

# International Warehouse KPIs and Standards - Formulas & Benchmarks

## ISO 22400 Standard Framework

ISO 22400-2:2014 - Key Performance Indicators for Manufacturing Operations Management provides the international standard framework for KPIs with standardized formulas and characteristics.

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### 1. INVENTORY MANAGEMENT KPIs

#### 1.1 Inventory Accuracy

- **Formula:**  $(\text{Physical Inventory Count} / \text{Book Inventory Count}) \times 100$
- **International Standard:** 97%+ (World-class: 99.5%+)
- **Unit:** Percentage (%)
- **Frequency:** Weekly/Monthly

#### 1.2 Inventory Turnover Ratio

- **Formula:**  $\text{Cost of Goods Sold} / \text{Average Inventory Value}$
- **International Benchmark:** 4-12 times per year (varies by industry)
- **Unit:** Times per period
- **Frequency:** Monthly/Quarterly

#### 1.3 Inventory-to-Sales Ratio

- **Formula:**  $\text{Average Inventory Value} / \text{Monthly Sales}$
- **International Standard:** 1.2-2.0 (depends on industry)
- **Unit:** Ratio
- **Frequency:** Monthly

#### 1.4 Stock-Out Rate

- **Formula:**  $(\text{Number of Stock-Outs} / \text{Total Number of SKUs}) \times 100$
- **International Standard:** <5% (Best-in-class: <2%)
- **Unit:** Percentage (%)
- **Frequency:** Weekly

#### 1.5 Carrying Cost of Inventory

- **Formula:**  $(\text{Storage Cost} + \text{Insurance} + \text{Depreciation} + \text{Opportunity Cost}) / \text{Total Inventory Value} \times 100$
  - **International Standard:** 15-25% annually
  - **Unit:** Percentage (%)
  - **Frequency:** Quarterly/Annually
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## 2. ORDER FULFILLMENT KPIs

### 2.1 Perfect Order Rate

- **Formula:**  $(\text{Perfect Orders} / \text{Total Orders}) \times 100$
- **International Standard:** 95%+ (World-class: 99%+)
- **Unit:** Percentage (%)
- **Frequency:** Daily/Weekly

### 2.2 Order Accuracy Rate

- **Formula:**  $(\text{Error-Free Orders} / \text{Total Orders}) \times 100$
- **International Standard:** 99.5%+ (World-class: 99.87%)
- **Unit:** Percentage (%)
- **Frequency:** Daily

### 2.3 Order Cycle Time

- **Formula:**  $\text{Sum of Order Processing Time} / \text{Number of Orders}$
- **International Standard:** 1-3 days (B2B), <24 hours (B2C)
- **Unit:** Hours/Days
- **Frequency:** Daily

### 2.4 Fill Rate

- **Formula:**  $(\text{Complete Orders on First Shipment} / \text{Total Orders}) \times 100$
- **International Standard:** 95%+ (World-class: 98%+)
- **Unit:** Percentage (%)
- **Frequency:** Daily

### 2.5 On-Time In-Full (OTIF)

- **Formula:**  $(\text{Orders Delivered On-Time and Complete} / \text{Total Orders}) \times 100$
- **International Standard:** 95%+ (World-class: 98%+)
- **Unit:** Percentage (%)
- **Frequency:** Daily

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## 3. OPERATIONAL EFFICIENCY KPIs

### 3.1 Overall Equipment Effectiveness (OEE)

- **Formula:**  $\text{Availability} \times \text{Performance} \times \text{Quality}$
- **International Standard:** 85%+ (World-class: 90%+)
- **Unit:** Percentage (%)
- **Frequency:** Daily

### 3.2 Warehouse Capacity Utilization

- **Formula:**  $(\text{Used Warehouse Space} / \text{Total Available Space}) \times 100$
- **International Standard:** 80-85% (Maximum: 90%)
- **Unit:** Percentage (%)
- **Frequency:** Weekly

### 3.3 Pick Rate (Lines per Hour)

- **Formula:**  $\text{Total Lines Picked} / \text{Total Picking Hours}$

- **International Standard:** 100-300 lines/hour (depends on method)
- **Unit:** Lines per hour
- **Frequency:** Daily

### 3.4 Dock-to-Stock Time

- **Formula:** Total Time from Dock to Stock / Number of Shipments
- **International Standard:** <24 hours (Best-in-class: <4 hours)
- **Unit:** Hours
- **Frequency:** Daily

### 3.5 Put-Away Time

- **Formula:** Total Time from Receiving to Storage / Number of Items
- **International Standard:** <4 hours (Best-in-class: <2 hours)
- **Unit:** Hours per item
- **Frequency:** Daily

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## 4. COST MANAGEMENT KPIs

### 4.1 Cost per Order

- **Formula:** Total Warehouse Operating Costs / Number of Orders
- **International Standard:** \$8-15 per order (varies by industry)
- **Unit:** Currency per order
- **Frequency:** Monthly

### 4.2 Cost per Shipment

- **Formula:** Total Shipping Costs / Number of Shipments
- **International Standard:** 5-10% of order value
- **Unit:** Currency per shipment
- **Frequency:** Monthly

