Note

Project	Develop and implement harmonised noise assessment methods		
Concerns	Source Modules Road – Programming guide		
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1. Introduction

This report provides the programming guide for the implementation of the source model for road traffic noise as described in Chapter III of the JRC Reference Report "Stylianos Kephalopoulos, Marco Paviotti, Fabienne Anfosso-Lédée (2012), Common Noise Assessment Methods in Europe (CNOSSOS-EU), EUR 25379 EN".

The source model calculates the source power of a road segment for an hourly traffic flow and under given conditions. Typically calculations are performed for day, evening and night period. Values like ambient temperature could differ for these periods, but they might also differ on a seasonal basis. This however is outside the scope of the source model. The source model will only describe the calculation of the source power for a given hour, under given geographical conditions (e.g. slope) and given meteorological conditions (e.g. ambient temperature).

Chapter 2 gives the file format for the look-up tables. These files contain all the static data needed for the calculation of the source power. Examples of static data are:

- Coefficients A_r, B_r, A_p and B_p per vehicle type
- Coefficients for acceleration and deceleration effect
- Coefficients $a_{i,m}$ and β_m for the road surface correction.

Chapter 3 gives the file format for the input XML file and chapter 4 the file format for the output XML file.

Chapter 5 describes how the command line utility is used. Chapter 6 gives an overview of the source model DLL interface.

Annexes:

A. example of the file CNOSSOS_Road_Params.xml
B. example of the file CNOSSOS_Road_Surfaces.xml
C. example of the file CNOSSOS_Road_Input.xml
D. example of the file CNOSSOS_Road_Output.xml
E. example of the file CNOSSOS_Road_Output.csv

2. Look-up tables

All data for the look-up tables is located in two XML files:

- CNOSSOS_Road_Params.xml
  contains all look-up tables, except the road surfaces, needed for the calculation of the emission of road noise.
- CNOSSOS_Road_Surfaces.xml
  contains the look-up table for the road surfaces, needed for the calculation of the emission of road noise.

The format used is self-explanatory and the delivered files contain supporting comments.

All XML files (also for the user input) need to comply with the following:

- Decimal separator a point ('.')
- Spectral information is given as
  - 8 values for octave information (63 Hz .. 8 kHz)
  - 24 values for 1/3 octave information (50 Hz .. 10 kHz)
  - values are separated by 1 or more spaces.

2.1 CNOSSOS_Road_Params.xml

All information is located within the main tag "`RoadParameters`". As attribute the version of the file format is given, currently "V1.0".

```
<RoadParameters version="V1.0">
    <!-- Contents -->
</RoadParameters>
```

Within the main tag the following static data is given:

- Date
  Catalogue date, purely informative.
  ```
  <Date>2013-10-17</Date>
  ```
- Reference speed
  ```
  <Vref>70</Vref>
  ```
- Source height
  ```
  <Hsrc>0.05</Hsrc>
  ```
- Reference temperature
  ```
  <Tref>20</Tref>
  ```
- Vehicle definition
  This section contains the definitions of the supported vehicle categories. If a category is not defined in this section, it is not calculated.
  ```
  <VehicleDefinition>
      <!-- Contents -->
  </VehicleDefinition>
  ```
- Gradient calculation
  Breakdown of the formula to calculate the gradient correction as described in "Chapter III.2.4.b. Effect of road gradients"
  ```
  <GradientCalculation>
      <!-- Contents -->
  </GradientCalculation>
  ```

- Emission values Ar, Br, Ap and Bp
  coefficients AR,i,m and BR,i,m for rolling noise (III-5) and coefficients AP,i,m and BP,i,m for rolling propulsion (III-11).

```
<EmissionAB>
     <!-- Contents -->
</EmissionAB>
```

- Speed variations
  Coefficients Cr,k en Cp,k for acceleration and deceleration effect (III-17 and III-18).

```
<SpeedVariations>
     <!-- Contents -->
</SpeedVariations>
```

2.1.1 Vehicle definition

This section contains the definitions of the supported vehicle categories. If a category is not defined in this section, it is not calculated.

Example for this section:

```
<Category ID="1" Description="Light vehicles"
                 RollingNoise="true"
                 PropulsionNoise="true"
                 Studded="true"
                 Astudded="0 0 0 2.6 2.9  1.5  2.3  9.2"
                 Bstudded="0 0 0 -3.1 -6.4 -14.0 -22.4 -11.4"
                 Ksurface="0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08"
/>
```

- ID
  This field gives the identification of the vehicle type and is used for reference of all other information, such as road surface definition and user input.
- Description
  Purely informative field, describing the vehicle type
- RollingNoise
  Indicated is rolling noise will be calculated for this vehicle type. Possible values "true" and "false"
- PropulsionNoise
  Indicated is propulsion noise will be calculated for this vehicle type. Possible values "true" and "false"
- Studded
  Indicated is a correction for studded tyres will be calculated for this vehicle type. Possible values "true" and "false"
- Astudded and Bstudded
  If a correction for studded tyres is calculated these fields contain the coefficients a_i and b_i. If no correction is calculated these fields contain zeros
- Ksurface
  The generic coefficient K per octave to calculate the effect of air temperature on rolling noise correction

2.1.2 Gradient correction

This section describes the breakdown of the formula to calculate the gradient correction as described in "Chapter III.2.4.b. Effect of road gradients".

