

Verification Directions for DK-STM BL3

Banedanmark				Address Banedanmark Carsten Niebuhrs Gade 43 DK-1577 Copenhagen V DENMARK	Construction Banedanmark The Signal Program Carsten Niebuhrs Gade 43 DK-1577 Copenhagen V DENMARK
Approved by Banedanmark			Replaced -		
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Change Log

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01.10	2015-06-23	ECPn	XJOWI / XSICU		Most	Changed from Indbygningsforskrift to Verifikationsforskrift and translated into English.
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01.14	2017-11-22	ECPn	XSICU	ECPn	Most	Document revised based on input from the NSA.
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01.19	2021-06-01	XTHP	ECPn	KFLA	6.2, 6.4, 7.3, 9.1, 10.3 and App. A+B	Adjustment of DeBo activities. Process for series added. Role of keeper introduced and comments from NSA.
01.20	2022-01-20	XTHP	ECPn	KFLA	2.0, 10.3, 11.0 and App.B	Update after assessment AR932
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01.22	2023.09.29	XTHP	ECPn/ MJON	KFLA	2.0, 3.0, 6.2, 6.5, 7.2, 9.2, 10.3 11.0	New VE6 card and SW 03.01.00 New document archive address. Including verification module SH1 Ver. 01.22 was never published.
01.23	2024.02.28	XTHP	MJON	OAHS	All.	Changes due to remarks from the NSA and BDK updates

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1.0 Preface

Vehicles equipped with a DK-STM must be authorized by the National Safety Authority (NSA)¹. As part of this authorization procedure, a DeBo is required to check and certify that the requirements of this document are met.

The authorization procedure is in compliance with the executive order issued by the National Safety Authority on the authorization of vehicles. The applicable rules are always available at the National Safety Authority's website, or information about the applicable rules may be obtained by enquiry to the National Safety Authority.

Reference is made to the documents listed in the next chapter. The text and the underlying documents lay down a number of requirements. All these requirements are gathered in Appendix A, thus enabling a DeBo to check whether all requirements are met. The applicant must choose which module to be used.

Chapter 10 includes a list of the documents and declarations to be prepared according to these Verification Directions.

Please note that these directions only concern DK-STM and its interface to the train. The approval of combined STM-DK/ETCS shall be addressed separately and in accordance with the procedures, given by the NSA.

Banedanmark (BDK) has had DK-STM developed so that it is able to work with ETCS equipment. See chapter 6.1 regarding connection to the ETCS equipment.

2.0 References

In this document, reference is made to various other regulations. A reference is written with a reference number in square brackets [number] or as "the name of the regulations".

References:

- [0] IN655.00 Q4598, List of References to the DK-STM. Published by BDK.
- [1] KN 655.00 Q2959, DK-STM System Description. Published by BDK.
- [2a] IN 655.00 Q2962, DK-STM Subrack Installation Manual. Published by BDK.
- [2b] IN 655.00 Q4432, DK-STM Cubicle Installation Manual. Published by BDK.
- [3] IN 656 V1721, Forskrift for vurdering af ATC Havarilogdata. Published by BDK.
- [4] IN 656 V1711, Protocol for Serial Communication between ATC, TC, MSR3 and Event Recorder. Published by BDK.
- [5a] VN 655.00 Q2961, DK-STM Subrack Maintenance Manual. Published by BDK.
- [5b] VN 655.00 Q4433, DK-STM Maintenance Manual Cubicle. Published by BDK.
- [6a] STM-DK. Application Rules. (Appendix to STM-DK Generic Application Safety Case). Published by Siemens.
- [6b] STM-DK. Application Rules. STM-DK Cubicle. (Appendix to STM-DK Cubicle Safety Case), Published by Siemens.
- [7] SN 655.00 Q2960, DK-STM User Manual. Published by BDK.
- [8] AN 656.00 Q4446, DK-STM, Documented final test. Published by BDK.

¹ At the publishing date of this Verifications Directions, the Danish NSA is called: Trafikstyrelsen (TS).

