WINNARD

BRAKE ROTOR QUALITY ASSESMENT

Most WINNARD Brake Rotors are approved to ECE R90 Regulation.

What is ECE R90

ECE R90 is a global standard which ensures that Brake Pads and more recently Brake Rotors manufactured for the aftermarket comply with ECE R90 standards and are suitable replacements for the Original Equipment part.

To meet these standards there are some stringent tests and approvals required.

Stage 1:

Before any product can be tested the manufacturing facility has to be audited and approved by the independent certification body. The production facility, processes and quality control systems are assessed to ensure they meet the necessary criteria.

Our facilities have been audited and approved by the VCA.

URL: https://www.vehicle-certification-agency.gov.uk/

Stage 2:

The testing regulation requirements are complex.

Attached below is a link to the full ECE R90 regulation document.

URL: https://unece.org/fileadmin/DAM/trans/main/wp29/wp29regs/R090r3e_01.pdf

The following information taken from the regulation summarises the procedure for Brake Rotor approval:

There are 4 different classes of replacement parts:

5.3. Technical requirements regarding the approval of a replacement brake drum or a replacement brake disc

All replacement parts have to be separated in 4 groups:

(a) Original replacement brake disc/drum;

(b) Identical brake disc/drum;

(c) Equivalent disc/drum;

(d) Interchangeable disc/drum.

Depending on its group, the replacement brake disc or drum has to pass the following tests:

	Performance tests according to Regulations Nos. 13/13-H (Type 0, I, II, etc.)	*Comparison test with dynamic frictional properties of the original part*	*Integrity tests (high load and thermal fatigue)*
Original replacement parts	No	No	No
Identical parts	No	No	No
Equivalent parts	No	No	Dynamometer test
Interchangeable parts	Vehicle test or alternative dynamometer test	Vehicle test or alternative dynamometer test	Dynamometer test

Winnard Brake Rotors are classes as “Interchangeable parts”.

ECE R90 Definition 2.3.3.6: "Interchangeable brake disc" is a replacement brake disc which has the same interface dimensions as the original brake disc but may differ from the original brake disc in terms of its “**Design”**, “**Material composition** and **mechanical properties**”.

“Design”:

This means that Winnard can produce a design of Brake Rotor that meets the necessary requirements to replace the Original Equipment part but we can incorporate new design enhancements to improve on the original.

“**Material composition** and **mechanical properties**”

We can use our material specification but it must meet approved standards, we use G3000.

3, Chemical Composition

C	3,10 - 3,60 %	Cr	0,05 - 0,20 %	Ti	max. 0,025 %
Si	1,60 - 2,10 %	Cu	0,07 - 0,40 %		
Mn	0,60 - 0,90 %	Mo	min. 0,005 %		
P	max. 0,10 %	Mg	max. 0,005 %		
S	max. 0,10 %	Sn	0,005 -0,05 %		

C, Si, Mn can be slightly vibrated according to production process and batch providing that tensile strength, hardness and metallurgical structure are all up to the standard. Contents of Cu, Cr, Ni, Mo are of optional.

4, Microstructure

Matrix: Even, fine lamellar pearlite; Pearlite min. 95%, Carbide max. 2%.

Graphite: Type A+B min. 85%; Type C, D and E max. 15%

Graphite size: Grade 3 – 5

5, Tensile Strength (taken out of the component)

190– 280 N/mm2

6, Hardness (on the friction surface)

160– 200 HB

To get ECE R90 approval “Interchangeable Brake Discs” have to pass the following tests:

3.4.3.1. A minimum number of disc or drum samples – of the design for which approval is requested – shall be provided, as shown in the following table.

The table also shows the recommended use of the samples.