Example for this section:

```
<Category Ref="1" calc="true" Low="-6" High="2">
     <Low a1="-6.0" a2="1.0" UseSpeed="false" a3= "0.0" />
     <High a1="-2.0" a2="1.5" UseSpeed="true" a3= "0.0" />
</Category>
```

General formula:

$$\Delta L_{WP,grad,i,m}(v_m) = \begin{Bmatrix} \frac{Min(12\%;-s)-a1}{a2} \times UseSpeed(\frac{v_m-a3}{100}) & for\ s < Low \\ \frac{Min(12\%;s)-a2}{a2} \times UseSpeed(\frac{v_m-a3}{100}) & for\ s > High \end{Bmatrix}$$

- Ref
  The reference to the vehicle type. This values needs to be identical to the contents of field "ID" as given in the vehicle definition section.
- calc
  Determines if a gradient correction is calculated for this vehicle type. Possible values "true" and "false"
- Low
  If the slope is smaller than this value a gradient correction will be calculated
- High
  If the slope is larger than this value a gradient correction will be calculated
- a1, a2, a3
  Values as shown in the formula
- UseSpeed
  The speed dependant part (*(v_m-a3)/100*) will only be calculated if this value is "true"

2.1.3 Emission coefficients

Example for this section:

```
<Category Ref="1" Ar="79.7 85.7 84.5 90.2 97.3 93.9 84.1 74.3"
                  Br="30.0 41.5 38.9 25.7 32.5 37.2 39.0 40.0"
                  Ap="94.5 89.2 88.0 85.9 84.2 86.9 83.3 76.1"
                  Bp="-1.3 7.2 7.7 8.0 8.0 8.0 8.0 8.0"/>
```

- Ref
  The reference to the vehicle type. This values needs to be identical to the contents of field "ID" as given in the vehicle definition section.
- Ar, Br, Ap and Bp
  coefficients AR,i,m and BR,i,m for rolling noise (III-5) and coefficients AP,i,m and BP,i,m for rolling propulsion (III-11).

2.1.4 Corrections for speed variations

Coefficients Cr,k en Cp,k for acceleration and deceleration effect (III-17 and III-18).
Example for this section:

```
<Category Ref="1">
     <Type k="1" Cr="-4.5" Cp="5.5"/>
     <Type k="2" Cr="-4.4" Cp="3.1"/>
     <Type k="3" Cr="0.0" Cp="0.0"/>
</Category>
```

- Ref
  The reference to the vehicle type. This values needs to be identical to the contents of field "ID" as given in the vehicle definition section.
- k
  kind of junction k (k = 1 for a crossing with traffic lights ; k = 2 for a roundabout).
- Cr and Ck
  Corrections for rolling and propulsion noise as overall correction values.

2.2 CNOSSOS_Road_Surfaces.xml

All information is located within the main tag "`RoadSurfaceParameters`". As attribute the version of the file format is given, currently "V1.0".

```
<RoadSurfaceParameters version="V1.0">
     <!-- Contents -->
</RoadSurfaceParameters>
```

- Date
  Catalogue date, purely informative.

```
<Date>2013-10-17</Date>
```

- Road surface definitions
  This section contains the definitions of the supported road surfaces.

```
<RoadSurfaces>
     <!-- Contents -->
</RoadSurfaces>
```

2.2.1 Road surface definitions

This section contains the definitions of the road surfaces in compliance with chapter III.2.6.
Example for this section:

```
<Surface ID="0" Description="reference surface" Vmin="20" Vmax="130">
     <-- Contents -->
</Surface>
```

- ID
  This field gives the identification of the road surface and is used for reference of all other information, such as user input.
- Description
  Purely informative field, describing the road surface.
- Vmin and Vmax
  Purely informative field, giving the speed range for which the values are validated.

2.2.2 Road surface values

This section contains correction values per vehicle type for of a specific road surface.

Example for this section:

```
<Category Ref="1"  A="0.5 3.3 2.4 3.2 -1.3 -3.5 -2.6 0.5"
                   B="-6.5"/>
```

- Ref
  The reference to the vehicle type. This value needs to be identical to the contents of field "ID" as given in the vehicle definition section.
- A
  Gives the values for $\alpha_{i,m}$ which is the spectral correction in dB at reference speed v_{ref}.
- B
  Gives the value for β_m which is the speed effect on rolling noise reduction.

3. User data

All user input is located XML file: CNOSSOS_Road_Input.xml.
The format used is self explaining and the delivered files contain supporting comments.

All information is located within the main tag "`SourceDefinition`". As attribute the version of the file format is given, currently "V1.0".
The main tag contains exactly one sub tag "`RoadSegment`".

```
<SourceDefinitionversion="V1.0">
    <RoadSegment>
        <!-- Contents -->
    </RoadSegment>
</SourceDefinition>
```

Within the tag "`RoadSegment`" the following data is given:

- Test
  If set to "false" only the calculated source power will be written to file (CNOSSOS_Road_Output.xml). If set to "true", aside from the calculated source power, the intermediate results will also be written to a separate file named CNOSSOS_Road_Output.csv. (Note that the CSV file is actually tab-separated; also, contrary to the XML files, it uses the user's locale settings to format numbers).
  ```
  <Test>true</Test>
  ```
- Average ambient temperature
  ```
  <Taverage>15</Taverage>
  ```
- Slope in %
  ```
  <Slope>5</Slope>
  ```
- Road surface type
  The reference to the corresponding road surface in CNOSSOS_Road_Surfaces.xml.
  ```
  <Surface Ref="1"/>
  ```
- Studded tyres
  Months per year vehicles equipped with studded tyres.
  ```
  <Tstudded>4</Tstudded>
  ```
- Speed variations
  Information regarding junction type and distance to the junction.
  ```
  <SpeedVariations>
      <Distance>50.0</Distance>
      <Type>1</Type>
  </SpeedVariations>
  ```
- Traffic flow information
  Per vehicle type the hourly number of vehicles, the average speed [km/h] and the fraction of vehicles equipped with studded tyres during the months vehicles equipped with studded tyres.
  ```
  <Category Ref="1">
      <Q>1000.0</Q>
      <V>70</V>
      <Fstud>0.5</Fstud>
  </Category>
  ```
  The reference for the category needs to be identical to the ID in the vehicles definition section located in the file CNOSSOS_Road_Params.xml.

