Equipment Specification

Driver & Vehicle Standards Agency

Title	**Heavy Goods Vehicles (HGV) AND Passenger service Vehicles (PSV) - Category M2, M3, N2, N3, O2, O3, O4)**
Equipment purpose	Roller Brake Tester for HGV & PSV
Author	DVSA Vehicle Testing & Roadworthiness
Contact details	VTR@dvsa.gov.uk Vehicle Testing & Roadworthiness Driver and Vehicle Standards Agency Berkeley House Croydon Street Bristol BS5 0DA
Issue date	01/08/2022
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IMPORTANT:

If a multi class approval is required, then reference must be made to the RBT specification for the relevant classes of vehicle:

Gross Vehicle Weight (GVW), Total Axle Weight (TAW) and Gross Train weight (GTW) are mentioned in several places within this document, these should be taken as DESIGN weights.

Information is correct at the time of the release of this document, please check for any updates in the current HGV and PSV inspection manuals.

All brake efficiency measurements within this spec should be rounded DOWN to the whole number whereas imbalance, bind and ovality values should be rounded UP to the next whole number. (Not using standard mathematics formulas/ formatting)

Note: *rounding is done from one decimal place in all cases*

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Contents

1. Introduction

This Specification details the MINIMUM performance and constructional requirements for Roller Brake Testers (RBTs) intended to be used for the statutory test brake performance testing of Heavy Goods Vehicles (HGV – motor vehicles and trailers), and Public Service Vehicles (Class VI vehicles PSVs). PSVs are tested in accordance with the Motor Vehicle (Tests) Regulations 1981 and for HGVs are tested in accordance with the Goods Vehicles (Plating and Testing) Regulations 1988, as amended.

The Specification does not rule out additional features supplied with the equipment provided that the features are acceptable on health and safety grounds and do not prevent or make it less efficient to carry out the test as prescribed.

ISO 21069-1-2004 and 21069-2-2008 are mentioned several times within this document. These standards must be adhered to unless contradicted within the text of this document.

2. Technical Requirements

The RBT shall consist of a pair of roller sets mounted in the ground, or within a raised floor, with a separate display console. The RBT shall be safe to use, robustly constructed to acceptable engineering standards and suitable for brake testing of Heavy Goods and Public Service vehicles. The RBT must utilise a Computer - Controlled System (CCS).

Analogue instruments register a value to be measured and show it on an analogue display, usually by a pointer on a scale. So, the value is displayed in a stepless and continuous way. When compared to digital displays, instabilities and tendencies of a value may be recognised faster and more intuitively on an analogue display. On the other hand, an analogue display's exact numerical values are more difficult to read compared to a digital instrument (reading error).

The roller brake tester console/handheld display must adhere to the following:

1. Have an analogue primary (may be a digital representation) and a digital secondary display
2. Have the primary value of brake force displayed in kilograms force (kgf)
3. Have a means to display brake force over two ranges (if analogue)
    a. Low range max brake force value in range 600 to 800 kgf
    b. High range max brake force value in the range 3500 to 5000 kgf
4. be marked with graduations of not greater than:
    a. 10 kgf from zero up to and including 240 kgf.
    b. 20 kgf from 240 kgf up to and including 800 kgf.
    c. 50 kgf from 800 kgf and above.
5. If a digital representation of an analogue display is used, it must have the same sensitivity, speed and accuracy as a traditional motorised meter
6. The display must include the system that is currently being tested i.e., Axle number, service/secondary/park, N/S, O/S
7. The display must intuitively guide the user through the brake test using written on-screen instructions
8. Must indicate brake force individually for each wheel on an axle
9. An on screen warning when ovality and bind limits have been breached, depending upon what is being tested (see ovality & bind sections)
10. Indicate individually for each roller set where a wheel lock occurs
11. Retain the maximum brake force values until either the indication is manually reset, or the rollers are re-started.
12. A visual indication for the user on the display console showing:

    I. when each roller set is in operation.

II. if the RBT has a bi-directional facility, whether the roller sets are operating in 'forward' or 'reverse' direction

2.2 ISO 21069 standard

ISO 21069-1 and 2 specification Annex A (technical requirements of roller brake tester) should be adhered to with **exceptions** listed in the table below or in other parts of this document.

ISO standard	Text from ISO	DVSA requirement
ANNEX Aa	If the test machine is equipped with an automatic starting function, the rollers should start only after a time delay of 3s or more has elapsed once the axle has been placed on the roller brake tester	DVSA does not permit an automatic start-up of the rollers. (Note, for drive out assist, this must be performed manually via the RBT controls)
ANNEX Ag	If installed over a pit, the roller brake tester shall have an automatic stop function which shall stop the roller drive whenever a person enters the dangerous area of the pit (the whole pit length or at least 2.5m from the rollers in any direction)	Manufacturers should be aware that ATF Requirements found in Schedule 1 of the ATF Contract states that when a cross-pit RBT is installed for MOT use, the length of pit taken up by the RBT shall be in addition to the length of pit specified for the under-vehicle inspection. To meet this requirement, 1.5 metres will be added to the minimum pit length required. The extra 1.5 metres will be measured to the edge of the first aperture in the top of the RBT. An automatic stop function will be required if a person enters the dangerous area of the pit.
Annex A.2.-A3.	All braking forces are measured in Newtons (n)	DVSA require all forces to be displayed in kilograms force (kgf)
Annex 3.3.	Compressed air pressure	Currently there is no requirement to test air pressures
Annex A4e	Pressure(s) in brake chambers	Currently there is no requirement to test air pressures
Annex a4f	Control line pressures in trailers	Currently there is no requirement to test air pressures
Annex A4	Data collection	Listed throughout this document

2.3 Centralising the vehicle on the roller set

The RBT will centralise the vehicle on the roller set before commencing the test on an axle, based on the table below:

Mandatory:	Front steered axle of HGVs and PSVs where only one fitted
Optional:	Front steered axle of a drawbar trailer where only one is fitted Rear axles of HGVs and PSVs where only one is fitted Single axle trailer
Never:	All other axles

This operation will:

- be a manual process operated by the user, this **must not** be an automatic process
- require the user to stop the operation once they are happy that the vehicle is central

2.4 Drive out assist

There are times that the vehicles may not be able to drive out of the roller set, for example fully laden automatic with torque converter. The roller brake tester maybe equipped with drive out assist which will rotate the rollers and help the vehicle out of the roller set

Note: *A roller "brake" can be used as an alternative*

This operation will:

- be a manual process requiring the user to operate both rollers manually, allowing safe and controlled drive out assistance.
- The rollers shall be stopped automatically when the vehicle has safely left the roller set.

Note: *This only applies to a vehicle's drive axle*

2.5 Motor start-up inertia

It has been noted that the CCS may record the spike in KGf when the motor starts up. **This must not be recorded.** DVSA may need to take enforcement action on a vehicle with any brake that has **NO effort** – this cannot be done if this initial spike is recorded, and the result shows a difference between bind and efficiency.

3. Computer Control System

A fully detailed specification of the CCS requirements can be found *here*

Note that DVSA staff may need to operate several different models of RBT each day, it is important therefore that the CCS provides sufficient prompts and guidance to allow ease of use.

The CCS must indicate:

- an overview of the systems to be checked e.g., locations of park brakes, split system. The ability to amend this will be required before commencing the test as some brake codes may not accurately reflect the vehicle/trailer being tested.

Note: *This is most likely to be which axles park brake is located*

a. Primary User Controls

The primary user controls shall be:

I. manually operated

II. suitably identified in English and/or with acceptable symbols

III. capable of starting the roller sets independently or simultaneously

IV. capable of stopping the roller sets

V. A standard qwerty keyboard to enter information required for the brake test

VI. A mouse/touchpad/touchscreen to navigate around the screen display

b. Secondary User Control

1. a suitable secondary operating control shall be available on the console, or equivalent
2. the unit shall be resistant to spurious signals from other sources
3. a system shall be in place to ensure that each unit is dedicated to operating only one RBT when two or more are used in proximity
4. provision of safe storage shall be provided for the remote-control unit when not in use

c. Printout

The brake tester shall provide a printout with final test results, calculated, and determined as outlined in *Brake Test Report Printout* section

A printout should be provided which includes all the information, shown in *Annex 28*

The layout of the test results section must match the *Brake Test Report Printout* section for consistency

Additional information such as the manufacturer's logo and/or the site owners' logo may be included if desired

4. Calibration

The Roller brake tester must be calibrated every six months to the standard of ISO 21069-1-2004 and include the following.

Calibration is every 6 months, but to the end of the calendar month that it expires.

The applicant shall provide an assurance that a system is in place to ensure all its calibration devices used for the subject RBT are checked and certified by an accredited organisation on a regular basis.

A means of warning the user that the RBT is out of calibration is required. This could be an on-screen message at the beginning of each test, and/or a watermark across the screen.
The following message will be displayed "This Roller Brake Tester is out of calibration". This message will also be printed in the notes section of the printout
The calibration of the RBT equipment is to be conducted by engineers accredited by a recognised trade body/association

A means of calibrating the brake force shall be available and the RBT display shall be capable of showing negative numbers close to zero.

Brake Force Measurement

The calibration equipment must be calibrated to the accuracy of the ISO 21069-1:2004 standard in section A.3.1. Calibration can be in Newtons but must be displayed on the certificate as Kgf

***Note 1**: If the brake force measurement is displayed on traditional dials, the accuracy of the calibration shall be assessed via the dials and not from any secondary means.*

***Note 2:** If the brake force measurement is displayed digitally, the accuracy of the brake force measurement shall be judged against the digital values.*

The calibration equipment must have a method and operational accuracy that is traceable to a national physical standard, be certified by a UKAS accredited laboratory, or an equivalent European laboratory.

***Note 1**: All component parts of the calibration device, including any weights, shall be individually marked with an identity number to enable all parts to be kept together as a set. The certificate shall relate to the set and each calibration device produced shall require its own certificate.*

***Note 2:** If the certificate or any other relevant document produced for the calibration device is not in English, the applicant shall make available a translation into English.*

When the static calibration has been completed, to assess the level of torque required to rotate the RBT drive train mechanism, including any unexpected cause of increased friction such as a failing roller bearing, the following test shall be carried out:

With the RBT in ‘calibration mode’ and with NO vehicle in the rollers the rollers shall be rotated, and the brake force displayed shall not exceed: **50 kgf.**

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Accuracy

The RBT brake force readings will be to the ISO 21069-1:2004 standard in section A.3.1 in Kgf and not newtons

The RBT will also be checked in line with ANNEX B of ISO 21069-1 with the engineer's report made available to DVSA local management when required.

Weighing Facility

The RBT imposed weight readings shall be accurate to within:

+/- 3% of the true value at the mid-point of 200kg and 11600kg.

Calibration certificates can be hard copy or in digital form, providing the layout is the same

5. Instruction Manual

A comprehensive Instruction Manual shall be supplied with each RBT. The Instruction manual shall:

i. be written in English

ii. explain how to operate the RBT, including the function of each control, and how interpret the results.

iii. detail how to use the RBT to carry out a brake performance test and refer to the need to follow the brake test procedures detailed in the latest version of the relevant HGV/PSV Inspection Manual.

6. Identification

The RBT shall be marked with a durable identification, in a conspicuous position on the front exterior of the control console, or equivalent, showing at least:

i. the make

ii. model

iii. serial number

iv. Approval number (EIN) (new or replacement equipment from the release of this spec)

7. Connected Equipment

For conducting HGV and PSV statutory testing DVSA do not require the RBT to have connected data transfer functionality as per the MOT scheme. If the RBT manufacturer wants to add this feature, it can do so, so long as it uses an industry accepted protocol.

8. Abbreviations used:

CCS	**Computer Control Software**	**MOT**	**Ministry Of Transport**
DFT	**Department For Transport (formerly Dtp)**	**PCLG**	**Private Cars & Light Goods**
DGTW	**Design Gross Train Weight**	**PSV**	**Public Service Vehicle**
DGVW	**Design Gross Vehicle Weight**	**RBT**	**Roller Brake Tester**
GTW	**Gross Train Weight**	**IVA**	**Individual Vehicle Approval**
GVW	**Gross Vehicle Weight**	**TAW**	**Total Axle Weight**
Dtp	**Department for Transport number allocated for brake testing**	**TW**	**Table/Test (Chart) Weight**
FWA	**Front Wheel Allowance**	**UK**	**United Kingdom**
GB	**Great Britain**	**ULTAST**	**Unladen Tri-Axle Semi-Trailer**
HGV	**Heavy Goods Vehicle**	**ULW**	**Un-Laden Weight**
LGV	**Light Goods Vehicle**	**DVSA**	**Driver & Vehicle Standards Agency**
GV	**Goods Vehicle**	**VRM/ID**	**Vehicle Registration number/Trailer Identification number**
LW	**Laden Weight**		
LSV	**Load Sensing Valve**		

9. Introduction to the Annexes

This section of the document describes the construction of the brake master database files and the principles of the associated computer control software (CCS). The CCS is used in the Roller Brake Tester (RBT) for testing all types of heavy vehicles and trailers.

Annex 1. Computer Control System

The initial screen of the CCS enables the user to select from four different vehicle types, and more could be added if required.

