



**DELATABLOC®**  
SAFETY BARRIERS

# MANUAL INSTALLATION

## SB 70 6m MW180 T3 W2 A

surface mounted on asphalt or concrete

**K733137C**

INTERNATIONAL

DELATABLOC.COM



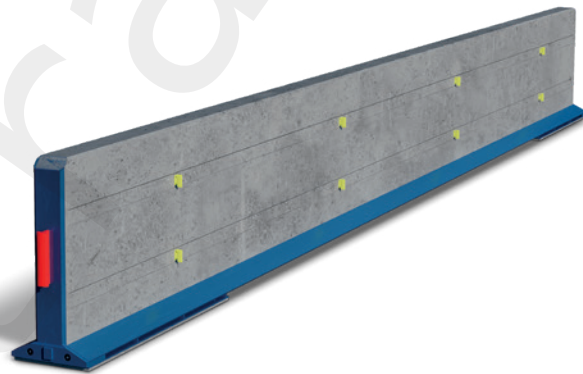
**PROTECTING LIVES  
IS OUR MOTIVATION.**

## **SB Series**

### **Ultralight, superslim & superfast**

Experience a new level of installation speed and versatility for all barrier applications around the work zone.

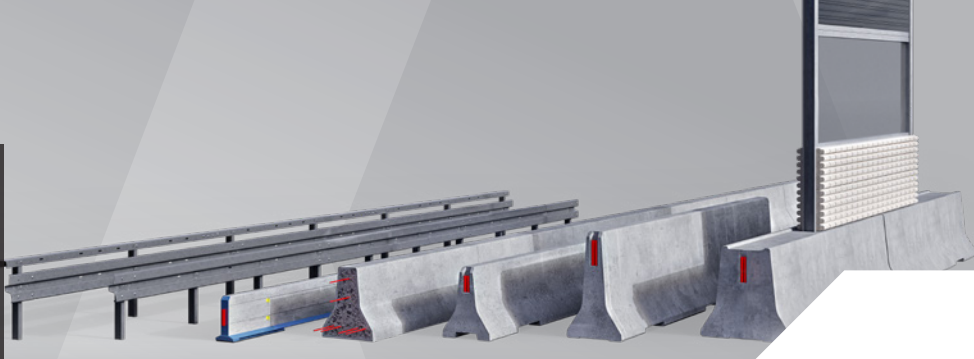
Efficient transportation and fast installation is what you expect from a modern work zone barrier — the right safety performance is a must, anyway. To meet these demands, DELTABLOC® created the ultralight, superslim and superfast SB Series.



Surface mounted or pinned

**Eliminating complexity  
around the work zone**

Vertraulich



# SB 70 6m MW180 T3 W2 A

surface mounted on asphalt or concrete

## PRODUCT DATA SHEET

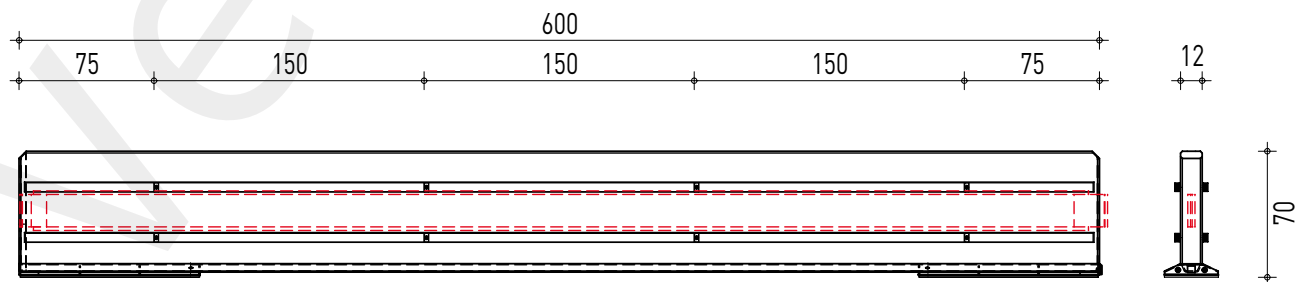
**K733137C**

Performance class	T3 W2 V11 A
Working width $W_N$	W2 (0,7 m)
Vehicle intrusion $V_{I_N}$	V11 (0,6 m)
Dynamic deflection	0,40 m
Tested system length	72 m
EC Certification report	-

Product series	SB Series
Tension bar	MW180
Design	Generation 2
Product variant	

System height	70 cm
System width	30 cm
Dimensions of element (l × w × h)	600 × 30 × 70 cm
Element weight / length	1.235 kg / 6 m

Mode of operation	double sided
Mode of installation	surface mounted on asphalt or concrete
Terminal anchoring	yes
Article number / Installation drawing	183436 / K733137



## DOCUMENT RELEASE AND STATUS

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Date of issue: 01 June 2023



### USEFUL INFORMATION

This technical manual was written in German.

All translations of this technical manual were carried out with greatest possible care. Translation errors particularly in technical terms and omissions are not excluded.

Specific national requirements are marked separately.

The figures and photographs in this manual do not always show the exact type of system described! The diagrams provide a corresponding explanation and description even when similar or other system types are shown for the purposes of illustration.

Errors and omissions excepted.

If there are obvious errors in the manual, please let us know by writing to [documentation@deltabloc.com](mailto:documentation@deltabloc.com). In the event of general questions, please consult the DELTABLOC® partner.

The documentation is continuously updated, the currently valid version is available in the DELTABLOC® Extranet ([extranet.deltabloc.com](http://extranet.deltabloc.com)). DELTABLOC® recommends the use of the DELTABLOC® Extranet with mobile devices.