4. Calculated source power

All calculated source power is located in the XML file: CNOSSOS_Road_Output.xml.
The format used is self-explanatory and the delivered files contain supporting comments.

All information is located within the main tag "`CNOSSOS_SourcePower`". As attribute the version of the file format is given, currently "V1.0".
The main tag contains one or more subtags "`source`", one for each source.

```
<CNOSSOS_SourcePower version="V1.0">
   <source>
      <!-- Source height in m -->
      <h>0.05</h>
      <!-- Sound power definitions
         * sourceType = "PointSource", "LineSource" or "AreaSource"
         * measurementType    = "Unknown", "FreeField" or "HemiSpherical"
         * frequencyWeighting = "LIN" or "dBA"
      -->
      <Lw sourceType="LineSource"
          measurementType="HemiSpherical"
          frequencyWeighting="LIN">
          100.45 96.57 97.88 96.63 92.01 89.11 85.35 80.92
      </Lw>
   </source>
</CNOSSOS_SourcePower>
```

Within the tag "`source`" the following data is given:

- Source height in m.
  `<h>0.05</h>`
- The calculated source power (linear), with the following attributes:
  - Source type
    Possible source types are: "PointSource", "LineSource" or "AreaSource".
    `sourceType="LineSource"`
  - Radiation type
    Possible radiation types are: "Unknown", "FreeField" or "HemiSpherical".
    `measurementType="HemiSpherical"`
  - The frequency weighing ("LIN" or "dBA")
    `frequencyWeighting="LIN"`
- The calculated power source is provided for the spectrum:

```
<Lw sourceType="LineSource"
     measurementType="HemiSpherical"
     frequencyWeighting="LIN">
     100.45 96.57 97.88 96.63 92.01 89.11 85.35 80.92
</Lw>
```

If the value "Test" in the input file is set to "true" all intermediate results will be written to the file named CNOSSOS_Road_Output.csv.

5. Command line utility "CNOSSOS_DLL_CONSOLE.exe"

The command line utility can be used to calculate the source power using a XML file as input. The use is as follows:

CNOSSOS_DLL_CONSOLE.exe <-road | -rail> infile outfile

- **<-road | -rail | -industry>** describes which source model will be used. Currently only road and industry are supported.
- **Infile** contains the location and name of the XML input file which format is described in chapter 3.
  If no location is specified, the location is assumed to be the current folder;
- **Outfile** contains the location and name of the XML output file (and if specified the corresponding CSV file) which format is described in chapter 4.
  If no location is specified, the location is assumed to be the current folder.

The source module DLL (CNOSSOS_ROADNOISE_DLL.dll) and the look-up tables (CNOSSOS_Road_Params.xml and CNOSSOS_Road_Surfaces.xml) need to be located in the same folder as the command line utility "CNOSSOS_DLL_CONSOLE.exe".

6. Interface of "CNOSSOS_ROADNOISE_DLL.dll"

This section defines all of the supported functions included in the CNOSSOS_ROADNOISE DLL. These are currently only the required functions to support XML input and output:

- InitDLL
- CalcFormFile
- ReleaseDLL.

6.1 InitDLL

Initializes the road noise model DLL, creates the required data structures and imports the look-up tables.

Usage:

int InitDLL();

Parameters:

-

Return values:

0 in case of success

-1 in case of failure

6.2 CalcFromFile

Reads to road segment data from a user specified input file. Calculates the corresponding road segment source power and writes the results to a user specified output file.

Usage:

int CalcFromFile(const string infile, string outfile);

Parameters:

infile the file which contains the road segment data

outfile the file to which the calculated source power will be written

Return values:

0 in case of succes

-1 in case of failure

6.3 ReleaseDLL

Release the active DLL and frees all active objects

Usage:

void ReleaseDLL()

Parameters:

-

Return values:

-

6.4 GetVersionDLL

Release the active DLL and frees all active objects

Usage:

```
char* GetVersionDLL();
```

Parameters:

-

Return values:

String encoded version of the shared library

Annex A -- example of the file CNOSSOS_Road_Params.xml

```
<?xml version="1.0" ?>
<RoadParameters version="V1.0">
    <!--
        CNOSSOS_Road_Params.XML contains all look-up tables, except the road
        surfaces, needed for the calculation of the emission of road noise.

        Format:
        - Decimal separator a point ('.')
        - Spectral information is given as
          - 8 values for octave information (63 Hz .. 8 kHz)
          - 24 values for 1/3 octave information (50 Hz .. 10 kHz)
          - values are separated by 1 or more spaces.
    -->
    <Date>2014-03-31</Date> <!-- Catalogue date (informative) -->
    <Vref>70</Vref>   <!-- reference speed -->
    <Hsrc>0.05</Hsrc> <!-- Source height -->
    <Tref>20</Tref>   <!-- Reference temperature -->
    <VehicleDefinition>
        <!--
            This section contains the definitions of the supported vehicle categories.
            If a category is not defined in this section, it is not calculated.
        -->
        <Category ID="1"  Description="Light vehicles"
                          RollingNoise="true"
                          PropulsionNoise="true"
                          Studded="true"
                          Astudded="0 0 0  2.6  2.9   1.5   2.3   9.2"
                          Bstudded="0 0 0 -3.1 -6.4 -14.0 -22.4 -11.4"
                          Ksurface="0.08 0.08 0.08 0.08 0.08 0.08 0.08 0.08"
        />
        <Category ID="2"  Description="Light trucks"
                          RollingNoise="true"
                          PropulsionNoise="true"
                          Studded="false"
                          Astudded="0 0 0 0 0 0 0 0"
                          Bstudded="0 0 0 0 0 0 0 0"
                          Ksurface="0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04"
        />
        <Category ID="3"  Description="Heavy trucks"
                          RollingNoise="true"
                          PropulsionNoise="true"
                          Studded="false"
                          Astudded="0 0 0 0 0 0 0 0"
                          Bstudded="0 0 0 0 0 0 0 0"
                          Ksurface="0.04 0.04 0.04 0.04 0.04 0.04 0.04 0.04"
        />
        <Category ID="4a" Description="Light mopeds"
                          RollingNoise="false"
                          PropulsionNoise="true"
                          Studded="false"
                          Astudded="0 0 0 0 0 0 0 0"
                          Bstudded="0 0 0 0 0 0 0 0"
                          Ksurface="0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00"
        />
        <Category ID="4b" Description="Motors and quads"
                          RollingNoise="false"
                          PropulsionNoise="true"
                          Studded="false"
                          Astudded="0 0 0 0 0 0 0 0"
                          Bstudded="0 0 0 0 0 0 0 0"
                          Ksurface="0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00"
        />
        <Category ID="5"  Description="Open category"
                          RollingNoise="false"
                          PropulsionNoise="false"
                          Studded="false"
                          Astudded="0 0 0 0 0 0 0 0"
                          Bstudded="0 0 0 0 0 0 0 0"
                          Ksurface="0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00"
        />
    </VehicleDefinition>

    <GradientCalculation>
        <!--
            Breakdown of the formula to calculate the gradient correction as
            described in "Chapter III.2.4.b. Effect of road gradients"
        -->
        <Category Ref="1"  calc="true" Low="-6" High="2">
            <Low  a1="-6.0" a2="1.0" UseSpeed="false" a3= "0.0" />
            <High a1="-2.0" a2="1.5" UseSpeed="true"  a3= "0.0" />
        </Category>
        <Category Ref="2"  calc="true" Low="-4" High="0">
```

```
        <Low  a1="-4.0" a2="0.7" UseSpeed="true"  a3= "20.0" />
        <High a1=" 0.0" a2="1.0" UseSpeed="true"  a3=  "0.0" />
    </Category>
    <Category Ref="3"  calc="true" Low="-4" High="0">
        <Low  a1="-4.0" a2="0.5" UseSpeed="true"  a3= "10.0" />
        <High a1="0.0"  a2="0.8" UseSpeed="true"  a3=  "0.0" />
    </Category>
    <Category Ref="4a" calc="false" Low="0" High="0">
        <Low  a1="0.0" a2="0.0" UseSpeed="false" a3=  "0.0" />
        <High a1="0.0" a2="0.0" UseSpeed="false" a3=  "0.0" />
    </Category>
    <Category Ref="4b" calc="false" Low="0" High="0">
        <Low  a1="0.0" a2="0.0" UseSpeed="false" a3=  "0.0" />
        <High a1="0.0" a2="0.0" UseSpeed="false" a3=  "0.0" />
    </Category>
    <Category Ref="5"  calc="false" Low="0" High="0">
        <Low  a1="0.0" a2="0.0" UseSpeed="false" a3=  "0.0" />
        <High a1="0.0" a2="0.0" UseSpeed="false" a3=  "0.0" />
    </Category>
</GradientCalculation>

<EmissionAB>
    <!--
        AR and BR: coefficients AR,i,m and BR,i,m for rolling noise (III-5)
        AP and BP: coefficients AP,i,m and BP,i,m for rolling propulsion (III-11)
    -->
    <Category Ref="1"  Ar=" 79.7  85.7  84.5  90.2  97.3  93.9  84.1  74.3"
                       Br=" 30.0  41.5  38.9  25.7  32.5  37.2  39.0  40.0"
                       Ap=" 94.5  89.2  88.0  85.9  84.2  86.9  83.3  76.1"
                       Bp=" -1.3   7.2   7.7   8.0   8.0   8.0   8.0   8.0"/>
    <Category Ref="2"  Ar=" 84.0  88.7  91.5  96.7  97.4  90.9  83.8  80.5"
                       Br=" 30.0  35.8  32.6  23.8  30.1  36.2  38.3  40.1"
                       Ap="101.0  96.5  98.8  96.8  98.6  95.2  88.8  82.7"
                       Bp=" -1.9   4.7   6.4   6.5   6.5   6.5   6.5   6.5"/>
    <Category Ref="3"  Ar=" 87.0  91.7  94.1 100.7 100.8  94.3  87.1  82.5"
                       Br=" 30.0  33.5  31.3  25.4  31.8  37.1  38.6  40.6"
                       Ap="104.4 100.6 101.7 101.0 100.1  95.9  91.3  85.3"
                       Bp="  0.0   3.0   4.6   5.0   5.0   5.0   5.0   5.0"/>
    <Category Ref="4a" Ar="  0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0"
                       Br="  0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0"
                       Ap=" 88.0  87.5  89.5  93.7  96.6  98.8  93.9  88.7"
                       Bp="  4.2   7.4   9.8  11.6  15.7  18.9  20.3  20.6"/>
    <Category Ref="4b" Ar="  0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0"
                       Br="  0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0"
                       Ap=" 95.0  97.2  92.7  92.9  94.7  93.2  90.1  86.5"
                       Bp="  3.2   5.9  11.9  11.6  11.5  12.6  11.1  12.0"/>
    <Category Ref="5"  Ar="  0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0"
                       Br="  0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0"
                       Ap="  0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0"
                       Bp="  0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0"/>
</EmissionAB>

<SpeedVariations>
    <!--
        Cr and Cp: Coefficients Cr,k en Cp,k for acceleration and
        deceleration effect (III-17 and III-18).
        k=1: Crossing, k=2: Roundabout, k=3: Open type
    -->
    <Category Ref="1">
        <Type k="1" Cr="-4.5" Cp="5.5"/>
        <Type k="2" Cr="-4.4" Cp="3.1"/>
        <Type k="3" Cr="0.0" Cp="0.0"/>
    </Category>
    <Category Ref="2">
        <Type k="1" Cr="-4.0" Cp="9.0"/>
        <Type k="2" Cr="-2.3" Cp="6.7"/>
        <Type k="3" Cr="0.0" Cp="0.0"/>
    </Category>
    <Category Ref="3">
        <Type k="1" Cr="-4.0" Cp="9.0"/>
        <Type k="2" Cr="-2.3" Cp="6.7"/>
        <Type k="3" Cr="0.0" Cp="0.0"/>
    </Category>
    <Category Ref="4a">
        <Type k="1" Cr="0.0" Cp="0.0"/>
        <Type k="2" Cr="0.0" Cp="0.0"/>
        <Type k="3" Cr="0.0" Cp="0.0"/>
    </Category>
    <Category Ref="4b">
        <Type k="1" Cr="0.0" Cp="0.0"/>
        <Type k="2" Cr="0.0" Cp="0.0"/>
        <Type k="3" Cr="0.0" Cp="0.0"/>
    </Category>
    <Category Ref="5">
        <Type k="1" Cr="0.0" Cp="0.0"/>
```

```
            <Type k="2" Cr="0.0" Cp="0.0"/>
            <Type k="3" Cr="0.0" Cp="0.0"/>
        </Category>
    </SpeedVariations>
</RoadParameters>
```