### 4.3 Labor Cost per Unit

- **Formula:** Total Labor Costs / Total Units Processed
- **International Standard:** 2-5% of product value
- **Unit:** Currency per unit
- **Frequency:** Monthly

### 4.4 Storage Cost per Unit

- **Formula:** Total Storage Costs / Average Inventory Units
- **International Standard:** \$0.50-2.00 per unit per month
- **Unit:** Currency per unit per month
- **Frequency:** Monthly

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## 5. QUALITY & SAFETY KPIs

### 5.1 Damage Rate

- **Formula:** (Damaged Units / Total Units Handled) × 100
- **International Standard:** <0.5% (Best-in-class: <0.1%)
- **Unit:** Percentage (%)

- **Frequency:** Weekly

## 5.2 Return Rate

- **Formula:**  $(\text{Returned Orders} / \text{Total Orders Shipped}) \times 100$
- **International Standard:** <5% (Best-in-class: <2%)
- **Unit:** Percentage (%)
- **Frequency:** Weekly

## 5.3 Picking Accuracy

- **Formula:**  $(\text{Correctly Picked Items} / \text{Total Items Picked}) \times 100$
- **International Standard:** 99.5%+ (World-class: 99.9%+)
- **Unit:** Percentage (%)
- **Frequency:** Daily

## 5.4 Safety Incident Rate

- **Formula:**  $(\text{Number of Incidents} \times 200,000) / \text{Total Hours Worked}$
- **International Standard:** <3.0 (OSHA benchmark)
- **Unit:** Incidents per 100 FTE
- **Frequency:** Monthly

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# 6. CUSTOMER SERVICE KPIs

## 6.1 Order Lead Time

- **Formula:**  $\text{Sum of Time from Order to Delivery} / \text{Number of Orders}$
- **International Standard:** 24-72 hours (varies by service level)
- **Unit:** Hours/Days
- **Frequency:** Daily

## 6.2 Delivery Time Variance

- **Formula:**  $\text{Sum of Delivery Time Deviations} / \text{Total Orders with Promised Delivery}$
- **International Standard:**  $\pm 5\%$  (Best-in-class:  $\pm 1\%$ )
- **Unit:** Percentage (%)
- **Frequency:** Weekly

## 6.3 Customer Satisfaction Score

- **Formula:**  $(\text{Satisfied Customers} / \text{Total Customers Surveyed}) \times 100$
- **International Standard:** 90%+ (World-class: 95%+)
- **Unit:** Percentage (%)
- **Frequency:** Monthly

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# 7. PRODUCTIVITY KPIs

## 7.1 Cases per Labor Hour

- **Formula:**  $\text{Total Cases Processed} / \text{Total Labor Hours}$
- **International Standard:** 100-200 cases/hour (depends on operation)
- **Unit:** Cases per hour
- **Frequency:** Daily

## 7.2 Receiving Efficiency

- **Formula:** Items Received and Inspected / Total Receiving Hours
- **International Standard:** 200-500 items/hour (depends on complexity)
- **Unit:** Items per hour
- **Frequency:** Daily

## 7.3 Throughput Rate

- **Formula:** Total Units Processed / Total Processing Time
- **International Standard:** Varies by operation type
- **Unit:** Units per hour
- **Frequency:** Daily

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# INTERNATIONAL BENCHMARKING STANDARDS

### World-Class Performance Levels:

- **Inventory Accuracy:** 99.5%+
- **Order Accuracy:** 99.87%+
- **OTIF:** 98%+
- **Damage Rate:** <0.1%
- **OEE:** 90%+

### Industry-Acceptable Levels:

- **Inventory Accuracy:** 97%+
- **Order Accuracy:** 99%+
- **OTIF:** 95%+
- **Damage Rate:** <0.5%
- **OEE:** 85%+

### Monitoring Frequency:

- **Daily:** Order accuracy, OTIF, pick rates, throughput
- **Weekly:** Inventory accuracy, damage rates, capacity utilization
- **Monthly:** Cost KPIs, customer satisfaction, safety metrics
- **Quarterly:** Inventory turnover, carrying costs, strategic metrics

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# COMPLIANCE STANDARDS

### ISO Standards:

- **ISO 22400-1/2:** Manufacturing Operations Management KPIs
- **ISO 9001:** Quality Management Systems
- **ISO 14001:** Environmental Management
- **ISO 45001:** Occupational Health and Safety

### Regional Standards:

- **APICS SCOR Model:** Supply Chain Operations Reference
- **CSCMP:** Council of Supply Chain Management Professionals
- **WERC:** Warehouse Education and Research Council
- **IWLA:** International Warehouse Logistics Association

## Regulatory Compliance:

- **OSHA:** Safety standards (US)
  - **HSE:** Health and Safety Executive (UK)
  - **HACCP:** Food safety standards
  - **GDP:** Good Distribution Practice (Pharmaceuticals)
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## IMPLEMENTATION NOTES

1. **Baseline Measurement:** Establish current performance before implementing improvements
2. **Benchmarking:** Compare against industry standards and best-in-class performers
3. **Continuous Improvement:** Regular review and adjustment of targets
4. **Technology Integration:** Use WMS and analytics tools for real-time monitoring
5. **Training:** Ensure staff understand KPIs and their role in achieving targets

