GUIDANCE

NOISE BARRIERS – GUIDANCE

TENDER SPECIFICATION

JUNE 2012

DISCLAIMER

The translation into English of Road Standards (Vejregler) and Tender Specifications is to be regarded entirely as a service. In the event of any discrepancy or shortcomings in the translation, the Danish version will prevail. At any time the Danish versions of Road Standards (Vejregler) and Tender Specifications are those in force.

VEJREGLER

PREFACE

This tender specification includes the requirements for CE marked noise barriers and set-up of the equipment.

The tender specification is part of the series *Tender specifications for road restraint systems*. The series now consists of:

- *Common to Road Equipment – GWS*
- Road Signs
- Street Lighting Equipment
- Road Safety Barriers and Related Equipment
- Bridge Barriers and Parapets
- Noise Barriers.

The tender specification for noise barriers is new in the road specifications. The tender specification has been prepared by the Road standards group for equipment for roads and structures which has included the following persons during the period:

John Kjærsgaard	Danish Road Directorate (chairman until May 2011)
Morten Larsen	(chairman from May 2011)
Tim Larsen	Tl Engineering (secretary)
Erik Petersen	NESA (until August 2011)
Kai Sørensen	DELTA Lys og Optik (until June 2011)
Charlotte Sejr	Danish Road Directorate
Johannes Vindum	Møller & Grønborg A/S
Peter Johnsen	Johnsen Consult
Henrik Aagaard	Dragør Local Authority, Vej og Park (Roads and Parks)
Ole Hardt	Danish Road Directorate (VRS)
P. Allan Nestén	Seri Q Sign
Erik Vejsgaard Christensen	NCC Roads.

In April-May 2012, the members of the Danish Road Standard Committee conducted a consultation on Tender specification for noise barriers before it was issued.

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1 GENERAL

The overall purpose of issuing the tender specification for noise barriers is:
- To help/support the designer in the preparation of tender for noise barriers
- To ensure a consistent and well-defined basis for the tenderer.

Tender specification for noise barriers includes the following:
- Specifications (this document)
- General Work Specification (GWS)
- Paradigm for Special Work Specification (SWS-P)
- Paradigm for Tender and Calculation Basis (TCB-P)
- Paradigm for Bills Of Quantities (BOQ-P).

2 USE

It should be clarified that these specifications and corresponding tender specifications only include flat noise barriers (se instructions in Handbook in noise barriers, which is currently being prepared).

Tenders, acquisition and installation of noise barriers are regulated by the Construction Products Directive, the Public Procurement Directive and Executive Order on the procedures for award of public works contracts, public supply contracts and public service contracts.

For noise barriers, a number of standards under the Construction Products Directive have been prepared. The standards have been prepared by CEN TC 226/WG6 “Noise Reducing Devices”.
A number of the standards are binding and some of them are voluntary. Status and use of the individual standards are reviewed in the following.

The European standards for noise barriers in accordance with the Construction Products Directive are incorporated in these tender specifications. The detailed rules as to when and how a tendering procedure shall be conducted are described in the Public Procurement Directive, including rules for the contracting entity's (the Employer's) reference to technical specifications – or any omission of this – in connection with call for tenders for planning and construction works.

3 REQUIREMENTS FOR NOISE BARRIERS

3.1 General

Requirements for noise barriers are described in the product standard DS/EN 14388. Reference is made to the other standards for noise barriers in the product standard. A list of the various requirements and standards is shown below:

Requirements for noise barriers		
Characteristics	Standard	Comment
Sound absorption	DS/EN 1793-1	Requirements for absorbing noise barriers
Sound insulation	DS/EN 1793-2	Requirements for all noise barriers
Diffraction	CEN/TS 1793-4	Optional
Wind and static load	DS/EN 1794-1 (Annex A)	Requirements
Dead weight	DS/EN 1794-1 (Annex B)	Requirements
Chipping	DS/EN 1794-1 (Annex C)	Requirements in special cases
Collision safety	DS/EN 1794-1 (Annex D)	Requirements in special cases
Snow removal load	DS/EN 1794-1 (Annex E)	Requirements in special cases
Fire safety	DS/EN 1794-2 (Annex A)	Requirements in special cases
Attachment of the elements	DS/EN 1794-2 (Annex B)	Requirements in special cases
Environmental protection	DS/EN 1794-2 (Annex C)	Requirements in special cases
Emergency exits	DS/EN 1794-2 (Annex C)	Requirements in special cases
Light reflection	DS/EN 1794-2 (Annex C)	Requirements in special cases
Transparency	DS/EN 1794-2 (Annex C)	Requirements in special cases
Long durability	DS/EN 14389-1	Not used
Long durability	DS/EN 14389-2	Not used

3.2 Review of the various requirements

General
All noise barriers – both absorbent and reflective – shall be tested in a laboratory and certified for sound insulation. All absorbent noise barriers shall also be tested in a laboratory and certified for sound absorption.