Annex B -- example of the file CNOSSOS_Road_Surfaces.xml

```
<?xml version="1.0" ?>
< RoadSurfaceParameters version="V1.0">
    <!--
        CNOSSOS_Road_Surfaces.XML contains the look-up table for the road
        surfaces needed for the calculation of the emission of road noise.

        Format:
        - Decimal separator a point ('.')
        - Spectral information is given as
          - 8 values for octave information (63 Hz .. 8 kHz)
          - 24 values for 1/3 octave information (50 Hz .. 10 kHz)
          - values are separated by 1 or more spaces.
    -->
    <Date>2014-03-31</Date> <!-- Catalogue date (informative) -->
    <RoadSurfaces>
        <!--
            This section contains the definitions of the road surfaces.
        -->
        <Surface ID="0" Description="Reference road surface" Vmin="20" Vmax="130">
            <Category Ref="1"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="2"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="3"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
        </Surface>
        <Surface ID="NL01" Description="1-layer ZOAB" Vmin="50" Vmax="130">
            <Category Ref="1"  A=" 0.5  3.3  2.4  3.2 -1.3 -3.5 -2.6  0.5"
                               B="-6.5"/>
            <Category Ref="2"  A=" 0.9  1.4  1.8 -0.4 -5.2 -4.6 -3.0 -1.4"
                               B=" 0.2"/>
            <Category Ref="3"  A=" 0.9  1.4  1.8 -0.4 -5.2 -4.6 -3.0 -1.4"
                               B=" 0.2"/>
            <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
        </Surface>
        <Surface ID="NL02" Description="2-layer ZOAB" Vmin="50" Vmax="130">
            <Category Ref="1"  A=" 0.4  2.4  0.2 -3.1 -4.2 -6.3 -4.8 -2.0"
                               B="-3.0"/>
            <Category Ref="2"  A=" 0.4  0.2 -0.7 -5.4 -6.3 -6.3 -4.7 -3.7"
                               B=" 4.7"/>
            <Category Ref="3"  A=" 0.4  0.2 -0.7 -5.4 -6.3 -6.3 -4.7 -3.7"
                               B=" 4.7"/>
            <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
        </Surface>
        <Surface ID="NL03" Description="2-layer ZOAB (fine)" Vmin="80" Vmax="130">
            <Category Ref="1"  A="-1.0  1.7 -1.5 -5.3 -6.3 -8.5 -5.3 -2.4"
                               B="-0.1"/>
            <Category Ref="2"  A=" 1.0  0.1 -1.8 -5.9 -6.1 -6.7 -4.8 -3.8"
                               B="-0.8"/>
            <Category Ref="3"  A=" 1.0  0.1 -1.8 -5.9 -6.1 -6.7 -4.8 -3.8"
                               B="-0.8"/>
            <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
        </Surface>
        <Surface ID="NL04" Description="SMA-NL5" Vmin="40" Vmax="80">
            <Category Ref="1"  A=" 1.1 -1.0  0.2  1.3 -1.9 -2.8 -2.1 -1.4"
                               B="-1.0"/>
            <Category Ref="2"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="3"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                               B=" 0.0"/>
            <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
```

```
                        B=" 0.0"/>
    <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
</Surface>
<Surface ID="NL05" Description="SMA-NL8" Vmin="40" Vmax="80">
    <Category Ref="1"  A=" 0.3  0.0  0.0 -0.1 -0.7 -1.3 -0.8 -0.8"
                        B="-1.0"/>
    <Category Ref="2"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="3"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
</Surface>
<Surface ID="NL06" Description="Brushed down concrete" Vmin="70" Vmax="120">
    <Category Ref="1"  A=" 1.1 -0.4  1.3  2.2  2.5  0.8 -0.2 -0.1"
                        B=" 1.4"/>
    <Category Ref="2"  A=" 0.0  1.1  0.4 -0.3 -0.2 -0.7 -1.1 -1.0"
                        B=" 4.4"/>
    <Category Ref="3"  A=" 0.0  1.1  0.4 -0.3 -0.2 -0.7 -1.1 -1.0"
                        B=" 4.4"/>
    <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
</Surface>
<Surface ID="NL07" Description="Optimized Brushed down concrete" Vmin="70" Vmax="80">
    <Category Ref="1"  A="-0.2 -0.7  0.6  1.0  1.1 -1.5 -2.0 -1.8"
                        B=" 1.0"/>
    <Category Ref="2"  A="-0.3  1.0 -1.7 -1.2 -1.6 -2.4 -1.7 -1.7"
                        B="-6.6"/>
    <Category Ref="3"  A="-0.3  1.0 -1.7 -1.2 -1.6 -2.4 -1.7 -1.7"
                        B="-6.6"/>
    <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
</Surface>
<Surface ID="NL08" Description="Fine Broomed concrete" Vmin="70" Vmax="120">
    <Category Ref="1"  A=" 1.1 -0.5  2.7  2.1  1.6  2.7  1.3 -0.4"
                        B=" 7.7"/>
    <Category Ref="2"  A=" 0.0  3.3  2.4  1.9  2.0  1.2  0.1  0.0"
                        B=" 3.7"/>
    <Category Ref="3"  A=" 0.0  3.3  2.4  1.9  2.0  1.2  0.1  0.0"
                        B=" 3.7"/>
    <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
</Surface>
<Surface ID="NL09" Description="Worked surface" Vmin="50" Vmax="130">
    <Category Ref="1"  A=" 1.1  1.0  2.6  4.0  4.0  0.1 -1.0 -0.8"
                        B="-0.2"/>
    <Category Ref="2"  A=" 0.0  2.0  1.8  1.0 -0.7 -2.1 -1.9 -1.7"
                        B=" 1.7"/>
    <Category Ref="3"  A=" 0.0  2.0  1.8  1.0 -0.7 -2.1 -1.9 -1.7"
                        B=" 1.7"/>
    <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
    <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
</Surface>
<Surface ID="NL10" Description="Hard elements in herring-bone" Vmin="30" Vmax="60">
    <Category Ref="1"  A=" 8.3  8.7  7.8  5.0  3.0 -0.7  0.8  1.8"
                        B=" 2.5"/>
    <Category Ref="2"  A=" 8.3  8.7  7.8  5.0  3.0 -0.7  0.8  1.8"
                        B=" 2.5"/>
    <Category Ref="3"  A=" 8.3  8.7  7.8  5.0  3.0 -0.7  0.8  1.8"
                        B=" 2.5"/>
    <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                        B=" 0.0"/>
```

```
            <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
            <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
        </Surface>
        <Surface ID="NL11" Description="Hard elements not in herring-bone" Vmin="30" Vmax="60">
            <Category Ref="1"  A="12.3 11.9  9.7  7.1  7.1  2.8  4.7  4.5"
                              B=" 2.9"/>
            <Category Ref="2"  A="12.3 11.9  9.7  7.1  7.1  2.8  4.7  4.5"
                              B=" 2.9"/>
            <Category Ref="3"  A="12.3 11.9  9.7  7.1  7.1  2.8  4.7  4.5"
                              B=" 2.9"/>
            <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
            <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
            <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
        </Surface>
        <Surface ID="NL12" Description="Quiet hard elements" Vmin="30" Vmax="60">
            <Category Ref="1"  A=" 7.8  6.3  5.2  2.8 -1.9 -6.0 -3.0 -0.1"
                              B="-1.7"/>
            <Category Ref="2"  A=" 0.2  0.7  0.7  1.1  1.8  1.2  1.1  0.2"
                              B=" 0.0"/>
            <Category Ref="3"  A=" 0.2  0.7  0.7  1.1  1.8  1.2  1.1  0.2"
                              B=" 0.0"/>
            <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
            <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
            <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
        </Surface>
        <Surface ID="NL13" Description="Thin layer A" Vmin="40" Vmax="130">
            <Category Ref="1"  A=" 1.1  0.1 -0.7 -1.3 -3.1 -4.9 -3.5 -1.5"
                              B="-2.5"/>
            <Category Ref="2"  A=" 1.6  1.3  0.9 -0.4 -1.8 -2.1 -0.7 -0.2"
                              B=" 0.5"/>
            <Category Ref="3"  A=" 1.6  1.3  0.9 -0.4 -1.8 -2.1 -0.7 -0.2"
                              B=" 0.5"/>
            <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
            <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
            <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
        </Surface>
        <Surface ID="NL14" Description="Thin layer B" Vmin="40" Vmax="130">
            <Category Ref="1"  A=" 0.4 -1.3 -1.3 -0.4 -5.0 -7.1 -4.9 -3.3"
                              B="-1.5"/>
            <Category Ref="2"  A=" 1.6  1.3  0.9 -0.4 -1.8 -2.1 -0.7 -0.2"
                              B=" 0.5"/>
            <Category Ref="3"  A=" 1.6  1.3  0.9 -0.4 -1.8 -2.1 -0.7 -0.2"
                              B=" 0.5"/>
            <Category Ref="4a" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
            <Category Ref="4b" A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
            <Category Ref="5"  A=" 0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0"
                              B=" 0.0"/>
        </Surface>
    </RoadSurfaces>
</RoadSurfaceParameters>
```