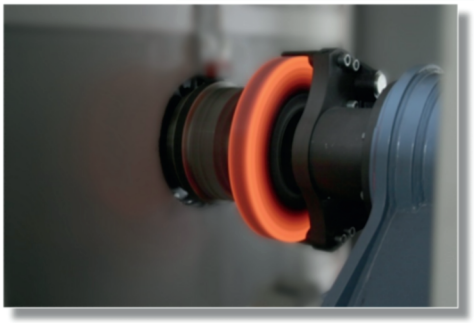
Item No.	*Check/Test*	*Sample Number*						*Remarks*
		1	*2*	*3*	*4*	*5*	*6*	
1	Geometric check Paragraphs 5.3.3.1., 5.3.4.1.	x	x	x	x	x	x	
2	Material check Paragraphs 5.3.3.2., 5.3.4.2.	x	x					
3	Balancing provisions check Paragraph 5.3.7.2.			x	x	x	x	
4	Wear condition marking check Paragraph 5.3.7.3.			x	x	x	x	
5	Integrity test – thermal fatigue Paragraphs 4.1.1., 4.2.1. of Annex 11, 4.1.1., 4.2.1. of Annex 12				x	x		
6	Integrity test – high load test Paragraphs 4.1.2., 4.2.2. of Annex 11, and paragraphs 4.1.2., 4.2.2. of Annex 12			x				
7	Service brake vehicle performance test Paragraph 2.2. of Annex 11, Paragraph 2.2. of Annex 12						Pair of discs	Either front or rear axle

Our rotors have been tested at the MIRA facility

M.I.R.A.

Motor Industry Research Association

All our ECE R90 tests are completed at the M.I.R.A. testing grounds in Nuneaton where the VCA are also located.



www.mira.co.uk/about-mira

Check list explanation:

1. Geometric check: The critical dimensions of 6 sample brake rotors are checked and compared to the original equipment part.

2. Material check: The cast iron material specification is checked to ensure it conforms to the approved material specification.

3. Balance provision: Checks to ensure the part has been balanced.

4. Wear condition marking: Checks to ensure the brake rotor's minimum thickness is marked on the part.

5. Integrity test - Thermal fatigue: Dynamometer comparison test. Rotors are tested to destruction:

Thermal Fatigue Test program

"Bedding-in" procedure	100 Brake applications Initial speed: 60 km/h Final speed: 30 km/h Avg Decel alternating between 1 m/s2 and 2 m/s2 Initial temperature: Less than or equal to 300 ° C (beginning at room temperature)
1. Conditioned braking	10 Brake applications from 60 to 30 km/h Avg Decel alternating between 1 m/s2 and 2 m/s2 Initial temperature : Less than or equal to 250 ° C
2. High-speed braking	2 Brake applications from 130 to 80 km/h Avg Decel = 3 m/s2 Initial temperature: Less than or equal to 100 ° C
3. Conditioned braking	See test stage 1. Conditioned braking
4. High-speed braking	See test stage 2. High speed braking
5. Conditioned braking	See test stage 1. Conditioned braking
6. Continuous braking (1)	5 Brake applications at a constant speed of: 85 km/h Decelerating torque corresponding to 0.5 m/s2 Braking period 60 s Initial temperature: Less than or equal to 80 ° C
7. Conditioned braking	see test stage 1. Conditioned braking
8. Continuous braking (2)	5 Brake applications at a constant speed of: 85km/h Decelerating torque corresponding to 1.0 m/s2 Braking period 40 s Initial temperature: Less than or equal to 80 ° C

