



# Zebra Healthcare Wristbands

Improve Care with Positive Patient Identification





Medication errors cause at least one death in the U.S. every day and injure 1.3 million people annually.<sup>3</sup>

## Does the Quality of a Patient's Wristband Really Matter?

Digital technology continues to play an ever-increasing role in today's modern healthcare systems. While 95% of hospitals in the United States have implemented Electronic Health Records or EHR, much work remains.<sup>1</sup> Patient identification errors continue to plague hospitals and are the precipitating factor for 13% of surgical mistakes and 67% of transfusion mix-ups.<sup>2</sup> Nationally, medication errors cause at least one death every day and injure 1.3 million people annually.<sup>3</sup> The cost of lost lives, reduced productivity and malpractice insurance fees are debilitating the healthcare industry.

At the center of every hospital's safety program is the patient wristband, which provides caregivers access to the information they need at every point of care during the patient stay. However, not all wristbands are of equal quality. Some wristbands are not durable enough to withstand the rigors of a busy hospital environment, leading to workarounds and mistakes that, in the end, compromise patient care.

How can you distinguish quality wristbands from their inferior counterparts? The answer is relatively complicated and includes factors ranging from durability, quality and patient comfort to ease of printing, compatibility with existing systems and supplier experience. This paper outlines key considerations decision makers should keep in mind as you make the all-important wristband purchasing decisions.

<sup>1</sup> Office of the National Coordinator of Health IT; <sup>2</sup> Joint Commission International Center for Patient Safety; <sup>3</sup> World Health Organization.



# From Admission to Discharge and Everywhere In Between

Patient wristbands are the foundation for a safer, more efficient process for delivering care. And quality does, in fact, matter. High-quality patient wristbands are specifically designed for the rigors of the healthcare environment and able to withstand repeated handling by clinicians in the course of care and treatment without fading, smudging or smearing.

Wristbands must be durable enough to last throughout the patient stay. They must be tough enough to hold up under constant exposure to water and hand sanitizers yet gentle enough to protect sensitive skin from injury. They must be the right size and type for the patient and comfortable to wear. Above all else, wristbands must be clearly readable and scannable for all patient interactions 100% of the time.

## THE HIGH COST OF WRISTBAND FAILURE

High-quality patient wristbands enable hospital staff to provide the “five rights” at the bedside – right patient, right medication, right dose, right time and right method of administration. When patient identification errors occur, serious issues can result.

### THIRD LEADING CAUSE OF DEATH

Behind heart disease and cancer with more than **250,000 fatalities annually**<sup>4</sup>



**MEDICAL ERRORS**

### ANNUAL COST

**\$17 billion to \$29 billion**<sup>5</sup>



### MEDICATION ADMINISTRATION

**30%** of drug administration errors are committed during medication administration<sup>6</sup>



### TESTS & PROCEDURES

**22%** of patient misidentification errors occur during procedures and tests<sup>7</sup>



### BLOOD TRANSFUSIONS

**21 million** blood components are transfused annually in the U.S., and at least one error occurs in every 12,000 transfusions<sup>8</sup>



### SPECIMEN COLLECTION

Misidentified specimens cost an average of **\$712** each not including delays in diagnosis and treatment<sup>9</sup>

# Key Considerations: What You Need to Know

Quality care begins with quality wristbands. Selecting the right patient wristbands for a healthcare facility is critical to improving patient safety, reducing errors and increasing productivity. When one considers the high cost of failure, it is clear why it is essential to ask the right questions about a potential supplier's products and processes.

## DURABILITY



**How durable is the product?** It is vital for a patient wristband to remain readable and scannable for every encounter with hospital staff throughout every patient stay – whether that stay is two days or two weeks. Designed to function for at least 14 days – and in many cases lasting much longer – Zebra wristbands enable immediate access to critical patient information at the bedside and across all hospital departments throughout the patient journey. Z-Band wristbands feature a coating that is precisely applied during the manufacturing process to provide additional resistance to exposure to water and hand sanitizers. LaserBand wristbands feature a self-laminating seal that locks out moisture and hand sanitizers.

## QUALITY



**Are quality materials used that protect patient safety?** The material used in the manufacturing of a patient wristband is a significant factor in determining a product's quality. Zebra Z-Band wristbands are made of polypropylene. The direct thermal imaging chemistry is composed primarily of leuco dyes and developers. The inks and varnishes used are UV varnishes and water-based inks. There is no metal content in or on these bands, so they are safe to use for magnetic resonance imaging.

