BRIDGES

CONCRETE BRIDGES

Supervision Handbook for Waterproofing and Bridge Surfacing

QUALITY SYSTEM FOR EMPLOYER'S SUPERVISION AND CONTRACTOR'S CONTROL

Activity areas
Waterproofing
Drain channels
Bridge surfacing
Soft joints
Thin pavements with synthetic binder

October 2010
Replaces
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Danish Road Standards Committee

Vejdirektoratet

TABLE OF CONTENTS **PAGE**

0. BACKGROUND

This supervision handbook is part of the tender specification for concrete bridges and is to be used for waterproofing and pavement works on concrete bridges. The supervision handbook has been prepared by the Danish Road Directorate's departments for Road operations and Road construction as a report in preparation of road standards by an ad hoc group with the following composition:

Vibeke Wegan, Danish Road Directorate, chairman Arne Henriksen, Danish Road Directorate
Jan Gerberg Skals, Cowi A/S
Kåre Abrahamsen, Danish Road Directorate
Mikael Thau, LOTCON, secretary.

It has subsequently been presented, commented on and approved in working group U. 32, waterproofing and bridge surfacing, which has the following composition:

Vibeke Wegan, Danish Road Directorate, chairman Vagn Jensen, RAMBØLL, secretary
Erik Stoltzner, Danish Road Directorate Otto Bach Ulstrup, BaneDanmark
J. Blumensen, COWI Mikael Thau, LOTCON Palle Bisballe, LMK-VEJ Mogens Bøhm, MB Projekt
K. Stovgård, Phønix Trelleborg a/s.

At its meeting on 4 November 2005, the working group approved the tender specifications for issue. The Road Standards Secretariat decided to issue it as a report in preparation of road standards for collation of experience during the period from March 2006 to September 2006. The experience collection period did not result in any changes in the supervision handbook.

At its meeting on 15 November 2006, the Danish Road Standards Committee decided to issue the supervision handbook as a final tender specification. This version was updated by the editors after the revision of GWS 10 in October 2010.

1. INTRODUCTION

This supervision handbook deals with the activities which are necessary to ensure that waterproofing and surfacing works are be carried out correctly and optimally in accordance with the provisions of the contract.

The inspect handbook contains a number of forms to be used for preliminary meeting, the Contractor's control of own work and the subsequent controls by the supervision. The forms are organised in 5 annexes, where the first 4 annexes divide the activities for waterproofing, bridge surfacing, soft joints and thin pavements with synthetic binder, respectively. Annex 5, "Subsequent control" is common to the four activities.

The supervision handbook does not contain a comprehensive set of checklists to be used for waterproofing type I, which is used e.g. on track-bearing bridges. Control of waterproofing type I may, however, be done by using the checklists for priming and waterproofing. The control of the protective concrete is assumed to be documented in accordance with the provisions of GWS concrete bridges section 8, concrete.

The supervision handbook does also not include forms to be used in connection with any handover of the concrete base to the subsequent Contractor.

When used for individual bridge contracts, the activities of the supervision and Contractor shall be adapted to the relevant contract including the staff and working methods of the Contractor.

The supervision handbook has been prepared to be used in bridge contracts for construction or repair work in which the waterproofing and surfacing works form a significant part of the contract. It is not assumed to be used for maintenance or operation works. The supervision handbook forms part of the tender material when it is specifically mentioned in the terms of reference, including in SC (Special Conditions) or in the letter of invitation to tender.

Importance is attached to efficient interaction between the Employer's supervision, in the following referred to as the "SUPERVISION" and the Contractor's control of own work, in the following referred to as "CONTRACTOR'S CONTROL"

2. ORGANISATION

For each bridge contract, a person responsible for the contract will be appointed for each party. The parties hold a preparatory meeting and prepare a protocol for the preparatory meeting.

The supervision ensures that the Contractor's control is in order, including that checklists are filled in. By stating its comments on the forms, the supervision provides an assessment of the completed Contractor's control.

3. PLANNING

Prior to the supervision's and Contractor's control work, it is necessary to plan this work relative to the plans for the execution of the work.

The basis for the planning of supervision and Contractor's control is:

* Contract (including specific, specified conditions and specifications, e.g. for the use of type-approved materials/system-approved structures etc.)
* Tender material
* Contractor's working schedule (including working procedure, control plans, etc.)

Thorough project review is a requirement for both parties (supervision and Contractor).

In good time – however, no later than 14 days before commencement of the relevant activities, a meeting will be held between the supervision and the Contractor – including subcontractors involved – where the topics covered by the "Protocol for preparatory meeting", Form A are discussed and the necessary agreements are made.
At the preliminary meeting, a detailed procedure will be agreed for supervision of whether the base has been prepared and of the delivery of any outstanding services in this connection, such as outstanding works, remediation of defects or documentation for the nature of the base or remediation methods. The preliminary meeting is typically held before any handover of the base to the Contractor.

Prior to commencement, the supervision shall receive and accept the

Contractor's working procedures, specifications, control and working procedures (see the guidelines for Form A).

The supervision shall ensure that the Contractor submits the documentation required for the materials used in accordance with the control plans and that the traffic marking plan is available and has been approved.

4. EXECUTION, CONTROL AND DOCUMENTATION

The work may not commence before the defects specified in the box in Form A box "Action on defects before commencement" have been remedied and accepted by the supervision.

The supervision and the Contractor shall fill in the forms attached in annexes 1-5. The items on the checklist (Form B) may be replaced by the Contractor's QA documentation by making a reference to them in the boxes of the form. Daily report (Annex 2, Form D), laboratory form (Annex 2, Form E) and comparison of requirements in GWS with specification and controls (Form F)

The Contractor shall regularly and immediately submit all relevant documents and documentation of controls performed to the supervision as described in the tender material and agreed at the preliminary meeting.

The supervision shall keep a record of the observations made by the supervision.

After completion of the work, the supervision shall approve the completion of the documentation material and complete the subsequent checklist, Form C in Annex 5.

The supervision will receive and assess the above documentation; see the forms in annexes 1-4. These and any other observations after the completion of the work form the basis for handover and billing.

5. SUPERVISION HANDBOOK FORMS

Annexes 1-5 contain the supervision handbook forms. The tables are used as described above and in the related guiding annexes.

Annex 1:

WATERPROOFING

Annex 1 for waterproofing contains the following forms and guidance:

Priming and waterproofing shall be checked on a daily basis by the Contractor on Form B1: "Checklist - priming" and on Form B2: "Checklist - waterproofing" or on similar documentation material with reference to the checklist in the boxes of the form.

Subsequent controls of waterproofing shall be performed by the supervision and be entered in Form C: "Subsequent checklist - bridge contracts". Form C and guidance can be found in Annex 5.

Form A:

Protocol for preparatory meeting - waterproofing Guidance for completing Form A

Form B1:

Checklist - priming

Guidance for completing Form B1:

Form B2:

Checklist – waterproofing

Guidance for completing Form B2

Protocol for preparatory meeting - waterproofing

Annex 1: Form A Page 1

Contract no.:	**Bridge no. / Reg. no.:**	**Bridge name:**	
Main Contractor:	**Waterproofing Contractor:**	**Employer:**	**Date:**
Contractor's control:		**Supervision:**	

Waterproofing design:

Waterproofing type:

Primer (including blinding): 1. layer: 2. layer:

Scrape levelling (if any):

Levelling mortar (if any):

Intermediate coating:

Lower sheet:

Upper sheet:

Protective concrete:

Comments:

Bituminous thick coatings for waterproofing:

Primer:

Waterproofing mass:

Covering material:

Stainless steel profile:

Stainless steel profiles:

Primer (concrete/steel):

Joint sealant: **type:** ☐ **B**

Elastic synthetic sheet:

1. Drawings/tender material	**A. Stainless steel profile flashing along edge beams:** **B. PMB sheet joints on surfaces/in depth lines/curved bridges:** **C. Termination at bridge ends:** **D. Flashing at joint structure:** **E. Wells and drip pipe (such as location and dimension taking account of any cables):** **F. Construction joints (including construction fields in protective concrete):** **G. Any reshaping/level plan/gradients – including levelling of base:** **H. Other:**
2. Deviations or derogations from the tender material	**Deviations from base or materials planned to be used:** **Derogations:**

3. Working procedures

Accepted by the supervision	Yes	No	Comments:
General			
- Coord. adjoining works and transport routes	☐	☐	
- Equipment	☐	☐	
- Temperature and humidity criteria	☐	☐	
- Weather precautions	☐	☐	
Preparation of bridge deck	☐	☐	
Priming/scrape levelling			
- Preparation of base	☐	☐	
- Application	☐	☐	
Waterproofing type I, IVa/c			
- Welding/joints	☐	☐	
- Flashings	☐	☐	
- Measures against dents /blistering	☐	☐	
- Precautions for longitudinal slope <8‰ (0.8%)	☐	☐	
Bituminous thick coatings for waterproofing	☐	☐	
Joint type B	☐	☐	

Protocol for preparatory meeting - waterproofing

Annex 1: Form A Page 2

4. System/type approval of materials, technical data sheets, as well as any CE mark

Accepted version	Type approvals Yes	Type approvals No	Optional appr. Yes	Optional appr. No	CE mark Yes	CE mark No	Technical data sheets Yes	Technical data sheets No
Waterprf. system type I/IVa/IVc:			☐	☐				
Scrape levelling							☐	☐
Levelling motar							☐	☐
Primer:	☐	☐					☐	☐
Intermediate coating:	☐	☐					☐	☐
Lower sheet:					☐	☐	☐	☐
Upper sheet:					☐	☐	☐	☐
Joint sealant/primer system			☐	☐			☐	☐
Joint sealant DS/EN 1488-2, class C:					☐	☐	☐	☐
Primer EN 1488-4, type PRH, PRC-s, PRC-m:					☐	☐	☐	☐
Stainless steel profile:							☐	☐
Elastic film:							☐	☐
Bituminous thick coatings for waterproofing:	☐	☐					☐	☐
Protective concrete					☐	☐	☐	☐

5. Control of own work:
-- Analysis data
-- Marking

	ITT Yes	ITT No	Are the requirements of GWS observed Yes	Are the requirements of GWS observed No
Lower sheet in accordance with DS/EN 14695	☐	☐	☐	☐
Upper sheet in accordance with DS/EN 14695	☐	☐	☐	☐
Joint sealant in accordance with DS/EN 14188-2	☐	☐	☐	☐
Primer for joint sealant in accordance with DS/EN 14188-4	☐	☐	☐	☐

	FPC Yes	FPC No	Are the production tolerances observed Yes	Are the production tolerances observed No
Lower sheet in accordance with DS/EN 14695	☐	☐	☐	☐
Upper sheet in accordance with DS/EN 14695	☐	☐	☐	☐
Joint sealant in accordance with DS/EN 14188-2	☐	☐	☐	☐
Primer for joint sealant in accordance with DS/EN 14188-4	☐	☐	☐	☐

	Yes	No	Yes	No
Marking of raw materials for PMB sheets	☐	☐	☐	☐

	Analysis data from current batch Yes	Analysis data from current batch No	Are production tolerances observed Yes	Are production tolerances observed No
Primer for PMB sheets:	☐	☐	☐	☐
Any intermediate coating:	☐	☐	☐	☐
Primer for bituminous thick coatings for waterproofing:	☐	☐	☐	☐
Waterproofing mass for bituminous thick coatings for waterproofing:	☐	☐	☐	☐

	Analysis data from current batch Yes	Analysis data from current batch No	Are the requirements of GWS observed Yes	Are the requirements of GWS observed No
Any systems without optional approval:				
Waterproofing system type I, IVa and IVc				
- Restraint testing:	☐	☐	☐	☐
- Peeling strength:	☐	☐	☐	☐
- Collapse specification:	☐	☐	☐	☐
Joint sealant primer system type B:				
- Water displacement ability:	☐	☐	☐	☐
- Alkali resistance:	☐	☐	☐	☐
- Storage stability:	☐	☐	☐	☐

