



Chip and PIN

A Retailer Guide to Bank Accreditation

An Overview of the Bank Accreditation /
Acquirer Acceptance Testing Process for Chip and PIN

Produced by the Chip and PIN Programme Management Organisation
Version 1.1

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Introduction

Overview

Equipment that processes card payments at the Point of Sale must conform to a number of standards and whenever a retailer introduces or modifies its card processing system, acquirers perform a series of tests to confirm that these new systems operate correctly. Such tests ensure that interoperability and security of card payments are maintained.

Chip and PIN gives rise to new standards, new specifications and, in some cases, new product rules set by the card payment schemes. These must be followed and change how approval is performed for a retailer's POS system. During the Northampton trial significant learning was obtained on how best to gain approval (see page 11 for further detail). This guide describes the process that must be completed by all retailers or their vendors, in order for their Point of Sale terminal products, software and systems to be able to process chip and PIN transactions.

This document is intended to provide retailers with:

- a clear explanation of the approvals process for chip and PIN and
- practical advice so that a retailer is more likely to pass AAT first-time round

What is Bank Accreditation?

Bank Accreditation is the final stage of the end-to-end certification process. It is conducted by acquirers to ensure that messages are passed end-to-end correctly and that scheme product rules are followed. Bank Accreditation involves acquirers performing a series of tests to confirm that clearing and settlement records all contain the appropriate data for authorisation, interchange and settlement and that all transactions are processed in accordance with scheme rules. Bank Accreditation commences after the retailer and its suppliers have completed their development and should not be viewed as a replacement for the internal testing that must be undertaken during the development phase.

Terminology: The acquirer conducts some tests in its own right and others on behalf of the payment schemes. This includes phases sometimes known as *scheme end-to-end testing*, *terminal integration processing (TIP)*, and *acquirer certification or acquirer end-to-end testing*. For the purpose of this guide, the whole process is referred to as Bank Accreditation. Bank Accreditation is also sometimes referred to as Acquirer Acceptance Testing (AAT).

Need to Know

During the Northampton Trial in 2003 the acquirer approval process for chip and PIN was fully road-tested and several key lessons learned. Whilst key parties are pursuing a number of initiatives to refine and improve the overall process, retailers should be aware that the approvals process:

Is Complex – There are several discrete but interlocking phases required to ensure that security and integrity are maintained

Involves several parties – The retailer (operations and IT), systems integrator, hardware and software vendors, acquirer(s) and schemes all need to be involved

Requires careful planning – Maintain close communication with all parties and ensure they are aware of changes to your plans. The process is complex and has been frequently under-estimated

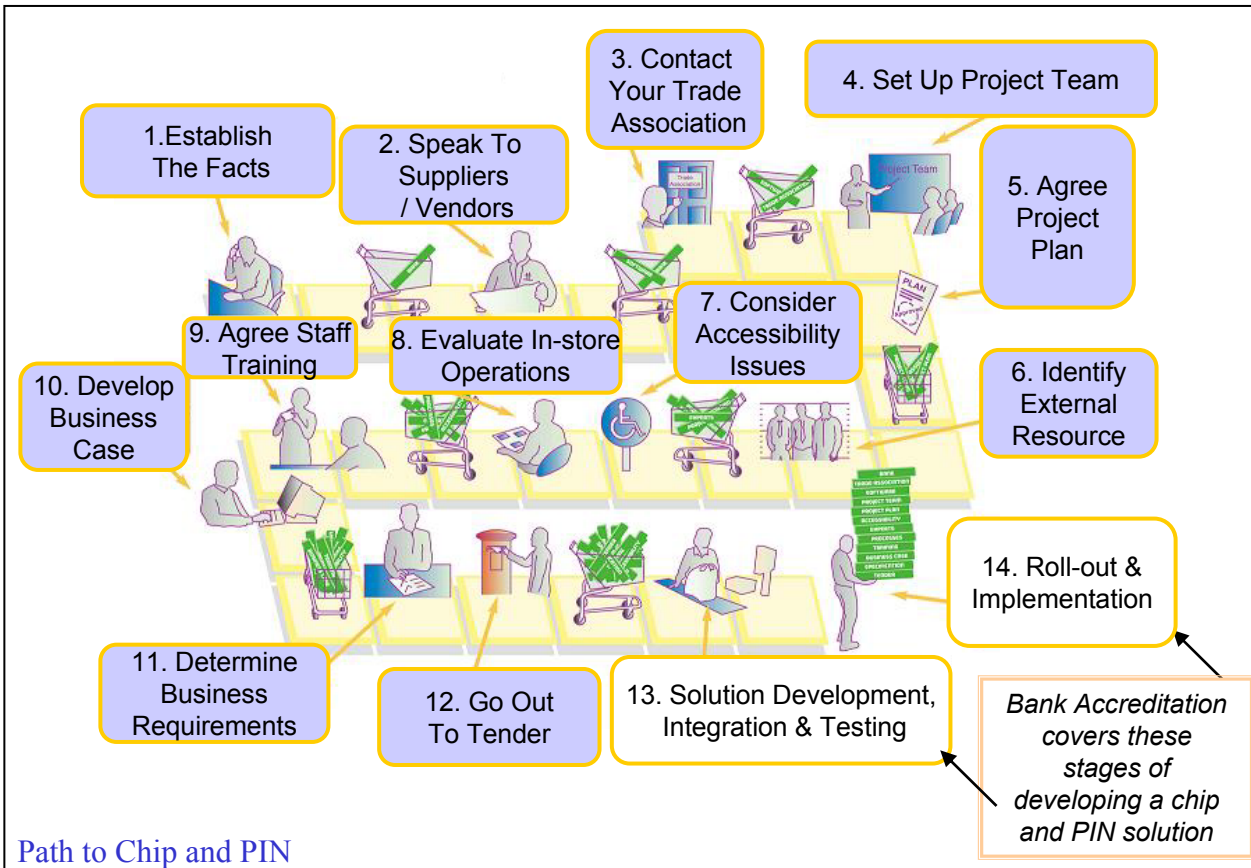
Is rarely completed in one pass – Please book test slots well in advance with your acquirer and agree contingency dates as well