## COMFORT



**Is there a selection of sizes and levels of comfort?** Patient comfort is of paramount importance. Zebra offers a host of wristbands that provide improved patient comfort over standard wristbands, including a host of soft infant solutions. The Z-Band UltraSoft wristband is the softest wristband available in the industry, providing patient comfort without sacrificing quality. Our LaserBand wristbands are made from materials that conform to the patient's wrist from body heat.

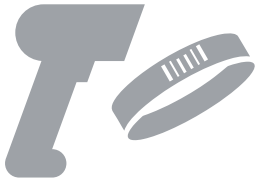
## TESTING



**What kind of testing has the wristband supplier completed to validate product quality and reliability?** Ensuring that a patient wristband can maintain its scannability throughout every patient stay is a crucial concern for all hospitals. Suppliers should provide clear documentation about testing methods and results. At Zebra, patient identification wristbands undergo severe stress testing where resistance to a wide range of substances, including isopropyl and rubbing alcohol, water, and hand sanitizers are measured. Results are impressive and reveal that when subjected to Purell Waterless hand sanitizer, the Z-Band Direct can endure 740 cycles before becoming unreadable.



## EASE OF SCANNING



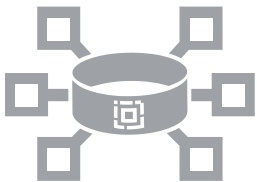
To prevent nurse workarounds and improve the patient experience, choosing a solution that is easy to scan is important. Zebra's LaserBand2 wristbands, feature a special shape so they do not twist on the patient's wrist and lay flat. A best practice for thermal wristbands are to repeat 2-D barcodes around the entire band. This makes the wristband easier for nurses to scan as it reduces the instances of having to awaken patients unnecessarily to adjust the band for scanning.

## PRINTING



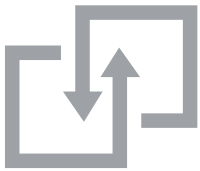
**Are the wristbands easy to print?** Frequent paper jams and other printing issues can delay critical procedures and treatments and impact efficiency. The Zebra LaserBand is made with lay-flat and anti-wicking materials that are resistant to temperature and humidity changes, reducing feeding issues and jamming.

## PORTFOLIO



**Does the vendor offer a broad product portfolio?** Because different hospital departments have different patient identification needs and may want to implement laser in some areas and thermal in others, it's imperative that the supplier supports a variety of applications. Zebra's broad product portfolio includes solutions for neonatal, maternity and outpatient services while supporting the need to identify special patient conditions.

## COMPATIBILITY



**Are the vendor's wristbands compatible with existing systems and technology?** A patient wristband solution should easily integrate with a hospital's existing information systems to simplify deployment and ongoing system management. Zebra positive patient identification systems offer live printing with leading EMR companies that include Epic, Cerner, Meditech and McKesson.

## INNOVATION



**Does the vendor have a commitment to ongoing innovation?** Today's busy healthcare environments face constant changes in requirements and regulations, technologies and materials. Over the two decades that Zebra has produced wristbands, we have listened intently to customer feedback. We've introduced new products and made multiple improvements to the durability and comfort of our bands. We continually monitor all potential exposures and usage conditions to ensure that our products can withstand changing conditions.

## CASE STUDY



At Morristown Memorial Hospital in New Jersey, Zebra patient wristbands are enabling dramatic improvements in patient safety. Patient identification barcodes ensure that the right medication is delivered at the right time in the right dosages. Even after 10 days of showering, washing, and contact with alcohol and other common substances used at the patient's bedside, the wristbands are still scannable. Today, Zebra wristbands are an essential component of the hospital's patient safety initiatives.

# Selecting a Patient Wristband Solution You Can Rely On

For decades, Zebra has been recognized as a leader in enabling safe and accurate care with our patient identity management solutions. Throughout the patient journey, Zebra wristbands help healthcare staff access and confirm essential patient information. In 2017, more than 215 million patients in the U.S. and nearly two billion globally were identified with a Zebra Z-Band or LaserBand wristband. And 14 of the top 20 hospitals on the U.S. News 2017-18 Best Hospitals Honor Roll use Zebra wristbands.

## ZEBRA LASERBAND



Since the launch of LaserBand Original, the industry's first direct-print laser wristband, LaserBand has made it easier for healthcare professionals to position the band flat on the patient's wrist for quick scanning and superior comfort for patients. And because patient chart labels and wristbands can be printed simultaneously on a single sheet, they streamline patient admissions. Their self-laminating seal protects the wristband from moisture and hand sanitizers, preserving patient data for more extended wristband usability.

