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| Subject: | Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on requirements relating to emission limits and type-approval for internal combustion engines for non-road mobile machinery |

Delegations will find attached an updated version of the Annexes.

New text compared to the Commission's proposal is indicated in **bold/underlined** and deletions are marked with ~~strikethrough~~. **Highlighted** text shows changes compared to the previous document.

ANNEX I

Definition of engine sub-categories referred to in Article 4

Table I-1: Sub-categories of engine category NRE defined in Article 4 point (1)

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | Reference power |
|----------|---------------|----------------------|-----------------------|--------------|-------------------|
| NRE | CI | variable | $0 < P < 8$ | NRE-v-1 | Maximum net power |
| | CI | | $8 \leq P < 19$ | NRE-v-2 | |
| | CI | | $19 \leq P < 37$ | NRE-v-3 | |
| | CI | | $37 \leq P < 56$ | NRE-v-4 | |
| | all | | $56 \leq P < 130$ | NRE-v-5 | |
| | | | $130 \leq P \leq 560$ | NRE-v-6 | |
| | | | $P > 560$ | NRE-v-7 | |
| | CI | constant | $0 < P < 8$ | NRE-c-1 | Rated net power |
| | CI | | $8 \leq P < 19$ | NRE-c-2 | |
| | CI | | $19 \leq P < 37$ | NRE-c-3 | |
| | CI | | $37 \leq P < 56$ | NRE-c-4 | |
| | all | | $56 \leq P < 130$ | NRE-c-5 | |
| | | | $130 \leq P \leq 560$ | NRE-c-6 | |
| | | | $P > 560$ | NRE-c-7 | |

Table I-2: Sub-categories of engine category NRG defined in Article 4 point (2)

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | Reference power |
|----------|---------------|---------------------------------|------------------|--------------|-------------------|
| NRG | all | variable | P>560 | NRG-v-1 | Maximum net power |
| | | constant | P>560 | NRG-c-1 | Rated net power |

Table I-3: Sub-categories of engine category NRSh defined in Article 4 point (3)

| Category | Ignition type | Speed mode operation | Power range (kW) | Swept volume (cm ³) | Sub-category | Reference power |
|----------|---------------|---------------------------------|------------------|---------------------------------|--------------|-------------------|
| NRSh | SI | variable or constant | 0<P<19 | SV<50 | NRSh-v-1a | Maximum net power |
| | | | | SV≥50 | NRSh-v-1b | |

Table I-4: Sub-categories of engine category NRS defined in Article 4 point (4)

| Category | Ignition type | Speed mode operation | Power range (kW) | Swept volume (cm ³) | Sub-category | Reference power |
|----------|---------------|---|------------------|---------------------------------|--------------|-------------------|
| NRS | SI | variable, rated ≥3600 rpm ; or constant | 0<P<19 | 80≤SV<225 | NRS-vr-1a | Maximum net power |
| | | | | SV≥225 | NRS-vr-1b | |
| | | | | 80≤SV<225 | NRS-vi-1a | |
| | | | | SV≥225 | NRS-vi-1b | |
| | | variable or constant | 19≤P<30 | SV≤1000 | NRS-v-2a | Maximum net power |
| | | | | SV>1000 | NRS-v-2b | |
| | | | 30≤P<56 | any | NRS-v-3 | Maximum net power |

For engines <19kW with SV<80cm³ in machinery other than hand-held machinery, engines of the category NRSh shall be used.

Table I-5: Sub-categories of engine category IWP defined in Article 4 point (5)

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | Reference power |
|----------|---------------|----------------------|---------------------|--------------|-------------------|
| IWP | all | variable | $37 \leq P < 75$ | IWP-v-1 | Maximum net power |
| | | | $75 \leq P < 130$ | IWP-v-2 | |
| | | | $130 \leq P < 300$ | IWP-v-3 | |
| | | | $300 \leq P < 1000$ | IWP-v-4 | |
| | | | $P \geq 1000$ | IWP-v-5 | |
| | | constant | $37 \leq P < 75$ | IWP-c-1 | Rated net power |
| | | | $75 \leq P < 130$ | IWP-c-2 | |
| | | | $130 \leq P < 300$ | IWP-c-3 | |
| | | | $300 \leq P < 1000$ | IWP-c-4 | |
| | | | $P \geq 1000$ | IWP-c-5 | |

Table I-6: Sub-categories of engine category IWA defined in Article 4 point (6)