Requires live and test cards to complete – Read PMO Guideline G15 (Test and Training Cards) and talk to your acquirer and vendors about how best to source cards

Requires preparation – Ensure that you understand the pre-requisites that your acquirer will expect prior to Bank Accreditation.

The Steps to Chip and PIN

The path to chip and PIN is illustrated below – Bank Accreditation needs to be completed successfully before chip and PIN can be implemented.



The PMO has produced a range of material that may assist your move to chip and PIN. It is very important that you obtain the following materials:

- Guideline (G6) : Certification Process Description
- Guideline (G15): Test and Training Cards
- Recommendation (R7): POS Processes
- Live Trialling Guide
- Chip and PIN Implementation Guide for Retailers
- Chip and PIN training video

Notes:

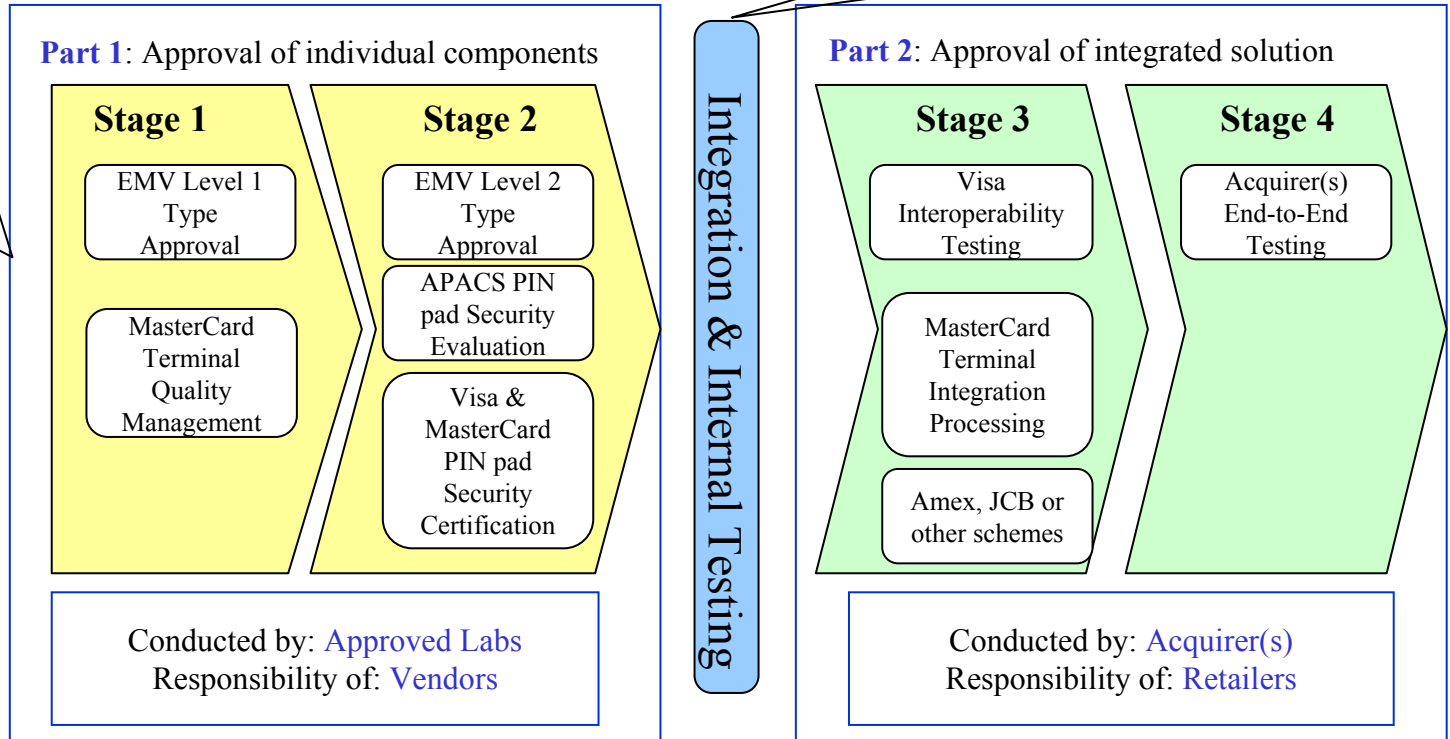
1. The steps in the above schematic are not necessarily linear and some of the activities can be performed in parallel
2. The effort associated with each step is variable and dependent on the size and complexity of your organisation and systems.

