May 2009

Additional Sound Emission Provisions

The ASEP Excel Sheet

How to use it

INTERNATIONAL ORGANIZATION OF MOTOR VEHICLE MANUFACTURERS

Introduction

- The ASEP Excel Sheet is meant as a work sheet for test engineers, who carry out measurements on the proving ground.
- The Excel Sheet is based on the work draft of the GRB Informal Group on ASEP from May 2009.
- This document will give a guideline for the use of the Excel sheet.

General Rules

- Yellow cells are meant for entry of values or text.
- Blue cells should not be changed, they contain formulas.
- Cells may change their colour to indicate whether a value entered is correct or is deviating from an expected value.

- To carry out the ASEP test follow the flowchart as delivered, or follow the text of the regulation.
- This Excel sheet guides you through the test in five steps.

Steps Through the ASEP Test - Overview

(1) Enter the Headline and the General Vehicle Data.

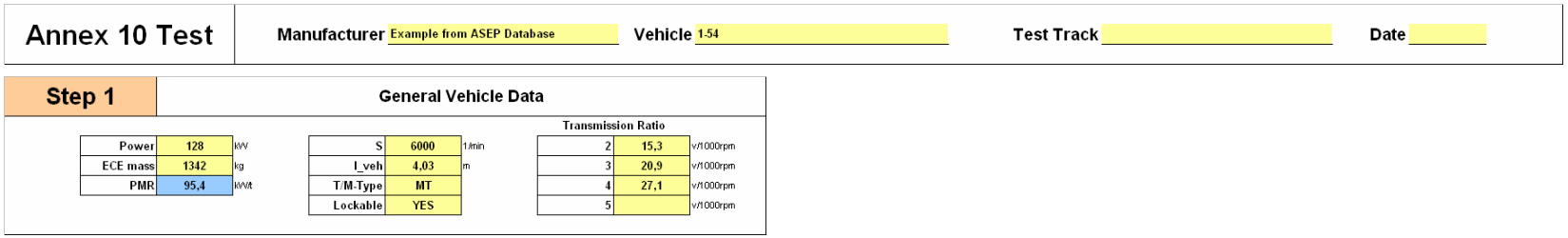
(2) Enter the necessary data from Annex 3. If not available carry out the test of Annex 3.

(3) Enter the correct boundary conditions. For the time being, the values are not fixed and a change might be needed. Once fixed by regulation this step can be skipped.

(4) Following the requirements for the boundary conditions, a check is needed to determine whether gear 2 has to be skipped.

(5) Step 5 is not specifically indicated in the Excel sheet. Step 5 means to carry out the measurements in all indicated gears and to fill the Excel sheet with the results.

Steps 1 - General Information



Annex 10 Test	Manufacturer: Example from ASEP Database	Vehicle: 1-54	Test Track:	Date:

Step 1 — General Vehicle Data

Power	128	kW
ECE mass	1342	kg
PMR	95,4	kW/t

S	6000	1/min
l_veh	4,03	m
T/M-Type	MT	
Lockable	YES	

Transmission Ratio

2	15,3	v/1000rpm
3	20,9	v/1000rpm
4	27,1	v/1000rpm
5		v/1000rpm

Enter the requested values.

T/M-Type: **Transmission Type, please enter either:**

MT **for Manual Transmission**

AT **for Automatic Transmission**

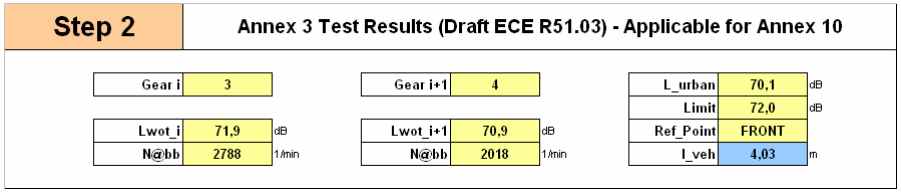
Lockable: **Is the test carry out in a locked transmission mode or in D-range? Please enter either:**

YES **for a test in non locked mode**

NO **for a test in locked mode**

In latter case only one data table is activated for D-range.

Steps 2 - Annex 3 Test Result Data



Step 2	Annex 3 Test Results (Draft ECE R51.03) - Applicable for Annex 10								
Gear i	3		Gear i+1	4		L_urban	70,1	dB
						Limit	72,0	dB
Lwot_i	71,9	dB	Lwot_i+1	70,9	dB	Ref_Point	FRONT	
N@bb	2788	1/min	N@bb	2018	1/min	l_veh	4,03	m

Enter the requested values, which are all available, after the type approval test according to Annex 3 has been carried out. This test is mandatory before ASEP can be verified.

Please enter as Reference point [Ref_Point]:

FRONT **for vehicles equipped with a front engine**

MID **for vehicles equipped with a mid engine**

REAR **for vehicles equipped with a rear engine**

Steps 3 - Boundary Conditions

Step 3	Annex 10 Boundary Conditions (no changes required)

Max Acc	4,0	m/s²	Max Slope	7,0	dB/1000rpm	Min Gear	2	
nbb_max	4363	1/min	d_Slope	1,5	dB/1000rpm	Max Gear	4	
vbb_max	70	km/h	Margin	3,0	dB			

For the yellow highlighted cells, no specific values are fixed up to now. You may enter values according to your interest or following the further discussion in GRB.

