Develop and Implement
Harmonised Noise Assessment Methods

Process Applied to Establish CNOSSOS-EU/National Method Equivalence for Rail Source Data

General Approach

In order to enable data and knowledge relevant to existing national methods to be applied to the CNOSSOS-EU approach, it is necessary to identify how national method categories of vehicle and infrastructure may be represented in CNOSSOS-EU.

Preferably the MS would establish, either from records or new measurements, relevant data in the CNOSSOS-EU database format. However, as an interim approach, the closest match between a selection of national method data categories and the 'default' or sample data examples within 'CNOSSOS-EU_Rail_Input_Database_Tables_Final - 01April2014' ("the database") have been established as follows.

In several instances the national methods include generic groupings which can comprise vehicles with disparate acoustic characteristics (e.g. different brake types) and, as CNOSSOS-EU is vehicle-based rather than train-based, the national method rolling stock categories have been subdivided where necessary to maintain acoustic homogeneity within category.

Vehicle Information

Vehicle Rolling Noise Transfer Function

The database includes transfer functions between combined effective roughness and sound power per axle for wheels with diameters ranging from 680mm to 1200mm.

These transfer functions are a function of wheel vibration response and radiation and can be derived from theory (e.g. TWINS modelling) or by the use of pass-by source separation techniques combined with direct or indirect measurement of combined effective roughness.

New wheel diameters for national method rolling stock, either actual or assumed from experience, have been used to identify the closest relevant database categories.

The database does not currently contain information on vehicle transfer functions where wheel dampers have been fitted. Vehicles that are known to have these devices installed have therefore not had a transfer function allocated to them at this stage, but a worst-case assumption could be made for modelling purposes by applying the transfer function for the relevant wheel diameter without a damper fitted.

Contact Filter

The contact filter at the wheel-rail interface modifies the combined wheel and rail roughness due to the ellipsoid contact zone and is largely a function of wheel diameter and axle load. This filter is normally derived from analytical approaches, with examples provided in the database against a range of axle loads and wheel diameters.

The highest axle load catered for in the database is 100 kN. As this would be typical of the lower end of the axle load range for standard stock, and as the contact filter value is not highly sensitive to load, the values for 100 kN have been used throughout in the equivalence tables.

Wheel Roughness

The database holds three default sets of wheel roughness data, for cast-iron tread brakes, composite tread brakes and disc brakes.

Brake types are not often readily available from industry and public-domain sources, and therefore, where definitive information has not been available, an assumption has been made for stock categories in national methods that is based on the types of vehicle, their vintage, and by examination of public-domain photographs where, for example, brake discs may be visible.

Where a vehicle has a combination of disc brakes and cast-iron tread brakes, the allocated brake category is always the latter.

Traction Noise

The database currently only holds data, in terms of sound power level per vehicle, for one example each of Diesel Multiple Unit, Electric Multiple Unit and Electric Locomotive, and therefore stock within the national methods that fall into these categories are identified accordingly.

In the case of Diesel Locomotives however, a range of types and available power is provided. Details of the type and power of each diesel locomotive included within the national method has therefore been used to inform the choice of the appropriate database equivalent.

This choice can be considered to apply for all modes of operation included within the database, ie idling, accelerating, constant speed and braking.

Aerodynamic Noise

Where aerodynamic noise is included in a national method for higher speed stock, or if the MS wishes to add this capability to the national method, the database provides a single reference spectrum in terms of sound power per vehicle at 300 km/h with associated speed exponents for the two source heights.

Track Information

Track Transfer Function

The transfer function between combined effective roughness and sound power per axle is a function of track structure type and pad stiffness.

These transfer functions are a function of track vibration response and radiation and can be derived from theory (e.g. TWINS modelling) or by the use of pass-by source separation techniques combined with direct or indirect measurement of combined effective roughness.

Where track types are described in national methods it has been possible to choose an appropriate equivalent CNOSSOS-EU type in a selection of cases.