The Context of Bank Accreditation

Bank Accreditation is the final stage of the end-to-end certification process for chip and PIN. The full certification process is shown below. Activities in Part 1 involve seeking approval for individual technical components and are managed by vendors whereas the activities in Part 2 focus on testing the integrated solution.

Though the diagram shows four distinct stages, there is often a high degree of overlap. In particular, acquirers may execute stages 3 and 4 in parallel. From the retailer's perspective this gives the impression of a single stage. Bank Accreditation can therefore be viewed as both stages 3 and 4 combined.

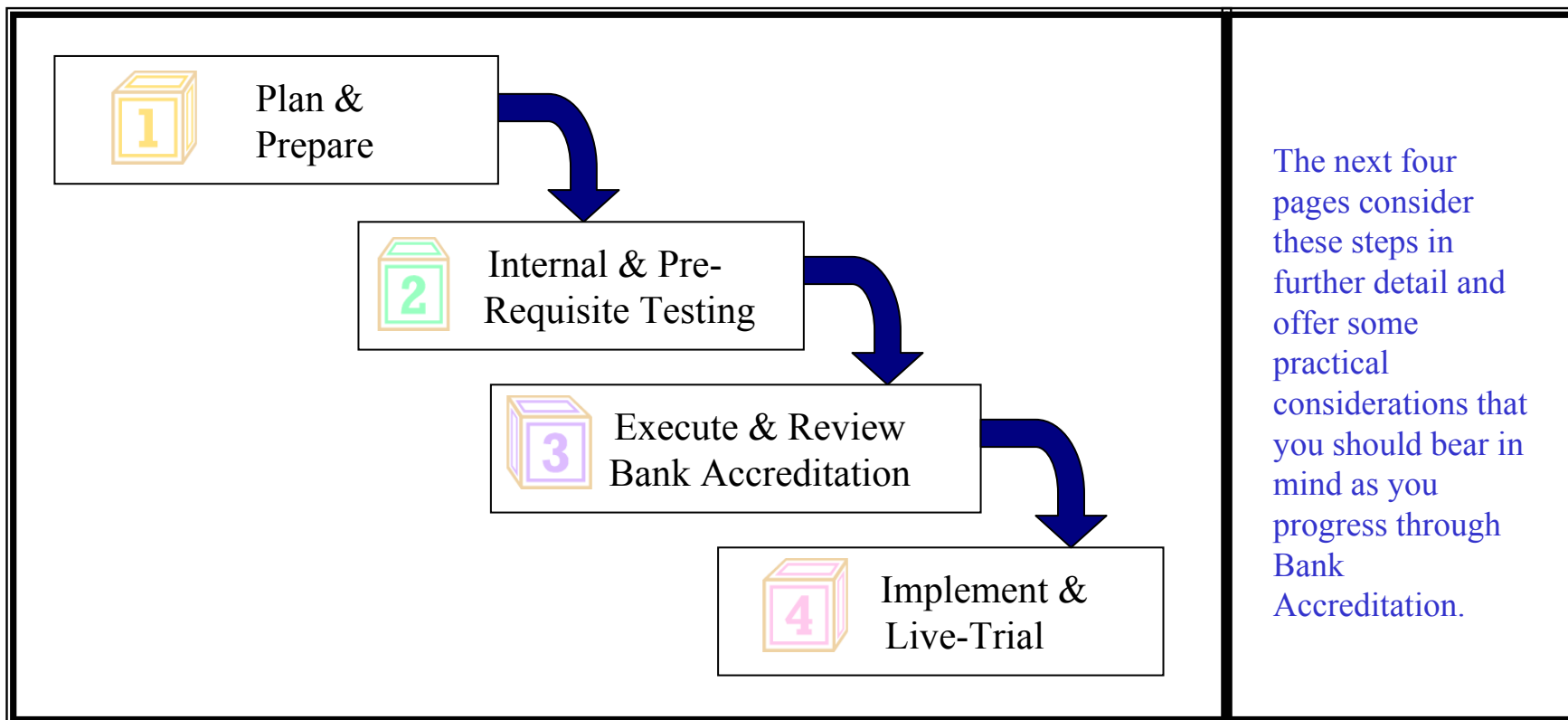
These activities are explained in further detail in Appendix A.



