Note

Project Develop and implement harmonised noise assessment methods

Concerns Source Modules Rail – Programming guide

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1. Introduction

This report provides the programming guide for the implementation of the source model for railway noise as described in Chapter IV 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 single railway noise source, for a given type of source (point, line or area) and direction. The source model will only describe the calculation of the source power for a given period and direction.

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:

- Emitted sound power
- Correction on the sound emitted in each direction, relative to the source's direction.

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_Rail_Track.xml
- B. example of the file CNOSSOS_Rail_Vehicles.xml
- C. example of the file CNOSSOS_Rail_Input.xml
- D. example of the file CNOSSOS_Rail_Output.xml
- E. example of the file CNOSSOS_Rail_Output.csv



2. Look-up tables

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

- CNOSSOS_Rail_Track.xml
 contains the track-based look-up tables needed for the calculation of the emission of railway
 noise.
- CNOSSOS_Rail_Vehicles.xml
 contains the vehicle-related look-up tables needed for the calculation of the emission of
 railway noise.

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

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

- Decimal separator a point ('.')
- Date format yyyy-MM-dd
- Spectral information is given as
 - o 8 values for octave information (63 Hz .. 8 kHz)
 - o 24 values for 1/3 octave information (50 Hz .. 10 kHz)
 - o values are separated by 1 or more spaces.
- Wave length information is given as
 - o 32 values (100 cm .. 0.08 cm)
 - Wavelengths:

100.000	80.000	63.000	50.000	40.000	31.500	25.000	20.000
16.000	12.500	10.000	8.000	6.300	5.000	4.000	3.150
2.500	2.000	1.600	1.250	1.000	0.800	0.630	0.500
0.400	0.315	0.250	0.200	0.160	0.125	0.100	0.080

values are separated by 1 or more spaces.

The following sections describe the contents of each file. The table is formatted as follows.

- The first column lists the element or attribute name, preceded by its parent element's name:
 - o Names in **bold** represent an XML element which can contain other elements.
 - o Names in *italics* represent an XML attribute.
 - Names neither bold or italic represent an XML element containing a simple value.
- The second column lists the data type:
 - Data type "decimal" means a floating-point number.
 - Data type "list of decimals" is used for spectral information. The values are separated by one or more whitespace characters (space, tab, or line-break).
- The third column lists the allowed number of occurrences:
 - o "1" means the item is required, and must occur exactly once.
 - o "1..n" means the item is required, and may occur more than once.
 - o "0..1" means the item is optional, but if present may not occur more than once.
 - °0..n" means the item is optional, but if present may occur more than once.
- The fourth column provides a description of the item.



2.1 CNOSSOS_Rail_Track.xml

Name	Data Type	Count	Description
TrackParameters	71.0	1	
. TrackParameters> version	string	1	Version of this file format.
. Date	date	1	Catalogue date (informative)
. TrackParameters>TrackTransfer		1	
TrackTransfer> Track	·	1n	
Track> ID	integer	1	
Track> Default	boolean	01	(informative)
Track> Reference	string	01	(informative)
Track> Description	string	01	(informative)
Track> SleeperCode	string	01	(informative)
Track> RailpadCode	string	01	(informative)
Track> Values	list of decimals	1	Values are given per 1/3 octave band (50 Hz 10 kHz)
. TrackParameters>StructureTra	nsfer	1	
StructureTransfer>Structure		1n	
Structure> ID	integer	1	
Structure> Default	boolean	01	(informative)
Structure> Reference	string	01	(informative)
Structure> Description	string	01	(informative)
Structure> Values	list of decimals	1	Values are given per 1/3 octave band (50 Hz 10 kHz)
. TrackParameters>RailRoughness		1	
RailRoughness>Rail		1n	
Rail› ID	integer	1	
Rail› Default	boolean	01	(informative)
Rail> Reference	string	01	(informative)
Rail> Description	string	01	(informative)
Rail> RoughnessCode	string	01	(informative)
Rail> Values	list of decimals	1	Values are given per wavelength (100 cm 0.08 cm)
. TrackParameters>ImpactNoise		1	
ImpactNoise>Impact		1n	
Impact> ID	integer	1	
Impact> Default	boolean	01	(informative)
Impact> Reference	string	01	(informative)
Impact> Description	string	01	(informative)
Impact> JointDensity	integer	1	Number of joints per 100 metres
Impact> JointDensityDescription	string	01	(informative)
Impact> RoughnessCode	string	01	(informative)
Impact> Values	list of decimals	1	Values are given per wavelength (100 cm 0.08 cm)
. TrackParameters>BridgeConstant		1	
BridgeConstant> Bridge		1n	
Bridge> ID	integer	1	
Bridge> Default	boolean	01	(informative)
Bridge> Reference	string	01	(informative)
Bridge> Description	string	01	(informative)
Bridge> Value	integer	1	ΔLbridge [dB]



2.2 CNOSSOS_Rail_Vehicles.xml

Data Type		Count	Description
RailParameters		1	
. RailParameters> version	string	1	Version of this file format.
. Date	date	1	Catalogue date (informative)
. r0 decimal		1	Reference value for roughness in µm
. h1	decimal	1	First source height in m
. h2	decimal	1	Second source height in m
. RailParameters>VehicleDefinit	ion	1	This section contains the definitions of the
			supported train vehicles. If a vehicle is not defined in this section, it is not calculated.
VehicleDefinition> Vehicle		1n	
Vehicle> ID	string	1	unique identification of the vehicle
Vehicle> Code	string	01	Vehicle Code short description (informative)
Vehicle> Description	string	01	Vehicle Type long description (informative)
Vehicle> P_mech	integer	01	Power in kW (informative)
Vehicle> V_max	integer	01	Max speed in km/h (informative)
Vehicle> Weight	decimal	01	in metric tonnes
Vehicle> Length	decimal	01	in metres
Vehicle> Axles	integer	1	number of axles
Vehicle> WheelDiameter	integer (or empty)	01	in mm (informative)
Vehicle> WheelDiameterCode	value from list:	01	(informative)
Vehicle> WheelMeasure	(empty) large(>800mm) medium (500 to 800mm) small(<500mm) value from list:	01	Wheel measures (informative)
Vehicle> BrakeCode	other screens none value from list:	0 1	Brake type (informative)
	castIronBlock compositeBlock disk		
Vehicle> Load	integer (or empty)	01	load in kN (informative)
Vehicle> RefTransfer	string	1	Reference to "VehicleTransfer"
Vehicle> RefContact	string	1	Reference to "ContactFilter"
Vehicle> RefRoughness	string	1	Reference to "WheelRoughness"
Vehicle> RefTraction	string	1	Reference to "TractionNoise"
Vehicle> RefAerodynamic string		1	Reference to "AerodynamicNoise"
. RailParameters> VehicleTransfer		1	
VehicleTransfer> Transfer			
Transfer> ID string			unique identification
Transfer> Default	boolean	01	(informative)





Transfer> Reference	string	01	(informative); examples: IMAGINE, European Commission. Member State, Local User, CNOSSOS
Transfer> Description	string	01	(informative)
Transfer> WheelDiameter	integer (or empty)	01	in mm (informative)
Transfer> WheelDiameterCode	value from list:	01	(informative)
	(empty) large(>800mm) medium (500 to 800mm) small(<500mm)		
Transfer> Values	list of decimals	1	Values are given per 1/3 octave band (50 Hz 10 kHz)
. RailParameters>WheelRoughn	iess	1	
WheelRoughness>Roughness		1n	
Roughness> ID	string	1	unique identification
Roughness> Default	boolean	01	(informative)
Roughness> Reference	string	01	(informative); examples: IMAGINE, European Commission. Member State, Local User, CNOSSOS
Roughness> Description	string	01	(informative)
Roughness> Values	list of decimals	1	Values are given per wave length (100cm 0.04cm)
. RailParameters>ContactFilter			
ContactFilter>Contact		1n	
Contact> ID	string	1	unique identification
Contact> Default	boolean	01	(informative)
Contact> Reference	string	01	(informative); examples: IMAGINE, European Commission. Member State, Local User, CNOSSOS
Contact> Description	string	01	(informative)
Contact> Load	integer (or empty)	01	Load in kN (informative)
Contact> WheelDiameter	integer (or empty)	01	in mm (informative)
Contact> WheelDiameterCode	value from list:	01	(informative)
	(empty) large(>800mm) medium (500 to 800mm) small(<500mm)		
Contact> Values	list of decimals	1	Values are given per 1/3 octave band (50 Hz 10 kHz)
. RailParameters> TractionNoise	<u> </u>	1	
TractionNoise>Traction		1n	
Traction> ID	string	1	unique identification
Traction> Default	boolean	01	(informative)
Traction> Reference	string	01	(informative); examples: IMAGINE, European Commission. Member State, Local User, CNOSSOS
Traction> Description	string	01	(informative)
Traction> Source		1n	



A (source at 0.5 m) B (source at 4.0 m) Source> Constant				
B (source at 4.0 m)	Source> Type	value from list:	1	source (height) to which these values apply
Source> Accelerating list of decimals 1 Source> Decelerating list of decimals 1 Source> Decelerating list of decimals 1 Source> Idling list of decimals 1 NOTE 1: values should be Sound Power per vehicle for use directly in Equ IV-8 NOTE 2: values were converted from SF SWL using method in IMAGINE. 1 AerodynamicNoise> Aerodynamic Aerodynamic> ID string 1 unique identification Aerodynamic> Default boolean 01 (informative) Aerodynamic> Reference string 01 (informative); examples: IMAGINE, Euro Commission. Member State, Local User, CNOSSOS Aerodynamic> Description string 01 (informative) Aerodynamic> Source 1n Source> Type value from list: 1 source (height) to which these values applied to which aerodynamic noise is 1 Source> V0 decimal 1 Speed at which aerodynamic noise is		'		
Source> Decelerating list of decimals 1 Source> Decelerating list of decimals 1 Source> Idling list of decimals 1 Source> Idling list of decimals 1 Source> Idling list of decimals 1 RailParameters> AerodynamicNoise 1 AerodynamicNoise> Aerodynamic 1n	Source> Constant	list of decimals	1	Values are given per 1/3 octave band (50 Hz
Source Decelerating list of decimals 1 per vehicle for use directly in Equ IV-8 NOTE 2: values were converted from SF SWL using method in IMAGINE. RailParameters>AerodynamicNoise 1 AerodynamicNoise>Aerodynamic 1	Source> Accelerating	list of decimals	1	1
Source> Idling list of decimals 1 NOTE 2: values were converted from SF SWL using method in IMAGINE. RailParameters> AerodynamicNoise 1n Aerodynamic> ID string 1 unique identification Aerodynamic> Default boolean 01 (informative) Aerodynamic> Reference string 01 (informative); examples: IMAGINE, Euro Commission. Member State, Local User, CNOSSOS Aerodynamic> Description string 01 (informative) Aerodynamic> Source 1n Source> Type value from list: 1 source (height) to which these values at A (source at 4.0 m) Source> VO decimal 1 Speed at which aerodynamic noise is	Source> Decelerating	list of decimals	1	
AerodynamicNoise>Aerodynamic Aerodynamic> ID Aerodynamic> Default Aerodynamic> Default Aerodynamic> Reference string 01 (informative) (informative); examples: IMAGINE, Eurocommission. Member State, Local User, CNOSSOS Aerodynamic> Description Aerodynamic> Source 1n Source> Type value from list: 1 source (height) to which these values approximate to which aerodynamic noise is	Source> Idling	list of decimals	1	NOTE 2: values were converted from SPL to
Aerodynamic> ID string 1 unique identification Aerodynamic> Default boolean 01 (informative) Aerodynamic> Reference string 01 (informative); examples: IMAGINE, Eurocommission. Member State, Local User, CNOSSOS Aerodynamic> Description string 01 (informative) Aerodynamic> Source 1n Source> Type value from list: 1 source (height) to which these values and A (source at 0.5 m) B (source at 4.0 m) Source> V0 decimal 1 Speed at which aerodynamic noise is	. RailParameters>Aerodynamic	Noise	1	
Aerodynamic> Default boolean 01 (informative) Aerodynamic> Reference string 01 (informative); examples: IMAGINE, Euro Commission. Member State, Local User, CNOSSOS Aerodynamic> Description string 01 (informative) Aerodynamic> Source 1n Source> Type value from list: 1 source (height) to which these values a A (source at 0.5 m) B (source at 4.0 m) Source> V0 decimal 1 Speed at which aerodynamic noise is	AerodynamicNoise>Aerodyna	amic	1n	
Aerodynamic> Reference string 01 (informative); examples: IMAGINE, Eurocommission. Member State, Local User, CNOSSOS Aerodynamic> Description string 01 (informative) Aerodynamic> Source 1n Source> Type value from list: 1 source (height) to which these values at A (source at 0.5 m) B (source at 4.0 m) Source> V0 decimal 1 Speed at which aerodynamic noise is	Aerodynamic> ID	string	1	unique identification
Commission. Member State, Local User, CNOSSOS Aerodynamic> Description string 01 (informative) Aerodynamic> Source 1n Source> Type value from list: 1 source (height) to which these values at A (source at 0.5 m) B (source at 4.0 m) Source> V0 decimal 1 Speed at which aerodynamic noise is	Aerodynamic> Default	boolean	01	(informative)
Aerodynamic>Source 1 source> Type value from list: 1 source (height) to which these values a A (source at 0.5 m) B (source at 4.0 m) c Source> V0 decimal 1 Speed at which aerodynamic noise is	Aerodynamic> Reference	string	01	(informative); examples: IMAGINE, European Commission. Member State, Local User, CNOSSOS
Source Type value from list: A (source at 0.5 m) B (source at 4.0 m) decimal 1 source (height) to which these values at 1 source (height) to which these values at 1 source at 2.5 m) Speed at which aerodynamic noise is	Aerodynamic> Description	string	01	(informative)
A (source at 0.5 m) B (source at 4.0 m) Source> V0 decimal 1 Speed at which aerodynamic noise is	Aerodynamic> Source		1n	
B (source at 4.0 m) Source> V0 decimal 1 Speed at which aerodynamic noise is	Source> Type		1	source (height) to which these values apply
		B (source at 4.0 m)		
	Source> V0	decimal	1	
	Source> Values	list of decimals	1	Lw0(v0) = source power for rolling noise at speed v0. Values are given per 1/3 octave band (50 Hz 10 kHz)
Source> Alpha decimal 1 Coefficient for aerodynamic noise	Source> Alpha	decimal	1	Coefficient for aerodynamic noise



3. User data

All user input is located in a single XML file: CNOSSOS_Rail_Input.xml. (The file name itself is variable).