Medium pad stiffness is assumed, to reflect the fact that harder pads, despite their acoustic benefits in increasing track vibration decay rate, are not attractive to infrastructure engineers who wish to protect the sleepers from high track forces.

For track with wooden sleepers, the database holds only one transfer function dataset.

Rail Roughness

The database holds rail roughness spectra for EN ISO 3095 2013 conditions and for the Netherlands average network.

The former is track of low roughness designed for type testing (Technical Specification of Interoperability [TSI]) purposes, while the latter can be taken to represent an average figure for a typical European network that is maintained to a generally high level. However, for equivalence purposes some additional considerations have been taken into account.

For RMR, being a Netherlands method, the Netherlands average network figure is considered appropriate.

For the UK method “CRN”, it has been found from previous research studies that total pass-by noise for disc-braked stock on “CRN track” is typically 1.7 dB greater than total pass-by noise of the same stock on EN ISO 3095 2013 track. The ISO 3095 rail roughness has therefore been adjusted to provide this increase when combined with a typical disc-braked wheel roughness at the TSI testing speed of 80 km/h, leading to the new rail roughness spectrum provided in the CRN equivalence table.

For the German “Besonders Überwachtes Gleis” (BÜG) specially monitored acoustically-ground track, Schall03 provides a sound level reduction at certain frequencies. For the purpose of CNOSSOS-EU equivalence it has been assumed that these reductions apply directly to the rail roughness (which is a reasonable first approximation in the presence of smooth wheels) and the relevant frequencies have therefore been converted to roughness wavelength for the Schall03 reference speed of 100 km/h. Schall03 also refers to TSI track and EN ISO 3095 (2005) track and, for the purposes of equivalence, the use of the database rail roughness for EN ISO 3095 2013 roughness is recommended here.

Impact Noise

Where a method includes the noise increase due to impacts from joints, switches and crossings, CNOSSOS-EU provides an additional rail roughness element that is based on joint density. Therefore, where a national method takes this into account, it is necessary for n, the number of discontinuities per 100m, to be established for the track section in question and the database default spectrum “single switch /joint /crossing /100m” adjusted by the addition of 10log(n) at all wavelengths.

Bridge Noise

There are many variants of railway elevated structures, constructed typically from steel, concrete, masonry and various combinations of all these, and other, materials.

Therefore in the database there are only two key examples of bridge type with an associated enhancement to overall sound level, ie “Predominantly concrete or masonry bridges with any trackform” +1 dB(A) and “Predominantly steel bridges with ballasted track” +4 dB(A).

There is, however, also the “max” value of +9 dB(A) which can be applied as an approximation for known very high noise structures.

This information has informed the choice of bridge enhancement applied to the Schall03, RMR and CRN equivalence tables.

Details of how data supporting a selection of existing national railway noise calculation methods may be applied to the CNOSSOS-EU railway methodology is set out in the following section.

Extrium

30 April 2014

Calculation of Railway Noise (CRN)

Based on Department of Transport Publication "Calculation of Railway Noise 1995" + Eurostar Supplement No. 1 1996 "Procedure for the calculation of noise from Eurostar trains class 373"

Notes:

1. CNOSSOS-EU is single vehicle-based in general, as is CRN, expect for the case of Eurostar which is treated in CRN as a single train but for CNOSSOS-EU purposes will need to be separated into its component vehicles

2. Aerodynamic noise is not included in CRN

3. IDs shown are those in 'Rail_Input_Database_Tables_Final-01April2014'

4. CRN rail roughness has been found to give rolling noise values, with a smooth wheel, ~1.7 dB(A) greater than values on TSI track. The rail roughness spectrum shown below provides an approximation to this