Steps 4 - Vehicle Pre-Check

Step 4	Vehicle Pre-Check

Carry out one measurements in first applicable gear (basically 2nd gear) to verify acceleration performance and engine speed criteria

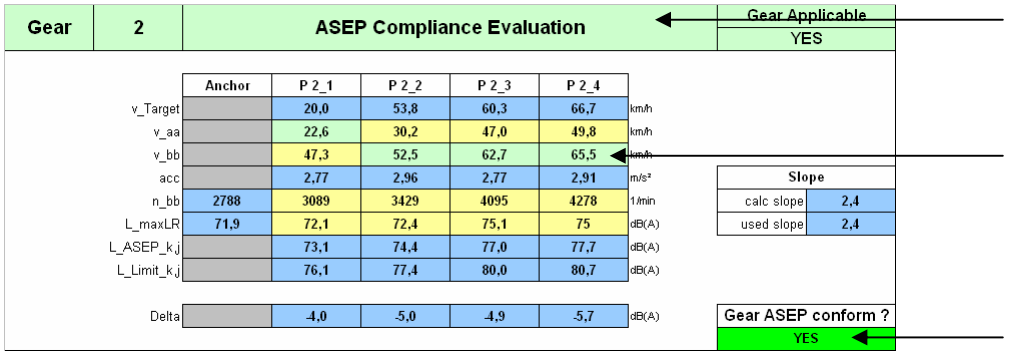
Point	v_aa	v_bb	acc	n_bb	Gear valid ?
	[km/h]	[km/h]	[m/s²]	[1/min]	
P 2_1	22,6	47,3	2,77	3089	YES

To verify whether gear 2 is a valid gear for testing ASEP, a simple pre-check will give clarification. Carry out in gear 2 a pass-by measurement as specified in §2.6 of Annex 10.

If the derived acceleration exceeds the maximum acceleration of 4.0 m/s², this gear shall be skipped, since it can be expected at higher vehicle entry speeds the acceleration will increase.

Furthermore it is checked, whether the exit engine speed n_bb does exceed the maximum test engine speed n_{BB_ASEP}. If so, this gear will not deliver a reportable result for ASEP.

Steps 5 - Table for Testing a Specific Gear



Gear	2	ASEP Compliance Evaluation	Gear Applicable: YES

	Anchor	P 2_1	P 2_2	P 2_3	P 2_4	
v_Target		20,0	53,8	60,3	66,7	km/h
v_aa		22,6	30,2	47,0	49,8	km/h
v_bb		47,3	52,5	62,7	65,5	km/h
acc		2,77	2,96	2,77	2,91	m/s²
n_bb	2788	3089	3429	4095	4278	1/min
L_maxLR	71,9	72,1	72,4	75,1	75	dB(A)
L_ASEP_k,j		73,1	74,4	77,0	77,7	dB(A)
L_Limit_k,j		76,1	77,4	80,0	80,7	dB(A)
Delta		-4,0	-5,0	-4,9	-5,7	dB(A)

Slope	
calc slope	2,4
used slope	2,4

Gear ASEP conform ? YES

if colour turns grey, the gear is not applicable

Turns green, if measured values is within the tolerance of expected speed for the point Pi.
Is checked for v_{aa} of P1 and v_{bb} of all other points.

Indicates ASEP conformity of this gear

Values to be entered are v_{aa}, v_{bb}, n_{bb} and L_{maxLR}. All other values are calculated.

v_Target: **Indication of the vehicle target speeds for testing.**
For P_{k_1} always v_{aa}, for all other points v_{bb}.

acc: **Calculation of acceleration, always from the AA' line to the BB' line.**

L_ASEP_k,j: **calculated according §3.3 of Annex 10**

L_Limit_K,j: **calculated according to §4 of Annex 10. [Limit-L_{urban}] is suppressed.**