The Bank Accreditation Process

A high-level representation of the steps that a retailer needs to undertake as part of the Bank Accreditation process is shown below:

- Plan and Prepare for Bank Accreditation
- Internal and Pre-Requisite Testing of Chip and PIN
- Execute and Review Bank Accreditation
- Implement and Live-Trial Chip and PIN





Plan & Prepare

Objectives

- To agree with your acquirer the **range of tests** that will be conducted and the **schedule**
- To understand the **pre-requisites** set by your acquirer(s) of what must be accomplished before they will commence on-site Bank Accreditation testing (see Appendix A for further discussion on pre-requisites)
- To confirm with your acquirer the source of the **test tools and test cards** needed for development requirements
- To develop a **plan** so that your specialist resources (such as IT developers) are available for supporting the testing
- To ensure that your **supplier(s)** are aware of the booked Bank Accreditation date and their responsibilities

Hints and Tips

- **Co-ordinate your plans well in advance** of Bank Accreditation commencing. Trying to arrange your testing schedule at short notice could incur significant delays
- Obtain **background material** and documentation from your acquirer, suppliers, schemes and the PMO. Your acquirer will have specific documentation detailing their pre-requisites (see appendix B)..
- Obtain **paper copies** of Level 1 and 2 Type Approval certificates from vendors as your acquirer may need them
- Challenge the plans of your vendor(s) and supplier(s) to ensure that they have identified **realistic dates**.
- Discuss with your acquirer whether it is advisable to reserve an **additional slot** in case you do not pass the tests successfully first time round. Assess what level of **contingency** is needed in your plans.
- The **degree of effort** will be dependent on the complexity of your systems and whether your configuration is already in use by another retailer. Confirm with your acquirer the likely degree of effort for Bank Accreditation.
- Make sure that you get a thorough understanding of the **sign-off process** and criteria from your acquirer(s)
- If you accept **American Express or JCB** you should contact them as soon as possible to ensure that your systems are certified in a timely manner (during the Northampton trial this was occasionally overlooked); discuss with your vendor the details to be used in the Approval Request form.
- Establish if members of your project team already have **chip and PIN cards** as these may prove valuable during the final stages of testing (e.g. live trialling). If you contact the card issuer, they will generally replace your card with a chip and PIN card.

Outputs

- A **booked slot** with each acquirer – only book a date when you have a clear understanding on the likely completion date for your development
- A **plan** that demonstrates how your internal resources and those of your vendor/supplier will support Bank Accreditation, including a confirmed source of test cards and testing tools.

Do not assume you will pass Bank Accreditation first time



Internal & Pre-Requisite Testing

Objectives

- To test the **end-to-end integration** of your chip and PIN system (using test stubs to simulate issuer and authorisation systems)
- To demonstrate that all acquirer **pre-requisites** for Bank Accreditation have been achieved
- To ensure that your test **environment** is ready for the acquirer to use.
- For the retailer to conduct **User Acceptance Testing** (e.g. to test functionality and prompt sequences) and confirm that these are in line with POS procedures and documentation

Hints and Tips

- Ensure that the **test environment** (for Bank Accreditation) matches the actual trading environment. It needs to have the same levels of software, operating system and software patches (but with test keys instead of live)
- Acquirers may provide you with **test harnesses or access to a test environment** to assist with this phase.
- Investing the **effort** to perform comprehensive testing is likely to increase the likelihood that Bank Accreditation will be passed first time round. Purchasing the **ETEC** test pack from MasterCard will greatly assist in conducting testing during this stage. Some other retailers have found the cost is justified by the benefits in testing whilst others expect their integrator/vendor to provide this. It may also be useful to consider purchasing the **ICC Solutions** test card pack.
- Use this phase to test the **documentation and cashier instructions**.
- Keep your **acquirer informed** of progress during this stage. They may be able to assist when issues occur.
- If possible use the **pre-requisite testing services** provided by third party system integrators. These are designed to increase confidence that a solution will pass bank approval at the first attempt and typically involve a third party conducting a series of tests recommended by the acquirers.
- Ensure that your plans allow sufficient time for **re-testing and issue resolution**. This is important during both this stage and the execution stage that follows. Applying a strict change control process at this stage is important in order to minimise the amount of re-working. It is likely to take 3-4 weeks from completion of pre-requisite testing before you are ready to start full bank Accreditation.