CRN Vehicle Category

CRN Vehicle Cat			Veh TF	Contact filter	Wheel roughness	Traction noise*	Default length m	Axles/ vehicle
Cat 1								
		British Rail MkI	3	7	3	-	17.4	4
		British Rail MkII	3	7	3	-	19.7	4
		Gatwick Express	3	7	3	-	19.7	4
		Class 421 EMU	3	7	3	10	20.2	4
		Class 422 EMU	3	7	3	10	20.2	4
		London Underground-A Stock	3	7	3	10	15.4	4
		London Underground-Tube Stock	4	7	3	10	16.6	4
Cat 2								
		British Rail MkIII	3	7	5	-	23.0	4
		British Rail Mk IV	3	7	5	-	23.0	4
		Class 319 EMU	3	7	5	10	20.2	4
		Class 465 EMU	3	7	5	10	20.9	4
		Class 466 EMU	3	7	5	10	20.8	4
		Class 165 DMU	3	7	5	8	23.5	4
		Class 166 DMU	3	7	5	8	23.5	4
Cat 2a								
		Manchester Metrolink LRV articulated	5	7	5	10	28.4	6
Cat 2b								
		South Yorkshire Supertram LRV (double articulated)	5	7	5	10	35.0	8
Cat 3								
		2 axle tank wagons	3	7	3	-	7.3	2
Cat 4								
		4 axle tank wagons	3	7	3	-	18.3	4
Cat 5								
		Merry Go Round Coal Hopper HA	3	7	5	-	9.0	2
Cat 6								
		Freightliner	3	7	5	-	20.3	4
Cat 7								
	Rolling	Class 20 Diesel Locomotive	3	7	3	-	14.3	4
	Rolling	Class 31 Diesel Locomotive	3	7	3	-	17.3	6
	Rolling	Class 33 Diesel Locomotive	3	7	3	-	15.5	4
	Rolling	Class 37 Diesel Locomotive	6	7	3	-	18.8	6
	Rolling	Class 43 Diesel Locomotive	3	7	3	-	17.8	4
	Rolling	Class 47 Diesel Locomotive	6	7	3	-	19.4	6
	Rolling	Class 56 Diesel Locomotive	6	7	3	-	19.4	6
	Rolling	Class 59 Diesel Locomotive	3	7	3	-	21.4	6
	Rolling	Class 60 Diesel Locomotive	6	7	3	-	21.3	6
	Rolling	Class 73 Electric Locomotive (with alternative diesel power sourc	3	7	3	-	16.4	4
	Rolling	Class 86 Electric Locomotive	6	7	3	-	17.8	4
	Rolling	Class 87 Electric Locomotive	6	7	3	-	17.8	4
	Rolling	Class 90 Electric Locomotive	6	7	3	-	18.8	4
	Rolling	Class 91 Electric Locomotive	3	7	3	-	19.4	4
Cat 8*								
	Power	Class 20 Diesel Locomotive Under Full Power				3	14.3	4
	Power	Class 31 Diesel Locomotive Under Full Power				6	17.3	6
	Power	Class 33 Diesel Locomotive Under Full Power				6	15.5	4
	Power	Class 37 Diesel Locomotive Under Full Power				6	18.8	6
	Power	Class 43 Diesel Locomotive Under Full Power				6	17.8	4
	Power	Class 47 Diesel Locomotive Under Full Power				4	19.4	6
	Power	Class 56 Diesel Locomotive Under Full Power				4	19.4	6
	Power	Class 59 Diesel Locomotive Under Full Power				7	21.4	6
	Power	Class 60 Diesel Locomotive Under Full Power				4	21.3	6
Eurostar								
		Class 373 Power Car	3	7	3	9**	22.2	4
		Class 373 Vehicle adjacent to Power Car (2 of 3 axles are Cl trea	3	7	3	-	21.2	3
		Class 373 Central "TBF" vehicles	3	7	5	-	21.2	3
		Class 373 All other vehicles	3	7	5	-	18.7	2

*Where appropriate - NB CRN does not apply traction noise separately to Elec Loco, EMU, DMU