The format used is self-explanatory, and the delivered files contain comments for clarification.

The following table describes the contents of the file. The table is formatted as specified in chapter 2.

Data Type	Count	Description
Duta Typo		
string		Version of this file format.
boolean	1	whether or not to create a tab-separated file with the intermediate results
decimal	1	The reference time in hours
value from list:	1	The source to calculate
A (source at 0.5 m) B (source at 4.0 m)		
boolean	1	whether to calculate idling (true) or moving (false) vehicles
1	1	The track-specific parameters to be used
decimal	1	the length of the track section [m]
integer	1	the vertical angle [°]
integer	1	the horizontal angle [°]
integer	1	references /TrackParameters/TrackTransfer/Track with the given ID, in CNOSSOS_Rail_Track.xml
integer	1	references /TrackParameters/StructureTransfer/Structure with the given ID, in CNOSSOS_Rail_Track.xml
integer	1	references /TrackParameters/RailRoughness/Rail with the given ID, in CNOSSOS_Rail_Track.xml
integer	1	references /TrackParameters/ImpactNoise/Impact with the given ID, in CNOSSOS_Rail_Track.xml
decimal	1	the radius R of the curve [m]
integer	1	references /TrackParameters/BridgeConstant/Bridge with the given ID, in CNOSSOS_Rail_Track.xml
s	1	The types of vehicle circulating on the specified track section.
	1n	·
integer		references /RailParameters/VehicleDefinition/Vehicle with the given ID, in CNOSSOS_Rail_Vehicles.xml. Also used for VehicleTransfer, WheelRoughness, ContactFilter, TractionNoise and AerodynamicNoise in that same file.
string	1	
value from list:	1	the running condition of railway vehicles. Note that when Idling (see above) is set to 'true', only idling vehicles will be taken into
	decimal value from list: A (source at 0.5 m) B (source at 4.0 m) boolean decimal integer integer integer integer integer s integer	boolean

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	accelerating decelerating idling		account. Vice versa, when Idling is set to 'false', only moving vehicles will be taken into account.
Vehicle> Q	integer		the number of vehicles on the track section; not used when RunningCondition = "idling"
Vehicle> v	integer	01	the speed of the vehicles [km/h]; not used when RunningCondition = "idling"
Vehicle> IdlingTime	integer	01	the idling time of the vehicle [hours]; only used when RunningCondition = "idling"



4. Calculated source power

All calculated source power is output to the given XML file name (e.g. CNOSSOS_Industry_Output.xml).

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

The following table describes the contents of the file. The table is formatted as specified in chapter 2.

Name	Data Type	Count	Description
CNOSSOS_SourcePower			
. CNOSSOS_SourcePower> version	string	1	
. CNOSSOS_SourcePower>source	·	1n	
h	decimal	1	Source height in m
Lw	list of decimals	1	Sound power definitions
Lw> frequencyWeighting	value from list:	1	
	LIN dBA		
Lw> measurementType	value from list:	1	
	Unknown FreeField HemiSpherical		
Lw> sourceType	value from list:	1	
	PointSource LineSource AreaSource		

If the value "Test" in the input file is set to "true" all intermediate results will be written to a file named after the output file, except with the extension '.csv'; e.g. 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 | -industry> infile outfile

- <-road | -rail | -industry> describes which source model will be used.
- **infile** contains the location and name of the XML input file. Its 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). Its format is described in chapter 4. If no location is specified, the location is assumed to be the current folder.

The source module DLLs (CNOSSOS_RAILNOISE_DLL.dll, CNOSSOS_ROADNOISE_DLL.dll and CNOSSOS_INDUSTRIAL_NOISE_DLL.dll) and the corresponding look-up tables (CNOSSOS_Rail_Track. CNOSSOS_Road_Params.xml, CNOSSOS_Road_Surfaces.xml and CNOSSOS_Industry_Catalogue.xml) need to be located in the same folder as the command line utility "CNOSSOS_DLL_CONSOLE.exe".



6. Interface of "CNOSSOS_RAILNOISE_DLL.dll"

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

- InitDLL
- CalcFromFile
- ReleaseDLL.

6.1 InitDLL

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

Usage:

```
int InitDLL();
```

Parameters:

_

Return values:

0 in case of succes

-1 in case of failure

6.2 CalcFromFile

Reads the rail data from a user specified input file. Calculates the corresponding rail section 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 rail data

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

Return values:

0 in case of success

-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_Rail_Track.xml

```
<?xml version="1.0" ?>
<TrackParameters version="V1.0">
   <!--
       CNOSSOS_Rail_Track.XML contains all look-up tables needed for the
       calculation of the emission of rail noise which are related to the
       track.
       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.
        - Information concerning wavelengths
           - is given as 32 values (100 cm .. 0.08 cm)
           - Wavelengths:
               100.000 80.000 63.000 50.000
                                                   40.000
                                                            31.500
                                                                     25.000
                20.000 16.000 12.500 10.000
                                                    8.000
                                                             6.300
                                                                      5.000
                 4.000
                        3.150
                                 2.500
                                           2.000
                                                    1.600
                                                             1.250
                                                                      1.000
                 0.800
                        0.630
                                  0.500
                                           0.400
                                                    0.315
                                                             0.250
                                                                      0.200
                 0.160
                         0.125
                                  0.100
                                           0.080
        - Values are separated by 1 or more spaces.
    <Date>2014-04-27 <!-- Catalogue date (informative) -->
    <TrackTransfer>
       <1--
           - ID = unique identification of the track transfer function
           - Default = true or false (informative)
           - Reference = (informative), examples:
                           IMAGINE
                           European Commission
                           Member State
                           Local User
                           CNOSSOS
           - Description = (informative)
           - SleeperCode = (informative), options
                           Concrete bi-block
                           Concrete mono-block
                           Steel
                           Wood
                           Steel zigzag
           - RailpadCode = (informative), options
```



```
Stiff
                Medium
                Soft
   - Values are given per 1/3 octave band (50 Hz .. 10 kHz)
   - NOTE 1: Values should be Sound Power Level per axle for use directly in Equ IV-7
   - NOTE 2: Values were converted from SPL to SWL using method in IMAGINE
-->
<Track ID="0"
     Default="true"
     Reference=""
     Description="empty track transfer function"
     SleeperCode=""
     RailpadCode=""
     />
<Track ID="1"
     Default="true"
     Reference="IMAGINE"
     Description="min"
     SleeperCode=""
     RailpadCode=""
     />
<Track ID="2"
     Default="true"
     Reference="IMAGINE"
     Description="max"
     SleeperCode=""
     RailpadCode=""
     />
<Track ID="3"
     Default="true"
     Reference="IMAGINE"
     Description="Mono-block sleeper on soft rail pad"
     SleeperCode="Concrete mono-block"
     RailpadCode="Soft"
     Values="53.3 59.3 67.2 75.9 79.2 81.8 84.2 88.6 91.0 94.5 97.0 99.2 104.0 107.1 108.3 108.5 109.7 110.0 110.0 110.0 110.3 110.0 110.1 110.6"
/>
<Track ID="4"
     Default="true"
     Reference="IMAGINE"
     Description="Mono-block sleeper on medium stiffness rail pad"
     SleeperCode="Concrete mono-block"
      RailpadCode="Medium"
```



```
Values="50.9 57.8 66.5 76.8 80.9 83.3 85.8 90.0 91.6 93.9 95.6 97.4 101.7 104.4 106.0 106.8 108.3 108.9 109.1 109.4 109.9 109.9 110.3 111.0"
   />
   <Track ID="5"
          Default="true"
          Reference="IMAGINE"
          Description="Mono-block on hard rail pad"
          SleeperCode="Concrete mono-block"
          RailpadCode="Hard"
          Values="50.1 57.2 66.3 77.2 81.6 84.0 86.5 90.7 92.1 94.3 95.8 97.0 100.3 102.5 104.2 105.4 107.1 107.9 108.2 108.7 109.4 109.7 110.4 111.4"
   <Track ID="6"
          Default="true"
          Reference="IMAGINE"
          Description="Bi-block sleeper on soft rail pad"
          SleeperCode="Concrete bi-block"
          RailpadCode="Soft"
          Values="50.9 56.6 64.3 72.3 75.4 78.5 81.8 86.6 89.1 91.9 94.5 97.5 104.0 107.9 108.9 108.8 109.8 110.2 110.1 110.1 110.3 109.9 110.0 110.4"
   <Track ID="7"
          Default="true"
          Reference="IMAGINE"
          Description="Bi-block sleeper on medium stiffness rail pad"
          SleeperCode="Concrete bi-block"
          RailpadCode="Medium"
          Values="50.0 56.1 64.1 72.5 75.8 79.1 83.6 88.7 89.6 89.7 90.6 93.8 100.6 104.7 106.3 107.1 108.8 109.3 109.4 109.7 110.0 109.8 110.0 110.5"
   />
   <Track ID="8"
          Default="true"
          Reference="IMAGINE"
          Description="Bi-block sleeper on hard rail pad"
          SleeperCode="Concrete bi-block"
          RailpadCode="Hard"
          Values="49.8 55.9 64.0 72.5 75.9 79.4 84.4 89.7 90.2 90.2 90.8 93.1 97.9 101.1 103.4 105.4 107.7 108.5 108.7 109.1 109.6 109.6 109.9 110.6"
   <Track ID="9"
          Default="true"
          Reference="IMAGINE"
          Description="Wooden sleepers"
          SleeperCode="Wood"
          RailpadCode=""
          Values="44.0 51.0 59.9 70.8 75.1 76.9 77.2 80.9 85.3 92.5 97.0 98.7 102.8 105.4 106.5 106.4 107.5 108.1 108.4 108.7 109.1 109.1 109.5 110.2"
   />
</TrackTransfer>
<StructureTransfer>
```



```
- ID = unique identification of the superstructure transfer function
      - Default = true or false (informative)
      - Reference = (informative), examples:
                  IMAGINE
                  European Commission
                  Member State
                  Local User
                  CNOSSOS
      - Description = (informative)
      - Values are given per 1/3 octave band (50 Hz .. 10 kHz)
      - NOTE: Values should be Sound Power Level per axle for use directly in Equ IV-9
   <Structure ID="0"
           Default="true"
           Reference=""
           Description="empty superstructure transfer function"
           />
   <Structure ID="1"</pre>
           Default="true"
           Reference="IMAGINE"
           Description="min"
           />
   <Structure ID="2"</pre>
           Default="true"
           Reference="IMAGINE"
           Description="max"
           />
   <Structure ID="3"</pre>
           Default="true"
           Reference="CNOSSOS"
           Description="CNOSSOS-EU Default"
           />
</StructureTransfer>
<RailRoughness>
  <!--
      - ID = unique identification of the rail roughness
      - Default = true or false (informative)
      - Reference = (informative), examples:
                  IMAGINE
```



```
European Commission
               Member State
               Local User
               CNOSSOS
   - Description = (informative)
   - RougnessCode = (informative), options
               Not maintained and bad condition
               Well maintained and very smooth
               Normally maintained smooth
               Not well maintained
   - Values are given per wave length (100 cm .. 0.08 cm)
-->
<Rail ID="0"
    Default="true"
    Reference=""
    Description="empty rail roughness"
    RoughnessCode=""
    />
<Rail ID="1"
    Default="true"
    Reference="IMAGINE"
    Description="min"
    RoughnessCode="Well maintained and very smooth"
    />
<Rail ID="2"
    Default="true"
    Reference="IMAGINE"
    Description="max"
    RoughnessCode="Not maintained and bad condition"
    />
<Rail ID="3"
    Default="true"
    Reference="IMAGINE"
    Description="EN ISO 3095 2013"
    RoughnessCode="Well maintained and very smooth"
    Values="17.1 17.1 17.1 17.1 17.1 15 13 11 9 7 4.9 2.9 0.9 -1.1 -3.2 -5 -5.6 -6.2 -6.8 -7.4 -8 -8.6 -9.2 -9.8 -10.4 -11 -11.6 -12.2 -12.8 -13.4 -14 -14"
<Rail ID="4"
    Default="true"
    Reference="IMAGINE"
    Description="Average network"
    RoughnessCode="Normally maintained smooth"
```



```
Values="11 11 11 11 11 10 9 8 7 6 5 4 3 2 1 0 -1 -2 -3 -4 -5 -6 -7 -8 -9 -10 -11 -12 -13 -14 -15 -15"
   />
</RailRoughness>
<ImpactNoise>
   <!--
       - ID = unique identification of the record
       - Default = true or false (informative)
       - Reference = (informative), examples:
                      IMAGINE
                      European Commission
                      Member State
                      Local User
                      CNOSSOS
       - Description = (informative)
       - RoughnessCode = (informative), options
                      Not maintained and bad condition
                      Well maintained and very smooth
                      Normally maintained smooth
                      Not well maintained
       - JointDensity = Joint density is given per 100 meters, options
                      3
                      0
       - JointDensityDescription = (informative), options
                      2 switches/joints/crossings/100m
                      >2 switches/joints/crossings/100m
                      none
                      single switch/joint/crossing/100m
       - Values are given per wave length (100 cm .. 0.08 cm)
   <Impact ID="0"</pre>
           Default="true"
           Reference=""
           Description="empty impact noise"
           RoughnessCode=""
           JointDensity=""
           JointDensityDescription=""
           />
   <Impact ID="1"</pre>
           Default="true"
           Reference="IMAGINE"
           Description="min"
```



```
RoughnessCode="Normally maintained smooth"
          JointDensity="0"
          JointDensityDescription="none"
          />
   <Impact ID="2"</pre>
          Default="true"
          Reference="IMAGINE"
          Description="max"
          RoughnessCode="Normally maintained smooth"
          JointDensity="3"
          JointDensityDescription="more than 2 switches/joints/crossings/100m"
          />
   <Impact ID="3"</pre>
          Default="true"
          Reference="IMAGINE"
          Description="Single switch/joint/crossing/100m"
          RoughnessCode="Normally maintained smooth"
          JointDensity="1"
          JointDensityDescription="single switch/joint/crossing/100m"
          Values="22.4 22.4 22.4 23.8 24.7 24.7 23.4 21.7 20.2 20.4 20.8 20.9 19.8 18 16 13 10 6 1 -4 -11 -16.5 -18.5 -21 -22.5 -24.7 -26.6 -28.6 -30.6 -32.6 -34 -34"
   />
</ImpactNoise>
<BridgeConstant>
   <!--
      - ID = unique identification of the record
      - Default = true or false (informative)
      - Reference = (informative), examples:
                    IMAGINE
                    European Commission
                   Member State
                    Local User
                    CNOSSOS
      - Description = (informative)
      - Value = Overall value for the bridge correction
   <Bridge ID="0"
          Default="true"
          Reference=""
          Description="empty bridge constant"
          Value="0"
   />
   <Bridge ID="1"
```



```
Default="true"
                Reference="IMAGINE"
                Description="min"
                Value="0"
        <Bridge ID="2"</pre>
                Default="true"
                Reference="IMAGINE"
                Description="max"
                Value="9"
        />
        <Bridge ID="3"</pre>
                Default="true"
                Reference="CNOSSOS"
                Description="Predominantly concrete or masonry bridges with any trackform"
                Value="1"
        />
        <Bridge ID="4"
                Default="true"
                Reference="CNOSSOS"
                Description="Predominantly steel bridges with ballasted track"
                Value="4"
        />
    </BridgeConstant>
</TrackParameters>
```



