

Excerpt from:

Experimental Noise Source Ranking Study

Measurement Results Documentation & Vehicle Info

| | | |
|------------|---|------------|
| Report No. | FVT-044/21/Sch K&A 2021/04/4123 from 05/07/2021 | |
| | Name | Date |
| Approved | S. Schmidt | 2021-07-05 |
| Written | H-J. Schacht | 2021-07-05 |

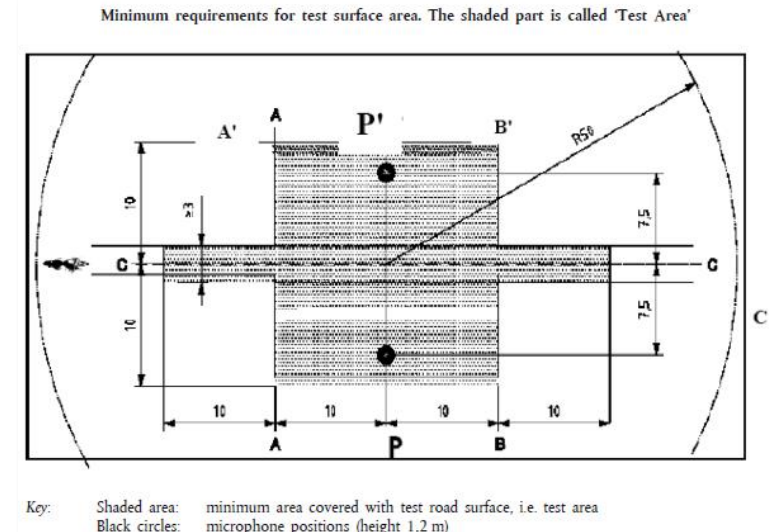
Regulation No 41 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of motor cycles with regard to noise

ANNEX 7

ADDITIONAL SOUND EMISSION PROVISIONS (ASEP)

1. Scope
 - 1.1. This Annex applies to vehicles of category L₃ with PMR > 50.
 - 1.2. Vehicles with variable gear ratios or automatic transmission with non-lockable gear ratios are exempted from the requirements of this Annex, if the vehicle manufacturer provides technical documents to the Type Approval Authority showing, that the vehicle's engine speed at BB' does neither exceed $n_{BB'} + 0,05 * (S - n_{idle})$ nor fall below $n_{BB'} - 0,05 * (S - n_{idle})$ for any test condition inside the ASEP control range defined in paragraph 2.5 below, where $n_{BB'}$ is the average engine speed at BB' from the three valid acceleration tests according to paragraph 1 of Annex 3.
2. Additional sound emission requirements
 - 2.1. Measuring instruments

The requirements for the measurement equipment are identical to those defined in paragraph 1.1 of Annex 3 for the tests of the motor cycle in motion.



Design guidelines

| Quantity | Target values | | Tolerances |
|---|--------------------------|--------------------------|------------|
| | by total mass of mix | by mass of the aggregate | |
| Mass of stones, square mesh sieve (SM) > 2 mm | 47,6 % | 50,5 % | ± 5 |
| Mass of sand 0,063 < SM < 2 mm | 38,0 % | 40,2 % | ± 5 |
| Mass of filler SM < 0,063 mm | 8,8 % | 9,3 % | ± 2 |
| Mass of binder (bitumen) | 5,8 % | N.A. | ± 0,5 |
| Max. chipping size | 8 mm | | 6,3 – 10 |
| Binder hardness | (see paragraph 3.2.2(f)) | | — |
| Polished stone value (PSV) | > 50 | | — |

| Compactn Marshall o | MAXIMUM LIMITS OF SOUND LEVELS | |
|------------------------|---------------------------------|--------------------------------------|
| | Category | Limit value for L_{urban} in dB(A) |
| | Power-to-mass ratio index (PMR) | |
| First category | PMR ≤ 25 | 73 |
| Second category | 25 < PMR ≤ 50 | 74 |
| Third category | PMR > 50 | 77 (f) |

(f) For motor cycles tested in second gear only in Annex 3, the limit value is increased by 1 dB(A) until the date in paragraph 12.7. Data for affected vehicles shall be studied, and discussions shall be made in case of further extension.