Annex C -- example of the file CNOSSOS_Road_Input.xml

```
<?xml version="1.0" ?>
<SourceDefinition version="V1.0">
    <!--
        CNOSSOS_Road_Input.XML contains all user input data needed for
        the calculation of the emission of road noise.

        Format:
        - Decimal separator a point ('.')
        - Spectral information is given as
          - 8 values for octave information (63 Hz .. 8 kHz)
          - 24 values for 1/3 octave information (50 Hz .. 10 kHz)
          - values are separated by 1 or more spaces.
    -->
    <RoadSegment>
        <Test>true</Test>     <!-- Create file with intermediate results (true/false)   -->
        <Taverage>15</Taverage> <!-- Average temperature (III-10)                        -->
        <Slope>10</Slope>       <!-- Slope s in % (III-13), (III-14), (III-15), (III-16)  -->
        <Surface Ref="NL01"/>     <!-- Reference to CNOSSOS Road Surfaces.xml               -->
        <Tstudded>4</Tstudded> <!-- Months per year vehicles equipped with studded tyres -->
        <SpeedVariations>
            <Distance>50.0</Distance> <!-- Distance to junction (III-17), (III-18)        -->
            <Type>1</Type>           <!-- Type of junction (III-17), (III-18)            -->
        </SpeedVariations>

        <Category Ref="1">
            <Q>1000.0</Q>
            <V>70</V>
            <Fstud>0.5</Fstud> <!-- Fraction of vehicles equipped with studded tyres (III-8) -->
        </Category>
        <Category Ref="2">
            <Q>1000.0</Q>
            <V>70</V>
            <Fstud>0</Fstud> <!-- Fraction of vehicles equipped with studded tyres (III-8) -->
        </Category>
        <Category Ref="3">
            <Q>1000.0</Q>
            <V>70</V>
            <Fstud>0</Fstud> <!-- Fraction of vehicles equipped with studded tyres (III-8) -->
        </Category>
        <Category Ref="4a">
            <Q>1000.0</Q>
            <V>70</V>
            <Fstud>0</Fstud> <!-- Fraction of vehicles equipped with studded tyres (III-8) -->
        </Category>
        <Category Ref="4b">
            <Q>1000.0</Q>
            <V>70</V>
            <Fstud>0</Fstud> <!-- Fraction of vehicles equipped with studded tyres (III-8) -->
        </Category>
        <Category Ref="5">
            <Q>1000.0</Q>
            <V>70</V>
            <Fstud>0</Fstud> <!-- Fraction of vehicles equipped with studded tyres (III-8) -->
        </Category>
    </RoadSegment>
</SourceDefinition>
```