The Contractor sends a copy of analysis data to the Danish Road Institute ☐ ☐

6.Construction supervision:	**Bond strength, base:** **Comments:** - **Number of tests: ……** **Texture measurements:** - **Concrete surfaces:** **Number of tests: ……** **(may be omitted)** - **Primed surfaces:** **Number of tests: ……** **Hydro test:** **Performed Yes ☐ No ☐** **Peeling test:** **Pretesting: …… number of tests** **Comments:** **Monitored by the supervision:** **Yes ☐ No ☐** **Regular control of own work for lower sheet:** **- Frequency: …… per …… m^2 or per day / per stage** **- Monitored by the supervision: Yes ☐ No ☐** **Regular control of own work for any upper sheet** **- Frequency: …… per …… m^2 or per day / per stage** **- Monitored by the supervision: Yes ☐ No ☐** **Comments:**
7. Employer's control: **- Material samples**	**Samples are provided of:** **Yes** **No** **Specify quantity:** **Primer:** ☐ ☐ **…… x 2 kg** **Blinding for primer:** ☐ ☐ **…… x min. 5 kg (in unbroken packaging)** **Intermediate coating:** ☐ ☐ **…… x 2 kg** **Lower sheet:** ☐ ☐ **…… x 1 roll** **Upper sheet:** ☐ ☐ **…… x 1 roll** **Primer for bituminous thick coatings for waterproofing:** ☐ ☐ **…… x 2 kg** **Waterproofing mass for bituminous thick coatings for waterproofing:** ☐ ☐ **…… x 5 kg** **Primer for sealant:** ☐ ☐ **…… x 2 kg** **Joint sealant:** ☐ ☐ **…… x 2 kg** **Provided directly to the supervision** ☐ ☐ **The Contractor sends samples to the Danish Road Institute** ☐ ☐
8. Traffic flow	**Submitted** **Approved in another contract** **Marking plan** ☐ ☐ ☐ **Other:**
9. Working time restrictions	**Yes** **No** ☐ ☐ **If Yes: Work shall not be carried out within the following hours:**
10. Environmental aspects	**Yes** **No** **Comments:** **Is a health and safety plan available:** ☐ ☐ **Workplace assessment:** ☐ ☐ **Other:**
11. Training requirements	**Welding crew:** **Yes** **No** **Number** **- Trained roofer** ☐ ☐ ☐ **- Module: "Roofing – bridge membrane construction"** ☐ ☐ ☐ **Site managers:** **Yes** **No** **- Module: "Roofing – bridge membrane construction"** ☐ ☐ **- Waterproofing and bridge surfacing – supervision** ☐ ☐
12. Special conditions	

13. Actions in response to identified defects		
Signature	**Main Contractor's signature: Waterproofing** **Contractor's signature:**	**Supervision's signature:**

Guidance for completing Form A: Protocol for preparatory meeting – waterproofing

To be filled in by supervision and Contractor

Header supervision.	State the name of the Contractor's foreman (Contractor's control) and name of the supervision. Describe the structure of the waterproofing and constituent materials as specified in the form.
1. Drawings/tender material	Discuss the details of the waterproofing work on the basis of a project plan or other drawings. Under points A-H, state the agreements made during the preparatory meeting with drawing identification to the extent needed. If a need arises for levelling-reshaping mortar, state the make and type and the applied primer as well as documentation for compatibility, e.g. by means of references.
2. Deviations or derogations from the tender material	In the event of deviations from the specification in the tender material which may have consequences, it shall be stated here. Derogations from the project requested by the Contractor and accepted by the supervision shall also be stated here.
3. Working procedures	As a minimum, working procedures shall describe the points listed in GWS 10.3.1 as well as precautions at a slope of < 8‰ (0.8%); see GWS 10.3.2.6.
4. System/type approval of materials, technical data sheets, as well as any CE mark	State here whether any documents for the type approval, voluntary system approval or technical data sheets and any CE marking are applicable and have been handed over to the supervision, and whether there are any shortcomings in the documentation submitted. If no is stated to optional approval scheme for polymer modified bitumen sheets and elastic joints, the supplier shall provide data from the system test specified in GWS for each combination of each batch polymer modified bitumen sheet/primer or joint sealant/primer; see item 5. If no is stated for other materials, the defect shall be stated under item 12.
5. Control of own work: Analysis data Marking	This is where the supervision shall compare the supplier's production supervision with the requirements in the document for voluntary system approval scheme/type approval with the requirements of GWS if approvals are not available. For products manufactured according to an EN standard, data from • ITT shall be compared to the requirements of GWS by checking whether MDV values on the CE mark are within the ranges specified in GWS (Form 9 in GWS 10 and Form 3 in GWS 11.9), • FPC shall be compared to the requirements of GWS. Where the acceptance criterion in GWS is specified as MDV +/- PT MDV and PT appear from the CE mark or from the technical datasheet. Results of comparing data from the current batch and specified production tolerances from the approval document (type/system/CE mark) shall be stated in the last 2 columns. Outcomes of system tests for polymer modified bitumen sheets and elastic joints should only be stated if they are not subject to voluntary system approval.

6. Construction supervision	This is where the extent of and procedure for construction shall be agreed, including testing for handover inspection of concrete surface and primed surface. For peeling tests, it shall be agreed whether the supervision wants to attend the tests and whether the tests are to be performed for all layers. In general, at least 3 peeling tests should be performed at any pre-testing. In the regular controls, at least one test shall be performed for each 300 m^2. It should be considered whether it is more appropriate to perform peeling tests on the lower sheet after 1 production day than to perform pre-testing which will typically delay the process by 1 working day. For bridges with slopes of less than 10‰ (1%), a procedure shall be agreed for hydro testing.
7. Employer's control	State any agreement on Employer's control of materials. Note that material samples are not a requirement but may be agreed if there is a special request for random sampling. The supervision should make an agreement with the Employer to this effect before the preparatory meeting.
8. Traffic flow	State any agreements on traffic flow and marking plan.
9. Working time restrictions	State restricted or abnormal working time which is conditional on e.g. rush-hour traffic or noise restrictions.
10. Environmental aspects	State any relevant documentation on environmental and health and safety aspects, e.g. health and safety plan; see GWS "Management and Cooperation".
11. Training requirements	State the relevant capacity of staff resources for courses specified in GWS 10.1.
12. Special conditions	State any other conditions of relevance for the waterproofing work. May be provided in an annex.
13. Actions in response to identified defects	State the defects identified at the preparatory meeting and the actions agreed to bring all matters up to date before starting the waterproofing work.

Checklist – primer

Annex 1: Form B1 Page 1

Contract no.:	Bridge no. / Reg. no./ Stage.:	Bridge name:
Contractor's control:		Date:

Contractor's control:

1. Concrete base - Supervision

Supervision made: Date: ……

	Yes	No	Comments:
Supervision attended:	☐	☐	
Repair work required:	☐	☐	

Number of maturity hours of the concrete surface: ……..hours (To be stated by the concrete Contractor)
Moisture measurement, base: …… (To be stated by the concrete Contractor)

	Accepted by the supervision Yes	No	Comments:		
Slope base/hydro testing: …….	☐	☐			
Evenness, base: ……	☐	☐	……..		
Adhesion measurements in MPa: ……	☐	☐	Mean	Min.	Max.
Any texture measurements (sand patch values) in mm:	☐	☐	Mean	Min.	Max.

Repair needs and methods: …….

Action in response to any defects:

The priming Contractor took over the concrete base: Date: ……

	Yes	No	Comments:
Marking as specified:	☐	☐	
Storage as specified:	☐	☐	

3. Weather:

Air temperature:

	Heavy	Light	Changing	None	Humidity:
Start_____°C at:_____ Wind	☐	☐	☐	☐	_____
Rain	☐	☐	☐	☐	_____

4. Priming:

Concrete surface condition:

For epoxy primer, the temperature of the concrete surface temperature shall be at least 3°C above the dew-point temperature.

Concrete temperature:	Air temperature:	Air humidity:	Dew-point temperature:	Δt (dew-point distance)
Start_____°C	Start _____°C	Start_____	Start_____°C	_____°C at:___
Every 3 hours				
_____°C	_____°C	_____	_____°C	_____°C at:____
_____°C	_____°C	_____	_____°C	_____°C at:____
_____°C	_____°C	_____	_____°C	_____°C at:____
End_____°C	_____°C	_____	End _____°C	_____°C at:____

Application period

Priming surface before second layer/scrape levelling:

Date: **First layer hardened:**

Concrete temperature:	Air temperature:	Air humidity:	Dew-point temperature:	Δt (dew-point distance)
Start_____°C	Start_____°C	Start_____	Start_____°C	_____°C at:____
Every 3 hours				
_____°C	_____°C	_____	_____°C	_____°C at:____
_____°C	_____°C	_____	_____°C	_____°C at:____
_____°C	_____°C	_____	_____°C	_____°C at:____
End_____°C	_____°C	_____	End _____°C	_____°C at:____

Texture depth in mm after priming Yes ☐ No ☐ (sand patch values): Mean Min. Max.

Adhesion measurements in MPa …… ☐ ☐ Mean Min. Max.

5. Priming/scrape levelling, material consumption

Daily reports: Date Area Consumption

Batch no. Priming 1. Layer (kg)
- Primer (kg)
- Sand (kg)

Priming possibly 2. Layer (kg)
- Primer (kg)
- Sand (kg)

Possibly scrape levelling
- Primer (kg)
- Sand (kg)

Are the primer and quantities applied as agreed and described in Form A: Yes ☐ No ☐

If X in "No", state the primer and quantities applied:

6. Employer's control - Materials for samples

	Yes	No
Have material samples been taken as specified in Form A item 7:	☐	☐

Samples have been handed over to: _____

7. Other comments	**Is the general condition of the priming work ok:** **Yes** ☐ **No** ☐ **(Pinholes, blinding, mottling, craters, grooves) Other comments:**
Signature	**Priming contractor's signature:**

Supervision's comments:

Guidance for completing form: Checklist – primer

To be filled in by the priming Contractor

General	The items on the checklist may be replaced by the Contractor's QA documentation by making a reference to them in the boxes of the form.
Header	State the name of the Contractor's foreman (Contractor's control). By ticking the fields "Yes" or "No", the Contractor shall indicate whether the primer and the quantities applied are as agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – waterproofing"). If X in "No", state the primer and quantities applied.
1. Concrete base	State the date of supervision. If a need for repair work is found, this shall be stated together with the agreed methods of repair. The priming Contractor states the date of his taking over the concrete base. (For consecutive execution, do not fill in). State the number of maturity hours/moisture content of the concrete before priming. Information relating to this can be obtained from the concrete Contractor. Moisture content is measured in accordance with any method specified in the type approval document for the primer. (For consecutive execution, do not fill in). The outcome of the construction supervision shall be stated and controlled against the acceptance criteria.
2. Packaging, shipping and storage	To be answered by yes/no.
3. Weather	Air temperature shall be read at the start and completion of the laying work. Note whether there is heavy, light, changing or no wind or rain. If the weather changes significantly, a new form shall be completed.
4. Priming	Temperatures shall be stated in the form at the start of the work and every three hours. For epoxy primers, the concrete base temperature shall be at least 3°C above the dew point temperature. Relative humidity (RH/ %), surface temperature and dew point are determined by special measuring equipment. The current dew point distance shall be stated in the column Δt by subtracting the dew point temperature from the concrete surface temperature. State here whether the texture depth after priming is observed. The average of the measured sand patch values and the minimum and maximum values shall be stated.
5. Priming/scrape levelling, material consumption	State the dew point distances on an ongoing basis during the laying work as well as the current material consumption
6. Employer's control - Materials for samples	Material samples shall be taken for Employer's control. Necessary sampling has been agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – waterproofing", box 7).
7. Other comments	State whether the general condition of the priming work is ok. The surface shall be inspected for pinholes, craters, insufficient or surplus blinding, mottling due to moisture before hardening of the epoxy and to control that grooves are correctly designed. Any other conditions of relevance for the priming work may be stated. May be provided in an annex.