Magna Steyr – Test Facility Graz



AVL-Test Facility Gratkorn

| Brand | Model | ASEP points | Reason for Priorization | Euro stage | L_urb [dB(A)] | Limit [dB(A)] | Δlimit [dB(A)] | engine capacity [cc] | cylinders | | transmission | Power | MRO | PMR | subclass |
|----------|-----------------|---|---------------------------|------------|---------------|---------------|----------------|----------------------|-----------|---------|--------------|-------|-----|-------|----------|
| | | | | | | | | | no. | config. | | kW | kg | W/kg | |
| Honda | Forza 125 2021 | - | lower vehicle cost CVT | 5 | 74 | 74 | 0 | 125 | 1 | - | CVT | 10,7 | 162 | 45 | L3e-A1 |
| Piaggio | Beverly 300 | 1) v_AA' = 10 km/h, WOT* 2. v_BB' = 80 km/h, WOT* | | 5 | 75 | 77 | 2 | 300 | 1 | - | CVT | 15,5 | 183 | 60,1 | L3e-A2 |
| YAMAHA | T-MAX | 1) v_AA' = 10 km/h, WOT* 2. v_BB' = 100 km/h, WOT* | ASEP 2 ; 2-points CVT | 5 | 75 | 77 | 2 | 562 | 2 | row | CVT | 35 | 218 | 119,5 | L3e-A2 |
| KTM | 390 Duke | - | | 5 | 74,8 | 77 | 2,2 | 390 | 1 | - | manual | 32 | 162 | 135 | L3e-A2 |
| Kawasaki | Vulcan S (TBC) | | | 5 | 73,4 | 77 | 3,6 | 649 | 2 | row | manual | 44,7 | 229 | 147 | L3e-A3 |
| Triumph | Street Triple R | 2 throttle positions / at 3 gears / TBC | ASEP2; 6-points | 5 | 76,6 | 77 | 0,4 | 765 | 3 | row | manual | 86,8 | 187 | 331,3 | L3e-A3 |
| BMW | R 1250 GS | - | | 5 | 76,1 | 77 | 0,9 | 1254 | 2 | boxer | manual | 100 | 249 | 309 | L3e-A3 |
| H-D | Street Bob | 2 throttle positions / at 3 gears / TBC | ASEP 2; 6-points | 4 | 75,1 | 77 | 1,9 | 1745 | 2 | V | manual | 64 | 297 | 172,0 | L3e-A3 |

| Test point | Triumph | H-D |
|---------------|--|---|
| 1 | 100 km/h at BB 2 nd gear WOT | 100 km/h at BB 3rd gear @ WOT |
| 2 | 2325rpm at AA then WOT in 1 st gear | 1300 rpm at AA then WOT in 1st gear |
| 3 | 2325rpm at AA then WOT in 3 rd gear (in case too fast 4 th gear) | 1300 rpm at AA then WOT in 3rd gear |
| 4 | 100 km/h at BB with 50% WOT (gear not sure) | 100 km/h at BB with 50% WOT (gear not sure) |
| 5 | 100 km/h at BB in 6th gear WOT | 100 km/h at BB in 6th gear WOT |
| 6 | 100 km/h at AA and BB in 6th gear | 100 km/h at AA and BB in 6th gear |
| Common to all | | |
| L (Urban) | WOT acceleration for 50km/h at PP not faster than 80km/h at BB – find appropriate gear and – determine approximation speed ??km/h to AA Constant Speed depending on PMR 40 or 50 km/h | |

*1 vehicle * 4 variants * (6 + 2_{L(Urban)}) points * 4 valid runs = 128 runs/vehicle*