HGV	Tested by DVSA staff only
PSV	
Drawbar Trailers	
Semi-Trailers	

After the tester has selected the vehicle type to be tested, the option of a full brake test, or a voluntary brake test shall be made. The CCS will give the option for the user to enter their name.

Note: *The entered name will stay for the following tests unless changed, CCS shutdown or it is the next calendar day*

Note: *Further brake test options may be made available to the user, but only in semi-automatic mode*

The basic information that the CCS will ask the user for is:

Display	Mandatory/Optional	Comments
Vehicle Reg / Trailer Id	Mandatory	
Brake code	Mandatory	if no brake code number is entered, semi-automatic mode will be offered (see below)
Name	Optional	(pre-populated from the first entry of the day until the end of the day (23:59) or until changed by the user. When the name is changed, this will stay until the end of the day or is changed etc etc)
Test Type	Mandatory	Full test or Voluntary

The CCS will then guide the user through the correct procedure for the vehicle selected to ensure that an accurate brake test is carried out to a consistent standard. All brake force calculations are

done by the CCS, but the tester must be able to observe the dials to assess the condition of the brake components. HGV and PSV vehicles have complicated brake systems compared to the majority of those within the light vehicle testing scheme, and to enable the CCS to work, all the 'DVSA only Tested' vehicles have an identity number (DTP) which is the key to the CCS.

For HGV and Trailers, the basic information is contained in the brake master database files supplied by DVSA. A detailed description of all the files which make up the brake master database is given in *Annex 2.*

A meaningful numbering system, along with all the information required is contained within that number, is used for testing Public Service Vehicles (PSVs), no separate files are necessary. No vehicle identity numbers, or separate files are used for vehicles tested under the light vehicle scheme.

Although the Dtp number contains most of the information required for the brake test, further questions may be required to be asked when the Dtp number is entered depending upon the type and age of vehicle/trailer being tested. For example – "Parking brake on axle 1"

For any vehicle for which no Dtp number is available, the CCS will produce questions to be answered by the user, sufficient to carry the test in the same way as AUTO mode. When this has been completed the CCS will guide the user through the test in the normal way. This system is referred to as 'semi- automatic' mode *(Brake Test Modes).*

Completed brake test results will be stored in the CCS for the minimum period of 13 months for DVSA audit purposes. This will be readily available to DVSA local management and easy to find/view, either by registration number, trailer ID or date. These must be password protected for data protection. The password is held and maintained by the ATF and not by DVSA. DVSA may require access to this at any time for reprints or brake test audits.

The CCS will display a summary of the braking system which will identify the location of service, secondary and park brakes. There will be an option to amend this before the brake test starts in case of vehicle specifics being different to the information within *Field 1* Dtp number.

The database files are emailed to the manufacturers, and calibrators, and a few others - ATF's maintenance contractors etc. The process is the calibrator turns up with the data and installs it during a calibration visit.

The list below, in alphabetical order, gives the name of each file supplied and the types of vehicles to which it is applicable:

Braktype.dta Master.dta secbkpos.dta splitrou.dta Vehmake.dta	Applicable only to the testing of HGV's
vehtype.dta	Applicable to all vehicles
1atrl.dta 2atrl.dta 3atrl.dta 4atrl.dta	Applicable only to the testing of semi-trailers
version.dta	Identifies the release date of the brake file set

Annex 2. Description of MASTER.DTA file

This section shows the form definition used to construct the master.dta file, which is applicable only to HGVs. At the outset, to ensure all information contained on the brake data cards (which are no longer in use) was included, 34 fields were defined on the form but not all are now used by the DVSA CCS. A description of each field is given below.

Field 1 - Dtp Number

The Dtp number is contained in Field 1 which has space for six alpha/numeric characters. The Dtp number is the key to the entire process as it leads to the identification of the complete braking system on a particular vehicle. For vehicles manufactured prior to the introduction of type approval, the Dtp number would be either four numbers or four numbers followed by a single character (A to E). When type approval was introduced, it was decided to re-start the Dtp numbers at 3000 and these are all four numbers.

In addition to the Dtp numbers used for new vehicle types, when a vehicle has been modified after manufacture; these numbers are identified by a 'B' prefix and are discussed in *Annex 3* Also, there are further suffixes to identify variations which occur with any Dtp number. These suffixes, which are used with both pre and post type approval and 'B' prefix Dtp numbers; are discussed in *Annex 4*

Field 2 - Vehicle Make

Field 2 contains a three-character numeric code used to identify the vehicle make. The code is used in conjunction with the vehicle make file (vehmake.dta) described in Description of VEHMAKE.DTA File.

Field 3 - Vehicle Type

Field 3 contains a two-character alpha/numeric code used to identify the vehicle type. The code is used in conjunction with the vehicle type file (vehtype.dta) described in *Annex 6* The vehicle type file contains codes for all vehicle types.

Field 4 - Brake Routine Number

Field 4 contains a three-character alpha/numeric code used to identify the configuration of all three designated braking systems on the vehicle. The code is used in conjunction with the brake routine file (brakrout.dta), described in *Annex 7*

Field 5 - Pre / Prior / Post 1968 Options

Field 5 is a single character alpha field used to identify whether there is an option to test a vehicle under the Pre-1968 or Prior-1968 performance requirements, this field is not applicable to type approved vehicles. This field will either contain a 'Y' or be blank, if blank and the Dtp number is less than 3000, the vehicle will be tested as a post-1968 vehicle. If however, it contains a 'Y' the software will ask a question to establish whether the vehicle should be tested as a Pre-1968, Prior-1968 or Post 1968 vehicle; the answer to this question shall come only from the vehicle tester. Annex 16 discusses brake performance requirements for HGVs and, with reference to the 1968 period, there are different performance requirements according to the age of vehicle.

Field 6 - Split Routines

Field 6 contains a four-character alpha/numeric code which identifies the format of the split routine where a split service system is the designated secondary brake. The code is used in conjunction with the split routine file (splitrou.dta), described in Annex 8

Field 7 - Second Front Axle Steered

Field 7 is a single character alpha field used to identify whether a vehicle has one or two **front** steered axles (any steered axle forward of the centre line of the vehicle). This field either contains a 'Y' or is blank; if blank the vehicle has only one front steered axle. This information is used when calculating the front wheel allowance (FWA) described *here.*

Any steered axle that is not at the front (from the centre line of the vehicle length forward) of the vehicle has no effect on the FWA. This field also influences which wheels are assessed for ovality; if the field is blank the wheels of the second steered axle are not assessed.

Field 8 - Brake Distribution (Service)

Field 8 is a two-character numeric field used to provide the static brake distribution for the service brake. The brake distribution figure is used in the calculation of the FWA, which is used in the brake performance calculation when a front wheel locks during the brake test. The brake distribution, shown as a percentage, refers to the design static brake performance expected from the brake components used on the front axle(s) compared to the brake components used on the rear axles(s). Examples of different vehicles are given below.

a) A two-axle vehicle with identical brake components on both axles would be expected to provide the same static brake force from each axle thus 50% of the total brake force would be provided by the front axle and the entry for Field 8 would be '50'.

b) A three-axle vehicle with a single front axle and identical brake components on all axles would be expected to provide the same static brake force from each axle thus 33% of the total brake force would be provided by the front axle and the entry for Field 8 would be '33'.

c) A three axle vehicle with twin steered front axles and identical brake components on all axles would be expected to provide the same static brake force from each axle thus 33% of the total brake force would be provided by each of the front axles and in this case the entry for Field 8 would be '66'.

Field 9 - Brake Distribution (Secondary)

Field 9 is a two-character numeric field used to provide the static brake distribution for the secondary brake system. The figure, which is derived in the same way as for Field 8, is used in the calculation of the FWA when testing the secondary brake system. However, when the secondary brake works only on the front axle 100% of the secondary brake performance is required from the front axle and '100' should be found in Field 9 but as only two characters are available '99' is entered which should always be read as 100.

Field 10 - Transmission Brake

Field 10 is a single character alpha field used to identify when a vehicle is fitted with a transmission secondary and/or parking brake. Field 10 contains a 'Y' if the vehicle has a transmission brake and is blank if the vehicle does not. If the vehicle does have a transmission brake, the procedure described *here* should be followed.

Field 11 - Secondary Brake on Tractor Only

Field 11 is a single character alpha field used to identify a tractor unit with a secondary brake that operates only on the tractor unit. This field contains a 'Y' if the tractor unit does not provide secondary braking to a trailer. If blank the tractor unit does provide secondary braking to a trailer, and the secondary brake performance must be assessed against the GTW and GVW. This condition does not occur on type approved vehicles.

Field 12 - Design Gross Vehicle Weight

Field 12 is a four-character numeric field used to provide the maximum GVW for the vehicle group. The number given is in the form GVW/10 kg, for example, 7500 kg would be entered as '0750', with leading zero, and 17000 kg would be entered as '1700'. GVW is used in various brake calculations.

Field 13 - Design Gross Train Weight

Field 13 is a four-character numeric field used to provide the maximum GTW for the vehicle. The number given is in the form GTW/10 kg, for example, 9950 kg would be entered as ‘0995', with leading zero, and 37000 kg would be entered as ‘3700'. GTW is used in various brake calculations.

Field 14 - Design Weight Axle 1

Field 14 is a three-character numeric field used to provide the maximum design axle weight for the first axle. The number given is in the form axle-weight/10 kg. For example, 7500 kg would be entered as ‘750'. The axle weight is used in various brake calculations.

Field 15 - Design Weight Axle 2

Field 15 is a four-character numeric field used to provide the maximum design axle weight for the second axle. The number given is in the form axle-weight/10 kg. For example, 7500 kg would be entered as ‘0750', with leading zero, and 10000 kg would be entered as ‘1000'. The axle weight is used in various brake calculations.

Field 16 - Design Weight Axle 3

Field 16 is a four-character numeric field used to provide the maximum design axle weight for the third axle. Format and use details as for Field 15.

Field 17 - Design Weight Axle 4

Field 17 is a four-character numeric field used to provide the maximum design axle weight for the fourth axle. Format and use details as for Field 15.

Field 18 - Design Weight Axle 5

Field 18 is a four-character numeric field used to provide the maximum design axle weight for the fifth axle. Format and use details as for Field 15.

Fields 19 to 21 - No longer used.

Field 22 - Method of Operation (Service)

Field 22 is a two-character numeric code used to indicate the method of operation of the service brake system. The code is used in conjunction with the brake type file (braktype.dta), described in *Annex 9*

Field 23 - Method of Operation (Secondary)

Field 23 is a two-character numeric code used to indicate the method of operation of the **designated** secondary brake system. The code is used in conjunction with the brake type file (braktype.dta), described in *Annex 9*

Field 24 - Method of Operation (Park)

Field 24 is a two-character numeric code used to indicate the method of operation of the park brake system.

The code is used in conjunction with the brake type file (braktype.dta), described in *Annex 9*

Field 25 - No longer used.

Field 26 - Load Sensing Valve Fitted

Field 26 is a single character alpha field used to identify when a load sensing valve (LSV) is fitted, contains a “Y” if the vehicle is known to have an LSV fitted, otherwise it is left blank.

Field 27 - Load Sensing Valve Option

Field 27 is a single character alpha field used to identify if an LSV is an optional fitting, contains a “Y” if the option is available to have an LSV fitted and is left blank if either no option is available or when a ‘Y’ has been entered in Field 26.

Fields 28 to 32 - Brake Modulation

Fields 28 to 32 are single character alpha fields used to identify axles upon which the brake line pressure is modulated and hence would appear to provide little braking effort when not fully laden. Brake modulation is most common on the second axle of modern three axle tractor units. However, even when a tractor unit is presented fully laden, maximum brake performance is unlikely to be achievable on the modulated axle as the system is designed to take account of the dynamic weight transfer of the semi-trailer during braking. Special rules have been issued to take account of assessment of axles with modulated braking, see *Modulated Braking* section.

Field 33 - No longer used.

Field 34 - Double Drive with No Third Differential

Field 34 is a single character alpha field used to identify when the vehicle has a double drive with no third differential. Field 34 contains a Y if the vehicle is a double drive with no interposed third differential; otherwise, the field is left blank. To avoid serious damage, the correct procedure must be used when testing a vehicle without a third differential, see *Multi-drive axles* section.

Annex 3. Modified Vehicles - B Prefix

Some vehicles are modified after manufacture, to vary their carrying capacity for example. Where the modification results in alterations to the braking requirements the vehicle will require a revised Dtp number, if there is no matching entry in the database a number with a ‘B’ prefix will be issued.

Annex 4. Dtp Number Suffixes

With Dtp numbers of less than 3000 (pre-type approval), suffixes A to E are used to identify different brake characteristics within the same basic vehicle. These suffixes (A to E) form a part of the Dtp number and are shown on the vehicle plate. However, the database contains further suffixes, which are used with all types of HGV Dtp numbers, including 'B' prefix numbers, these suffixes ('F' onwards) do not appear on the vehicle plate; they appear only in the master.dta file and on the brake test report printout.

These additional suffixes indicate an option of some kind related to the brake system of the vehicle that shall be identified only by tester observation. For example, a vehicle may be type approved with the option of a parking brake operating on either axle 1 or axle 2. In this situation a correct brake test shall only be carried out when the CCS knows on which axle the parking brake operates. Thus, the additional suffix enables the CCS to ask the question at an early stage in the test so that an uninterrupted brake test shall then be carried out.