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## 1 GENERAL INFORMATION

### 1.1 NOTIFICATIONS, SIGNS AND SYMBOLS

The following notifications might be shown in the DELTABLOC® technical documentation:



#### USEFUL INFORMATION

This symbol indicates useful tips, recommendations as well as information for efficient and trouble-free operation.



#### NOTE

This symbol indicates useful hints and references to available documentation.



#### IMPORTANT!

This symbol gives indication to important instructions, that have to be followed in any case!



#### DANGER!

This combination of symbol and signal word indicates a possible or imminently hazardous situation that can cause damage, severe injury or death if not avoided.



#### COUNTRY-SPECIFIC INFORMATION

This symbol indicates requirements that may be regulated differently from one country to another. The respective national specifications must be observed in this case.

The following signs and symbols are self-explaining and might be shown, amongst other such signs and symbols, in the DELTABLOC® technical documentation:



SAFETY NOTICE



# SB 70 6m MW180

## T3 W2 A surface mounted



WARNING NOTICE

## 1.2 AVAILABLE DOCUMENTATION

Each DELTABLOC® vehicle restraint system comes with comprehensive technical documentation. This technical documentation is structured in specific categories, enabling an efficient and up to date know-how transfer to authorities, contractors, producers, installers and operators.

The technical documentation consists of:

- ▶ Product Data Sheets
- ▶ Technical Manuals
- ▶ Technical Drawings



### NOTE

The latest versions of any technical documentation of DELTABLOC® can be found on the DELTABLOC® Extranet website. Register on [extranet.deltabloc.com](https://extranet.deltabloc.com) to have access to the entire DELTABLOC® documentation!

This extensive documentation is required to ensure system conformity of the DELTABLOC® vehicle restraint system with European standard EN 1317-5.

### 1.2.1 TECHNICAL MANUALS

The following technical manuals are available on the DELTABLOC® Extranet website:

#### ▶ APPLICATION & INSTALLATION MANUAL

The APPLICATION & INSTALLATION MANUAL provides all technical information that is necessary for a safe, efficient and correct installation and proper operation of the respective DELTABLOC® vehicle restraint systems.

It is available for all persons who are involved in the planning and installation of DELTABLOC® products.

#### ▶ PRODUCTION MANUAL

The PRODUCTION MANUAL provides all technical information that is necessary for a safe, efficient and correct production of the respective DELTABLOC® vehicle restraint systems.

It is available for all DELTABLOC® production plants.

## 1.2.2 TECHNICAL DRAWINGS

The following technical drawings are available on the DELTABLOC® Extranet website depending on the authorization of the DELTABLOC® installer, planer or other stakeholders:

▶ **M-DRAWINGS**

M-DRAWINGS or type drawings describe the general type of the DELTABLOC® vehicle restraint system. They contain the most important technical properties such as dimensions and safety performance.

M-DRAWINGS are available for all DELTABLOC® stakeholders.

▶ **K-DRAWINGS**

K-DRAWINGS or installation drawings give all necessary information for a proper installation of the respective DELTABLOC® vehicle restraint system. They are the key-drawings for the identification of DELTABLOC® restraint system.

K-DRAWINGS contain an overview of the DELTABLOC® vehicle restraint system with measures and tolerances as well as in factory assembled components. Additionally they contain one or more lists for all necessary components for proper installation and order processing.

The K-DRAWINGS are available for all DELTABLOC® partners, installation companies and planners.

▶ **B-DRAWINGS**

B-DRAWINGS or production drawings describe the production of the DELTABLOC® vehicle restraint system. They contain all information for producers such as dimensions, material specifications, components and reinforcement characteristics. Additionally they contain information about materials and the treatment of surfaces.

B-DRAWINGS are available for all authorized DELTABLOC® production plants.

▶ **Q-DRAWINGS**

Q-DRAWINGS or Quick Assembly Guides (QAG) are handy instructions to guide the DELTABLOC® producer through the production process of the respective DELTABLOC® system types. It is meant to support production workers to achieve an efficient, accurate and safe production and pre-assembly of the vehicle restraint system.

Q-DRAWINGS are available for all DELTABLOC® producers.

▶ **A-DRAWINGS**

A-DRAWINGS or production drawings of components and mounting parts describe the proper manufacture of the respective DELTABLOC® components. Apart from the necessary technical information, they contain detailed quality requirements for the proper manufacture of exclusive DELTABLOC® components. Depending on the respective DELTABLOC® system type the components might be patented or covered by industrial property rights.

A-DRAWINGS are confidential internal DELTABLOC® documents and are therefore not available.

## 2 PRODUCT DESCRIPTION

### 2.1 SCOPE

The vehicle restraint system described in this technical manual is part of the DELTABLOC® product family. It is tested according to the European standard EN 1317-1: 2010-07 and -2: 2010-07.

The product is made of components whose characteristic material is concrete and steel. It has a modular design and is intended for use in public road traffic areas. It serves to protect occupants of errant vehicles, the protection of third parties and the protection of obstacles and objects.

This system is primarily used for the temporary protection of construction sites.

Within the SB Series a distinction is made between the following product families and variants:

- ▶ SB 50 6m MW180 surface mounted
- ▶ SB 70 6m MW180 surface mounted
- ▶ SB 70P 6m MW180 anchored on one side
- ▶ SB 70P 6m MW180 PA anchored alternately
- ▶ SB 70B 6m MW180 surface mounted

The current document is valid for the DELTABLOC® product SB 70 6m MW180 .