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | Reference power |
|----------|---------------|----------------------|---------------------|--------------|-------------------|
| IWA | all | variable | $560 \leq P < 1000$ | IWA-v-1 | Maximum net power |
| | | | $P \geq 1000$ | IWA-v-2 | |
| | | constant | $560 \leq P < 1000$ | IWA-c-1 | Rated net power |
| | | | $P \geq 1000$ | IWA-c-2 | |

Table I-7: Sub-categories of engine category RLL defined in Article 4 point (7)

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | Reference power |
|----------|---------------|----------------------|------------------|--------------|-------------------|
| RLL | all | variable | P>0 | RLL-v-1 | Maximum net power |
| | | constant | P>0 | RLL-c-1 | Rated net power |

Table I-8: Sub-categories of engine category RLR defined in Article 4 point (8)

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | Reference power |
|----------|---------------|----------------------|------------------|--------------|-------------------|
| RLR | all | variable | P>0 | RLR-v-1 | Maximum net power |
| | | constant | P>0 | RLR-c-1 | Rated net power |

Table I-9: Sub-categories of engine category SMB defined in Article 4 point (9)

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | Reference power |
|----------|---------------|----------------------|------------------|--------------|-------------------|
| SMB | SI | variable or constant | P>0 | SMB-v-1 | Maximum net power |

Table I-10: Sub-categories of engine category ATS defined in Article 4 point (10)

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | Reference power |
|----------|---------------|----------------------|------------------|--------------|-------------------|
| ATS | SI | variable or constant | P>0 | ATS-v-1 | Maximum net power |

ANNEX II

Exhaust emission limits referred to in Article 17(2)

Table II-1: Stage V emission limits for engine category NRE defined in Article 4 point (1)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC | NOx | PM mass | PN | A |
|----------------|---------------------|-------------|----------------------|-------|---------------|-------|--------------------|--------------------|------|
| | | kW | | g/kWh | g/kWh | g/kWh | g/kWh | #/kWh | |
| Stage V | NRE-v-1 NRE-c-1 | 0<P<8 | CI | 8,00 | (HC+NOx≤7,50) | | 0,40 ¹⁾ | - | 1,10 |
| Stage V | NRE-v-2 NRE-c-2 | 8≤P<19 | CI | 6,60 | (HC+NOx≤7,50) | | 0,40 | - | 1,10 |
| Stage V | NRE-v-3 NRE-c-3 | 19≤P<37 | CI | 5,00 | (HC+NOx≤4,70) | | 0,015 | 1x10 ¹² | 1,10 |
| Stage V | NRE-v-4 NRE-c-4 | 37≤P<56 | CI | 5,00 | (HC+NOx≤4,70) | | 0,015 | 1x10 ¹² | 1,10 |
| Stage V | NRE-v-5 NRE-c-5 | 56≤P<130 | all | 5,00 | 0,19 | 0,40 | 0,015 | 1x10 ¹² | 1,10 |
| Stage V | NRE-v-6 NRE-c-6 | 130≤P≤560 | all | 3,50 | 0,19 | 0,40 | 0,015 | 1x10 ¹² | 1,10 |
| Stage V | NRE-v-7 NRE-c-7 | P>560 | all | 3,50 | 0,19 | 3,50 | 0,045 | - | 6,00 |

¹⁾ 0,6 for hand-startable, air-cooled direct injection engines

Table II-2: Stage V emission limits for engine category NRG defined in Article 4 point (2)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC | NOx | PM mass | PN | A |
|----------------|---------------------|-------------|----------------------|-------|-------|-------|---------|-------|------|
| | | kW | | g/kWh | g/kWh | g/kWh | g/kWh | #/kWh | |
| Stage V | NRG-v-1 NRG-c-1 | P>560 | all | 3,50 | 0,19 | 0,67 | 0,035 | - | 6,00 |

Table II-3: Stage V emission limits for engine category NRSh defined in Article 4 point (3)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC + NOx |
|----------------|---------------------|-------------|----------------------|-------|----------|
| | | kW | | g/kWh | g/kWh |
| Stage V | NRSh-v-1a | 0<P<19 | SI | 805 | 50 |
| Stage V | NRSh-v-1b | | | 603 | 72 |