Experimental Noise Source Ranking Study

Honda Forza 125



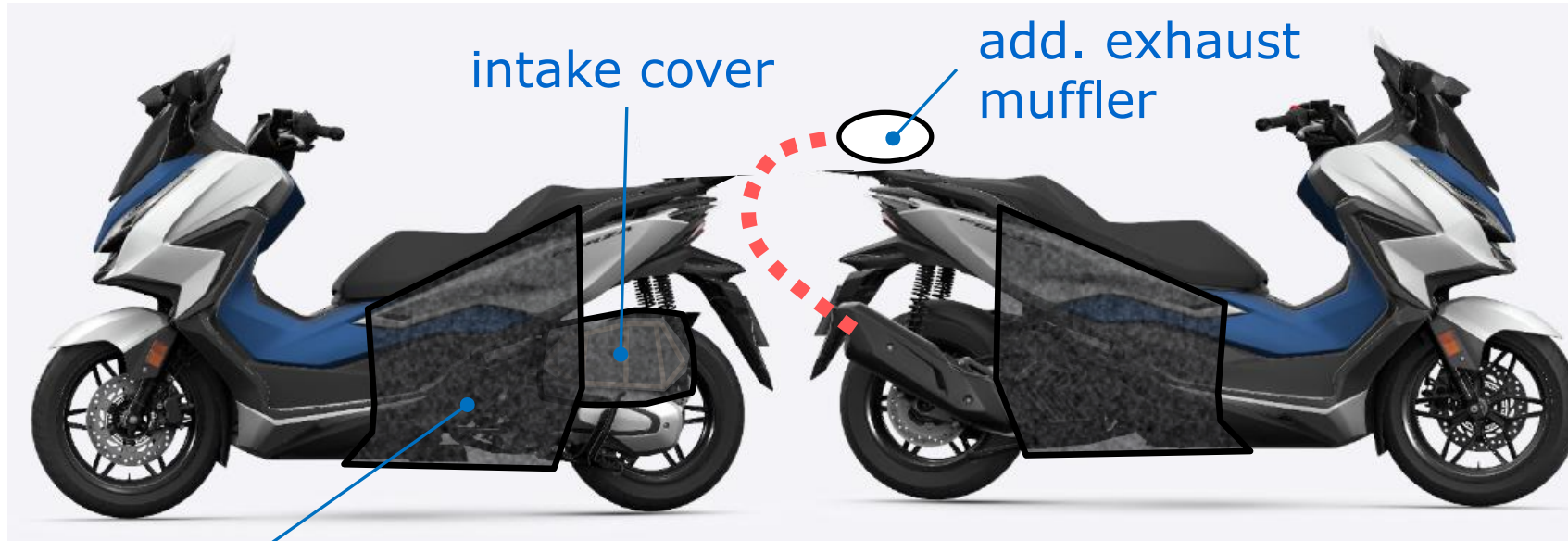
| Specs | | |
|-------------|-------------------------------|-----------------------|
| Engine | single-cylinder liquid-cooled | 124.9 cm ³ |
| Performance | 10.7kW @ 8,750rpm | 12.3Nm @ 6,500rpm |
| PMR | 45.1 | 162 kg |

Results of Noise Measurements acc. R41 rev3

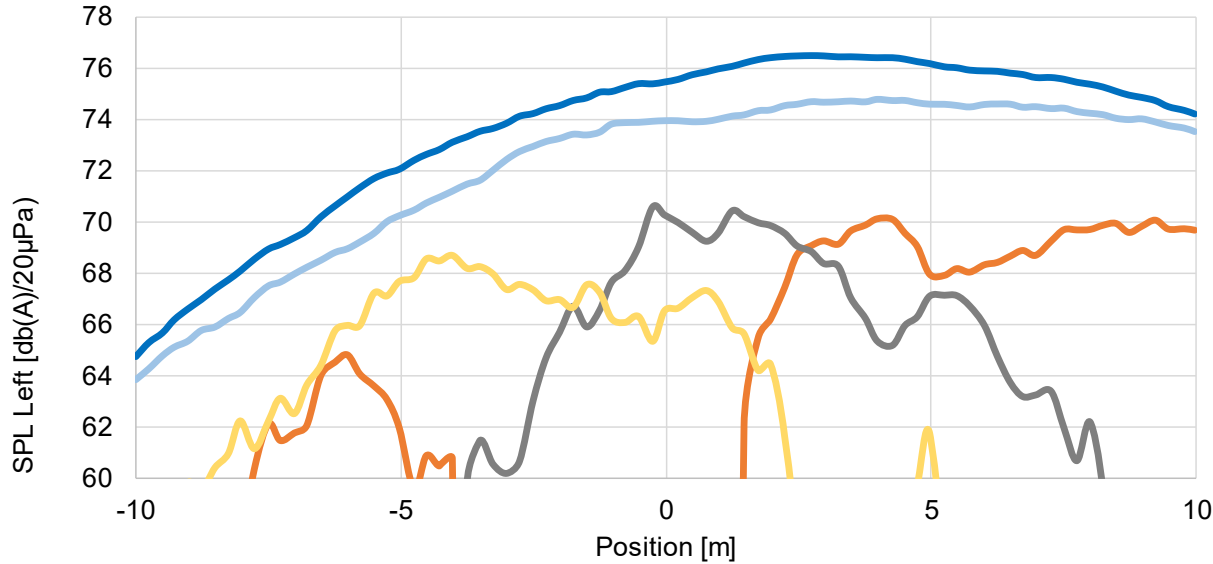
| Forza 125 ANNEX 3 | | | | | | | | |
|-------------------|----------|----------|-----------------------------|-------------------------------|------|---|------------|------|
| Lurban | Lwot,rep | Lcrs,rep | a urban [m/s ²] | a wot,ref [m/s ²] | kp | k | Calc. Type | PMR |
| 74,7 | 77,8 | 69,1 | 1,19 | 1,57 | 0,36 | 0 | R41 rev3 | 45.1 |

