

# REPORT

## **TEST FACILITY**

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## **CONFIDENTIAL**

## **STUDY TITLE**

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ISO Skin Irritation Study in Rabbits

## **TEST ARTICLE NAME**

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M153 Pressure Sensitive Adhesive

## **TEST ARTICLE IDENTIFICATION**

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2602-97E Lot# 02162021

**NAMSA**

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## Summary

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The test article, M153 Pressure Sensitive Adhesive, was evaluated for primary skin irritation in rabbits. This study was conducted in accordance with the guidelines of ISO 10993-10, Biological evaluation of medical devices - Part 10: Tests for irritation and skin sensitization. Two 25 mm x 25 mm sections of the test article and control article were topically applied to the skin of each of three rabbits and left in place for a minimum of 23 hours and a maximum of 24 hours. The sites were graded for erythema and edema at 1, 24, 48 and 72 hours after removal of the single sample application.

There was no erythema and no edema observed on the skin of the animals treated with the test article. The Primary Irritation Index for the test article was calculated to be 0.0. The response of the test article was categorized as negligible.

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01 Apr 2021  
Date

## 1. Introduction

### 1.1 Purpose

The purpose of this study was to evaluate the test article for the potential to cause skin irritation in the rabbit.

### 1.2 Testing Guidelines

This study was conducted based on the International Organization for Standardization 10993-10, Biological evaluation of medical devices, Part 10: Tests for irritation and skin sensitization.

This test was performed in compliance with the ISO 13485 standard, with the test method accredited to the ISO 17025 standard.

### 1.3 Dates

Test Article Received: February 17, 2021  
Treatment Started: March 24, 2021  
Observations Concluded: March 28, 2021

## 2. Identification of Test and Control Articles

The test article provided by the sponsor was identified and handled as described below:

**Table 1: Test Article**

|                                           |                                                           |
|-------------------------------------------|-----------------------------------------------------------|
| Name:                                     | M153 Pressure Sensitive Adhesive                          |
| Identification:                           | 2602-97E Lot# 02162021                                    |
| Physical Description of the Test Article: | Adhesive between two layers of white release paper liners |
| Storage Conditions:                       | Ambient Temperature                                       |

**Table 2: Control Article**

|                                                         |                                                                                                                             |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Name:                                                   | Four-ply gauze, supplied by the test facility, was cut into 25 mm x 25 mm sections.                                         |
| Strength, Purity, Composition or Other Characteristics: | Purity: FDA Quality System Requirements (QSR) as stipulated in 21 CFR Part 820; Composition: 20% rayon, 80% polyester blend |

## 3. Test System

### 3.1 Test System

Species: Rabbit (*Oryctolagus cuniculus*)  
Breed: New Zealand White  
Source: Robinson Services, Inc.  
Sex: Male  
Body Weight Range: 3.0 kg to 3.3 kg at selection  
Age: Young adult  
Acclimation Period: Minimum 5 days  
Number of Animals: Three  
Identification Method: Ear tag

### 3.2 Justification of Test System

The rabbit (animal) is specified as an appropriate animal model for evaluating potential skin irritants by the current ISO testing standards. The rabbit is widely used for this purpose and relative ranking of irritant scores can be determined.

## 4. Animal Management

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### 4.1 Husbandry, Housing and Environment

Conditions conformed to NAMSA Standard Operating Procedures that are based on the “*Guide for the Care and Use of Laboratory Animals*.” Animals were individually housed in stainless steel or plastic suspended cages identified by a card indicating the lab number, animal number, test code, sex, and date dosed.

The animal housing room temperature and relative humidity were monitored daily. The temperature for the room was set to 61-72°F and the relative humidity was set to 30-70%. There were no significant environmental excursions that adversely affected the health of the animals.

The light cycle was controlled using an automatic timer (12 hours light, 12 hours dark).

### 4.2 Food, Water and Contaminants

A commercially available rabbit feed, Laboratory Rabbit Diet - 5L6N, was provided daily. Potable water was provided *ad libitum* through species appropriate water containers or delivered through an automatic watering system.

No contaminants present in the feed and water impacted the results of this study.

### 4.3 Accreditation

NAMSA is an AAALAC International accredited facility and is registered with the United States Department of Agriculture. Additionally, NAMSA maintains an approved Animal Welfare Assurance on file with the National Institutes of Health, Office for Laboratory Animal Welfare.