## Z-BAND THERMAL WRISTBAND



One of the most durable thermal wristbands, Zebra Z-Band wristbands can withstand continuous contact with hand sanitizers ensuring high levels of scannability that reduce the need for nurse workarounds. In fact, they are scannable for up to 14 days. Staff can quickly and easily print and securely fasten wristbands, using an adhesive tab or color clip, in less than a minute. Z-Band UltraSoft wristbands are the softest wristbands available today. A patented silver antimicrobial coating protects the wristband from fading.

## ZD510-HC Z-Band Wristbands

Zebra's ZD510-HC allows you to print patient information and barcodes directly on Z-Band direct thermal wristbands.

In addition, Zebra's Z-Band direct thermal wristbands:





- Features a silver antimicrobial coating that protects the wristband
- Enable staff to quickly and easily print and securely fasten in less than a minute using an adhesive tab or color clip
- Zebra's Z-Band wristbands are made of polypropylene. The direct thermal imaging chemistry is composed primarily of leuco dyes and developers. The inks/varnishes used are UV varnishes and water based inks. There is no metal content in or on these particular patient identification bands. Therefore, Z-Band wristbands are considered to be MR-Safe
- Latex-free






A barcode that fails to scan or requires repeated attempts to scan jeopardizes patient safety and staff productivity. Zebra's supplies research and development team tested the image durability of Z-Band direct thermal wristbands to ensure optimum image durability and scanning performance.

Zebra Z-Band wristbands are up to six times more durable against a common hand sanitizer than the leading competitor. For more details on the durability testing performed, please download our white paper on [www.zebra.com/wristbands](http://www.zebra.com/wristbands) titled "Putting Wristband Durability to the Test".



# Zebra Z-Band wristbands are available with adhesive or clip closure, in a variety of sizes and colors to meet your organization's needs.

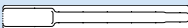
Z-Band UltraSoft	Part Number	Size	
<ul style="list-style-type: none"> <li>• One of the softest direct thermal wristband in the market</li> <li>• Adhesive closure</li> <li>• Resistance to hand sanitizers such as Purell®</li> </ul>	<b>Adult</b>		
	10015355K (White)	1" x 11"	
	10015355-2K (Blue)	25mm x	
	10015355-3K (Green)	275mm	
	10015355-5K (Pink)		
	10015356K (White)	0.75" x 11" / 16mm x 279mm	
	10019259-1K (Green)	<i>Made to order</i>	
	<b>Pediatric</b>		
	10015357K	1" x 7" / 25mm x 178mm	
	10019260-1K (Pink)	<i>Made to order</i>	
<b>Infant</b>			
10015358K	1" x 6" / 25mm x 152mm		



Z-Band Direct	Part Number	Size	
<ul style="list-style-type: none"> <li>• Classic wristband</li> <li>• Adhesive closure</li> <li>• Resistance to hand sanitizers such as Purell®</li> </ul>	<b>Adult</b>		
	10006995K (White), 10006995-1K (Red), 10006995-2K (Blue), 10006995-3K (Green), 10006995-4K (Purple), 10006995-5K (Pink), 10006995-6K (Orange), 10006995-7K (Yellow)	1" x 11" 25mm x 279mm	
	10006997K	0.75" x 11" / 19mm x 279mm	
	10006996K	.1875" x 11" / 30mm x 279mm	
	<b>Pediatric</b>		
	10006999K	1" x 7" / 25mm x 178mm	
	<b>Infant</b>		
	10006998K	1" x 6" / 25mm x 152mm	



**ZEBRA HEALTHCARE WRISTBANDS**

IMPROVE CARE WITH POSITIVE PATIENT IDENTIFICATION

Soft Infant Z-Band Direct	Part Number	Size
<ul style="list-style-type: none"> <li>• Adhesive closure</li> <li>• Soft nylon backing is perfect for delicate skin</li> <li>• Adjustable band fits the smallest patients</li> <li>• Flat print area ensures ease of scanning</li> </ul>	10031289K	1" x 7.9375" / 25 mm x 202 mm 

Z-Band QuickClip	Part Number	Size
<ul style="list-style-type: none"> <li>• Clip closure</li> <li>• Color clips available in red, yellow, purple, green, pink and blue</li> </ul>	<b>Adult</b>	
	10027730K	1.1875" x 11" / 30mm x 279mm 
	<b>Pediatric</b>	
	10027729K	1" x 7" / 25mm x 178mm 





**ZEBRA HEALTHCARE WRISTBANDS**

IMPROVE CARE WITH POSITIVE PATIENT IDENTIFICATION

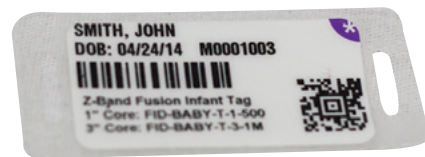
**Zebra's Z-Band Direct Soft Infant wristbands feature:**

