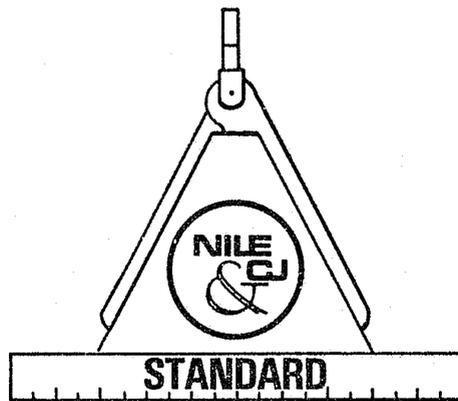


# LAW ENFORCEMENT STANDARDS PROGRAM

## METALLIC HANDCUFFS



15436

U.S. DEPARTMENT OF JUSTICE  
Law Enforcement Assistance Administration  
National Institute of Law Enforcement and Criminal Justice

**Library of Congress Cataloging in Publication Data**

National Institute of Law Enforcement and Criminal Justice.  
NILECJ standard for metallic handcuffs.

At head of title: Law enforcement standards program.  
"NILECJ-STD 0307.00."

Bibliography: p.

1. Handcuffs—Standards. I. Title. II. Title: Metallic handcuffs. III. Title: Law enforcement standards program.

HV7936.E7N38 1974

363.2'34'028

75-1068

# **LAW ENFORCEMENT STANDARDS PROGRAM**

## **NILECJ STANDARD**

# **METALLIC HANDCUFFS**

**A Voluntary National Standard Promulgated by the  
National Institute of Law Enforcement and Criminal Justice.**

**October 1974**

**U.S. DEPARTMENT OF JUSTICE  
Law Enforcement Assistance Administration  
National Institute of Law Enforcement and Criminal Justice**

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ACKNOWLEDGMENTS

This standard was formulated by the Law Enforcement Standards Laboratory of the National Bureau of Standards under the direction of Marshall A. Isler and Lawrence K. Eliason, Managers, Security Systems Program, and Jacob J. Diamond, Chief of LESL.

# NILECJ Standard for Metallic Handcuffs

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## FOREWORD

Following a Congressional mandate<sup>1</sup> to develop new and improved techniques, systems, and equipment to strengthen law enforcement and criminal justice, the National Institute of Law Enforcement and Criminal Justice (NILECJ) has established the Law Enforcement Standards Laboratory (LESL) at the National Bureau of Standards. LESL's function is to conduct research that will assist law enforcement and criminal justice agencies in the selection and procurement of quality equipment.

In response to priorities established by NILECJ, LESL is (1) subjecting existing equipment to laboratory testing and evaluation and (2) conducting research leading to the development of several series of documents, including national voluntary equipment standards, user guidelines, state-of-the-art surveys and other reports.

This document, NILECJ-STD-0307.00, Metallic Handcuffs, is a law enforcement equipment standard developed by LESL and approved and issued by NILECJ. Additional standards as well as other documents will be issued under the LESL program in the areas of protective equipment, communications equipment, security systems, weapons, emergency equipment, investigative aids, vehicles and clothing.

This equipment standard is a technical document consisting of performance and other requirements together with a description of test methods. Equipment which can meet these requirements is of superior quality and is suited to the needs of law enforcement agencies. Purchasing agents can use the test methods described in this standard to determine firsthand whether a particular equipment item meets the requirements of the standard, or they may have the tests conducted on their behalf by a qualified testing laboratory. Law enforcement personnel may also reference this standard in purchase documents and require that any equipment offered for purchase meet its requirements and that this compliance be either guaranteed by the vendor or attested to by an independent testing laboratory.

The necessarily technical nature of this NILECJ standard, and its special focus as a procurement aid, make it of limited use to those who seek general guidance concerning metallic handcuffs. The NILECJ Guideline Series is designed to fill that need. We plan to issue guidelines to this as well as other law enforcement equipment as soon as possible, within the constraints of available funding and the overall NILECJ program.