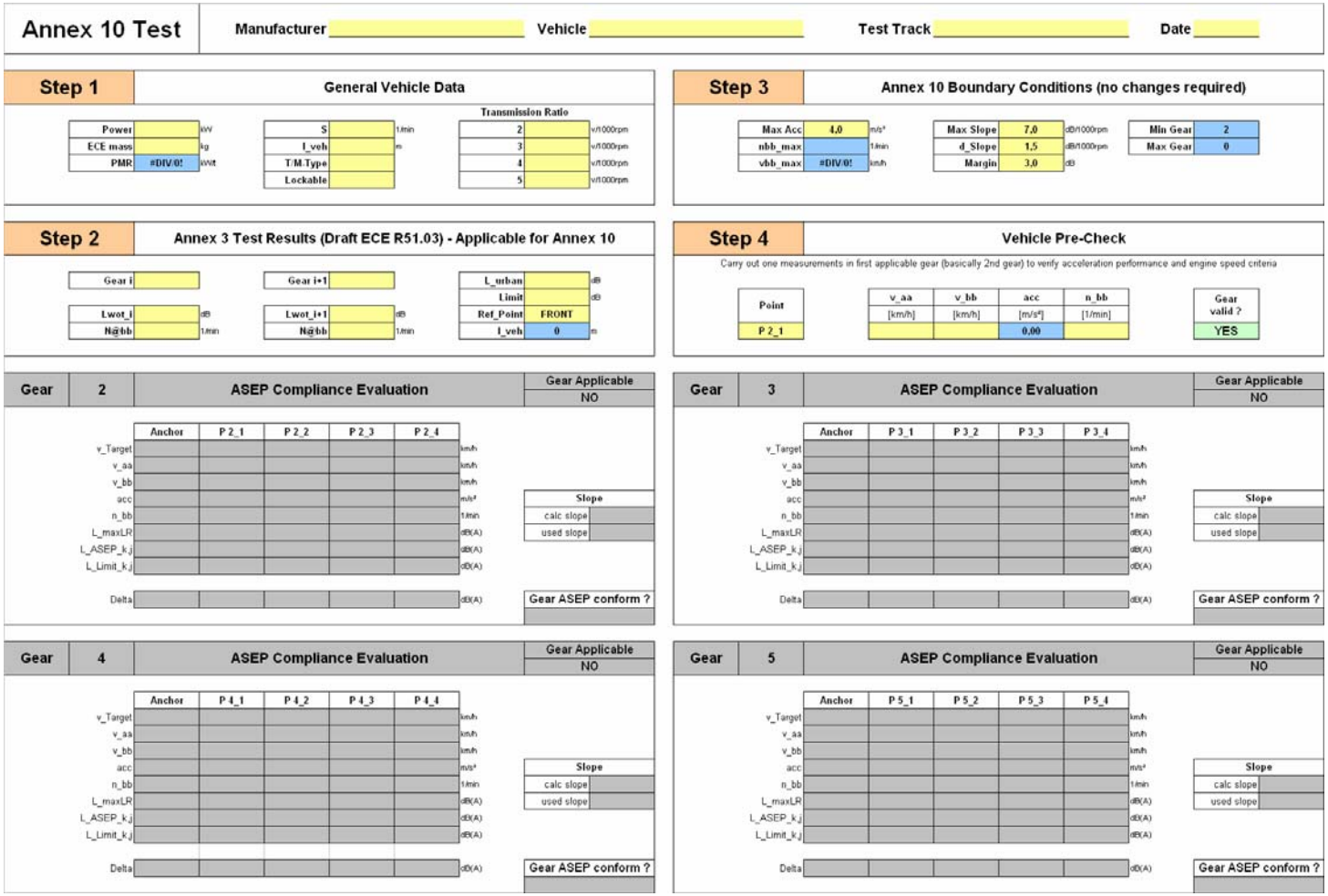
Delta: **Difference between measured value and limit value.**
Turns red if point $P_{k,j}$ exceeds L_Limit_k,j

Finally

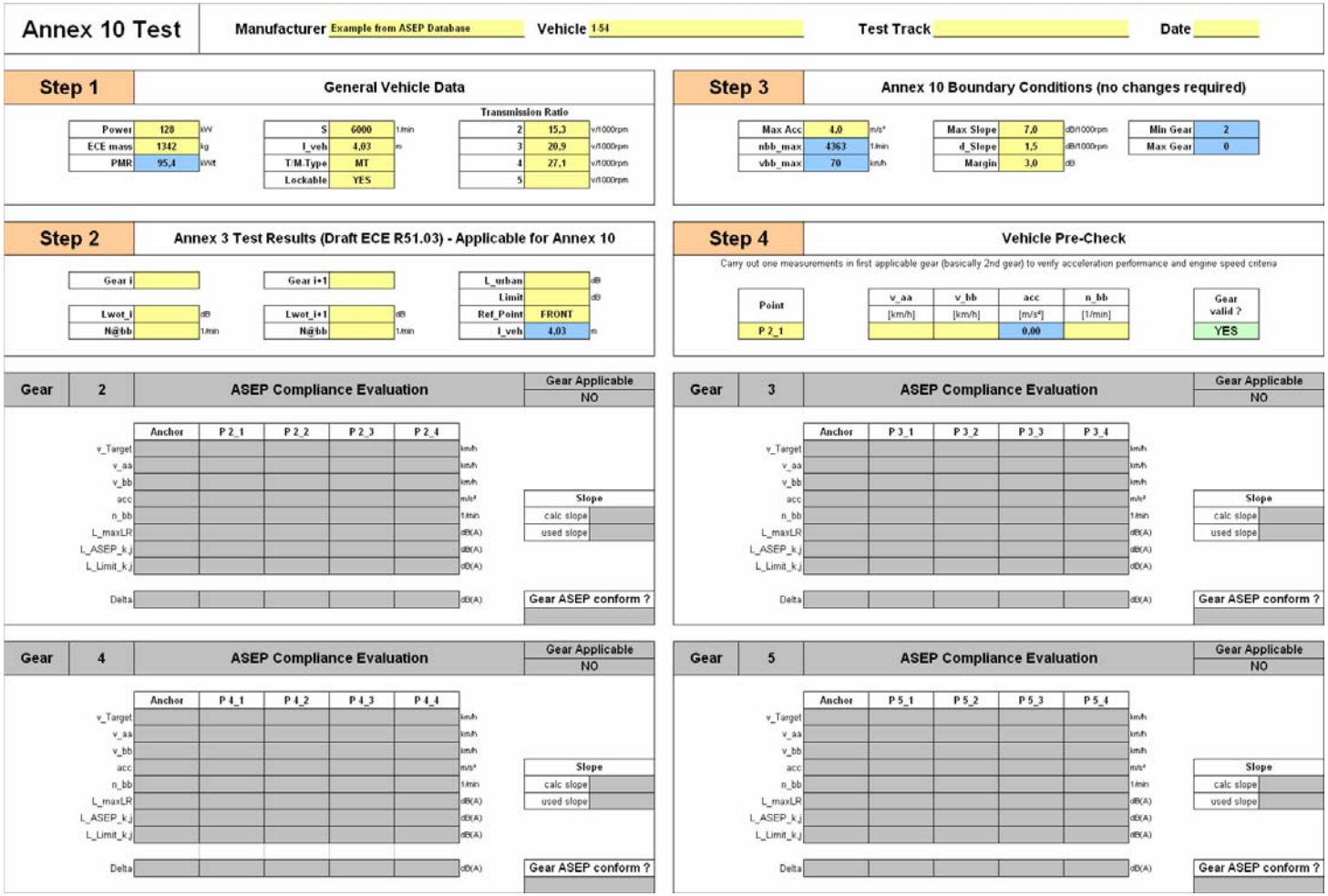
- **Nothing is perfect.**
- **This Excel sheet aims to cover most cases of technical variants and should ease your work.**
- **However you may detect errors or the semiautomatic Excel file may not be compatible to your measurements.**
- **In any case, this Excel sheet does not substitute the wording of the regulation text. In case of doubts follow the requirements as specified in ECE R 51.03 Annex 10.**

The Following Slides show all Steps for an example.