- Soft nylon material that is perfect for delicate skin
- Adjustable design that fits the smallest patients
- Flat surface print area to ensure ease of scanning
- 2" x 0.75" / 51 mm x 19 mm print area and a 0.4375" x 5.5" / 11 mm x 140 mm band
- Patented antimicrobial coating that protects the wristband
- Pressure sensitive, adhesive tab closure for quick and easy securement







**Zebra Fusion ID Tags**

Zebra's Z-Band Fusion ID Tags feature a self-laminating design that protects the image, making them perfect for use in the NICU where the average infant stay exceeds 14 days. They can be used in conjunction with the ComfyCuff® foam wristband, SwaddleBand and Vinyl Infant wristbands.



**Soft Infant Wristband Accessories**

Zebra's ComfyCuff family of wristband accessories when paired with Z-Band Direct Soft Infant wristbands, offers clinicians a way to identify infants without having to unwrap them.

<p><b>ComfyCuff</b></p>  <p>This soft, foam cuff features an adjustable Velcro® closure ensuring infant comfort. It can be used in conjunction with Z-Band Fusion ID tags.</p> <p>5" x 1.25" / 127 mm x 32 mm</p> <p>Latex Free</p> <p>Part Number: LB2-BABY-P</p>	<p><b>ComfyCuff Security Seal</b></p>  <p>Label securely sticks to the ComfyCuff and tears away to indicate tampering.</p> <p>2.875" x 0.4375" / 73 mm x 11 mm</p> <p>Latex-free</p> <p>Part Number: LB2-BABY-CCS</p>
<p><b>ComfyCuff Infant Swaddle Band</b></p>  <p>Tyvek® band creates an extension between the ComfyCuff and Z-Band Direct Soft Infant Wristband or Z-Band Fusion ID Tag to make identification of swaddled babies quick and easy.</p> <p>9" / 229 mm long</p> <p>Latex Free</p> <p>Part Number: LB2-BABY-SWB9</p>	<p><b>Vinyl Infant Wristbands</b></p>  <p>These latex-free, soft, flexible vinyl wristbands are for use with Z-Band Fusion infant ID tags. The narrow width allows some models of "Abduction Prevention Systems" to be attached. They are available in clip or self-locking closure. The self-locking closure wristband enables size adjustment with a gentle tug as the infant loses mass around the wrists and ankles within the first 24 hours of birth.</p> <p>Clip-Closure Part Number: PS-BABY;</p> <p>Self-Locking Closure Part Number: PS- INFANT-ADJ</p>

Specifications subject to change without notice.



# LaserBand2 Advanced Wristbands

WE COVER PATIENT IDENTIFICATION  
LIKE NOBODY ELSE CAN



## How LaserBand is Different

Most wristband products address merely a couple of patient identification needs at a time, such as patient comfort or improved workflow.

The Zebra® self-laminating LaserBand2® Advanced direct print laser wristbands feature an advanced shape and design that makes assembly easy and allows the wristband to lie flat on the wrist to enable quick scanning, while providing superior patient comfort.

### SOME OF THE BENEFITS OF LASERBAND2 WRISTBANDS

#### Patient Safety

Our patented self-laminating seal protects the wristband from moisture and hand-sanitiser products, preserving patient data and giving longer wristband usability.

#### Patient Comfort

Unique self-adhesive designs contour to the patient's wrist for increased comfort while the inclusion of wristband extenders and the range of wristband sizes provide comfort for patients of every size. Use of our unique ID Tags with ComfyCuff® padded cuffs means baby can be identified without disturbance.

#### Improved Workflow

Simultaneous printing of patient wristband and chart labels on one sheet using your existing laser printers allows quicker printing of information, streamlining patient admissions.

#### Cost-Efficiency

Quick deployment of a bar-coded wristband solution without the need for a separate printer for wristbands; adhesive-free zones prevent printer jams and reduce costly printer maintenance; wristband / label combination products use fewer resources.



## FEATURES AT A GLANCE

- Self-laminating design protects printed text and barcodes
- Tamper-evident, adhesive closure
- Wristband extender to fit a wide range of wrist sizes
- Unique ID Tags & ComfyCuff padded cuffs for babies
- Adult, paediatric and infant sizes, and formats specifically designed for maternity and neonates
- Durable enough to remain legible throughout the patient journey
- Latex free



## LaserBand2 Advanced Wristbands are available in a wide range of sizes and formats to fit the patient identification needs of virtually all hospitals.