Annex D -- example of the file CNOSSOS_Road_Output.xml

```
<?xml version="1.0" ?>
<CNOSSOS_SourcePower version="V1.0">
    <!--
        CNOSSOS_Road_Output.XML contains the calculated source power.

        Format:
        - Decimal separator a point (".")
        - Spectral information is given as
            - 8 values for octave information (63 Hz .. 8 kHz);
            - 24 values for 1/3 octave information (50 Hz .. 10 kHz)
            - values are separated by 1 or more spaces.
    -->
    <source>
        <!-- Source height in m -->
        <h>0.05</h>
        <!-- Sound power definitions
            * sourceType = "PointSource", "LineSource" or "AreaSource"
            * measurementType    = "Unknown", "FreeField" or "HemiSpherical"
            * frequencyWeighting = "LIN" or "dBA"
        -->
        <Lw sourceType="LineSource"
            measurementType="HemiSpherical"
            frequencyWeighting="LIN">
            100.45   96.57   97.88   96.63   92.01   89.11   85.35   80.92
        </Lw>
    </source>
</CNOSSOS_SourcePower>
```

Annex E -- example of the file CNOSSOS_Road_Output.csv

```
Sep=⇥
Cat  ID   Quantity  SpeedFstud
Cat0 1    1    70   0
Cat1 2    1    70   0
Cat2 3    1    70   0
Cat3 4a   1    70   0
Cat4 4b   1    70   0
Cat5 5    1    70   0
Use temperature: 20°C
Acceleration: ROUNDABOUT at distance of: 50 m
Roadsegment has gradient of: 0%

Roadsegment has the following studded tyre properties:
Months per year: 0

Fraction of vehicles with studded tyres:
Cat0 0
Cat1 0
Cat2 0
Cat3 0
Cat4 0
Cat5 0
Cat6 0
Cat7 0
Cat8 0
Cat9 0


Rolling noise acceleration correction
                63       125       250       500      1.000     2.000     4.000     8.000

Cat0     -2,2      -2,2      -2,2      -2,2      -2,2      -2,2      -2,2      -2,2
Cat1    -1,15     -1,15     -1,15     -1,15     -1,15     -1,15     -1,15     -1,15
Cat2    -1,15     -1,15     -1,15     -1,15     -1,15     -1,15     -1,15     -1,15
Cat3        0         0         0         0         0         0         0         0
Cat4        0         0         0         0         0         0         0         0
Cat5        0         0         0         0         0         0         0         0
Cat6        0         0         0         0         0         0         0         0
Cat7        0         0         0         0         0         0         0         0
Cat8        0         0         0         0         0         0         0         0
Cat9        0         0         0         0         0         0         0         0

Rolling noise tyre correction
                63       125       250       500      1.000     2.000     4.000     8.000

Cat0        0         0         0         0         0         0         0         0
Cat1        0         0         0         0         0         0         0         0
Cat2        0         0         0         0         0         0         0         0
Cat3        0         0         0         0         0         0         0         0
Cat4        0         0         0         0         0         0         0         0
Cat5        0         0         0         0         0         0         0         0
Cat6        0         0         0         0         0         0         0         0
Cat7        0         0         0         0         0         0         0         0
Cat8        0         0         0         0         0         0         0         0
Cat9        0         0         0         0         0         0         0         0

Temperature correction
Cat0 0
Cat1 0
Cat2 0
Cat3 0
Cat4 0
Cat5 0
Cat6 0
Cat7 0
Cat8 0
Cat9 0

Rolling noise road correction
                63       125       250       500      1.000     2.000     4.000     8.000

Cat0        0         0         0         0         0         0         0         0
Cat1        0         0         0         0         0         0         0         0
Cat2        0         0         0         0         0         0         0         0
Cat3        0         0         0         0         0         0         0         0
Cat4        0         0         0         0         0         0         0         0
Cat5        0         0         0         0         0         0         0         0
Cat6        0         0         0         0         0         0         0         0
Cat7        0         0         0         0         0         0         0         0
Cat8        0         0         0         0         0         0         0         0
Cat9        0         0         0         0         0         0         0         0
```