Table II-4: Stage V emission limits for engine category NRS defined in Article 4 point (4)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC + NOx |
|----------------|------------------------|-------------|----------------------|-------|----------|
| | | kW | | g/kWh | g/kWh |
| Stage V | NRS-vr-1a NRS-vi-1a | 0<P<19 | SI | 610 | 10 |
| Stage V | NRS-vr-1b NRS-vi-1b | | | 610 | 8 |
| Stage V | NRS-v-2a | 19≤P≤30 | | 610 | 8 |
| Stage V | NRS-v-2b NRS-v-3 | 19≤P<56 | | 4,40* | 2,70* |

* Optionally, as alternative, any combination of values satisfying the equation $(HC+NO_x) \times CO^{0.784} \leq 8,57$ as well as the following conditions: $CO \leq 20,6$ g/kWh and $(HC+NO_x) \leq 2,7$ g/kWh

Table II-5: Stage V emission limits for engine category IWP defined in Article 4 point (5)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC | NOx | PM mass | PN | A |
|----------------|---------------------|---------------------|----------------------|-------|----------------------|-------|---------------------------------|--------------------|------|
| | | kW | | g/kWh | g/kWh | g/kWh | g/kWh | #/kWh | |
| Stage V | IWP-v-1 IWP-c-1 | $37 \leq P < 75$ | all | 5,00 | (HC+NOx \leq 4,70) | | 0,30 | - | 6,00 |
| Stage V | IWP-v-2 IWP-c-2 | $75 \leq P < 130$ | all | 5,00 | (HC+NOx \leq 5,40) | | 0,14 | - | 6,00 |
| Stage V | IWP-v-3 IWP-c-3 | $130 \leq P < 300$ | all | 3,50 | 1,00 | 2,10 | 0,11 | - | 6,00 |
| Stage V | IWP-v-4 IWP-c-4 | $300 \leq P < 1000$ | all | 3,50 | 0,19 | 1,20 | 0,02 0,015 | 1×10^{12} | 6,00 |
| Stage V | IWP-v-5 IWP-c-5 | $P > 1000$ | all | 3,50 | 0,19 | 0,40 | 0,01 0,015 | 1×10^{12} | 6,00 |

Table II-6: Stage V emission limits for engine category IWA defined in Article 4 point (6)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC | NOx | PM mass | PN | A |
|----------------|---------------------|---------------------|----------------------|-------|-------|-------|---------------------------------|--------------------|------|
| | | kW | | g/kWh | g/kWh | g/kWh | g/kWh | #/kWh | |
| Stage V | IWA-v-1 IWA-c-1 | $560 \leq P < 1000$ | all | 3,50 | 0,19 | 1,20 | 0,02 0,015 | 1×10^{12} | 6,00 |
| Stage V | IWA-v-2 IWA-c-2 | $P \geq 1000$ | all | 3,50 | 0,19 | 0,40 | 0,01 0,015 | 1×10^{12} | 6,00 |

Table II-7: Stage V emission limits for engine category RLL defined in Article 4 point (7)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC | NOx | PM mass | PN | A |
|----------------|---------------------|-------------|----------------------|-------|---------------|-------|---------|-------|------|
| | | kW | | g/kWh | g/kWh | g/kWh | g/kWh | #/kWh | |
| Stage V | RLL-c-1 RLL-v-1 | P>0 | all | 3,50 | (HC+NOx≤4,00) | | 0,025 | - | 6,00 |

Table II-8: Stage V emission limits for engine category RLR defined in Article 4 point (8)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC | NOx | PM mass | PN | A |
|----------------|---------------------|-------------|----------------------|-------|-------|-------|---------|--------------------|------|
| | | kW | | g/kWh | g/kWh | g/kWh | g/kWh | #/kWh | |
| Stage V | RLR-c-1 RLR-v-1 | P>0 | all | 3,50 | 0,19 | 2,00 | 0,015 | 1x10 ¹² | 6,00 |

Table II-9: Stage V emission limits for engine category SMB defined in Article 4 point (9)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | NOx | HC |
|----------------|---------------------|-------------|----------------------|-------|-------|-------|
| | | kW | | g/kWh | g/kWh | g/kWh |
| Stage V | SMB-v-1 | P>0 | SI | 275 | - | 75 |

Table II-10: Stage V emission limits for engine category ATS defined in Article 4 point (10)

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC + NOx |
|----------------|---------------------|-------------|----------------------|-------|----------|
| | | kW | | g/kWh | g/kWh |
| Stage V | ATS-v-1 | P>0 | SI | 400 | 8 |

Specific provisions on hydro-carbon (HC) limits for fully and partially gaseous fuelled engines

1. For the sub-categories where an A factor is defined, the HC limit for fully and partially gaseous fuelled engines indicated in ~~the~~ Tables II-1 to II-10 is replaced by the one calculated with the following formula:

$$\text{HC} = 0,19 + (1,5 * \text{A} * \text{GER})$$

where GER is the average gas energy ratio over the appropriate cycle. Where both a steady-state and transient test cycle applies, the GER shall be determined from the hot-start transient test cycle. Where more than one steady-state test cycle applies, the average gas energy ratio shall be determined for each cycle individually.