The list below shows the question that will be asked when a particular suffix is used:

F.	Not used at present
G	Drum brakes or disc brakes?
H	Two or three position hand control fitted?
I	Parking brake on Axles 1 & 4, 2 & 4, or 2 & 3?
J	Type 24 or Twin stop 12/30 actuators fitted on front axle?
K	Parking brake on Axle 1?
L	Secondary & parking brakes on Axle 1?
M	Parking brake on Axle 2?
N	Secondary & parking brakes on Axle 3?
O	Parking brake on Axles 1 & 2, 1 & 3, or 2 only?
P	Secondary & parking brakes on Axle 4?
Q	Not used at present
R	Not used at present
S	Used as the second alternative when options are available
T	Used as the third option when option I is used
U	Used as the third option when option O is used
V-Z	Not used at present

Annex 5. Description of VEHMAKE.DTA File

Each entry of the vehmake.dta file (vehicle make) consists of two fields.

Field 1 contains a three-character numeric code, as used in Field 2 of the master.dta file.

Field 2 contains the make of the vehicle in full, in alpha characters.

A printout of part of the vehmake.dta file is shown in Appendix 4. The file will grow as new vehicle makes are presented for type approval or when an existing vehicle is marketed under a new name.

Annex 6. Description of VEHTYPE.DTA File

Each entry of the vehtype.dta file (vehicle type) consists of two fields.

Field 1 contains a two-character alpha/numeric code, as used in Field 3 of the master.dta file.

Field 2 contains a description of the vehicle type in alpha/numeric characters.

A printout of the whole vehtype.dta file is shown in Appendix 5. The file will grow only when a new type of vehicle is introduced for testing, very rarely.

Annex 7. Description of BRAKROUT.DTA File

Each entry of the brakrout.dta file (brake routine) consists of four field

Field 1 contains a three-character alpha/numeric code, as used in Field 4 of the master.dta file. The meaning of the code is described below:

First character: identifies the axles on which the service brake system operates

Second character: identifies the secondary brake system, either split or axle details

Third character: identifies the axles on which the parking brake system operates

Each character has the following meaning:

Character	Detail
0 (Zero)	Split system (used only for second character)
1	Axle 1
2	Axle 2
3	Axles 1 + 2
4	Axle 3
5	Axles 1 + 3
6	Axles 2 + 3
7	Axles 1 + 2 + 3
8	Axle 4
9	Axles 1 + 4
A	Axles 2 + 4
B	Axles 1 + 2 + 4
C	Axles 3 + 4
D	Axles 1 + 3 + 4
E	Axles 2 + 3 + 4
F	Axles 1 + 2 + 3 + 4

For example, a brake routine code of 754 would have the following meaning:

First character	7	Service brake operates on axles 1,2 and 3
Second character	5	Secondary brake operates on ales 1 and 3
Third character	4	Parking brake operates on axle 3 only

Field 2 contains details, as shown above, of the axles on which the service brake operates.

Field 3 contains either details of the axles on which the nominated/designated secondary brake operates, as shown above, or the word SPLIT. The word SPLIT indicates that the vehicle has a split service braking system rather than a separate secondary system. Details of the split braking system are held in splitrou.dta described in *Annex 8*

Field 4 contains details, as shown above, of the axles on which the parking brake operates.

A printout of the whole file is shown in Appendix 6. The brake routine file will increase in size in the future if five+ or different axle configuration vehicles are introduced in GB.

Annex 8. Description of SPLITROU.DTA File

Each entry of the splitrou.dta file (split routine) consists of two fields.

Field 1 contains a four-character alpha/numeric code, as used in Field 6 of the master.dta file.

Field 2 contains a description of the split routine, as shown below:

vehicles	Code	Type	Split A	Split B
Two Axle	1100		[1] only	
	1122	Front/Rear	[1]	[2]
	1133		[0.60 x 1]	[(0.40 x 1) +2]
	1221	Diagonal	[n/s1 + o/s2]	[o/s1 + n/s2]
	3113	'L' split	[(0.5 x 1) + n/s2]	[(0.5 x 1) + o/s2]
	3333	Duplicate	[1 + 2]	[1 + 2]
Three Axle	1166	Front/Rear	[1]	[2 + 3]
	1177		[0.60 x 1]	[(0.40 x 1) + 2 + 3]
	3146		[1 + n/s2]	[3 + o/s2]
	3344		[1 + 2]	[3]
	3355		[1 + 2]	[1 + 3]
	3366		[1 + 2]	[2 + 3]
	3377		[1 + 2]	[1 + 2 + 3]
	5522	Inner/Outer	[1 + 3]	[2]
	5566		[1 + 3]	[2 + 3]
	5577		[1 + 3]	[1 + 2 + 3]
	7337		[1 + 2 + n/s3]	[1 + 2 + o/s3]
	7777	Duplicate	[1 + 2 + 3]	[1 + 2 + 3]
Four Axle	33CC	Front/Rear	[1 + 2]	[3 + 4]
	55AA		[1 + 3]	[2 + 4]
	9966	Inner/Outer	[1 + 4]	[2 + 3]
	FFFF	Duplicate	[1 + 2 + 3 + 4]	[1 + 2 + 3 +4]

Note: *The contents of the whole file are shown above, the file may increase in the future if a new form of split system is introduced.*

For type approved vehicles with **NO** split routine (field 6 of masterdata file empty), the following shall be assumed:

2 Axle Vehicles	1122	Front/rear	[1]	[2]
3 Axle vehicles	1166	Front/rear	[1]	[2+3]
4 Axle Vehicles	33CC	Front/rear	[1+2]	[3+4]
5 Axle Vehicles	N/A	Front/rear	[1+2]	[3+4+5]

Annex 9. Description of BRAKTYPE.DTA File

Each entry of the braktype.dta file (method of brake operation) consists of two fields.

Field 1 contains a two-character numeric code, as used in Fields 22, 23 & 24 of the master.dta file.

Field 2 contains a description of the method of operation of the brake system as shown below:

Field 1	Field 2
1	Full mechanical
2	Air assisted mechanical
3	Full hydraulic
4	Vacuum assisted hydraulic
5	Air assisted hydraulic
6	Full vacuum
7	Full air
8	Power hydraulic
9	Lock actuator
10	Full spring
11	Full electric
12	Full air and spring
13	Full air and Air assisted hydraulic
14	Vacuum or Air assisted hydraulic
15	Vacuum and/or Hydraulic assisted mechanical(option)
16	Air assisted or Full air (option)

The contents of the whole file are shown above, the file may increase in the future if a new form of braking system is introduced.

Annex 10. Description of VERSION.DTA File

The version.dta file contains one entry field which gives the version number of the brake master database supplied. An example of the entry is:

V986.0 or 1003.0

The above version numbers indicate the brake master database supplied was the first issue compiled in June 1998 and October 2003.

Annex 11. Trailers

There are two basic types of trailers:

- Drawbar trailer
- Semi-trailer

Each type of trailer may be single or multi-axle, and draw-bar trailers shall be either a full drawbar or a centre-axle drawbar. *Appendix 2* contains pictures showing each type of trailer covered by this document.

Trailer Numbering System

A six-character reference number is used to identify the details required to carry out a brake test on any type of trailer. The Dtp trailer brake reference number, which must not be confused with the unique trailer identity number, is constructed as follows: entered as ABCDEF

A		B	C	D		E		F

Character A

Character A is numeric and used to identify the type of trailer:

Character A	Trailer Type
1	1 axle semi-trailer
2	2 axle semi-trailer
3	3 axle semi-trailer
4	4 axle semi-trailer
5	1 axle centre-axle draw-bar trailer
6	2 axle centre-axle draw-bar trailer
7	3 axle centre-axle draw-bar trailer
8	2 axle full drawbar trailer
9	3 axle full drawbar trailer
0	4 axle full drawbar trailer

Characters B, C & D

Characters B, C & D are numeric and used to identify the GVW of the trailer, but the construction of the number is different for draw-bar trailers and semi-trailers.

1 Draw-Bar Trailers

The weight used when brake testing brake efficiency of draw-bar trailers are:

a) Full drawbar GVW for service and parking

b) Centre drawbar trailers TAW for service and GVW for parking

The GVW/TAW is entered in the character B, C & D positions as follows:

i) The GVW/TAW is entered in the form GVW/TAW divided by 100, rounded up to the next whole number if necessary.

ii) When the GVW/TAW is less than 10000 kg the sum will result in a two- character number and in these cases a leading zero must be used. For example, a draw-bar trailer with a GVW of 9750 kg would be shown as follows:

9750/100 = 98 (rounded up) Number entered = 098

iii) When, for example, the GVW is 32750 kg, the entry would be as follows:

32750/100 = 328 (rounded up) Number entered = 328

Thus, the number entered in the character B, C & D positions for drawbar trailers is a meaningful number.

2 Semi-Trailers

Semi-trailers have to be treated in a different way to centre draw-bar trailers as the GVW of semi-trailers includes the total weight on the axles plus the imposed weight on the king- pin of the tractor unit. When a semi-trailer is connected to a tractor unit, the tractor unit would have sufficient braking from its service brake to cope with the imposed weight on the kingpin and the semi-trailer service brake would need to take account only of the total weight on the axles. However, when a fully laden semi-trailer is parked without the tractor unit, the parking brake must control the entire GVW. It was not possible to present all this information in three characters so, for semi-trailers only, the number entered in characters B, C & D is not a meaningful number, it is used only as a reference to access the additional files:

i) atrl.dta

ii) atrl.dta

iii) atrl.dta

iv) atrl.dta

supplied with the brake master database. All axle weight and GVW information required to test a semi-trailer is contained in the additional files, a description of which is given in *Annex 12 - 13*

The additional semi-trailer files are active files in that a printout of the files is used when a semi-trailer is first presented for testing, which is when the trailer brake code is created and allocated to the trailer. If the combination of axle weights and GVW for the trailer is not available in the list, a new code will be created, and the information added to the relevant file for future use. All new additions will be included automatically when the semi-trailer files are next supplied. It is important therefore, that updates of these files are obtained and used if heavy Vehicle MOT testing is being carried out.

Character E

Character E is alpha/numeric and identifies the axles on which the parking brake operates and takes the same form, except for “0 (Zero)”.

Character F

Character F is numeric and identifies whether load sensing valves and/or anti-lock brakes are fitted, whether the trailer is fitted with brakes to a type approved standard and whether it has Electronic Braking System (EBS). The meaning of character F is as below:

Character F	Load sensing	Anti-Lock	Type approved	EBS
0	-	-	-	-
1	-	-	Y	-
2	-	Y	-	-
3	-	Y	Y	-
4	Y	-	-	-
5	Y	-	Y	-
6	Y	Y	-	-
7	Y	Y	Y	Y
8	Y	Y	Y	Y

A trailer with a type approved braking system will be tested according to the performance requirements specified in *Brake efficiency requirements* section. If the brake system is not type approved then the RBT CCS will ask a question whether the trailer should be tested as a Pre-1968, Prior-1968 or post-1968 vehicle.

Annex 12. Description of 1ATRL.DTA File

Each entry of the 1atrl.dta file consists of five fields, all numeric but Field 3 is blank.

Field 1 a five-character numeric field, which gives the GVW of the trailer. To restrict the total number of different entries GVWs are grouped in ranges of 250 kg. For example, all trailers with a GVW in the range 16250 kg to 16499 kg would be shown with an entry of '16250' (rounded down). GVWs of less than 10000 kg are shown without leading zeroes.

Field 2 a five-character numeric field, which gives the design axle weight of the single axle. Again, to restrict the total number of different entries, axle weights have been grouped in ranges of 100 kg. For example, all trailers with an axle weight in the range 6100 kg to 6199 kg would be shown with an entry of '6100' (rounded down). Leading zeroes are not shown.

Field 3 is blank

Field 4 a five-character numeric field which gives the TAW of the bogie which in the case of a single axle semi-trailer is the same as Field 2.

Leading zeroes are not shown.

Field 5 a three-character numeric code field which relates to that used in Characters B, C & D of the Dtp Trailer Brake Reference Number. Thus, by use of this code, details of the TAW and GVW of the semi-trailer shall be obtained.

A printout of part of the 1atrl.dta file, sorted on GVW ascending, is shown in Appendix 10.

Annex 13. Description of 2, 3 & 4ATRL.DTA Files

Each entry of the ?atrl.dta files consist of nine fields: all numeric but varying fields are blank.

Fields 1 & 2 as for 1atrl.dta file, see *Description of 1ATRL.DTA File*

Fields 3 to 5 are five-character numeric fields which gives the design axle weight of the second, third & fourth axles. Format details as for Field 2.

Fields 6 & 7 are blank.

Field 8 a five-character numeric field, which gives the total axle weight of the bogie. This value is simply the addition of Fields 2 to 5, and format details are the same as Field 2.

Field 9 a three-character numeric code field which relates to that used in Characters B, C & D of the Dtp Trailer Brake Reference Number. Thus, by use of this code, details of the axle weights and GVW of the semi-trailer shall be obtained.

Annex 14. Other Trailers

Although semi-trailers with more than four axles, and other multi-axle trailers not included in the above descriptions, are used in GB, they are designed for special purposes and are not used for normal operations.

The RBT will have the ability to test more than 4 axles using an intuitive menu system in semi-automatic mode

Annex 15. Buses And Coaches

Buses and coaches fall into three categories:

- Class IV
- Class V
- Class VI.