**Assume permanently on "accelerating" due to high level of fan noise

CRN Track Type

CRN Track Type			Track Transfer ID	Impact noise ID	Bridge constant ID			
CWR								
		Concrete sleepers + Ballast	4					
		Timber sleepers + Ballast	9					
Jointed								
		18.3m lengths		CNOSSOS Impact Spectrum ID3 + 7.4dB @ all wavelengths				
Slab								
		Slab not currently catered for in CNOSSOS - would require additional source data acquisition						
Bridges + viaducts								
		Concrete bridges and viaducts			3			
		Steel			4			
		Steel with directly-fitted rails			2			

Rail roughness spectrum to approximate CRN conditions		
Wavelength	Lr dB re 1 micron	
1000 mm	18.8	
800 mm	18.8	
630 mm	18.8	
500 mm	18.8	
400 mm	18.8	
315 mm	16.7	
250 mm	14.8	
200 mm	12.9	
160 mm	11.0	
120 mm	9.1	
100 mm	7.3	
80 mm	5.4	
63 mm	3.6	
50 mm	1.7	
40 mm	-0.2	
31.5 mm	-2.1	
25 mm	-3.0	
20 mm	-3.8	
16 mm	-4.4	
12 mm	-4.9	
10 mm	-5.5	
8 mm	-6.0	
6.3 mm	-6.5	
5 mm	-7.1	
4 mm	-7.6	
3.2 mm	-7.7	
2.5 mm	-8.1	
2 mm	-8.5	
1.6 mm	-8.8	
1.2 mm	-9.2	
1 mm	-9.5	
0.8 mm	-9.5	

Nord 2000

Notes:

1. CNOSSOS-EU is single vehicle-based in general, and therefore it is assumed that each vehicle in an ONR 305011 category will be considered separately in CNOSSOS-EU.

2. IDs are those in 'Rail_Input_Database_Tables_Final-01April2014'

		.....		CNOSSOS ID		.....	
	Nord 2000 Vehicle Categories	Veh TF	Contact filter	Wheel roughness	Traction noise*	Default length m	Axles/ vehicle
1	1a (X2000) HS Passenger						
1a	X2000 coach	3	7	3	-	25.0	4
1b	X2000 locomotive	6	7	5	9	17.8	4
2	2a Pass IC trains with RC locomotive						
2a	Passenger coach	3	7	3	-	26.4	4
2b	RC locomotive	6	7	5	9	15.4	4
4	3a X10	3	7	3	10	25.0	4
5	4a Freight El with RC Electric locomotive						
5a	RC locomotive	6	7	5	9	15.4	4
5b	Freight wagon	3	7	3	-	14.0	4
6	4b Freight Di withT44 diesel locomotive						
6a	T44 locomotive	3	7	3	6	15.4	4
6b	Freight wagon	3	7	3	-	14.0	4
7	1a-2d-3c (Type BM 71, BM 72, BM 73)						
7a	BM71	3	7	5	10	27.4	4
7b	BM72	3	7	5	10	28.5	4
7c	BM73	3	7	5	10	27.1	4
8	2a (Type BM 70)	3	7	3	10	27.0	4
9	2b (Passenger train El (locomotive driven))						
9a	RC locomotive	6	7	5	9	15.4	4
9b	Passenger coach	3	7	3	-	26.4	4
10	2c-3b (Passenger train DI, Type BM 92)	3	7	5	8	24.7	4
11	2e (Type BM 93)	3	7	5	8	19.1	3
12	3a (Type BM 69)	3	7	3	10	25.0	4
13	4a (Ordinary goods, El)						
13a	RC locomotive	6	7	5	9	15.4	4
13b	Freight wagon	3	7	3	-	14.0	4
14	4b (Ordinary express goods, El)						
14a	RC locomotive	6	7	5	9	15.4	4
14b	Freight wagon	3	7	3	-	14.0	4
15	4c (Goods, Di)						
15a	T44 locomotive	3	7	3	6	15.4	4
15b	Freight wagon	3	7	3	-	14.0	4
16	A&D (type IC3 and ER (IR4)						
16a	IC3	3	7	5	8	20.5 end, 17.7 middle	4
16b	IR4	3	7	5	10	20.5 end, 17.7 middle	4
17	B, C, H & I (type MZ, ME, MY and EA)						
17a	MZ locomotive	3	7	3	4	21.0	6
17b	ME locomotive	3	7	3	4	21.0	6
17c	MY locomotive	3	7	3	6	18.9	6
17d	EA locomotive	6	7	3	9	19.4	4
17e	Freight wagon	3	7	3	-	14.0	4
17f	Passenger coach	3	7	3	-	26.4	4
18	E (type MR and Y)	3	7	3	10	22.3	4
19	F2 & F3 (S-train 2 and 3 generation) OBSOLETE						
20	F4 (S train 4 generation)	3	7	5	10	83.8	10
21	Oeresundstog	3	7	5	10	26.3	4
22	Metrotog	3	7	5	10	39.0	8
23	X60	3	7	5	10	107.0	14
24	X40	3	7	5	10	27.0	4