The guideline documents to be issued are highly readable and tutorial in nature in contrast to the standards, which are highly technical, and intended for laboratory use by technical personnel. The guidelines will provide, in non-technical language, information for purchasing agents and other interested persons concerning the capabilities of equipment currently available. They may then select equipment appropriate to the performance required by their agency. Recommendations for the development of particular guidelines should be sent to us.

NILECJ standards are subjected to continuing review. Technical comments and recommended revisions are invited from all interested parties. Suggestions should be addressed to the Program Manager for Standards, National Institute of Law Enforcement and Criminal Justice, Law Enforcement Assistance Administration, U.S. Department of Justice, Washington, D.C. 20531.

Lester D. Shubin  
Manager, Standards Program  
National Institute of Law  
Enforcement and Criminal Justice

<sup>1</sup> Section 402(b) of the Omnibus Crime Control and Safe Streets Act of 1968, as amended.

# NILECJ Standard for Metallic Handcuffs

## 1. PURPOSE

This standard establishes requirements and methods of test for metallic handcuffs intended to be used to restrict the physical movement of apprehended persons.

## 2. SCOPE

This document addresses double locking metallic handcuffs.

## 3. DEFINITIONS

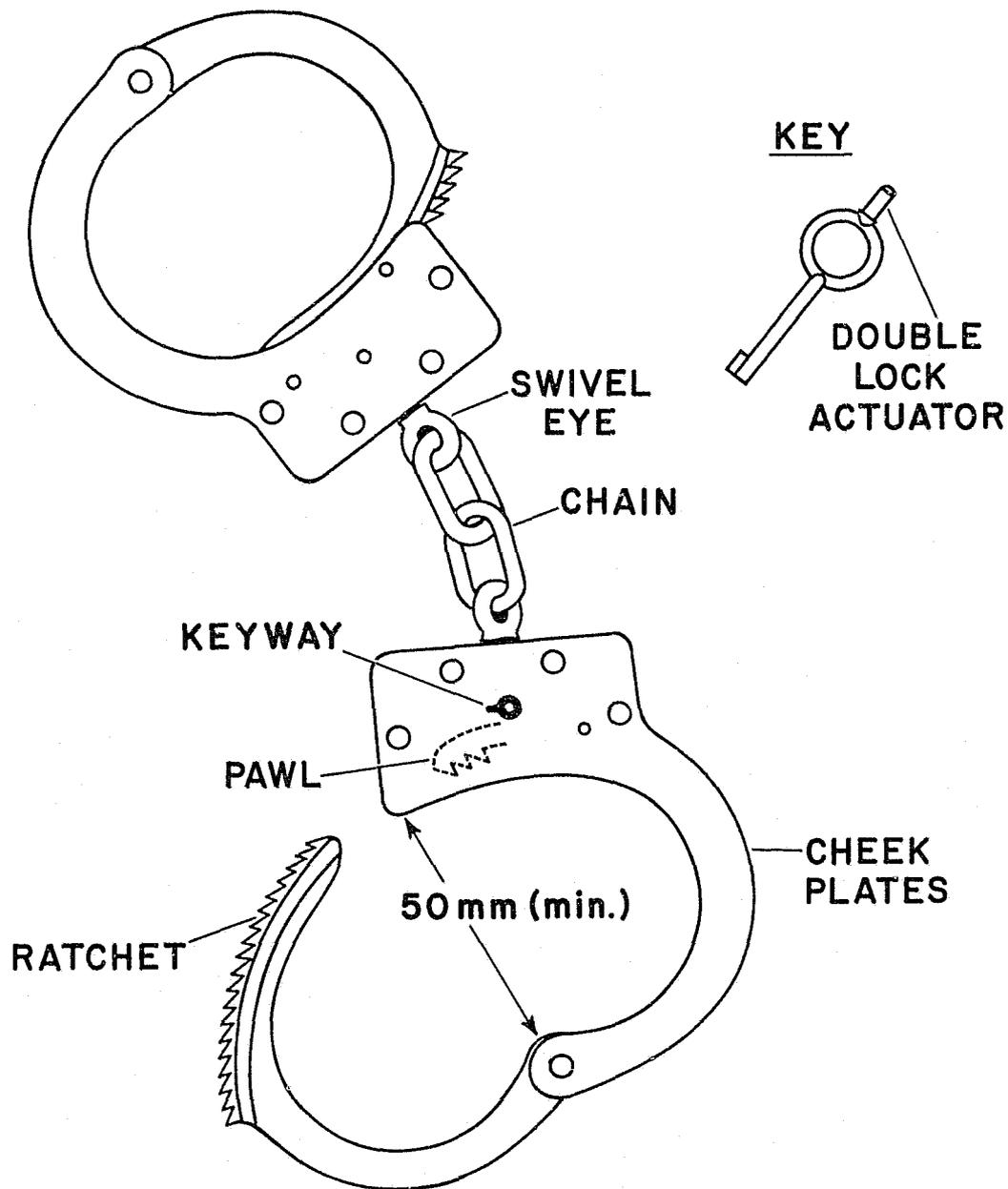
### 3.1 Double Locking Mechanism

A mechanism which locks a handcuff pawl in an engaged position, and prevents it from advancing further in the closing direction.

### 3.2 Handcuff

A ring-shaped shackle for the wrist, usually one of a pair connected by a short chain or linked bar. A typical pair of handcuffs is shown in figure 1.

# Figure 1 HANDCUFFS



### 3.3 Pawl

A spring-loaded, pivoted bar which engages the teeth of a ratchet, permitting it to advance in the closing direction only.

### 3.4 Ratchet

A bar with inclined teeth designed to engage with a pawl. The ratchet is free to advance past the pawl in one direction of motion only.