- [9a] Safety Assessment Reports, Published by SINTEF.
- [9b] Safety Assessment Report, DK-STM Cubicle, Published by SINTEF.
- [10] Declaration of Conformity of Interoperability Constituent, Published by Siemens.
- [11] Vejledning om godkendelse af systemer med software på jernbanen, Published by NSA.
- [12] AN655.00 Q4602, DK-STM Integration test 2, specification, Published by BDK.
- [13] IN655.00 Q4600, DK-STM versions, Published by BDK.
- [14] KN655.00 Q4601, Customized DMI for DK-STM BL3, Published by BDK.
- [15a] G81002-E3135-F005, STM-DK Subrack, 24 V_{DC}/ 110 V_{DC}, Final Inspection Report. Published by Siemens.
- [15b] G81002-E3134-F005, STM-DK Cubicle, 24 V_{DC}/ 72 V_{DC}/ 110 V_{DC}, Final Inspection Report. Published by Siemens.
- [16] IN 655.00 Q4652, Procedure for update of SW in DK-STM, Published by BDK.
- [17] IN 655.00 Q5019, Procedure for update of SW in DK-STM VE6, Published by BDK.

The document control list ref. [0] is a document listing the valid versions and dates of the reference documents ref. [1] to [17], published by BDK. All documents can be obtained from the NSA, see chapter 3.

3.0 Scope

This document describes BDK's general directions for installation of the DK-STM in railway vehicles / locomotives / train sets (hereinafter only referred to as "FoC" or "serial vehicle") that will run on BDK's long-distance railway network equipped with ATC.

Whenever reference is made to DK-STM in this document, it should be taken to mean the mobile DK-STM equipment on a vehicle.

These directions have been prepared and will be updated by BDK and apply in connection with the Danish Transport Authority's issue of Authorizations for Placing on the market (APOM), following publication on:

[Verifikationsforskrift \(trafikstyrelsen.dk\)](http://trafikstyrelsen.dk)

General:

- The DK-STM is installed in accordance with ref. [2a] and [2b] and must comply with the requirements outlined in these documents.
- The DK-STM is tested in accordance with chapter: "9. Requirements to checks and tests of DK-STM" in this document.
- The DK-STM is maintained in accordance with ref. [5] and must comply with the requirements outlined in these documents.

The planning, organization, installation, tests and final test of the mobile DK-STM equipment on vehicles must be performed in accordance with this document.

4.0 Abbreviations and definitions

APIS	Authorization to Place In Service. Issued by the NSA.
Applicant	An applicant refers to the party that applies to the Danish Transport Authority for authorization for placing in service, authorization of type etc. The applicant is also responsible for the type configuration / FoC documentation. The applicant is the same person as the holder of the vehicle type authorization.
Assessor	An assessor refers to an independent and competent person, organization or unit that performs investigations with a view to reaching a documented decision on the suitability of a system with regard to fulfilling the safety requirements for such system. Assessor prepares a safety assessment report as documentation.
ATC	Automatic Train Control. Delivered by Siemens with the designation ZUB 123.
BDK	Banedanmark.
BL3	Baseline 3.
CSM RA	Common safety method on risk evaluation and assessment (Commission Implementing Regulation 402/2013/EU of 30 April 2013 on the common safety method on risk evaluation and assessment and repealing Regulation (EC) No. 352/2009).
DeBo	A DeBo means an independent and competent person, organization or unit that performs investigations with a view to issuing certificates pursuant to the executive order on the authorization of railway vehicles issued by the NSA.
DK-STM	Danish STM (Specific Transmission Module).
DK-STM - components	DK-STM Cubicle, DK-STM SUB RACK, DK-STM Train Interface Unit (TIU), DK-STM Connector Plate and Antenna.
DMI	Driver Machine Interface.
DoV	Declaration of Verification according to Article 15 of Interoperability Directive (EU) 2016/797.
DRU	Data Recording Unit. Recording unit in compliance with the requirements of TSI Loc&Pas: 2014/1302/EU.
Entity managing the change	The 'entity managing the change' can be either the 'holder of the vehicle type authorization' or the keeper or the entity entrusted by them.
ETCS	European Train Control System. Subsystem of the European Rail Traffic Management System (ERTMS) which is a pan-European initiative that provides a standardized signaling system. In this document, ETCS generally refers to the mobile equipment on the train / vehicle.
ETCS level 2	Level 2 ETCS equipment. GSM-R radios and balises for data communication are used for the transfer of information between trackside installations and train.
EVC	European Vital Computer.
FoC	First of Class. The first vehicle of a class to be fitted with ETCS + DK-STM.
GASC	Generic Application Safety Case.
GSM-R	Line radio. Special railway version of the GSM system. Used for voice communication and data communication.
ISA	Independent Safety Assessor.
JRU	Juridical Recorder Unit. Recorder unit in the mobile ETCS equipment. For new vehicles DRU is used as recording unit.