Outputs

- **Change control** process agreed with acquirer
- Fully functioning **test environment** including lines and network
- Evidence supplied to your acquirer that demonstrates **pre-requisites** have been met



Execute and Review Bank Accreditation

Objectives

- To confirm that a retailer's systems **conform to specifications** and that transactions and error conditions are correctly processed
- To ensure **messages** are correctly formatted and exchanged between the retailer and bank systems.
- To ensure that all **scheme product rules** are followed.

Hints and Tips

- The typical **process** for Bank Accreditation execution and review is depicted below. It is important to understand the likely timescales and to plan accordingly. As a best case, you should expect a minimum of 4 weeks however 8 weeks is more realistic.

Outputs

- During this phase, ensure that you have the **appropriate support** available on-site, otherwise a small configuration problem could result in the whole test execution being phase being prolonged.
- The acquirer will typically send you a **test report** detailing any issues that they have identified and once all the tests have been passed, you will receive a letter of 'sign-off'.

The process for Bank Accreditation execution and review

Acquirer visits and executes tests (both their own test and those defined by schemes)

4 days

Acquirer reviews test results and packages results

5-10 days

Terminal Integration
Processing test results submitted to MasterCard

MasterCard reviews test results

1 week

Initial Test Cycle

Further Re-test Cycles (as required)

Acquirer sends letter of approval

Acquirer and Scheme agree any required waivers

1 week

Accreditation completion

Issue Resolution



Live-Trial and Implement

Objectives	<ul style="list-style-type: none">•To demonstrate that the live chip and PIN system is operating successfully prior to the general public using it ‘in anger’•To set-up live keys and routing•To successfully introduce chip and PIN into the target retail environment whilst minimising any risk or disruption to the business, including rollout of training
Hints and Tips	<ul style="list-style-type: none">• Do not assume that the testing performed by your acquirer will guarantee that no teething problems emerge when you first switch on chip and PIN. During the trial, several large retailers experienced configuration issues when they first started to accept chip and PIN. On the whole these were resolved rapidly, however they can cause disruption if not dealt with in a timely manner. It is best to start small and to switch on more tills /stores as confidence grows.• Ensure all AIDs (including for example online debit cards) are set up and all test keys have been replaced with live keys.• Try and test as many different types of live card (including Solo, Electron, Maestro/Switch) when you first activate chip and PIN. If members of your project team do not have a range of these cards, discuss the available options with your bank. Notify the PMO if you accept significant numbers of overseas-issued cards so that additional testing can be undertaken if necessary.• Effective training is a critical component of this stage. The PMO has produced a video that can help support your training activities (see www.chipandpin.co.uk for details). Training needs to incorporate both successful and error conditions.• It is important that a customer’s PIN is not compromised at the point of sale. PIN pads should be positioned so that neither the cashier nor other customers can see the PIN being entered. Likewise CCTV needs to be positioned accordingly.• Confirm that the mounting and accessibility of your PIN pads meets the needs of all your customers. The Disability Discrimination Act means that retailers have responsibilities to ensure that reasonable adjustments have been made to accommodate all cardholders.
Outputs	<ul style="list-style-type: none">• Obtain a copy of the PMO publication ‘Chip and PIN Implementation Guide for Retailers’.• Chip and PIN operating successfully

Recent Developments to the Certification Process

The PMO has actively been working with the schemes and acquirers to identify ways of reducing the effort and timescales associated with the Bank Accreditation processes. The improved process aims to:

- reduce the amount of repetition currently required in testing;
- reduce the total TIP testing effort required per system to less than five (5) days; and
- enable a high proportion of the testing to be carried out prior to installation on the retailers premises.

MasterCard certification tests have been divided into ‘off-line’ and ‘online’ testing; off-line tests need only be carried out once for all acquirers for all systems meeting a ‘similarity test’.The "same product" is defined as having the:

- same EMVCo level 1 approval
- same EMVCo level 2 approval including the same PIN pad if the PIN pad encrypts the PIN

The offline testing is network independent and can be completed in the lab, whilst the on-line testing is host specific and needs to be completed by each acquirer. Once each system configuration has been registered as fully tested, each additional implementation with another retailer will only have to go through the ‘online’ testing to assess the proper integration with the Acquirer system.