## 4. REQUIREMENTS

### 4.1 Acceptance Criteria

The handcuffs meet the requirement of this standard if none of the handcuff specimens fail any of the required tests or only one pair of handcuffs fails and the spare pair of handcuffs (see paragraph 5.1) passes all tests.

### 4.2 User Information

The following items of information shall be among those supplied to the user by the manufacturer or distributor:

- a) Operating instructions
- b) Type of finish
- c) Weight
- d) Materials of construction
- e) Certification of compliance with this standard

### 4.3 Marking

All handcuffs shall be permanently and legibly marked as follows:

- a) Manufacturer's name or trademark
- b) Serial number

### 4.4 Workmanship

The handcuffs shall be free from defects as shown in table 1.

### 4.5 Weight

The weight of the pair of handcuffs shall not exceed 425 grams (15.0 oz.).

### 4.6 Dimensions

Each handcuff of each pair shall have a minimum opening of 50 millimeters (2.0 inches) for insertion of the wrist. The inside perimeter of the handcuff shall be a minimum of 200 millimeters (7.9 inches) when the ratchet is engaged at the first notch entering the locking mechanism. The inside perimeter of the handcuff shall be a maximum of 165 millimeters (6.5 inches) when the ratchet is engaged at the last notch entering the locking mechanism. The maximum overall length of the pair of handcuffs shall be 240 millimeters (9.4 inches).

### 4.7 Mechanical Strength

Each pair of handcuffs shall withstand a tensile force of 2200 newtons (495 pounds-force) for a period not less than 30 seconds when tested in accordance with paragraphs 5.6.1 and 5.6.2. The handcuffs shall show no sign of permanent distortion or fracture and shall function in a normal manner following these tests.

### 4.8 Cheek Plate Tamper Resistance

The handcuff cheek plates shall not separate or permanently distort when subjected to a torque of 23.0 newton meters (204 pound-force inches) when tested in accordance with paragraph 5.7. The handcuffs shall function in a normal manner following the test.

### 4.9 Dust Resistance

The handcuffs shall show no evidence of dust interfering with the locking mechanism after being subjected to a dusty atmosphere for one hour in accordance with paragraph 5.8, and shall then function in a normal manner.