- ▶ Installation drawing: K733137



#### USEFUL INFORMATION

For detailed information about the whole DELTABLOC® product range visit [www.deltabloc.com](http://www.deltabloc.com)

### 2.2 NAMING & UNIQUE IDENTIFICATION

The designation of the restraint system is based on the following structure:

- ▶ Brand: DELTABLOC®
- ▶ Product series: SB Series
- ▶ Product family: SB 70
- ▶ System height: 70 cm
- ▶ Element length: 6 m
- ▶ Coupling system: MW180
- ▶ Product variant:
- ▶ Performance class: T3 W2 A

- ▶ Mode of installation: surface mounted on asphalt or concrete
- ▶ Mode of operation: double sided

The unique system identification is provided by the Product ID:

- ▶ Product ID: K733137C

### COMPOSITION PRODUCT ID

NUMBER OF THE K DRAWING	PRODUCT ID INDEX
K733137	C

Table 1 | Composition of the Product ID.



### USEFUL INFORMATION

The K-drawing or installation drawing is a clear representation of how to properly install the system. Among other things, it contains one or more parts lists for all the components required for installation and order processing.

DELTABLOC® systems that are installed using the same K drawing can be tested for different performance classes. In other cases, several product variants can be shown in the same K-drawing. The Product ID Index is used in order to be able to differentiate between these and to identify them clearly.

The Product ID is therefore made up of the number of the K drawing and the Product ID Index, a sequential alphabetical index.

All product variants are explained in more detail in the document "PL099DB-EN Product Variant Codes". See [extranet.deltabloc.com](https://extranet.deltabloc.com).

### SYSTEM DRAWINGS

DRAWING STYLE	DRAWING NUMBER
Type drawing	M733137
Installation drawing	K733137
Production drawing	B733137

Table 2 | List of system drawings.



# SB 70 6m MW180 T3 W2 A surface mounted

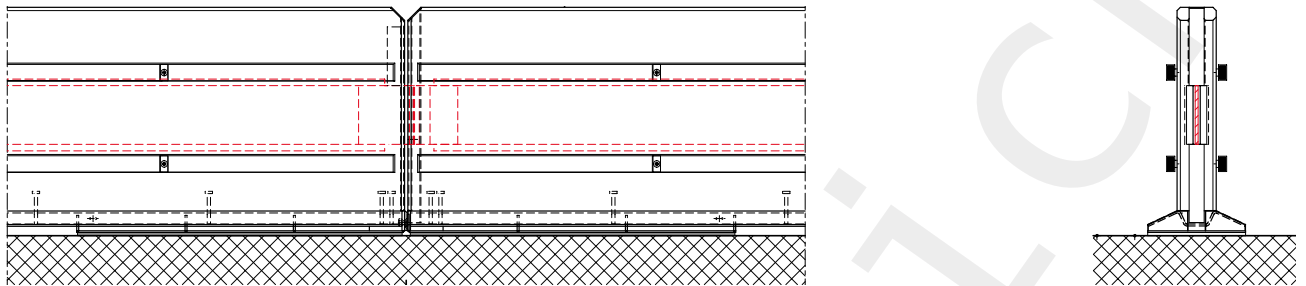


Figure 1 | System overview. Extract from the installation drawing K733137.

The installation drawing contains all the information required for proper installation in accordance with CE certification. The drawing contains a parts list of all the components required for the installation.



## USEFUL INFORMATION

In order to guarantee the full restraint safety of DELTABLOC® vehicle restraint systems, it is essential to comply with the specifications regarding installation and subgrade. Make sure that the system is installed according to the associated installation drawing.

## 2.3 DURABILITY

This DELTABLOC® safety barrier meets and surpasses the respective national requirements in terms of durability and product life cycle. The system was designed in such a way that the performance parameters established in impact tests in accordance with EN 1317-2 can be reproduced reliably during the entire product life cycle.

The total performance life time depends on many factors that are beyond the influence of the producer, for example installation conditions, environmental conditions, handling, application and maintenance.

Exposure classes for concrete and precast concrete elements according to EN 206:

- ▶ Exposure class 2: XC4 (Corrosion induced by carbonation)
- ▶ Exposure class 3: XD3 (Corrosion induced by chlorides other than from sea water)
- ▶ Exposure class 5: XF4 (Freeze/thaw attack with or without de-icing agents)

**IMPORTANT!**

Exposition classes and concrete cover for this DELTABLOC® safety barrier are defined in the production drawing (B-drawing).

National regulations or special applications might require different or lower exposition classes or concrete cover. Always ensure, that the concrete quality and concrete cover are suitable to meet or outreach the respective requirements for performance lifetime.

## 2.4 MATERIALS AND LABELLING

The components required for installation are indicated on the installation drawing (K-drawing). The material specifications for the components for the vehicle restraint system required for production are given on the production drawings (B-drawings). Specifications of the materials and detailed information on the components can be found on the component drawings (A-drawing).

### 2.4.1 COMPRESSIVE STRENGTH CLASS AND CONCRETE COVER

The specifications for the concrete, such as minimum concrete compressive strength and the exposure classes, as well as the components required for the production of the precast concrete element are indicated on the corresponding production drawing (B-drawing).

The strength category of the concrete type used must have the following minimum classification in accordance with EN 206:

- ▶ Compressive strength class: **C30/37**

The concrete quality is defined in the specific production drawing (B-drawing).

The minimum concrete coverage  $c_{\min}$  is the minimum distance between the surface of a reinforcing rod and the nearest concrete surface. The nominal concrete cover  $c_{\text{nom}}$  relevant for production according to EN 13369 results as follows:  $c_{\text{nom}} = c_{\min} + c_{\text{dev}}$ .

Please refer to national regulations for the allowance in design for deviation  $c_{\text{dev}}$  for precast concrete elements.

- ▶ DELTABLOC® precast concrete elements have a nominal concrete cover  $c_{\text{nom}}$  of 2.5 cm.

**IMPORTANT!**

DELTABLOC® safety barriers are certified for a specific minimum concrete quality as defined in the respective production drawing (B-drawing).