Note: *For Class IV & V vehicles please see the relevant specification.*

Class VI

These vehicles consist of all buses and coaches, with more than eight passenger seats, which carry fare-paying passengers; these are public service vehicles (PSVs). Class VI vehicles are tested in accordance with the Public Service Vehicle Inspection Manual by DVSA staff only, in Authorised Testing Facilities (ATFs)

Brake Performance Calculations - PSV's is applicable only to testing Class VI vehicles.

Public Service Vehicle (Class VI) Numbering System

A	**B**	**C**		**D**		**E**		**F**

Characters A, B & C

Characters A, B & C are numeric and used to identify either the laden weight or the GVW of the PSV.

The weight is entered in the form: Weight/100 kg

If the resulting sum is only two characters, a leading zero is added. For example: A PSV with a GVW of 7500 kg will be calculated as 7500/100 and entered as '075'.

Character D

Character D contains an alpha/numeric code which is used to identify the vehicle's split service braking system and details the system. The table below is only used where character E (page 39) is "zero" or where a secondary alternative calculation is required.

Each character used has the following meaning:

Character	Vehicle	Service Brake Split System	Equivalent HGV Code
1	2 axle	No split (separate secondary system)	
2	2 axle	Front/Rear split	*1122*
3	2 axle	'L' split	*3113*
4	2 axle	Duplicated system	*3333*
5	2 axle	Diagonal split	*1221*
6	2 axle	Axles [1] & [1 + 2]	*1133*
7	3 axle	No split (separate secondary system)	
8	3 axle	Axles [1 + 2] & [1 + 3]	*3355*
9	3 axle	Axles [1 + 3] & [2 + 3]	*5566*
A	3 axle	Axles [1] & [1 + 2 + 3]	*1177*
B	3 axle	Axles [1] & [2 + 3]	*1166*
C	3 axle	Axles [1 + 2] & [3]	*3344*
D	3 axle	Axles [1 + 3] & [2]	*5522*
E	3 axle	Axles [1 + 2] & [1 + 2 + 3]	*3377*
F	3 axle	Axles [1 + 2] & [2 + 3]	*3366*
G	3 axle	Duplicated system	*7777r*

Description of SPLITROU.DTA File section will provide a detailed description of the names used for each of the split braking systems shown in the table above and, except for character "6" - *PSV Secondary Brake* shows how to calculate each half of all the split systems. To aid that process, the relevant HGV Codes have been shown in the table above.

Character E

Character E contains a numeric code that is used to identify if or where a separate nominated/designated secondary brake system is fitted

Important Note: *Character E defines the designated secondary for the vehicle. If character E is "zero" then the split system (character D) is to be taken as the nominated/designated secondary.*

Character	Detail
0 (Zero)	Split system (used only for second character)
1	Axle 1
2	Axle 2
3	Axles 1 + 2
4	Axle 3
5	Axles 1 + 3
6	Axles 2 + 3
7	Axles 1 + 2 + 3

Character F

Character F contains an alpha/numeric code that is used to identify on which axles the parking brake is fitted.

Character	Detail
0 (Zero)	Split system (used only for second character)
1	Axle 1
2	Axle 2
3	Axles 1 + 2
4	Axle 3
5	Axles 1 + 3
6	Axles 2 + 3
7	Axles 1 + 2 + 3
F	Transmission Brake

Annex 16. Brake Performance Calculations - HGV

The brake performance requirements for vehicles tested under the Heavy Goods Vehicle testing scheme are specified in the Goods Vehicles (Plating and Testing) Regulations 1988, as amended. This section explains how the brake performance for each braking system is calculated for HGVs. The vehicles to be tested as an HGV are specified in the Regulations, but in general terms they are any motorised load-carrying vehicle with a GVW greater than 3500kg. *Brake efficiency requirements* section shows the brake performance requirements for all rigid vehicles and tractor units and was correct at the time of writing this document. However, the information contained in the latest version of either the Plating and Testing Regulations or the Heavy Goods Vehicle Inspection Manual shall be regarded as the definitive requirements.

The Plating and Testing Regulations relate brake performance to GVW, and in some circumstances GTW, which will be found in the brake master database. As some elements of the brake performance test relate to presented axle weight, either a built-in weighing system or a separate (preferably electrically linked) axle weighing system is necessary with the RBT.

Service Brake

The brake performance requirements for the service brake are detailed in *Brake efficiency requirements*. For all vehicles other than 'pre-1968' vehicles, the total service brake performance requirement is:

50% x DGVW

The total service brake performance requirement for 'pre-1968' vehicles varies with the number of axles and whether the vehicle is a rigid or a tractor unit. It should be noted also there is no requirement for 'pre-1968' vehicles to have a brake on every axle.

Secondary Brake

There are basically two types of secondary brake:

- completely separate system with a hand lever (normally handbrake) in the cab
- split service brake system whereby both halves of the split are completely independent systems operated by the single foot operated service brake pedal.

Where the designated (Manufacturer stated) secondary is the service brake split system, secondary brake is **NOT** assessed at test, the secondary split figures will be added to the printout to aid industry diagnosis (to calculate, see optional systems below)

The brake performance requirements for the secondary brake are detailed in *Brake efficiency requirements.* For most vehicles, the secondary brake performance requirement is:

25% x DGVW

The secondary brake performance requirement for 'pre-1968' vehicles varies with the number of axles and whether the vehicle is a rigid or a tractor unit. For 'Prior-1968' and 'post-1968' vehicles, if the secondary brake of a tractor unit does not work on the trailer the GTW has to be used (ref. Field 11, *MASTER.DTA file*).

Optional Systems

Where the designated secondary brake is via the hand control and the system fails to meet the requirements, an alternative using the service brake split system shall be used. This will be automatically calculated by the RBT.

The split routine characters will be missing (or represented by 0) from the splitrou.dta file (split routine) Field 1 and field 6 of the master.dta file.

In this case, the table should be used in *Annex 8* and the characters added based upon how many axles the vehicle has where the data is missing.

The following will take place to calculate an alternative using the service brake split system following a failure for secondary (designated to the hand control)

Each half of split service brake system figures are added together and divided by DGVW x 100 to get a percentage. This will produce two readings, one for each half

Note: *Lock allowance will apply, see Front Wheel Allowance*

For semi-auto mode, a lock allowance of 25% will be used

If each half of the split system has >50% locks than this will deemed to pass without the requirement for the calculation.

Each half of the split system based upon the calculation above, will need to meet:

>=25% efficiency or with >50% locks. This will be calculated by the CCS

Parking Brake

The brake performance requirements for the parking brake are detailed in *Brake Performance Calculations - HGV*. There are no specific performance requirements for 'Pre-1968' or 'Prior-1968' vehicles and there are different requirements for 'Post-1968' and Type Approved vehicles.

It should be noted that for Type Approved motor vehicles, the criteria to be met is the greater of either:

16% x DGVW, or 12% x DGTW whichever is greater

Applied Brake Test

Before the applied park brake test is commenced, any tension must be released from the tyres to avoid potential tyre damage, for example:

- Both rollers can be rotated prior to the park brake being applied (all brakes must be released). This must be a manual operation with on screen instructions for the user to follow
- The releasing of any electrical locks applied to lock the rollers in position

When testing HGVs, the parking brake system should be tested using the applied brake test method whereby the parking brake is fully applied prior to starting the RBT motors.

Transmission Brake

When a vehicle is fitted with a transmission brake it shall only be tested by running both wheels on the axle together, in the same direction, the brake must be applied very carefully and to prevent the vehicle from coming out of the rollers the front axle must be chocked.

***Note**:* *An on-screen warning to state:*

- *"Make sure the vehicle is adequately chocked"*
- *"Apply the handbrake slow and steady"*

Transmission brakes may be found on all classes of vehicle except trailers.

If during the roller brake test of the transmission brake, the CCS detects that only one wheel is locking then this must be overruled as a pass on locks (the overrule will be noted on the printout, see *Annex 22*)

Multi-drive axles

Vehicles with multi-drive axles may be tested on a RBT, those with a third differential shall be tested as a normal vehicle, i.e., as a single drive axle. However, if the vehicle does not have a third differential the vehicle has to be tested by rotating the wheels on the RBT in contra-rotation. Obviously, this means that those vehicles without a third differential cannot be tested running two wheels together both in a forward direction, a requirement for classes 4, 5 & 7.

Annex 17. Related Aspects

In addition to the main performance requirements there are other aspects of the brake test that need clarification to ensure that all computer controlled RBTs are operating to the same standards.

Bind

When a wheel starts to rotate on a RBT it is likely that a small ‘brake force’ will be indicated which could arise from two sources, ‘drag’ and ‘bind’. Drag is an unavoidable effect caused by the effort placed upon the RBT motor to rotate the vehicle wheel, the drive mechanism (if applicable) and to overcome the surface friction and deflection of the vehicle tyres. Because of the tyre effect, drag will become greater as the presented weight on the axle becomes greater. Bind is the friction resulting from any contact between the braking surfaces. It is likely that the brakes will have been adjusted to ensure that there is the best chance of passing the test and there is a possibility that the adjustment may have left the braking surfaces in too close a contact. As a result, a limit has been placed on the maximum ‘brake force’ allowed when the RBT motor is running, and the vehicle brakes have yet to be applied. The limit set takes account of both drag and bind but is referred to only as ‘bind.’

To pass the test for ‘Bind’, the indicated brake force when the RBT rollers are started shall not exceed:

4% of presented (measured) axle weight per wheel

The CCS will warn the operator during the test, where measured bind is greater than 4% by means of an on-screen warning.

The final report will show the bind in KGs and as a percentage.

Little or No Brake Effort

The Regulations state that on all Post-1968 and Type Approved vehicles every wheel shall have an effective service brake. Although the overall brake performance of a vehicle may be obtained with one wheel ineffective, a limit has been set for 'little or no brake effort'.

To pass the test for 'Little or No Brake Effort' the maximum brake force shall not be less than:

5% of presented (measured) axle weight per wheel

It can be seen in the *Brake efficiency requirements* section that for vehicles registered before 1968 no performance requirement is specified for the parking brake, but these vehicles must have a parking brake and it shall meet the 'little or no brake effort' requirement. However, as it was not a requirement to have a brake on every wheel of pre-1968 vehicles, where no brake is fitted to a wheel the 'little or no brake effort' rule cannot be applied.

Time lag

This information has now been removed; time lag must be assessed manually.

Imbalance

For HGVs, PSVs and Trailers all wheels are tested individually, thus it is not possible to assess imbalance throughout the whole range of brake force. Imbalance is assessed only at the maximum brake effort achieved for each wheel on an axle.

Note: *Imbalance is to be tested on **service** and **secondary** brake systems, the same calculation applies.*

The following formula is used:

$$\text{Imbalance (\%)} = \frac{Higher\ Brake\ Effort - Lower\ Brake\ Effort}{Higher\ Brake\ Effort}\ X\ 100$$

For the service and secondary brakes, a failure shall be recorded if the imbalance is:

Greater than 30%

Note: *The HGV/PSV inspection manuals states: braking effort from any wheel on an axle is less than 70% of the brake effort from another wheel on the same axle.*

If both wheels on an axle lock, the imbalance criterion is not applicable. If one wheel on an axle locks, the following rules must be applied:

a) If the brake force from the locked wheel is less than the non-locked wheel, the imbalance criteria defined above is not applicable as the locked wheel is deemed to be capable of a greater brake force.

b) If the brake force from the locked wheel is greater than the non-locked wheel, the imbalance criteria defined above must be applied, as the non-locked wheel may be defective.

Ovality

Ovality is measured only on **front** steered axles (any steered axle forward of the vehicle centre line).

In the CCS for HGVs and PSVs, the braking effort trigger for measuring ovality comes in a band of 25% - 35% of the measured wheel weight, for 4 seconds. If this is not achieved, then the band will drop to 5% of measured wheel weight.

If there is little or no increase in effort on that brake, for example, the brake is not working, then the test must proceed and the rolling resistance or very low effort shall be taken as the result for that brake

The following formula is used:

Ovality (%) =

$$\frac{Max\ Brake\ Force - Min\ Brake\ Force}{Max\ Brake\ force}\ X\ 100$$

Note: *If the brake being tested has little or no effort, then the ovality band may not be reached, if this is the case, there must be a way of stopping the rollers and moving on to the next wheel/axle. The max force will still be recorded if the rollers are stopped.*

A failure shall be recorded if, when a wheel is rotated with a steady brake pressure applied, the braking effort varies by greater than 70%.

If the 70% threshold is breached during the test, then the CCS will display an on-screen warning

Advisories (see *Annex 22*) will show the following:

a) **Imbalance** - where the resulting figure is between 25 and 30%

b) **Ovality** - where the resulting figure is between 65 and 70%

c) **Bind** - where the resulting figure is between 3% and 4% of the presented (measured) axle weight

d) **Low effort** - where the resulting figure is between 5% and 10% of the presented (measured) axle weight per wheel

Hydraulic Pressure Fall-Off

The entry in the master.dta file (Field 22) is used to identify when hydraulics forms a part, or all, of the brake system. When the brake test report is printed out (see *Annex 22*), the heading 'Fall-Off' will be shown. No result will be shown when the heading is 'Ovality' but a result of either 'Pass' or 'Fail' based on the ovality algorithm will be shown when the heading is 'Fall-Off'.