| Forza 125 ANNEX 3 | | | | |
|-------------------|-----------|----------------|----------------|-----------------------|
| | L [dB(A)] | Lmax L [dB(A)] | Lmax R [dB(A)] | a [m/s ²] |
| Acceleration WOT | 78,8 | 76,7 | 78,8 | 1,857 |
| Constant 50 km/h | 70,1 | 69,1 | 70,1 | 0,05 |

Encapsulation variant : Fully encapsulated

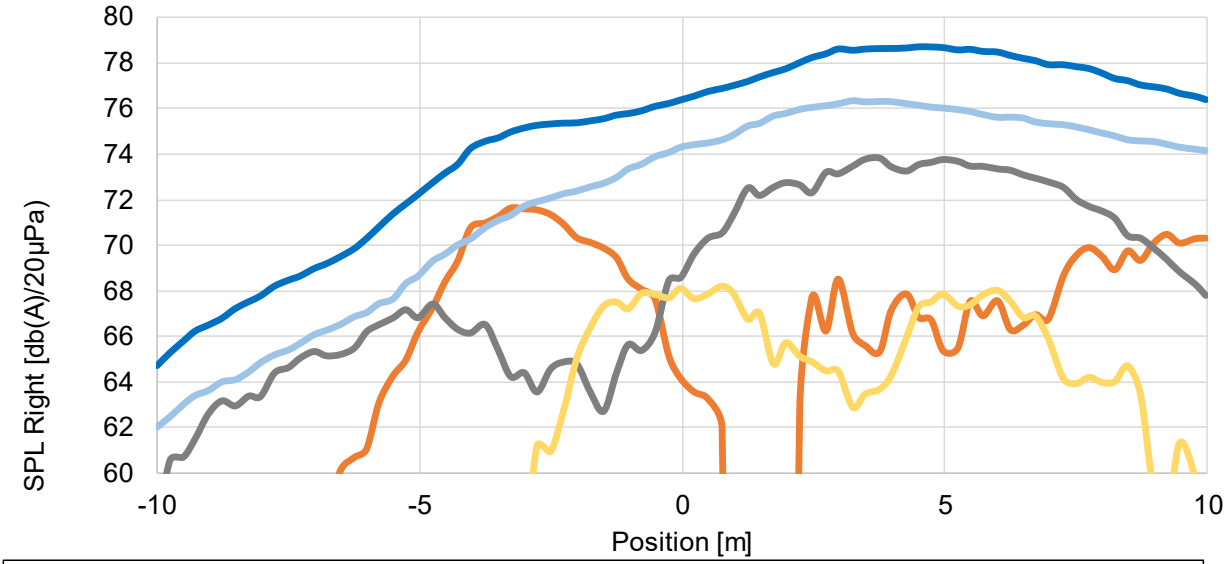


Forza 125 ANNEX 3
Acceleration WOT / Left



- baseline (=naked)
- exhaust (=covered exhaust-naked)
- engine (=covered exhaust- covered exhaust + engine)
- intake (=covered exhaust+ engine - covered driveline, wheel)
- tyre, driveline, ... (=fully covered)