#### **4.10 Salt Spray Corrosion Resistance**

The handcuffs shall show no visual evidence of corrosion of the basic metal or the coating after being exposed to a salt spray for 12 hours in accordance with paragraph 5.9, and shall then function in a normal manner.

### **5. TEST METHODS**

#### **5.1 Sampling**

A sample of five handcuff specimens shall be selected at random. Four of these specimens shall be tested for conformance with this standard and one shall be retained as a spare (see paragraph 4.1).

#### **5.2 Test Sequence**

The tests shall be performed in the following sequence:

- a) Inspection
- b) Weight and Dimensional Measurements
- c) Mechanical Loading Tests
- d) Check Plate Test
- e) Dust Test
- f) Salt Spray Test

#### **5.3 Test Equipment**

##### **5.3.1 Tensile Testing Machine**

The tensile testing machine shall be capable of applying and maintaining a force of  $2200 \pm 90$  newtons ( $495 \pm 20$  pounds-force).

##### **5.3.2 Test Fixtures**

The torque bit shall be made from tool steel to the dimensions shown in Figure 2 and shall be heat treated to a Rockwell hardness of 55–60C. The tensile loading fixture shall be made from tool steel to the dimensions shown in figure 3.

# Figure 2 CHEEK PLATE TEST

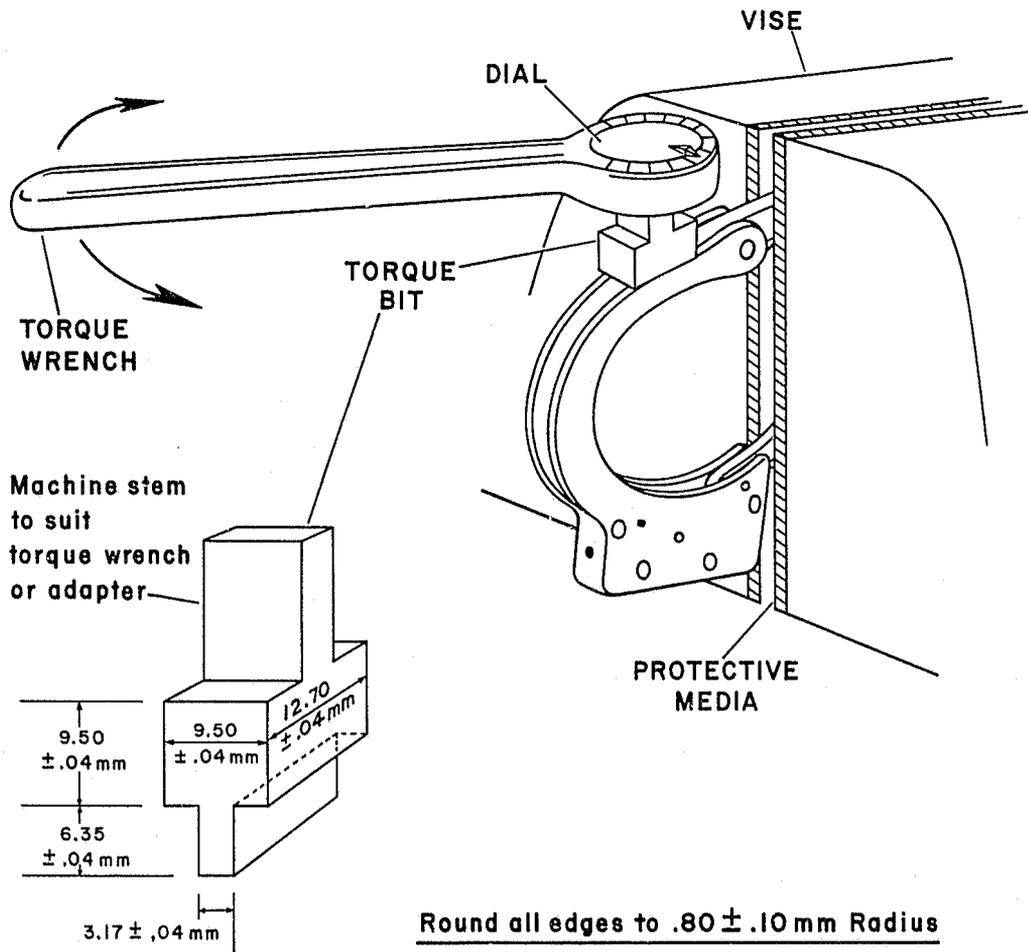
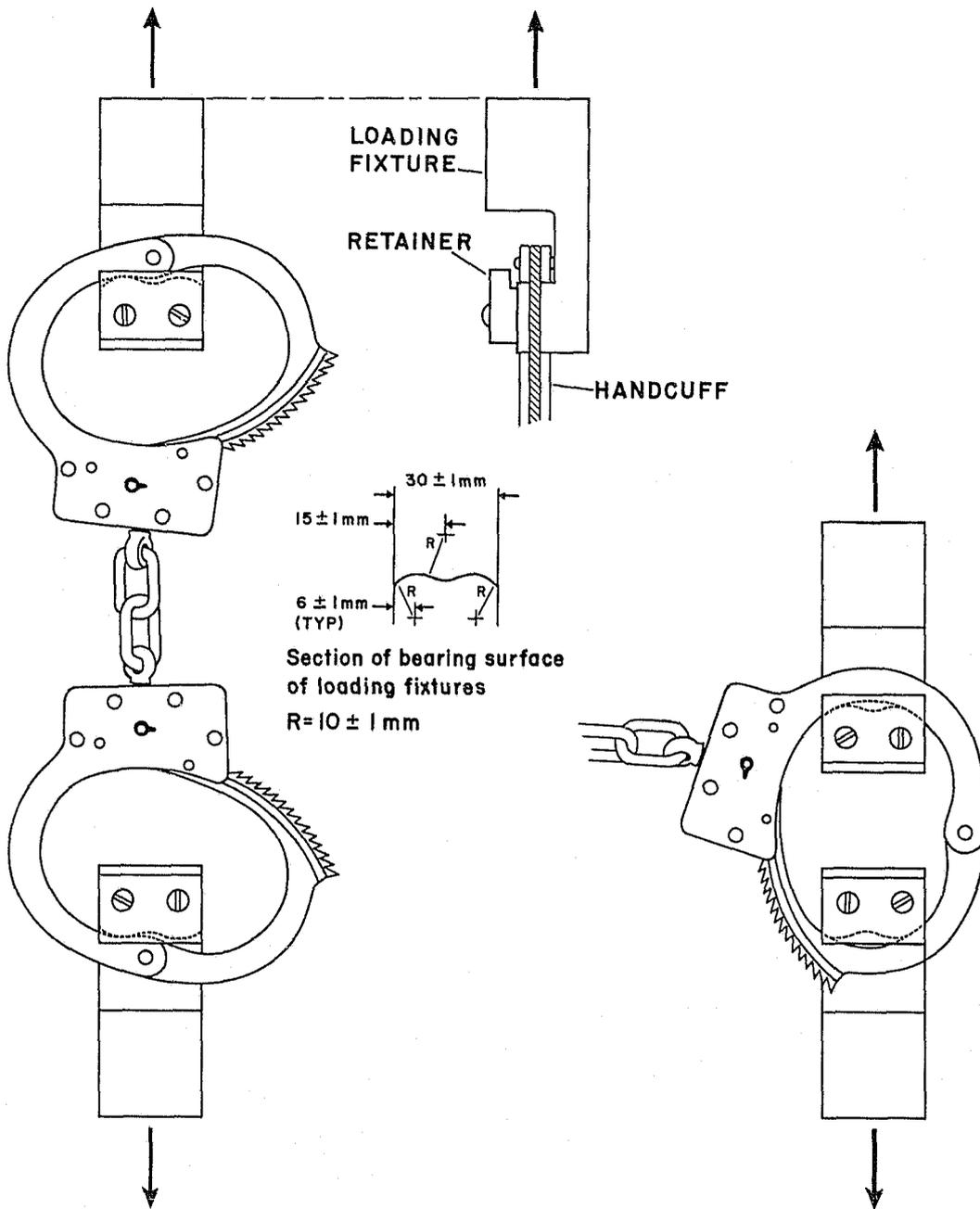


Figure 3  
MECHANICAL LOADING TESTS



### 5.3.3 Dust Chamber

The dust chamber shall meet the requirements of MIL-STD-202E, method 110 [1].