There is an anomaly, because the ovality algorithm is used for the 'Fall-Off' check if, by chance, the wheel does record extreme ovality it is possible for the CCS to show an invalid 'Fail' for 'Fall-Off'. However, by the time the 'Ovality' and 'Fall-Off' checks have been completed at least four wheels will have been checked and it should be possible to make an accurate assessment of the whole situation. When the driver is asked to hold the brake pressure steady for either test, if actual ovality is present the brake force will generally oscillate whereas when fall-off of hydraulic brake pressure occurs there will be little or no rise in 'brake force', it will just steadily fall.

For fall-off to become a failure, it must be detected on more than one wheel of a vehicle during the test, otherwise a pass is shown. This should counter the issue of the driver letting their foot off the brake too early.

For rear axle fall off, the CCS for HGVs and PSVs, the braking effort trigger for measuring fall off comes in a band of 25% - 35% of the measured wheel weight, for 4 seconds. If this is not achieved, then the band will drop to 5% of measured wheel weight.

Note: *If fall-off is suspected and is only on one wheel, it will be up to the user to decide whether fall-off exists and overrule as appropriate.*

Front Wheel Allowance

If a front wheel locks during a test of the service or secondary brake (alternative), either the actual value of brake force recorded or the calculated FWA value, whichever is the greater, shall be used. The FWA is calculated using the information from Fields 7, 8, 9 & 12 of the brake master database as follows:

For each front wheel that locks, the FWA (kg) is:

Service = (0.5DGVW / Number of Front Steered Wheels) x (Brake Distribution Service / 100)

Secondary = (0.25DGVW / Number of Front Steered Wheels) x (Brake Distribution Secondary / 100)

***Notes**: i) The value to be used for GVW is in Field 12 (x 10)*

ii) Number of front steered wheels shall be derived using Field 7

iii) Brake Distribution Service is in Field 8

ii) Brake Distribution Secondary is in Field 9 (note: 99 = 100)

When testing in semi auto mode (and the Brake Distribution is therefore unknown), the Front Wheel Allowance for a locked front steered wheel should be taken as:

Maximum brake force achieved x 1.25

Locked Wheels

If more than half of the wheels lock during the test of any brake system, and the related elements e.g., Bind & Ovality, have been met, the vehicle shall be deemed to have met the performance requirements for that system.

The exception to this would be transmission park brake, if it is recorded that one-wheel locks, then by virtue of that system the other side will also lock. If this scenario occurs, which is most likely when a wheel lifts off the load sensing bar, then it will deemed to have passed.

Load Sensing Valves

HGVs and Trailers, unless exempted, are required to be laden for the brake test. The CCS will automatically display “more load required” during the test when there is insufficient weight on an axle’

Note: *Insufficient weight for HGVs and all trailers apart from 3 axle semi-trailers is less than 65% measured axle weight. PSVs are not included as they are tested empty*

Modulated Braking

On some three-axle tractor units modulated braking is applied to (usually) the second axle (ref. Fields 28 to 32 of the master.dta file). The brake line air pressure is severely limited to the modulated axle until a significant load has been applied. A laden semi- trailer will enable some brake force to be achieved but the system has been designed to take account of dynamic weight transfer and even with a normal laden semi-trailer insufficient brake force may be available to pass the test. At least 65% of the total design axle weight should be available prior to starting the brake test.

Modified Vehicles

All ‘B’ prefix *Modified Vehicles - B Prefix* shall be tested to the Type Approval requirements.

Annex 18. Brake Performance Calculations - Trailers

The Goods Vehicles (Plating and Testing) Regulations 1988, as amended, define which trailers shall be tested under the HGV Testing Scheme. For a trailer to be tested under the HGV Testing Scheme, it must either be a semi-trailer, converter dolly or a trailer with an unladen weight exceeding 1020 kg. The brake performance is related to the GVW and, in the case of a semi-trailer or centre drawbar trailers to the total weight carried on the axle(s) alone (TAW). *Annex 24* lists the brake performance requirements for each type and all age categories. The information shown in *Annex 24* was correct at the time of writing this document but the information contained in either the Plating and Testing Regulations or the latest version of the Heavy Goods Vehicle Inspection Manual shall be regarded as the definitive requirements.

Service Brake

The brake performance requirements for the service brake are detailed ***Annex 24***

Depending upon the age and type of trailer, the service brake performance requirement for semi-trailers ranges from 32% to 45% TAW. The TAW is used for semi-trailers as the imposed weight on the king-pin is catered for in the braking capacity of the tractor unit.

For draw-bar trailers, the service brake performance requirement ranges from 35% to 50% GVW or TAW depending upon the age and type of the trailer.

Drawbar trailers, the following question is asked when entering the Dtp number:

"Manufactured after 1st January 2012?" (Yes/No)

Drawbar trailers	Manufactured before 1 January 1968	Manufactured from 1 January 1968 to 30 September 1982	Manufactured from 1 October 1982	Manufactured from 1 January 2012
Specified Efficiency Centre Axle Drawbars	35% DTAW	40% DTAW	45% DTAW	50% DTAW
Specified Efficiency Other Drawbars	40% DGVW	50% DGVW	45% DGVW	50% DGVW

Note: *the examiner will need to refer to the brake force requirement table in the relevant inspection manual for trailers manufactured pre-1st October 1982*

Full drawbar trailer may consider FWA see *Related Aspects*

Secondary Brake

There is no requirement to test the performance of the secondary brake on a trailer; a functional check is conducted at another stage of the inspection.

Parking Brake

The brake performance requirements for the parking brake are detailed in *Annex 24*. It can be seen there is no performance requirement specified for the parking brake system on either Pre-1968 or Prior-1968 trailers of any type but trailers must have a parking brake and the minimum requirement for 'little or no brake effort' should be achieved. The requirement for Post-1968 and Type Approved trailers of all types is 16% GVW.

Applied Brake Test

Before the applied park brake test is commenced, any tension must be released from the tyres to avoid potential tyre damage, for example:

- Both rollers can be rotated prior to the park brake being applied (all brakes must be released). This must be a manual operation with on screen instructions for the user to follow
- The releasing of any electrical locks applied to lock the rollers in position

When testing Trailers, the parking brake system should be tested using the applied brake test method whereby the parking brake is fully applied prior to starting the RBT motors.

Related Aspects

Some of the related aspects described in *Related Aspects* are applicable also to Trailers. To save repeating the whole text, all the subjects discussed are listed below and the relevance to Trailers is shown:

Little or No Brake Effort	Applicable to all Trailers
Bind	Applicable to all Trailers
Imbalance	Applicable to all Trailers
Ovality	Not applicable to any Trailers
Hydraulic Pressure Fall-Off	Not applicable to any Trailers
Front Wheel Allowance	Applicable only to full draw-bar Trailers Locked
Locked Wheels	Applicable to all Trailers (however see section *Tri-axle Semi-Trailers)*
Load Sensing Valves	Applicable to all Trailers (however see section *Tri-axle Semi-Trailers)*
Modulated Braking	Not applicable to any Trailers

To take account of the dynamic weight transfer that takes place when the brakes are applied on a full draw-bar trailer, a FWA shall be applied when a front steered wheel locks. The method used to calculate the FWA, which is applicable only to the service brake system, is:

Maximum Brake Force (achieved per wheel) x 1.25

The above method of calculating the *Front Wheel Allowance* is applicable only to full drawbar trailers with either one or two front steered axles it is not applicable to any other type of trailer.

Tri-axle Semi-Trailers

A large percentage of tri-axle semi-trailers are leased from rental companies, and these companies have difficulty in presenting trailers for test in a laden condition. When a trailer is tested in the normal way; even when using a load simulator, if the load sensing valve is working correctly, and the brakes are in perfect working order; it is likely that insufficient brake force will be achieved to pass the test. If the LSV is disconnected and the brake system is in very poor condition, a trailer could easily lock more than half the wheels (and pass on locks), but that result would not be a viable assessment of the braking system. To address this problem a special procedure was developed which deals specifically with unladen tri-axle semi-trailers (ULTASTs), however it is not applicable to any other type of unladen trailer.

The basis of the revised procedure is to achieve a specified level of brake force in addition to a specified number of wheel locks for both the service and parking brake systems.

- **Rules**

The rules used to assess whether the ULTAST test is applicable are:

i) The trailer must be a tri-axle semi-trailer.

ii) The trailer must be totally unladen, it must carry nothing but ropes, sheets and any other items which shall be regarded as a part of the equipment of the trailer. Any body type is eligible for an ULTAST test provided the trailer is unladen.

iii) If the trailer is partly laden, it must meet the statutory requirements, however the >50% locks rule **must** not apply

Note: *A skeletal trailer designed to carry a container is regarded as unladen even when an empty container (20ft or 40ft) or flat rack is being carried.*

The ULTAST test procedure cannot be applied if:

i) a load simulator is used.

ii) the load sensing valve is tied up or by-passed.

It should be noted that an ULTAST will have to meet the normal brake performance requirements for trailers, as shown in *Annex 24* if either:

i) an ULTAST test procedure is not applicable, as in c & d, or

ii) an ULTAST test is commenced and an insufficient number of wheels lock for either the service or parking brake systems.

Note*:* *The first ULTAST test was introduced in 1989 and was developed over the next few years. However, the ULTAST test is still considered by the Department of Transport as a trial and as such the procedure has not been included in the current HGV*

Inspection Manual.

Note: *Any power raised roller beds must be disabled for ULTAST*

- **Performance Requirements**

The requirements for both service and parking brake performance for an ULTAST are shown in tabular form in *Annex 26*. The performance requirements depend upon whether the RBT has level or raised rollers and whether the trailer is fitted with air suspension. To clarify the procedure, the same information given *here* is shown in the form of two flow charts, one dealing with testing the service brake, the other dealing with the parking brake.

Note 1: *When the ULTAST test was developed, DVSA had some RBTs that had the roller sets installed level but raised about 75 mm above the floor level to increase the effective weight on the axle being tested but this did not work when air suspension was used. No RBTs with raised rollers are now used by DVSA but it is possible some may still be in use* in designated premises. *A raised rear roller alone is acceptable.*

Note 2: *The brake forces shown in the flow charts in* Annex 26. Flow chart procedure – service brake for Tri-Axle semi-trailer *Annex 26 are applicable only when RBT's with level rollers installed normally are used. If an RBT with raised rollers is used the relevant brake force values shown here will need to be substituted in the flow charts.*

- **Variable Lock Sensing (***units approved previously operate using the following process)*

Important: *not required on new equipment installed/replaced following the release of this spec*

During the development of DVSA computer controlled RBTs it was noted that when testing ULTASTs it was impossible to achieve the level of brake force required. To overcome this problem a system that allowed the lock sensing of the RBT to vary with presented axle weight was developed. The principle is based on the fact that only a small amount of slip is necessary when the axle is substantially loaded but to achieve a reasonable level of brake force with a lightly laden vehicle, a greater degree of slip is required. It was observed that higher levels of slip did not result in significant occurrences of tyre damage on lightly laden axles.

Note: *Slip is the difference in surface speed of the RBT rollers and the tyre of the vehicle being tested. As the brake force increases, the difference in surface speed will increase and in most RBTs the motors will be switched off, and a wheel lock (or blocking) recorded, when the slip value reaches 20%. A slip of 20% occurs when the surface speed of the vehicle tyre is 80% of the surface speed of the RBT rollers.*

The variable lock sensing system is dependent upon knowing the presented weight of the axle being tested. The axle weight measurement built into the RBT is interactive with the CCS and this allows a system of variable lock sensing to be used. The lock sensing is set to 66.6% slip for all axle weights up to 2000 kgs. The level of slip is then reduced on a linear basis to 33.3% slip when the axle weight reaches 8000 kgs. The lock sensing then remains at 33.3% for all axle weights of

8000 kgs and over.

Annex 19. Brake Performance Calculations - PSV's

Note: *This section refers only to the testing of Class VI vehicles.*

When the CCS for the DVSA RBTs was being developed, PSVs were tested exclusively by a higher grade of staff than HGV's. The test procedure, which had been in use since the testing of PSVs started in 1982, took account of the fact that the unladen weight of PSVs was readily available and that PSVs were always tested empty. Two tables (*Brake Performance Requirements)* had been created which gave the brake performance required for each brake system based upon whether any wheel's lock. If no wheels lock the brake performance is judged against the laden weight, but if up to and including half the wheels lock the brake performance is judged against the unladen weight. As with other vehicles, if more than half the wheels lock the vehicle is deemed to have met the brake performance requirements.

To enable the above procedure to be used by the CCS, the weight of the PSV as presented for test (measured by the weighbridge within the RBT) is used as the unladen weight (ULW), and the laden weight (LW), or design GVW, is derived from the first three fields of the PSV Dtp brake reference number.

Articulated PSVs are treated as one vehicle for brake tests.

For all brake systems, the *Brake Performance Requirements* depend upon whether a wheel locks during the brake test of that system. Thus, when testing a PSV, the service brake system and one half of the secondary may be assessed against Table 1 while the other half of the secondary and the parking brake are assessed against Table 2.