If the calculated limit for HC exceeds the value of $0,19 + \text{A}$ the limit for HC shall be set to $0,19 + \text{A}$.

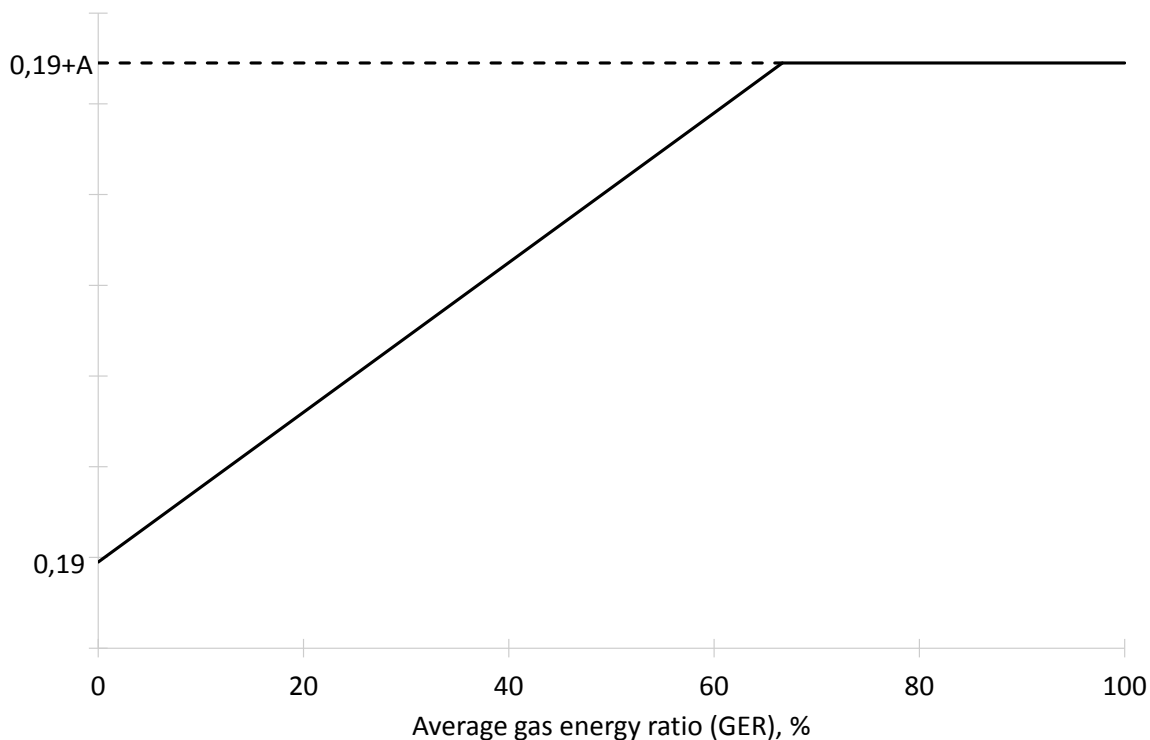


Figure 1. Schematic of HC emission limit as function of average gas energy ratio (GER)

2. For sub-categories with a combined HC and NO_x limit, the combined limit value for HC and NO_x shall be reduced by 0,19 g/kWh and apply for NO_x only.
3. For non-gaseous fuelled engines the formula does not apply.