SUPERVISION'S COMMENTS

By its comments, the supervision provides an assessment of whether the Contractor's control performed gives rise to any special actions. If the supervision has no comments, state "No comments".

Checklist – waterproofing

Annex 1: Form B2 **Page 1**

Contract no.:	Bridge no. / Reg. no./ Stage.:	Bridge name:
Contractor's control:		Date:

Are the structure of the waterproofing and quantities applied as agreed and described in Form A: Yes ☐ No ☐

If X in "No", state the design and quantities applied:

Contractor's control:

1. Pretesting

Peeling test at pretesting: ……. Approved

Concrete surface temperature:

Collapse specification:		Yes	No
- Peeling 1:	Annex no.,.	☐	☐
- Peeling 2:	Annex no.,.	☐	☐
- Peeling 3:	Annex no.,.	☐	☐

Comments:

2. Packaging, shipping and storage

	Yes	No
Marking as specified:	☐	☐
Storage as specified:	☐	☐

3. Weather:

Air temperature:

		Heavy	Light	Changing	None
Start_____°C at:_____	Wind	☐	☐	☐	☐
	Rain	☐	☐	☐	☐

End_____°C at.:_____

4. Welding

Hammer test:	Yes	No
Hollow sounds	☐	☐

Joints at longitudinal slopes < 8‰. Comments: ……..

Hydro test made:	Yes	No
Comments:	☐	☐

Peeling test at regular control:

Concrete surface temperature: Approved

Any comments:

			Yes	No
- Peeling 1:	Photo no.,.	Annex no.,.	☐	☐
- Peeling 2:	Photo no.,.	Annex no.,.	☐	☐
- Peeling 3:	Photo no.,.	Annex no.,.	☐	☐
- Peeling 4:	Photo no.,.	Annex no.,.	☐	☐
- Peeling 5:	Photo no.,.	Annex no.,.	☐	☐
- Peeling 6:	Photo no.,.	Annex no.,.	☐	☐

5. Employer's control - Materials for samples

Yes No

Have material samples been taken as specified in Form A item 7: ☐ ☐

Samples have been handed over to:_____

Checklist – waterproofing

Annex 1: Form B2 Page 2

6. Particularly for stainless steel profile flashing	**Indicative torque kNm:** _____ **Method for degreasing stainless steel profiles:** _____ **Tightening carried out, date:** **Re-tightening carried out, date:** **At stainless steel profile according to drawing 6.2 / 7.2 / 10.2** **1. filling of joint groove:** _____ **(date, time) Photo:** **2. filling of joint groove:** _____ **(date, time)**
7. Particularly for bituminous thick coatings for waterproofing	**Concrete surface:** **Yes** **No** **If yes – where / how?** **- Has pre-treatment of the concrete surface been carried out** ☐ ☐ **Average material consumption:** **- Primer:** **g/m²** **- Waterproofing mass:** **g/m²** **- Thickness:** **- Waterproofing mass:** **mm** **min** **max** **mean** **Protection used (please tick):** **Make:** **- Geotextile:** ☐ **- Cement mortar:** ☐ **Construction joints:** **- Type and width of bitumen sheets used on construction joints:** **- Comments:**
8. Other comments	**Yes** **No** **Is the general condition of the waterproofing ok:** ☐ ☐ **(Endings, overlap locations, outlet along overlaps, blisters/bumps including any repair, puddle formation, tightening of stainless steel profiles, filling of joint groove etc.)** **Other comments:**
Signature	**Waterproofing Contractor's signature:**

Supervision's comments:

Checklist I to Annex 1 Form B2 item 4.
Welded waterproofing system type I or IV (epoxy primer)

Peeling test: Regular controls ☐ Pre-testing ☐								
Bridge no.: Name: Location: Date: By:							General comments (such as weather conditions): Peeling field no.:	
Strip								
Surface temperature, °C								
Breaking point	In filler, %							
	Interface filler/coating mass, %							
	In coating mass, %							
	Interface coating mass/primer, %							
	In primer, %							
	Interface primer/concrete, %							
	In concrete, %							
Peeling force: I: High II: Mean III: Loose IV: Even V: Uneven								
Membrane condition: I: Good II: Middle III: Aged, brittle								
Description (e.g. condition of the filler etc.)								
Samples for the Danish Road Institute								
Photo no.								

Indicate sample point/peeling field on sketch

Checklist II to Annex 1 Form B2 item 4.
Welded waterproofing system type I or IV (solvent-based primer)

Peeling test: Regular controls ☐ Pre-testing ☐								
Bridge no.: Name: Location: Date: Completed by:						General comments (such as weather conditions): Peeling field no.:		
Strip								
Surface temperature, °C								
Breaking point	In filler, %							
	Interface filler/coating mass, %							
	In coating mass, %							
	Interface coating mass/intermediate coating, %							
	Interface intermediate coating/primer, %							
	In primer, %							
	Interface primer/concrete, %							
	In concrete, %							
Peeling force: I: High II: Medium III: Loose IV: Even V: Uneven								
Membrane condition: I: Good II: Middle III: Aged, brittle								
Description (e.g. condition of the filler etc.)								
Samples for the Danish Road Institute								
Photo no.								

Indicate sample point/peeling field on sketch

Guidance for completing Form B2: Checklist – waterproofing

To be filled in by the waterproofing Contractor

General	The items on the checklist may be replaced by the Contractor's QA documentation by making a reference to them in the boxes of the form.
Header	State the name of the Contractor's foreman (Contractor's control). By checking off the fields "Yes" or "No", the Contractor shall indicate whether the structure of the waterproofing and the quantities applied are as agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – waterproofing"). If X in "No", state the design and volumes applied:
1. Pre-testing	State the result of the peeling test made during pretesting for each stage. The concrete surface temperature shall be measured immediately after peeling. (For consecutive execution within the same stage, do not fill in)
2. Packaging, shipping and storage	To be answered by yes/no.
3. Weather	Air temperature shall be read at the start and completion of the laying work. Note whether there is heavy, light, changing or no wind or rain. If the weather changes significantly, a new form shall be completed. The outcome of the construction supervision of the waterproofed surface shall be stated
4. Welding	State whether hydro test is made in accordance with GWS 10.3.2.4. The result of peeling tests as part of regular control shall be stated together with the concrete surface temperature measured immediately after peeling – photo references shall be specified. One of the two attached checklists I or II for epoxy primer or solvent-based primer, respectively, shall be used.
5. Employer's control - Materials for samples	Material samples shall be taken for the supervision's random samples. Necessary sampling has been agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – waterproofing", box 7).
6. Particularly for stainless steel profile flashing	This indicates the torque the Contractor has determined as being indicative using a torque wrench. The method used for degreasing stainless steel profiles shall be stated. Also state the date and time of the first and second filling of joint groove at stainless steel profile flashing according to drawing 6.2 / 7.2 / 10.2 and take a photo for documentation after the first filling.
7. Particularly for bituminous thick coatings for waterproofing	If any pre-treatment of the concrete surface has been carried out, this shall be stated. Also state the average consumption of primer and waterproofing mass as well as the protection used for the bituminous thick coatings for waterproofing. Type and width of bitumen sheets on construction joints shall be stated:
8. Other comments	State whether the general condition of the waterproofing work is ok. Special focus shall be given to endings, lane courses on curved bridges, overlaps, blisters, bumps, puddle formation, tightening of stainless steel profiles as well as filling of joint grooves etc. In addition, other conditions of relevance for the waterproofing work may be stated. May be provided in an annex.

SUPERVISION'S COMMENTS

By its comments, the supervision provides an assessment of whether the Contractor's control performed gives rise to any special actions. If the supervision has no comments, state "No comments".

Annex 2:

BRIDGE SURFACING AND DRAIN CHANNELS

Annex 2 for bridge surfacing and drain channel contains the following forms and possibly the related guidance:

Bridge surfacing and drain channels shall be controlled on a daily basis by the Contractor on Form B1: "Checklist - bridge surfacing" and on Form B2: "Checklist - drain channels" or on similar documentation material with reference to the checklist in the boxes of the form. "Daily report", Form D, and "Laboratory form", Form E, are examples for optional use.

Subsequent controls of bridge surfacing etc. shall be performed by the supervision and be entered in Form C: "Subsequent checklist - bridge contracts". Form C and guidance can be found in Annex 5.

Form A: Protocol for preparatory meeting – bridge surfacing etc.
Guidance for completing Form A

Form B1: Checklist - bridge surfacing
Guidance for completing Form B1

Form B2: Checklist - drain channels
Guidance for completing Form B2

Form D Daily report - bridge surfacing
Example of form for optional use)
Guidance for completing Form D

Form E Laboratory form
Form for optional use)

Form F Comparison of requirements with specifications and controls.
(Forms for optional use)

- F1: Comparison requirements, specification and controls
- F2: Comparison requirements and compaction controls

Protocol for preparatory meeting – bridge surfacing etc. Annex 2: Form A Page 1

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Contractor's control:		Supervision:	
Materials, bitumen types and layer thicknesses in mm: 1. layer: 2. layer: 3. layer: 4. layer:			Wearing course: Illuminated: β ≥ 0.095 Unillumated: β ≥ 0.080 No requirements
Drain channels: Binder: Content: ……..% Chippings Fraction:			

1. Drawings/tender material	A. Cross Section: B. Longitudinal section (possibly artificial gutter gradient): C. Edge beam /berms/ kerbstone opening: D. Design of connections at contract interfaces: E. Wells: F. Drain channels: G. Other:			
2. Deviations from the tender material				
3. Working procedures	Are these available? Bridge surfacing Drain channels Comments on plan for sampling of cores:	Yes ☐ ☐	No ☐ ☐	Comments:
4. Specifications for materials and binders	Are these available? Surfacing Drain channels The Contractor sends a copy to the Danish Road Institute	Yes ☐ ☐ ☐	No ☐ ☐ ☐	Comments:

Protocol for preparatory meeting – bridge surfacing etc. Annex 2: Form A Page 2

5. Daily reports:		Yes	No	Other agreement:
	Provided directly to the supervision	☐	☐	
6. Control of own work:	**Bridge surfacing:**	Yes	No	Comments:
	Provided directly to the supervision:	☐	☐	
	Drain channels:			
	Provided directly to the supervision:	☐	☐	
	The Contractor sends a copy to the Danish Road Institute:	☐	☐	
7. Employer's control:	**Bridge surfacing:**	Yes	No	Specify quantity:
	- Material samples	☐	☐	
	- Compaction control	☐	☐	
	Drain channels:			
	- Chippings	☐	☐	
	The Contractor sends samples to the Danish Road Institute:	☐	☐	
8. Traffic flow		Submitted	Approved	
	Marking plan	☐	☐	
	Other:			
9. Right of disposal and execution period		Yes	No	Comments:
	Has right of disposal been obtained:	☐	☐	
	Execution period:	Start date:	End date:	
10. Working time restrictions		Yes	No	
		☐	☐	
	If Yes: Work shall not be carried out within the following hours:			
11. Environmental aspects		Yes	No	Comments:
	Is a health and safety plan available:	☐	☐	
	Other:			
12. Special conditions				
13. Action on defects and shortcomings before start-up				

Signature	**Main Contractor's signature:**	**Supervision's signature:**
	Surfacing Contractor's signature:	

Guidance for completing Form A: Protocol for preparatory meeting – bridge surfacing etc.