Excel-Sheet - Empty



Excel-Sheet - After Step 1



Annex 10 Test — Manufacturer: Example from ASEP Database — Vehicle: 1-54 — Test Track: — Date:

Step 1 — General Vehicle Data

Power	128	kW
ECE mass	1342	kg
PMR	95,4	kW/t

S	6000	1/min
l_veh	4,03	m
T/M-Type	MT	
Lockable	YES	

Transmission Ratio

2	15,3	v/1000rpm
3	20,9	v/1000rpm
4	27,1	v/1000rpm
5		v/1000rpm

Step 3 — Annex 10 Boundary Conditions (no changes required)

Max Acc	4,0	m/s²
nbb_max	4363	1/min
vbb_max	70	km/h

Max Slope	7,0	dD/1000rpm
d_Slope	1,5	dB/1000rpm
Margin	3,0	dB

Min Gear	2
Max Gear	6

Step 2 — Annex 3 Test Results (Draft ECE R51.03) - Applicable for Annex 10

Gear i		Gear i+1		L_urban	dB
				Limit	dB
Lwot_i	dB	Lwot_i+1	dB	Ref_Point	FRONT
N@bb	1/min	N@bb	1/min	l_veh	4,03 m

Step 4 — Vehicle Pre-Check

Carry out one measurements in first applicable gear (basically 2nd gear) to verify acceleration performance and engine speed criteria

Point	v_aa [km/h]	v_bb [km/h]	acc [m/s²]	n_bb [1/min]	Gear valid ?
P 2_1			0,00		YES

Gear 2 — ASEP Compliance Evaluation — Gear Applicable: NO

	Anchor	P 2_1	P 2_2	P 2_3	P 2_4	
v_Target						km/h
v_aa						km/h
v_bb						km/h
acc						m/s²
n_bb						1/min
L_maxLR						dB(A)
L_ASEP_k,j						dB(A)
L_Limit_k,j						dD(A)
Delta						dB(A)

Slope: calc slope / used slope — Gear ASEP conform ?

Gear 3 — ASEP Compliance Evaluation — Gear Applicable: NO

	Anchor	P 3_1	P 3_2	P 3_3	P 3_4	
v_Target						km/h
v_aa						km/h
v_bb						km/h
acc						m/s²
n_bb						1/min
L_maxLR						dB(A)
L_ASEP_k,j						dB(A)
L_Limit_k,j						dD(A)
Delta						dB(A)

Slope: calc slope / used slope — Gear ASEP conform ?

Gear 4 — ASEP Compliance Evaluation — Gear Applicable: NO

	Anchor	P 4_1	P 4_2	P 4_3	P 4_4	
v_Target						km/h
v_aa						km/h
v_bb						km/h
acc						m/s²
n_bb						1/min
L_maxLR						dB(A)
L_ASEP_k,j						dB(A)
L_Limit_k,j						dB(A)
Delta						dD(A)

