifications	Material & Construction
KP-61521	Total Weight: 5.1 kg ± 0.05 kg Size: Φ120 × 228 mm Surface Roughness: Ra 1.6	Aluminum cone tool for entrapment testing
KP-61522	Total Weight: 3.34 kg ± 0.05 kg Size: Φ60 × 318 mm Surface Roughness: Ra 1.6	Stainless steel cylindrical tool for gap assessment
KP-61523	Total Weight: 1500 N Size: Φ335 × 500 mm Composition: Loading pad + stainless steel cylinder + loading steel balls	Aluminum + stainless steel for standardized loading
KP-61525	Force Range: 100–2200 N adjustable Sizes: 250 × 950 mm and 250 × 475 mm Composition: Stainless steel plate + loading steel balls	Stainless steel pressure plate for variable loading
KP-61526	Force: 1350 N Test Time: 0–9999 s Drive: Pneumatic Equipment Size: 600 × 600 × 800 mm	Pneumatic footboard force application device

Testing Principle

These test tools and fixtures enable defined, repeatable mechanical interactions with medical bed structures to evaluate critical safety aspects:

- 1. Entrapment & Gap Assessment (KP-61521 / KP-61522):** Cone and cylindrical tools are applied to openings and gaps in side rails, head/foot boards, and mattress support platforms to assess the risk of patient entrapment or passage of body parts.
- 2. Standardized Loading (KP-61523):** The loading pad applies a defined 1500 N force through a specified contact area to evaluate structural strength and deflection under representative patient loading conditions.
- 3. Pressure Loading (KP-61525):** The pressure plate applies adjustable force (100–2200 N) over defined areas to evaluate localized strength, stability, and resistance to deformation.
- 4. Footboard Force Application (KP-61526):** The pneumatic device applies a controlled 1350 N force to the footboard for a programmable duration to evaluate structural integrity and attachment strength.

All tools are designed to produce consistent contact conditions, force application, and measurement references, enabling laboratories to perform repeatable evaluations aligned with the mechanical safety requirements of IEC 60601-2-52 and related standards.

Typical Applications

- Medical bed manufacturers — Product development verification, design validation, and production quality control for side rail entrapment, loading strength, and footboard integrity
- Third-party testing laboratories — Compliance testing and certification support for IEC 60601-2-52 mechanical safety requirements
- R&D and engineering teams — Evaluation of new side rail designs, mattress support structures, and footboard attachment methods
- Quality assurance departments — Incoming inspection and batch verification of bed components and assemblies
- Regulatory and compliance teams — Generation of mechanical safety test data for technical documentation and market approval submissions

Tool Selection Guide

Select tools based on the specific mechanical safety evaluation required:

- **Entrapment Risk:** KP-61521 Cone Tool
- **Gap / Opening Assessment:** KP-61522 Cylindrical Tool
- **Standardized Structural Loading:** KP-61523 Loading Pad
- **Localized Pressure / Loading:** KP-61525 Pressure Plate
- **Footboard Strength / Attachment:** KP-61526 Footboard Force Application Device

Compliance & Manufacturer

These test tools and fixtures support mechanical safety evaluation methods aligned with IEC 60601-2-52 and related national standards (GB 9706.252-2021 / YY 9706.252). They are designed to assist manufacturers and laboratories in assessing critical aspects of medical bed safety including entrapment prevention, structural loading strength, and footboard integrity.

Note: Full compliance evaluation requires complete application of the relevant standards, including product design, risk management, and laboratory procedures. The tools provide defined test conditions aligned with specific mechanical safety test needs; final compliance determination remains the responsibility of the manufacturer and accredited testing bodies. Confirm the applicable edition and exact clause references before tool selection, as numbering and figure references may vary between IEC, GB, and YY versions.

Factory verification of dimensions, weight, and surface condition is performed before delivery. Optional calibration documentation is available. Custom configurations, fixture adaptations, and test report formats can be provided based on customer requirements. Manufactured under ISO 9001, ISO 14001, and ISO 45001 quality management systems.

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