### Adult Wristbands

LaserBand® adult wristbands are available with 1 wristband and 20 chart labels per A4 sheet, enabling hospitals to streamline the admissions process.

All LaserBand sheets include an extender bar offering greater flexibility to identify bariatric or oedema patients.

Part Number: LB2-ADULT-L3E  
LB2-ADULT-L3E-RED



### Paediatric Wristbands

LaserBand paediatric wristbands are available with 1 wristband and 20 chart labels per A4 sheet, enabling hospitals to streamline the admissions process.

Paediatric departments typically treat a wide age group of patients from toddlers to teenagers. LaserBand paediatric products offer wristbands with a wide size range designed specifically to meet these requirements.

Part Number: LB2-PED-L3E  
LB2-PED-L3E-RED



### Infant Wristbands

LaserBand infant wristbands have 2 wristbands, 2 ID tags and 12 chart labels per A4 sheet. New-born babies would typically have 2 identity bands. The LaserBand infant product enables nurses to apply 1 wristband to each wrist and an ID tag to each ankle using ComfyCuff padded cuffs, or a combination of both.

The above wristbands are available in A4 sheet format, containing chart labels and also in wristband-only sheet format where labels are not required. Both options are available in white or red. Red wristbands are typically used as a visual alert to nursing staff where a patient has a specific medical condition.

Part Number: LB2-BABY-L3E  
LB2-BABY-L3E-RED



### Paediatric Wristbands

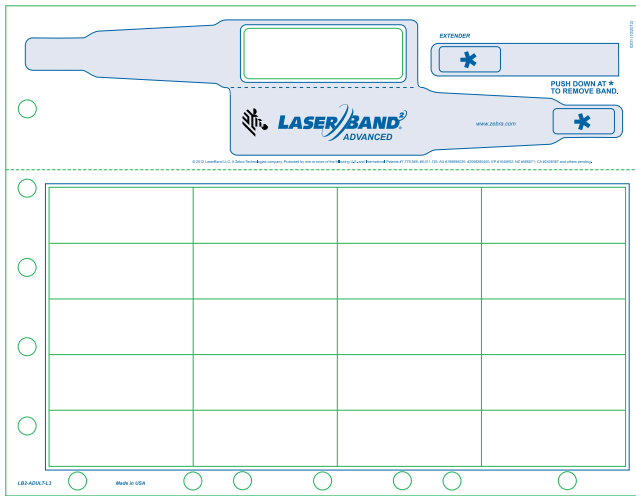
The 'Family' LaserBand solution is available for use in the maternity department. This product includes 2 infant wristbands, 2 ID tags and 2 adult wristbands on the same sheet for simultaneous printing, enabling the parents to be identified together with their new-born baby.

The ComfyCuff is a non-printable, complementary product for use with the infant wristbands and ID tags. This product is suitable for use with new-born babies and neonates who have the most sensitive skin.

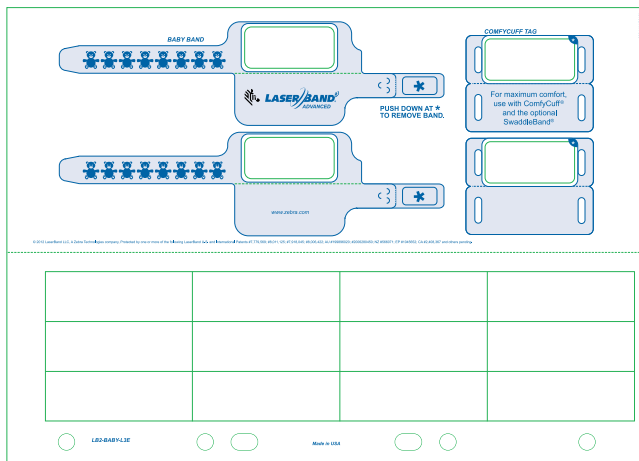
The ComfyCuff is also available in a larger size, for identification of elderly patients with delicate skin.