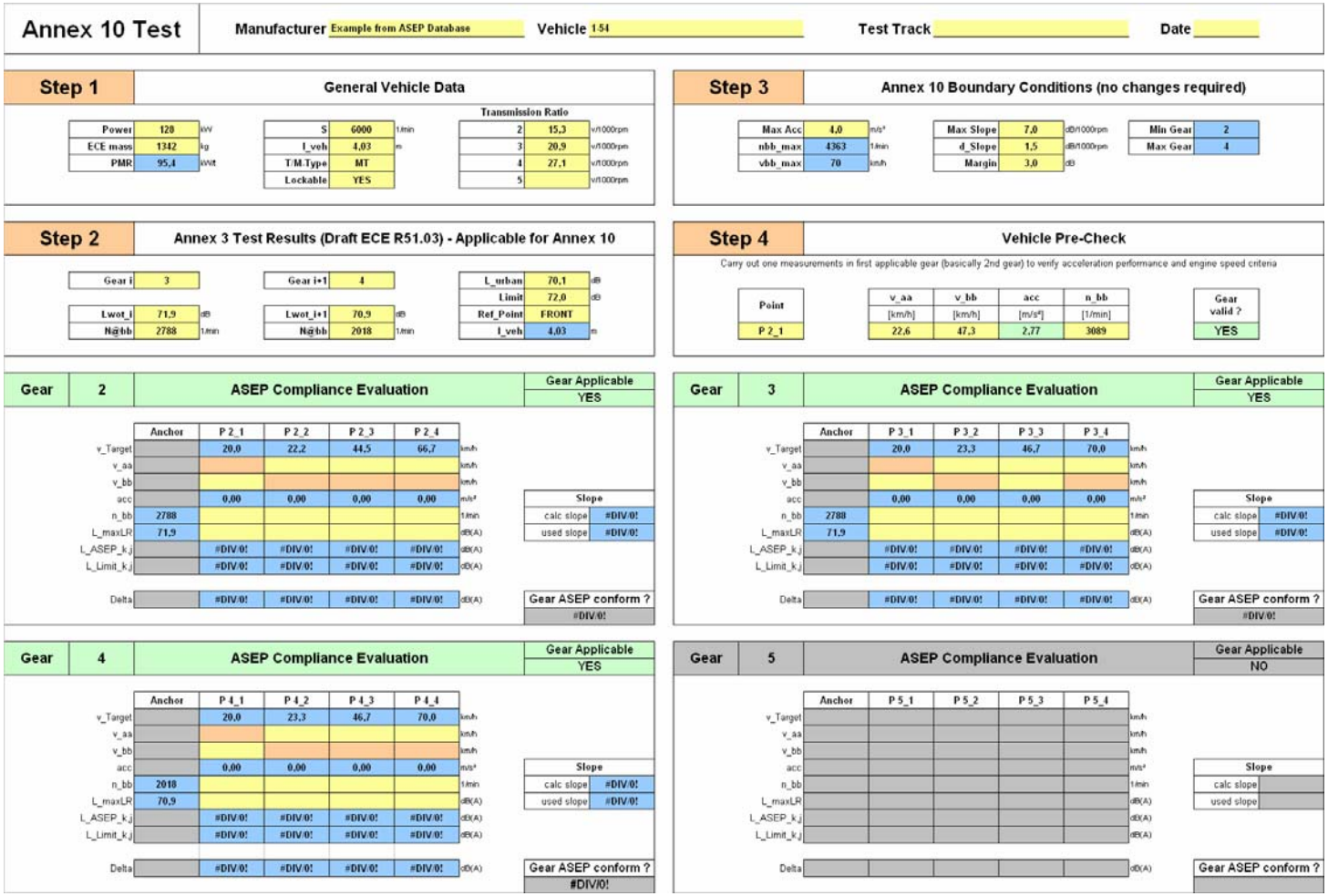
Slope: calc slope / used slope — Gear ASEP conform ?

Gear 5 — ASEP Compliance Evaluation — Gear Applicable: NO

	Anchor	P 5_1	P 5_2	P 5_3	P 5_4	
v_Target						km/h
v_aa						km/h
v_bb						km/h
acc						m/s²
n_bb						1/min
L_maxLR						dB(A)
L_ASEP_k,j						dB(A)
L_Limit_k,j						dB(A)
Delta						dD(A)

Slope: calc slope / used slope — Gear ASEP conform ?

Excel-Sheet - After Step 4



Annex 10 Test — Manufacturer: Example from ASEP Database — Vehicle: 1-54 — Test Track: — Date:

Step 1 — General Vehicle Data

						Transmission Ratio		
Power	128	kW	S	6000	1/min	2	15,3	v/1000rpm
ECE mass	1342	kg	l_veh	4,03	m	3	20,9	v/1000rpm
PMR	95,4	kW/t	T/M-Type	MT		4	27,1	v/1000rpm
			Lockable	YES		5		v/1000rpm

Step 3 — Annex 10 Boundary Conditions (no changes required)

Max Acc	4,0	m/s²	Max Slope	7,0	dB/1000rpm	Min Gear	2
nbb_max	4363	1/min	d_Slope	1,5	dB/1000rpm	Max Gear	4
vbb_max	70	km/h	Margin	3,0	dB		

Step 2 — Annex 3 Test Results (Draft ECE R51.03) - Applicable for Annex 10

Gear i	3		Gear i+1	4		L_urban	70,1 dB
						Limit	72,0 dB
Lwot_i	71,9	dB	Lwot_i+1	70,9	dB	Ref_Point	FRONT
N@bb	2788	1/min	N@bb	2018	1/min	l_veh	4,03 m

Step 4 — Vehicle Pre-Check

Carry out one measurements in first applicable gear (basically 2nd gear) to verify acceleration performance and engine speed criteria

Point	v_aa [km/h]	v_bb [km/h]	acc [m/s²]	n_bb [1/min]	Gear valid ?
P 2_1	22,6	47,3	2,77	3089	YES

Gear 2 — ASEP Compliance Evaluation — Gear Applicable: YES

	Anchor	P 2_1	P 2_2	P 2_3	P 2_4	
v_Target		20,0	22,2	44,5	66,7	km/h
v_aa						km/h
v_bb						km/h
acc		0,00	0,00	0,00	0,00	m/s²
n_bb	2788					1/min
L_maxLR	71,9					dB(A)
L_ASEP_k,j		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	dB(A)
L_Limit_k,j		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	dB(A)
Delta		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	dB(A)

Slope: calc slope #DIV/0! — used slope #DIV/0!

Gear ASEP conform ? #DIV/0!

Gear 3 — ASEP Compliance Evaluation — Gear Applicable: YES

	Anchor	P 3_1	P 3_2	P 3_3	P 3_4	
v_Target		20,0	23,3	46,7	70,0	km/h
v_aa						km/h
v_bb						km/h
acc		0,00	0,00	0,00	0,00	m/s²
n_bb	2788					1/min
L_maxLR	71,9					dB(A)
L_ASEP_k,j		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	dB(A)
L_Limit_k,j		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	dB(A)
Delta		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	dB(A)

Slope: calc slope #DIV/0! — used slope #DIV/0!

Gear ASEP conform ? #DIV/0!