Annex B -- example of the file CNOSSOS_Rail_Vehicles.xml

```
<?xml version="1.0" ?>
<RailParameters version="V1.0">
   <!--
       CNOSSOS Rail Vehicles.XML contains all look-up tables needed for the
       calculation of the emission of rail 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.
        - Information concerning wavelengths
           - is given as 32 values (100 cm .. 0.08 cm)
           - Wavelengths:
               100.000 80.000 63.000 50.000 40.000
                                                            31.500
                                                                     25.000
                20.000 16.000 12.500 10.000
                                                    8.000
                                                             6.300
                                                                      5.000
                 4.000
                        3.150
                                 2.500
                                          2.000
                                                    1.600
                                                             1,250
                                                                      1.000
                 0.800
                          0.630
                                   0.500
                                           0.400
                                                    0.315
                                                             0.250
                                                                      0.200
                 0.160
                         0.125
                                   0.100
                                           0.080
        - Values are separated by 1 or more spaces.
    <Date>2014-04-27 <!-- Catalogue date (informative)</pre>
    <r0>1</r0>
                           <!-- Reference value for roughness in µm -->
    <h1>0.5</h1>
                           <!-- Height of source A in m (bogie)
                           <!-- Height of source B in m (pantograph) -->
    <h2>4.0</h2>
    <VehicleDefinition>
       <1--
           This section contains the definitions of the supported train vehicles.
           If a vehicle is not defined in this section, it is not calculated.
           - ID = unique identification of the vehicle
           - Code = Vehicle Code short description (informative)
           - Description = Vehicle Type long description (informative)
           - P mech = Power in kW (informative)
           - V max = Max speed in kmh (informative)
           - Weight = Weight in tonnes (informative)
           - Length = Length in m
           - Axles = no of axles
           - WheelDiameter = in mm (informative)
           - WheelDiameterCode = diameter in mm (large, medium, small) (informative)
           - WheelMeasure = Wheel measures (none, wheelDampers, screens, other) (informative)
           - BrakeCode = Brake type (castIronBlock, compositeBlock, disk) (informative)
```



```
- Load = load in kN (informative)
    - RefTransfer = Reference to table "VehicleTransfer"
    - RefContact = Reference to table "ContactFilter"
    - RefRoughness = Reference to table "WheelRoughness"
    - RefTraction = Reference to table "TractionNoise"
    - RefAerodynamic = Reference to table "AeroDynamicNoise"
-->
<Vehicle ID= "0"
         Code=""
         Description="Empty vehicle definition"
         P mech="0"
         V max="0"
         Weight="0"
         Length="0"
         Axles="0"
         WheelDiameter="0"
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load=""
         RefTransfer="0"
         RefContact="0"
         RefRoughness="0"
         RefTraction="0"
         RefAerodynamic="0"
/>
<Vehicle ID= "1"</pre>
         Code="1"
         Description="Example vehicle 1"
         P mech="830"
         V max="120"
         Weight="68"
         Length="14.89"
         Axles="4"
         WheelDiameter="360"
         WheelDiameterCode="small"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load="17"
         RefTransfer="1"
         RefContact="1"
         RefRoughness="1"
         RefTraction="1"
         RefAerodynamic="3"
/>
```



```
<Vehicle ID= "2"
         Code="2"
         Description="Example vehicle 2"
         P mech="640"
         V max="140"
         Weight="93.8"
         Length="52.34"
         Axles="4"
         WheelDiameter="920"
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load="23"
         RefTransfer="2"
         RefContact="2"
         RefRoughness="2"
         RefTraction="2"
         RefAerodynamic="3"
/>
<Vehicle ID= "3"</pre>
         Code="SNCF BB66400"
         Description="Diesel loc"
         P mech="830"
         V max="120"
         Weight="70"
         Length="14.97"
         Axles="4"
         WheelDiameter="1100"
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load="18"
         RefTransfer="6"
         RefContact="6"
         RefRoughness="3"
         RefTraction="3"
         RefAerodynamic="3"
<Vehicle ID= "4"
         Code="SNCF CC72000"
         Description="Diesel loc"
         P mech="2250"
         V max="160"
         Weight="114"
         Length="20"
```



```
Axles="4"
         WheelDiameter="1140"
        WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load="29"
         RefTransfer="6"
         RefContact="6"
         RefRoughness="3"
         RefTraction="4"
         RefAerodynamic="3"
<Vehicle ID= "5"
         Code="RENFE Dloco"
         Description="Diesel loc"
         P mech="1155"
         V max="125"
         Weight="80"
         Length="19.5"
         Axles="4"
         WheelDiameter="1000"
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load="20"
         RefTransfer="3"
         RefContact="6"
         RefRoughness="3"
        RefTraction="5"
         RefAerodynamic="3"
/>
<Vehicle ID= "6"
         Code="NS6400 Dloco"
         Description="Diesel loc"
         P_mech="1180"
         V max="125"
         Weight="82"
         Length="14.4"
         Axles="4"
         WheelDiameter="1000"
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load="21"
         RefTransfer="3"
```



```
RefContact="6"
         RefRoughness="3"
         RefTraction="6"
         RefAerodynamic="3"
/>
<Vehicle ID= "7"</pre>
         Code="TKOJ JT42CWR/Class66"
         Description="Diesel loc"
         P mech="2200"
         V_max="121"
         Weight="126"
         Length="20.1"
         Axles="6"
         WheelDiameter="1120"
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CompositeBlock-k-block"
         Load="21"
         RefTransfer="6"
         RefContact="6"
         RefRoughness="4"
         RefTraction="7"
         RefAerodynamic="3"
/>
<Vehicle ID= "8"
         Code="NS DM 90 DMU"
         Description="DMU"
         P_mech="640"
         V max="140"
         Weight="94"
         Length="52.3"
         Axles="4"
         WheelDiameter="920"
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="Disc-Non-Tread"
         Load="24"
         RefTransfer="3"
         RefContact="6"
         RefRoughness="5"
         RefTraction="8"
         RefAerodynamic="3"
<Vehicle ID= "9"
         Code="NS 1700 Eloco"
```



```
Description="ELoco"
         P_mech="4560"
         V max="140"
         Weight="86"
         Length="17.6"
         Axles="4"
         WheelDiameter="1260"
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load="22"
         RefTransfer="6"
         RefContact="6"
         RefRoughness="3"
         RefTraction="9"
         RefAerodynamic="3"
/>
<Vehicle ID= "10</pre>
         Code="NS mat 64 EMU"
         Description="EMU"
         P_mech="508"
         V max="140"
         Weight="82"
         Length="52.1"
         Axles="4"
         WheelDiameter="920"
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load="21"
         RefTransfer="3"
         RefContact="6"
         RefRoughness="3"
         RefTraction="10"
         RefAerodynamic="3"
/>
<Vehicle ID= "11</pre>
         Code="RMR Cat 1"
         Description="Block braked passenger"
         P mech=""
         V_max=""
         Weight=""
         Length="26"
         Axles="4"
         WheelDiameter=""
```



```
WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="3"
         RefTraction="10"
         RefAerodynamic="3"
<Vehicle ID= "12
         Code="RMR Cat 2 (a)"
         Description="ICM-III, ICR trailer, SNCF passenger, TEE"
         P mech=""
         V max=""
         Weight=""
         Length="26"
         Axles="4"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="3"
         RefTraction="10"
         RefAerodynamic="3"
/>
<Vehicle ID= "13</pre>
         Code="RMR Cat 2 (b)"
         Description="ICR 1700, DDM-1 1800 loco, Belgian locos"
         P mech=""
         V_max=""
         Weight=""
         Length="18"
         Axles="4"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load=""
         RefTransfer="6"
         RefContact="6"
         RefRoughness="3"
```



```
RefTraction="9"
         RefAerodynamic="3"
/>
<Vehicle ID= "14</pre>
         Code= "RMR Cat 3"
         Description="Disc braked passenger trains"
         P mech=""
         V_max=""
         Weight=""
         Length="26"
         Axles="4"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="Disc-Non-Tread"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="5"
         RefTraction="10"
         RefAerodynamic="3"
<Vehicle ID= "15
         Code= "RMR Cat 4"
         Description="Block braked freight trains variable 1 and no. axles"
         P_mech=""
         V_max=""
         Weight=""
         Length="n"
         Axles="n"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="3"
         RefTraction="0"
         RefAerodynamic="3"
/>
<Vehicle ID= "16</pre>
         Code= "RMR Cat 5 (a)"
         Description="DE1, DE2, DE3"
         P mech=""
```



```
V_max=""
         Weight=""
        Length="25"
         Axles="4"
        WheelDiameter=""
        WheelDiameterCode="large"
        WheelMeasure="none"
         BrakeCode="CastIronBlock"
        Load=""
         RefTransfer="3"
        RefContact="6"
        RefRoughness="3"
        RefTraction="8"
        RefAerodynamic="3"
/>
<Vehicle ID= "17
        Code= "RMR Cat 5 (b)"
         Description="2200, 2300 locos"
        P mech=""
        V_max=""
        Weight=""
        Length="14"
        Axles="4"
        WheelDiameter=""
        WheelDiameterCode="large"
        WheelMeasure="none"
        BrakeCode="CastIronBlock"
        Load=""
        RefTransfer="3"
        RefContact="6"
        RefRoughness="3"
        RefTraction="3"
        RefAerodynamic="3"
/>
<Vehicle ID= "18
        Code= "RMR Cat 5 (c)"
        Description="2400, 2500 locos"
        P_mech=""
        V max=""
        Weight=""
        Length="13"
         Axles="4"
        WheelDiameter=""
        WheelDiameterCode="large"
        WheelMeasure="none"
```



```
BrakeCode="CastIronBlock"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="3"
         RefTraction="3"
         RefAerodynamic="3"
/>
<Vehicle ID= "19</pre>
         Code= "RMR Cat 6"
         Description="Diesel trains with disc brakes"
         P mech=""
         V_max=""
         Weight=""
         Length="26"
         Axles="4"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="Disc-Non-Tread"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="5"
         RefTraction="8"
         RefAerodynamic="3"
/>
<Vehicle ID= "20
         Code= "RMR Cat 7"
         Description="Disc braked urban subway and rapid tram trains"
         P mech=""
         V_max=""
         Weight=""
         Length="15"
         Axles="3"
         WheelDiameter=""
         WheelDiameterCode="medium"
         WheelMeasure="none"
         BrakeCode="Disc-Non-Tread"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="5"
         RefTraction="10"
         RefAerodynamic="3"
```



```
<Vehicle ID= "21</pre>
         Code= "RMR Cat 8 (a)"
         Description="ICM IV, IRM"
         P mech=""
         V_max=""
         Weight=""
         Length="26"
         Axles="4"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="Disc-Non-Tread"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="5"
         RefTraction="10"
         RefAerodynamic="3"
<Vehicle ID= "22
         Code= "RMR Cat 8 (b)"
         Description="DDM 2/3"
         P mech=""
         V max=""
         Weight=""
         Length="26"
         Axles="4"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="3"
         RefTraction="10"
         RefAerodynamic="3"
/>
<Vehicle ID= "23</pre>
         Code= "RMR Cat 9 (a)"
         Description="TGV PBA type, power car"
         P mech=""
         V max=""
         Weight=""
```



```
Length="20"
         Axles="4"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="CastIronBlock"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="3"
         RefTraction="9"
         RefAerodynamic="3"
/>
<Vehicle ID= "24
         Code= "RMR Cat 9 (b)"
         Description="TGV PBA type, trailer car adjacent to power car"
         P mech=""
         V max=""
         Weight=""
         Length="20"
         Axles="3"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="Disc-Non-Tread"
         Load=""
         RefTransfer="3"
         RefContact="6"
         RefRoughness="5"
         RefTraction="0"
         RefAerodynamic="3"
<Vehicle ID= "25</pre>
         Code= "RMR Cat 9 (c)"
         Description="TGV PBA types, other trailer cars"
         P mech=""
         V max=""
         Weight=""
         Length="20"
         Axles="2"
         WheelDiameter=""
         WheelDiameterCode="large"
         WheelMeasure="none"
         BrakeCode="Disc-Non-Tread"
         Load=""
```



```
RefTransfer="3"
             RefContact="6"
            RefRoughness="5"
            RefTraction="0"
            RefAerodynamic="3"
   />
   <Vehicle ID= "26
            Code= "RMR Cat 10"
             Description="ICE-3 type assuming no wheel dampers"
             P_mech=""
            V max=""
             Weight=""
            Length="25"
             Axles="4"
            WheelDiameter=""
            WheelDiameterCode="large"
            WheelMeasure="none"
             BrakeCode="Disc-Non-Tread"
            Load=""
             RefTransfer="3"
            RefContact="6"
            RefRoughness="5"
            RefTraction="10"
            RefAerodynamic="3"
   />
</VehicleDefinition>
<VehicleTransfer>
   <!--
       - ID = unique identification of the vehicle transfer function
       - Default = true or false (informative)
       - Reference = (informative), examples:
                        IMAGINE
                        European Commission
                       Member State
                        Local User
                        CNOSSOS
       - Description = (informative)
        - WheelDiameter = diameter in mm(informative)
        - WheelDiameterCode = wheel diameter code (informative), options:
                        large
                        medium
                        small
        - Values are given per 1/3 octave band (50 Hz .. 10 kHz)
```



```
<Transfer ID="0"
        Default="true"
        Reference=""
        Description="empty vehicle transfer function"
        WheelDiameter=""
        WheelDiameterCode=""
        />
<Transfer ID="1"
        Default="true"
        Reference="IMAGINE"
        Description="min"
        WheelDiameter=""
        WheelDiameterCode=""
        />
<Transfer ID="2"</pre>
        Default="true"
        Reference="IMAGINE"
        Description="max"
        WheelDiameter=""
        WheelDiameterCode=""
        />
<Transfer ID="3"</pre>
        Default="true"
        Reference="IMAGINE"
        Description="Wheel with diameter 920 mm, no measure"
        WheelDiameter="920"
        WheelDiameterCode="large"
        Values="75.4 77.3 81.1 84.1 83.3 84.3 86.0 90.1 89.8 89.0 88.8 90.4 92.4 94.9 100.4 104.6 109.6 114.9 115.0 115.0 115.5 115.6 116.0 116.7"
<Transfer ID="4"
        Default="true"
        Reference="IMAGINE"
        Description="Wheel with diameter 840 mm, no measure"
        WheelDiameter="840"
        WheelDiameterCode="large"
        Values="75.4 77.3 81.1 84.1 82.8 83.3 84.1 86.9 87.9 89.9 90.9 91.5 91.5 93.0 98.7 101.6 107.6 111.9 114.5 114.5 115.0 115.1 115.5 116.2"
<Transfer ID="5"</pre>
        Default="true"
        Reference="IMAGINE"
        Description="Wheel with diameter 680 mm, no measure"
        WheelDiameter="680"
```



```
WheelDiameterCode="medium"
             Values="75.4 77.3 81.1 84.1 82.8 83.3 83.9 86.3 88.0 92.2 93.9 92.5 90.9 90.4 93.2 93.5 99.6 104.9 108.0 111.0 111.5 111.6 112.0 112.7"
   />
   <Transfer ID="6"</pre>
             Default="true"
             Reference="IMAGINE"
             Description="Wheel with diameter 1200 mm, no measure"
             WheelDiameter="1200"
             WheelDiameterCode="large"
             Values="75.4 77.3 81.1 84.1 82.8 83.3 84.5 90.4 90.4 89.9 90.1 91.3 91.5 93.6 100.5 104.6 115.6 115.9 116.0 116.0 116.5 116.6 117.0 117.7"
   />
</VehicleTransfer>
<ContactFilter>
   <!--
       - ID = unique identification of the contact filter
       - Default = true or false (informative)
       - Reference = (informative), examples:
                      IMAGINE
                      European Commission
                      Member State
                      Local User
                      CNOSSOS
       - Description = (informative)
       - Load = Load in kN (informative)
       - WheelDiameter = diameter in mm(informative)
       - WheelDiameterCode = wheel diameter code (informative), options:
                      large
                      medium
                      small
       - Values are given per 1/3 octave band (50 Hz .. 10 kHz)
   <Contact ID="0"
            Default="true"
            Reference=""
            Description="empty contact filter"
            Load=""
            WheelDiameter=""
            WheelDiameterCode=""
            />
   <Contact ID="1"
            Default="true"
            Reference="IMAGINE"
            Description="min"
```



```
Load=""
       WheelDiameter=""
       WheelDiameterCode=""
       />
<Contact ID="2"
       Default="true"
       Reference="IMAGINE"
       Description="max"
       Load=""
       WheelDiameter=""
       WheelDiameterCode=""
       />
<Contact ID="3"
       Default="true"
       Reference="IMAGINE"
       Description="Axle load 50kN - wheel diameter 360mm"
       Load="50"
       WheelDiameter="360"
       WheelDiameterCode="small"
       Values="0 0 0 0 0 0 0 0 0 0 0 0 0 -0.2 -0.5 -1.2 -2 -3 -4.3 -6 -8.4 -12 -11.5 -12.5 -13.9 -14.7 -15.6 -16.6 -17.6 -18.6 -19.6 -20.6"
/>
<Contact ID="4"
       Default="true"
       Reference="IMAGINE"
       Description="Axle load 50kN - wheel diameter 680mm"
       Load="50"
       WheelDiameter="680"
       WheelDiameterCode="medium"
       Values="0 0 0 0 0 0 0 0 0 0 0 0 0 0 -0.2 -0.4 -0.7 -1.5 -2.8 -4.5 -7 -10.3 -12 -12.5 -13.5 -16 -16 -16.5 -17 -18 -19 -20.2 -21.2 -22.2"
<Contact ID="5"
       Default="true"
       Reference="IMAGINE"