Part Number: LB2-L3-FAMILY (US Letter Format)

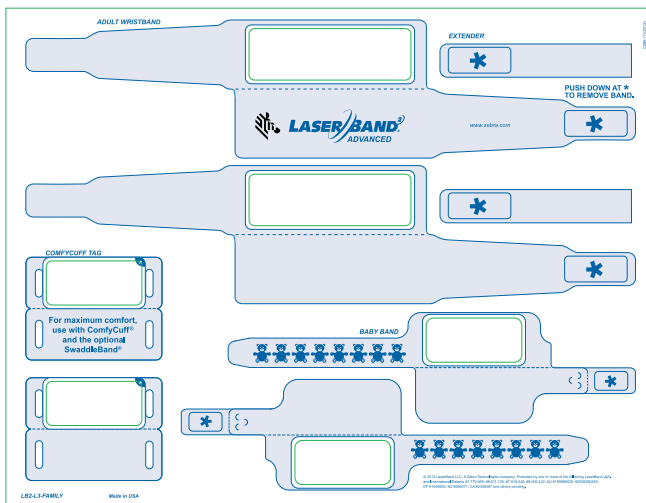
### ADULT WRISTBAND



### INFANT WRISTBANDS



### MATERNITY SOLUTIONS (FAMILY WRISTBANDS)



6x

Z-Band Direct wristbands are 6 times more durable against Purell Waterless Hand Sanitizer than the leading competitor.

## Putting Wristband Durability to the Test

Z-BAND® DIRECT AND ULTRASOFT WRISTBANDS EMERGE AS CLEAR WINNERS

Automated patient identification is essential to protecting the well-being of patients and the integrity of the healthcare system. Wristbands are a vital part of this process. They must be durable enough to withstand the rigors of the busy hospital environment as well as repeated exposure to hand sanitizers that can degrade readability. Unfortunately, not all wristbands are of equal quality.

At Zebra, patient identification wristbands undergo severe stress testing where resistance to a wide range of substances, including isopropyl and rubbing alcohol, water and hand sanitizers are measured. In addition, our wristbands are tested by an independent laboratory to measure quality and resistance to hand sanitizers against competitive offerings.

This document details the results of an independent laboratory durability testing completed on Zebra's Z-Band Direct and Z-Band UltraSoft wristbands and a leading competitor's wristband. The tests reveal that Zebra® Z-Band Direct and Z-Band UltraSoft wristbands are more durable and consistently outperform the leading competitor under repeated exposure to a wide range of hand sanitizers.



# Cycles to Failure

	Z-Band Direct	Z-Band UltraSoft	Leading Competitor
<b>3M Avagard</b>	70 Cycles	60 Cycles	20 Cycles
<b>Ecolab SkinMan</b>	270 Cycles	80 Cycles	40 Cycles
<b>Purell Waterless</b>	120 Cycles	100 Cycles	20 Cycles

3M Avagard  
(after 20 cycles)

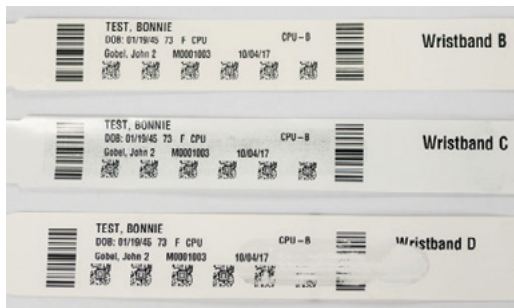


Z-Band Direct

Z-Band UltraSoft

Competitor

Ecolab SkinMan  
(after 40 cycles)



Z-Band Direct

Z-Band UltraSoft

Competitor

Purell Waterless  
(after 20 cycles)



Z-Band Direct

Z-Band UltraSoft

Competitor

# 100%

ARDL tests prove that when it comes to interaction with hand sanitizers, Z-Band wristbands are more than 100% more durable than the leading competitor's wristbands.

### Z-BAND DIRECT WRISTBANDS

Zebra's latex-free and MR-safe Z-Band Direct thermal polypropylene wristbands are scannable up to 14 days even with the excessive application of hand sanitizer. Independent testing demonstrated that Z-Band Direct wristbands are significantly more durable when compared to a leading competitor:

- **3.5 times** more durable against 3M Avagard
- **6.75 times** more durable against Ecolab SkinMan
- **6 times** more durable against Purell Waterless hand sanitizers

### Z-BAND ULTRASOFT WRISTBANDS

Zebra's UltraSoft thermal synthetic wristbands are MR-Safe and latex-free. Independent testing demonstrated that Z-Band UltraSoft wristbands are significantly more durable when compared to a leading competitor:

- **3 times** more durable against 3M Avagard
- **2 times** more durable against Ecolab SkinMan
- **5 times** more durable against Purell Waterless hand sanitizers



### About the Tests

Zebra Technologies commissioned Akron Rubber Development Laboratory (ARDL) to conduct durability testing for the Z-Band Direct, Z-Band UltraSoft and a leading competitor's wristbands. ARDL is an A2LA ISO 17025 accredited, ISO 9001:2008 registered FDA compliant independent testing laboratory. ARDL conducted blind testing of four sets of four wristbands, identified as A, B, C and D, against contact with the following hand sanitizers: Purell Waterless, 3M Avagard and Ecolab SkinMan. The tests were designed to measure the number of rubs the wristbands could endure before failing to scan.