Gear 4 — ASEP Compliance Evaluation — Gear Applicable: YES

	Anchor	P 4_1	P 4_2	P 4_3	P 4_4	
v_Target		20,0	23,3	46,7	70,0	km/h
v_aa						km/h
v_bb						km/h
acc		0,00	0,00	0,00	0,00	m/s²
n_bb	2018					1/min
L_maxLR	70,9					dB(A)
L_ASEP_k,j		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	dB(A)
L_Limit_k,j		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	dB(A)
Delta		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	dB(A)

Slope: calc slope #DIV/0! — used slope #DIV/0!

Gear ASEP conform ? #DIV/0!

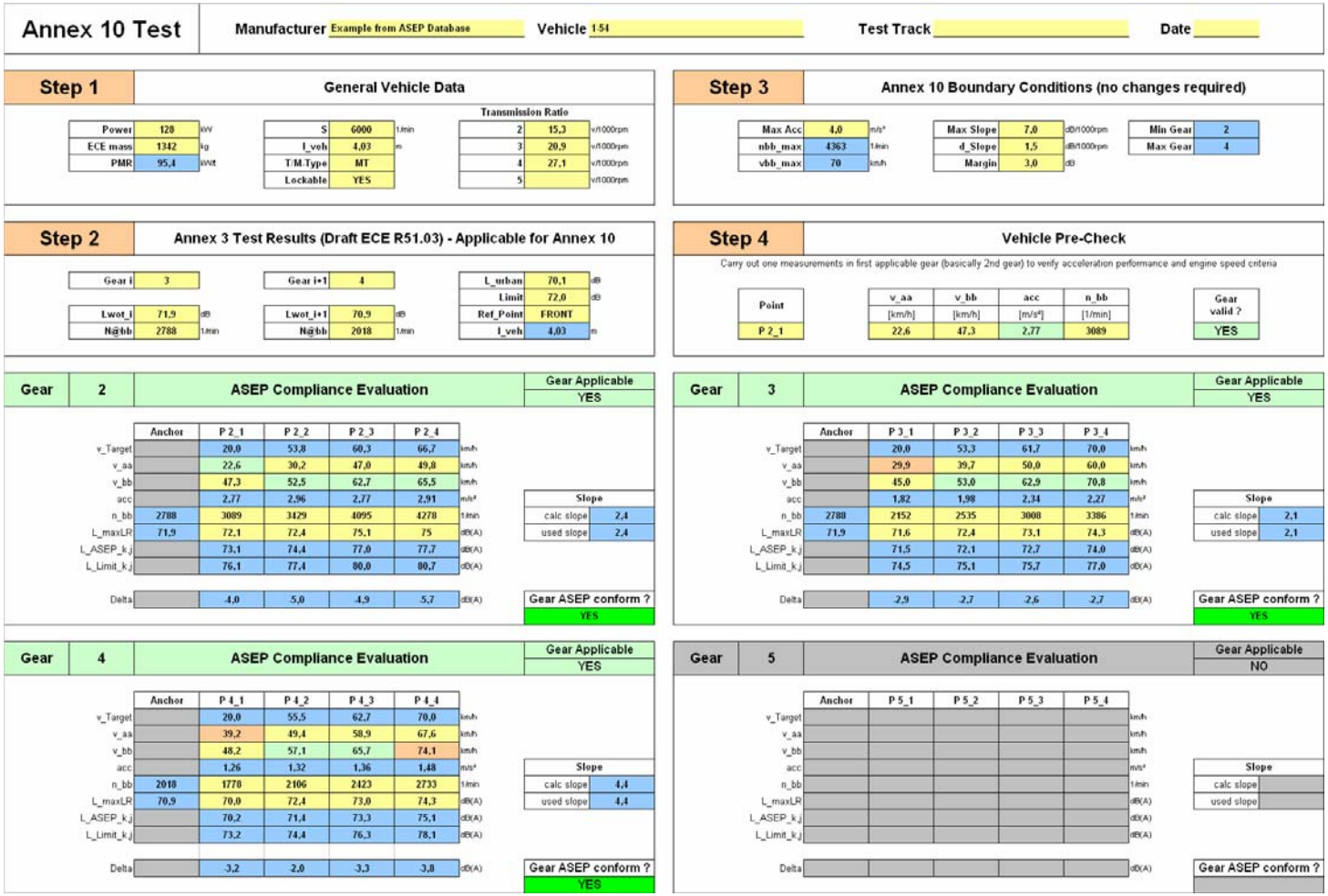
Gear 5 — ASEP Compliance Evaluation — Gear Applicable: NO

	Anchor	P 5_1	P 5_2	P 5_3	P 5_4	
v_Target						km/h
v_aa						km/h
v_bb						km/h
acc						m/s²
n_bb						1/min
L_maxLR						dB(A)
L_ASEP_k,j						dB(A)
L_Limit_k,j						dB(A)
Delta						dB(A)

Slope: calc slope — used slope

Gear ASEP conform ?