       Description="Axle load 50kN - wheel diameter 920mm"
       Load="50"
       WheelDiameter="920"
       WheelDiameterCode="large"
       Values="0 0 0 0 0 0 0 0 0 0 0 0 0 -0.2 -0.5 -0.9 -1.6 -2.5 -3.8 -5.8 -8.5 -12 -12.6 -13.5 -14.5 -16 -16.5 -17.7 -18.6 -19.6 -20.6 -21.6 -22.6"
/>
<Contact ID="6"
       Default="true"
       Reference="IMAGINE"
        Description="Axle load 25kN - wheel diameter 920mm"
```



```
Load="25"
          WheelDiameter="920"
          WheelDiameterCode="large"
          Values="0 0 0 0 0 0 0 0 0 0 0 0 0 -0.2 -0.5 -0.9 -1.6 -2.5 -3.8 -5.8 -8.5 -11.4 -12 -13.5 -14.5 -16 -16.5 -17.7 -18.6 -19.6 -20.6 -21.6 -22.6 -23.6"
   <Contact ID="7"
          Default="true"
          Reference="IMAGINE"
          Description="Axle load 100kN - wheel diameter 920mm"
          Load="100"
          WheelDiameter="920"
          WheelDiameterCode="large"
          Values="0 0 0 0 0 0 0 0 0 0 0 0 0 -0.2 -0.6 -1.3 -2.2 -3.7 -5.8 -9 -11.5 -12.5 -12 -14 -15 -17 -18.4 -19.5 -20.5 -21.5 -22.4 -23.5 -24.5 -25.4"
   />
</ContactFilter>
<WheelRoughness>
   <!--
      - ID = unique identification of the wheel roughness
      - Default = true or false (informative)
      - Reference = (informative), examples:
                    IMAGINE
                    European Commission
                    Member State
                    Local User
                    CNOSSOS
      - Description = (informative)
      - Values are given per wave length (100cm .. 0.08cm)
   -->
   <Roughness ID="0"
            Default="TRUE"
            Reference=""
            Description="empty wheel roughness"
            <Roughness ID="1"
            Default="TRUE"
            Reference="IMAGINE"
            Description="min"
            />
   <Roughness ID="2"
            Default="TRUE"
            Reference="IMAGINE"
            Description="max"
```



```
/>
            <Roughness ID="3"
                                               Default="TRUE"
                                              Reference="IMAGINE"
                                              Description="standard freight cast iron tread"
                                               <Roughness ID="4"
                                               Default="TRUE"
                                               Reference="IMAGINE"
                                              Description="freight with k-block composite"
                                              Values="-3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.95 -3.9
            <Roughness ID="5"
                                              Default="TRUE"
                                              Reference="IMAGINE"
                                              Description="passenger disc brake"
                                              Values="-5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.93 -5.9
           />
</WheelRoughness>
<TractionNoise>
            <!--
                        - ID = unique identification of the traction noise
                        - Default = true or false (informative)
                         - Reference = (informative), examples:
                                                                           IMAGINE
                                                                           European Commission
                                                                          Member State
                                                                          Local User
                                                                           CNOSSOS
                         - Description = (informative)
                         - Type = A: values for source located at bogie height (0.5m)
                                                     B: values for source located at pantograph height (4.0m)
                         - Constant = Traction noise for constant speed
                         - Accelerating = Traction noise for accelerating vehicles
                         - Decelerating = Traction noise for decelerating vehicles
                         - Idling = Traction noise for idling vehicles
                         - Values are given per 1/3 octave band (50 Hz .. 10 kHz)
                         - NOTE 1: Values should be Sound Power Level per vehicle for use directly in Equ IV-8
                         - NOTE 2: Values were converted from SPL to SWL using method in IMAGINE
            <Traction ID="0"
                                           Default="true"
```



```
Reference=""
 Description="empty traction">
<Source Type="A"
  />
<Source Type="B"</pre>
  />
</Traction>
<Traction ID="1"
 Default="true"
 Reference="IMAGINE"
 Description="min">
<Source Type="A"
  />
<Source Type="B"
  />
</Traction>
<Traction ID="2"
 Default="true"
 Reference="IMAGINE"
 Description="max">
<Source Type="A"
  />
<Source Type="B"</pre>
```



```
/>
</Traction>
<Traction ID="3"
          Default="true"
          Reference="IMAGINE"
          Description="Diesel locomotive (c. 800kW)">
    <Source Type="A"
            Constant="98.86 94.76 92.56 94.56 92.76 92.76 92.76 92.96 94.76 94.56 95.66 95.56 98.56 95.16 95.06 95.06 94.06 94.06 99.36 92.46 89.46 86.96 84.06 81.46 79.16"
            Accelerating="96.86 102.76 100.56 97.56 95.76 95.76 95.76 97.56 98.66 98.56 102.56 98.16 98.06 97.06 97.06 97.36 105.46 97.46 94.96 92.06 89.46 87.16"
            Decelerating="87.86 83.76 86.56 88.56 86.76 86.76 86.76 86.96 88.76 88.56 89.66 89.56 93.56 89.16 89.06 89.06 88.06 88.06 88.06 80.46 77.96 75.06 72.46 70.16"
            Idling="87.86 83.76 86.56 88.56 86.76 86.76 86.76 86.76 88.56 89.66 89.56 93.56 89.16 89.06 89.06 88.06 88.06 83.46 80.46 77.96 75.06 72.46 70.16"
   />
    <Source Type="B"
            Constant="103.16 99.96 95.46 93.96 93.26 93.56 92.86 92.66 92.36 92.76 92.76 92.76 92.66 92.86 93.06 93.16 98.26 91.46 88.66 85.96 83.36 80.86 78.66"
            Accelerating="101.16 107.96 103.46 96.96 96.26 96.56 95.86 95.66 95.36 95.76 95.76 100.76 95.66 95.96 95.86 96.06 96.16 96.26 104.46 96.66 93.96 91.36 88.86 86.66"
            Decelerating="92.16 88.96 89.46 87.96 87.26 87.56 86.86 86.66 86.36 86.76 86.76 91.76 86.66 86.96 86.86 87.06 87.16 85.26 82.46 79.66 76.96 74.36 71.86 69.66"
            Idling="92.16 88.96 89.46 87.96 87.26 87.56 86.86 86.86 86.66 86.36 86.76 86.76 91.76 86.66 86.96 86.86 87.06 87.16 85.26 82.46 79.66 76.96 74.36 71.86 69.66"
   />
</Traction>
<Traction ID="4"
          Default="true"
          Reference="IMAGINE"
          Description="Diesel locomotive (c. 2200kW)">
    <Source Type="A"
            Constant="99.41 107.31 103.11 102.11 99.31 99.31 99.51 101.31 101.11 102.21 102.11 101.11 101.71 101.61 99.31 96.01 93.71 101.91 89.51 87.11 90.51 31.41 81.21 79.61"
            Accelerating="99.41 102.31 113.11 107.11 103.31 102.31 102.51 104.31 104.11 105.21 105.11 104.11 104.71 104.61 102.31 99.01 96.71 94.71 105.01 90.11 88.31 93.61 84.21 82.61"
            Decelerating="89.41 90.31 103.11 95.11 93.31 93.31 93.51 95.31 95.11 96.21 96.11 95.11 95.71 95.61 93.31 96.61 87.71 85.71 87.01 81.11 79.31 77.11 75.21 73.61"
            Idling="89.41 90.31 103.11 95.11 93.31 93.31 93.51 95.31 95.11 96.21 96.11 95.11 95.71 95.61 93.31 96.61 87.71 85.71 87.01 81.11 79.31 77.11 75.21 73.61"
   />
    <Source Type="B"
            Constant="103.71 112.51 106.01 101.51 99.81 100.11 99.41 99.21 98.91 99.31 99.31 99.31 99.51 97.11 95.01 92.81 100.81 88.51 86.31 89.51 30.71 80.61 79.11"
            Accelerating="103.71 107.51 116.01 106.51 103.81 103.11 102.41 102.21 101.91 102.31 102.31 102.31 102.21 102.51 100.11 98.01 95.81 93.61 104.01 89.31 87.31 92.91 83.61 82.11"
            Decelerating="93.71 95.51 106.01 94.51 93.81 94.11 93.41 93.21 92.91 93.31 93.31 93.31 93.21 93.51 91.11 95.61 86.81 84.61 86.01 80.31 78.31 76.41 74.61 73.11"
            Idling="93.71 95.51 106.01 94.51 93.81 94.11 93.41 93.21 92.91 93.31 93.31 93.31 93.21 93.51 91.11 95.61 86.81 84.61 86.01 80.31 78.31 76.41 74.61 73.11"
   />
</Traction>
<Traction ID="5"
          Default="true"
          Reference="IMAGINE"
          Description="Diesel loc/RENFE Dloco/1155kW">
    <Source Type="A"
            Constant="99.3 103.2 109.0 114.0 109.2 106.2 103.4 105.2 105.0 106.1 106.0 105.0 105.6 104.5 102.9 99.4 96.8 94.6 92.1 89.6 87.5 85.1 82.9 81.1"
            Accelerating="99.3 103.2 109.0 114.0 115.2 112.2 109.4 108.2 108.0 109.1 109.0 108.0 108.6 108.5 107.5 104.9 102.4 100.1 97.7 95.1 93.1 90.6 88.5 86.6"
```



```
Decelerating="99.3 103.2 103.0 102.0 97.2 97.2 97.4 99.2 99.0 100.1 100.0 98.0 97.0 94.4 91.8 88.3 85.7 83.5 81.0 78.5 76.4 74.0 71.9 70.1"
           Idling="99.3 103.2 103.0 102.0 97.2 97.2 97.4 99.2 99.0 100.1 100.0 98.0 97.0 94.4 91.8 88.3 85.7 83.5 81.0 78.5 76.4 74.0 71.9 70.1"
    <Source Type="B"
            Constant="103.6 108.4 111.9 113.4 109.7 107.0 103.3 103.1 102.8 103.2 103.2 103.2 103.1 102.4 100.7 98.4 95.9 93.5 91.1 88.8 86.5 84.4 82.3 80.6"
            Accelerating="103.6 108.4 111.9 113.4 115.7 113.0 109.3 106.1 105.8 106.2 106.2 106.2 106.1 106.4 105.3 103.9 101.5 99.0 96.7 94.3 92.1 89.9 87.9 86.1"
           Decelerating="103.6 108.4 105.9 101.4 97.7 98.0 97.3 97.1 96.8 97.2 97.2 96.2 94.5 92.3 89.6 87.3 84.8 82.4 80.0 77.7 75.4 73.3 71.3 69.6"
           Idling="103.6 108.4 105.9 101.4 97.7 98.0 97.3 97.1 96.8 97.2 97.2 96.2 94.5 92.3 89.6 87.3 84.8 82.4 80.0 77.7 75.4 73.3 71.3 69.6"
   />
</Traction>
<Traction ID="6"
          Default="true"
          Reference="IMAGINE"
          Description="Diesel loc/NS6400 Dloco/1180kW">
    <Source Type="A"
            Constant="101.0 89.9 92.7 104.7 94.9 87.9 83.1 84.9 84.7 85.8 85.7 84.7 85.3 85.2 85.2 84.2 84.2 84.5 81.6 78.6 76.1 73.2 70.6 68.3"
           Accelerating="99.0 104.9 95.7 97.7 105.9 97.9 91.1 87.9 87.7 88.8 88.7 87.7 88.3 88.2 88.2 87.2 87.2 87.5 87.6 84.6 82.1 79.2 76.6 74.3"
           Decelerating="83.0 93.9 88.7 83.7 76.9 76.9 77.1 78.9 78.7 79.8 79.7 78.7 79.3 79.2 79.2 78.2 75.2 72.5 69.6 66.6 64.1 61.2 58.6 56.3"
            Idling="83.0 93.9 88.7 83.7 76.9 76.9 77.1 78.9 78.7 79.8 79.7 78.7 79.3 79.2 79.2 78.2 75.2 72.5 69.6 66.6 64.1 61.2 58.6 56.3"
    />
    <Source Type="B"</pre>
            Constant="105.3 95.1 95.6 104.1 95.4 88.7 83.0 82.8 82.5 82.9 82.9 82.9 82.8 83.1 83.0 83.2 83.3 83.4 80.6 77.8 75.1 72.5 70.0 67.8"
           Accelerating="103.3 110.1 98.6 97.1 106.4 98.7 91.0 85.8 85.5 85.9 85.9 85.9 85.8 86.1 86.0 86.2 86.3 86.4 86.6 83.8 81.1 78.5 76.0 73.8"
           Decelerating="87.3 99.1 91.6 83.1 77.4 77.7 77.0 76.8 76.5 76.9 76.9 76.9 76.8 77.1 77.0 77.2 74.3 71.4 68.6 65.8 63.1 60.5 58.0 55.8"
           Idling="87.3 99.1 91.6 83.1 77.4 77.7 77.0 76.8 76.5 76.9 76.9 76.9 76.8 77.1 77.0 77.2 74.3 71.4 68.6 65.8 63.1 60.5 58.0 55.8"
   />
</Traction>
<Traction ID="7"
          Default="true"
          Reference="IMAGINE"
          Description="Diesel loc/TKOJ JT42CWR/Class66/2200kW">
    <Source Type="A"
           Constant="95.4 104.3 102.1 99.1 93.3 96.3 96.5 98.3 98.1 99.2 99.1 98.1 98.7 96.6 94.6 91.6 89.6 87.9 86.0 84.0 82.5 80.6 79.0 77.7"
           Accelerating="91.4 99.3 110.1 107.1 100.3 96.3 99.5 101.3 101.1 102.2 102.1 101.1 101.7 101.6 99.6 96.6 94.6 92.9 91.0 89.0 87.5 85.6 84.0 82.7"
           Decelerating="92.4 88.3 87.1 92.1 90.3 90.3 90.5 92.3 92.1 93.2 93.1 90.1 88.7 86.6 84.6 81.6 79.6 77.9 76.0 74.0 72.5 70.6 69.0 67.7"
           Idling="92.4 88.3 87.1 92.1 90.3 90.3 90.5 92.3 92.1 93.2 93.1 90.1 88.7 86.6 84.6 81.6 79.6 77.9 76.0 74.0 72.5 70.6 69.0 67.7"
    />
    <Source Type="B"
            Constant="99.7 109.5 105.0 98.5 93.8 97.1 96.4 96.2 95.9 96.3 96.3 96.3 96.2 94.5 92.4 90.6 88.7 86.8 85.0 83.2 81.5 79.9 78.4 77.2"
           Accelerating="95.7 104.5 113.0 106.5 100.8 97.1 99.4 99.2 98.9 99.3 99.3 99.3 99.5 97.4 95.6 93.7 91.8 90.0 88.2 86.5 84.9 83.4 82.2"
           Decelerating="96.7 93.5 90.0 91.5 90.8 91.1 90.4 90.2 89.9 90.3 90.3 88.3 86.2 84.5 82.4 80.6 78.7 76.8 75.0 73.2 71.5 69.9 68.4 67.2"
            Idling="96.7 93.5 90.0 91.5 90.8 91.1 90.4 90.2 89.9 90.3 90.3 88.3 86.2 84.5 82.4 80.6 78.7 76.8 75.0 73.2 71.5 69.9 68.4 67.2"
    />
</Traction>
<Traction ID="8"
```



```
Default="true"
          Reference="IMAGINE"
          Description="Diesel multiple unit">
    <Source Type="A"
             Constant="82.58 82.48 89.28 90.28 93.48 99.48 98.68 95.48 90.28 91.38 91.28 90.28 90.88 91.78 92.78 92.78 90.78 88.08 85.18 83.18 81.68 78.78 76.18 73.88"
             Accelerating="80.58 86.48 88.28 94.28 91.48 96.48 102.68 103.48 98.28 94.38 94.28 93.88 93.78 94.78 94.78 95.78 94.08 91.18 88.18 86.68 84.78 82.18 79.88"
            Decelerating="78.58 79.48 88.28 84.28 82.48 82.48 82.48 88.68 84.48 84.28 85.38 85.28 84.28 90.88 84.78 83.78 83.78 84.08 82.18 79.18 75.68 71.78 68.18 64.88"
            Idling="78.58 79.48 88.28 84.28 82.48 82.48 88.68 84.48 84.28 85.38 85.28 84.28 90.88 84.78 84.78 83.78 83.78 84.08 82.18 79.18 75.68 71.78 68.18 64.88"
    />
    <Source Type="B"
             Constant="86.88 87.68 92.18 89.68 93.98 100.28 98.58 93.38 88.08 88.48 88.48 88.48 88.48 89.68 90.58 91.78 89.88 86.98 84.18 82.38 80.68 78.08 75.58 73.38"
            Accelerating="84.88 91.68 91.18 93.68 91.98 97.28 102.58 101.38 96.08 91.48 91.48 91.48 91.38 91.68 92.58 93.78 94.88 92.98 90.18 87.38 85.68 84.08 81.58 79.38"
            Decelerating="82.88 84.68 91.18 83.68 82.98 83.28 88.58 82.38 82.08 82.48 82.48 82.48 82.48 82.58 82.78 82.88 82.98 81.18 78.38 74.68 71.08 67.58 64.38"
             Idling="82.88 84.68 91.18 83.68 82.98 83.28 88.58 82.38 82.08 82.48 82.48 82.48 82.48 82.58 82.78 82.88 82.98 81.18 78.38 74.68 71.08 67.58 64.38"
    />
</Traction>
<Traction ID="9"
          Default="true"
          Reference="IMAGINE"
          Description="Electric locomotive">
    <Source Type="A"
             Constant="87.86 90.76 91.56 94.56 94.76 96.76 103.96 100.76 99.56 101.66 98.56 95.56 95.16 96.06 92.06 89.06 87.06 85.36 83.46 81.46 79.96 78.06 76.46 75.16"
            Accelerating="87.86 94.76 91.56 94.76 94.76 96.76 107.96 100.76 99.56 105.66 98.56 95.56 95.16 100.06 92.06 89.06 87.06 85.36 83.46 81.46 79.96 78.06 76.46 75.16"
            Decelerating="78.86 84.76 82.56 85.56 85.76 87.76 97.96 91.76 90.56 95.66 89.56 86.56 86.16 90.06 83.06 80.06 78.06 76.36 74.46 72.46 70.96 69.06 67.46 66.16"
             Idling="78.86 84.76 82.56 85.56 85.76 87.76 97.96 91.76 90.56 95.66 89.56 86.56 86.16 90.06 83.06 80.06 78.06 76.36 74.46 72.46 70.96 69.06 67.46 66.16"
    />
    <Source Type="B"
             Constant="92.16 95.96 94.46 93.96 95.26 97.56 103.86 98.66 97.36 98.76 95.76 93.76 92.66 93.96 89.86 88.06 86.16 84.26 82.46 80.66 78.96 77.36 75.86 74.66"
            Accelerating="92.16 99.96 94.46 93.96 95.26 97.56 107.86 98.66 97.36 102.76 95.76 93.76 92.66 97.96 89.86 88.06 86.16 84.26 82.46 80.66 78.96 77.36 75.86 74.66"
            Decelerating="83.16 89.96 85.46 84.96 86.26 88.56 97.86 89.66 88.36 92.76 86.76 84.76 83.66 87.96 80.86 79.06 77.16 75.26 73.46 71.66 69.96 68.36 66.86 65.66"
             Idling="83.16 89.96 85.46 84.96 86.26 88.56 97.86 89.66 88.36 92.76 86.76 84.76 83.66 87.96 80.86 79.06 77.16 75.26 73.46 71.66 69.96 68.36 66.86 65.66"
</Traction>
<Traction ID="10"
          Default="true"
          Reference="IMAGINE"
          Description="Electric multiple unit ">
    <Source Type="A"
             Constant="80.55 81.45 80.55 82.25 80.05 79.75 79.65 96.45 80.55 81.35 97.25 79.55 79.85 86.75 81.75 82.75 80.75 78.05 75.15 72.15 69.65 66.75 64.15 61.85"
            Accelerating="80.55 81.45 80.55 82.25 94.45 79.75 79.65 96.45 80.55 81.35 80.85 79.55 79.85 86.75 81.75 82.75 80.75 78.05 75.15 72.15 69.65 66.75 64.15 61.85"
            Decelerating="80.55 81.45 80.55 82.25 80.05 79.75 79.65 81.05 80.55 81.35 80.85 79.55 79.85 86.75 81.75 82.75 80.75 78.05 75.15 72.15 69.65 66.75 64.15 61.85"
             Idling="80.55 81.45 80.55 82.25 80.05 79.75 79.65 81.05 80.55 81.35 80.85 79.55 79.85 86.75 81.75 82.75 80.75 78.05 75.15 72.15 69.65 66.75 64.15 61.85"
    <Source Type="B"
             Constant="84.85 86.65 83.45 81.65 80.55 80.55 79.55 94.35 78.35 78.45 94.45 77.75 77.35 84.65 79.55 81.75 79.85 76.95 74.15 71.35 68.65 66.05 63.55 61.35"
```



```
Accelerating="84.85 86.65 83.45 81.65 94.95 80.55 79.55 94.35 78.35 78.45 78.05 77.75 77.35 84.65 79.55 81.75 79.85 76.95 74.15 71.35 68.65 66.05 63.55 61.35"
               Decelerating="84.85 86.65 83.45 81.65 80.55 80.55 79.55 78.95 78.95 78.45 78.05 77.75 77.35 84.65 79.55 81.75 79.85 76.95 74.15 71.35 68.65 66.05 63.55 61.35"
               Idling="84.85 86.65 83.45 81.65 80.55 80.55 79.55 78.95 78.95 78.45 78.05 77.75 77.35 84.65 79.55 81.75 79.85 76.95 74.15 71.35 68.65 66.05 63.55 61.35"
       />
   </Traction>
</TractionNoise>
<AerodynamicNoise>
   <!--
       - ID = unique identification of the aerodynamic noise
       - Default = true or false (informative)
       - Reference = (informative), examples:
                       IMAGINE
                       European Commission
                      Member State
                       Local User
                       CNOSSOS
       - Description = (informative)
       - Type = A: values for source located at bogie height (0.5m)
                B: values for source located at pantograph height (4.0m)
       - V0 = Speed at which the given values are determined
       - Alpha =
       - Values are given per 1/3 octave band (50 Hz .. 10 kHz)
   <Aerodynamic ID="0"
                Default="true"
                Reference=""
                Description="empty aerodynamic noise">
       <Source Type="A"
               V0="0"
               Alpha="0"
       />
       <Source Type="B"
               V0="0"
               Alpha="0"
       />
   </Aerodynamic>
   <Aerodynamic ID="1"
                Default="true"
                Reference="IMAGINE"
                Description="min">
       <Source Type="A"
               V0="0"
```



```
Alpha="0"
        />
        <Source Type="B"
              Alpha="0"
        />
     </Aerodynamic>
     <Aerodynamic ID="2"
              Default="true"
              Reference="IMAGINE"
              Description="max">
        <Source Type="A"
              V0="400"
              Alpha="100"
        <Source Type="B"
              Alpha="100"
        />
     </Aerodynamic>
     <Aerodynamic ID="3"
              Default="true"
              Reference="IMAGINE"
              Description="Aerodynamic noise given at 300 km/h">
        <Source Type="A"
              Values="112.6 113.2 115.7 117.4 115.3 115.0 114.9 116.4 115.9 116.3 116.2 115.2 115.8 115.7 115.7 114.7 114.7 115.0 114.5 113.1 112.1 110.6 109.6 108.8"
              Alpha="50"
        />
        <Source Type="B"
              V0="300"
              Values="36.7 38.5 39.0 37.5 36.8 37.1 36.4 36.2 35.9 36.3 36.3 36.3 36.2 36.5 36.4 105.2 110.3 110.4 105.6 37.2 37.5 37.9 38.4 39.2"
              Alpha="50"
        />
     </Aerodynamic>
  </AerodynamicNoise>
</RailParameters>
```