ANNEX III

**Timetable for the application of this Regulation
in respect of EU type-approvals and placing on the market**

Table III-1: Dates of application of this Regulation for engine category NRE

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|-----------|---------------|------------------|----------------|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| NRE | CI | 0<P<8 | NRE-v-1 | 1 January 2018 | 1 January 2019 |
| | | | NRE-c-1 | | |
| | CI | 8≤P<19 | NRE-v-2 | 1 January 2018 | 1 January 2019 |
| | | | NRE-c-2 | | |
| | CI | 19≤P<37 | NRE-v-3 | 1 January 2018 | 1 January 2019 |
| | | | NRE-c-3 | | |
| | CI | 37≤P<56 | NRE-v-4 | 1 January 2018 | 1 January 2019 |
| | | | NRE-c-4 | | |
| | all | | 56≤P<130 | 1 January 2019 | 1 January 2020 |
| 130≤P≤560 | | | 1 January 2018 | 1 January 2019 | |
| P>560 | | | 1 January 2018 | 1 January 2019 | |

Table III-2: Dates of application of this Regulation for engine category NRG

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|----------|---------------|------------------|--------------------|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| NRG | all | P>560 | NRG-v-1 NRG-c-1 | 1 January 2018 | 1 January 2019 |

Table III-3: Dates of application of this Regulation for engine category NRSh

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|----------|---------------|------------------|------------------------|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| NRSh | SI | 0<P<19 | NRSh-v-1a NRSh-v-1b | 1 January 2018 | 1 January 2019 |

Table III-4: Dates of application of this Regulation for engine category NRS

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|----------|---------------|------------------|---|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| NRS | SI | 0<P<56 | NRS-vr-1a NRS-vi-1a NRS-vr-1b NRS-vi-1b NRS-v-2a NRS-v-2b NRS-v-3 | 1 January 2018 | 1 January 2019 |

Table III-5: Dates of application of this Regulation for engine category IWP

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|----------|---------------|------------------|----------------|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| IWP | all | 37<P<300 | IWP-v-1 | 1 January 2018 | 1 January 2019 |
| | | | IWP-c-1 | | |
| | | | IWP-v-2 | | |
| | | 300≤P<1000 | IWP-c-2 | 1 January 2019 | 1 January 2020 |
| | | | IWP-v-3 | | |
| | | | IWP-c-3 | | |
| P≥1000 | IWP-v-4 | 1 January 2020 | 1 January 2021 | | |
| | IWP-c-4 | | | | |
| | | | IWP-v-5 | | |
| | | | IWP-c-5 | | |

Table III-6: Dates of application of this Regulation for engine category IWA

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|----------|---------------|------------------|--------------|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| IWA | all | 560≤P<1000 | IWA-v-1 | 1 January 2019 | 1 January 2020 |
| | | | IWA-c-1 | | |
| | | P≥1000 | IWA-v-2 | 1 January 2020 | 1 January 2021 |
| | | | IWA-c-2 | | |

Table III-7: Dates of application of this Regulation for engine category RLL

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|----------|---------------|------------------|--------------------|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| RLL | all | P>0 | RLL-v-1 RLL-c-1 | 1 January 2020 | 1 January 2021 |

Table III-8: Dates of application of this Regulation for engine category RLR

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|----------|---------------|------------------|--------------------|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| RLR | all | P>0 | RLR-v-1 RLR-c-1 | 1 January 2020 | 1 January 2021 |

Table III-9: Dates of application of this Regulation for category SMB

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|----------|---------------|------------------|--------------|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| SMB | SI | P>0 | SMB-v-1 | 1 January 2018 | 1 January 2019 |

Table III-10: Dates of application of this Regulation for engine category ATS

| Category | Ignition type | Power range (kW) | Sub-category | Mandatory date of application of this Regulation for | |
|----------|---------------|------------------|--------------|--|----------------------------------|
| | | | | EU type-approval of engines | Placing on the market of engines |
| ATS | SI | P>0 | ATS-v-1 | 1 January 2018 | 1 January 2019 |

ANNEX IV

Non-road steady-state test cycles (NRSC)

Table IV-1: NRSC test cycles for engines of category NRE

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|----------------------|--|---|----------|
| NRE | variable | Variable speed engine having a reference power less than 19 kW | NRE-v-1 NRE-v-2 | G2 or C1 |
| | | Variable speed engine having a reference power greater than or equal to 19 kW but not more than 560 kW | NRE-v-3 NRE-v-4 NRE-v-5 NRE-v-6 | C1 |
| | | Variable speed engine having a reference power greater than 560 kW | NRE-v-7 | C1 |
| | constant | Constant speed engine | NRE-c-1 NRE-c-2 NRE-c-3 NRE-c-4 NRE-c-5 NRE-c-6 NRE-c-7 | D2 |

Table IV-2: NRSC test cycles for engines of category NRG

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|----------------------|--|--------------|------|
| NRG | variable | Variable speed engine for generating set | NRG-v-1 | C1 |
| | constant | Constant speed engine for generating set | NRG-c-1 | D2 |