National regulations might require a specific concrete quality. Always make sure, that the used concrete fulfils or exceeds the required quality according to the specific national regulations.

# SB 70 6m MW180 T3 W2 A surface mounted



## 2.4.2 COMPONENTS

DELATABLOC® safety barriers are equipped with premium quality components. All components are produced according to the respective product standards at highest quality. A full traceability is guaranteed according to EN 1317-5.

The typical DELATABLOC® system components are:

- ▶ DB Tension bar
- ▶ DB Coupling
- ▶ DB Mesh
- ▶ Further components



### NOTE!

A full list of all components needed for production of the specific DELATABLOC® safety barrier is included in every production drawing (B-drawing).

A list of all components needed for installation of the specific DELATABLOC® safety barrier is included in every installation drawing (K-drawing).

## COMPONENT PART LIST

Refer to the component part list in the production drawing or installation drawing!

QUANTITY	UN.	ART.NO.	DESCRIPTION
1.00	PCF	96 19	COUPLING K280
300.00	ml	103438	INJECTABLE MORTAR HILTI HIT-RE 500
1.00	PCF	1380 14	DB 120S-F / 6m K280E
4.00	PCF	147 197	TRAPEZOID WASHER 100/65x120x15 HDG
4.00	PCF	1502 15	ANCHOR BOLT HILTI HIT-V-R M24x400 ML

Box 1

Any B- or K-drawing

## 2.4.3 REINFORCEMENT

DELATABLOC® safety barriers are produced with high quality reinforcement that is specified in detail in the corresponding B-drawing for production.



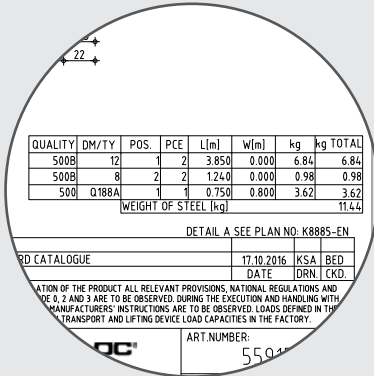
### IMPORTANT!

DELATABLOC® safety barriers are certified for a specific reinforcement quality as defined in the respective production drawing (B-drawing).

National regulations might require a specific reinforcement properties. Always make sure, that the used reinforcement fulfils or exceeds the required quality according to the specific national regulations.

### REINFORCEMENT PART LIST

Refer to the reinforcement part list in the production drawing!



QUALITY	DM/TY	POS.	PCE	L[m]	w[m]	kg	kg TOTAL
S00B	12	1	2	3.850	0.000	6.84	6.84
S00B	8	2	2	1.240	0.000	0.98	0.98
S00	Q188A	1	1	0.750	0.800	3.62	3.62
WEIGHT OF STEEL [kg]							11.44

DETAIL A. SEE PLAN NO. K8885-EN

RD CATALOGUE	17.10.2016	KSA	BED
	DATE	DRN	CKD.

ART NUMBER: 5504

Any B-drawing

Box 2

### 2.4.4 DISPOSAL AND RECYCLING

DELTABLOC® safety barrier elements consist of standard construction materials and are therefore fully recyclable.

- ▶ DELTABLOC® precast concrete products do not contain any toxic substances or polluting materials.
- ▶ Recycle or dispose of individual parts of the safety barrier in accordance with applicable national regulations.
- ▶ DELTABLOC® concrete elements do not contain any substances to be monitored.

### 2.4.5 IDENTIFICATION

Every single DELTABLOC® SB safety barrier element is provided with a serial number on the chamfered upper part of the steel frame. The serial number enables product traceability when required.



### SERIAL NUMBER

The serial number is located on the chamfered upper part of the steel frame of the DELTABLOC® SB concrete element.

General information

Box 3



# SB 70 6m MW180

## T3 W2 A surface mounted



### COUNTRY-SPECIFIC INFORMATION - LOCATION OF THE SERIAL NUMBER

The serial number is located on the chamfered upper part of the steel frame of the DELTABLOC® SB concrete element. National regulations may require a separate position of the serial number.

## 2.5 GROUND CONDITIONS

Refer to the installation drawing (K-drawing K733137) for detailed specifications regarding the requirements of the ground.

## 2.6 CLEANING AND RECYCLING

The DELTABLOC® installer must dispose waste as soon as possible in an environmentally conscious manner.



### IMPORTANT!

Waste, residues and dirt must be removed during the entire production and installation process!

The entire DELTABLOC® product range is recyclable similar to standard steel and concrete construction material.



### IMPORTANT!

Always recycle or dispose in accordance with applicable national regulations!

DELTABLOC® products do not contain any toxic substances or polluting materials.

## 3 SAFETY INSTRUCTIONS



### IMPORTANT!

The safety instructions listed below are only intended as support for production and installation. The manufacturer or the executing company is responsible for occupational safety. For this reason, all valid safety instructions must be provided by the manufacturing company or the company carrying out the work.

Under certain circumstances, national regulations may make subject-specific training or proof of training necessary. DELTABLOC® training courses are offered in the area of production and installation

The personal safety of all persons involved in the manufacture, transport and installation of DELTABLOC® vehicle restraint systems is of the utmost importance. Trained personnel must carry out the work and the relevant safety instructions must be observed!

### 3.1 PERSONAL SAFETY

Personnel designated for the installation must be sufficiently qualified and trained to be able to perform the work to be carried out in a faultless manner and at a high level of quality.

All qualifications and know-how of personnel must be updated through regular training.



### USEFUL INFORMATION

For proper training and education get in touch with the technical sales of DELTABLOC®.

DELTABLOC® recommends the deployment of "installation specialists for precast concrete barriers". The presence of qualified personnel for production and installation is necessary for the proper production and installation of DELTABLOC® vehicle restraint systems.