Annex C -- example of the file CNOSSOS_Rail_Input.xml

```
<?xml version="1.0"?>
<CNOSSOS Rail Input version="X1.0">
    <Test>true</Test>
                            <!-- whether or not to create a tab-separated file with the intermediate
                                 results
    <Tref>12</Tref>
                           <!--
                                   The reference time [hours] -->
                           <!--
                                   the source to calculate; A(0.5m) or B(4.0m) -->
    <Source>A</Source>
                                   whether to calculate idling (true) or moving (false) vehicles -->
    <Idling>false</Idling> <!--
    <!--
        The track-specific parameters to be used:
       SectionLength
                           the length of the track section [m]
       VerticalAnale
                           the vertical angle [°]
                           the horizontal angle [°]
       HorizontalAngle
                           references /TrackParameters/TrackTransfer/Track with the given ID, in CNOSSOS_Rail_Track.xml
       TrackTransferID
       StructureTransferID references /TrackParameters/StructureTransfer/Structure with the given ID, in CNOSSOS Rail Track.xml
       RailRoughnessID
                           references /TrackParameters/RailRoughness/Rail with the given ID, in CNOSSOS Rail Track.xml
       ImpactNoiseID
                           references /TrackParameters/ImpactNoise/Impact with the given ID, in CNOSSOS Rail Track.xml
        CurveRadius
                            the radius R of the curve [m]
        BridgeConstantID
                           references /TrackParameters/BridgeConstant/Bridge with the given ID, in CNOSSOS Rail Track.xml
    <Track SectionLength="50"</pre>
            VerticalAngle="0"
            HorizontalAngle="90"
            TrackTransferID="1"
            StructureTransferID="1"
            RailRoughnessID="1"
            ImpactNoiseID="1"
           CurveRadius="250"
            BridgeConstantID="1"
            />
    <Vehicles>
        <!--
            The types of vehicle circulating on the specific track section.
            For each vehicle type, specify the following parameters:
                               references /RailParameters/VehicleDefinition/Vehicle with the given
            Ref
                                ID, in CNOSSOS Rail Vehicles.xml
                               This also references the following parameters as required:
                               /RailParameters/VehicleTransfer/Vehicle
                               /RailParameters/WheelRoughness/Vehicle
```



```
/RailParameters/ContactFilter/Vehicle
                                /RailParameters/TractionNoise/Vehicle
                                /RailParameters/AerodynamicNoise/Vehicle
            Description
                                a description for the user
            RunningCondition
                                the running condition of the railway vehicle.
                                Possible values: constant, accelerating, decelerating, idling
                                Note that when Idling (see above) is set to 'true', only idling
                                vehicles will be taken into account. Vice versa, when Idling is
                                 set to 'false', only moving vehicles will be taken into account.
                                the number of vehicles on the track section
            Q
                                the speed of the vehicles [km/h]
            ν
                                the idling time of the vehicle [hours]; only used when
            IdlingTime
                                 RunningCondition = "idling"
        <Vehicle Ref="1"
                Description=""
                 RunningCondition="accelerating"
                0="1"
                v="250"
                IdlingTime="1"
        <Vehicle Ref="2"
                Description=""
                Q="1"
                 v="200"
                IdlingTime="1"
                RunningCondition="constant"
                />
        <Vehicle Ref="2"
                Description=""
                 0="10"
                v="250"
                IdlingTime="4"
                 RunningCondition="idling"
    </Vehicles>
</CNOSSOS_Rail_Input>
```