Table IV-3: NRSC test cycles for engines of category NRSh

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|----------------------|---|------------------------|------|
| NRSh | variable or constant | Engine having a reference power of not more than 19 kW, for use in handheld machinery | NRSh-v-1a NRSh-v-1b | G3 |

Table IV-4: NRSC test cycles for engines of category NRS

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|---------------------------------------|---|------------------------|------|
| NRS | variable, intermediate <3600rpm | Variable speed engine having a reference power of not more than 19 kW, intended for intermediate speed application operation <3600rpm | NRS-vi-1a NRS-vi-1b | G1 |
| | variable, rated ≥3600rpm; or constant | Variable speed engine having a reference power of not more than 19 kW, intended for rated speed application operation ≥3600rpm; constant speed engine having a reference power of not more than 19 kW | NRS-vr-1a NRS-vr-1b | G2 |
| | variable or constant | Engine having both a reference power between 19 kW and 30 kW and a total swept volume of less than 1 litre | NRS-v-2a | G2 |
| | | Engine having a reference power of greater than 19 kW, other than engine having both a reference power between 19 kW and 30 kW and a total swept volume of less than 1 litre | NRS-v-2b NRS-v-3 | C2 |

Table IV-5: NRSC test cycles for engines of category IWP

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|----------------------|---|---|------|
| IWP | variable | Variable speed engine intended for propulsion that operates on a fixed-pitch propeller curve | IWP-v-1 IWP-v-2 IWP-v-3 IWP-v-4 IWP-v-5 | E3 |
| | constant | Constant speed engine intended for propulsion that operates with a controllable-pitch or electrically coupled propeller | IWP-c-1 IWP-c-2 IWP-c-3 IWP-c-4 IWP-c-5 | E2 |

Table IV-6: NRSC test cycles for engines of category IWA

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|----------------------|--|--------------------|------|
| IWA | variable | Variable speed engine having a reference power that is greater than 560 kW intended for auxiliary use on inland waterway vessels | IWA-v-1 IWA-v-2 | C1 |
| | constant | Constant speed engine having a reference power that is greater than 560 kW intended for auxiliary use on inland waterway vessels | IWA-c-1 IWA-c-2 | D2 |

Table IV-7: NRSC test cycles for engines of category RLL

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|----------------------|---|--------------|------|
| RLL | variable | Variable speed engine for propulsion of locomotives | RLL-v-1 | F |
| | constant | Constant speed engine for propulsion of locomotives | RLL-c-1 | D2 |

Table IV-8: NRSC test cycles for engines of category RLR

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|----------------------|--|--------------|------|
| RLR | variable | Variable speed engine for propulsion of railcars | RLR-v-1 | C1 |
| | constant | Constant speed engine for propulsion of railcars | RLR-c-1 | D2 |

Table IV-9: NRSC test cycles for engines of category SMB

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|----------------------|---------------------------------------|--------------|------|
| SMB | variable or constant | Engines for propulsion of snowmobiles | SMB-v-1 | H |

Table IV-10: NRSC test cycle for engines of category ATS

| Category | Speed mode operation | Purpose | Sub-category | NRSC |
|----------|----------------------|--------------------------------------|--------------|------|
| ATS | variable or constant | Engines for propulsion of ATV or SbS | ATS-v-1 | G1 |

Non-road transient test cycles

Table IV-11: Non-road transient test cycle for engines of category NRE

| Category | Speed mode operation | Purpose | Sub-category | |
|----------|----------------------|--|--|------|
| NRE | variable | Variable speed engine having reference power greater than or equal to 19 kW but not more than 560 kW | NRE-v-3 NRE-v-4 NRE-v-5 NRE-v-6 | NRTC |

Table IV-12: Non-road transient test cycle for engines of category NRS⁽¹⁾

| Category | Speed mode operation | Purpose | Sub-category | |
|----------|----------------------|--|---------------------|----------|
| NRS | variable or constant | Engine having a reference power of greater than 19 kW, other than engine having both a reference power between 19 kW and 30 kW and a total swept volume of less than 1 litre | NRS-v-2b NRS-v-3 | LSI-NRTC |

⁽¹⁾ Only applicable for engines with maximum test speed ≤ 3400 rpm.

