

Verification Procedure Guide

How to Verify Barcodes

Verifying barcodes is a required part of many QC processes as it provides a full technical analysis of any given barcode against the ISO standard. This can be used to demonstrate the quality of your label production with reliable and comprehensive evidence. On top of this it can also be used as a means of determining improvements to production quality by reacting to feedback provided by the verifier software.

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Barcode Quality Checklist

1. Check the barcode number matches.

A basic but essential check is to confirm the number printed beneath the barcode is the same as the code that is scanned. There are a few exceptions to this rule such as M&S tray end barcodes.

2. Check the grade of the barcode.

This must be at least grade C in order to be considered a pass, but the aim should always be produce grade A barcodes.

3. Check the magnification (scale).

Barcodes must be printed within a given range of sizes in order to be usable. The scale will depend on each barcode type (symbology), the print method and intended use of the barcode. EAN-8 and EAN-13 retail barcodes should be printed at 100% where possible.

4. Check the bar height.

Physically measure the height of the barcode. For retail barcodes such as EAN-8 and EAN-13 barcodes the height must be at least 16 mm and for trade barcodes such as ITF-14 the height must be at least 32 mm. Some retailers will specify different bar heights according to their own specifications.

Verification Procedure

When verifying your labels it is important to remember that barcodes scanned are representative of the actual labels and packaging used on your goods. This means the barcodes you verify should always be taken from the actual print run at normal production speeds. This is especially important with film printing where it is typical to start a print run at a slow speed.

Minimum number of scans

It is not a requirement to verify the quality of every single barcode. However it is a requirement to show reliable analysis. The very minimum that any print run should be verified is three barcode from the beginning, middle and end of the print run (nine barcodes in total). This allows for a reliable analysis of the print run without making the task inefficient.

When you verify each barcode the minimum number of individual scans required is three. This will mean to meet the minimum requirement as recommended by GS1 for barcode quality for each print run you will perform 27 scans. Some retailers will accept smaller statistical sampling. The 27 scan procedure is purely a recommendation to ensure accuracy.

Scanning with the Verifier

How you scan each barcode will depend on which verifier models you have. The Axicon 6515 models will require you to position the verifier over three different parts of the barcode for each scan. There is no advantage to scanning exactly the same part of the barcode.

How to Scan

Where possible the barcode should be scanned in final packaging configuration. If this is not possible please attempt to scan in conditions that do not intentionally aid readability, for example, a white label stuck on a piece of white paper may disguise poor light margins.

What to do with the results?

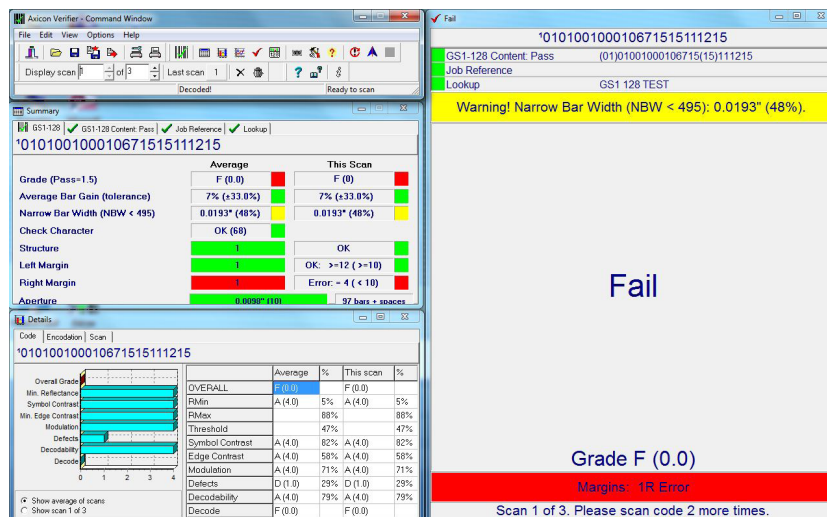
The sample labels and barcodes should be kept along with any QC documentation that you use. The verifier will save a scan profile for each barcode that is verified providing full traceability if required. These scans can be printed if required but it is often not necessary to do so for every barcode. Simply recording a reference on the QC sheet to the scan profile with a time and date along with the overall grade is enough. The saved results can be easily found for integration if required at a later date.

Record Management

With the sample barcodes it is important to keep them in their original condition. It is advisable to not mark the barcode in anyway by ticking or writing on top or within the light margins as this prevents the barcode from being scanned again. The saved scan profiles will grow in size so periodic archiving is essential in order to make future analysis easier. How long you keep these scan profiles will depend on your Quality Management System and your customer requirements.