ONR 305011

Notes:

1. CNOSSOS-EU is single vehicle-based in general, and therefore it is assumed that each vehicle in an ONR 305011 category will be considered separately in CNOSSOS-EU.

2. IDs are those in 'Rail_Input_Database_Tables_Final-01April2014'

ONR Train Category

				CNOSSOS ID			
	ONR 305011 Cat	Veh TF	Contact filter	Wheel roughness	Traction noise*	Default length m	Axles/ vehicle
1	Reisezugwagen klotz-/kombiniert 2004	3	7	3	-	26.0	4
2	Reisezugwagen scheibengebremst 2004	3	7	5	-	26.0	4
3	Triebwagengarnitur BR4010 (Fernv.) 2004	3	7	3	10	16.8	4
4	Triebwagengar. BR4020&4030 (Nahv.) 2004	3	7	5	10	23.0	4
5	Nahverk. Dieseltriebwagen BR5047 2004	3	7	3	8	25.4	4
6	Güterwagen 2004	3	7	3	-	14.0	4
7	8-achsiger Niederflurwagen 2004	5	7	5	-	24.0	8
8	Elektro-Triebfahrzeug (BR1044) 2004	6	7	3	9	16.1	4
9	Diesel-Triebfahrzeug (BR2143) 2004	3	7	3	5	15.8	4
10	Reisezugwagen klotz-/kombiniert gebremst 2009	3	7	3	-	26.0	4
11	Reisezugwagen scheibengebremst 2009	3	7	5	-	26.0	4
12	Triebwagengarnitur BR4020 (NahVerk.) 2009	3	7	5	10	23.3	4
13	Triebwagengarnitur BR4023/4024/4124 (NV) 2009 (Talent)						
13a	Talent end vehicles	3	7	5	10	17.0	3
13b	Talent other vehicles	3	7	5	10	17.0	2
14	Dieseltriebwagen BR 5047/5147 (NV) 2009	3	7	3	8	25.4	4
15	Güterwagen mit Grauguss-Bremsklotzsohle 2009	3	7	3	-	14.0	4
16	Güterwagen mit K-Sohle 2009	3	7	4	-	14.0	4
17	Niederflurwagen (ROLA) 2009	5	7	5	-	24.0	8
18	Elektro-Triebfahrzeug (BR1044/1144)	3	7	3	9	16.1	4
19	Elektro-Triebfahrzeug (BR1016/1116/1216) 2009 (**Eurosprinter)	6	7	5	9	19.3	4
20	Diesel-Triebfahrzeug (BR 2143) 2009	3	7	3	5	15.8	4
21	Diesel-Triebfahrzeug (BR 2016) 2009	6	7	5	4	19.3	4
22	Railjet 2009 - trailer vehicles only (locomotive is Eurosprinter**)	3	7	5	-	26.5	4
23	ICE-Familie 2009 (Velaro)	3	7	5	10	25.0	4