Excel-Sheet - After Whole ASEP Test



Annex 10 Test — Manufacturer: Example from ASEP Database — Vehicle: 1-54 — Test Track: — Date:

Step 1 — General Vehicle Data

						Transmission Ratio	
Power	128 kW	S	6000 1/min			2	15,3 v/1000rpm
ECE mass	1342 kg	l_veh	4,03 m			3	20,9 v/1000rpm
PMR	95,4 kW/t	T/M-Type	MT			4	27,1 v/1000rpm
		Lockable	YES			5	v/1000rpm

Step 3 — Annex 10 Boundary Conditions (no changes required)

Max Acc	4,0 m/s²	Max Slope	7,0 dB/1000rpm	Min Gear	2
nbb_max	4363 1/min	d_Slope	1,5 dB/1000rpm	Max Gear	4
vbb_max	70 km/h	Margin	3,0 dB		

Step 2 — Annex 3 Test Results (Draft ECE R51.03) - Applicable for Annex 10

Gear i	3	Gear i+1	4	L_urban	70,1 dB
				Limit	72,0 dB
Lwot_i	71,9 dB	Lwot_i+1	70,9 dB	Ref_Point	FRONT
N@bb	2788 1/min	N@bb	2018 1/min	l_veh	4,03 m

Step 4 — Vehicle Pre-Check

Carry out one measurements in first applicable gear (basically 2nd gear) to verify acceleration performance and engine speed criteria

Point	v_aa [km/h]	v_bb [km/h]	acc [m/s²]	n_bb [1/min]	Gear valid ?
P 2_1	22,6	47,3	2,77	3089	YES

Gear 2 — ASEP Compliance Evaluation — Gear Applicable: YES

	Anchor	P 2_1	P 2_2	P 2_3	P 2_4	
v_Target		20,0	53,8	60,3	66,7	km/h
v_aa		22,6	30,2	47,0	49,8	km/h
v_bb		47,3	52,5	62,7	65,5	km/h
acc		2,77	2,96	2,77	2,91	m/s²
n_bb	2788	3089	3429	4095	4278	1/min
L_maxLR	71,9	72,1	72,4	75,1	75	dB(A)
L_ASEP_k,j		73,1	74,4	77,0	77,7	dB(A)
L_Limit_k,j		76,1	77,4	80,0	80,7	dB(A)
Delta		-4,0	-5,0	-4,9	-5,7	dB(A)

Slope: calc slope 2,4 — used slope 2,4

Gear ASEP conform ? YES

Gear 3 — ASEP Compliance Evaluation — Gear Applicable: YES

	Anchor	P 3_1	P 3_2	P 3_3	P 3_4	
v_Target		20,0	53,3	61,7	70,0	km/h
v_aa		29,9	39,7	50,0	60,0	km/h
v_bb		45,0	53,0	62,9	70,8	km/h
acc		1,82	1,98	2,34	2,27	m/s²
n_bb	2788	2152	2535	3008	3386	1/min
L_maxLR	71,9	71,6	72,4	73,1	74,3	dB(A)
L_ASEP_k,j		71,5	72,1	72,7	74,0	dB(A)
L_Limit_k,j		74,5	75,1	75,7	77,0	dB(A)
Delta		-2,9	-2,7	-2,6	-2,7	dB(A)

Slope: calc slope 2,1 — used slope 2,1

Gear ASEP conform ? YES

Gear 4 — ASEP Compliance Evaluation — Gear Applicable: YES

	Anchor	P 4_1	P 4_2	P 4_3	P 4_4	
v_Target		20,0	55,5	62,7	70,0	km/h
v_aa		39,2	49,4	58,9	67,6	km/h
v_bb		48,2	57,1	65,7	74,1	km/h
acc		1,26	1,32	1,36	1,48	m/s²
n_bb	2018	1778	2106	2423	2733	1/min
L_maxLR	70,9	70,0	72,4	73,0	74,3	dB(A)
L_ASEP_k,j		70,2	71,4	73,3	75,1	dB(A)
L_Limit_k,j		73,2	74,4	76,3	78,1	dB(A)
Delta		-3,2	-2,0	-3,3	-3,8	dB(A)