9. Repeat test stages 1 to 8: 9 or 14 times (whichever is applicable)

6. Integrity test - High load: High speed, high torque brake test.

7. Service brake vehicles: On vehicle brake test

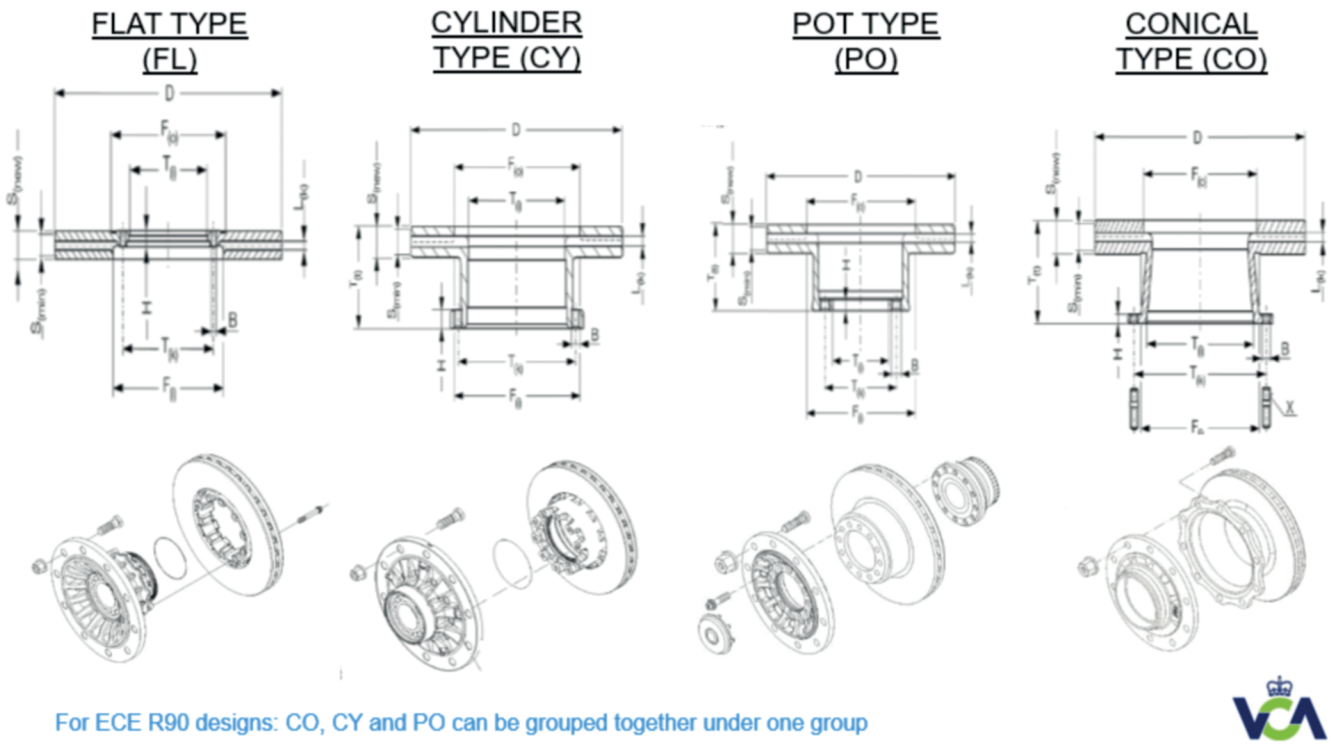
Brake Rotor family groups

Because there are so many different parts numbers, especially in the car sector, the certification body has put together family groups. If a part is tested from this group all the parts within that family can have an ECE R90 approval number.

The groups are determined by it's diameter / thickness, design and venting construction.