*Where appropriate

RMR

Based on Wölfel Meßsysteme non-contextual English translation 2003 : "CALCULATION AND MEASUREMENT GUIDELINES FOR RAIL TRANSPORT NOISE 1996"

Notes:

1. CNOSSOS-EU is single vehicle-based in general, and therefore it is assumed that each vehicle in an RMR category will be considered separately in CNOSSOS
2. Aerodynamic noise is not included in this version of RMR
3. IDs are those in 'Rail_Input_Database_Tables_Final-01April2014'
4. Assume rail roughness is CNOSSOS-EU "ID 4" : 'NL average network with extrapolation'

RMR Train Category

				CNOSSOS ID			
RMR Train Cat		**Veh TF**	**Contact filter**	**Wheel roughness**	**Traction noise***	**Default length m**	**Axles/ vehicle**
Cat 1							
	All	3	7	3	10	26	4
Cat 2							
	ICM-III, ICR trailer vehicles, DDM-1 trailer vehicles, SNCF passenger coaches and TEE	3	7	3	10	26	4
	ICR 1700 locomotive, DDM-1 1800 locomotive and Belgian locomotives	6	7	3	9	18	4
Cat 3							
	All	3	7	5	10	26	4
Cat 4							
	Freight wagons	3	7	3	-	Variable	Variable
Cat 5							
	DE1, DE2, DE3	3	7	3	8	25	4
	2200 and 2300 locomotive	3	7	3	3	14	4
	2400 and 2500 locomotive	3	7	3	3	13	4
Cat 6							
	All	3	7	5	8	26	4
Cat 7							
	All	3	7	5	10	15	3
Cat 8							
	ICM IV and IRM	3	7	5	10	26	4
	DDM 2/3	3	7	3	10	26	4
Cat 9							
	TGV PBA type, power car	3	7	3	9	20	4
	TGV PBA type, trailer car adjacent to power car	3	7	5	-	20	3
	TGV PBA type other trailer cars	3	7	5	-	20	2
Cat 10							
	ICE-3 type assuming no wheel dampers	3	7	5	10	25	4

*Where appropriate

RMR Track Category

RMR Track Cat "b"		Track Transfer ID
1		
	Monoblock	4
	Bi-block	7
2		
	Wooden	9
3		
	See impact correction table below for jointed track	
4		
	"Blocks" - not catered for in CNOSSOS - would require additional source data acquisition	
5		
	"Blocks" - not catered for in CNOSSOS - would require additional source data acquisition	
6		
	"Adjustable rail fixation" - not catered for in CNOSSOS - would require additional source data acquisition	
7		
	"Adjustable rail fixation" - not catered for in CNOSSOS - would require additional source data acquisition	
8		
	"Poured in" not catered for in CNOSSOS - would require additional source data acquisition	
9		
	"Level crossings" not catered for in CNOSSOS - would require additional source data acquisition	

RMR Joints “m”

RMR Joints "m"		Impact noise ID
1		
	Jointless rails (fully welded tracks) with or without jointless switches or crossings	1
2		
	Rails with joints (= tracks with joints) or an isolated switch	3
3		
	Switches and crossings with joints, 2 per 100m	3
4		
	More than 2 switches per 100m	2

RMR Structure

RMR Structure		Bridge constant ID
	TT & U-type bridge - predominantly concrete or masonry	3
	TT & U-type bridge - predominantly steel	4
	Plate & girder bridge	4
	Steel deck bridge	4

Schall03

Based on SCHALL03 (2006)

Notes:

1. CNOSSOS-EU is single vehicle-based in general, and therefore it is assumed that each vehicle in a Schall03 category will be considered separately in CNOSSOS-EU.