Note: *Since the introduction of PSV testing, including testing with the latest CCS, all PSVs are deemed to be either pre-1968 or post-1968 vehicles. The CCS has not been written to allow PSVs to be tested to the post-1982 Type Approved requirements as detailed in the current PSV Inspection Manual.*

Service Brake

Apart from the need to take account of whether a wheel locks during the test, an assessment of the service brake performance is straightforward. The total brake force achieved is compared to the relevant weight (ULW or LW) to assess the overall service brake performance.

Secondary Brake

Where the designated secondary is the service brake split system (character D), secondary brake is **NOT** assessed at test, however secondary split figures will be added to the printout to aid industry diagnosis.

If a separate secondary brake system is fitted (character E); apart from the need to take account of whether any wheel locks during the test; an assessment of the secondary brake performance is straightforward. The total brake force achieved is compared to the relevant weight (ULW or LW) to assess the overall secondary brake performance.

If the secondary (designated to the hand control) fails to meet the requirements, an alternative must be considered using the service brake split system.

The various split systems found on PSVs are listed under *(Character D)*, However, it should be noted that when Character D is '6', because of the type of brake system used, a variation from the previously described method needs to be taken into account when calculating the overall secondary brake performance for PSVs.

When Character D is '6':

To assess Split 'a': Multiply the service brake effort from Axle 1 by 0.55

To assess Split 'b': Multiply the service brake effort from Axle 1 by 0.45 and add the service brake effort obtained from Axle 2

Where Character D has a value of 1 or 7, the split routines in the table below should be used.

Character D value	Equivalent HGV split	Split Type	1st half	2nd Half
1	1122	Front/Rear	[1]	[2]
7	1166	Front/Rear	[1]	[2+3]

If the designated secondary using the hand control fails to meet the requirements, an alternative using the service brake split system is to be calculated (providing the service brake efficiency passes)

Using (Character D) and the table above, the following method will be used to see if the service brake split shall be used as an alternative:

Each half of the split must meet the requirements in the tables in *Annex 28* depending upon locked wheels

Each half of the split = service brake figures added together and divided by either the GVW or ULW depending upon locks, multiplied by 100

Note: *there is no lock allowance or FWA added to the service brake efficiency figures for a locked front steered wheel when considering an alternative*

Parking Brake

Apart from the need to take account of whether a wheel locks during the test, assessment of the parking brake performance is straightforward. The total brake force achieved is compared to the relevant weight (ULW or LW) to achieve the overall parking brake performance.

Applied Brake Test

Before the applied park brake test is commenced, any tension must be released from the tyres to avoid potential tyre damage, for example:

- Both rollers can be rotated prior to the park brake being applied (all brakes must be released). This must be a manual operation with on screen instructions for the user to follow
- The releasing of any electrical locks applied to lock the rollers in position

When testing PSVs, the parking brake system shall be tested using the applied brake test method whereby the parking brake is fully applied prior to starting the RBT motors.

Transmission Brake (character F in the Dtp number)

When a vehicle is fitted with a transmission brake it shall only be tested by running both wheels on the axle together, in the same direction, the brake must be applied very carefully and to prevent the vehicle from coming out of the rollers the front axle must be chocked.

***Note**:* *An on-screen warning to state:*

- *"Make sure the vehicle is adequately chocked"*

- *“Apply the handbrake slow and steady”*

Transmission brakes may be found on all classes of vehicle except trailers.

If during the roller brake test of the transmission brake, the CCS detects that only one wheel is locking then this must be overruled as a pass on locks (the overrule will be noted on the printout, see *Annex 22*)

Related Aspects

Many of the related aspects described in *Optional Systems* are applicable also to PSVs. To save repeating the whole text, all the subjects discussed are listed below and the relevance to PSVs is shown:

Bind	Applicable to all PSVs
Little or no brake effort	Applicable to all PSVs
Imbalance Service and Secondary	Applicable to all PSVs, service and secondary
Ovality	Applicable to all PSVs
Hydraulic Pressure Fall-off (now including rear axle)	Applicable to all PSVs
*Front wheel allowance	Applicable to all PSVs
**Locked wheels	Applicable to all PSVs
Load sense valves	Not applicable to any PSVs
Modulated braking	Not applicable to any PSVs

* *Not as described in Optional Systems, see Hydraulic Pressure Fall-Off*

** *Not as described in Optional Systems, see Front Wheel Allowance*

Hydraulic Pressure Fall-Off

In previous versions of the RBT software, ovality/fall-off were only tested by the CCS on the front axle, leaving the examiner to apply it manually for any rear axle with hydraulic brakes.

Now that PSVs will be tested in the same way as HGVs, without the CCS knowing that the vehicle has hydraulic brakes via the brake code, the following question will be asked when entering the brake code at the beginning of the test:

"Hydraulic brakes: yes/no"

- Yes: RBT will test the fall-off on the rear axle(s) (as below)
- No: RBT will continue to test rear axle as normal

In the CCS for HGVs and PSVs, the braking effort trigger for measuring hydraulic fall off comes in a band of 25% - 35% of the measured wheel weight, for 4 seconds. If this is not achieved, then the band will drop to 5% of measured wheel weight.

If there is little or no increase in effort on that brake, for example, the brake is not working, then the test must proceed and the rolling resistance or very low effort shall be taken as the result for that brake.

When fall-off is being measured for the rear axle(s) of a PSV, the ovality heading on the printout will be replaced by "fall-off".

Note: *The same rules for fall-off will apply to PSVs as HGVs, fall of will only be recorded as a failure if more than one wheel has indicated fall-off*

Front Wheel Allowance

To take account of the dynamic weight transfer that takes place when the brakes are applied on PSVs, two separate tables were derived (*Annex 28*), one utilising the Unladen/Presented weight and the other the calculated laden weight. Because the unladen weight is used for the assessment it is not necessary to apply any calculated allowance.

Annex 20. Brake Performance Calculations - Other Vehicle Types

For complete and up-to-date information, reference to the latest version of the relevant MOT Inspection Manual is necessary. For multi-drive axle vehicles *go here*

Annex 21. Brake Test Modes

The RBTs must have the ability to test in three different modes.

- Automatic
- Semi-automatic
- Manual

Automatic is used for nearly all vehicles as the brake master database. The associated vehicle numbering systems and the intelligence of the CCS enable this to take place and 'AUTO' will be shown at the bottom right of the brake test report. However, occasionally a vehicle (e.g., a foreign vehicle) may be presented for test without a Dtp No., or a vehicle may have a Dtp No. which is not yet available in the installed version of the brake master database. In these situations, the vehicle is tested in semi-automatic mode and 'SEMI' is shown in place of 'AUTO'. When a vehicle is tested in semi-automatic mode there will be no entry for 'Vehicle Make' and, for 'Dtp No' there will be either no entry or there will be the number entered by the tester. The RBT will go into semi-automatic mode if the 'Dtp No' entered is either wrong or is not yet in the brake master database installed in that RBT.

Where the facility exists, if for any reason the CCS is not operational, the RBT may be used in a basic manual mode with no menu assistance and with only a very basic print-out of brake test results. The brake test report described in this document is applicable only when the RBT is used in either automatic or semi-automatic mode.

Annex 22. Brake Test Report Printout

A detailed brake test report may be printed out automatically at the end of every brake test and this section explains in detail how the brake test report printout is presented and with what information is required.

The printout may need to be printed using more than one page depending on the type of vehicle being tested. If more than one page is being used, the table in the first section will be required to be printed on all pages to aid identification. Also, page numbers must be printed at the centre bottom of each page. For example, Page 1 of 2

Note: *The printout layout in Appendix 1 is a representation of what is expected to be output from the RBT, however different font and size of text can be used so long as it is legible*

Note: More information may be added to the printout as the manufacturer deems necessary so long as it does not confuse, nor conflict the information set out in this specification

Note: The table is not required to be printed, it is merely a guide

First section

The first section of the printout will show the vehicle detail, type of brake test etc. as pictured:

Test Type		**Time**	
Test Number & Id		**Date**	
Vehicle Make		**Station**	(name & Number)
Vehicle Type		**GVW**	
VRM/ID		**GTW**	
DTP Number/brake code		**TAW**	

Field Name	To be printed
Test Type	Full Test or Voluntary Test
Time Format	HH:MM 24-hour format - built into the CCS – Using system clock **(The time is taken when the test starts)**
Date format	DD-MM-YYYY for example 21-09-2021
Station	built into the CCS –The station number is the DVSA authorization number, normally begins with a P and the station name added into the system on initial setup
Test Number & Id	sequential number identifying the current test starting at zero & Id entered at the start of the test
Vehicle Make	for HGVs only, this will be from Field 2 of the *Dtp Number*
Vehicle Type	HGV Vehicle, [?] Axle Semi-Trailer, [?] Axle Centre Drawbar Trailer, [?] Axle Full Drawbar Trailer or PSV
VRM/ID	entered at the beginning of the test
DTP Number/brake code	entered at the beginning of the test
GVW, GTW, TAW	obtained from the fields within the Dtp number entered (TAW is not required for vehicles)

Second Section

Axle 1 (Weight)		Bind (%age & kgf) (PASS/FAIL)	Ovality /fall-off (%age) (PASS/FAIL)	Imbalance (%age) (PASS/FAIL)	Max Force (kgf)
Service	N/S				
	O/S				
Secondary	N/S				
	O/S				
Park	N/S				
	O/S				
Axle 2 (Weight)		Bind (%age & kgf) (PASS/FAIL)	Ovality /fall-off (%age) (PASS/FAIL)	Imbalance (%age) (PASS/FAIL)	Max Force (kgf)
Service	N/S				
	O/S				
Secondary	N/S				
	O/S				
Park	N/S				
	O/S				

This section of the printout will display the individual wheel result. The table will be extended/reduced as necessary depending upon the vehicle or system being tested, i.e., for multi axle vehicles/trailers.

- The axle weight measured by the RBT will be displayed next to its associated axle number
- Bind will be shown as a percentage and kgf as well as PASS/FAIL
- Ovality will be shown as a percentage as well as PASS/FAIL
- Fall-off, where appropriate, will show PASS/FAIL
- Imbalance will be shown as a percentage as well as PASS/FAIL
- Ovality is measured on all front steered axles, however the first non-front axle (normally the second axle), the heading will show either ‘Ovality’ or ‘Fall-Off’. If the vehicle has a hydraulic element to the brake system, the heading ‘Fall-Off’ will be triggered as hydraulic pressure fall-off will be measured
- In the max force column, (L) will be shown next to any value where the wheel has locked

Third Section

Test Summary

	Pass Value	Test Value	Pass/Fail (locks)
Service			
Secondary			
Secondary			
Park			
Deficiencies			
Advisories			
Overall Result			
Notes			
Tested by		Signed	

This section, test summary includes a great deal of information.

- **Pass value** the minimum efficiency effort (percentage) expected from each system depending upon the type of vehicle/trailer being tested.
- **Test value** will show the test result efficiency for each system in a percentage
- **Pass/Fail** will show the result of the test value against the pass value – (locks) will be shown if the pass was down to locks and not efficiency
- **Secondary** will either be missing or show one or two results depending upon the type of vehicle being tested. For example,
    - **a)** a trailer is not assessed for secondary
    - **b)** the designated secondary on the hand control will show one secondary result (one system)
    - **c)** the designated secondary on the split system will show two results (as shown above), one for each half of the split.

- **Deficiencies** will show any deficiencies found during the roller brake test and be printed in a format that can be easily understood. The table below will be used to describe the deficiency

Deficiency	Text to be printed
Bind	[wheel position & axle number] - Binding
Ovality	[wheel position & axle number] - Ovality reading in excess of 70%
Fall-off	[Wheel position & axle number] – hydraulic fall-off
Imbalance	[axle number] - Imbalance is greater than 30%
Overall performance	[service] [secondary] [park] - The specified brake effort is not met
Little effort	[service] [secondary] [park] [wheel position] [axle number] - There is very little effort *Note: This is where the brake reading is > 0% and <5%*
No effort	[service] [secondary] [park] [wheel position] [axle number] - There is no effort *Note: This is where there is no change between the free rolling reading and when the brake is applied*

- **Advisories** will be shown where there are any marginal results found during the roller brake test and be printed in a format that can be easily understood. The table below will be used to describe the advisory:

Advisory	Result	Text to be printed
Imbalance	where the resulting figure is between 25 and 30% (both service and secondary apply)	Advise [service brake or secondary] [axle number] Imbalance [%age]
Ovality	where the resulting figure is between 65 and 70%	Advise [Wheel position] [axle number] Ovality [%age]
Bind	where the resulting figure is between 3% and 4% of the presented axle weight	Advise [Wheel position] [axle number] Bind [kgf]
Low effort	where the resulting figure is between 5% and 10% of the presented axle weight per wheel	Advise [service] [secondary] [park] [Wheel position] [axle number] Low effort [kgf]

Note: *the imbalance advisory is not necessary if both wheels on the tested axle lock, or if one-wheel locks **and** the lock is the lower efficiency*

- **Overall Result** either ‘Pass’ or ‘Fail’ is shown.

If a front wheel has locked and the FWA has been considered to achieve the necessary Test Value, ‘(FWA)’ will be shown after the relevant Test Value and if wheel locks have been considered to achieve the overall requirements for a system, ‘(Locks)’ will be shown after the relevant Pass or Fail result.