Interpreting Scan Results

Choosing how in-depth to analyse any given barcode depends on a few things: Whether the verifier has picked up an error; If a customer has indicated an issue with barcode quality; Whether you are trying to improve the quality of a particular barcode.



The various diagnostic tools often display the same technical information but present them in different ways. For example a light margin error is clearly indicated in the Pass/Fail Window and the Summary Window and does not really require further analysis. However it is possible to analyse this using the Scan Reflectance Profile and Dimensional Analysis which will indicate the same result.

In general the Summary, Pass/Fail and Details diagnostic windows provide overall feedback about the barcode whereas the Scan Reflectance Profile and Dimensional Analysis provide specific feedback for each element of the barcode. For reference and more information about each diagnostic tool and what it displays please see our [Understanding the Axicon Verifier Software](#) guide.

Common Errors and Issues

Light Margin Error

When the barcode is too close to another element or the edge of the label it will infringe the light margin. This can be caused by either the label design, print drift or the feed path being misaligned or a combination of these factors. A good way to tell what adjustments need to be made is to look at all the other printed data on the label. If only the barcode is out of position then adjust the label design. If all the printed data is out of position then check the feed path and print margins.

Parameter	Average	This Scan
Grade (Pass=1.5)	F (0.0)	F (0)
Average Bar Gain (tolerance)	7% (+33.0%)	7% (+33.0%)
Narrow Bar Width (NBW < 495)	0.0193* (48%)	0.0193* (48%)
Check Character	OK (68)	
Structure	1	OK
Left Margin	1	OK: >=12 (>=10)
Right Margin	1	Error: -4 (< 10)
Aperture	0.0000" (0.0)	97 bars + spaces

Overall Grade	Average	%	This scan	%
OVERALL	F (0.0)		F (0.0)	
RMin	A (4.0)	5%	A (4.0)	5%
RMax		88%		88%
Threshold		47%		47%
Symbol Contrast	A (4.0)	82%	A (4.0)	82%
Edge Contrast	A (4.0)	58%	A (4.0)	58%
Modulation	A (4.0)	71%	A (4.0)	71%
Defects	D (1.0)	23%	D (1.0)	23%
Decodability	A (4.0)	79%	A (4.0)	79%
Decode	F (0.0)		F (0.0)	

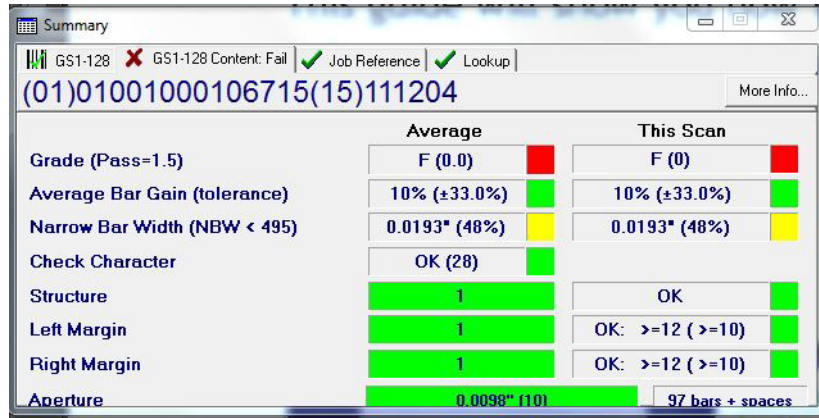
In this example the scan profile shows an error with the right margin. This is reflected in the overall grade F.

With Dataguard it is possible to adjust print margin in order to move the position of all the printed data. This is a preferable solution as it will adjust the print position for that print job whereas editing the label design will affect all future print jobs.

Example

Magnification (Barcode Scale) Error

Barcodes have a scale which must be within a specific range of sizes in order to be read by a barcode scanner. The correct barcode magnification will depend on the print head definition of the printer (DPI) and the barcode type being printed. The Axicon Verifier software will analyse your barcode against the accepted range of magnification for that barcode type and indicate whether it has passed or failed.



In this example the Narrow Bar Width (magnification) has a warning as it is so close to the tolerance threshold so should be improved.

Magnification Warnings

The Axicon Verifier software may display a Narrow Bar Width warning instead of failing the magnification. Warnings are advisory comments and do not mean that the barcode is automatically of poor quality. It is advised if the verifier displays a warning against the barcode magnification that you increase the scale of the barcode if it is possible to do so.