Emission durability periods referred to in Article 24(1)

Table V-1: Emission durability periods (EDP) for engine category **NRE**

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | EDP (hours) |
|----------|---------------|----------------------|-----------------------|--------------|-------------|
| NRE | CI | variable | $0 < P < 8$ | NRE-v-1 | 3000 |
| | CI | | $8 \leq P < 19$ | NRE-v-2 | |
| | CI | | $19 \leq P < 37$ | NRE-v-3 | 5000 |
| | CI | | $37 \leq P < 56$ | NRE-v-4 | 8000 |
| | all | | $56 \leq P < 130$ | NRE-v-5 | |
| | | | $130 \leq P \leq 560$ | NRE-v-6 | |
| | | | $P > 560$ | NRE-v-7 | |
| | CI | constant | $0 < P < 8$ | NRE-c-1 | 3000 |
| | CI | | $8 \leq P < 19$ | NRE-c-2 | |
| | CI | | $19 \leq P < 37$ | NRE-c-3 | |
| | CI | | $37 \leq P < 56$ | NRE-c-4 | 8000 |
| | all | | $56 \leq P < 130$ | NRE-c-5 | |
| | | | $130 \leq P \leq 560$ | NRE-c-6 | |
| | | | $P > 560$ | NRE-c-7 | |

Table V-2: Emission durability period (EDP) for engine category **NRG**

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | EDP (hours) |
|----------|---------------|----------------------|------------------|--------------|-------------|
| NRG | all | constant | $P > 560$ | NRG-v-1 | 8000 |
| | | variable | | NRG-c-1 | |

Table V-3: Emission durability period (EDP) for engine category NRSh

| Category | Ignition type | Speed mode operation | Power range (kW) | Swept volume (cm3) | Sub-category | EDP (hours) |
|----------|---------------|----------------------|------------------|--------------------|--------------|--------------------------|
| NRSh | SI | variable or constant | 0<P<19 | SV<50 | NRSh-v-1a | 50/125/300 ¹⁾ |
| | | | | SV≥50 | NRSh-v-1b | |

¹⁾ EDP hours correspond to the EDP categories Cat 1/Cat 2/Cat 3 as defined in the delegated acts.

Table V-4: Emission durability period (EDP) for engine category **NRS**

| Category | Ignition type | Speed mode operation | Power range (kW) | Swept volume (cm3) | Sub-category | EDP (hours) | |
|----------|---------------|---|------------------|--------------------|--------------|---------------------------|----------------------------|
| NRS | SI | variable, rated ≥ 3600rpm ; or constant | 0<P<19 | 80≤SV<225 | NRS-vr-1a | 125/250/500 ¹⁾ | |
| | | variable, intermediate < 3600rpm | | | NRS-vi-1a | | |
| | | variable, rated ≥ 3600rpm ; or constant | | SV≥225 | NRS-vr-1b | | 250/500/1000 ¹⁾ |
| | | variable, intermediate < 3600rpm | | | NRS-vi-1b | | |
| | | variable or constant | 19≤P<30 | SV≤1000 | NRS-v-2a | 1000 | |
| | | | 30≤P<56 | SV>1000 | NRS-v-2b | 5000 | |
| | | | | any | NRS-v-3 | 5000 | |

¹⁾ EDP hours correspond to the EDP categories Cat 1/Cat 2/Cat 3 as defined in the delegated acts.

Table V-5: Emission durability period (EDP) for engine category **IWP**

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | EDP (hours) |
|----------|---------------|----------------------|---------------------|--------------|-------------|
| IWP | all | variable | $37 \leq P < 75$ | IWP-v-1 | 10000 |
| | | | $75 \leq P < 130$ | IWP -v-2 | |
| | | | $130 \leq P < 300$ | IWP -v-3 | |
| | | | $300 \leq P < 1000$ | IWP -v-4 | |
| | | | $P \geq 1000$ | IWP -v-5 | |
| | | constant | $37 \leq P < 75$ | IWP -c-1 | 10000 |
| | | | $75 \leq P < 130$ | IWP -c-2 | |
| | | | $130 \leq P < 300$ | IWP -c-3 | |
| | | | $300 \leq P < 1000$ | IWP -c-4 | |
| | | | $P \geq 1000$ | IWP -c-5 | |

Table V-6: Emission durability period (EDP) for engine category IWA

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | EDP (hours) |
|----------|---------------|----------------------|---------------------|--------------|-------------|
| IWA | all | variable | $560 \leq P < 1000$ | IWA-v-1 | 10000 |
| | | | $P \geq 1000$ | IWA-v-2 | |
| | | constant | $560 \leq P < 1000$ | IWA-c-1 | |
| | | | $P \geq 1000$ | IWA-c-2 | |