In normal circumstances the ‘Overall Result’ will be followed by either ‘Pass’ or ‘Fail’ but there are two other entries:

Situation	Text to be printed
If the test is aborted	**** No Overall Test Result: Test Aborted ****
If the vehicle is a ULTAST which has failed because insufficient brake performance was achieved when all six wheels locked	**** Test Result: Failed ****

- **Notes** This section will show the following as necessary:

Method	Text to be printed
The Measured Vehicle Weight is shown totalling all axles of the vehicle which have been tested.	Measured vehicle weight [total measured axle weights added together]
Insufficient Load on Axle ***Note:*** *this applies to all axles apart from front steered axles* This will be calculated: **HGV** – less than 65% of measure axle weight on each axle **Semi-trailers (except Tri axle) & Centre Drawbar trailers** less than 65% of measured axle weight **Full Drawbar trailer** DGVW / number of axles **Tri-axle semi-trailer** using the flow chart in *Annex 26* **PSV** not included	Insufficient load on axle [axle number]
If an HGV/PSV has the designated secondary on the hand control and *Optional Systems* section applies	secondary alternative applied
Where an HGV or PSV is tested in semi-automatic mode	no Secondary brake calculations due to unknown split system
Where a transmission brake deficiency has been overruled (see section *Transmission Brake*)	transmission brake result amended
If the RBT Is out of calibration	This Roller Brake Tester is out of calibration

- **Name and signature**

  The name will be taken from the entry on the initial screen or will be empty if no name input.

  Signature will remain empty (apart from the heading) for the user to complete once the printout is obtained.

- **Extra information required**

The following must be printed at the bottom right of all pages – this can be printed smaller than the main report but must be legible when printed:

  - RBT serial number

- Version of CCS used
- Version brake master database used
- Duration of test in seconds
- Mode of brake test – shown as AUTO or SEMI
- Shown when a 3-axle semi-trailer is tested as an ULTAST – shown as U
- Shown when a 3-axle semi-trailer is tested as Part Laden/Laden – shown as P

Annex 23. Voluntary Brake Tests

Voluntary brake tests are separate to the MOT brake test and should be separated as such. Therefore, when selected the printout is required to have “voluntary test” in the test type section of the printout

Annex 24. Brake performance requirements

SERVICE BRAKE EFFICIENCY REQUIREMENTS				
Motor Vehicles	2 Axle Rigid vehicle first used before 1 January 1968 **and** with **no** manufacturer's plate	Rigid vehicle with more than 2 axles or any articulated tractor first used before 1 January 1968 **and** with **no** manufacturer's plate	Any other vehicle	
Specified Efficiency	45% DGVW	40% DGVW	50% DGVW	
Semitrailers	Manufactured before 1 January 1968 with GVW 6100 kg or more	Manufactured before 1 January 1968 with GVW less than 6100 kg	Manufactured from 1 January 1968 to 30 September 1982	Manufactured from 1 October 1982
Specified Efficiency	35% DTAW	32% DTAW	40% DTAW	45% DTAW
Drawbar trailers	Manufactured before 1 January 1968	Manufactured from 1 January 1968 to 30 September 1982	Manufactured from 1 October 1982	Manufactured from 1 January 2012
Specified Efficiency Centre Axle Drawbars	35% DTAW	40% DTAW	45% DTAW	50% DTAW
Specified Efficiency Other Drawbars	40% DGVW	50% DGVW	45% DGVW	50% DGVW

DGVW = Design Gross Vehicle Weight. DTAW = Design Total Axle Weight.

Notes:

1.	Pre-1968	First used before 1 January 1968 having no manufacturer's plate
2.	Prior-1968	First used before 1 January 1968 having a manufacturer's plate.
3.	Post 1968	First used on or after 1 January 1968 having a manufacturer's plate.
4.	GVW	Design gross vehicle weight.
5.	GTW	Design gross train weight
6.		There is no performance requirement for the Parking brake on Pre-1968 & Prior - 1968 vehicles but the minimum requirement for little or no brake effort should be achieved.

Note, this information is correct at the time of release, please refer to the relevant inspection manual for the latest version

SECONDARY BRAKE EFFICIENCY REQUIREMENTS			
Motor Vehicles	2 Axle Rigid vehicle first used before 1 January 1968 **and** with **no** manufacturer's plate	Rigid vehicle with more than 2 axles or any articulated tractor first used before 1 January 1968 **and** with **no** manufacturer's plate	Any other vehicle
Specified Efficiency	20% DGVW	15% DGVW	25% DGVW

DGVW = Design Gross Vehicle Weight.

PARKING BRAKE EFFICIENCY REQUIREMENTS			
Motor Vehicles	Any vehicle first used before 1 January 1968	Any vehicle first used from 1 January 1968 apart from a Type Approved articulated tractor or drawing vehicle	A Type Approved* articulated tractor or drawing vehicle
Specified Efficiency	–	16% DGVW	16% DGVW 12% DGTW
Semi-trailers and Draw-bar trailers	Manufactured before 1 January 1968	Any other trailer	
Specified Efficiency	–	16% DGVW	

DGVW = Design Gross Vehicle Weight. **DGTW** = Design Gross Train Weight.

*Type Approved - Manufactured from 1 October 1982 and first used from 1 April 1983 and has been issued with a Type Approval Certificate of Conformity, a Ministers Approval Certificate or a Type Approval Certificate issued by an EU member state.

Annex 25. Brake Performance Requirements (Unladen Tri-Axle Semi-Trailers)

Service Brake

Table 1 is applicable to an unladen Tri-Axle Semi-Trailer (ULTAST) when tested on an RBT

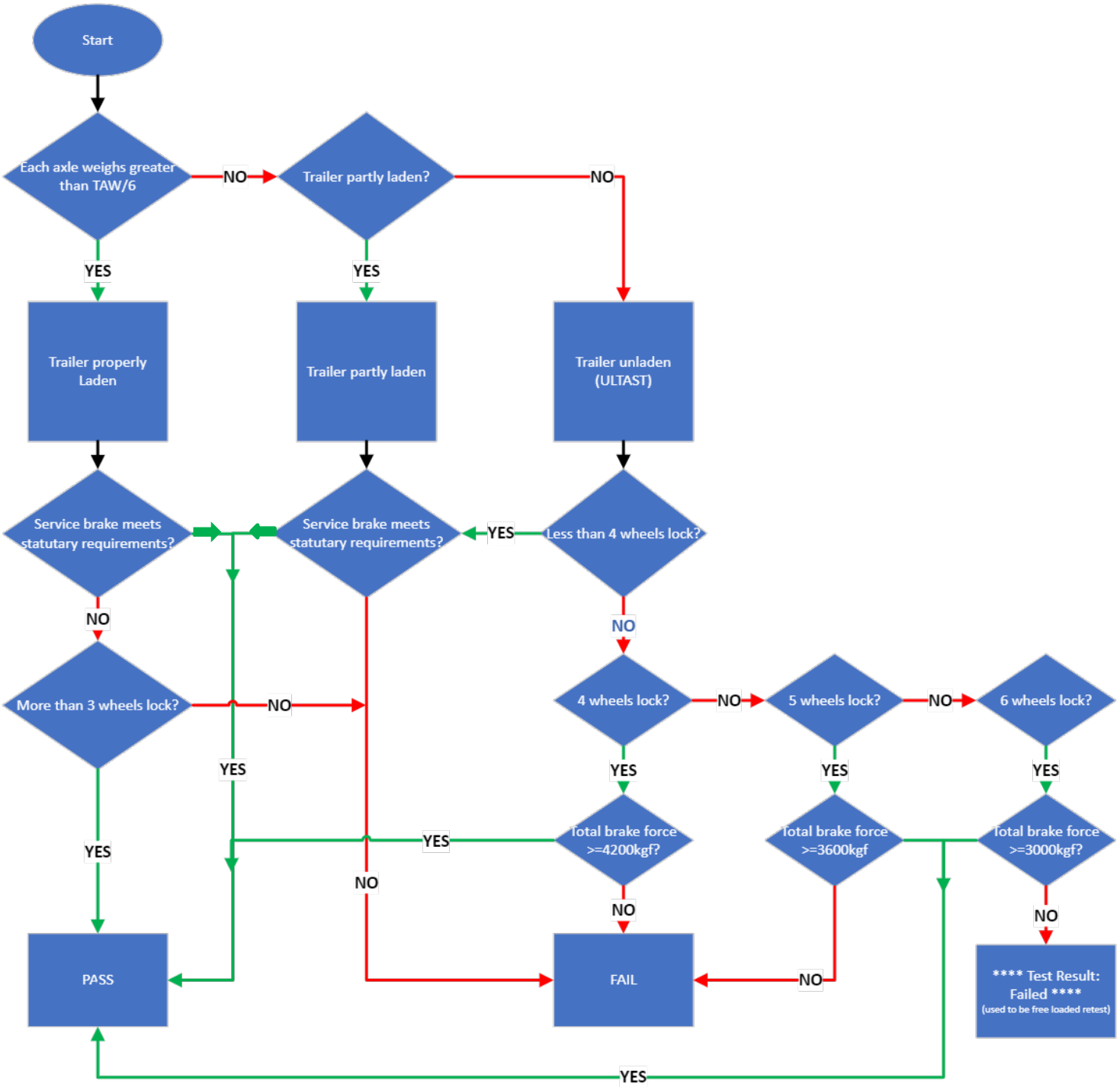
No of Wheels Locking	Minimum Brake Force Required to Pass (kgf)
6	3000
5	3600
4	4200

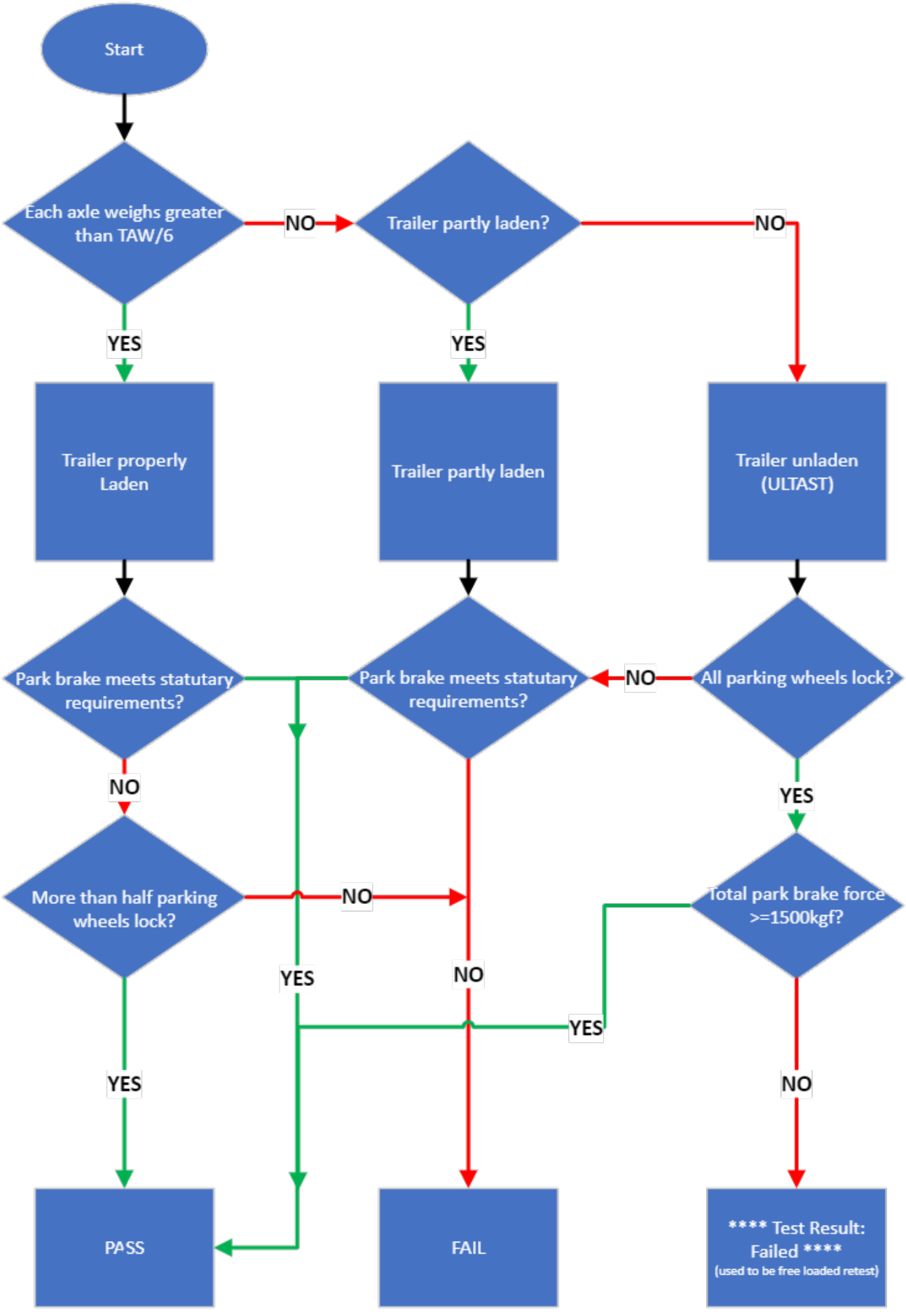
Parking Brake

Table 3 is applicable to ULTAST's when testing the Parking brake system.