The responsibilities and authorities of the personnel for monitoring and carrying out work that is decisive for product conformity must be defined.

Works that may affect product conformity must be carried out by appropriately trained personnel. This training is obtained through suitable education, training, acquired skills and experience, proof of which must be documented and stored.

# SB 70 6m MW180

## T3 W2 A surface mounted



### DANGER!

Always carry out functional testing of production and installation equipment, power switches, emergency switches and the warning devices before each use!

Always ensure to have complete and proper personal safety equipment available for the whole production and installation crew!

Adjust capacity of lifting equipment to the characteristics of the load!

Do not linger under suspended loads in any circumstance!



**WEAR HEAD PROTECTION!**

**WEAR SAFETY FOOTWEAR!**

**WEAR HIGH-VISIBILITY CLOTHING!**

## 3.2 PRODUCTION SITE SAFETY

All workers on site must be aware of all hazards! Identify sources of danger during the setup of the construction site and initiate suitable countermeasures!



### DANGER!

Implement a standard production site safety plan when setting up the production!

Always wear personal safety equipment when working on the production site!

Pay attention to other operations on or near the production site!

## 3.3 CONSTRUCTION SITE SAFETY

All workers on site must be aware of all hazards! Identify sources of danger during the setup of the construction site and initiate suitable countermeasures.

Ensure the safety of all traffic participants on the installation sites in public road construction!



### DANGER!

Implement a standard construction site safety plan when setting up the installation site!

Always wear a high-visibility waistcoat when working near road traffic!

Pay attention to the coordination of construction site traffic!

## 4 APPLICATION & INSTALLATION

### 4.1 ADJUSTMENT TO LOCAL CONDITIONS

#### 4.1.1 STANDARD CONFIGURATION FOR INSTALLATION

This DELTABLOC® vehicle restraint system is designed and certified for the application on public roads. The standard configuration for installation including all necessary parts and specifications is represented in the specific installation drawing.

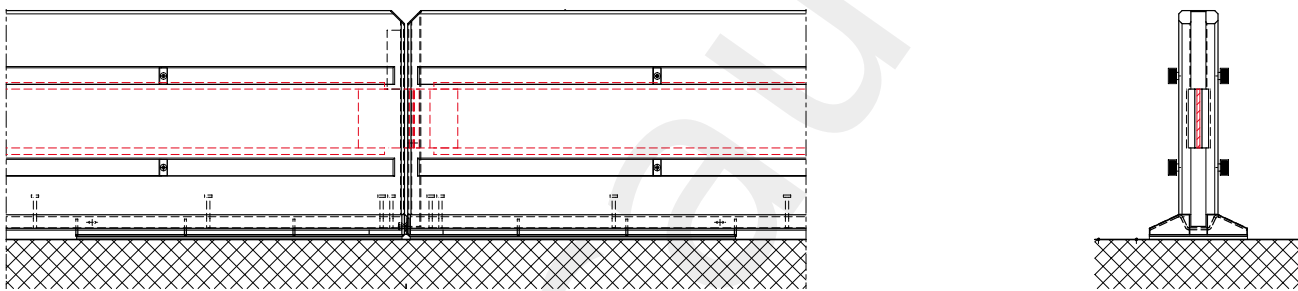


Figure 2 | Detail from the installation drawing K733137.

#### 4.1.2 LOCAL CONDITIONS

Due to specific local conditions, it may be necessary to adapt the DELTABLOC® restraint system to these specific local conditions. The following chapters cover the most common deviations from the standard arrangement.

For cases which are not mentioned here, the manufacturer shall be contacted for project support.



#### **DANGER!**

Adjustments might have an influence on the safety performance of the system.

Any adjustment to local conditions must meet national regulations and/or must be confirmed by the overseeing national authority.



### 4.1.3 REDUCED WORKING WIDTH

The DELTABLOC® vehicle restraint system was tested according to EN 1317-2, which defines the type, impact angle and impact speed of the test vehicle. The impact under test conditions results in a specific deformation of the system, respectively the working width. In exceptional cases the working width can be reduced, but only in strict accordance with the local authorities. Reasonable conditions for the reduction of the working width might be the following:

- ▶ Limitation of the traffic speed
- ▶ Positive risk assessment
- ▶ There is no reasonable alternative existing



#### USEFUL INFORMATION

The DELTABLOC® product range offers several different system types with different deflection performance. If an equivalent DELTABLOC® system is available, showing a lower working width, it should preferably be installed specifically in the area of reduced available space for installation.

### 4.1.4 UNEVEN GROUND CONDITIONS

The foundation of the DELTABLOC® concrete barrier should be as even as possible to avoid problems during the installation process.

Deviations from the evenness of the ground are acceptable within the range of  $\pm 1$  cm over a length of 6 m.

Before starting with the installation process, the subgrade has to be inspected and approved by an experienced DELTABLOC® installer.



#### USEFUL INFORMATION

Installing the barrier on uneven ground conditions might result in longer installation time and damage to the barrier.

### 4.1.5 SLOPE OF THE GROUND

Longitudinal slopes of the road do not have a significant influence on the safety performance of DELTABLOC® safety barriers. For cross falls it is necessary to follow the instructions below for the optimum performance of DELTABLOC® products.

The subgrade should not have a cross fall greater than 7 %. Consider the national regulations if cross falls of less than 7 % are specified.

### INSTALLATION ON CROSS SLOPES

CROSS INCLINATION	MEASURE
≤ 7 %	Acceptable application. Check national regulations for formal acceptance!
> 7 %	Adjustment of the ground conditions required.

Table 3 | Installation on cross slopes.



#### USEFUL INFORMATION

National regulations might define stricter requirements regarding the maximum inclination of slopes.