Total rolling noise correction

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	-2,2	-2,2	-2,2	-2,2	-2,2	-2,2	-2,2	-2,2
Cat1	-1,15	-1,15	-1,15	-1,15	-1,15	-1,15	-1,15	-1,15
Cat2	-1,15	-1,15	-1,15	-1,15	-1,15	-1,15	-1,15	-1,15
Cat3	0	0	0	0	0	0	0	0
Cat4	0	0	0	0	0	0	0	0
Cat5	0	0	0	0	0	0	0	0
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Total rolling noise factor

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	79,7	85,7	84,5	90,2	97,3	93,9	84,1	74,3
Cat1	84	88,7	91,5	96,7	97,4	90,9	83,8	80,5
Cat2	87	91,7	94,1	100,7	100,8	94,3	87,1	82,5
Cat3	0	0	0	0	0	0	0	0
Cat4	0	0	0	0	0	0	0	0
Cat5	0	0	0	0	0	0	0	0
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Total rolling noise

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	77,5	83,5	82,3	88	95,1	91,7	81,9	72,1
Cat1	82,85	87,55	90,35	95,55	96,25	89,75	82,65	79,35
Cat2	85,85	90,55	92,95	99,55	99,65	93,15	85,95	81,35
Cat3	0	0	0	0	0	0	0	0
Cat4	0	0	0	0	0	0	0	0
Cat5	0	0	0	0	0	0	0	0
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Propulsion noise acceleration correction

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	1,55	1,55	1,55	1,55	1,55	1,55	1,55	1,55
Cat1	3,35	3,35	3,35	3,35	3,35	3,35	3,35	3,35
Cat2	3,35	3,35	3,35	3,35	3,35	3,35	3,35	3,35
Cat3	0	0	0	0	0	0	0	0
Cat4	0	0	0	0	0	0	0	0
Cat5	0	0	0	0	0	0	0	0
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Propulsion noise gradient correction

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	0	0	0	0	0	0	0	0
Cat1	0	0	0	0	0	0	0	0
Cat2	0	0	0	0	0	0	0	0
Cat3	0	0	0	0	0	0	0	0
Cat4	0	0	0	0	0	0	0	0
Cat5	0	0	0	0	0	0	0	0
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Propulsion noise road correction

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	0	0	0	0	0	0	0	0
Cat1	0	0	0	0	0	0	0	0
Cat2	0	0	0	0	0	0	0	0
Cat3	0	0	0	0	0	0	0	0
Cat4	0	0	0	0	0	0	0	0
Cat5	0	0	0	0	0	0	0	0
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Total propulsion noise correction

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	1,55	1,55	1,55	1,55	1,55	1,55	1,55	1,55
Cat1	3,35	3,35	3,35	3,35	3,35	3,35	3,35	3,35
Cat2	3,35	3,35	3,35	3,35	3,35	3,35	3,35	3,35
Cat3	0	0	0	0	0	0	0	0
Cat4	0	0	0	0	0	0	0	0
Cat5	0	0	0	0	0	0	0	0
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Total propulsion noise factor

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	94,5	89,2	88	85,9	84,2	86,9	83,3	76,1
Cat1	101	96,5	98,8	96,8	98,6	95,2	88,8	82,7
Cat2	104,4	100,6	101,7	101	100,1	95,9	91,3	85,3
Cat3	88	87,5	89,5	93,7	96,6	98,8	93,9	88,7
Cat4	95	97,2	92,7	92,9	94,7	93,2	90,1	86,5
Cat5	0	0	0	0	0	0	0	0
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Total propulsion noise

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	96,05	90,75	89,55	87,45	85,75	88,45	84,85	77,65
Cat1	104,35	99,85	102,15	100,15	101,95	98,55	92,15	86,05
Cat2	107,75	103,95	105,05	104,35	103,45	99,25	94,65	88,65
Cat3	88	87,5	89,5	93,7	96,6	98,8	93,9	88,7
Cat4	95	97,2	92,7	92,9	94,7	93,2	90,1	86,5
Cat5	0	0	0	0	0	0	0	0
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Total Lwim

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	96,1102	91,4995	90,2995	90,744	95,5772	93,3825	86,6311	78,7174
Cat1	104,381	100,098	102,428	101,443	102,985	99,0878	92,6118	86,8915
Cat2	107,778	104,144	105,31	105,592	104,963	100,203	95,1996	89,3916
Cat3	88	87,5	89,5	93,7	96,6	98,8	93,9	88,7
Cat4	95	97,2	92,7	92,9	94,7	93,2	90,1	86,5
Cat5	3,0103	3,0103	3,0103	3,0103	3,0103	3,0103	3,0103	3,0103
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Total Lwwqline_im factor

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451
Cat1	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451
Cat2	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451
Cat3	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451
Cat4	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451
Cat5	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451	-48,451
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Total result

	63	125	250	500	1.000	2.000	4.000	8.000
Cat0	47,6592	43,0485	41,8485	42,293	47,1262	44,9315	38,1801	30,2664
Cat1	55,9297	51,6475	53,9769	52,9918	54,5342	50,6368	44,1609	38,4405
Cat2	59,327	55,6931	56,8589	57,1412	56,5123	51,7524	46,7486	40,9406
Cat3	39,549	39,049	41,049	45,249	48,149	50,349	45,449	40,249
Cat4	46,549	48,749	44,249	44,449	46,249	44,749	41,649	38,049
Cat5	-45,4407	-45,4407	-45,4407	-45,4407	-45,4407	-45,4407	-45,4407	-45,4407
Cat6	0	0	0	0	0	0	0	0
Cat7	0	0	0	0	0	0	0	0
Cat8	0	0	0	0	0	0	0	0
Cat9	0	0	0	0	0	0	0	0

Cumulated total result

	63	125	250	500	1.000	2.000	4.000	8.000

61,3375 57,9258 58,9744 59,0048 59,4991 56,3833 51,127 45,7329