Table V-7: Emission durability period (EDP) for engine category RLL

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | EDP (hours) |
|----------|---------------|----------------------|------------------|--------------|-------------|
| RLL | all | variable | $P > 0$ | RLL-v-1 | 10000 |
| | | constant | $P > 0$ | RLL-c-1 | |

Table V-8: Emission durability period (EDP) for engine category RLR

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | EDP (hours) |
|----------|---------------|----------------------|------------------|--------------|-------------|
| RLR | all | variable | P>0 | RLR-v-1 | 10000 |
| | | constant | P>0 | RLR-c-1 | |

Table V-9: Emission durability period (EDP) for category SMB

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | EDP (hours) |
|----------|---------------|----------------------|------------------|--------------|-------------|
| SMB | SI | variable or constant | P>0 | SMB-v-1 | 400 |

Table V-10: Emission durability period (EDP) for engine category ATS

| Category | Ignition type | Speed mode operation | Power range (kW) | Sub-category | EDP (hours) |
|----------|---------------|----------------------|------------------|--------------|------------------------|
| ATS | SI | variable or constant | P>0 | ATS-v-1 | 500/1000 ²⁾ |

²⁾ EDP hours correspond to the following total engine swept volumes: <100 cm³ / ≥100 cm³.

ATEX Special purpose engine (SPE) emission limit values referred to in Article 32(4)Table VI-1: ~~ATEX~~ **SPE** emission limit values for engine category NRE

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | THC | NOx | PM mass | A |
|--------------------------------------|---------------------|-------------|----------------------|-------|-------|-------|---------|-----|
| | | kW | | g/kWh | g/kWh | g/kWh | g/kWh | |
| ATEX <u>SPE</u> | NRE-v-1 NRE-c-1 | 0<P<8 | CI | 8 | 7,5 | | 0,4 | 6,0 |
| ATEX <u>SPE</u> | NRE-v-2 NRE-c-2 | 8≤P<19 | CI | 6,6 | 7,5 | | 0,4 | 6,0 |
| ATEX <u>SPE</u> | NRE-v-3 NRE-c-3 | 19≤P<37 | CI | 5,5 | 7,5 | | 0,6 | 6,0 |
| ATEX <u>SPE</u> | NRE-v-4 NRE-c-4 | 37≤P<56 | CI | 5,0 | 4,7 | | 0,4 | 6,0 |
| ATEX <u>SPE</u> | NRE-v-5 NRE-c-5 | 56≤P<130 | all | 5,0 | 4,0 | | 0,3 | 6,0 |
| ATEX <u>SPE</u> | NRE-v-6 NRE-c-6 | 130≤P≤560 | all | 3,5 | 4,0 | | 0,2 | 6,0 |
| ATEX <u>SPE</u> | NRE-v-7 NRE-c-7 | P>560 | all | 3,5 | 6,4 | | 0,2 | 6,0 |

Table VI-2: ~~ATEX~~ **SPE** emission limit values for engine category NRG

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | HC | NOx | PM mass | A |
|-------------------------------|---------------------|-------------|----------------------|-------|-------|-------|---------|-----|
| | | kW | | g/kWh | g/kWh | g/kWh | g/kWh | |
| ATEX SPE | NRG-c-1 | P>560 | all | 3,5 | 6.4 | | 0,2 | 6,0 |
| | NRG-v-1 | | | | | | | |

Table VI-3: ~~ATEX~~ **SPE** emission limit values for engine category RLL

| Emission stage | Engine sub-category | Power range | Engine ignition type | CO | THC | NOx | PM mass | A |
|-------------------------------|---------------------|---|----------------------|-------|--------------|-------|---------|-----|
| | | kW | | g/kWh | g/kWh | g/kWh | g/kWh | |
| ATEX SPE | RLL-v-1 | P≤560 | all | 3,5 | (HC+NOx≤4,0) | | 0,2 | 6,0 |
| | RLL-c-1 | | | | | | | |
| ATEX SPE | RLL-v-1 | P>560 kW | all | 3,5 | 0,5 | 6,0 | 0,2 | 6,0 |
| | RLL-c-1 | | | | | | | |
| ATEX SPE | RLL-v-1 | P>2000 kW and SVc ¹⁾ >5 litres | all | 3,5 | 0,4 | 7,4 | 0,2 | 6,0 |
| | RLL-c-1 | | | | | | | |

¹⁾ Swept Volume per cylinder