

How to use the CNOSSOS train database for Spain in iNoise

This document describes the implementation of the ADIF CNOSSOS train database for Spain as CAT files for use in iNoise V2024. The CNOSSOS CAT files for Spain are based on the published data from ADIF from November 2023:

Guía para la aplicación del método CNOSSOS-EU en la modelización del ruido producido por las circulaciones ferroviarias en las infraestructuras de ADIF y ADIF AV
1ª EDICIÓN: NOVIEMBRE 2023 (Rev. 2)

Where to find the CNOSSOS CAT files for Spain for use in iNoise

The CNOSSOS CAT files for Spain are:

- ADIF - CNOSSOS_RailVehicles.CAT
- ADIF - CNOSSOS_RailTracks.CAT

These files can be downloaded from the DGMR Software website at

<https://dgmsoftware.com/downloads/>

Use in iNoise

The calculation of the sound power level of a railway is based on 2 catalogues, CNOSSOS_RailVehicles.CAT and CNOSSOS_RailTracks.CAT. Both files are available in the CAT sub-folder of the iNoise program folder. Installation of iNoise includes default catalogues. When a new CNOSSOS model is created in an iNoise project, the catalogues are included in and used for that specific model.

When you want to use the ADIF CNOSSOS catalogues for Spain for all new CNOSSOS models created with iNoise:

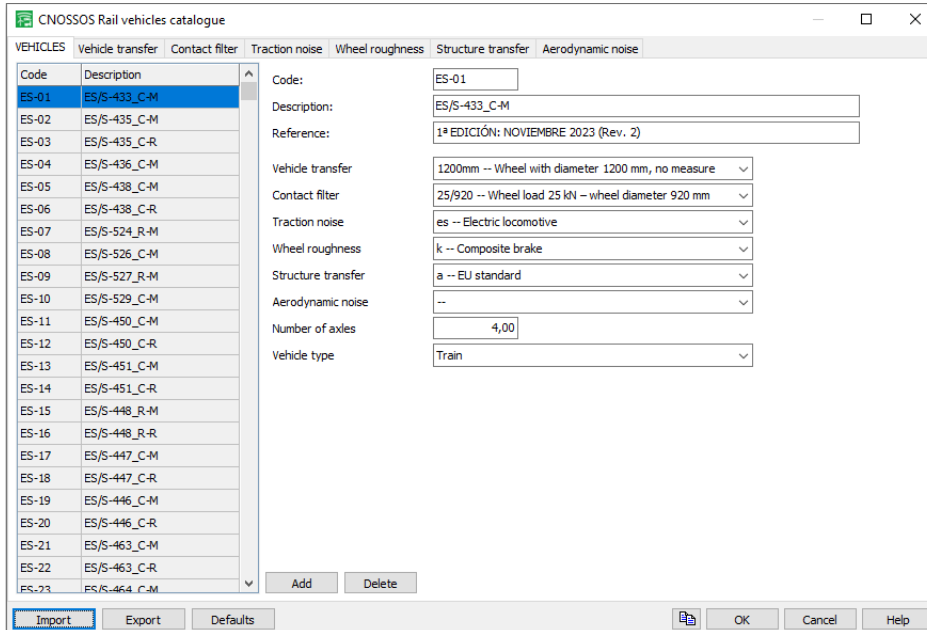
1. Take a backup of the existing catalogue files in the CAT sub-folder of the iNoise program folder and replace them with the 2 ADIF CAT files
2. Rename the:
 - a. "ADIF - CNOSSOS_RailVehicles.CAT" to "CNOSSOS_RailVehicles.CAT"
 - b. "ADIF - CNOSSOS_RailTracks.CAT" to "CNOSSOS_RailTracks.CAT"

All new models will now use the ADIF train database.