### 4.1.6 RADII AND CURVED SECTIONS

When installing the DELTABLOC® vehicle restraint system in curved sections, specific measures have to be taken into consideration to allow full safety performance. If standard element length of the DELTABLOC® vehicle restraint system is not suitable to achieve a narrow curve in a specific project, different element length might be used to achieve the required curve radius.

#### RADII - SB 50 PRODUCT FAMILY

PRESSURE PLATE	CURVE		CREST		SAG	
	RADIUS	BUCKLE	RADIUS	BUCKLE	RADIUS	BUCKLE
Without pressure plate	> 83 m	-	> 211 m	-	> 183 m	-
6 mm	> 207 m	< 1,66°	> 532 m	< 0,64°	> 183 m	< 1,89°
8 mm (Standard)	> 422 m	< 0,81°	> 1385 m	< 0,32°	> 183 m	< 1,89°

Table 4 | Radii for the product family SB 50.

#### RADII - SB 70 PRODUCT FAMILIES

PRESSURE PLATE	CURVE		CREST		SAG	
	RADIUS	BUCKLE	RADIUS	BUCKLE	RADIUS	BUCKLE
Without pressure plate	> 101 m	-	> 270 m	-	> 230 m	-
6 mm	> 258 m	< 1,5°	> 679 m	< 0,6°	> 230 m	< 1,7°
8 mm (Standard)	> 525 m	< 0,8°	> 1385 m	< 0,4°	> 230 m	< 1,7°

Table 5 | Radii for the product families SB 70 (SB 70, SB 70P and SB 70B).

### 4.1.7 MINIMUM INSTALLATION LENGTH

The minimum installation length of the DELTABLOC® vehicle restraint system corresponds to the system length during the impact test in accordance with the EN 1317-2. Any terminal elements are not included in the minimum installation length.

# SB 70 6m MW180 T3 W2 A surface mounted



In case of a shorter installation length in a specific project, please get in touch with your local DELTABLOC® partner.

INSTALLATION LENGTH	
EXTENSION	MEASURE
< 72 m	A shorter installation length might influence the safety performance. Contact your local DELTABLOC® partner for project support!
= 72 m	Minimum installation length according to impact test. Test conform installation, no measure required.
> 72 m	Test conform installation, no measure required.

Table 6 | Measures for different installation lengths.



## USEFUL INFORMATION

Please consider the national regulations for possible different or stricter requirements!

### 4.1.8 TIGHTENING TORQUES OF SCREW CONNECTIONS

For screw connections, minimum values for the tightening torque must be observed which correspond to the values in the following table.

TIGHTENING TORQUES OF SCREW CONNECTIONS	
TYPE	TIGHTENING TORQUE Nm <sub>min</sub>
M10	Min. 15 Nm
M12	Min. 20 Nm
M14	Min. 40 Nm
M16	Min. 70 Nm
M20	Min. 130 Nm

Table 7 | Minimum values for tightening torques Nm<sub>min</sub> of screw connections.

### 4.1.9 CLIMATIC CONDITIONS

This DELTABLOC® vehicle restraint system is suitable for all basic climatic conditions covered by EN 206 in the classification of exposure classes, provided the right type of concrete is selected as per the national regulation. The safety performance is not influenced by basic climatic conditions.

### 4.1.10 REALIGNMENTS

Realignments along the carriage way potentially result in different impact angles of errant vehicles. Therefore realignments should follow specific rules.

REALIGNMENTS		
TYPE	ANGLE	MEASURE
Realignment towards the oncoming traffic	≤ 1:20	The influence on the safety performance is acceptable. Check the national regulations for conformity.
	> 1:20	Influence on the safety performance has to be expected, contact the project manager.
Realignment away from the upcoming traffic	Any inclination	Any alignment angle is acceptable.

Table 8 | Realignments.

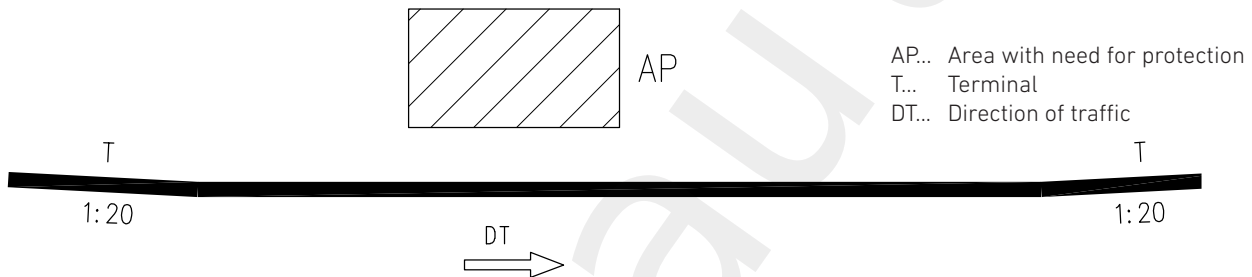


Figure 3 | Realignments.



#### USEFUL INFORMATION

Please consider national regulations for possible stricter requirements!

### 4.1.11 TERMINAL ANCHORING

Taking into account country-specific regulations and specific installation situations, it is not always possible to install anchored terminal elements (usually sloped end terminals) for temporary systems on construction sites. Additional standard elements can be used instead of such elements for terminal anchoring. However, it must be ensured that the number of additional elements together with the minimum installation length maintains the full performance of the tested system (for minimum installation length see "tested system length" in the product data sheet!).