For all acoustic tests, the complete structure, including load-bearing parts and any sealing, shall be tested.

All tests shall be carried out in accordance with DS/EN 1793-1 and -2.

Even if the complete structure has been tested and CE-marked, there are noise barrier elements on the market which are CE marked. In Denmark, noise barrier elements which are CE marked are accepted if they are installed in a similar structure as that used in the test on which the CE marking is based.

Sound insulation
All noise barriers shall be tested for sound insulation in accordance with DS/EN 1793-2 and should as a minimum be in category B3 (DS/EN 1793-2, Annex A).

Sound absorption
Absorbent noise barriers shall be tested for sound absorption in accordance with DS/EN 1793-1 and should be in at least category A3 (DS/EN 1793-1, Annex A), and at least category B3 in terms of sound insulation (DS/EN 1793-2, Annex A).

Diffraction
Requirements for diffraction measurements are usually not included as they are mostly used for improvements of existing noise barriers.

Wind and static load
The noise barrier shall comply with the minimum requirements for wind load and static load in DS/EN 1794-1, Annex A, for both structural elements and acoustic elements.

Dead weight
The noise barrier shall comply with the minimum requirements for dead weight in DS/EN 1794-1, Annex B, for both structural elements and acoustic elements.

Chipping
For noise barriers situated close to the road, for example in the emergency lane on the motorway, noise barriers which are composed of metal elements or acrylic elements should be protected against chipping by fulfilling the test criteria in DS/EN 1794-1, Annex C.

Collision safety
Noise barriers constitute a fixed object in the traffic environment. If the noise barrier is situated within the safety zone and is not protected by guard rails it shall comply with DS/EN 1794-1, Annex D. With respect to choice of the correct guard rail class, reference is made to road standard for setting up safety barriers and crash cushions in open land.

Snow removal load
For noise barriers situated close to the road there should be requirements that the noise barrier shall be able to withstand the dynamic snow load as described in DS/EN 1794-1, Annex E.

Fire safety
There are usually no requirements for fire safety when setting up noise barriers.

When using absorbent material at tunnel openings, the requirements may be relevant.

If the requirement is used, the acoustic elements shall comply with the requirements in DS/EN 1794-2, Annex A, class 2.

Attachment of the elements
On roads in fillings or on bridges near residential areas etc., there should be requirements for compliance with the minimum requirements in DS/EN 1794-2, Annex B, class 3 or 6.

Environmental protection
The materials or components used shall be described in accordance with DS/EN 1794-2, Annex C.

Emergency exits
Emergency exits may be established on motorways where the cross section is closed with noise barriers over 2 km and the emergency exists are established at 500 m intervals. On other roads, emergency exits may be established based on the same principle.
The emergency exits shall comply with the requirements of DS/EN 1794-2, Annex D.

Light reflection
Requirements for light reflection may be relevant for metal or acrylic noise barriers as there may be light reflection.

There may be requirements for calculation of light reflection in accordance with DS/EN 1794-2, Annex E.

Transparency
Requirements for transparency may be relevant for noise barriers in residential areas and for the road users, for example to break the monotony of the traffic scenario or to create an overview of oncoming traffic flows.

There may be requirements for calculation of transparency in accordance with DS/EN 1794-2, Annex F.

3.3 Aesthetics and architectural conditions

In connection with the choice of noise barrier, it is important that the surrounding environment and the impression on the road users are taken into account. The aesthetic requirements for a noise barrier should be assessed for each individual project and inspiration for aesthetic requirements may be found on vejsektoren.dk under ”Strategier for støjafskærmning”.

If special elements or planting are to be attached to the noise barrier for aesthetic reasons, this shall be described in SWS, TCB and BOQ.

3.4 Foundation

The Contractor shall be able to document that the foundation assumptions for the relevant loads have been fulfilled.

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