### Equipment

**Printers.** The Zebra wristbands were printed using the Zebra HC100 printer at a print speed of 2 inches per second (IPS) and level 22-darkness setting. The competitor's wristbands were printed on the Zebra 110Xi4 at 2 IPS with a 22-darkness setting.

**Crockmeter.** A mechanically driven SDL Atlas Electronic CM-5 AATCC Crockmeter with a 16mm diameter acrylic finger was employed to measure the colorfastness of the wristband.

**Scanner.** The Zebra DS6707-HC handheld digital imager scanner was used to scan each of the wristbands during testing.

### Procedure

A cloth was soaked for a period of five minutes in hand sanitizer and then placed on the crockmeter with the wristband for testing. At the end of every 10 cycles, the ARDL technician stopped the crockmeter, scanned the barcode on the wristband and recorded the number of cycles until the barcode on the wristband could no longer be scanned.

### Results

ARDL conclusively found that both the Z-Band Direct and Z-Band UltraSoft wristbands were more durable than the leading competitor's wristbands. Testing results revealed that when subjected to Purell Waterless Hand Sanitizer, the Z-Band Direct can endure 120 cycles before becoming unreadable, while Z-Band UltraSoft can withstand 100 cycles. This was in contrast to the competitor's wristbands, which could only handle 20 cycles before becoming unscannable.





## Quality Matters

Zebra is committed to providing hospitals with wristbands that meet our high standards for image durability, scannability, and comfort. The Z-Band Direct and Z-Band UltraSoft wristbands are available in adult, pediatric, and infant sizes.

Zebra Technologies is a world leader in barcode, RFID, and ID card printing technologies, including systems installed at healthcare facilities for unit-of-use labeling, prescription label printing, patient wristband printing, materials management, security, and employee identification. Together with its partners, Zebra has the experience, industry knowledge, and specialized products needed for successful hospital implementations. Zebra is also a leader in standards development and actively participates in the work of life sciences industry associations to meet the emerging needs of its customers.



## Laboratory Testing: Zebra's Z-Band Direct Thermal Antimicrobial Wristbands

This document details the laboratory testing completed on Zebra® Z-Band® direct thermal antimicrobial-coated wristbands. Independent laboratories and the Zebra Technologies Supplies research and development team tested the wristbands to ensure they meet Zebra's high standards for image durability, scannability and comfort.

### THE TESTS EVALUATED THE FOLLOWING:

- **Durability**
- **Potential to cause skin irritation**

Since barcoded wristbands provide a convenient way to comply with The Joint Commission's National Patient Safety Goal to "improve the accuracy of patient identification," it is important for wristbands to be readable and scannable during the patient's stay. As you will see, Zebra's Z-Band wristbands were shown to be readable on the first scan. They also proved to be non-irritating. In addition, they do not appear to present an additional hazard or risk to a patient undergoing an MRI procedure.

### THE FOLLOWING FACILITIES CONDUCTED THE TESTING:

- **Image Durability and Peel Adhesion**  
Zebra's Supplies R&D Laboratory — Testing Completed: December, 2006
- **Tensile Strength**  
Zebra's Supplies research and development team utilized Northwestern University's Central Facilities supported by the MRSEC program of the National Science Foundation (DMR-0520513)
- **Skin Irritability**  
Toxikon Corporation, 15 Wiggins Ave. Bedford, MA 01730 — Report Date: May, 2006

The next section details the tests' procedures and results.

## Durability Testing

Optimum scanning performance and image durability are important, especially regarding the narrow 5 mil 128 Subset C barcodes that are printed on today's hospital wristbands. A barcode that fails to scan, or requires repeated attempts to scan, can both jeopardize patient safety and staff productivity. Zebra's Supplies research and development team tested the image durability of Z-Band direct thermal wristbands to insure optimum image durability and scanning performance. The image durability of a 5 mil narrow-bar 16 digit Code 128 C barcode printed on a Z-Band wristband at Zebra's recommended darkness and print speed settings was measured by scanning with a MS1690 Focus Area Imaging Barcode Scanner after exposure to solvents, abrasion and water. For each test performed, a "Pass" or "Fail" designation was noted. Following are definitions of the designations:

- **Pass** = Immediate scan of barcode without repeated attempts
- **Fail** = Failure of barcode to scan or required repeated attempts to scan

## Solvents

The following solvents were tested using an AAT CC Crockmeter, using a crocking cloth and a Crockmeter heavy arm:

### 91% ISOPROPYL ALCOHOL

50X rubs with a soaked cloth on a 5 mil narrow-bar 16-digit Code 128 C barcode.