Keeper	The natural or legal person that, being the owner of a vehicle or having the right to use it, exploits the vehicle as a means of transport and is registered as such in a vehicle register.
NoBo	Notified Body. A notified body whose primary purpose is to check that TSI requirements are met.
NSA	National Safety Authority. See TS.
Operator	The business / company operating with the vehicle. The operator is not necessarily the same as the owner or the one filing an application to the NSA.
QMS	Quality Management System.
SB	Assessment according to module SB in “Commission Decision No. 2010/713/EU on modules.
SD	Assessment according to module SD in “Commission Decision No. 2010/713/EU on modules.
Series vehicle	A vehicle in conformance to the FoC and Type.
SF	Assessment according to module SF in “Commission Decision No. 2010/713/EU on modules.
SH	Assessment according to module SH in “Commission Decision No. 2010/713/EU on modules.
SH1	Assessment according to module SH1 in “Commission Decision No. 2010/713/EU on modules.
TS	The Danish name for “Trafikstyrelsen”, which in English is called: “National Safety Authority” (NSA).
TSA	Technical System responsible, a defined job in Banedanmark.
TC	Train computer.
Type	A type of vehicle. In older literature often called: ”rolling stock class”.
Type Authorization holder	Natural or legal person that has applied for and received the vehicle type authorization, or its legal successor.

5.0 Introduction

5.1 The ATC system

The automatic train control system ZUB 123 is used on large sections of BDK's long-distance railway network. The automatic train control system is usually abbreviated to the ATC system. For further information on DK-STM, please refer to the system description ref. [1] and regarding the Cubicle, see the Cubicle installation manual ref. [2b].

When, in the following, reference is made to the ATC supplier or the DK-STM supplier, reference is made to Siemens A/S, Ballerup, Denmark.

5.2 Mobile systems and trackside installations

The ATC system is often divided into:

- the mobile ATC system which is fitted on vehicles.
- the trackside ATC installation which is fitted with balises and loops on lines and at stations.

In connection with the roll-out of ETCS on BDK's long-distance railway network, the current trackside ATC installations will be replaced with the new ETCS-based equipment. This replacement program will take several years.

In order to ensure that vehicles can still run all over the long-distance railway network, the "old" mobile ATC systems on vehicles will be replaced by the "new" mobile ETCS equipment and DK-STM.

Vehicles that have not previously been fitted with ATC may be directly installed with the "new" mobile ETCS equipment and DK-STM.

The Danish ATC system (ZUB123) was developed in the late 1980's. Siemens selected the transmission frequencies 50 kHz, 100 kHz and 850 kHz. Later on, manufactures of axel counters decided to include 50 kHz in their legal bands.

When driving in Denmark, this is not a problem, and driving outside Denmark, the DK-STM antenna is turned off (the ZUB123 in F-state).

Note, that for compliance between trackside and other subsystems, the ATC system emits 50kHz into band1 defined in TSI Loc&Pas index77. This is accepted by the Danish NSA on Banedanmark Infrastructure. This topic need revisit if a STM-DK are used on other Infrastructure Managers areas in Denmark.

5.3 JRU and DRU

Data from DK-STM must be logged to monitor the function and reliability of the system as well as for investigations in connection with accidents.

The scope of logging from DK-STM must include all the telegram types defined in document ref. [4] chapter 9, Telegram content ATC – Data Logging Unit. These telegram types are sent through the Profibus to the EVC, which must ensure that they are logged.

In addition, the result of the antenna tuning, and activation/deactivation of the emergency brake and the service brake must always be traceable in the log.

Verification of logging takes place in connection with the ATC test run or the documented final test specified in ref. [3] and ref. [8]. New vehicles build according to requirements of TSI LOC&PAS will have logged data in the Data Recording Unit (DRU).