To be filled in by the supervision and Contractor

Header supervision.	State the name of the Contractor's foreman (Contractor's control) and name of the Material types, layer thicknesses in mm and the proposed binder types shall be described (may be replaced by reference to drawings), and whether the road is illuminated / unilluminated. For drain channels, the binder is described as well as the content and chippings.
1. Drawings/tender material	Discuss the details of the bridge surfacing work or drain channels on the basis of a project plan or other drawings. Under points A-G, state the agreements made during the preparatory meeting with drawing identification to the extent needed.
2. Deviations from the tender material	In the event of deviations from the specification in the tender material which may have consequences, it shall be stated here.
3. Working procedures	The working procedures shall, as a minimum, contain the following: • Execution of surfacing work, including the materials used and layer thicknesses • Precautions and procedure for execution in several stages • Preparation and cleaning of base • The procedures and information on control of mixing temperature, storage time, transport (type and insulation of trucks and release agent used) as well as maximum time from mixing to laying • Execution of adhesion/priming work between the individual surfacing layers (types and quantities shall be stated) • Machine laying, procedures and equipment, including laying speed • Manual laying, extent and equipment • Construction of cold and warm joints • Construction of counter inclines • Construction of sealing (joints, berms) • Plan for sampling of cores and method for reinstatement of bore holes (plan shall assessed and commented on) • Method for construction of drain channels.
4. Specifications for materials and binders	State whether specifications have been provided to the supervision, and whether there are any shortcomings in the submitted documentation. This includes whether material specifications are in accordance with the requirements of the tender material. It also includes whether the specifications shall be sent to Danish Road Institute. If modified binder is used, documentation for the improved binder properties shall be enclosed.
5. Daily reports	State whether daily reports shall be provided directly to the supervision or whether other agreement is made.
6. Control of own work	State whether end product control of asphalt materials, compaction controls and any recording of asphalt temperature shall be provided directly to the supervision. Also state the conditions for drain channels. This also includes whether the documentation for control of own work shall be sent to the Danish Road Institute.
7. Employer's control	State any agreements on Employer's controls of cores and materials for drain channels (number of samples, sampling scope and budget shall be agreed with the Employer). The sample size for chippings depends on the grain size and sampling practice. Reference is also made to DS/EN 932-1. It should be pointed out that samples of cores and materials for drain channels are not a requirement but shall be agreed if random sampling is requested. The supervision should make an agreement with the Employer to this effect before the preparatory meeting.
8. Traffic flow	Stated any agreements on traffic flow and marking plan.

9. Right of disposal Execution period	State whether right of disposal has been obtained and the start date and end date of the execution.
10. Working time restrictions	State restricted or abnormal working time which is conditional on e.g. rush-hour traffic or noise restrictions.
11. Environmental aspects	State any agreements on environmental and health and safety aspects, e.g. health and safety plan.
12. Special conditions	State any other conditions of relevance for the bridge surfacing work. May be provided in an annex.
13. Action on defects and shortcomings before start-up	State the defects identified at the preparatory meeting and the actions agreed to bring all matters up to date before starting the surfacing work.

Checklist – bridge surfacing

Annex 2: Form B1 Page 1

Contract no.:	Bridge no. / Reg. no.:	Bridge name:
Contractor's control:	Material:	
Are the structure of the surfacing and quantities applied as agreed and described in Form A: Yes no If X in "No", state the design and volumes applied: May be stated in annex or on the back.		Date:

Contractor's control:

1. Base

	Yes	No	Comments:
Suitable for laying	☐	☐	
Levelling carried out and approved	☐	☐	
Bonding carried out and approved	☐	☐	

Bonding time: _____

2. Weather

Air temperature:

	Heavy	Light	Changing	None
Wind	☐	☐	☐	☐
Rain	☐	☐	☐	☐

Start_____°C at:_____ End_____°C at.:_____

3. Materials

Non-uniform	Yes☐No☐	Yes☐No	☐Yes☐No	☐Yes☐No	☐Yes☐No
Temperature in paver	_____	_____	_____	_____°C	_____
at:	_____	_____	_____	_____	_____

Separate temperature form Yes ☐ No ☐

4. Laying

Execution, see working procedure:	Yes	No	
Warm longitudinal joints	☐	☐	Offset of longitudinal joints:_____cm
Extra longitudinal joints	☐	☐	
Counter incline and depth line	☐	☐	Release agents – type applied:
Interruptions	☐	☐	

Deviations in the execution from the working procedure shall be stated:

Completion:	Yes	No	Comments:
Cleaning of covers/grates/any sand trap	☐	☐	
Levelling/profile measurements performed	☐	☐	
Sealing of joints	☐	☐	

5. Control of own work

	Yes	No	Comments:
CE marked according to DS/EN 13108-1 (Asphalt concrete)	☐	☐	
CE marked according to DS/EN 13108-5 (Stone mastic asphalt)	☐	☐	
Sample taken at laying	☐	☐	
Compaction control ordered	☐	☐	
End product analysis ordered	☐	☐	

6. Employer's control - Materials for samples

Have material samples been taken as specified in Form A item 7: Yes☐ No ☐
Samples have been handed over to:_____

7. Overload

		Yes	No
Weight slip no.:	Overload	☐	☐

8. Other comments

Is the general condition of the bridge surfacing work ok: Yes ☐ No ☐
(Joints, profile, evenness, tears, open panels, greasy spots)

Other comments:

Signature

Contractor's signature:

The supervision's comments shall be stated on the back or in annex.

Guidance for completing Form B1: Checklist – bridge surfacing

To be filled in by the surfacing Contractor

General	The items on the checklist may be replaced by the Contractor's QA documentation by making a reference to them in the boxes of the form.
Header	State the name of the Contractor's foreman (Contractor's control). A separate form shall be filled in for each material type. By checking off the fields "Yes" or "No", the Contractor shall indicate whether the structure of the bridge surfing and the quantities applied are as agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – bridge surfacing etc."). If X in "No", state the design and volumes applied:
1. Base	To be answered by yes/no. Under the yes/no boxes, the missing stations may be stated. State the date and time of bonding.
2. Weather	Air temperature shall be read at the start and completion of the laying work. Note whether there is heavy, light, changing or no wind or rain. If the weather changes significantly, a new form shall be completed.
3. Materials	To be answered by yes/no. For each load, the current temperature of the material in the paver shall be stated. If a separate form is used to record asphalt temperature, storage time and transport time, this shall be enclosed.
4. Laying	Deviations in relation to the working procedure shall be indicated by yes/no. State any offset of longitudinal joint in cm. State type of release agent. State any other conditions during the laying which deviate from the working procedure. It shall also be stated whether, after completion, covers and wells have been cleaned and if material has been dropped into gullies, whether this has been removed.
5. Control of own work	To be answered by yes/no. Below the yes/no box, state whether material samples have been collected and/or sampling of cores has been ordered. This control shall be documented in Form E or similar (Laboratory form).
6. Employer's control - Materials for samples	Material samples shall be taken for the supervision's random samples. Necessary sampling is specified in the tender material or has been agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – bridge surfacing etc.", box 7).
7. Overload	State weight slip no. Overload to be answered by yes/no. To control any overload, state the vehicle registration number and the specified maximum allowed weight. Controls shall be documented on the weight slips.
8. Other comments	State whether the general condition of the bridge surfacing is ok. Any other conditions of relevance for the work may be stated. May be provided in an annex.

SUPERVISION'S COMMENTS

By its comments, the supervision provides an assessment of whether the Contractor's control performed gives rise to any special actions. If the supervision has no comments, state "No comments".

Checklist – drain channels

Annex 2: Form B2 Page 1

Contract no.:	Bridge no. / Reg. no.:	Bridge name:
Contractor's control:		Date:

Are the structure of the drain channels and quantities applied as agreed and described in Form A: Yes ☐ No ☐

If X in "No", state the design and quantities applied:

Contractor's control:

1. Preparation:	**Supervision made:** **Date:** ……			
		Yes	**No**	**Comments:**
	Supervision attended:	☐	☐	
	Repair work required:	☐	☐	
	Surfaces cleaned:	☐	☐	
	Dimensions: **Height:** …… **mm** **Width:** …… **mm**			
	Action in response to any defects:			
2. Packaging, shipping and storage		**Yes**	**No**	**Comments:**
	Marking as specified:	☐	☐	
	Storage as specified:	☐	☐	
3. Weather	**Air temperature:**	**Heavy**	**Light**	**Changing** / **None**
	Start_____**°C at:**_____ **Wind**	☐	☐	☐ / ☐
	Rain	☐	☐	☐ / ☐
	End_____**°C at.:**_____			
4. Control of own work		**Yes**	**No**	**Comments:**
	Sample taken and delivered to the laboratory:	☐	☐	
5. Employer's control - Materials for samples			**Yes**	**No**
	Have material samples been taken as specified in Form A item 7:		☐	☐
	Samples have been handed over to:_____			
6. Other comments		**Yes**	**No**	
	Is the general condition of the drain channels ok: **(Mixing, bonding, laying out, adjacent surfacing)**	☐	☐	
	Other comments:			
Signature	**Contractor's signature:**			

Supervision's comments:

Guidance for completing Form B2: Checklist – drain channels

To be filled in by the Contractor

General	The items on the checklist may be replaced by the Contractor's QA documentation by making a reference to them in the boxes of the form.
Header	State the name of the Contractor's foreman (Contractor's control). By checking off the fields "Yes" or "No", the Contractor shall indicate whether the structure of the drain channels and the quantities applied are as agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – bridge surfacing etc."). If X in "No", state the design and volumes applied:
1. Preparation	State the date of supervision. If a need for repair work is found, this shall be stated together with the agreed methods of repair. Drain channel dimensions shall be noted by the Contractor.
2. Packaging, shipping and storage	To be answered by yes/no.
3. Weather	Air temperature shall be read at the start and completion of the laying work. Note whether there is heavy, light, changing or no wind or rain. If the weather changes significantly, a new form shall be completed.
4. Control of own work	Below the yes/no box, state whether material samples have been collected and whether these samples have been delivered to the laboratory.
5. Employer's control - Materials for samples	Material samples shall be taken for the supervision's random samples. Necessary sampling is specified in the tender material or has been agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – bridge surfacing etc.", box 7).
6. Other comments	State whether the general condition of the drain channels is ok. Any other conditions of relevance for the work may be stated. May be provided in an annex.

SUPERVISION'S COMMENTS

By its comments, the supervision provides an assessment of whether the Contractor's control performed gives rise to any special actions. If the supervision has no comments, state "No comments".

Daily report – bridge surfacing

Annex 2: Form D Page 1

Contract no.:	**Laying date:**
Bridge no. / Reg. no.:	
Bridge name:	
Main Contractor:	
Surfacing Contractor:	

Quantity:

1st Layer (place on bridge, material)			
2nd Layer (place on bridge, material)			
Number of tonnes laid	1st Layer	t	Number of tonnes laid out = number of less waste and return load
	2nd Layer	t	Number of tonnes laid out = number of less waste and return load
Laying area	1st Layer	m^2	See sketch, if any
	2nd Layer	m^2	See sketch, if any
Average consumption	1st Layer	kg/m^2	
	2nd Layer	kg/m^2	
Amount of bonding agent	kg/m^2		

Note: Weight slips shall be provided with the daily report.

Date:
Contractor's signature:

Guidance for completing form D: Daily report – bridge surfacing

To be filled in by the surfacing Contractor

General	The daily report form is an example for optional use. The form can be replaced by the Contractor's QA documentation, if this is adequate.
Header	To be completed as specified. The name of the Contractor's foreman shall be stated under "Surfacing Contractor".
Quantity:	The materials used and their location on the bridge shall be specified. The quantities laid out and the respective areas shall be noted. Average consumption shall be noted. Weight slips shall be provided with the form.