Instead of anchored terminal elements additional elements are to be installed to both ends of the chain of elements in order to replace the terminal anchoring according to the information below:

- ▶ SB 70 6m MW180 H1 W5 = 7 x 6 m = 42 m per anchored end terminal
- ▶ SB 70 6m MW180 N2 W4 = 7 x 6 m = 42 m per anchored end terminal
- ▶ SB 70 6m MW180 T3 W2 = 5 x 6 m = 30 m per anchored end terminal
- ▶ SB 70B 6m MW180 H1 W4 = 10 x 6 m = 60 m per anchored end terminal





### IMPORTANT!

Only valid for temporary installation and the listed systems with the declared performance classes. Only a few example systems are listed here. If you require a system other than those listed above and for all other performance classes, please contact your local DELTABLOC® partner.



### COUNTRY-SPECIFIC INFORMATION

National regulations may define different or stricter specifications!

#### 4.1.12 OBSTACLES WITHIN THE WORKING WIDTH

Basically, obstructions inside the deflection area of the DELTABLOC® vehicle restraint system are not allowed since this can affect the system behaviour.



### USEFUL INFORMATION

If the obstruction is even with the ground surface it might be acceptable. It must be ensured, that the barrier can slide onto and over the obstruction without getting caught.

#### 4.1.13 EMBANKMENTS

Embankments might influence the safety performance of the DELTABLOC® vehicle restraint system if they are located within the working width. Take account of all descending and ascending embankments in the layout plans!

EMBANKMENTS		
TYPE	LOCATION	MEASURE
Ascending embankment	Outside the working width	No measure required.
	Within the working width	Acceptable influence on the safety performance has to be expected, contact the project manager or select a safety barrier with a lower working width.
Descending embankment	Outside the working width	No measure required.
	Within the working width	Influence on the safety performance has to be expected, contact the project manager or select a safety barrier with a lower working width.

Table 9 | Embankments.

The material of ascending and descending embankments must meet general requirements in terms of consistency, load capacity and drainage capability.

## 5 INSTALLATION

### 5.1 GENERAL

Installation is based on the installation drawing (K drawing K733137). It contains all important information for the installation.

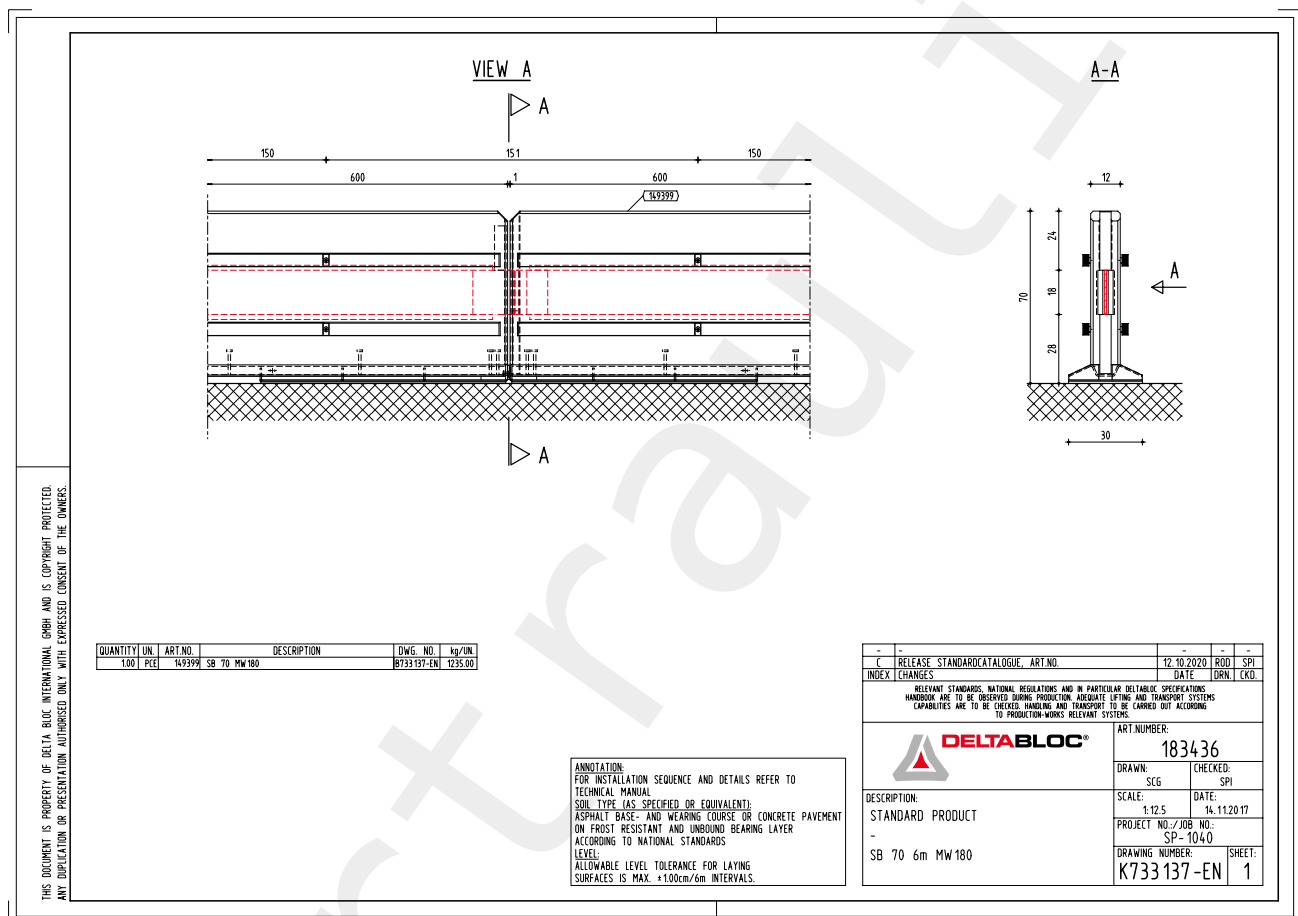


Figure 4 | System overview. See drawing K733137.