It must be possible to present the logged data from DK-STM in a readable form, so that they may be checked by the DeBo according to the requirements in ref. [3] and ref. [8]. See chapter 10 and Appendix A.

6.0 Preconditions for DK-STM

6.1 Compatibility between ETCS and DK-STM

A fully functional DK-STM on a vehicle presupposes that the mobile ETCS equipment and DK-STM are compatible. In order to ensure this compatibility, ETCS / DK-STM must be tested in a test lab, with focus on correct display in the customized DMI, specified in ref. [14]. Detailed information regarding the compatibility test ref. [12] shall be obtained from Banedanmark.

Regarding FoC, the DeBo must verify the existence of a GASC for the ETCS + DK-STM system [9a], accompanied by an ISA assessment report pursuant to EN50126-29, that the documents refer to valid document versions, that the conclusions in the documents are positive and it is documented, that Integration Test ref. [12] verifies fulfillment of requirements for DMI ref. [14] displaying the expected information to the driver. See Appendix A.

6.2 Compatibility for different types of FoC

Considering the many types of locomotives and train sets (FoC) that different operators have, it is characteristic that they are configured differently and that they also run and brake in dissimilar ways. In order to ensure that the DK-STM can monitor all types of FoC correctly, it is necessary to load the DK-STM with a number of different vehicle parameters.

The list of vehicle parameters and directions on how they are selected and loaded are included in ref. [2a] and [2b]. The DeBo shall check that ref. [2a], [2b], [9a] and [9b] includes the actual FoC, see Appendix A.

As stated in chapter 11.3 of ref. [2a] if the DK-STM is to be installed in a new train type, a suitable litra code has to be selected. The choice must be approved by BDK.

6.3 Installation

As a general rule, ref. [2a] and [2b] includes sufficient documentation to install a DK-STM on a FoC. In the event that the company preparing the drawings and wiring diagrams for the installation needs further information, they will be required to enter into an agreement with the supplier of DK-STM on providing supplementary services.

Installation of DK-STM shall be executed in accordance with ref. [2a] and [2b].

The DeBo's review of the available documentation (see chapter 10) is based on the module description in "Council Decision No. 2010/713/EU", which includes a verification to the effect that the specific installation is in compliance with all requirements in ref. [2a] and [2b]. See Appendix A.

6.4 Keeping documentation and checklists

Technical file, made by the entity managing the change:

For each FoC fitted with a DK-STM, the entity managing the change must compile a technical file. This file shall include all the DK-STM documentation for the installation on the vehicle. Based on the Technical File the DeBo shall issue a Certificate, see appendix A. Entity managing the change shall secure that the Technical File is updated in case of changes.

The completed checklists for tests conducted must be included in this file and kept by the type authorization holder.

The entity managing the change shall for each vehicle in the series compile and store a file including all the DK-STM documentation for the installation/test applicable for the vehicle.

DeBo file, made by the DeBo:

The DeBo shall for the verification compile and store a DeBo file, as described in modules: "EU decision no. 2010/713/EU". This file, which shall accompany the Certificate, shall all together accompany the EU-verification declaration for the complete CCS system (ETCS + STM). The DeBo file shall include all technical data, relevant for the verification of the compliance with this Verification Direction document.

6.5 Changing the SW in the DK-STM

Changing the SW in the DK-STM to a new version or back to an earlier version shall be performed according to ref. [16] for the VE5 card and ref. [17] for the VE6 card. When completed, there shall be made a number of documented tests according to ref. [8]. The tests required, are listed in chapter 1.5 in ref. [8].