Annex D -- example of the file CNOSSOS_Rail_Output.xml



Annex E -- example of the file CNOSSOS_Industry_Output.csv

Sep= Tref: Source: Idling:	12 A no ta:	LineSour	ce																	
Vertical	-	0																		
Horizonta		90																		
Section : Curve rac	-	50 250																		
04110 14	4140	200																		
[Hz]			63	125	250	500	1.000	2.000	4.000	8.000										
Lw	A	PointSou:		58,9042	61,8512	65,7076	65,4438	72,6234	85,3693	84,4143	80,6348									
Lw Lw	A B	LineSour PointSou		39,0046 40,9969	39,8615 38,0003	41,2514 40,9969	45,0035 38,0003	45,4897 40,9969	55,9174 38,0003	57,8646 33,5354	53,5764 22,1508									
LW	В	LineSour		25,9882	26,7536	26,6018	26,0299	25,9381	29,5134	25,5254	25,4468									
[Hz]			50	63	80	100	125	160	200	250	315	400	500	630	800	1.000	1.250	1.600	2.000	2.500
LwEqTdir	3.150	4.000 PointSou	5.000	6.300 53,0314	8.000 54,022	10.000 55,0996	56,0086	57,0039	58,0002	59,5264	61,5099	61,4902	59,6736	59,5951	62,2114	63,4649	65,772	70,898	75,4413	
nwediair	79,5954	83,3882		79,2981	76,7499	76,3725	75,8434	75,31	30,0002	33,3204	01,3099	01,4902	33,0730	39,3931	02,2114	03,4043	03,112	70,090	73,4413	
LwEqTdir		LineSour		34,0407	34,1882	34,4608	34,8194	35,0489	35,384	35,6538	36,3217	37,3047	39,2016	40,7404	40,5951	39,0928	39,3189	42,7264	45,697	
	50,1372	53,9841		53,7637	51,3825	48,9993	49,0752	48,2998												
LwEqTdir		PointSou:		33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	
LwEqTdir	33,2291	33,2291 LineSour		28,2291 21,4742	24,2291 21,0012	20,2291 21,1623	16,2291 21,1079	12,2291 21,5424	23,0501	22,6853	21,5424	21,1079	21,1079	21,1079	21,5453	21,1079	21,1623	21,2298	21,3133	
nwediair	25,8262		20,8077	20,7448	20,7095	20,6856	20,6736	20,6676	23,0301	22,0000	21, 3424	21,1079	21,1079	21,1079	21,3433	21,1079	21,1023	21,2290	21,3133	
	VEHICL																			
Q:	condition: 1	accelerat	ting	LineSour	ce															
v:	250																			
LwEqLine		F1 0010	33,7701	33,86	34,0633	34,361	34,4772	34,6298	34,7551	35,0404	36,3359	38,8178	40,48	40,0895	38,0925	37,5597	39,7693	40,3439	45,4147	
Lw0dir	49,372 A	51,0812	52,4074 87,7495	50,0859 87,8394	46,7108 88,0427	47,1616 88,3404	46,2462 88,4566	88,6092	88,7345	89,0198	90,3153	92,7972	94,4594	94,0689	92,0719	91,5391	93,7487	94,3233	99,3941	
200022	103,351	105,061	106,387	104,065	100,69	101,141	100,226	00,0032	00,7010	03,0130	30,0100	32,7372	31,1031	31,0003	32,0123	31,0031	30,7107	31,0200	33,0311	
Lw0dir	A	rolling	82,2989	83,2989	84,2989	85,2989	85,7989	86,2989	86,6989	87,2989	89,1989	92,2956	94,1237	93,6939	91,4726	90,8552	93,3505	93,9765	99,2891	
	103,31	105,036	106,374	104,05	100,667	101,126	100,212													
Lw0	A	rolling	82,2989	83,2989	84,2989	85,2989	85 , 7989	86,2989	86,6989	87 , 2989	89,1989	92,2956	94,1237	93,6939	91,4726	90,8552	93,3505	93,9765	99,2891	
Lw0dir	103,31 A	105,036 traction	106,374 66.99	104,05 61,99	100,667 61,99	101,126 61,99	100,212 61,99	61,99	61,99	61,99	61,99	61,99	61,99	66,99	61,99	61,99	61,99	61,99	61,99	59,99
20011	56,99	53,99	50,99	47,99	44,99	41,99	02,00	02,00	01,00	02,00	02,00	02,00	02,00	00,00	02,00	02,00	02,00	01,00	02,00	55 , 55
Lw0	A	traction		61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	66,99	61,99	61,99	61,99	61,99	61,99	59,99
	56,99	53,99	50,99	47,99	44,99	41,99														
Lw0dir	A 83,1409	aerodynam		86,2409	85,9409 79,6409	85,6409	85,3409	85,0409	84,7409	84,4409	84,1409	83,8409	83,1409	83,1409	83,1409	83,1409	83,1409	83,1409	83,1409	
	03,1409	83,1409	82,5409	81,1409	19,0409	78,0409	76,6409	75,1409												

V2012.0816.00.N00

Develop and implement harmonised noise assessment methods



Lw0	7\	aoroduran	ni a	86,2409	85,9409	85,6409	85,3409	85,0409	84,7409	84,4409	84,1409	83,8409	83,1409	83,1409	83,1409	83,1409	83,1409	83,1409	83,1409	
TM O	A 83,1409	aerodynam 83,1409	82,5409	86,2409	79,6409	78,0409	76,6409	75,1409	04,/409	04,4409	04,1409	03,8409	03,1409	03,1409	03,1409	03,1409	03,1409	03,1409	03,1409	
deltaLw0d	•	83,1409 A	02,3409	0	79,6409	78,0409 0	76,6409 0	75 , 1409	0	0	0	0	0	0	0	0	0	0	0	0
ieitalwoo	0	0	0	0	0	0	0	U	U	U	U	U	U	U	U	U	U	U	U	U
	-	-	-	-	-	-	-													
LwEqLine	В		21,3499	20,8912	20,8912	20,8912	20,8912	20,8912	20,8912	20,8912	20,8912	20,8912	20,8912	21,3499	20,8912	20,8912	20,8912	20,8912	25,7355	
	25,7083	20,7355	20,6988	20,6802	20,6709	20,6662	20,6639													
Lw0dir	В		75,3293	74,8706	74,8706	74,8706	74,8706	74,8706	74,8706	74,8706	74,8706	74,8706	74,8706	75,3293	74,8706	74,8706	74,8706	74,8706	79,7149	
	79,6877	74,7149	74,6782	74,6596	74,6503	74,6456	74,6433													
Lw0dir	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0														
Lw0	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0														
Lw0dir	В	traction	66.99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	66,99	61,99	61,99	61,99	61,99	61,99	59,99
	56,99	53,99	50,99	47,99	44,99	41,99	,	,	,	,	,	,	,	,	,	,	,	,	,	,
Lw0	В	traction	-	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	66,99	61,99	61,99	61,99	61,99	61,99	59,99
	56,99	53,99	50,99	47,99	44,99	41,99	,	,	,	,	,	1	,	20,22	,	,	,	,	,	22,23
Lw0dir	В	aerodynam		74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	
IWOULL	79,6409	79,6409		74,6409	74,6409	74,6409	74,6409	74,6409	74,0405	74,0403	74,0405	71,0103	74,0405	74,0403	74,0405	74,0405	71,0103	74,0403	74,0403	
Lw0	В	aerodynam		74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	
_w∪	79,6409	79,6409		74,6409	74,6409	74,6409	74,6409	74,6409	/4,6409	74,6409	74,6409	74,6409	74,6409	/4,6409	74,6409	74,6409	74,6409	74,6409	74,6409	
1 1. 7 01	•	79,6409 B	74,6409	0	74,6409 N	0	74,6409 N	0		0	0	0	0	0	0	0	0	0	0	0
deltaLw0d		_		-	•	-	•	U	0	0	U	U	U	U	U	U	U	U	U	U
	0	0	0	0	0	0	0													
deltaLw0d	lirHorz			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
LwTr			8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29565	8,3237	8,29392	8,27263	8,05518	7,7505	7,07654	6,28912	
	5,30964	4,03614	2,37373	0,0495889	9 -3,33345	-2,87442	-3,78792													
LwVeh	•		74,2989	75,2989	76,2989	77,2989	77,7989	78,2989	78,6989	79,2989	81,1989	84,2956	86,1237	85,6939	83,4726	82,8552	85,3505	85,9765	91,2891	
	95,3096	97,0361	98,3737	96,0496	92,6666	93,1256	92,2121	•	•				•	•		•			•	
LwVehSup		,	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29565	8,3237	8,29392	8,27263	8,05518	7,7505	7,07654	6,28912	
	5,30964	4,03614	2,37373		9 -3,33345	-	•	.,	.,			.,	.,	.,		.,	,	,	.,	
deltaLsqu		-,	_,	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
acrearoqu	8	8	8	8	8	8	8	Ü	Ü	Ü	Ü	o .	Ü	Ü	Ü	Ü	Ü	Ü	Ü	Ü
deltaLbri		0	0	0	0	0	0													
LRtot	age		2,27831	2,27831	2,27831	2,27831	2,27831	2,27831	2,27831	2,27831	2,27831	2,27505	2,3031	2,27332	2,25203	2,03458	1,7299	1,05594	0,268516	_
	1 00116	-3,64687				-9,80852	2,27031	2,27031	2,27031	2,27031	2,27031	2,27303	2,3031	2,27332	2,23203	2,03430	1,1233	1,00094	0,200310	
J, /10961 LHTr	1,70440	3,0400/	-5,97101	-9,35405	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111 T T	0	0	0	0	0	0	U	U	U	v	U	U	v	J	U	v	U	v	U	U
1117-l-	U	U	-	-			CO E	7.0	70.4	71	70.0	7.0	77 0	77 4	75.0	74.0	77 (70 0	0.5	90
HVeh	0.0	0.6	66	67	68	69	69,5	70	70,4	71	72,9	76	77,8	77,4	75,2	74,8	77,6	78,9	85	90
	93	96	96	96	96	96	_	_	_			_		_	_		_		_	_
LHVehSup			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0														
rRough			2,25254	2,25254	2,25254	2,25254	2,25254	2,25254	2,25254	2,25254	2,25254	2,24925	2,27747	2,24752	2,22609	2,00731	1,70064	1,02175	0,227498	-
762419	-2,05359	-3,74862	-6,14624	•	-9,24553	-10,2453														
LrImpact			-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
	-20	-20	-20	-20	-20	-20														