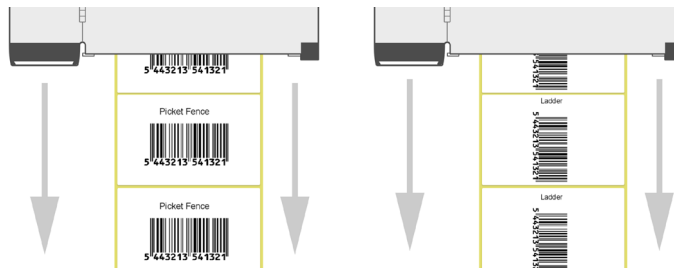
Example



The left barcode represents a 100% EAN-8 barcode scale and the right represents a 60% EAN-8 barcode scale which would fail.

Bar Gain or Bar Blur Error

When too much ink or too little ink is printed on to the label the barcode becomes harder to read with a barcode scanner. There are four key elements that affect this the most with on demand printing: The scale of the barcode, the orientation of the barcode, the print speed and the print temperature.

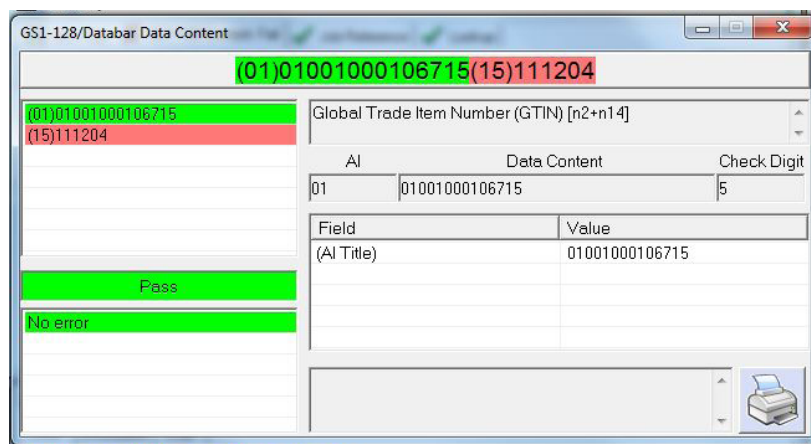


With barcode orientation printing 'ladder style' often decreases barcode quality. With the other elements it is advisable to always print the barcode as large as possible (normally 100%), as slow as possible with a low temperature (0). In reality you will want to print labels as fast as possible, and this can be done, but it is always a balance between maintaining high productivity and good quality.

Bar gain and bar blur are also affected by the thermal transfer ribbon grade and the label stock being used. If trying to improve overall quality it is recommended to test various combinations of materials at different speed and temperature settings to help identify optimum settings.

GS1-128 Content Error

If your GS1-128 barcode has been constructed incorrectly due to inferior barcode generation software you will sometimes see these content errors. Typical examples include the incorrect use of the article identifiers and calculation check digits. Another common example is when the GS1-128 contains a display until or best before date that is in the past.



Example of unsuitable barcode date that is in the past.

The Summary Window will highlight the specific part of the barcode that has failed. To look at the details click on the GS1-128 tab.

Barcode Printing Best Practice

Improving the quality of barcodes can be a complex process due to the many components involved in actually producing the barcode. Achieving good quality is a synthesis of the printing technology used, the type of label, printer settings, label design software as well as customer requirements along with global standards.

However there are some general rules of thumb which are useful for maintaining good quality.

Barcode Orientation

Picket Fence is always preferred over ladder style. This has the added benefit of being less aggressive on the print head so prolonging its life.

Bearer Bars

Bearer bars should be added to all trade barcodes to help identify blown pins in the printhead and should be at least 1 mm deep.

Magnification

The barcode scale should always be as large as possible. Barcodes that are printed onto labels should follow:

Retail and Point of sale barcodes

BARCODE TYPE	MAGNIFICATION RANGE	TARGET SIZE	VECTOR SCALE
EAN-8	*80 to 200%	100% ± 20%	4 ≅ 100%
EAN-13	*80 to 200%	100% ± 20%	4 ≅ 100%

Trade (outer case) and wholesale barcodes

BARCODE TYPE	MAGNIFICATION RANGE	TARGET SIZE	VECTOR SCALE
EAN-13	80 to 200%	150%	6 ≅ 150%
ITF-14	48.7 to 100%	48.7%	6 ≅ 50%
EAN-128	48.7 to 100%	48.7%	6 ≅ 50%

* With thermal transfer printers it is permissible to use a magnification of 75% due to the resolution options of the printers.

Printer Settings

Temperature and speed should be as low as possible. Temperature should never need to go above '3' and speed should be one or two settings below maximum. Print speed should only be set to maximum if good print quality can be maintained.