7.0 Requirements to the DK-STM system

7.1 DK-STM interfaces

DK-STM and other vehicle systems must be connected to each other. The interfaces between the various parts of the systems are illustrated below:

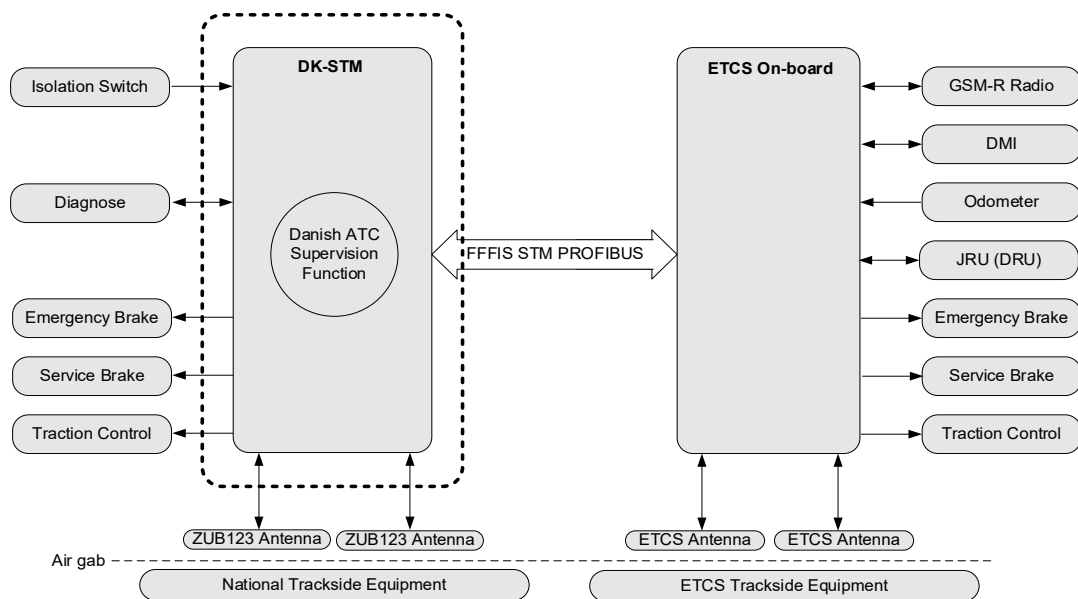


Figure 1: DK-STM's interfaces

7.2 Purchasing DK-STM components

The DK-STM component must be purchased from the DK-STM supplier. The DK-STM is built into a 19" rack and consists of a number of printed circuit boards with various functions. The version of the power supply is dependent on the nominal battery voltage of the vehicle.

Note that the SW to be used depends on the CPU-card, see ref. [16] and [17]. The different versions can be used as specified by the DK-STM supplier, see ref. [13].

The DK-STM is supplied as one unit.

7.3 Current DK-STM components and current software

In connection with the installation of DK-STM, the SW and HW versions will appear from the supplier's documentation together with the latest valid version of the Safety Assessment report on GASC (Generic Application Safety Case) ref. [9a].

During installation, the serial numbers of the components must be recorded and filed in the technical file. It is the entity managing, who has the change responsibility to store information regarding serial numbers.

As the Infrastructure Manager, it is important for Banedanmark to maintain an overview of the STM SW- versions that are in use on the infrastructure. Therefore, entity managing the change shall provide BDK TSA copy of the documented final test ref. [8] per vehicle that records information regarding version of DK-STM SW-version used together with hardware version as well as reference to filled out and valid version of the Final Inspection Report ref. [15] per vehicle.

For FoC, the DeBo shall check that the SW and HW versions of DK-STM used are permitted ref. [13] to use together and that the serial numbers in ref. [8] corresponds to those recorded in the Final Inspection Report ref. [15] from the supplier. See Appendix A.

For each vehicle in the series, the entity managing the change for the installation is ultimately responsible to ensure that correct SW/HW are documented in the documented final test ref. [8]. See Appendix A.

The keeper shall archive the documentation until the system is no longer in operation.

7.4 Cables

Specific requirements to types of cable for internal and external connections for the DK-STM appear from ref. [2a] and [2b]. DeBo shall check that cable types referred in ref. [2a] and [2b] are the one used during installation, see Appendix A.

8.0 Requirements to the positioning of DK-STM

The positioning of DK-STM components must be carefully planned to ensure that it is appropriately positioned in the various vehicle types, see Appendix A.

In the installation manual ref. [2a] and [2b] information regarding components that shall not be exposed to stresses can be found.

Detailed instructions concerning the interfaces to the rest of the vehicle are included in ref. [2a] and [2b].

This is verified / documented via the requirement in chapter 6.3.