Note: Changing the catalogues in iNoise's CAT subfolder has no effect on existing models. Therefore, when the ADIF catalogues are needed for an existing model:

1. Open the model

- Using menu option ‘Catalogues l Railway vehicles (Model)’ and import the relevant catalogue from iNoise’s CAT subfolder:



Code	Description
ES-01	ES/S-433_C-M
ES-02	ES/S-435_C-M
ES-03	ES/S-435_C-R
ES-04	ES/S-436_C-M
ES-05	ES/S-438_C-M
ES-06	ES/S-438_C-R
ES-07	ES/S-524_R-M
ES-08	ES/S-526_C-M
ES-09	ES/S-527_R-M
ES-10	ES/S-529_C-M
ES-11	ES/S-450_C-M
ES-12	ES/S-450_C-R
ES-13	ES/S-451_C-M
ES-14	ES/S-451_C-R
ES-15	ES/S-448_R-M
ES-16	ES/S-448_R-R
ES-17	ES/S-447_C-M
ES-18	ES/S-447_C-R
ES-19	ES/S-446_C-M
ES-20	ES/S-446_C-R
ES-21	ES/S-463_C-M
ES-22	ES/S-463_C-R
ES-23	ES/S-464_C-M

Code:	ES-01
Description:	ES/S-433_C-M
Reference:	1ª EDICIÓN: NOVIEMBRE 2023 (Rev. 2)
Vehicle transfer	1200mm -- Wheel with diameter 1200 mm, no measure
Contact filter	25/920 -- Wheel load 25 kN -- wheel diameter 920 mm
Traction noise	es -- Electric locomotive
Wheel roughness	k -- Composite brake
Structure transfer	a -- EU standard
Aerodynamic noise	--
Number of axes	4,00
Vehicle type	Train

- Do the same for ‘Catalogues l Railway tracks (Model)’

If you wish to revert to the default CAT files, then follow the above principles.

Remarks regarding the ADIF implementation in iNoise

- In iNoise the user has to create a full train by selecting the units that define the train. So for instance train type S-438 has to be composed as M-R-R. In iNoise this means selecting 1 unit ‘ES/S-438_C-M’ and 2 units of ‘ES/S-438_C-R’.
- For the tables G1 – G-7 we have used the tables of the second update (2021).
- Set the speed for aerodynamic noise to 250 km/hr in the calculation settings of a CNOSSOS model. According to ADIF aerodynamic noise is to be calculated from 250 km/hr and not from the CNOSSOS default setting 200 km/hr.

Quality assurance

The CNOSSOS method contains 1 propagation model for road, rail and industry and 3 separate source models. The quality assurance method ISO 17534-4 describes tests for the propagation model. However there are no tests for the source models. Most national rail authorities, like ADIF in Spain, do not provide additional quality assurance procedures to validate an implementation of national road and/or rail source emission data according to the CNOSSOS source models in software. This means that for DGMR Software it is not possible to test an implementation of a source model against official quality assured results.

CNOSSOS_RailVehicles

File contains the definition of all vehicles, with all associated tables.

Tables:

1. List of vehicles starts with the line "**#Vehicle**" and also ends with the line "#Vehicle".
2. The list of wheel roughnesses begins and ends with "**#WheelRoughness**".
3. The list of contact filters starts and ends with "**#ContactFilter**".
4. The list of vehicle transfer functions starts and ends with "**#VehicleTransfer**".
5. Those with vehicle structure transfer functions with "**#StructureTransfer**" (usually 0)
6. The one with traction noise with "**#TractionNoise**"
7. And finally, those with the values for aerodynamic sound with "**#AerodynamicNoise**"

#Vehicle

Each record ends with a line with only '#'

Fields:

1. Code=SNCF BB66400
a text, maximum 15 characters. Used as the coupling field.
2. Description=Diesel locomotive
→ text, informative.
3. Reference=
→ text, informative.
4. VehicleTransfer=1200mm
→ Text: reference to the vehicle transfer functions table
5. ContactFilter=25/920
→ Text: reference to the table of vehicle contact filters
6. TractionNoise=d1
→ Text: reference to the table of traction noise
7. WheelRoughness=c
→ Text: reference to the wheel roughness table
8. StructureTransfer=a
→ Text: reference to the table with vehicle structure transfer function
9. AerodynamicNoise=a
→ Text: reference to the table for aerodynamic corrections
10. NrOfAxles=4
→ Number of axles per unit (vehicle)
11. Type=Train
→ Possibilities: "Train", "Tram" or "Light rail metro". Required to determine the minimum speed.