This reduces the effort considerably since:

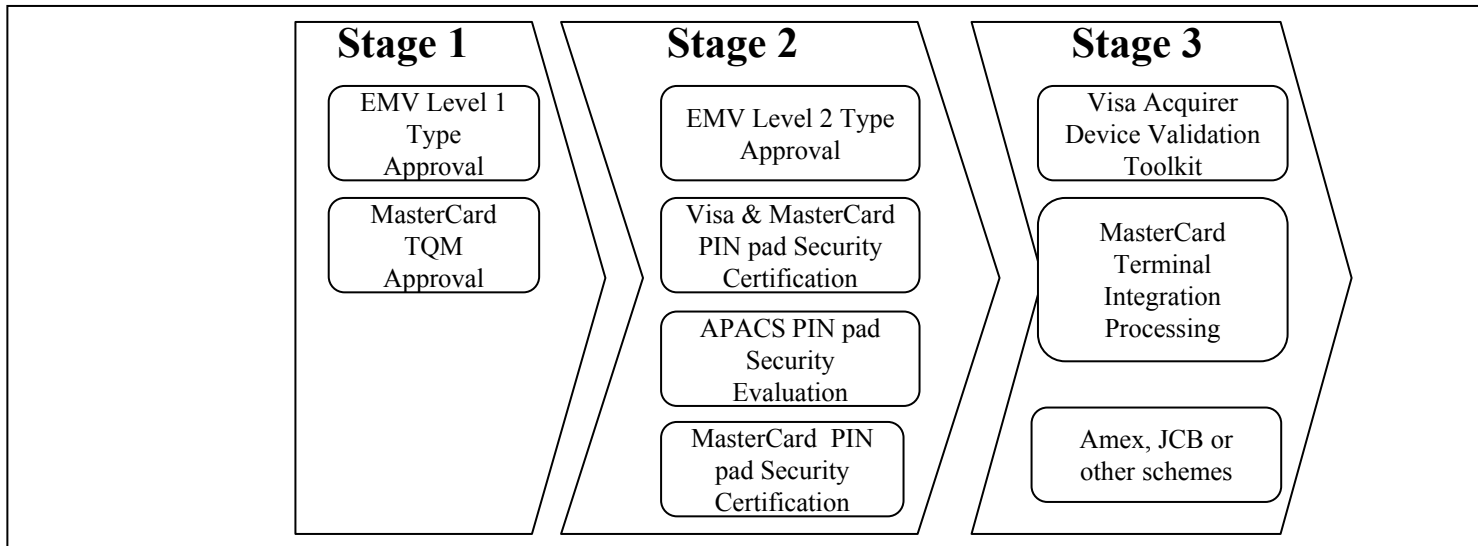
- It is estimated that there are only 600 unique system configurations that will require the full ETEC tests (as compared to 20,000 retailers who own their own point of sale equipment); and
- Within the Terminal Integration Process, the on-line tests comprise of only 35 tests whereas the full set of tests exceed 280 tests.

Feedback from Northampton Trial

The box below summarizes the key learning points that emerged from the Northampton trial (held from May-August 2003)

- Retailers were frequently unable to meet the test slot that they had originally agreed with their acquirer as the chip and PIN development took longer than expected.
- Many retailers underestimated the time required for preparing and carrying out Bank Accreditation. As a result of this most retailers had to postpone their Bank Accreditation test slots at least once.
- The average estimated time for Bank Accreditation was just less than 4 weeks whereas it took on average between 6 and 8 weeks. In addition few retailers passed first time.
- Delays were experienced as getting hold of cards development, testing and training proved problematic
- Many retailers in the Public Trial found that tests normally fail first time
- Having key skills and resources available on-site (or available at short notice) from both vendors and acquirers helped reduce the duration of Bank Accreditation
- All parties involved in the process of Bank Accreditation experienced a steep learning curve with regards to the extent of testing during Bank Accreditation. For example, retailers were not aware of the pre-requisites for Bank Accreditation and relied on the confidence of their vendors when preparing for testing. Also acquirers underestimated the time required to review and package up accreditation results so that they are acceptable for submission to MasterCard.
- Don't assume everything will work on the day – have technical/IT staff available to fix small issues on the spot.
- Don't underestimate the effort required for acquirers to collate and review Bank Accreditation results. The actual tests take on average 4 to 5 days whereas the review of test results can typically take two weeks.
- Do not assume that you will get a test slot exactly when you would like, particularly if your dates have moved or if you are getting close to Q4/2004 deadline. Remember the acquirers are dealing with multiple retailers in parallel.