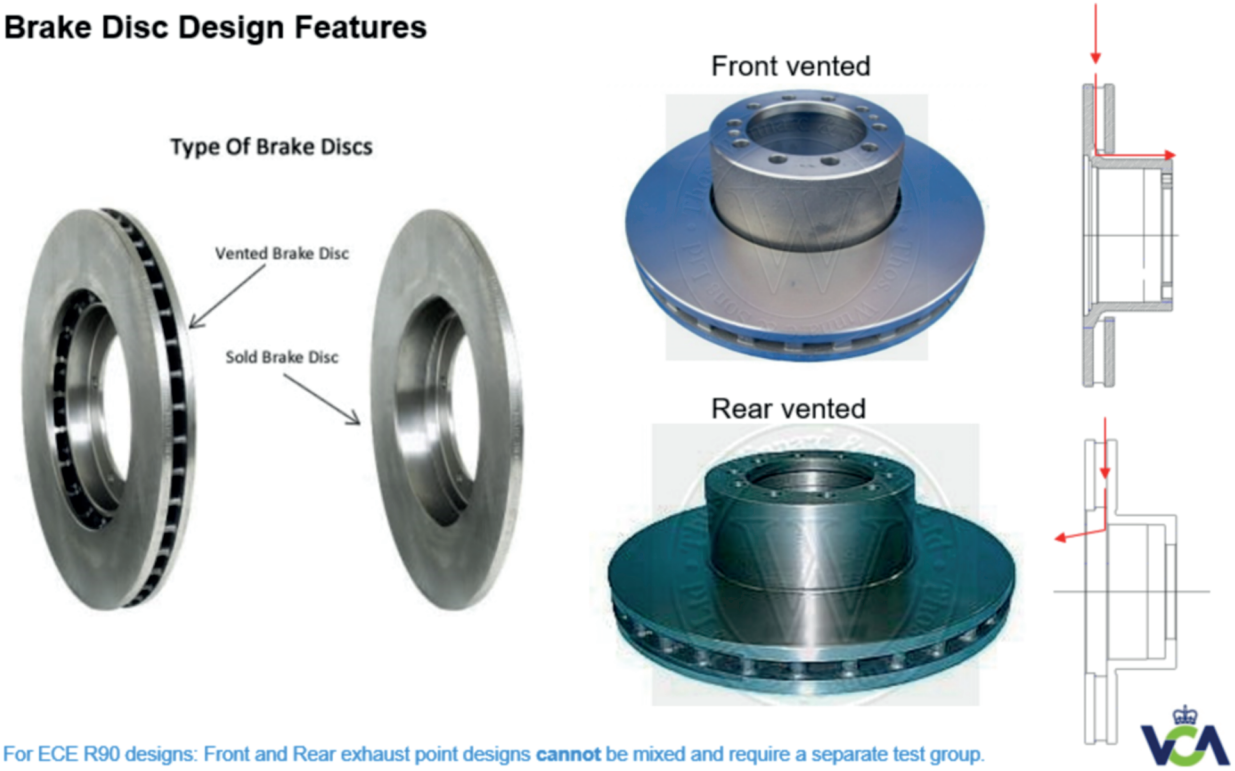
Illustrated below are details on the design criteria:

Brake Disc Designs



For ECE R90 designs: CO, CY and PO can be grouped together under one group

Brake Disc Design Features



For ECE R90 designs: Front and Rear exhaust point designs **cannot** be mixed and require a separate test group.

Brake Rotor family groups

The venting design must be the same within a family group:

Brake Disc Design Features - Venting

Straight type vents

Pillar type vents

Brake rotor marking and labelling requirement.

Once a part has been approved it must follow certain marking and labelling requirements.

1. Multi language fitting instructions must be included inside the box.

2. Product label must have company name, part number, batch number, position of fitment, vehicle application, ECE R90 approval number.

3. The edge marking on the brake disc must have the supplier name, Part#, Minimum thickness, Batch code and ECE R90#

ECE R90 Approved Brake Disc Label example:

Certificates

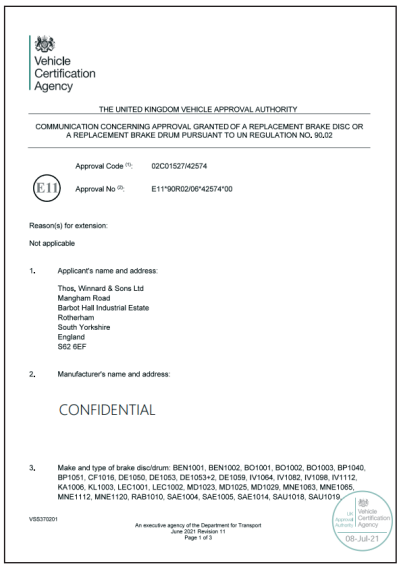
Copied below are some images of our ECE R90 certificate for the most popular group:

CV G001 P Int = ECE R90 Number E11 90R02/064257400

This group has the following part numbers:

BEN1001, BEN1002, BO1001, BO1002, BO1003, BP1040, BP1051, CF1016, DE050, DE053, DE1053+2, DE1059, IV1064, IV1082, IV1098, IV1112, KA1006, KL1003, LEC1001, LEC1002, MD1023, MD1025, MD1029, MNE1063, MNE1065, MNE1112, MNE1120, RAB1010, SAE1004, SAE1005, SAE1014, SAU1018, SAU1019, SAU1039, SAU1040, SC1023, SCH1001, SMB1002, YO1017, YO1031, ZF1010

A simplified two page version of the certificate is available for distribution



Vehicle Certification Agency

THE UNITED KINGDOM VEHICLE APPROVAL AUTHORITY

COMMUNICATION CONCERNING APPROVAL GRANTED OF A REPLACEMENT BRAKE DISC OR A REPLACEMENT BRAKE DRUM PURSUANT TO UN REGULATION NO. 90.02

Approval Code (1): 02C01527/42574

E11 Approval No (2): E11*90R02/06*42574*00

Reason(s) for extension:

Not applicable

1. Applicant's name and address:

Thos. Winnard & Sons Ltd
Mangham Road
Barbot Hall Industrial Estate
Rotherham
South Yorkshire
England
S62 6EF

2. Manufacturer's name and address:

CONFIDENTIAL

3. Make and type of brake disc/drum: BEN1001, BEN1002, BO1001, BO1002, BO1003, BP1040, BP1051, CF1016, DE1050, DE1053, DE1053+2, DE1059, IV1064, IV1082, IV1098, IV1112, KA1006, KL1003, LEC1001, LEC1002, MD1023, MD1025, MD1029, MNE1063, MNE1065, MNE1112, MNE1120, RAB1010, SAE1004, SAE1005, SAE1014, SAU1018, SAU1019,

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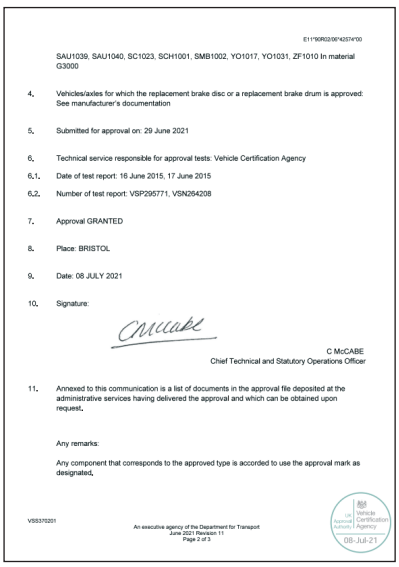

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SAU1039, SAU1040, SC1023, SCH1001, SMB1002, YO1017, YO1031, ZF1010 In material G3000

4. Vehicles/axles for which the replacement brake disc or a replacement brake drum is approved: See manufacturer's documentation

5. Submitted for approval on: 29 June 2021

6. Technical service responsible for approval tests: Vehicle Certification Agency

6.1. Date of test report: 16 June 2015, 17 June 2015

6.2. Number of test report: VSP295771, VSN264208

7. Approval GRANTED

8. Place: BRISTOL

9. Date: 08 JULY 2021

10. Signature:

C McCABE
Chief Technical and Statutory Operations Officer

11. Annexed to this communication is a list of documents in the approval file deposited at the administrative services having delivered the approval and which can be obtained upon request.

Any remarks:

Any component that corresponds to the approved type is accorded to use the approval mark as designated.

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The full certificate contains the vehicle applications and approved product drawings. Distribution of this version is restricted to help protect the certificates market integrity.

Example of drawings attached in the certificate: BO1002