Laboratory form

Annex 2. **Form E** **Page 1**

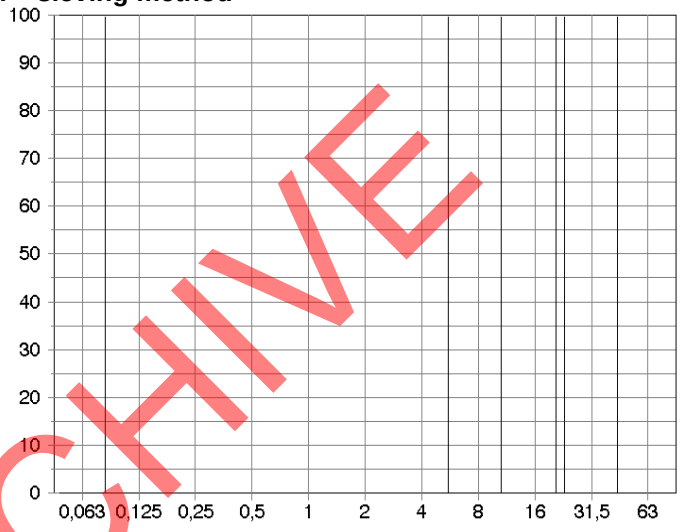
Contract no.: Bridge no./Reg. no.: Employer: Material:		Sampled on: Time Sampling point: Received by lab. on: Sample no.: Lab no.

Material sample Stone density: Mg/m^3 Bitumen: W/v:
Reflection factor: V_B/V_S:

Marshall sample Stability: N Deformation: mm H_S: %
Asphalt density: Mg/m^3 Void H_M: % Vol. Bit. Filling: % Vol.

Determination of particle size distribution – sieving method

Sieve fraction. mm	Passing %
31.5	
22.4	
16	
11.2	
8	
5.6	
4	
2	
1	
0.5	
0.25	
0.125	
0.075	
0.063	



Compaction control Laid out on:

Cores:	Station	Asphalt den. Mg/m^3	V_L %	K. %

On surface (K, M, S cores):

Mean:
Tolerance:

In joints (Sa cores):

Mean:
Tolerance:

Reference:
Asphalt density Mg/m^3
Bitumen %
Stone density Mg/m^3

Recipe no.
Bitumen: kg/ton aggregate Type:

Components:

Comments:

Signature:

Comparison requirements, specification and controls

Annex 2: Form F1 Page 1

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material ÅAB 8**			

Properties	Unit	GWS requirement*	Specification	GWS tolerance requirements	Control of own work	Employer's control
Date of laying		-	-	-		
Time of sampling		-	-	-		
Laying temperature	°C	-	-	-		
Bitumen type		70/100 160/220		- -		
Bitumen content	W/v	≥ 3.4[1)]	(a)	(a) ± 0.3		
Extracted aggregates:						
Title < 11.2 mm	W/v	100		≥ 98		
- mat. < 8 mm	W/v	90-100	(b)	(b) -8, +5		
- mat. < 2 mm	W/v	< 24	(c)	(c) ± 6		
- stone density	g/cm^3	-	(d)	(d) ± 0.05		
Marshall data:						
- density	g/cm^3	-		-		
- void[2)]	vol %	18.0-24.0		-		
Start bitumen:						
- softening points k and r	°C	-	(e)	-		
- penetration, 100 g, 5s, 25°C	1/10 mm	-		-		
- penetration index		-		-		
Data for recovered bitumen:						
- softening points k and r	°C	-	-	< (e) + 6		
- penetration, 100 g, 5s, 25°C	1/10 mm	-	-	-		
- penetration index		-	-	-		

* Absolute requirements regardless of tolerances
(a), (b), (c) and (d) = specified value
(e) = start value
1) Applicable to stone density 2.65 g/cm^3) if other stone density is corrected in accordance with GWS 11.2.2.0)
2) Use of densities for bitumen and aggregates as well as their mutual mass ratio

Comparison requirements, specification and controls

Annex 2: Form F1 Page 2

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material ABM type a**			

Properties	Unit	GWS requirement*	Specification	GWS tolerance requirements	Control of own work	Employer's control
Date of laying		-	-	-		
Time of sampling		-	-	-		
Laying temperature	°C	-	-	-		
Bitumen type		70/100		-		
Bitumen content	W/v	-	(a)	(a) ± 0.3		
Extracted aggregates:						
- mat. < 11.2 mm	W/v	100		≥ 98		
- mat. < 8 mm	W/v	90-100	(b)	(b) -8, +5		
- mat. < 2 mm	W/v	35-50	(c)	(c) ± 6		
- mat. < 0.063 mm	W/v	6-12	(d)	(d) ± 2		
- stone density	g/cm^3	-	(e)	(e) ± 0.05		
Marshall data:						
- stability	N	> 4000		-		
- deformation, read at 9 kN	mm	≤ 8.0		-		
- density	g/cm^3	-		-		
- void[1)]	% Vol.	0.5-2.0		-		
- bitumen filling[1)]	% Vol.	88-97		-		
Start bitumen:						
- softening points k and r	°C	-	(f)	-		
- penetration, 100g, 5s, 25°C	1/10 mm	-		-		
- penetration index		-		-		
Data for recovered bitumen:						
- softening points k and r	°C	-	-	< (f) + 4		
- penetration, 100g, 5s, 25°C	1/10 mm	-	-	-		
- penetration index		-	-	-		

* Absolute requirements regardless of permitted tolerances (a), (b), (c) and (d) = specified value
(f) = start value
1) Use of densities for bitumen and aggregates as well as their mutual mass ratio

Comparison requirements, specification and controls

Annex 2: Form F1 Page 3

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material ABM type b**			

Properties	Unit	GWS requirement*	Specification	GWS tolerance requirements	Control of own work	Employer's control
Date of laying		-	-	-		
Time of sampling		-	-	-		
Laying temperature	°C	-	-	-		
Bitumen type		40/60 pmb		-		
Bitumen content	W/v	-	(a)	(a) ± 0.3		
Extracted aggregates:						
- mat. < 16 mm	W/v	100		≥ 98		
- mat. < 11.2 mm	W/v	90-100	(b)	(b) -8, +5		
- mat. < 4 mm	W/v	< 50	(c)	(c) ± 7		
- mat. < 2 mm	W/v	< 40	(d)	(d) ± 6		
- mat. < 0.5 mm	W/v	< 25	(e)	(e) ± 4		
- mat. < 0.063 mm	W/v	≥ 6	(f)	(f) ± 2		
- stone density	g/cm^3	-	(g)	(g) ± 0.05		
Marshall data:						
- stability	N	> 7500		-		
- deformation, read at 9 kN	mm	≤ 6.0		-		
- density	g/cm^3	-		-		
- void[1)]	% Vol.	1.0 - 2.5		-		
- bitumen filling[1)]	% Vol.	85 - 95		-		
- voids in aggregate1)	% Vol.	≥ 14.0		-		
Start bitumen:						
- softening points k and r	°C	-	(h)	-		
- penetration, 100g, 5s, 25°C	1/10 mm	-		-		
- penetration index		-		-		
Data for recovered bitumen:						
- softening points k and r	°C	-	-	< (h) + 4		
- penetration, 100g, 5s, 25°C	1/10 mm	-	-	-		
- penetration index		-	-	-		

* Absolute requirements regardless of permitted tolerances
(a), (b), (c), (d), (e), (f) and (g) = specified value
(h) = start value
1) Use of densities for bitumen and aggregates as well as their mutual mass ratio

Comparison requirements, specification and controls

Annex 2: Form F1 Page 4

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material ABM type c**			

Properties	Unit	GWS requirement*	Specification	GWS tolerance	Control of own work	Employer's control
Date of laying		-	-	-		
Time of sampling		-	-	-		
Laying temperature	°C	-	-	-		
Bitumen type		40/60 pmb		-		
Bitumen content	W/v	-	(a)	(a) ± 0.3		
Extracted aggregates:						
- mat. < 16 mm	W/v	100		≥ 98		
- mat. < 11.2 mm	W/v	90-100	(b)	(b) -8, +5		
- mat. < 4 mm	W/v	< 50	(c)	(c) ± 7		
- mat. < 2 mm	W/v	< 40	(d)	(d) ± 6		
- mat. < 0.5 mm	W/v	< 25	(e)	(e) ± 4		
- mat. < 0.063 mm	W/v	≥ 6	(f)	(f) ± 2		
- stone density	g/cm^3	-	(g)	(g) ± 0,05		
Marshall data:						
- stability	N	> 9000		-		
- deformation, read at 9 kN	mm	≤ 4.0		-		
- density	g/cm^3	-		-		
- void[1)]	% Vol.	1.0-3.0		-		
- bitumen filling[1)]	% Vol.	85-95		-		
- voids in aggregate1)	% Vol.	≥ 14.0		-		
Start bitumen:						
- softening points k and r	°C	-	(h)	-		
- penetration, 100g, 5s, 25°C	1/10 mm	-		-		
- penetration index		-		-		
Data for recovered bitumen:						
- softening points k and r	°C	-	-	< (h) + 4		
- penetration, 100g, 5s, 25°C	1/10 mm	-	-	-		
- penetration index		-	-	-		

* Absolute requirements regardless of permitted tolerances
(a), (b), (c), (d), (e), (f) and (g) = specified value
(h) = start value
1) Use of densities for bitumen and aggregates as well as their mutual mass ratio

Comparison requirements, specification and controls

Annex 2: Form F1 Page 5

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material SMA type 11B**			

Properties	Unit	GWS requirement*	Specification	GWS tolerance requirements	Control of own work	Employer's control
Date of laying		-	-	-		
Time of sampling		-	-	-		
Laying temperature	°C	-	-	-		
Bitumen type		40/60 pmb		- -		
Bitumen content	W/v	-	(a)	(a) ± 0.3		
Extracted aggregates:						
- mat. < 16 mm	W/v	100		≥ 98		
- mat. < 11.2 mm	W/v	90-100	(b)	(b) -8, +5		
- mat. < 8 mm	W/v	40-65	(c)	(c) ± 7		
- mat. < 5.6 mm	W/v	30-45	(d)	(d) ± 7		
- mat. < 2 mm	W/v	18-28	(e)	(e) ± 6		
- mat. < 0.063 mm	W/v	7-13	(f)	(f) ± 2		
- stone density	g/cm^3	-	(g)	(g) ± 0.05		
Marshall data:						
- density	g/cm^3	-		-		
- void	% Vol.	2.0-4.0		-		
- bitumen filling[1)]	% Vol.	77-92				
- bitumen filling[2)]	% Vol.	80-92		-		
- voids in aggregate3)	% Vol.	≥ 17.0		-		
Start bitumen:						
- softening points k and r	°C	-	(h)	-		
- penetration, 100g, 5s, 25°C	1/10 mm	-		-		
- penetration index		-		-		
Data for recovered bitumen:						
- softening points k and r	°C	-	-	< (h) + 4		
- penetration, 100g, 5s, 25°C	1/10 mm	-	-	-		
- penetration index		-	-	-		

* Absolute requirements regardless of permitted tolerances
(a), (b), (c), (d), (e), (f) and (g) = specified value
(h) = start value
1) Use of densities for bitumen and aggregates as well as their mutual mass ratio
2) Use of the max. asphalt density
3) Indicative value

Comparison requirements, specification and controls

Annex 2: Form F1 Page 6

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material type AB 11t (40/60-70/100)**			

Properties	Unit	GWS requirement*	Specification	GWS tolerance requirements	Control of own work	Employer's control
Date of laying		-	-	-		
Time of sampling		-	-	-		
Laying temperature	°C	-	-	-		
Bitumen type		40/60 70/100		- -		
Bitumen content	W/v	-	(a)	(a) ± 0.3		
Extracted aggregates:						
- mat. < 16 mm	W/v	100		≥ 98		
- mat. < 11.2 mm	W/v	90-100	(b)	(b) -8, +5		
- mat. < 8 mm	W/v	55-85	(c)	(c) ± 7		
- mat. < 2 mm	W/v	30-45	(d)	(d) ± 6		
- mat. < 0.5 mm	W/v	15-30	(e)	(e) ± 4		
- mat. < 0.063 mm	W/v	4-12	(f)	(f) ± 2		
- stone density	g/cm^3	-	(g)	(g) ± 0.05		
Marshall data:						
- stability[1)]		> 6000				
- deformation, read at 9kN1)		1.0-4.0				
- density	g/cm^3	-		-		
- void[2) 3)]	% Vol.	2.0-4.0		-		
- bitumen filling[2)]	% Vol.	75-93				
- bitumen filling[4)]	% Vol.	78-97		-		
Start bitumen:						
- softening points k and r	°C	-	(h)	-		
- penetration, 100g, 5s, 25°C	1/10 mm	-		-		
- penetration index		-		-		
Data for recovered bitumen:						
- softening points k and r	°C	-	-	< (h) + 4		
- penetration, 100g, 5s, 25°C	1/10 mm	-	-	-		
- penetration index		-	-	-		