Forza 125 ANNEX 3
Acceleration WOT / Right



- baseline (=naked)
- exhaust (=covered exhaust-naked)
- engine (=covered exhaust- covered exhaust + engine)
- intake (=covered exhaust+ engine - covered driveline, wheel)
- tyre, driveline, ... (=fully covered)

| Forza 125 ANNEX 3 / Acceleration WOT | SPL Left [db(A)/20µPa] max |
|--|-------------------------------|
| baseline (=naked) | 76,5 |
| exhaust (=covered exhaust-naked) | 70,1 |
| engine (=covered exhaust- covered exhaust + engine) | 70,6 |
| intake (=covered exhaust+ engine - covered driveline, wheel) | 68,7 |
| tyre, driveline, ... (=fully covered) | 74,8 |

| Forza 125 ANNEX 3 / Acceleration WOT | SPL Right [db(A)/20µPa] max |
|--|--------------------------------|
| baseline (=naked) | 78,7 |
| exhaust (=covered exhaust-naked) | 71,7 |
| engine (=covered exhaust- covered exhaust + engine) | 73,8 |
| intake (=covered exhaust+ engine - covered driveline, wheel) | 68,2 |
| tyre, driveline, ... (=fully covered) | 76,4 |

Experimental Noise Source Ranking Study

BMW R 1250 GS



| Specs | | |
|-------------|--------------------|----------------------|
| Engine | 2 cyl. Boxer | 1254 cm ³ |
| Performance | 100 kW @ 7.750 RPM | 143 Nm@ 6.250 RPM |
| PMR | 309 | 249 kg |

Results of Noise Measurements acc. R41 rev3

| BMW R1250 GS ANNEX 3 | | | | | | | | |
|----------------------|----------|----------|-----------------------------|-------------------------------|------|---|------------|-------|
| Lurban | Lwot,rep | Lcrs,rep | a urban [m/s ²] | a wot,ref [m/s ²] | kp | k | Calc. Type | PMR |
| 74,3 | 78,5 | 69,7 | 2 | 4,13 | 0,48 | 0 | R41 rev3 | 308.6 |

| BMW R1250 GS ANNEX 3 | | | | |
|----------------------|-----------|----------------|----------------|-----------------------|
| | L [dB(A)] | Lmax L [dB(A)] | Lmax R [dB(A)] | a [m/s ²] |
| Acceleration WOT | 79,5 | 78,6 | 79,5 | 3,88 |
| Constant 50 km/h | 70,7 | 70,7 | 70,4 | 0,107 |