Appendix A: Overview of Certification Process prior to AAT



Stage 1	
EMV Level 1	<p>Purpose: To ensure that the chip card reader and chip do not damage each other</p> <p>Scope: Electromechanical tests of the Interface Module. This may currently be carried out against either EMV 3.1.1 or EMV 4.0 specifications. Wherever possible EMV 4.0 is preferred and testing against EMV 3.1.1 will discontinue on 1 March 2004 (i.e. vendors will not be able to submit products for 3.1.1 certification after this date, though retailers can still implement products that have previously obtained 3.1.1 certification with errata tests).</p> <p>Tools: Card schemes recommend specialist test tools</p> <p>Responsibility: The device manufacturer/vendor must obtain this certification. Amex, Visa and MasterCard chip transactions cannot be processed without this certification.</p> <p>Outputs: EMV Level 1 certificate.</p> <p>Further information is available on EMVCo website (www.emvco.com)</p>

Note: Activities in Stages 1 and 2 are the responsibility of hardware and software manufacturers. Retailers should check the status of these approvals (with suppliers) when selecting a solution.

Appendix A: Overview of Certification Process prior to AAT

Stage 1	
MasterCard TQM	<p>Purpose: To ensure vendors have a quality assurance program in place that guarantees that vendor's terminals are reliable and compliant with EMV standards</p> <p>Scope: TQM applies to the smart card interface and is complementary to EMV Level 1.</p> <p>Tools: MasterCard provide specialist test tools</p> <p>Responsibility: The device manufacturer/vendor must obtain this certification. MasterCard chip transactions cannot be processed without this certification. Vendors must achieve TQM certification within the first year of volume production to remain listed as a TQM-approved IFM</p> <p>Outputs: MasterCard grants a TQM label when the vendor has demonstrated compliance</p> <p>Further information is available from chip_help@mastercard.com</p>
Stage 2	
EMV Level 2	<p>Purpose: To test the EMV application software and validate the correct interpretation and flow of data between chip card and card reader.</p> <p>Scope: EMV functions are tested within the "kernel". Wherever possible EMV 4.0 is recommended as testing against EMV 3.1.1 will discontinue on 1 March 2004.</p> <p>Tools: Card schemes recommend specialist test tools</p> <p>Responsibility: The device manufacturer/vendor must obtain this certification. Amex, Visa and MasterCard chip transactions cannot be processed without this certification</p> <p>Outputs: EMV Level 2 certificate</p> <p>Further information is available on www.emvco.com.</p>

Appendix A: Overview of Certification Process prior to AAT

Stage 2

Visa/ MasterCard PIN Pad Security

Purpose: To prove that the PIN pad adheres to the Common PIN Entry Device Requirements, specifically the physical and logical security

Scope: Any PIN pad used to process Visa and MasterCard transactions must be approved by an approved testing laboratory,

Responsibility: The device manufacturer/vendor must obtain this certification.

Outputs: Visa/MasterCard will issue approval letters to manufacturers with PEDs that have successfully passed a laboratory evaluation.

Further information is available on www.visa.com/pin. With effect from 1 October 2004 Visa and MasterCard are operating a common process for PINpad certification.

APACS PIN Pad Security

Purpose: APACS member banks have a requirement that all PIN pads installed in the UK should be evaluated against a Protection Profile, in accordance with Common Criteria (ISO 15408-1:1999) procedures. To support this policy APACS has developed a Protection Profile for a PIN Entry Device, which defines the security requirements for PEDs deployed in the UK.

Scope: All new devices deployed after 1st January 2004 must have undergone (or have firm plans to undergo) evaluation, and existing devices must be evaluated or replaced by 1st July 2010.

Responsibility: The device manufacturer/vendor must obtain this certification with evaluation carried out by an approved testing laboratory (CLEF - Certified Laboratory Evaluation Facility).

Outputs: The test lab produces a technical evaluation report that should be submitted to the acquirer. Vendors may additionally submit the evaluation report to Communications and Electronics Security Group - based at GCHQ, Cheltenham) for a formal Common Criteria certificate.

Appendix A: Overview of Certification Process prior to AAT

Stage 3

Visa Acquirer Device Validation Toolkit (ADVTK)

Purpose: These tests are conducted following the integration and development of a retailer's end-to-end POS system and ensure that parameters have been correctly set up for Visa cards. The tests increase confidence in the end-to-end system.

Scope: The Visa end-to-end tests comprise 42 tests and are typically undertaken over 1 or 2 days. These tests are not mandated by Visa, however most acquirers mandate them.

Test tools and scripts Scripts are available for Visa's recommended test toolkit. Subscribers pay €500, which covers the test pack (cases, scripts and cards). It is available through chipven@visa.com.

Responsibility: It is the responsibility of the retailer [for integrated PoS systems] and the terminal placer [for standalone terminals] to obtain this approval (if required). However, the vendor or system integrator is expected to play a significant role.

Outputs: Visa neither reviews the results nor issues any certificate. Further information is available on www.visa/pin.