* Absolute requirements regardless of permitted tolerances
(a), (b), (c), (d), (e), (f) and (g) = specified value
(h) = start value
1) Indicative
2) Use of densities for bitumen and aggregates as well as their mutual mass ratio
3) If max density is used, the interval limits shall be lowered by 0.5 percentage point
4) Use of the max. asphalt density

Comparison requirements, specification and controls

Annex 2: Form F1 Page 7

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material type AB 11t (100/150-160/220)**			

Properties	Unit	GWS requirement*	Specification	GWS tolerance requirements	Control of own work	Employer's control
Date of laying		-	-	-		
Time of sampling		-	-	-		
Laying temperature	°C	-	-	-		
Bitumen type		100/150 160/220		- -		
Bitumen content	W/v	-	(a)	(a) ± 0.3		
Extracted aggregates:						
- mat. < 16 mm	W/v	100		≥ 98		
- mat. < 11.2 mm	W/v	90-100	(b)	(b) -8, +5		
- mat. < 8 mm	W/v	55-85	(c)	(c) ± 7		
- mat. < 2 mm	W/v	30-45	(d)	(d) ± 6		
- mat. < 0.5 mm	W/v	15-30	(e)	(e) ± 4		
- mat. < 0.063 mm	W/v	4-12	(f)	(f) ± 2		
- stone density	g/cm^3	-	(g)	(g) ± 0.05		
Marshall data:						
- stability[1)]		> 5000				
- deformation, read at 9kN1)		1.0-4.0				
- density	g/cm^3	-		-		
- void[2) 3)]	% Vol.	2.0-4.0		-		
- bitumen filling[2)]	% Vol.	72-93				
- bitumen filling[4)]	% Vol.	75-97		-		
Start bitumen:						
- softening points k and r	°C	-	(h)	-		
- penetration, 100g, 5s, 25°C	1/10 mm	-		-		
- penetration index		-		-		
Data for recovered bitumen:						
- softening points k and r	°C	-	-	< (h) + 4		
- penetration, 100g, 5s, 25°C	1/10 mm	-	-	-		
- penetration index		-	-	-		

* Absolute requirements regardless of permitted tolerances
(a), (b), (c), (d), (e), (f) and (g) = specified value
(h) = start value
1) Indicative
2) Use of densities for bitumen and aggregates as well as their mutual mass ratio
3) If max density is used, the interval limits shall be lowered by 0.5 percentage point
4) Use of the max. asphalt density

Comparison requirements and compaction controls

Annex 2: Form F2 Page 1

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material ABM type a/b/c**			

Properties	Unit	GWS requirements	Mean	k-m-s cores					
Control of own work:									
Height	mm								
Asphalt density	g/cm^3								
Void, mean	% Vol.	≤ 4.0							
Void, tolerance	% Vol	≤ 5.0							
K, mean	%	≥ 98.0							
K, tolerance	%	≥ 97.0							
				k-m-s cores					
Employer's control: Void, mean	% Vol.	≤ 4.0							
Void, tolerance	%. Vol	≤ 5.0							
K, mean	%	≥ 98.0							
K, tolerance	%	≥ 97.0							

K = degree of compaction

Properties	Unit	GWS requirements	Mean	Sa cores					
Control of own work:									
Height	mm								
Asphalt density	g/cm^3								
Void, mean	% Vol.	≤ 5.0							
Void, tolerance	% Vol	≤ 6.0							
K, mean	%	≥ 97.0							
K, tolerance	%	≥ 96.0							
				Sa cores					
Employer's control:									
Void, mean	% Vol.	≤ 5.0							
Void, tolerance	%. Vol	≤ 6.0							
K, mean	%	≥ 97.0							
K, tolerance	%	≥ 96.0							

K = degree of compaction

Comparison requirements and compaction controls

Annex 2: Form F2 Page 2

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material SMA type 8B/11B**			

Properties	Unit	GWS requirements	Middle	k-m-s cores					
Control of own work:									
Height	mm								
Asphalt density	g/cm^3								
Void, mean	% Vol.	≤ 5.0							
Void, tolerance	% Vol	≤ 6.0							
K, mean	%	≥ 98.0							
K, tolerance	%	≥ 97.0							
				k-m-s cores					
Employer's control:									
Void, mean	% Vol.	≤ 5.0							
Void, tolerance	%. Vol	≤ 6.0							
K, mean	%	≥ 98.0							
	%	≥ 97.0							

K = degree of compaction

Properties	Unit	GWS requirements	Mean	Sa cores					
Control of own work:									
Height	mm								
Asphalt density	g/cm^3								
Void, mean	% Vol.	≤ 6.0							
Void, tolerance	% Vol.	≤ 7.0							
K, mean	%	≥ 97.0							
K, tolerance	%	≥ 96.0							
				Sa cores					
Employer's control:									
Void, mean	% Vol.	≤ 6.0							
Void, tolerance	% Vol	≤ 7.0							
K, mean	%	≥ 97.0							
K, tolerance	%	≥ 96.0							

K = degree of compaction

Comparison requirements and compaction controls

Annex 2: Form F2 Page 3

Contract no.:	Bridge no. / Reg. no.:	Bridge name:	
Main Contractor: Surfacing Contractor:		Employer:	Date:
Material: **Asphalt material type AB 81t/11t/16t**			

Properties	Unit	GWS requirements	Mean	k-m-s cores					
Control of own work:									
Height	mm								
Asphalt density	g/cm^3								
Void, mean	% Vol.	≤ 7.0							
Void, tolerance	% Vol.	≤ 8.0							
K, mean	%	≥ 96.0							
K, tolerance	%	≥ 95.0							
				k-m-s cores					
Employer's control:									
Void, mean	% Vol. % Vol	≤ 7.0							
Void, tolerance	%	≤ 8.0							
K, mean	%	≥ 96.0							
K, tolerance	%	≥ 95.0							

K = degree of compaction

Properties	Unit	GWS requirements	Mean	Sa cores					
Control of own work:									
Height	mm								
Asphalt density	g/cm^3								
Void, mean	% Vol.	≤ 8.0							
Void, tolerance	% Vol.	≤ 9.0							
K, mean	%	≥ 95.0							
K, tolerance	%	≥ 94.0							
				Sa cores					
Employer's control:									
Void, mean	% Vol.	≤ 8.0							
Void, tolerance	% Vol	≤ 9.0							
K, mean	%	≥ 95.0							
K, tolerance	%	≥ 94.0							

K = degree of compaction

Annex 3:

SOFT JOINTS

Annex 3 for soft joints contains the following forms and guidance:

Soft joints shall be checked on a daily basis by the Contractor on Form B: "Checklist - soft joints" or on similar documentation material with reference to the checklist in the boxes of the form.

Subsequent controls of soft joints shall be performed by the supervision and be entered in Form C: "Subsequent checklist - bridge contracts". Form C and guidance can be found in Annex 5.

Form A:
Protocol for preparatory meeting - soft joints
Guidance for completing Form A

Form B:
Checklist - soft joints Guidance for completing Form B2

Note:
For joint sealant type B, which is used in connection with stainless steel profiles, reference is made to Annex 1.

Protocol for preparatory meeting – soft joints

Annex 3: Form A Page 1

Contract no.:	**Bridge no. / Reg. no.:**	**Bridge name:**	
Main Contractor: **Sealing Contractor:**		**Employer:**	**Date:**
Contractor's control:		**Supervision:**	
Elastic joints: **Joint dimension:** **Primer:** **Joint sealant:** **Type:** **A ☐** **B ☐** **Any joint filler:** **Any adhesion breaker:** **Comments:**		**Asphaltic plug joints:** **Joint dimension and design:** **Primer:** **Joint sealant:** **Type:** **D ☐** **E ☐** **Aggregates:** **Cover sheet (dimensions):** **Fabric, if any:** **Bottom filling, if any:** **Comments:**	

1. Drawings/tender material	**Elastic joints:** **A. Groove:** **B. Termination at bridge ends / joint structures:** **C. Adjacent surfaces:** **D. Other:**
	Asphaltic plug joints: **A. Groove:** **B. Termination at bridge ends / joint structures:** **C. Adjacent surfaces:** **D. Pavements / cycle paths:** **E. Other:**
2. Deviations from the tender material	
3. Working procedures	**Are these available?** **Yes ☐** **No ☐** **Comments:**

Protocol for preparatory meeting – soft joints

Annex 3: Form A Page 2

4. Approval of system	**Handed over to the supervision?**	**Yes**	**No**	**Comments:**
	Elastic joints:	☐	☐	
	Asphaltic plug joints:	☐	☐	
5. Control of own work: - Product data - Analysis data	**Voluntary control scheme**	**Yes** ☐	**No** ☐	**If X in no, reference is made to item 5 of the guidance.**
	Elastic joints: **Maximum joint movement:_____mm**			
	Type A:	**Yes**	**No**	**Comments:**
	CE marked according to DS/EN 14188-1, type N1:	☐	☐	
	Data sheet:	☐	☐	
	Pouring temperature:___°C Maximum standing time: hours at_____°C Destruction temperature:___°C			
	Type B:	**Yes**	**No**	**Comments:**
	CE marked according to DS/EN 14188-2, class C:	☐	☐	
	Data sheet:	☐	☐	
	Rate of cure:_____(possibly curve as annex)			
	Primer:	**Yes**	**No**	**Comments:**
	In accordance with prEN 14188-4, type PRH, PRC-s, PRC-m:	☐	☐	**Type: PR...**
	Data sheet:	☐	☐	
	Joint sealant / Primer: :	**Yes**	**No**	
	Has the CE mark been given on the basis of the same materials to be used on the structure:	☐	☐	
	Comments:			
		Yes	**No**	**Comments:**
	Batch control shall be provided directly to the supervision: (Primer and joint sealant)	☐	☐	
	The Contractor sends a copy to the Danish Road Institute	☐	☐	
	Asphaltic plug joints:	**Yes**	**No**	**Comments:**
	Batch control shall be provided directly to the supervision: (Primer, joint sealant and chippings)	☐	☐	
	The Contractor sends a copy to the Danish Road Institute	☐	☐	
6. Employer's control: - Material samples	**Samples are provided of:**	**Yes**	**No**	**Specify quantity: Sampling point:**
	Elastic joints:			
	Primer:	☐	☐	**..... x 2 kg**
	Joint sealant:	☐	☐	**..... x 2 kg**
	Asphaltic plug joints:			
	Primer:	☐	☐	**..... x 2 kg**
	Joint sealant:	☐	☐	**..... x 2 kg**
	Aggregates:	☐	☐	**See guidance**
	Provided directly to the supervision	☐	☐	
	The Contractor sends samples to the Danish Road Institute	☐	☐	

Protocol for preparatory meeting – soft joints

Annex 3: Form A Page 3

7. Traffic flow	**Marking plan** **Submitted** ☐ **Approved** ☐ **Other:**	
8. Working time restrictions	**Yes** ☐ **No** ☐ **If Yes:** **Work shall not be carried out within the following hours:**	
9. Environmental aspects	**Is a health and safety plan available:** **Yes** ☐ **No** ☐ **Comments:** **Other:**	
10. Special conditions		
11. Action on defects and shortcomings before start-up		
Signature	**Main Contractor's signature:** **Joint sealing Contractor's signature:**	**Supervision's signature:**

Guidance for completing Form A: Protocol for preparatory meeting – soft joints

To be filled in by the supervision and Contractor

Header supervision.