2. IDs are those in 'Rail_Input_Database_Tables_Final-01April2014'

3. Rail roughness: Default is CNOSSOS-EU "ID 4" : 'NL average network with extrapolation'

4. Rail roughness: For BÜG track: subtract, from "ID4", 4 dB for wavelengths 5mm-8mm and 40mm-63mm, and subtract 5dB for 10mm-31.5mm

5. Rail roughness: For TSI track and EN ISO 3095 track: "ID3" EN ISO 3095 2013 with extrapolation

6. Aerodynamic noise is dealt with through CNOSSOS-EU 'Rail_Input_Database_Tables_Final-01April2014' aerodynamic noise table.

7. For curve squeal add 8 dB for R<300 m and 5 dB for 300 m<R<500 m to the rolling noise sound power spectra for all frequencies.

Schall03 Train Category

		.....		CNOSSOS ID		.....	
	Schall03 Vehicle Cat	Veh TF	Contact filter	Wheel roughness	Traction noise*	Default length m	Axles/ vehicle
1	HGV-Triebkopf (ICE 1 and ICE 2)	3	7	5	9	25	4
2	HGV-Triebkopf ohne Radabsorber (Thalys)	3	7	3	9	20	4
3	HGV-Mittel-/Steuerwagen mit Radabsorber (ICE 1 and ICE 2)	**	7	5	-	25	4
4	HGV-Mittel-/Steuerwagen ohne Radabsorber (Thalys)	3	7	5	-	20	3-ax adjacent to power car, 2-ax other vehicles
5	HGV-Triebzug Ein-Systemversion	3	7	5	10	25	4
6	HGV-Triebzug Zwei-Systemversion	3	7	5	10	25	4
7	HGV-Triebzug Drei-Systemversion	3	7	5	10	25	4
8	HGV-Neigezug mit Radabsorber	**	7	5	10	26	4
9	HGV-Neigezug ohne Radabsorber (ETR 470)	3	7	5	10	26	4
10	E-Triebzug und S-Bahn mit Wellenscheibenbremse (WSB)	3	7	5	10	26	4
11	E-Triebzug und S-Bahn mit Radscheibenbremse (RSB)	3	7	5	10	26	4
12	Diesel-Triebzug	3	7	5	8	26	4
13	E-Lok mit Grauguss-Klotzbremse (GG-Bremse)	3	7	3	9	20	4
14	E-Lok mit Rad- oder Wellenscheibenbremse	3	7	5	9	20	4
15	Diesel-Lok	3	7	3	4	20	4
16	Reisezugwagen mit Grauguss-Klotzbremse (GG-Bremse)	3	7	3	-	26	4
17	Reisezugwagen mit Wellenscheibenzbremse	3	7	5	-	26	4
18	Güterwagen Grauguss-Klotzbremse (GG-Bremse)	3	7	3	-	2-ax:7m 4-ax:14m	2/4
19	Kesselwagen Grauguss-Klotzbremse (GG-Bremse)	3	7	3	-	2-ax:7m 4-ax:14m	2/4
20	Güterwagen Kunststoff-Klotzbremse (K-Bremse)	3	7	4	-	2-ax:7m 4-ax:14m	2/4
21	Kesselwagen Kunststoff-Klotzbremse (K-Bremse)	3	7	4	-	2-ax:7m 4-ax:14m	2/4
22	Güterwagen Wellenscheibenbremse	3	7	5	-	2-ax:7m 4-ax:14m	2/4
23	Kesselwagen Wellenscheibenbremse	3	7	5	-	2-ax:7m 4-ax:14m	2/4
24	Güterwagen mit Radscheibenbremse (nur RoLa)	5	7	5	-	24	8
25	Straßenbahn-Niederflurfahrzeug	5	7	5	10	40	8
26	Straßenbahn-Niederflurfahrzeug mit Klimaanlage	5	7	5	10	40	8
27	Straßenbahn-Hochflurfahrzeug	5	7	5	10	40	8
28	U-Bahn-Fahrzeuge	5	7	5	10	12	4