No of Wheels Locking	Minimum Brake Force Required to Pass (kgf)
ALL wheels on which the Parking brake operates LOCK	1500 kgf
ANY wheel on which the Parking brake operates DOES NOT LOCK	16% GVW

Annex 26. Flow chart procedure – service brake for Tri-Axle semi-trailer




Start
Each axle weighs greater than TAW/6
NO
Trailer partly laden?
NO
YES
YES
Trailer properly Laden
Trailer partly laden
Trailer unladen (ULTAST)
Park brake meets statutary requirements?
Park brake meets statutary requirements?
NO
All parking wheels lock?
NO
YES
More than half parking wheels lock?
NO
Total park brake force >=1500kgf?
YES
NO
YES
YES
NO
PASS
FAIL
**** Test Result: Failed ****
(used to be free loaded retest)

Annex 27. Flow chart procedure – Park brake for Tri-Axle semi-trailer

Annex 28. Brake Performance Requirements (Public Service Vehicles)

1. The following table is applicable where no wheels lock during the brake test of any system:

Brake System	Pre-1968	Post-1968
Service	45% CLW/CGVW	45% CLW/CGVW
Secondary	22% CLW/CGVW	22% CLW/CGVW
Parking	*	16% CLW/CGVW

CLW Calculated Laden Weight

CGVW Calculated Gross Vehicle Weight

* There is no performance requirement for the Parking brake for Pre-1968 PSVs but the minimum requirement for little or no brake effort should be achieved.

2. The following table is applicable where up to and including half the wheels lock during the brake test of any system:

Brake System	Pre-1968	Post-1968
Service	50% ULW	50% ULW
Secondary	25% ULW	25% ULW
Parking	*	16% ULW

ULW – Unladen Weight

* There is no performance requirement for the Parking brake for pre-1968 PSVs, however the minimum requirement for little or no brake effort should be achieved.

3. If more than half the wheels lock on any system, that system shall be deemed to have met the necessary performance requirements

Appendix 1 Brake Test Printout Layout

Test Type		**Time**	
Test Number & Id		**Date**	
Vehicle Make		**Station**	(name & Number)
Vehicle Type		**GVW**	
VRM/ID		**GTW**	
DTP Number/brake code		**TAW**	

Axle 1 (Weight)		**Bind (%age & kgf) (PASS/FAIL)**	**Ovality /fall-off (%age) (PASS/FAIL)**	**Imbalance (%age) (PASS/FAIL)**	**Max Force (kgf)**
Service	**N/S**				
	O/S				
Secondary	**N/S**				
	O/S				
Park	**N/S**				
	O/S				
Axle 2 (Weight)		**Bind (%age & kgf) (PASS/FAIL)**	**Ovality /fall-off (%age) (PASS/FAIL)**	**Imbalance (%age) (PASS/FAIL)**	**Max Force (kg)**
Service	**N/S**				
	O/S				
Secondary	**N/S**				
	O/S				
Park	**N/S**				
	O/S				

Test Summary

	Pass Value	**Test Value**	**Pass/Fail (locks)**
Service			
Secondary			
Secondary			
Park			
Deficiencies			
Advisories			
Overall Result			
Notes			
Tested by		**Signed**	

Note: *The headings for Bind, Ovality/Fall off, Imbalance and Max force must be along side each axle, as per image on page 62*

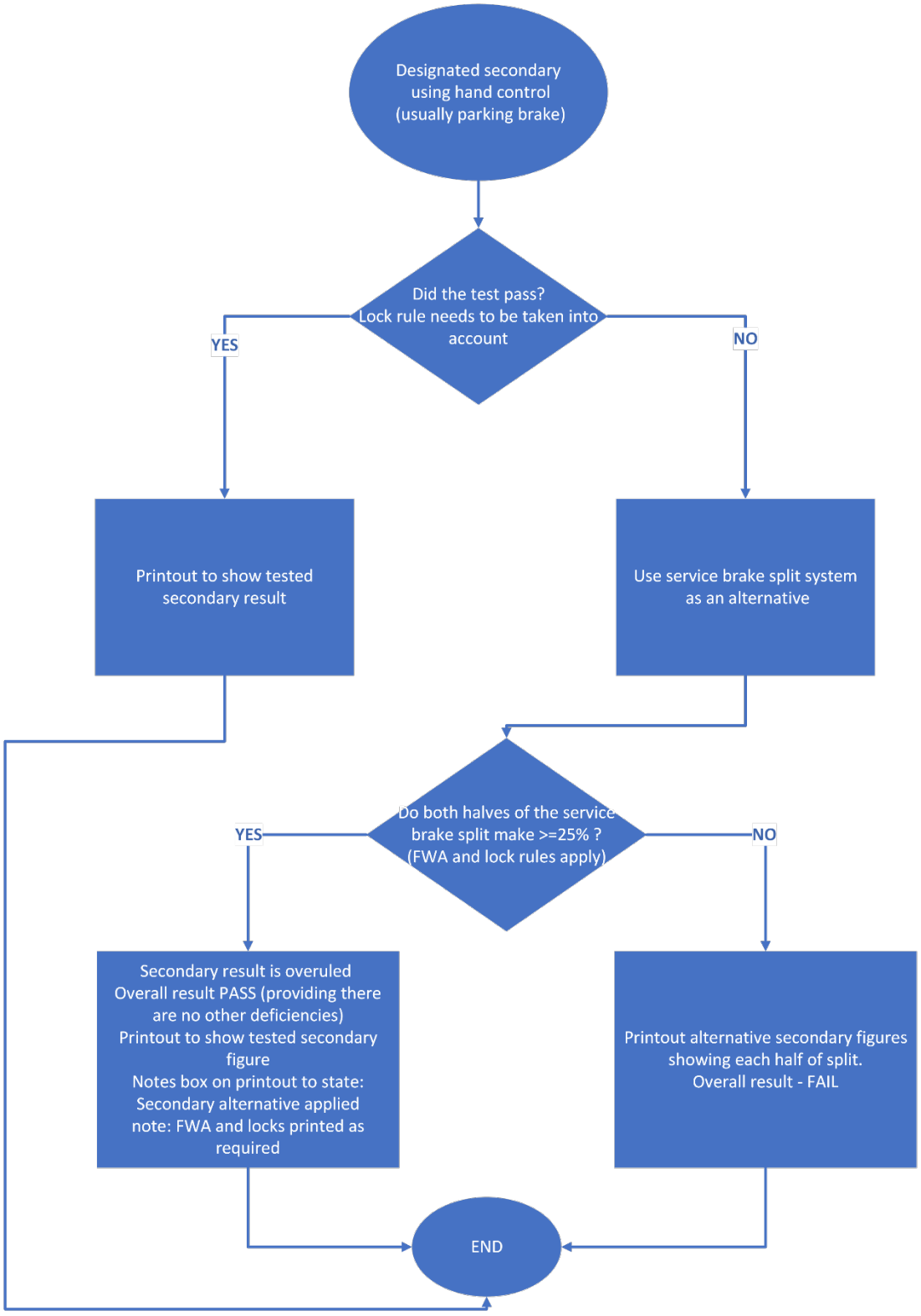
Appendix 2 Types of trailers

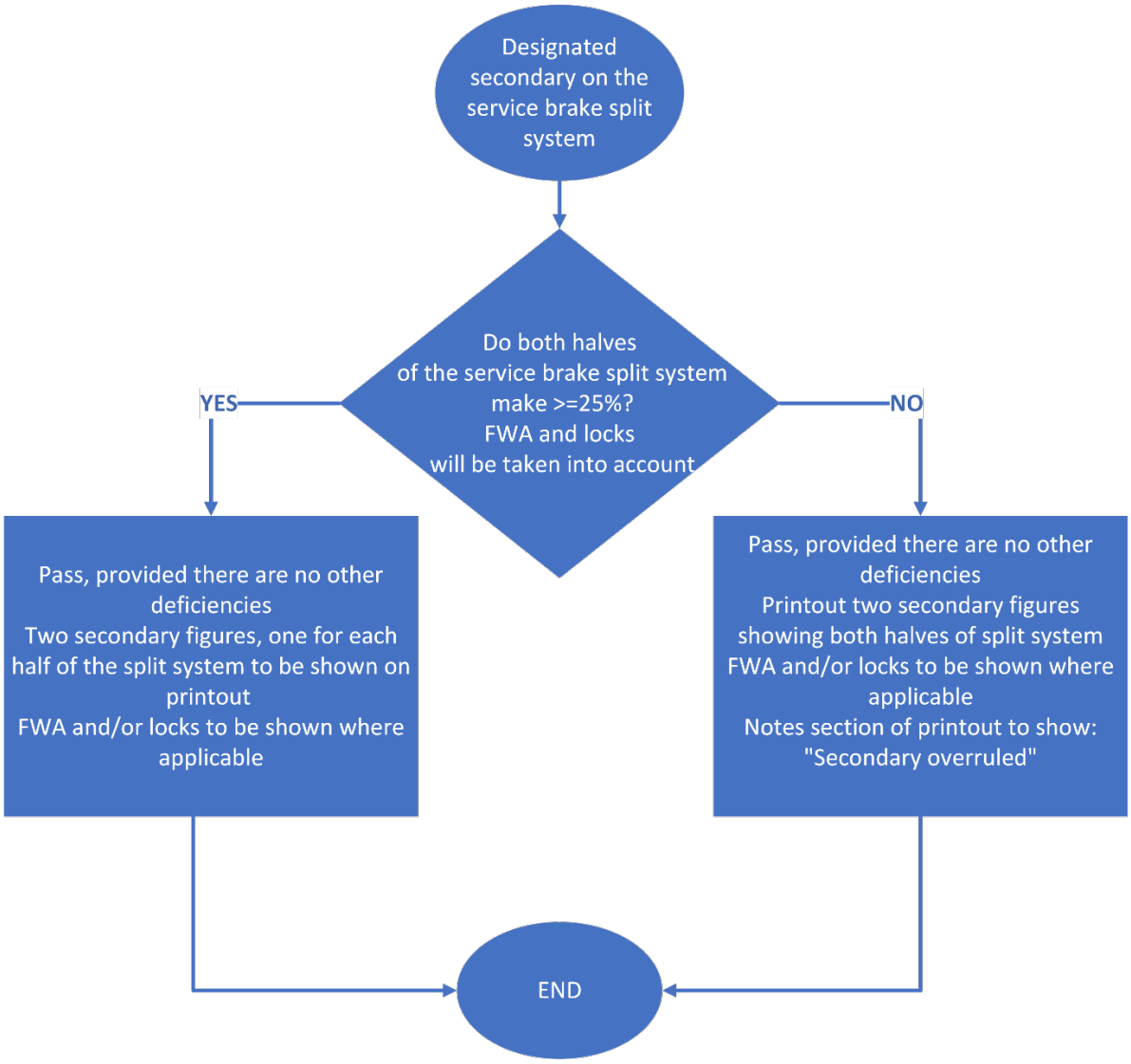
Centre Drawbar trailer (can be 1, 2 or 3 axle)

Full Drawbar trailer (can be 2, 3 or 4 axle

Semi-trailer (can be 1, 2 or 3 axle)

Appendix 3 Secondary failure & alternative flowcharts




Designated secondary on the service brake split system
Do both halves of the service brake split system make >=25%? FWA and locks will be taken into account
YES
NO
Pass, provided there are no other deficiencies
Two secondary figures, one for each half of the split system to be shown on printout
FWA and/or locks to be shown where applicable
Pass, provided there are no other deficiencies
Printout two secondary figures showing both halves of split system
FWA and/or locks to be shown where applicable
Notes section of printout to show: "Secondary overruled"
END

Change log

Amendment	Page	Version	Date
Amend the “10” to “0” in the table	31	5.1	17.11.2022
Amend split routine percentages to match the data DVSA sends out in update files	28	5.2	16.03.2023
A sentence added to make sure very low or no effort is recorded as the result for a brake and the test should proceed	46 & 59	6.0	05/04/2023
Amended table to show heading should be shown for each axle	62	6.0	05/04/2023
KGF has been removed and replaced by “percentage” for test result and Pass value	63	6.0	05/04/2023
Remove 20KGf and replace with 50 KGf as per original spec + note added to re-enforce that variable lock sensing is no longer required	10 & 52	7.0	01/06/2023
Table amended to make it clearer which is mandatory and optional	14	7.0	01/06/2023
Amended brake printout template re-ordering N/S & O/S so that it matches the order of brake test	61 & 75	8.0	08/08/2023
2.4 added stating initial start up force of the rollers must not be recorded	7	8.0	08/08/2023
Drive out assist changed from manually stopping the rollers to automatically stopping the rollers when the vehicle leaves	7	8.0	08/08/2023
Table added to show drawbar trailer efficiency – 1st January 2012 to be asked for all drawbar trailers	49	8.0	08/08/2023

Note added that the calibration runs to the end of the calendar month in which it expires	9	8.0	08/08/2023
Added clarity on how to determine a PSV's designated secondary. Renamed heading in table on [page 38 to Service brake split system instead of secondary	38 & 39	9.0	20/09/2023
Added [service] [secondary] [park] into tables, as the printout would not be clear without the brake system mentioned	63	9.0	20/09/2023
Added in secondary fail and alternative flow charts for ease of understanding	77	9.0	20/09/2023
Added "bind" into statement about rounding	1	9.1	1/11/2024