State the name of the Contractor's foreman (Contractor's control) and name of the

Describe the structure of the joint, gap width, dimensions and materials as specified in the form.

1. Drawings/tender material

Discuss the details of the joint sealing work on the basis of a project plan or other drawings. Under points A-E, state the agreements made during the preparatory meeting with drawing identification to the extent needed.

2. Deviations from the tender material

In the event of deviations from the specification in the tender material which may have consequences, it shall be stated here.

3. Working procedures

The working procedures shall, as a minimum, contain the following:

Elastic joints:

- Requirements for weather conditions during application, e.g. temperature and humidity.
- Any proposed changes to detailed geometrical design
- Method for possible cutting, cleaning and preparing of grooves
- Method for priming and any drying of groove. Including requirements for base
- Method for handling the sealant, including all relevant temperature criteria and maximum standing time
- Method for applying joint sealant and any time constraints. Layer thicknesses and any joint filler and/or adhesion breaker shall also be stated
- Method of final treatment of the joint surface.

Asphaltic plug joints:

- Method for cutting, cleaning and preparing of groove
- Method for any surface dressing of bridge deck and joint gap
- Method for fixing the cover sheet and use of adhesion breaker
- Method for priming
- Method for heating of chipping, including temperature criteria and any coating
- Method for heating the sealant, including all relevant temperature criteria and maximum standing time
- Method for laying of chipping and sealant, including layer thicknesses, processing, time constraints, etc.
- Method of final treatment of the joint surface

4. Approval of system

State whether any document for voluntary system approval scheme or type approval document has been provided to the supervision. If no to elastic joints, the supplier shall provide data from the system test specified in GWS for each combination of each batch joint sealant/primer. If no, the defect shall be stated under item 11.

5. Control of own work:
   - Product data
   - Analysis data

State whether the products are subject to a voluntary control scheme, see GWS section 10. If X in no, the supervision shall compare the supplier's production supervision with the requirements in the document for voluntary system approval scheme/type approval document with the requirements of GWS if approval are not available.

State the following data:

- Maximum joint movements
- For joint sealant type A, state whether it has been delivered in accordance with accordance with DS/EN 14188-1. If no, other agreements shall be made
- For joint sealant type A, temperature limits are stated for pouring temperature of the sealant, maximum standing time in hours at a specified temperature and destruction temperature
- For joint sealant type B, state whether it has been delivered in accordance with accordance with DS/EN 14188-2. If no, other agreements shall be made.
- For joint sealant type B, state the rate of cure

- For primer, state whether it has been delivered in accordance with prEN 14188-4, and is type PRH, PRC-s or PRC-m, and not type PBH, see GWS
- For the combination joint sealant/primer, state whether the CE marking is given on the basis of the types of materials currently used for the structure. If no, new documentation is required, see GWS
- It shall be stated whether batch controls of materials have to be delivered directly to the supervision, as well as whether documentation of batch controls shall also be sent to Danish Road Institute.

6. Employer's control - material samples	State any agreement Employer's control of materials. The sample size for chippings depends on the grain size and sampling practice. Reference is also made to DS/EN 932-1. Note that material samples are not a requirement but is to be agreed if there is a request for random sampling. The supervision should make an agreement with the Employer to this effect before the preparatory meeting.
7. Traffic flow	Stated any agreements on traffic flow and marking plan.
8. Working time restrictions	State restricted or abnormal working time which is conditional on e.g. rush-hour traffic or noise restrictions.
9. Environmental aspects	State any agreements on environmental and health and safety aspects, e.g. health and safety plan.
10. Special conditions	State any other conditions of relevance for the joint sealing work. May be provided in an annex.
11. Action on defects and shortcomings before start-up	State the defects identified at the preparatory meeting and the actions agreed to bring all matters up to date before starting the joint sealing work.

Checklist – soft joints

Annex 3: Form B Page 1

Contract no.:	Bridge no. / Reg. no.:	Bridge name:
Contractor's control:		Date:

Joint type: **Elastic joints:** ☐ **Asphaltic plug joints:** ☐

Are the structure of the joints and quantities applied as agreed and described in Form A: Yes ☐ no ☐

If X in "No", state the design and quantities applied:

Contractor's control:

1. Groove:	**Supervision made:** **Date:** ……					
		Yes	**No**	**Comments:**		
	Supervision attended:	☐	☐			
	Repair work required:	☐	☐			
	Surfaces cleaned:	☐	☐			
	Joint dimensions: **Height:** …… mm **Width:** …… mm					
	Action in response to any defects:					
2. Packaging, shipping and storage		**Yes**	**No**	**Comments:**		
	Marking as specified:	☐	☐			
	Storage as specified:	☐	☐			
3. Weather:	**Air temperature:**	**Heavy**	**Light**	**Changing**	**None**	
	Start_____**°C at:**_____ **Wind**	☐	☐	☐	☐	
	Rain	☐	☐	☐	☐	
	End_____**°C at.:**_____					
4. Execution:		**Yes**	**No**	**Comments:**		
	Execution, see working procedure:	☐	☐			
	Max. temperature in boiler: ……**°C**					
5. Control of own work		**Yes**	**No**	**Comments:**		
	Sample taken and delivered to the laboratory:	☐	☐			
6. Employer's control - Materials for samples		**Yes**	**No**			
	Have material samples been taken as specified in Form A item 6:	☐	☐			
	Samples have been handed over to:_____					
7. Other comments		**Yes**	**No**			
	Is the general condition of the joints ok: (Groove, joint gap, joint, adjoining surfacing)	☐	☐			
	Other comments:					
Signature	**Contractor's signature:**					

The supervision's comments shall be stated on the back or in annex:

Guidance for completing Form B: Checklist – soft joints

To be completed by the joint sealing Contractor

General	The items on the checklist may be replaced by the Contractor's QA documentation by making a reference to them in the boxes of the form.
Header	State the name of the Contractor's foreman (Contractor's control). By control off the fields "Yes" or "No", the Contractor shall indicate whether the structure of the joints and the quantities applied are as agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – soft joints") If X in "No", state the design and volumes applied:
1. Groove	State the date of supervision. If a need for repair work is found, this shall be stated together with the agreed methods of repair. Joint dimensions shall be stated by the Contractor.
2. Packaging, shipping and storage	To be answered by yes/no.
3. Weather	Air temperature shall be read at the start and completion of the execution. Note whether there is heavy, light, changing or no wind or rain. If the weather changes significantly, a new form shall be completed.
4. Execution	Deviations in relation to working procedure shall be stated in the form .The maximum temperature in the boiler during the joint sealing work shall be noted.
5. Control of own work	Below the yes/no box, state whether material samples have been collected and whether these samples have been delivered to the laboratory.
6. Employer's control - materials for samples	Material samples shall be taken for the supervision's random samples. Necessary sampling is specified in the tender material or has been agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – soft joints" box 6).
7. Other comments	State whether the general condition of the joints is ok. Any other conditions of relevance for the joint sealing work may be stated. May be provided in an annex.

SUPERVISION'S COMMENTS

By its comments, the supervision provides an assessment of whether the Contractor's control performed gives rise to any special actions. If the supervision has no comments, state "No comments".

Annex 4:

THIN PAVEMENTS WITH SYNTHETIC BINDER

Annex 4 for thin pavements with synthetic binder contains the following forms and guidance:

Thin pavements with synthetic binder shall be checked on a daily basis by the Contractor on Form B: "Checklist - thin pavements with synthetic binder" or on similar documentation material with reference to the checklist in the boxes of the form.

Subsequent controls of thin pavements with synthetic binder shall be performed by the supervision and be entered in Form C: "Subsequent checklist - bridge contracts". Form C and guidance can be found in Annex 5.

Form A:

Protocol for preparatory meeting - thin pavements with synthetic binder

Guidance for completing Form A

Form B:

Checklist - thin pavements with synthetic binder

Guidance for completing Form B

Protocol for preparatory meeting – thin pavements with synthetic binder

Annex 4: Form A Page 1

Contract no.:	**Bridge no. / Reg. no.:**	**Bridge name:**	
Main Contractor: **Surfacing Contractor:**		**Employer:**	**Date:**
Contractor's control:		**Supervision:**	
System designation:	**Traffic load:**	**Path bridge** ☐ **AADT 4000**	**4000 < AADT 10000** ☐

Surfacing structure, used materials and quantities:

Wearing course type:				
Primer:	**Type:**	**g/m²**	**Blinding:**	**kg/m²**
Membrane:	**Type:**	**kg/m²**	**Blinding:**	**kg/m²**
Wearing course (binder):	**Type:**	**kg/m²**		
Wearing course (aggregate):	**Type:**	**kg/m²**		
Frictional material:	**Type:**	**kg/m²**		
Surface sealing:	**Type:**	**kg/m²**		
Comments:				

1. Drawings/tender material	**A. Any longitudinal connections to bituminous surfacing:** **B. Termination at bridge ends:** **C. Termination at joint structure:** **D. Termination at edge beams, etc.:** **E. Wells:** **F. Any reshaping/level plan/gradients – including levelling of base:** **G. Other:**			
2. Deviations from the tender material				
3. Working procedures	**Are these available?**	**Yes** ☐	**No** ☐	**Comments:**
4. Approval of system	**Handed over to the supervision?**	**Yes** ☐	**No** ☐	**Comments:**
5. Daily reports:	**Provided directly to the supervision**	**Yes** ☐	**No** ☐	**Other agreement:**
6. Control of own work:	**Provided directly to the supervision:** **(All constituent materials listed above under surfacing structure)**	**Yes** ☐	**No** ☐	
	The Contractor sends a copy to the Danish Road Institute	☐	☐	
	Comments:			

Protocol for preparatory meeting – thin pavements with synthetic binder

Annex 4: Form A Page 2

7. Stripping test - base:	**Regular controls, base:** **- Frequency: ..... per ..... m²** **- Monitored by the supervision: Yes ☐ No ☐** **Comments**	**Regular controls, thin pavements with synthetic binder:** **- Frequency: ..... per ..... m²** **- Monitored by the supervision: Yes ☐ No ☐** **Comments**

8. Employer's control: - Material samples

Samples are provided of:	Yes	No	Specify quantity:
Raw materials:			
Primer:	☐	☐	..... x 3 kg
Blinding for primer:	☐	☐	..... x 5 kg
Membrane:	☐	☐	..... x 3 kg
Blinding for membrane:	☐	☐	..... x 5 kg
Wearing course (binder):	☐	☐	..... x 3 kg
Wearing course (aggregate):	☐	☐	..... x 5 kg
Frictional material:	☐	☐	See guidance
Sealing materials:	☐	☐	..... x 3 kg
Cast samples:			
Membrane (without blinding):	☐	☐	
Frequency:_____per_____m²			
Wearing course (without aggregate and blinding):	☐	☐	
Frequency:_____per_____m²			
Provided directly to the supervision	☐	☐	
The Contractor sends samples to the Danish Road Institute	☐	☐	

9. Traffic flow		**Submitted**	**Approved**
	Marking plan	☐	☐
	Other:		

10. Working time restrictions		**Yes**	**No**
		☐	☐
	If Yes: Work shall not be carried out within the following hours:		

11. Environmental aspects		**Yes**	**No**	**Comments:**
	Is a health and safety plan available:	☐	☐	
	Other:			

12. Special conditions	
13. Action on defects and shortcomings before start-up	

Signature	**Main Contractor's signature:** **Surfacing Contractor's signature:**	**Supervision's signature:**

Guidance for completing Form A: Protocol for preparatory meeting – thin pavements with synthetic binder

To be filled in by the supervision and Contractor

Header supervision.	State the name of the Contractor's foreman (Contractor's control) and name of the supervision. Also describe the system specification and type of the thin pavements with synthetic binder in relation to traffic loads (min. average thickness of the wearing course in mm), structure, materials and quantities as specified in the form.
1. Drawings/tender material	Discuss the details of the surfacing work on the basis of a project plan or other drawings. Under points A-G, state the agreements made during the preparatory meeting with drawing identification to the extent needed. If a need arises for levelling-reshaping mortar, state the make and type and the applied primer as well as documentation for compatibility, e.g. by means of references.
2. Deviations from the tender material	In the event of deviations from the specification in the tender material which may have consequences, it shall be stated here.
3. Working procedures	The working procedures shall, as a minimum, contain the following: • System configuration as well as constituents of and quantities of the individual layer • Coordination with completion of planned, adjoining works • Details regarding preparation of base, including approval and repair procedure • Requirements for concrete base as well as climate criteria during laying • Details concerning tent and other covering equipment • Supervision and testing equipment • Methods for creating surfacing, including method for and location of joints, method for upturned edges, skirting, penetrations and endings along free edges or expansion joints • Method for repair of any damage • Transport route during laying • Drainage during execution of the work • Health and safety issues.
4. Type approval of materials	State here whether the type approval document has been handed over to the supervision.

