Construction Plant-hire Association
Crane Interest Group

Mobile Crane (Wheeled & Crawler) Technical Information Note

TIN 104

Requirements for In-service Performance Testing of the Chassis Brakes of Mobile Cranes Operating Under STGO

The majority of mobile cranes operating in the UK are not able to comply fully with The Road Vehicles (Construction and Use) Regulations 1986 (as Amended), therefore they operate under the requirements of The Road Vehicles (Authorisation of Special Types) (General) Order 2003 (STGO).

The STGO Regulations permit certain derogations from the requirements for the type testing of vehicle brakes set out in European Directive 71/320/EEC. As a consequence, the requirements for in-service brake testing set out in the Driver and Vehicle Standards Agency (DVSA) Heavy Goods Vehicle Inspection Manual are not appropriate for mobile cranes subject to STGO. The purpose of this document is to set out the requirements for mobile cranes when operating under STGO.

1.0 Performance Requirements

1.1 *Service Brakes*

The minimum primary and secondary braking performance requirements for service brakes during in-service brake testing of mobile cranes running under STGO are:

Service Braking Performance STGO Mobile Crane			
Category	Mean Deceleration at Normal Engine Speed	Stopping Distance Measurement	
		Initial Test Speed	Stopping Distance
A	3 m/s^2	40mph (64km/h)	62.5m
B	3 m/s^2	40mph (64km/h)	62.5m
C	3 m/s^2	30mph (48km/h)	36.9m
Notional Braking Efficiency = 30%			

Secondary Braking Performance STGO Mobile Crane			
Category	Mean Deceleration at Normal Engine Speed	Stopping Distance Measurement	
		Initial Test Speed	Stopping Distance
A	1.45m/s^2	40mph (64km/h)	118.8m
B	1.45m/s^2	40mph (64km/h)	118.8m
C	1.45m/s^2	30mph (48km/h)	68.6m
Notional Braking Efficiency = 15%			

NOTE: *A mobile crane which meets the requirements for braking efficiency or deceleration or stopping distance is deemed to have passed the in-service brake test.*

NOTE: *Mobile Cranes with an axle weight in excess of 16,500kg are deemed to be "Engineering Plant", meeting the requirements of Schedule 3 of STGO, with a maximum travel speed of 30mph on motorways and 12mph on any other road. The requirements for brakes on mobile cranes designated as Engineering Plant are set out in Clause 7 of Schedule 3.*

1.2 *Parking Brakes*

The parking brakes of mobile cranes, when applied by the driver from his driving position, should be capable of holding the laden vehicle stationary on an 18% up or down gradient.

2.0 Testing Methods

2.1 *In-service Bakes*

The three alternatives for in-service brake testing in order of preference are:-

- Roller brake testing
- Decelerometer brake testing
- Stopping distance test

2.1.1 Roller Brake Testing

Testing on a Roller Brake Tester (RBT) is the preferred method of in-service brake testing as it requires a minimum of space, is carried out in controlled conditions and measures the performance of the brakes on individual axles. This is of particular importance on multi axle crane chassis where a satisfactory overall deceleration or stopping distance test may mask a problem with the brakes on one axle.

The disadvantage of roller brake testing for mobile cranes is finding a suitable Roller Brake Tester with adequate axle weight capacity located in a building of sufficient size to accommodate the mobile crane. Mobile cranes have axle weights of up to 16,500kg, lengths of up to 22m, widths of 3m and heights of 4.4m.

NOTE: *Some mobile cranes with axle weights in excess of 16,500kg are categorised as "Engineering Plant". Roller brake testing of these cranes will require a Roller Brake Tester with a minimum capacity of 20,000kg.*

NOTE: *If the mobile crane is taken to an Authorised Testing Facility or a DVSA vehicle test station, the RBT will be pre-programmed to apply the minimum brake performance criteria for the statutory annual HGV test (* 50% service brakes and 25% secondary *brakes). This will generate at automatic fail on the printout for the majority of mobile cranes. However, as long as the braking efficiencies shown on the report are in excess of those given in Section* ***1.0*** *of this document the crane brakes will meet the performance requirements for mobile cranes operating under STGO.*

2.1.2 Decelerometer Brake Testing

If testing on a Roller Brake Tester is not practicable decelerometer testing is the next preferred method, using a DVSA approved decelerometer. A list of approved decelerometer is available at:-
https://www.gov.uk/government/publications/approved-decelerometers

Decelerometers must be calibrated in accordance with the DVSA specification for decelerometers at intervals not exceeding two years.

The decelerometer should be set up in accordance with the decelerometer manufacturer's instructions and the test carried out in the following conditions:

- A straight test road with a firm, level surface and an absence of standing water;
- Sufficient distance to allow acceleration to a speed of 20mph, application of the brakes and braking to a halt;
- Vehicle ABS systems should not be disconnected;
- Any switchable retarders should be switched off;
- Measurements should be taken in both directions and averaged out to allow for any variation in gradient;
- A minimum of two measurements should be taken in each direction.

2.1.3 Stopping Distance Test

Measuring the stopping distance of a mobile crane requires similar conditions to a decelerometer test, with the exception that the minimum speed at which the brake are applied is 30mph.

2.2 ***The difficulty with this test is the accurate measurement of the stopping distance. This is best carried out using a GPS based data logger, but unfortunately these devices are significantly more expensive than a DVSA approved decelerometer.***

2.3 ***Parking Brakes***

Testing of mobile crane parking brakes can be under taken by either:

2.3.1 Using a Slope

This is carried out by locating a suitable slope with a gradient of 18% (10.2° or 1 in 5.5). The crane should be parked facing uphill and the parking brake applied. If the crane remains stationary the requirement will have been met. The test should then be repeated with the crane parked facing downhill. If the crane remains stationary in both directions, the requirement will have been met.

2.3.2 Using a Decelerometer

An alternative approach is to use a decelerometer. In this case the DVSA specify a minimum brake efficiency of 16%.

3.0 STGO Mobile Crane Categories

Under the STGO Regulations mobile cranes are divided into three categories A, B and C depending on the maximum axle weights. Full details are given in Schedule 2 of STGO and a brief summary is set out below.

STGO Category	***Max Axle Wt***	***Max No. Axles***	***Max GVW***
A	11,500 kg (drive)	4[1]	36,000kg
	10,000 kg (non drive)		
B	12,500 kg	Not specified	Dependant on number of axles[2]
C	16,500 kg	9	150,000kg[3]

NOTE[1] *See Table below*

NOTE[2] *Max GVW limited to N x 12,500kg where N is the number of axles on the crane*

NOTE[3] *Max GVW limited to N x 16,500kg where N is the number of axles on the crane*

Category A: Axles and Gross Weight		
Number of Axles	***Distance Between Outermost Axles***	***Maximum Gross Weight of Crane***
2	3 metres	20,000 kg
3	5 metres	30,000kg
4	6 metres	36,000kg