**Note: CNOSSOS-EU database does not currently include vehicle transfer functions for wheels with absorbers (Radabsorber) and therefore this data will have to be acquired by the user, or an appropriate assumption made based on theory (eg TWINS modelling)

Schall03 Track Category

Schall03 Track Cat	Track Transfer ID
Monoblock concrete sleeper on ballast	4
Wooden sleeper on ballast	9
Steel sleepers are not catered for in CNOSSOS - would require additional source data acquisition	
See impact correction table below for joints/crossings	
Other track forms are not catered for in CNOSSOS - would require additional source data acquisition	
SCHALL03 Bridge Type	Bridge constant ID
Steel – bridges with direct bedded rails	2
Steel – bridges with ballasted track	4
Steel - bridges with slab track or special steel bridges with ballasted track***	
Bridges with slab track***	

***Not catered for in CNOSSOS-EU - would require additional source data acquisition

SNCF method

Notes:

1. CNOSSOS-EU is single vehicle-based in general, and therefore it is assumed that each vehicle in a SNCF category will be considered separately in CNOSSOS-EU.

2. IDs are those in 'Rail_Input_Database_Tables_Final-01April2014'

SNCF Vehicle Category

				CNOSSOS ID			
	SNCF Vehicle Cat	Veh TF	Contact filter	Wheel roughness	Traction noise*	Default length m	Axles/ vehicle
1	TGV 200 (TGV-Duplex)	3	7	4 Power Car, 5 all other vehicles	9 Power Car only	20.0	4-ax power car, 3-ax adjacent to power car, 2-ax other vehicles
2	TGV 300, TGV 400 (TGV-A)	3	7	4 Power Car, 5 all other vehicles	9 Power Car only	20.0	4-ax power car, 3-ax adjacent to power car, 2-ax other vehicles
3	TGV 500, TGV 4500 (TGV-R, TGV Thalys PBA)	3	7	4 Power Car, 5 all other vehicles	9 Power Car only	20.0	4-ax power car, 3-ax adjacent to power car, 2-ax other vehicles
4	TGV 3200 (TGV-TMST Eurostar)		7				
4a	TGV 3200 Power Car	3	7	3	9	22.2	4
4b	TGV 3200 Vehicle adjacent to Power Car (2 of 3 axles are CI tread, so this is assumed to dominate)	3	7	3	-	21.2	3
4c	TGV 3200 Central "TBF" vehicles	3	7	5	-	21.2	3
4d	TGV 3200 All other vehicles	3	7	5	-	18.7	2
5	BB 16000-BB 16100	6	7	3	9	16.7	4
6	BB 17000, BB 17100	6	7	4	9	14.9	4
7	BB 22200-22300-22400	6	7	4	9	17.5	4
8	CC 72000-72100	6	7	4	4	20.2	4
9	Z 5300, Z 5400	3	7	4	10	26.0	4
10	Z 6400, Z 6500	3	7	4	10	23.0	4
11	Z 8100, Z 8200	3	7	4	10	26.0	4
12	Z 20500 pent. freinée fonte (Z2N)	3	7	3	10	26.0	4
13	Z 20500 pent freinée composite (MI2N)	3	7	4	10	26.0	4
14	Z 22500, Z 22600 pentacaisses (MI2N)	3	7	4	10	22.0	4
15	X 72500 bicaisses (X-TER)	3	7	4	8	26.5	4
16	X 73500, 73600, 73700, 73800, 73900 (A-TER)	3	7	5	8	28.9	4
17	Voiture VU, VTU freinée Fonte (CORAIL)	3	7	3	-	26.4	4
18	Voiture V2N	3	7	5	-	26.4	4
19	Voitures VB2N	3	7	3	-	24.3	4
20	Wagon trémie	3	7	5	-	17.0	4
21	Wagon de Fret (divers) freinée fonte	3	7	3	-	17.0	4

*Where appropriate