5. Daily reports	State whether daily reports shall be provided directly to the supervision or whether other agreement is made.
6. Control of own work	State here whether the control of own work for the sub-components included in the structure of the thin pavements with synthetic binder shall be provided directly to the supervision. This also includes whether the documentation for control of own work shall sent to the Danish Road Institute.
7. Stripping test	State the extent, procedure for stripping tests of base and thin pavements with synthetic binder. In general, at least one stripping test should be made for each 100 m², however, at least 3 per bridge.
8. Employer's control	State any agreement on Employer's control of materials. For **cast samples,** the GWS for thin pavements with synthetic binder specifies that for paving works larger than 500 m^2, at least 1 sample per 100 m^2 shall be taken. Note that **material samples** of raw materials are not a requirement but is to be agreed if there is a request for random sampling. The supervision should make an agreement with the Employer to this effect before the preparatory meeting. The sample size for chippings depends on the grain size and sampling practice. Reference is also made to DS/EN 932-1.
9. Traffic flow	Stated any agreements on traffic flow and marking plan.
10. Working time restrictions	State restricted or abnormal working time which is conditional on e.g. rush-hour traffic or noise restrictions.
11. Environmental aspects	State any agreements on environmental and health and safety aspects, e.g. health and safety plan.
12. Special conditions	State any other conditions of relevance for the surfacing work. May be provided in an annex.
13. Action on defects and shortcomings before start-up	State the defects identified at the preparatory meeting and the actions agreed to bring all matters up to date before starting the surfacing work.

Checklist – thin pavements with synthetic binder Annex 4: Form B Page 1

Contract no.:	Bridge no. / Reg. no.:	Bridge name:
Contractor's control:		Date:

Are the structure of the thin pavements with synthetic binder and quantities applied as agreed and described in Form A: Yes ☐ No ☐

If X in "No", state the design and quantities applied:

Contractor's control:

1. Concrete base - Supervision

Supervision made: Date: ……

	Yes	No	Comments:
Concrete Contractors attended:	☐	☐	
Supervision attended:	☐	☐	
Repair work required:	☐	☐	

Number of maturity hours of the concrete surface: ……..…hours (To be stated by the concrete Contractor)

Area size: …… m^2

	Yes	No	Sand patch values:		
Has the texture depth of the concrete base been observed	☐	☐	Mean	Min.	Max.
(Texture depth before priming: min. 0.5 mm – max 1.5 mm)			_____;	_____;	_____

Action in response to any defects:

The surfacing Contractor took over the concrete base: Date: _____

2. Packaging, shipping and storage

	Yes	No	Comments:
Marking as specified:	☐	☐	
Storage as specified:	☐	☐	

3. Weather:

Air temperature:

Start_____°C at :_____

End_____°C at.:_____

	Strong	Cloudy	Partially cloudy
Sun	☐	☐	☐

Weather changes: Time:_____

Comments:

4. Before priming:

Concrete surface condition (at least 3 measurements per day):

Area size: …… m^2

Core moisture content:_____% RH (Capillary saturation of core ≤ 90% RH)

Absolute moisture content:_____% (Core moisture measured on surface shall be less than 5%)

The concrete surface temperature shall be at least 5 °C and also at least 3°C above the dew point temperature.

Concrete temperature: Dew-point temperature:

Start_____°C Start_____°C at:_____

Comments:

5. Execution:

	Yes	No
Execution, see working procedure:	☐	☐
Is the quality of raw material ok (e.g. inhomogeneity, crystals):	☐	☐

Control log for measured values of air temperature, base temperature, material temperature and air humidity taken from commencement of the work and until the thin pavements with synthetic binder are no longer susceptible to moisture is available in:

Annex: _____

Comments:

Checklist – thin pavements with synthetic binder

Annex 4: Form B Page 2

6. Control of own work	**Stripping test – base:** **Force in MPa:** **- Stripping 1:** **- Stripping 2:** **- Stripping 3:** **- Stripping 4:** **- Stripping 5:** **- Stripping 6:** **Minimum: .....MPa** **Mean: .....MPa**	**Stripping test, thin pavements with synthetic binder:** **Force in MPa:** **- Stripping 1:** **- Stripping 2:** **- Stripping 3:** **- Stripping 4:** **- Stripping 5:** **- Stripping 6:** **Minimum: .....MPa** **Mean: ..... .MPa**
7. Employer's control **- Materials for samples**	**Yes No** **Have material samples of raw materials been taken as specified in Form A item 8:** ☐ ☐ **Have cast samples been taken as specified in Form A item 8:** ☐ ☐ **Samples have been handed over to:** _____	
8. Other comments	**Yes No** **Is the general condition of the thin pavements with synthetic binder ok:** ☐ ☐ **(Connections, joints, blisters, pinholes, puddle formation, groove)** **Other comments:**	
Signature	**Contractor's signature:**	

Supervision's comments:

Guidance for completing Form B: Checklist – thin pavements with synthetic binder

To be filled in by the surfacing Contractor

General	The items on the checklist may be replaced by the Contractor's QA documentation by making a reference to them in the boxes of the form.
Header	State the name of the Contractor's foreman (Contractor's control). By control off the fields "Yes" or "No", the Contractor shall indicate whether the structure of the thin pavements with synthetic binder and the quantities applied are as agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – thin pavements with synthetic binder"). If X in "No", state the design and volumes applied:
1. Concrete base	State the date of supervision. Also state the number of maturity hours of the concrete on handover of the concrete base by the concrete Contractor to the surfacing Contractor. Information relating to this can be obtained from the concrete Contractor. (For consecutive execution, do not fill in) State measured sand patch values. If a need for repair work is found, this shall be stated together with the agreed methods of repair. The surfacing Contractor states the date of his taking over the concrete base. (For consecutive execution, do not fill in) State the number of maturity hours of the concrete before priming. Information relating to this can be obtained from the concrete Contractor. (For consecutive execution, do not fill in)
2. Packaging, shipping and storage	To be answered by yes/no.
3. Weather	Air temperature shall be read at the start and completion of the laying work. It shall be stated whether there is strong sun or whether it is cloudy or partially cloudy. If the weather changes significantly, the time of the weather change shall be stated. If the weather changes and if the execution lasts for long periods of time, additional measurements shall be made, see GWS.
4. Before priming	The core moisture content, measured according to method TI-B 17, shall be less than 90% RH and be stated in the form. Core moisture content. Absolute moisture content, measured according to method DS/EN 1997-5, shall be less than 5% and be stated in the form. The concrete base temperature shall be at least 5°C and also at least 3°C above dew point temperature. The temperatures shall be noted in the form.
5. Execution	Deviations in relation to working procedure shall be stated in the form. It shall also be stated whether the quality of the raw materials is ok. Control log for measured values of air temperature, base temperature, material temperature and air humidity shall be kept from commencement of the laying and be repeated at least every 3 hours until the thin pavements with synthetic binder are no longer susceptible to moisture, see the type approval document. The control log shall be attached.
6. Control of own	State the results of stripping tests on bases and on full thin pavements with synthetic binder.
7. Employer's control - Materials for samples	Material samples of raw materials may need to be taken for the supervision's random samples. Necessary sampling has been agreed at the preparatory meeting (see form A: "Protocol for preparatory meeting – thin pavements with synthetic binder", box 8).
8. Other comments	State whether the general condition of the thin pavements with synthetic binder is ok. Any other conditions of relevance for the surfacing work may be stated. May be provided in an annex.

SUPERVISION'S COMMENTS

By its comments, the supervision provides an assessment of whether the Contractor's control performed gives rise to any special actions. If the supervision has no comments, state "No comments".

Annex 5:

SUBSEQUENT CONTROLS - BRIDGE CONTRACTS

Annex 5 for subsequent controls contains the following form and guidance:

Form C:
Subsequent checklist – bridge contracts
Guidance for completing Form C

Form C is a common form for all elements described in the annexes 1-4.

Subsequent controls – bridge contracts Annex 5: Form C Page 1

Contract no.:	**Bridge no. / reg. no.:**	**Bridge name:**	
Main Contractor: **Subcontractor:**		**Employer:**	**Date:**
Contractor's control:		**Supervision:**	
Description of the elements and location:			**Type of element:** **- Waterproofing:** ☐ **- Bridge surfacing:** ☐ **- Drain channels:** ☐ **- Joints:** ☐ **- Thin pavements** ☐
Comments:			

Employer's control

1. Laboratory control		**Completed**		**Requirements met**	
		Yes	**No**	**Yes**	**No**
	Control of own work	☐	☐	☐	☐
	Employer's control	☐	☐	☐	☐
	Comments:				
2. Functional requirements (Only for bridge surfacing and thin pavements with synthetic binder)		**Completed**		**Requirements met**	
		Yes	**No**	**Yes**	**No**
	Evenness and profile	☐	☐	☐	☐
	Friction measurement	☐	☐	☐	☐
	Comments:				
3. Preparation for handover				**Yes**	**No**
	Collection of data in accordance with checklist Form B			☐	☐
	Has documentation concerning environmental aspects been received			☐	☐
	Are results available from any Employer's control			☐	☐
	For bridge surfacing also:				
	- Is the visual condition of the bridge surfacing work ok?			☐	☐
	- Have daily reports and weight slips been received?			☐	☐
	Comments:				
4. Special comments					

Date:
Supervision's signature:

Guidance for completing Form C: Subsequent checklist – bridge contracts

To be completed by the supervision

Header supervision.	State the name of the Contractor's foreman (Contractor's control) and name of the supervision. The nature of the element shall be checked off. In addition, the location of the relevant elements shall be stated. For bridge surfacing, describe material types, layer thicknesses in mm and the binder types used. For joints, describe the type of joint.
EMPLOYER'S CONTROL	
1. Laboratory control	Contractor's control of own work and any Employer's control shall be carried out as agreed at the preparatory meeting stated in Form A.
2. Functional requirements	Only for bridge surfacing and thin pavements with synthetic binder. To be answered by yes/no. In the right hand column, state whether the requirements have been met.
3. Preparation for handover.	Before the handing-over meeting, all relevant information shall be compiled. This includes the Contractor providing all documentation stated in Form B. (For bridge surfacing also Forms D and E, as well as all weight slips). If Employer's controls have been carried out, the results shall be compiled. For environmental aspects, reference is also made to Form A. Under comments, it may be stated whether any circumstances were found during the execution of the work which should be described in the handover protocol. May be provided in an annex. For coating and thin pavements with synthetic binder it shall be decided whether the visual condition is ok (evenness, profile, friction, open panels, greasy spots, joints, drainage, etc.). All these data as well as an overall assessment of the work form the basis of the handing-over meeting with associated agreements regarding any defects and their remediation.
4. Special comments	Any other conditions of relevance for the work may be stated. May be provided in an annex.

Colophon

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