Submitted by the experts from CLEPA

Informal document **GRVA-10-29**
10th GRVA, 25-28 May 2021,
Agenda item 10

UN Regulation No. 90 - CoP

Document replacing GRVA-09-41 and GRVA-07-52

Additional Supporting Data

R90 CoP

Components no longer commercially available

Current Requirement

- 3.1.1. The machine shall be equipped with a disc brake of the fixed calliper type with a cylinder diameter of 60 mm and a solid (not ventilated) brake disc having a diameter of 278 ± 2 mm and a thickness of 12 mm ± 0.5 mm. A rectangular piece of the friction material with an area of 44 cm^2 ± 0.5 cm^2 and a thickness of at least 6 mm shall be attached to the backing plate

New Proposal

Keep 3.1.1. unchanged and add a new paragraph:

3.1.1.1. Alternatively the machine may be equipped with a disc brake and corresponding brake disc having a diameter of 278 ± 2 mm such as to allow a rectangular piece of the friction material with a surface area of 44cm^2 ± 0.5cm^2 and a thickness of at least 6 mm to be attached to the backing plates of the disc brake.

In this case the Registered Values of friction to be used for ongoing COP checks shall be established in accordance with the technical service by comparative tests using the same batch of friction material with the test hardware specified in 3.1.1 and the alternative hardware.

The applicant shall provide the values for the friction behavior resulting from the use of alternative test hardware in accordance with Annex 9 para 3.4.1 of this Regulation and the results shall be attached to the type-approval report

Points of Discussion

- 1) Use of alternative type of brake calliper – Agreed
- 2) Use of alternative type of brake disc
  - Vented rotor will result in lower EOS temperatures – will this detract from temperature spectrum experienced on approval tests
- 3) CLEPA position
  - Annex 9 /3.2.2. specifies start temperatures no requirement for EOS
  - Annex 9 /3.2.2. is an industry CoP test with surrogate parts not an approval test – no requirement for temperature matching
  - However temperature spectrum still consistent with approval tests

Annex 9 para 3.2.2 -Tests with Solid & Vented Discs

Cycle	No BrakeApps	IBT Deg c	Solid Disc	Vented Disc	% Diff
			End of Cycle Temp – Deg c	End of Cycle Temp – Deg c	
1	5	100	218	205	-6%
2	5	< 200	384	342	-11%
3	5	200	385	342	-11%
4	5	< 300	433	375	-13%
5	5	300	459	389	-15%
6	3	250	265	260	-2%
7	3	200	248	224	-10%
8	3	150	214	194	-9%
9	10	100	285	244	-14%
10	5	< 300	393	385	-2%
11	5	300	484	406	-16%
Total	54				
		Test Outcome			
		Mu Op1	0.494	0.524	6%
		Mu Op2	0.463	0.490	6%
		Mu Min	0.348	0.360	3%
		Mu Max	0.530	0.542	2%

Typical Temperatures on R90 HCV Approval Tests

Test No	Disc/ Drum	Disc/Drum Dia (mm)	DiscThk/ Drum width (mm)	Type 0 Test Test Temp (Deg. C)		Type 0 High Speed Test Temp (Deg. C)		Type 1 Fade (Deg. C)	Type II Fade (Deg. C)	Type III Fade (Deg. C)
				Start	End	Start	End	Max	Max	Max
1	Vent	434	45	40	79	40	121	430	307	N/A
2	Vent	434	45	40	72	40	116	387	331	N/A
3	Vent	334	30	98	129	98	161	379	284	N/A
4	Drum	410	178	90	140	96	188	392	322	358
5	Vent	377	45	97	143	96	155	394	341	372
Mean Values					**113**		**148**	**396**	**317**	**365**
Range of Values on Annex 9 / 3.2.2 with vented discs					**100 > 406 Deg. c**					