9.0 Requirements to checks and tests of DK-STM

The entity managing the change must provide the DeBo "handover / hand back" protocols or other documents that clearly state that the vehicle transferred to the DK-STM assembling upon the transfer had no errors which could in any way affect DK-STM installation.

It is a prerequisite that for all existing vehicles, with or without ETCS, there must be a "handover / hand back" protocol. In case DK-STM is installed on a brand-new vehicle, there is no handover / hand back protocol. The signed test protocols must be submitted to the DeBo. Test reports must contain information about the tests performed and their verdicts which should be as expected. See chapter 10.

9.1 Installation test

An installation test, consisting of a "cable and wire check", and a "final test", for the FoC and for each serial vehicle, must be performed.

Regarding FoC, all documentation for installation tests must be submitted to the DeBo, see Appendix A.

For each vehicle in the series the entity managing the change for the installation is ultimately responsible to ensure that tests are passed successfully and record the evidence according to the documented final test [8].

The keeper shall archive the documentation until the system is no longer in operation.

9.1.1 Cable and wire check

Checklists must be drawn up on the basis of cable lists, key diagrams and clamp drawings, and they must be prepared so that a full electric control can be made through all cables with regard to each conductor's correct connection in both ends, including termination (contact) of the screen leaders to be correct connected. The check results must be documented with completed checklists.

9.1.2 Final Testing

As evidence of the proper functioning of DK-STM in the vehicle, a test report based on [8] must be prepared.

9.2 Commissioning test run

For each FoC, an ATC test run must be performed according to ref. [3]. For the series installation, it is optional if you want to do the test run on the following vehicles or not, see chapter 10 and Appendix A.

Note that repetition of the test run is not needed if:

- the DK-STM and the antenna is placed in the same location, fixation points and cable routing in two different series of the same class.
- there are differences, from one serial installation to another, not having impact on the DK-STM.
- there in a serial installation suddenly needs to be used another hard- or software configuration, because Siemens is supplying an approved DK-STM with the approved functionality.
- the serial installation covers vehicles, owned by two or more different owner/keepers.

The purpose of the test run is to confirm the location of the antenna and the DK-STM to be robust during operation on the railway.

The person who attests the ATC test run must be qualified, ie:

- Have a thorough knowledge of ref. [3].
- Have a driver cab permit with observation duty.
- Must be able to readout the JRU (DRU), which should then be sent to the person, who will examine the files with the registration in the JRU (DRU).
- Experience:
 - Either participated at least 3 times in ATC test run with an experienced test leader, whose aspirant has independently witnessed the test run the last two times and signed the test protocol, supervised by the experienced test manager.
 - Or be an experienced test leader who has previously performed ATC test runs according to ref. [3], within the last 5 years.

The DeBo must always be invited to ATC (DK-STM), but do not have to attend.

The person who will subsequently examine the printout from the JRU (DRU) from the completed ATC test run must be qualified, ie:

- Have a thorough knowledge of ref. [3].
- Have a thorough knowledge of the data analysis program that will be used to decode JRU (DRU) data.
- Have reviewed data with the analysis program within the last 2 years.

When the printout is examined and the form in ref. [3] completed, the protocol must be signed for:

- "ATC test run completed".
- "Evaluation completed".

The person who performs the review of the printout can choose either to sign "ATC test run completed" on behalf of the witness filling out page 7 of the ref. [3] or submit page 8 in ref. [3] for signature. The person who has reviewed the printout must always sign for "Evaluation completed".

The signed test protocol is sent together with the printout from the JRU (DRU) to the DeBo. See Chapter 10 and Appendix A.

If the vehicle is equipped with a Swedish STM (SE-STM) too, there shall also be made a SAT2 test run on the Oresund Bridge according to ref. [3]. As the ETCS installation does not offer the possibility of selecting Danish or Swedish priority, the test run is carried out one time only for each driving direction.

If the vehicle is going to be approved to run in both Denmark and in Sweden, the test run over the Øresunds bridge shall be approved according to BEK 710. Test run over the bridge shall be performed for the FoC only.

10.0 Verification

10.1 Basis for the DeBo's work

It is a precondition that the ETCS onboard system installed on the train is verified in compliance with the EC verification procedure, see Appendix A, and that the following documents are available:

- EC Type Examination Certificate or Design Examination Certificate.
- EC Certificate of Verification
- A technical file, made by the NoBo.
- A SASC ISA assessment report, see EN50126-29.