### 5.3.4 Salt Spray Chamber

The salt spray chamber shall meet the requirements of ASTM Standard B 117-73 [2].

## 5.4 Inspection

Inspect the handcuffs for the defects shown in table 1.

**Table 1**  
**Defects in Workmanship**

Finish not as specified.  
Finish scratched, damaged or marred, exposing base metal.  
Foreign matter imbedded in finish.  
Corroded area.  
Finish not smooth, continuous, or adherent; i.e., blistered, peeled or flaked, pitted, excessive build-up of finish, or discolored.  
Any part missing, broken, malformed, loose, or not in proper alignment.  
Rivet or pin insecure or not secured neatly.  
Any burr, sliver, sharp edge, dent, or tool mark.  
Metal split, cracked, or crazed.  
End of pin set below exposed surface of plate.  
Cracked or incomplete welding.  
Marking is missing, illegible, incorrect or not permanent.  
Key cannot unlock handcuff or requires undue force to do so.  
Handcuff cannot be double-locked.  
Handcuff ratchet does not lock automatically with the pawl.  
Any malfunctioning in the opening or closing of the handcuffs; e.g., ratchet binds or does not rotate freely.

## 5.5 Weight and Dimensional Measurements

Measure and weigh each pair of handcuffs to determine compliance with paragraphs 4.5 and 4.6.

## 5.6 Mechanical Loading Tests

### 5.6.1 Handcuffs

Double lock each handcuff with the ratchet engaged at the first notch entering the locking mechanism. Apply a tensile force of 2200 newtons (495 pounds-force) in the direction of the chain (longitudinal), across the handcuffs, using the test fixtures as shown in figure 3. Maintain the tension for 30 seconds and then check the handcuffs for proper operation.

### 5.6.2 Locking Mechanism

Double lock each handcuff with the ratchet engaged at the first notch entering the locking mechanism. Apply a tensile force of 2200 newtons (495 pounds-force) to one of the handcuffs, at right angles to the direction of the chain, using the test fixtures as shown in figure 3. Maintain the tension for 30 seconds and then check the handcuff for proper operation. Repeat the test on the other handcuff of the pair.

### **5.7 Cheek Plate Test**

Clamp the handcuff ratchet, engaged with the pawl in the first notch, in a vise with either plastic or soft metal protection plates. Wear safety goggles for protection. As shown in figure 2, insert a torque bit between the cheek plates adjacent to the pivot pin securing the ratchet to the cheek plates. Alternately apply clockwise and counterclockwise torques of 23.0 newton meters (204 pound-force inches) to the torque bit for a period of 30 seconds in each direction, using a suitable torque wrench. Following the test, examine the cheek plates for distortion or lack of alignment, and check the handcuffs for proper operation.

### **5.8 Dust Test**

Place the handcuffs in a dust chamber and test according to MIL-STD-202E, method 110, test condition B, except that the duration shall be one hour. Following the test, wipe the handcuffs clean and check them for proper operation.

### **5.9 Salt Spray Test**

Subject the handcuffs to salt spray in accordance with ASTM Standard B 117-73. Use a five percent salt solution, a chamber temperature of  $35 \pm 2^\circ\text{C}$  ( $95 \pm 3.6^\circ\text{F}$ ) and an exposure of 12 hours. After the test, inspect the handcuff for any evidence of corrosion or improper operation.

### **References**

1. MIL-STD-202E, April 16, 1973, "Test Methods for Electrical and Electronic Component Parts," Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pa. 19120.
2. ASTM-B117-73, 1973, "Standard Method of Salt Spray (Fog) Testing," American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103.