Encapsulation variant : Fully encapsulated

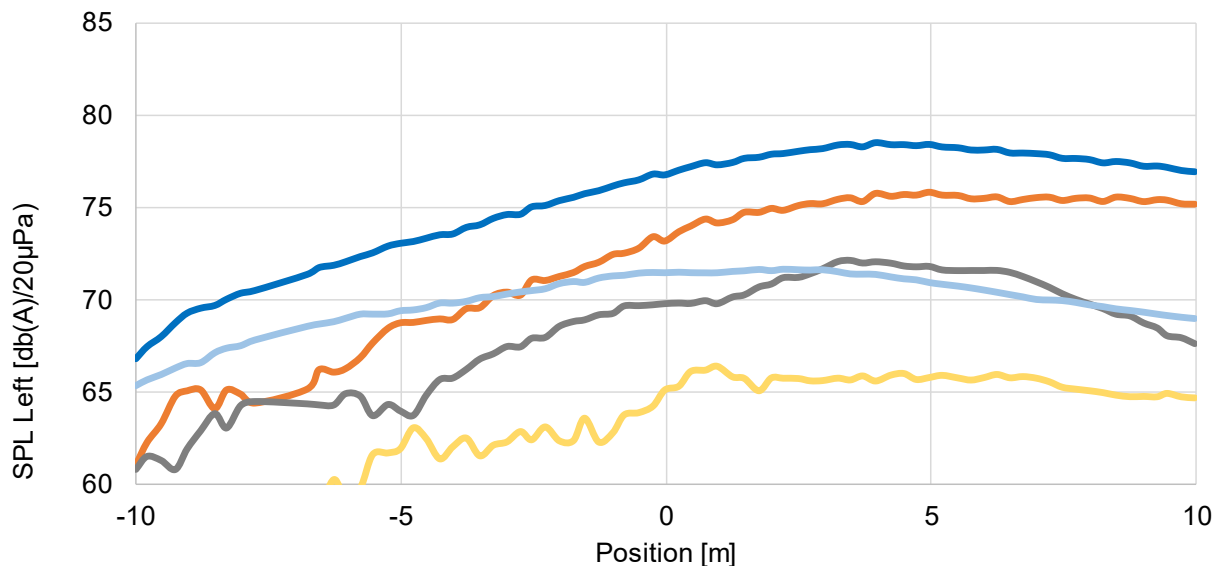
intake cover

add. exhaust
muffler

engine cover

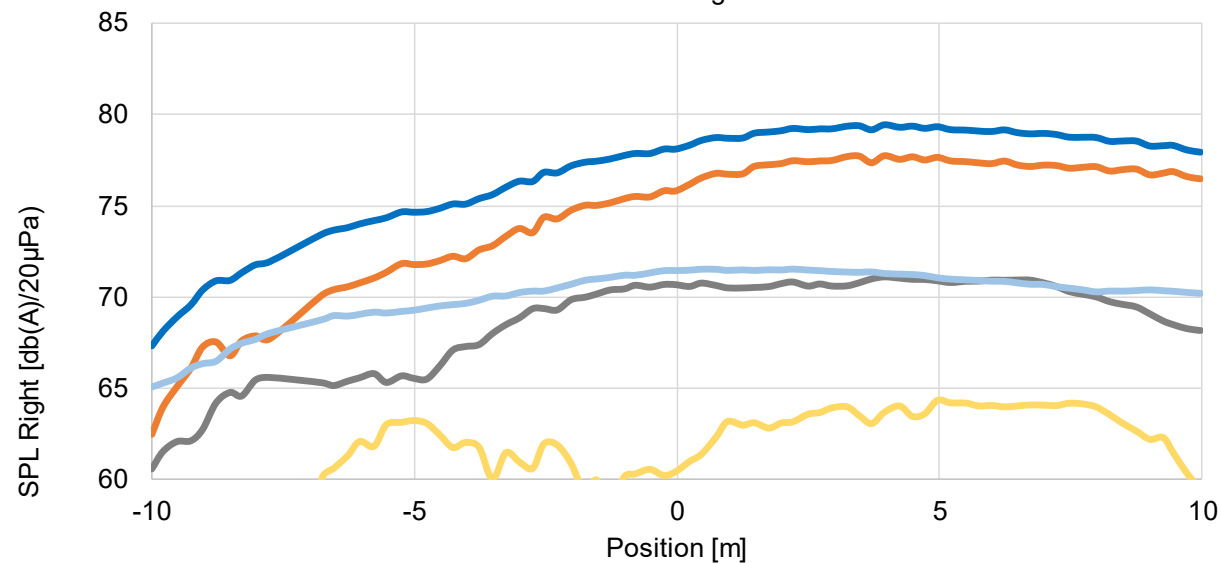


BMW R1250 GS ANNEX 3
Acceleration WOT / Left



- baseline (=naked)
- exhaust (=covered exhaust-naked)
- engine (=covered exhaust- covered exhaust + engine)
- intake (=covered exhaust+ engine - covered driveline, wheel)
- tyre, driveline, ... (=fully covered)

BMW R1250 GS ANNEX 3
Acceleration WOT / Right



- baseline (=naked)
- exhaust (=covered exhaust-naked)
- engine (=covered exhaust- covered exhaust + engine)
- intake (=covered exhaust+ engine - covered driveline, wheel)
- tyre, driveline, ... (=fully covered)

| BMW R1250 GS ANNEX 3 / Acceleration WOT | SPL Left [db(A)/20µPa] max |
|--|-------------------------------|
| baseline (=naked) | 78,5 |
| exhaust (=covered exhaust-naked) | 75,8 |
| engine (=covered exhaust- covered exhaust + engine) | 72,2 |
| intake (=covered exhaust+ engine - covered driveline, wheel) | 66,4 |
| tyre, driveline, ... (=fully covered) | 71,7 |

| BMW R1250 GS ANNEX 3 / Acceleration WOT | SPL Right [db(A)/20µPa] max |
|--|--------------------------------|
| baseline (=naked) | 79,5 |
| exhaust (=covered exhaust-naked) | 77,8 |
| engine (=covered exhaust- covered exhaust + engine) | 71,1 |
| intake (=covered exhaust+ engine - covered driveline, wheel) | 64,4 |
| tyre, driveline, ... (=fully covered) | 71,5 |

| OEM | Vehicle |
|----------|----------------------------------|
| Honda | Forza125 2021 |
| Piaggio | Vespa 300 GT |
| Yamaha | T-MAX |
| KTM | 390 Duke |
| Kawasaki | Vulcan S TBC |
| Triumph | Street Triple R → Update for PMR |
| BMW | R1250 GS |
| HD | Street Bob → Update for PMR |

→ Simon