Slope: calc slope 4,4 — used slope 4,4

Gear ASEP conform ? YES

Gear 5 — ASEP Compliance Evaluation — Gear Applicable: NO

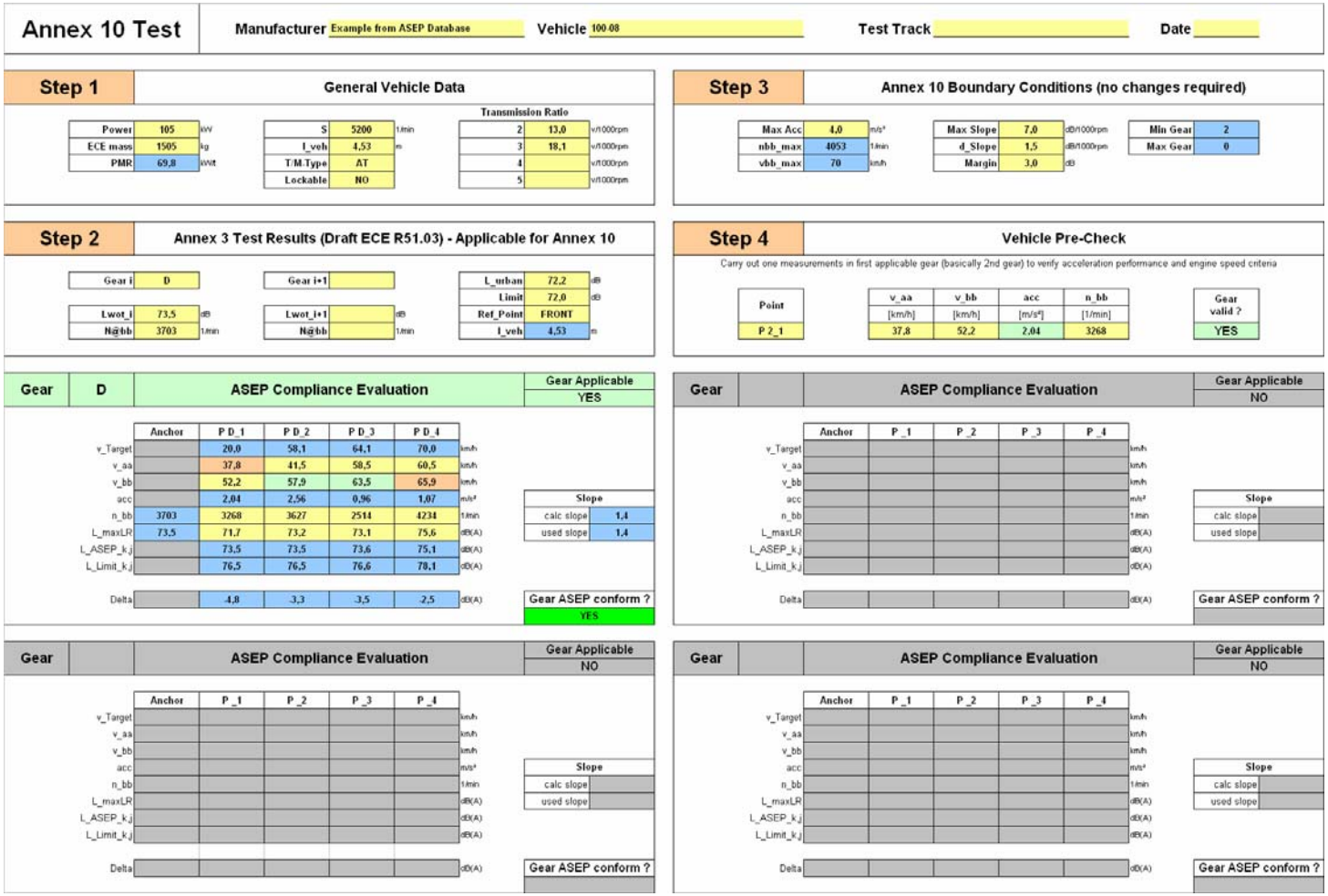
	Anchor	P 5_1	P 5_2	P 5_3	P 5_4	
v_Target						km/h
v_aa						km/h
v_bb						km/h
acc						m/s²
n_bb						1/min
L_maxLR						dB(A)
L_ASEP_k,j						dB(A)
L_Limit_k,j						dB(A)
Delta						dB(A)

Slope: calc slope — used slope

Gear ASEP conform ?

And a Example for a vehicle with a non-lockable automatic transmission.

Excel-Sheet - Automatic Transmission Non-lockable



Annex 10 Test — Manufacturer: Example from ASEP Database — Vehicle: 100.08 — Test Track: — Date:

Step 1 — General Vehicle Data

						Transmission Ratio		
Power	105	kW	S	5200	1/min	2	13,0	v/1000rpm
ECE mass	1505	kg	I_veh	4,53	m	3	18,1	v/1000rpm
PMR	69,8	kW/t	T/M-Type	AT		4		v/1000rpm
			Lockable	NO		5		v/1000rpm

Step 3 — Annex 10 Boundary Conditions (no changes required)

Max Acc	4,0	m/s²	Max Slope	7,0	dD/1000rpm	Min Gear	2	
nbb_max	4053	1/min	d_Slope	1,5	dB/1000rpm	Max Gear	0	
vbb_max	70	km/h	Margin	3,0	dB			

Step 2 — Annex 3 Test Results (Draft ECE R51.03) - Applicable for Annex 10

Gear i	D		Gear i+1			L_urban	72,2	dB
						Limit	72,0	dB
Lwot_i	73,5	dB	Lwot_i+1		dB	Ref_Point	FRONT	
N@bb	3703	1/min	N@bb		1/min	I_veh	4,53	m

Step 4 — Vehicle Pre-Check

Carry out one measurements in first applicable gear (basically 2nd gear) to verify acceleration performance and engine speed criteria

Point	v_aa [km/h]	v_bb [km/h]	acc [m/s²]	n_bb [1/min]	Gear valid ?
P 2_1	37,8	52,2	2,04	3268	YES

Gear D — ASEP Compliance Evaluation — Gear Applicable: YES

	Anchor	P D_1	P D_2	P D_3	P D_4	
v_Target		20,0	58,1	64,1	70,0	km/h
v_aa		37,8	41,5	58,5	60,5	km/h
v_bb		52,2	57,9	63,5	65,9	km/h
acc		2,04	2,56	0,96	1,07	m/s²
n_bb	3703	3268	3627	2514	4234	1/min
L_maxLR	73,5	71,7	73,2	73,1	75,6	dB(A)
L_ASEP_k,j		73,5	73,5	73,6	75,1	dB(A)
L_Limit_k,j		76,5	76,5	76,6	78,1	dD(A)
Delta		-4,8	-3,3	-3,5	-2,5	dB(A)

Slope: calc slope 1,4 — used slope 1,4

Gear ASEP conform ? YES

Gear — ASEP Compliance Evaluation — Gear Applicable: NO

	Anchor	P_1	P_2	P_3	P_4	
v_Target						km/h
v_aa						km/h
v_bb						km/h
acc						m/s²
n_bb						1/min
L_maxLR						dB(A)
L_ASEP_k,j						dB(A)
L_Limit_k,j						dD(A)
Delta						dB(A)

Slope: calc slope — used slope

Gear ASEP conform ?

Gear — ASEP Compliance Evaluation — Gear Applicable: NO

	Anchor	P_1	P_2	P_3	P_4	
v_Target						km/h
v_aa						km/h
v_bb						km/h
acc						m/s²
n_bb						1/min
L_maxLR						dB(A)
L_ASEP_k,j						dB(A)
L_Limit_k,j						dB(A)
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