MasterCard Terminal Integration Processing

Purpose: To perform interoperability testing for MasterCard branded cards and undertake regression testing of the EMV application kernel. MasterCard mandate these tests and no equipment can be used to process a MasterCard chip card transaction that does not have this certification.

Scope: Testing is in two parts with only Part 1 mandatory. Part 1 covers the interoperability tests and is supported by 60 cards in subset 1 of the ETEC test pack. Part 2 is the regression-testing element and is supported by the 100 cards in subset 2 of the ETEC test pack. A reduced test can be performed, using 25 cards from subset 2, depending on the perceived level of regression risk.

Responsibility: It is the responsibility of the retailer [for integrated PoS systems] and the terminal placer [for standalone terminals] to obtain this approval. Typically the acquirer will conduct these tests, however, the vendor or system integrator is expected to play a significant supporting role.

Test tools and scripts: These tests are fully scripted and the MasterCard ETEC test pack is required. This will normally be supplied by the acquirer for the tests themselves, however for pre-testing the vendor may use the ETEC test pack or obtain additional scripts for its existing test pack.

Outputs: MasterCard reviews the test results. The exception is when an acquirer has obtained delegated authority (whereby the acquirer has been authorised to approve these tests). Further details are available from your acquirer.

American Express Device Testing (and other schemes)

Purpose These tests are conducted following the integration and development of a retailer's end-to-end POS system and ensure that systems have been configured to process American Express branded cards correctly

Scope The scope of these tests is defined and documented by American Express

Responsibility: It is the responsibility of the retailer [for integrated PoS systems] and the terminal placer [for standalone terminals] to obtain this approval. In practice the vendor executes these tests, with approval by American Express.

Test tools and scripts American Express will supply documentation, test scripts and test cards

Outputs American Express reviews the test results and issue a letter of certification following successful completion

Other Schemes: Switch has no requirements other than those described for MasterCard. JCB provides test tools (cards and software) directly to the terminal manufacturer/software vendor for a self-assessment test of JCB chip card acceptance. The test report is then sent to JCB for validation JCB also conduct acquirer/merchant interface testing.

Appendix B: Indicative Pre-Requisites for Bank Accreditation

This Appendix provides a selection of the pre-requisites that acquirers will typically expect prior to commencing on-site testing. They are provided for guidance only and are not intended to be a comprehensive list of all pre-requisites. Retailers should ensure that they obtain a clear understanding of the specific requirements from their acquirer.

Typical Pre-Requisites

Accreditation & Documentation

- Your POS equipment must have attained EMV Level 1 and Level 2 Type Approvals
- Evidence of APACS and VISA PED approvals or in some cases indication that your PED supplier is working towards these approvals (see Note 1).
- A copy of the EMV Level 2 type approval certificate (for the EMV software)
- If your PIN pad is housed in a separate unit from the card reader, confirmation that the link has 3DES encryption

Environment

- A fully functioning test POS environment that supports transaction logging. You will need test tools that capture and analyse the following:
 - The authorisation request and responses messages
 - Card settings and
 - POS conversation between card and terminal

Sample Transactions

- Data from a limited number of transactions. These typically could be a subset of the ETEC (MasterCard TIP tests) or a standard chip and PIN purchase transaction
- Your acquirer will usually expect the settlement file for the test transactions to be submitted to them for verification

Note 1: PIN pad approvals

APACS: From 1 January 2004 all new PEDs must be undergoing evaluation against the APACS Common Criteria Protection Profile. All PEDs, including those implemented before 2004, must have this approval by 1 January 2010.

Retailers should seek to avoid buying PIN pads that are not undergoing evaluation, unless they have consulted with their acquirer and obtained a dispensation.

Appendix C: Glossary

Glossary and Abbreviations

Acquirer	The bank which processes a merchant's transactions and passes them into the clearing system.
AID	Application Identifier: The unique code associated with a card application
CLEF	Certified Laboratory Evaluation Facility
DES	Data Encryption Standard (the most widely used method for 'symmetric' encryption (i.e. where the same key is used for encryption and decryption))
EMV	The Europay MasterCard Visa specifications for chip-based payment cards. EMV part 1 corresponds with (and generally conforms with) ISO 7816 parts 1-5; the other parts of this specification cover the details of a standard credit/debit application and the requirements for terminals
IFM	Interface module
PED	PIN Entry Device
PIN	Personal Identification Number: a code (usually 4 digits) used as a password by a cardholder
POS	Point of Sale
TIP	Terminal Integration Processing. A series of tests specified by MasterCard and previously known as ' <i>Environment of Use Testing</i> '. ETEC test cards are used to conduct these tests.
TQM	Terminal Quality Management – An approval process mandated by MasterCard.