#WheelRoughness (Table G-1)

Each record ends with a line with only '#'

Fields:

1. Code=c
→ *text, maximum 15 characters. Used as the coupling field.*
2. Description=Cast iron tread brake
→ *text, informative.*
3. Reference=COMMISSION DELEGATED DIRECTIVE (EU) 2021/1226 of 21 December 2020
→ *text, informative.*
4. Values=2.2; 2.2; 2.2; 2.2; 2.2; 2.2; 2.2; 2.2; 2.2; 2.2; 2.2; 2.4; 0.6; 2.6; 5.8; 8.8; 11.1; 11.0; 9.8; 7.5; 5.2; 3.0; 1.3; 0.2; -0.7; -1.2; -1.0; 0.3; 0.2; 1.3; 3.1; 3.1; 3.1; 3.1; 3.1
→ *values per wavelength (200 cm .. 0.08 cm)*

#ContactFilter (Table G-2)

Each record ends with a line with only '#'

Fields:

1. Code=50/360
→ *text, maximum 15 characters. Used as the coupling field.*
2. Description=Wheel load 50 kN – wheel diameter 360 mm
→ *text, informative.*
3. Reference=COMMISSION DELEGATED DIRECTIVE (EU) 2021/1226 of 21 December 2020
→ *text, informative.*
4. Values=0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; -0.1; -0.2; -0.3; -0.6; -1.0; -1.8; -3.2; -5.4; -8.7; -12.2; -16.7; -17.7; -17.8; -20.7; -22.1; -22.8; -24.0; -24.5; -24.7; -27.0; -27.8
→ *values per wavelength (200 cm .. 0.08 cm)*

#VehicleTransfer (Table G-3)

Each record ends with a line with only '#'

Fields:

1. Code=920mm
→ *text, maximum 15 characters. Used as the coupling field.*
2. Description=Wheel with diameter 920 mm, no measure
→ *text, informative.*
3. Reference=COMMISSION DELEGATED DIRECTIVE (EU) 2021/1226 of 21 December 2020
→ *text, informative.*
4. 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
→ *values per 1/3-octave (50 Hz ... 10 kHz)*

#StructureTransfer (Table G-3)

Each record ends with a line with only '#'

Fields:

1. Code=a
→ *text, maximum 15 characters. Used as the coupling field.*

2. Description=EU standard
→ *text, informative.*
3. Reference=COMMISSION DELEGATED DIRECTIVE (EU) 2021/1226 of 21 December 2020
→ *text, informative.*
4. Values=0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0; 0.0;
0.0; 0.0; 0.0
→ *values per 1/3-octave (50 Hz .. 10 kHz)*

#TractionNoise (Table G-5)

Each record is closed with a line with only '#'.

Fields:

1. Code=dl
→ *text, maximum 15 characters. Used as the coupling field.*
2. Description=Diesel locomotive (c. 800 kW)
→ *text, informative.*
3. Reference=COMMISSION DELEGATED DIRECTIVE (EU) 2021/1226 of 21 December 2020
→ *tekst, informative.*
4. A_Idling=98.9; 94.8; 92.6; 94.6; 92.8; 92.8; 93; 94.8; 94.6; 95.7; 95.6; 98.6; 95.2; 95.1; 95.1;
94.1; 94.1; 99.4; 92.5; 89.5; 87; 84.1; 81.5; 79.2
→ *values per 1/3-octave (50 Hz .. 10 kHz) for voucher A (=0.5m) and condition Idling*
5. A_Decelerating=98.9; 94.8; 92.6; 94.6; 92.8; 92.8; 93; 94.8; 94.6; 95.7; 95.6; 98.6; 95.2; 95.1;
95.1; 94.1; 94.1; 99.4; 92.5; 89.5; 87; 84.1; 81.5; 79.2
→ *values per 1/3-octave (50 Hz .. 10 kHz) for voucher A (=0.5m) and condition decelrating*
6. A_Accelerating=98.9; 94.8; 92.6; 94.6; 92.8; 92.8; 93; 94.8; 94.6; 95.7; 95.6; 98.6; 95.2; 95.1;
95.1; 94.1; 94.1; 99.4; 92.5; 89.5; 87; 84.1; 81.5; 79.2
→ *values per 1/3-octave (50 Hz .. 10 kHz) for receipt A (=0.5m) and condition accelerating*
7. A_Constant=98.9; 94.8; 92.6; 94.6; 92.8; 92.8; 93; 94.8; 94.6; 95.7; 95.6; 98.6; 95.2; 95.1; 95.1;
94.1; 94.1; 99.4; 92.5; 89.5; 87; 84.1; 81.5; 79.2
→ *values per 1/3-octave (50 Hz .. 10 kHz) for bon A (=0.5m) and condition constant speed*
8. B_Idling=103.2; 100; 95.5; 94; 93.3; 93.6; 92.9; 92.7; 92.4; 92.8; 92.8; 96.8; 92.7; 93; 92.9; 93.1;
93.2; 98.3; 91.5; 88.7; 86; 83.4; 80.9; 78.7
→ *values per 1/3-octave (50 Hz .. 10 kHz) for voucher A (=0.5m) and condition Idling*
9. B_Decelerating=103.2; 100; 95.5; 94; 93.3; 93.6; 92.9; 92.7; 92.4; 92.8; 92.8; 96.8; 92.7; 93;
92.9; 93.1; 93.2; 98.3; 91.5; 88.7; 86; 83.4; 80.9; 78.7
→ *values per 1/3-octave (50 Hz .. 10 kHz) for bon B (=4.0m) and condition decelrating*
10. B_Accelerating=103.2; 100; 95.5; 94; 93.3; 93.6; 92.9; 92.7; 92.4; 92.8; 92.8; 96.8; 92.7; 93;
92.9; 93.1; 93.2; 98.3; 91.5; 88.7; 86; 83.4; 80.9; 78.7
→ *values per 1/3-octave (50 Hz .. 10 kHz) for receipt B (=4.0m) and condition accelerating*
11. B_Constant=103.2; 100; 95.5; 94; 93.3; 93.6; 92.9; 92.7; 92.4; 92.8; 92.8; 96.8; 92.7; 93; 92.9;
93.1; 93.2; 98.3; 91.5; 88.7; 86; 83.4; 80.9; 78.7
→ *values per 1/3-octave (50 Hz .. 10 kHz) for bon B (=4.0m) and condition constant speed*

#AerodynamicNoise (Table G-6)

Each record is closed with a line with only '#'.

Fields:

1. Code=a
→ *text, maximum 15 characters. Used as the coupling field.*
2. Description=EU standard
→ *text, informative.*
3. Reference=COMMISSION DELEGATED DIRECTIVE (EU) 2021/1226 of 21 December 2020
→ *text, informative.*
4. A_V0=300
→ *value v0 is a speed at which aerodynamic noise is dominant and is fixed at 300 km/h*
5. A_Alpha=50.0
→ *value for α_1 (is source height 0.5m)*
6. A_Values=98.9; 94.8; 92.6; 94.6; 92.8; 92.8; 93; 94.8; 94.6; 95.7; 95.6; 98.6; 95.2; 95.1; 95.1; 94.1; 94.1; 99.4; 92.5; 89.5; 87; 84.1; 81.5; 79.2
→ *values per 1/3 octave (50 Hz .. 10 kHz) for LW,0,1 (=0.5m)*
7. B_V0=300
→ *value v0: is a speed at which aerodynamic noise is dominant and is fixed at 300 km/h*
8. B_Alpha=50.0
→ *value for α_2 (is source height 4.0m)*
9. B_Values=98.9; 94.8; 92.6; 94.6; 92.8; 92.8; 93; 94.8; 94.6; 95.7; 95.6; 98.6; 95.2; 95.1; 95.1; 94.1; 94.1; 99.4; 92.5; 89.5; 87; 84.1; 81.5; 79.2
→ *values per 1/3 octave (50 Hz .. 10 kHz) for LW,0,2 (=4.0m)*

CNOSSOS_RailTracks

File contains the definition of all tables for a track

Tables:

1. **"#RailRoughness".**
2. **"#TrackTransfer".**
Also has the field "Gs", which is the ground factor at the source. This is usually 1.0, but for example at crossings or trams it can also be 0.0.
3. **"#ImpactNoise".**
4. **"#BridgeRadiation"**
Values per 1/3 octave.