----- VEHICLE Ref = 2

V2012.0816.00.N00



Develop and implement harmonised noise assessment methods

Running o	condition:	constant	LineSour	ce																
Q:	1																			
v:	200																			
LwEqLine	7		21,8502	22,8085	23,8792	24,827	25,9606	27 4002	20 2704	20 2054	30,3142	20 4746	20 2002	21 0047	32,2256	24 5441	20 6622	44,2002	48,3517	
Twedrille		50,3325	48,049	45,5004	45,1228	44,594	44,0606	21,4033	20,3704	30,3534	30,3142	20,4/40	20,3092	31,0047	32,2230	34,3441	39,0023	44,2002	40,3317	
Lw0dir	A	30,3323	74,8605	75,8188	76,8895	77,8373	78,9709	80,4196	81,3807	83,4057	83.3245	81,4849	81,3995	84,015	85,2359	87,5544	92,6726	97,2105	101,362	
200422	105,152	103.343	101,059	98,5107	98,1331	97,6043	97,0709	00,1130	01,000,	00,100	00,0210	01, 1015	01,0000	01,010	00,2003	0,,0011	32,0.20	3.,2100	101,002	
Lw0dir	A	rolling	74,7466	75,7466	76,7466	77,7466	78,7466	79,7466	80,9644	83,3263	83,299	81,446	81,3598	83,9933	85,2195	87,5423	92,6679	97,2085	101,362	
	105,152	_	101,059	98,5106	98,133	97,6042	97,0709	,	,	,	,	,	,	,		, , ,	,	,	, , , , ,	
Lw0	A	rolling	74,7466	75,7466	76,7466	77,7466	78,7466	79,7466	80,9644	83,3263	83,299	81,446	81,3598	83,9933	85,2195	87,5423	92,6679	97,2085	101,362	
	105,152	103,343	101,059	98,5106	98,133	97,6042	97,0709													
Lw0dir	A	traction	58,99	57,99	61,99	60,99	65,99	71,99	70,99	65,99	60,99	60,99	60,99	60,99	60,99	61,99	62,99	63,99	61,99	58,99
	55,99	53,99	51,99	48,99	45,99	42,99														
Lw0	A	traction	58,99	57,99	61,99	60,99	65,99	71,99	70,99	65,99	60,99	60,99	60,99	60,99	60,99	61,99	62,99	63,99	61,99	58,99
	55,99	53,99	51,99	48,99	45,99	42,99														
Lw0dir	A	aerodynar	nic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
Lw0	A	aerodynar	nic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
deltaLw0		A		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
LwEqLine	В		5,97971	4,97971	8,9797	7,9797	12,9797	18,9797	17,9797	12,9797	7,9797	7,9797	7,9797	7,9797	7,9797	8,9797	9,9797	10,9797	8,9797	
		2,97971	•	-1,02027	-4,02025		-10,0201			,	,	.,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	.,	.,	-,	.,	,	-,	
Lw0dir	В	_,	58,99	57,99	61,99	60,99	65,99	71,99	70,99	65,99	60,99	60,99	60,99	60,99	60,99	61,99	62,99	63,99	61,99	58,99
	55,99	53,99	51,99	48,9901	45,9901	42,9902	•		•		•	·	•	•	·			•		
Lw0dir	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0														
Lw0	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0														
Lw0dir	В	traction	58,99	57,99	61,99	60,99	65,99	71,99	70,99	65,99	60,99	60,99	60,99	60,99	60,99	61,99	62,99	63,99	61,99	58,99
	55,99	53,99	51,99	48,99	45,99	42,99														
Lw0	В	traction	58,99	57,99	61,99	60,99	65,99	71,99	70,99	65,99	60,99	60,99	60,99	60,99	60,99	61,99	62,99	63,99	61,99	58,99
	55,99	53,99	51,99	48,99	45,99	42,99														
Lw0dir	В	aerodynar	nic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
Lw0	В	aerodynar		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
deltaLw0d		В		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
deltaLw0	dirHorz			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
LwTr				0,746598		0,746598	0,746598	0,746598	0,464401	0,526257	0,599015	0,64601	0,659781	0,693314	0,519505	0,242329	-0,13212	5 -0,791536	5 -1,63845	-
2,8485	-4,6573	-6,94076		•	•	-10,9291														
LwVeh			66,7466	67,7466	68,7466	69,7466		71,7466	72,9644	75,3263	75,299	73,446	73,3598	75 , 9933	77,2195	79,5423	84,6679	89,2085	93,3615	
	97,1515	95,3427	93,0592	90,5106	90,133	89,6042	89,0709													



wVehSup ,8485	-4,6573	-6,94076	•	0,746598 -9,867		0,746598 -10,9291	0,746598	U,746598	U,464401	U , 526257	0,599015	U,64601	0,659781	U,693314	0,519505	0,242329	-0,132125	-0,791536	-1,63845	
eltaLsqu	eal			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
-	8	8	8	8	8	8	8													
taLbri				0																
tot	ago		-5,274	-5,274	-5,274	-5,274	-5,274	-5,274	-5,5562	-5 49434	-5,42158	-5 37459	-5 36082	-5 32729	-5 50109	-5 77827	-6 15272	-6 81214	-7 65905	i
8691	_10 6779	-12,9614	-15,51	-15,8876	-16,4164	-16,9497	3,274	3,274	3,3302	3,13131	3,42130	3,37433	3,30002	3,32723	3,30103	3,77027	0,13272	0,01214	7,00000	
Tr	10,0773	12,5014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
.11	0	0	0	0	0	0	0	O	0	0	0	0	O	O	O	0	0	0	O	
** 1	U	U					70	71	70 5	74.0	24.2	70.0	70.7	75.0	76.7	70.0	04.0	0.0	95	
Veh	100	100	66 100	67 100	68 100	69 100	70	71	72,5	74,8	74,7	72,8	72,7	75,3	76,7	79,3	84,8	90	95	
	100	100																		
VehSup			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	0	0	0	0	0	0														
Rough			-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	-5,71517	-5,65103	-5,57562	-5,52694	-5,51268	-5,47796	-5,65803	-5,94575	-6 , 33561	-7,02575	-7,92007	
21743	-11,2178	-13,9183	-17,4186	-18,0196	-18,9203	-19,9204														
Impact			-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	
	-20	-20	-20	-20	-20	-20														
	VEHICLE																			
_	ondition:	idling	PointSour	ce																
dling:																				
tion 1	ength:	50																		
qLine	A		53,0314	54,022	55,0996	56,0086	57,0039	58,0002	59,5264	61,5099	61,4902	59,6736	59,5951	62,2114	63,4649	65,772	70,898	75,4413	79,5954	
•	83,3882	81,5817	79,2981	76,7499	76,3725	75,8434	75,31													
Odir	A	,	74,7923	75,7829	76,8605	77,7696		79,7611	81,2873	83,2709	83,2511	81,4345	81,356	83,9723	85,2258	87,5329	92,6589	97,2022	101,356	
		103,343	101,059	98,5108	98,1334	97,6043	97,071	,	,	,		,	,			,	,	,	,	
0dir	Α	rolling	74,7466	75,7466	76,7466	77,7466		79,7466	81,2466	83,2644	83,2446	81,4246	81,346	83,9668	85,2094	87,5305	92,6582	97,202	101,356	
		103,343	101,059	98,5108	98,1334	97,6043	97,071	,	,	,	,	,	,	,	,	.,,	,	,	,	
0	A	rolling	74,7466	75,7466	76,7466	77,7466	•	79,7466	81,2466	83,2644	83,2446	81,4246	81,346	83,9668	85,2094	87,5305	92,6582	97,202	101,356	
-		103,343	101,059	98,5108	98,1334	97,6043	97,071	. 5, . 100	31,2300	30,2011	30,2440	, -270	32,010	30,3000	50,2051	3.,3303	J2, JJ02	3.,202	101/000	
Odir	A	traction		54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	
,411	52,99	49,99	45,99	41,99	37,99	33,99	52,55	51,55	30,33	54,55	54,55	J2 , JJ	54,55	52,55	30,33	54,55	J=1, JJ	54,55	54,33	
)	32,99 A	traction		54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	
,	52,99	49,99	45,99	41,99	37,99	33,99	J4, JJ	J4, JJ	00,22	J4, JJ	J4, JJ	J4, 33	J4, 77	J4, 77	00,22	J4, JJ	J4, JJ	J4, 77	J4, 77	
dir		aerodynam		41 , 99	0	33,99	0	0	0	0	0	0	0	0	0	0	0	0	0	
ULL	A 0	aerodynam 0	0	0	0	0	0	U	U	U	U	U	U	U	U	U	U	U	U	
				-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
)	A 0	aerodynam 0	0	0	0	0	0	0	0	0	0	U	0	0	0	0	0	U	0	
± - T C 3			U	-	-		0	0	0	0	0	0	0	0	0	0	0	0	0	
taLw0d		A 0	0	0	0	0	0	0	0	0	U	0	0	0	0	0	0	0	0	
	0	U	0	U	U	U	U													
qLine	В		33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	33,2291	
	33,2291	31,2291	28,2291	24,2291	20,2291	16,2291	12,2291													
dir	В	•	54,99	54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	
	52,99	49,99	45,99	41,99	37,99	33,99	,	,		,	•	,	,	,	.,	,	,	,	,	
			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
dir	В	LOTITIO																		
dir		rolling O	0	0																
dir	В 0 В	0		-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



	В	traction		54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99
	52,99	49,99	45,99	41,99	37,99	33,99														
Lw0	В	traction		54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99
	52,99	•	45,99	41,99	37,99	33,99														
	В	aerodynam	ic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0		0	0	0	0	0													
	В	aerodynam		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
deltaLw0d		В		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
deltaLw0d:	lirHorz			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0													
LwTr			0,746598	0,746598	0,746598	0,746598	0,746598	0,746598	0,746598	0,464401	0,544615	0,624636	0,64601	0,666821	0,509372	0,230515	-0,14185	-0,798039	-1,6438	=
2,85094	-4,65738	-6,94101	-9,48918	-9,86658	-10,3957	-10,929														
LwVeh			66,7466	67,7466	68,7466	69,7466	70,7466	71,7466	73,2466	75,2644	75,2446	73,4246	73,346	75,9668	77,2094	79,5305	84,6582	89,202	93,3562	
	97,1491	95,3426	93,059	90,5108	90,1334	89,6043	89,071													
LwVehSup			0,746598	0,746598	0,746598	0,746598	0,746598	0,746598	0,746598	0,464401	0,544615	0,624636	0,64601	0,666821	0,509372	0,230515	-0,14185	-0,798039	-1,6438	-
2,85094	-4,65738	-6,94101	-9,48918	-9,86658	-10,3957	-10,929														
deltaLsqu	eal			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
	8	8	8	8	8	8	8													
deltaLbri	.dge			0																
LRtot			-5,274	-5,274	-5,274	-5,274	-5,274	-5,274	-5,274	-5,5562	-5,47599	-5,39596	-5,37459	-5,35378	-5,51123	-5,79009	-6,16245	-6,81864	-7,6644	-
8,87154	-10,678	-12,9616	-15,5098	-15,8872	-16,4163	-16,9496														
LHTr			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0														
LHVeh			66	67	68	69	70	71	72,5	74,8	74,7	72,8	72,7	75,3	76,7	79,3	84,8	90	95	100
	100	100	100	100	100	100														
LHVehSup			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0														
LrRough			-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	-5,71517	-5,632	-5,54908	-5,52694	-5,50539	-5,66854	-5,95803	-6,34575	-7,03258	-7 , 92575	-
9,22007	-11,2179	-13,9186	-17,4183	-18,0189	-18,9202	-19,9203														
LrImpact			-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
rrimpact																				

Or, as imported into a spreadsheet:

Tref: 12

Source: A

Idling: no LineSource

Track data:

Vertical angle 0



Horizontal angle	90	<u> </u>	<u>- </u>																							
Section length	50	1																								
Curve radius	250	1																								
[Hz]			63	125	250	500	1.000	2.000	4.000	8.000																
Lw	Α	PointSourc e	58,9042	61,8512	65,7076	65,4438	72,6234	85,3693	84,4143	80,6348																
Lw	Α	LineSource	39,0046	39,8615	41,2514	45,0035	45,4897	55,9174	57,8646	53,5764																
Lw	В	PointSourc e	40,9969	38,0003	40,9969	38,0003	40,9969	38,0003	33,5354	22,1508																
Lw	В	LineSource	25,9882	26,7536	26,6018	26,0299	25,9381	29,5134	25,5254	25,4468																
[Hz]		D : 10	50	63	80	100	125	160	200	250	315	400	500	630	800	1.000	1.250	1.600	2.000	2.500	3.150	4.000	5.000	6.300	8.000	10.000
LwEqTdir	Α	PointSourc e	53,0314	54,022	55,0996	56,0086	57,0039	58,0002	59,5264	61,5099	61,4902	59,6736	59,5951	62,2114	63,4649	65,772	70,898	75,4413	79,5954	83,3882	81,581 7 53,733	79,2981	76,7499	76,372 5 48,999	75,843 4	75,31
LwEqTdir	Α	LineSource PointSourc	34,0407	34,1882	34,4608	34,8194	35,0489	35,384	35,6538	36,3217	37,3047	39,2016	40,7404	40,5951	39,0928	39,3189	42,7264	45,697	50,1372	53,9841		53,7637	51,3825	3 20,229	49,075 2 16,229	48,299 8 12,229
LwEqTdir	В	e	33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	33,2291	33,2291		28,2291	24,2291	1 20,685	1 20,673	1 20,667
LwEqTdir	В	LineSource	21,4742	21,0012	21,1623	21,1079	21,5424	23,0501	22,6853	21,5424	21,1079	21,1079	21,1079	21,5453	21,1079	21,1623	21,2298	21,3133	25,8262	25,7543		20,7448	20,7095	6	6	6
VEHICLE Running condition:	Ref = 1 acceleratin g	LineSource																								
Q:	1																									
v:	250	1																								
LwEqLine	A		33,7701	33,86	34,0633	34,361	24 4772	34,6298	34,7551	35 0404	36 3350	38,8178	40,48	40,0895	28 0025	37,5597	30 7603	40,3439	45,4147	49,372	51,081	52,4074	50,0859	46,710 8	47,161 6	46,246 2
Lw0dir	A		87,7495	87,8394	88,0427	88,3404	88,4566	88,6092	88,7345	,		92,7972	94,4594	·	92,0719	,		94,3233	99,3941		105,06	106,387	104,065	100,69	101,14	100,22
Lw0dir	A	rolling	82,2989	83,2989	84,2989	85,2989	85,7989	86,2989	86,6989	87,2989	89,1989	92,2956	94,1237	93,6939	91,4726			93,9765	99,2891	103,331	105,03	106,374	104,003	100,66	101,12	100,21
Lw0	A	rolling	82,2989	83,2989	84,2989	85,2989	85,7989	86,2989	86,6989	87,2989	89,1989	92,2956	94,1237	93,6939	91,4726	90,8552	93,3505	93,9765	99,2891	103,31	105,03 6	106,374	104,05	100,66	101,12	100,21
Lw0dir	A	traction	66,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	66,99	61,99	61,99	61,99	61,99	61,99	59,99	56,99	53,99	50,99	47,99	44,99	41,99
Lw0	A	traction	66,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	66,99	61,99	61,99	61,99	61,99	61,99	59,99	56,99	53,99	50,99	47,99	44,99	41,99
Lw0dir	Α	aerodynami c	86,2409	85,9409	85,6409	85,3409	85,0409	84,7409	84,4409	84,1409	83,8409	83,1409	83,1409	83,1409		83,1409		83,1409	83,1409	83,1409	82,540	81,1409	79,6409	78,040 9	76,640 9	75,140 9