For DK-STM the following documents must be available:

- Documentation from the supplier, see modules.
- Document of compliance for the DK-STM, prepared by the NoBo.
- Completed check lists for conducted tests, see chapter 9.
- Technical design documentation that includes SW and HW equipment versions, see chapter 7.3.
- Final Inspection report ref. [15a] or [15b] that includes software version of DK-STM used together with hardware version, see chapter 7.3.
- Handover / hand back protocol, see chapter 9.
- Cable check lists, see chapter 9.1.1.

For ETCS combined with DK-STM, the following documents must be available:

- A GASC for the ETCS + DK-STM facility, accompanied by an ISA assessment report, see EN50126-29, cf. Chapter 6.1.
- A safety case according to EN50126-29 for the first vehicle (this report may be in combination with the ETCS).
- ISA assessment report(s) for the ETCS + DK-STM, see EN50126-29 (this report may be in combination with ETCS).
- A system definition, see CSM RA.
- A CSM RA assessor safety assessment report to ensure the secure integration of ETCS + DK-STM in the vehicle type.
- Documentation for logging data from DK-STM, cf. chapter 5.3.
- Final test report, see chapter 9.1.2.
- Documentation for the commissioning test run, see chapter 9.2.

10.2 The DeBo's work

The entity managing the change must appoint a DK-STM DeBo, who must check and certify that all technical documentation concerning the DK-STM have been performed accordingly to the requirements in this document.

The DeBo must verify and certify that all technical regulations for DK-STM have been complied with (according to the list in Appendix A) and in accordance with Commission Decision No. 2010/713 / EU.

The DeBo may rely on the ISA reports and certificates issued by NoBo, cf. 10.1. Double assessment must be avoided.

10.3 Documentation to be prepared by the DeBo

The DeBo must prepare documentation according to module SB+SD, SH1 or SB+SF.

10.3.1 Module SB+SD (Type + QMS of production), or SH1 (Full QMS + design)

When using modules SB+SD or SH1 the DeBo must prepare the following documentation:

- DK-STM Type Examination Certificate/ Design Examination Certificate
- Quality management system approval. *)
- DK-STM Certificate of Verification for STM-DK installation
- A DeBo file

*) The DeBo can rely on the QMS approval from a Supplier NoBo if the QMS certificates for production (installation of STM-DK) are provided. If this is the case, DeBo shall witness/attend at the least the installation audits performed by the Suppliers NoBo. When the installation of STM-DK is done by an entity other than is installing the ETCS, DeBo must issue QMS approval according to Module SD.

10.3.2 Module SB+SF (Type + Product verification)

When using modules SB+SF the DeBo must prepare the following documentation:

- DK-STM Type Examination Certificate
- DK- STM certificate of verification for a vehicle
- A DeBo file

The entity managing the changes must inform the DeBo in advance of where and when the ATC test run for the FoC will take place and if test runs are performed on the serial installed vehicles. It is then up to the DeBo if the DeBo wishes to participate in the ATC (DK-STM) commissioning test run or not.

The DeBo must verify that all the terms / restrictions stated in the DK-STM supplier's documentation, in conjunction with the assessors and NoBo's remarks, have been handled correctly during the installation and that sufficient documentation is available, see Appendix A.

11.0 Changes

It is expected that the document version list ref. [0], published by BDK and referred to in Chapter 2, will be updated with new document versions when released. To ensure that the entity managing the change can always find the latest and current version of the document version list ref. [0], BDK TSA must always forward the updated version for approval at the NSA.

The current version of ref. [0] is available on the NSA site:

www.trafikstyrelsen.dk/publikationsliste/jernbanesikkerhed-publikationer (verifikationsforskrift)

If it appears necessary to change the approved Verification Directions (IN655 Q4236), BDK TSA must apply the NSA for approval of the modified version. Changes made to the Verification Direction will be done in accordance with BDK Safety Management System (SMS) Trace process ST-3.1.2

If a holder of the vehicle type authorization needs to develop a new DK-STM component (other than mechanical mounting accessories) or new software, the entity managing the change must request the extension or modification of the DK-STM system by BDK to update this document.