### 4.4 Personnel

Associates involved were appropriately qualified and trained.

### 4.5 Veterinary Care

Standard veterinary medical care was provided in this study.

### 4.6 IACUC

The procedures for this study were approved by the NAMSA Institutional Animal Care and Use Committee (IACUC) prior to conduct.

### 4.7 Selection

Only healthy, previously unused, animals free from irritation or other dermatological lesions that could interfere with the test were selected.

## 5. Method

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### 5.1 Test Article Preparation

The test article was an adhesive between two layers of white release paper liners. Per test site a 25 mm x 25 mm section of the test article was prepared. The release liner was removed and excluded prior to testing. The test article was backed with 4-ply gauze and the adhesive side was applied to the skin of the rabbit.

### 5.2 Test Procedure

Prior to treatment, each animal was identified and weighed. Within a 4 to 24 hour period before treatment, each animal was clipped free of fur from the back and both sides of the spinal column to yield a sufficient area for application. On the day of treatment, four sites, two on each side of the back and positioned cranially and caudally, were designated on each animal. The sites were free of blemishes that could interfere with the interpretation of results.

The test article was applied to one cranial site and one caudal site abraded (two sites per animal) by introduction under a 4 ply gauze layer to an area of skin approximately 25 mm x 25 mm square. The patches were covered with a nonreactive tape. The control was similarly applied to the opposite cranial and caudal sites. The trunk of each animal was wrapped with an elastic binder to maintain the test patches in position. Animals were returned to their cages after treatment.

After a minimum of 23 hours and a maximum of 24 hours exposure, the binders, tape, and patches were removed. The perimeter of each site was marked with nontoxic ink. The sites were gently wiped with a gauze sponge dampened with deionized water in an attempt to remove any remaining residue.

#### 5.2.1 Laboratory Observations

1. Animals were observed daily for general health.
2. Body weights were recorded for each animal at pretreatment.
3. Dermal observations for erythema and edema were recorded at 1, 24, 48 and 72 hours after patch removal in accordance with the criteria in Appendix 1.

All times and temperatures reported herein are approximate and are within ranges established by the external standards described in the References section of this report and/or NAMSA standard operating procedures.

## 6. Evaluation and Statistical Analysis

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The Primary Irritation Index of the test was calculated following test completion for each animal. The erythema and edema scores obtained at the 24, 48 and 72 hour intervals were added together and divided by the total number of observations. The 1 hour score was not included in the calculation. This calculation was conducted separately for the test and control article for each animal. The score for the control was subtracted from the score for the test article to obtain the Primary Irritation Score. The Primary Irritation Score for each animal was added together to determine the Combined Primary Irritation Score. The Combined Primary Irritation Score was divided by the number of animals to obtain the Primary Irritation Index. The Primary Irritation Index was characterized based on the definitions outlined in Appendix 1.

## 7. Discussion

The test article site for animal 50568 was unable to be evaluated over the course of the study. Therefore, only 5 out of 6 total sites were evaluated to determine the Primary Irritation Index. Since all evaluated 5 test article sites were "0", the scores for the missing test article site would not have varied significantly to impact the results of the test. Per discussion with the scientific director, an appropriate irritancy potential could be obtained from the evaluated 5 sites. Analysis of the results were modified to account for the missing test article site for animal 50568.

## 8. Results

### 8.1 Clinical Observations

All animals were clinically normal throughout the study.

### 8.2 Dermal Observations

Individual results of dermal scoring are presented in Appendix 2. No irritation was observed on the skin of the animals. No erythema and no edema reactions resulted in an overall evaluation of negligible irritation to the skin of the animals treated with the test article. The Primary Irritation Index of the test article was calculated to be 0.0. The irritation calculations are shown below:

**Table 3: Irritation Calculations**

| Animal Number | Test Score Average | - | Control Score Average | Individual Primary Irritation Score | Combined Primary Irritation Score (CPIS) | Primary Irritation Index (CPIS ÷ 3) | Response Category |
|---------------|--------------------|---|-----------------------|-------------------------------------|------------------------------------------|-------------------------------------|-------------------|
| 50560         | 0.0                | - | 0.0                   | 0.0                                 | 0.0                                      | 0.0                                 | Negligible        |
| 50562         | 0.0                | - | 0.0                   | 0.0                                 |                                          |                                     |                   |
| 50568         | 0.0                | - | 0.0                   | 0.0                                 |                                          |                                     |                   |

## 9. Conclusion

There was no erythema and no edema observed on the skin of the animals treated with the test article. The Primary Irritation Index for the test article was calculated to be 0.0. The response of the test article was categorized as negligible.