Lw0	A	aerodynami c	86,2409	85,9409	85,6409	85,3409	85,0409	84,7409	84,4409	84,1409	83,8409	83,1409	83,1409	83,1409	83,1409	83,1409	83,1409	83,1409	83,1409	83,1409	82,540 9	81,1409	79,6409	78,040 9	76,640 9	75,140 9
deltaLw0dirVe rt	Α		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LwEqLine	В		21,3499	20,8912	20,8912	20,8912	20,8912	20,8912	20,8912		20,8912	20,8912	20,8912				20,8912	20,8912	·	,	74,714	20,6988	20,6802	20,670 9 74,650	20,666 2 74,645	20,663 9 74,643
Lw0dir	В		75,3293	74,8706	74,8706	74,8706	74,8706	74,8706	74,8706	74,8706	74,8706	74,8706		75,3293		74,8706	74,8706	74,8706	79,7149		9	74,6782	74,6596	3	6	3
Lw0dir	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0dir	В	traction	66,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	66,99	61,99	61,99	61,99	61,99	61,99	59,99	56,99	53,99	50,99	47,99	44,99	41,99
Lw0	В	traction aerodynami	66,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	61,99	66,99	61,99	61,99	61,99	61,99	61,99	59,99	56,99 74,640	53,99	50,99	47,99 74,640	44,99 74,640	41,99 74,640
Lw0dir	В	c aerodynami	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	79,6409	79,6409	9 74,640	74,6409	74,6409	9 74,640	9 74,640	9 74,640
Lw0 deltaLw0dirVe	В	С	74,6409	74,6409		74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409	74,6409		74,6409	74,6409	74,6409	79,6409	79,6409		74,6409	74,6409	9	9	9
rt	В		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
deltaLw0dirHo rz			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																								-	-	-
LwTr			8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29565	8,3237	8,29392	8,27263	8,05518	7,7505	7,07654	6,28912	5,30964		2,37373	0,049588 9	3,3334	2,8744	3,7879 2
LwVeh			74,2989	75,2989	76,2989	77,2989	77,7989	78,2989	78,6989	79,2989	81,1989	84,2956	86,1237	85,6939	83,4726	82,8552	85,3505	85,9765	91,2891	95,3096	97,036 1	98,3737	96,0496	92,666 6	93,125 6	92,212 1
LwVehSup			8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29891	8,29565	8,3237	8,29392	8,27263	8,05518	7,7505	7,07654	6,28912	5,30964	4,0361 4	2,37373	0,049588	3,3334 5	2,8744 2	3,7879 2
deltaLsqueal			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
deltaLbridge			0																							
LRtot			2,27831	2,27831	2,27831	2,27831	2,27831	2,27831	2,27831	2,27831	2,27831	2,27505	2,3031	2,27332	2,25203	2,03458	1,7299	1,05594	0,26851 6	0,71096 1	1,9844 6	3,64687	-5,97101	9,3540 5	8,8950 2	9,8085 2
LHTr			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LHVeh			66	67	68	69	69,5	70	70,4	71	72,9	76	77,8	77,4	75,2	74,8	77,6	78,9	85	90	93	96	96	96	96	96
LHVehSup			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LrRough			2,25254	2,25254	2,25254	2,25254	2,25254	2,25254	2,25254	2,25254	2,25254	2,24925	2,27747	2,24752	2,22609	2,00731	1,70064	1,02175	0,22749 8	0,76241 9	2,0535 9	- 3,74862	-6,14624	9,7454 4	9,2455 3	10,245 3
LrImpact			-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20



VEHICLE Ref = 2 Running

condition: constant LineSource

Q:

ų.		-																								
v:		200																								
LwEqLine Lw0dir	A A		21,8502 74,8605	22,8085 75,8188	23,8792 76,8895	24,827 77,8373	25,9606 78,9709	27,4093 80,4196	28,3704 81,3807	30,3954 83,4057	30,3142 83,3245	28,4746 81,4849	28,3892 81,3995	31,0047 84,015	32,2256 85,2359	34,5441 87,5544		44,2002 97,2105	48,3517 101,362	52,1413 105,152	50,332 5 103,34 3 103,34	48,049 101,059	45,5004 98,5107	45,122 8 98,133 1	44,594 97,604 3 97,604	44,060 6 97,070 9 97,070
Lw0dir	Α	rolling	74,7466	75,7466	76,7466	77,7466	78,7466	79,7466	80,9644	83,3263	83,299	81,446	81,3598	83,9933	85,2195	87,5423	92,6679	97,2085	101,362	105,152	3 103,34	101,059	98,5106	98,133	2 97,604	9 97,070
Lw0	Α	rolling	74,7466	75,7466	76,7466	77,7466	78,7466	79,7466	80,9644	83,3263	83,299	81,446	81,3598	83,9933	85,2195	87,5423	92,6679	97,2085	101,362	105,152		101,059	98,5106	98,133	2	9
Lw0dir	Α	traction	58,99	57,99	61,99	60,99	65,99	71,99	70,99	65,99	60,99	60,99	60,99	60,99	60,99	61,99	62,99	63,99	61,99	58,99	55,99	53,99	51,99	48,99	45,99	42,99
Lw0	Α	traction aerodynami	58,99	57,99	61,99	60,99	65,99	71,99	70,99	65,99	60,99	60,99	60,99	60,99	60,99	61,99	62,99	63,99	61,99	58,99	55,99	53,99	51,99	48,99	45,99	42,99
Lw0dir	Α	c aerodynami	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0 deltaLw0dirVe	Α	С	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rt	Α		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LwEqLine Lw0dir	B B		5,97971 58,99	4,97971 57,99	8,9797 61,99	7,9797 60,99	12,9797 65,99	18,9797 71,99	17,9797 70,99	12,9797 65,99	7,9797 60,99	7,9797 60,99	7,9797 60,99	7,9797 60,99	7,9797 60,99	8,9797 61,99	9,9797 62,99	10,9797 63,99	8,9797 61,99	5,97971 58,99	2,9797 1 55,99	0,97971 7 53,99	-1,02027 51,99	4,0202 5 48,990 1	7,0201 9 45,990 1	10,020 1 42,990 2
Lw0dir	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0dir	В	traction	58,99	57,99	61,99	60,99	65,99	71,99	70,99	65,99	60,99	60,99	60,99	60,99	60,99	61,99	62,99	63,99	61,99	58,99	55,99	53,99	51,99	48,99	45,99	42,99
Lw0	В	traction aerodynami	58,99	57,99	61,99	60,99	65,99	71,99	70,99	65,99	60,99	60,99	60,99	60,99	60,99	61,99	62,99	63,99	61,99	58,99	55,99	53,99	51,99	48,99	45,99	42,99
Lw0dir	В	c aerodynami	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0 deltaLw0dirVe	В	c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
rt	В		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
deltaLw0dirHo rz			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



	Develo	p and imp	piemer	it narn	nonised	i noise	asses	sment	metno	oas																
LwTr			0,74659 8	0,74659 8	0,74659 8	0,74659 8	0,74659 8	0,74659 8	0,46440 1	0,52625 7	0,59901 5	0,64601	0,65978 1	0,69331 4	0,51950 5	0,24232 9	0,13212 5	0,79153 6	- 1,63845	-2,8485	- 4,6573	- 6,94076	-9,48937	-9,867	10,395 8	10,929 1
LwVeh			66,7466	67,7466	68,7466	69,7466	70,7466	71,7466	72,9644	75,3263	75,299	73,446	73,3598	75,9933	77,2195	79,5423	84,6679	89,2085	93,3615	97,1515	95,342 7	93,0592	90,5106	90,133	89,604 2	89,070 9
LwVehSup			0,74659 8	0,74659 8	0,74659 8	0,74659 8	0,74659 8	0,74659 8	0,46440 1	0,52625 7	0,59901 5	0,64601	0,65978 1	0,69331 4	0,51950 5	0,24232 9	0,13212 5	0,79153 6	- 1,63845	-2,8485	- 4,6573	- 6,94076	-9,48937	-9,867	10,395 8	10,929 1
deltaLsqueal			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
deltaLbridge			0																		_			_	_	_
LRtot			-5,274	-5,274	-5,274	-5,274	-5,274	-5,274	-5,5562	- 5,49434	- 5,42158	- 5,37459	5,36082	- 5,32729	- 5,50109	- 5,77827	- 6,15272	6,81214	- 7,65905	-8,8691	10,677 9	- 12,9614	-15,51	15,887 6	16,416 4	16,949 7
LHTr			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LHVeh			66	67	68	69	70	71	72,5	74,8	74,7	72,8	72,7	75,3	76,7	79,3	84,8	90	95	100	100	100	100	100	100	100
LHVehSup			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LrRough			-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	- 5,71517	- 5,65103	- 5,57562	- 5,52694	- 5,51268	- 5,47796	- 5,65803	- 5,94575	- 6,33561	- 7,02575	- 7,92007	- 9,21743	11,217 8	13,9183	-17,4186	18,019 6	18,920 3	19,920 4
LrImpact			-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20
VEHICLE Running condition:	Ref = 2	PointSourc e																								

fidling:

Section length: 50

LwEqLine	Α		53,0314	54,022	55,0996	56,0086	57,0039	58,0002	59,5264	61,5099	61,4902	59,6736	59,5951	62,2114	63,4649	65,772	70,898	75,4413	79,5954	83,3882	81,581 7	79,2981	76,7499	76,372 5	75,843 4	75,31
Lw0dir	Α		74,7923	75,7829	76,8605	77,7696	78,7648	79,7611	81,2873	83,2709	83,2511	81,4345	81,356	83,9723	85,2258	87,5329	92,6589	97,2022	101,356	105,149	103,34 3	101,059	98,5108	98,133 4	97,604 3	97,071
Lw0dir	٨	rolling	74.7466	75.7466	76 7166	77.7466	78.7466	70.7466	81.2466	83.2644	83.2446	81.4246	81,346	92 0669	9E 2004	97 E20E	02 6502	97.202	101,356	105,149	103,34	101,059	98,5108	98,133 4	97,604 3	97,071
	A	. 0	,	,	70,7400	,	-,	73,7400	,	,		,	,	63,3006	63,2034	67,3303	32,0362	37,202	•	·	103,34	,	•	98,133	97,604	,
Lw0	Α	rolling	74,7466	75,7466	76,7466	77,7466	78,7466	79,7466	81,2466	83,2644	83,2446	81,4246	81,346	83,9668	85,2094	87,5305	92,6582	97,202	101,356	105,149	3	101,059	98,5108	4	3	97,071
Lw0dir	Α	traction	54,99	54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	52,99	49,99	45,99	41,99	37,99	33,99
Lw0	Α	traction	54,99	54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	52,99	49,99	45,99	41,99	37,99	33,99
Lw0dir	Α	aerodynami c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0	Α	aerodynami c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
deltaLw0dirVe rt	Α		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



LwEqLine	В		33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	33,2291	33,2291	39,2291	33,2291	33,2291	33,2291	33,2291	33,2291	31,229 1	28,2291	24,2291	20,229	16,229 1	12,229
	_			·	,	•	,	,	,	•							•	,		,					_	
Lw0dir	В		54,99	54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	52,99	49,99	45,99	41,99	37,99	33,99
Lw0dir	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0	В	rolling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0dir	В	traction	54,99	54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	52,99	49,99	45,99	41,99	37,99	33,99
Lw0	В	traction aerodynami	54,99	54,99	60,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	60,99	54,99	54,99	54,99	54,99	54,99	52,99	49,99	45,99	41,99	37,99	33,99
Lw0dir	В	c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lw0	В	aerodynami c	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
deltaLw0dirVe rt	В		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
deltaLw0dirHo rz			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			0,74659	0,74659	0,74659	0,74659	0,74659	0,74659	0,74659	0,46440	0,54461	0,62463		0,66682	0,50937	0,23051		0,79803			- 4,6573	_		- 9,8665	10,395	
LwTr			8	8	8	8	8	8	8	1	5	6	0,64601	1	2		0,14185	9	-1,6438		8	6,94101	-9,48918	8	7 89,604	10,929
LwVeh			66,7466	67,7466	68,7466	69,7466	70,7466	71,7466	73,2466	75,2644	75,2446	73,4246	73,346	75,9668	77,2094	79,5305	84,6582	89,202	93,3562	97,1491	95,342 6	93,059	90,5108	90,133 4	3	89,071
			0,74659	0,74659	0,74659	0,74659	0,74659	0,74659	0,74659	0,46440	0,54461	0,62463		0,66682	0,50937	0,23051	-	-,		-	.,	-		9,8665	10,395	-
LwVehSup			8	8	8	8	8	8	8	1	5	6	0,64601	1	2	5	0,14185	9	-1,6438	2,85094	8	6,94101	-9,48918	8	7	10,929
deltaLsqueal			8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
deltaLbridge			0																					_	_	
LRtot			-5,274	-5,274	-5,274	-5,274	-5,274	-5,274	-5,274	-5,5562	- 5,47599	- 5,39596	- 5,37459	- 5,35378	- 5,51123	- 5,79009	- 6,16245	- 6,81864	-7,6644	- 8,87154	10,678	- 12,9616	-15,5098	15,887 2	16,416 3	16,949 6
LHTr			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LHVeh			66	67	68	69	70	71	72,5	74,8	74,7	72,8	72,7	75,3	76,7	79,3	84,8	90	95	100	100	100	100	100	100	100
LHVehSup			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
																					11,217			18,018	18,920	19,920
LrRough			-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	-5,4228	5,71517	-5,632	5,54908	5,52694	5,50539	5,66854	5,95803	6,34575	7,03258	7,92575		9	13,9186	-17,4183	9	2	3
LrImpact			-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20	-20