In case the DK-STM hardware or software, or the antenna or cables needs to be changed or exchanged, a final test, according to chapter 9.1.2, needs to be performed.
The entity managing the change, make an investigation regarding the change, and check that all application rules (ref. [6a] and [6b]) for the changed system are fulfilled.
Note: All hardware and software components are 1:1 exchangeable. Except for the application rules, no further work needs to be done.

The interface between DK-STM and the EVC is the PROFI-bus. Each time a new SW is to be released, Banedanmark test that all orders, send over the PROFI-bus, are transmitted/received correctly (Integration Test 2, ref. [12]). Any version of the DK-STM SW can therefore work correctly with any version of the EVC SW without further testing.

Appendix A

Verification of the technical requirements to DK-STM

The table below lists the technical requirements to DK-STM that are to be checked by the approved DeBo.

Assessment of DK-STM with Modules SB+SD or SH1

The columns "Design verification", "Production first vehicle" and "Series production" are according to the modules SB+SD or SH1 in "Commission Decision No. 2010/713/EU on modules for the procedures for assessment of conformity, suitability for use and EC verification to be used in the technical specifications for interoperability adopted under "Directive 2008/57/EC of the European Parliament and of the Council". For the series vehicles in order to prolong the validity of a certificate one or more surveillance audit(s) must be carried out. This may be ongoing surveillance and may include unexpected visits.

Assessment of DK-STM according to Modules SB+SF

The columns "Design verification" and "Production first vehicle" are according to the module SB in "Commission Decision No. 2010/713/EU on modules.

Column "Series production" corresponds to module SF when in the series production phase. Thus, a cross in this column means that the relevant feature must be verified by testing each individual vehicle, if module SF is selected.

Requirements to be assessed by DeBo	Design Verification	Production first vehicle	Series production
		Type test, control measurements	Series verification
Chapter 2.0 The DeBo must verify that the verification is based upon the approved version of ref. [0].	X	X	X
Chapter 5.3 It must be possible to present the logged data from DK-STM in a readable form, so that they may be checked by the DeBo according to the requirements in ref. [3] and [8].		X	X
Chapter 6.1a The DeBo must verify the existence of a GASC for the ETCS + DK-STM system, accompanied by an ISA assessment report.	X		
Chapter 6.1b The DeBo must check the documentation for correct integration test.	X		
Chapter 6.2 The DeBo must check that ref. [2a], [2b], [9a] and [9b] includes the actual vehicle type.	X		

Requirements to be assessed by DeBo	Design Verification	Production first vehicle	Series production
		Type test, control measurements	Series verification
Chapter 6.3 Installation of DK-STM according to ref. [2a] and [2b]. The DeBo's review, that the documentation is based on the module description in "Council Decision No. 2010/713/EU", which includes a verification to the effect that the specific installation is in compliance with all requirements in ref. [2a] and [2b].		X	X
Chapter 6.4 Based on the Technical File the DeBo shall issue a Certificate.		X	X
Chapter 7.3 DeBo shall check that the SW and HW versions of DK-STM used, are permitted ref. [13], registered in ref. [8] and corresponds to the recorded ones in the filled out Final Inspection Report ref. [15].		X	X
Chapter 7.4 Specific requirements for cable types for internal and external connections to DK-STM can be found in ref. [2a] and [2b]. The DeBo must check that it is also the cable types used in the installation as stated by the supplier's instructions ref. [2a] and [2b].		X	X
Chapter 8.0 DK-STM components must be planned conveniently located in the respective vehicle types. DK-STM components must not be exposed to effects beyond the specifications specified in the Installation Manual ref. [2a] and [2b].	X	X	X
Chapter 9.1 All documentation regarding the installation test shall be provided to the DeBo.		X	X
Chapter 9.2. An ATC commissioning test run shall be conducted for each FoC vehicle type.		X	X
Chapter 10.1 and 10.3 DeBo shall verify that conditions / restrictions written in the DK-STM supplier documentation together with comments given by the Assessor and NoBo are being handled correctly during installation and that adequate documentation of fulfilling all the points is provided. Including CfU mentioned in [13]		X	X