Results and conclusions apply only to the test article tested. Any extrapolation of these data to other articles is the sponsor's responsibility.

## 10. Records

All raw data pertaining to this study and a copy of the final report are retained in designated NAMSA archive files in accordance with NAMSA SOPs.

## 11. References

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Code of Federal Regulations (CFR), Title 9, Parts 1-4, Animal Welfare Act.

Code of Federal Regulations (CFR), Title 16, Part 1500, Federal Hazardous Substances Act (FHSA) Regulations (2008).

International Organization for Standardization (ISO) 10993-1, Biological evaluation of medical devices - Part 1: Evaluation and testing within a risk management process (2018).

International Organization for Standardization (ISO) 10993-2, Biological evaluation of medical devices - Part 2: Animal welfare requirements (2006).

International Organization for Standardization (ISO) 10993-10, Biological evaluation of medical devices - Part 10: Tests for irritation and skin sensitization (2010).

International Organization for Standardization (ISO) 10993-12, Biological evaluation of medical devices - Part 12: Sample preparation and reference materials (2012).

International Organization for Standardization (ISO) 13485, Medical devices - Quality management systems - Requirements for regulatory purposes (2016).

International Organization for Standardization (ISO) 17025, General requirements for the competence of testing and calibration laboratories (2017).

National Research Council, *Guide for the Care and Use of Laboratory Animals*, Washington, DC: National Academy Press, 2011.

Office of Laboratory Animal Welfare (OLAW), Public Health Service Policy on Humane Care and Use of Laboratory Animals.

## Appendix 1 - Classification System For Skin Reaction

| Reaction                                                                          | Numerical Grading |
|-----------------------------------------------------------------------------------|-------------------|
| Erythema and Eschar Formation                                                     |                   |
| No erythema                                                                       | 0                 |
| Very slight erythema (barely perceptible)                                         | 1                 |
| Well-defined erythema                                                             | 2                 |
| Moderate erythema                                                                 | 3                 |
| Severe erythema (beet redness) to eschar formation preventing grading of erythema | 4                 |
| Edema Formation                                                                   |                   |
| No edema                                                                          | 0                 |
| Very slight edema (barely perceptible)                                            | 1                 |
| Well-defined edema (edges of area well-defined by definite raising)               | 2                 |
| Moderate edema (raised approximately 1 mm)                                        | 3                 |
| Severe edema (raised more than 1 mm and extending beyond exposure area)           | 4                 |
| Total possible score for irritation                                               | 8                 |

NOTE: Other adverse changes at the skin sites shall be recorded and reported

| Irritation Response Categories in the Rabbit |            |
|----------------------------------------------|------------|
| Response Category                            | Mean Score |
| Negligible                                   | 0.0 to 0.4 |
| Slight                                       | 0.5 to 1.9 |
| Moderate                                     | 2.0 to 4.9 |
| Severe                                       | 5.0 to 8.0 |

## Appendix 2 - Dermal Observations

| Animal Number/<br>Sex | Weight (kg) | Group   | Observation | Interval (hours) |       |      |       |      |       |      |       |
|-----------------------|-------------|---------|-------------|------------------|-------|------|-------|------|-------|------|-------|
|                       |             |         |             | 1                |       | 24   |       | 48   |       | 72   |       |
|                       |             |         |             | Left             | Right | Left | Right | Left | Right | Left | Right |
| 50560<br>Male         | 3.0         | Test    | Erythema    | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                       |             |         | Edema       | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                       |             | Control | Erythema    | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                       |             |         | Edema       | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
| 50562<br>Male         | 3.3         | Test    | Erythema    | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                       |             |         | Edema       | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                       |             | Control | Erythema    | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                       |             |         | Edema       | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
| 50568<br>Male         | 3.3         | Test    | Erythema    | *                | 0     | *    | 0     | *    | 0     | *    | 0     |
|                       |             |         | Edema       | *                | 0     | *    | 0     | *    | 0     | *    | 0     |
|                       |             | Control | Erythema    | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |
|                       |             |         | Edema       | 0                | 0     | 0    | 0     | 0    | 0     | 0    | 0     |

\*See Discussion in Section 7.