[All Zebra Wristbands: Pass](#)

### 70% ETHYL RUBBING ALCOHOL

50X rubs with a soaked cloth on a 5 mil narrow-bar 16-digit Code 128 C barcode.

[All Zebra Wristbands: Pass](#)

### BETADINE

100X rubs with a soaked cloth on a 5 mil narrow-bar 16-digit Code 128 C barcode.

[All Zebra Wristbands: Pass](#)

### HAND SANITIZERS

Nickel-sized amount of the following hand sanitizers were placed on a 5 mil narrow-bar 16-digit Code 128 C barcode for 10 minutes and wiped off.

- Original Purell® Gel
- Purell Skin Nourishing Foam
- Purell Green Certified Foam

[All Zebra Wristbands: Pass](#)

### ABRASION

An abrasion test was conducted using an AAT CC Crockmeter, using a crocking cloth and a Crockmeter heavy arm. 1000X rubs with a dry crocking cloth on a 5 mil narrow-bar 16-digit Code 128 C barcode.

[All Zebra Wristbands: Pass](#)

### WATER RESISTANCE

The water resistance was tested using a Cimarec Stirring Hot Plate. The 5 mil narrow-bar 16-digit Code 128 C barcode was immersed in 105° F/40° C water, at stir setting 3.

[All Zebra Wristbands: Pass. Up to 6 hours.](#)

### TENSILE STRENGTH

The tensile strength was tested using a MTS Sintech 20/G Materials Testing Workstation, at a speed of 1 inch/minute. This test simulates pulling the wristband off a wrist.

[All Zebra Wristbands: Withstand up to 45 pounds of force.](#)

### PEEL ADHESION

The peel adhesion was tested using an IMASS SP-2000 Slip/Peel Tester at a speed of 12 inches per minute and a peel angle of 180 degrees. This test simulates peeling the wristband apart at the adhesive tab.

[All Zebra Wristbands: Withstand up to 55 ounces of force.](#)

## Skin Irritation Testing

Zebra's Z-Band wristbands were tested for the potential to produce a primary dermal irritation after a single exposure to the skin. Z-Band wristbands were tested to FDA 21CFR, Part 58, referencing:

- ISO 10993-10, 2002, Biological Evaluation of Medical Devices—Part 10: Tests for Irritation and Delayed-Type Hypersensitivity
- ISO 10993-12, 2002, Biological Evaluation of Medical Devices—Part 12: Sample Preparation and Reference Materials
- ISO/IEC 17025, 2005, General Requirements for the Competence of Testing and Calibration Laboratories

The test articles received a topical 4-hour application of the USP 0.9% Sodium Chloride for Injection (NaCl) and Cottonseed Oil (CSO) extracts of the Z-Band materials. After 72 hours, there were no signs of erythema or edema. Therefore, Z-Band wristbands are not likely to cause dermal irritation and are considered a negligible irritant, according to Toxikon Corporation.

## Conclusion

Zebra is committed to providing hospitals with wristbands that meet our high standards for image durability, scannability and comfort. Zebra's Z-Band direct thermal wristbands:

- Are scannable after repeated exposure to water and common solvents found in hospitals, as well as abrasion.
- Show no signs of erythema or edema when testing for primary skin irritations.

Zebra Technologies is a world leader in barcode, RFID, and ID card printing technologies, including systems installed at healthcare facilities for unit-of-use labeling, prescription label printing, patient wristband printing, materials management, security, and employee identification. Together with its partners, Zebra has the experience, industry knowledge, and specialized products needed for successful hospital implementations. Zebra is also a leader in standards development that actively participates in the work of life sciences industry associations so that it will be prepared to meet the emerging needs of its customers.



# ABOUT ZEBRA HEALTHCARE SUPPLIES

Zebra Offers The Latest in Healthcare Technology to Help You Provide Better Care

Connecting the right patient to the right care, at the right time is critically important. Zebra healthcare technology solutions connect medical providers to patient records, caregivers to colleagues and patients to practitioners for better care and better outcomes.

We offer a full suite of technologies designed for healthcare — including wristband and label printers, scanners, mobile computers and software that provide visibility and create efficiencies throughout the care environment. Zebra is a leader in patient identity, mobile healthcare and real-time locating and tracking. Let us bring the latest technology in healthcare to your facilities.

Find out more at [www.zebra.com/supplies](http://www.zebra.com/supplies)







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