### 5.2 COMPONENTS

The installation drawing (K drawing) contains a complete list of all components that are required for the installation of the specific DELTABLOC® system.

# SB 70 6m MW180 T3 W2 A surface mounted



## COMPONENT PARTS LIST

The parts lists on the installation drawing must be observed.

QUANTITY	UN.	ART. NO.	DESCRIPTION
1.00	PCF	9619	COUPLING K280
300.00	ml	103138	INJECTABLE MORTAR HILTI HIT-RE 500
1.00	PCF	138014	DB 120S-F / 6m K280E
4.00	PCF	147197	TRAPEZOID WASHER 100/65x120x15 HDG
4.00	PCF	150215	ANCHOR BOLT HILTI HIT-V-R M24x400 ML

K drawing

Box 4

## 5.3 INSTALLATION TOOLS AND OTHER ACCESSORIES

### 5.3.1 REQUIRED TOOLS

- ▶ Machinery:  
Mobile crane or truck mounted crane  
Suitable lifting equipment
- ▶ Aids:  
Crow bar  
Hammer  
Spirit level  
Tape measure / folding rule
- ▶ Components:  
Check the completeness of the individual components according to the parts list (see installation drawing K733137)



### USEFUL INFORMATION

With large installation surface inclinations, it may be necessary to use a special tool to incline the element during installation.

### 5.3.2 SELECTION OF SUITABLE LIFTING EQUIPMENT

Use suitable lifting equipment for the installation of vehicle restraint systems. Ensure that the lifting equipment is suitable for the respective weight of the elements and is in perfect condition.



MECHANICAL SAFETY BARRIER  
GRAB

Box 5

All system types

## 5.4 INSTALLATION STEPS

The following steps on the next few pages serve as a guide to the installation process.

# SB 70 6m MW180

## T3 W2 A surface mounted



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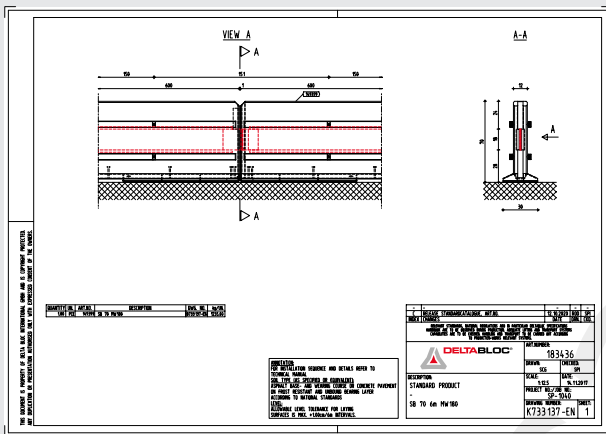


WEAR HEAD PROTECTION!  
WEAR SAFETY FOOTWEAR!  
WEAR HIGH-VISIBILITY CLOTHING!



### STEP 1 PREPARATION OF THE SUBSOIL

1. Preparation of the required tools and aids as well as selection of suitable lifting equipment.
2. Examination of the laying surface.
  - ▶ Details on the ground can be found in the installation drawing K733137 (K drawing).
  - ▶ It must be ensured that the ground has sufficient load-bearing capacity for the weight of the elements. Corresponding proof of load-bearing capacity must be requested from the manufacturer of the subsurface.
  - ▶ The inspection of the subsurface must be recorded.



#### CHECK THE INSTALLATION DRAWING

It must be ensured that the subsurface conditions meet the requirements as stated in the installation drawing K733137 (K drawing).

Box 6

All system types

3. If necessary: adjustment of uneven ground.
  - ▶ If the level tolerances in the installation drawing cannot be met, measures must be taken to adjust the unevenness of the road surface. This should only be done in the form of individual measures. Large-scale adjustment of uneven ground is not allowed.
  - ▶ For smaller unevenness, wedges made of plastic or concrete up to a thickness of 2 cm can be used to compensate.
4. Identification of the reference line on the construction site.
5. Identify all obstacles along the intended installation line.

➔ CONTINUE WITH NEXT STEP!

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### USEFUL INFORMATION

- ▶ If the surface is not suitable for the installation, contact the project manager.
- ▶ If there are any obstacles within the effective range of the restraint system, contact the project manager.

### STEP 2 INSTALLING THE SAFETY BARRIER ELEMENTS

#### 1. Grab and lift the element.

- ▶ Identify whether the male or female side is orientated in the installation direction.
- ▶ Lift the element with the grab from the loading area of the vehicle.
- ▶ Positioning of the element on the positioning line on the ground.
- ▶ **Only applicable for mechanical or hydraulic lifting grabs:** Element to be lifted off-centre (3-5cm) so that the connecting end of the element hangs 10cm lower.
- ▶ **Only applicable for lifting chains or round slings:** It must be ensured that the chains or round slings are secured to the rods by the safety mechanism.



#### INSTALLATION WITH A MECHANICAL GRAB

Grab the element in an off-centre position of about 3–5 cm away from the element side you want to interlock with the element on the ground. This way the interlocking end of the element hangs slightly lower for about 10 cm than the other end.

Box 7

All element types

#### 2. Accurate alignment of the floating element.

- ▶ The element has to be positioned hanging in longitudinal axis at distance of approximately 1 cm to the other element.



#### POSITIONING THE ELEMENT

Installing the elements.

Box 8

All element types

# SB 70 6m MW180

## T3 W2 A surface mounted



### 3. Hook in and lower the element.

- ▶ Hook in the T-coupling to the Y-profile of the already mounted element or hook in the Y-profile to the T-coupling of the element on the ground.
- ▶ To prevent deformations of the system due to temperature changes, the elements should be installed with maximum clearance.
- ▶ Lower the element until it fully rests on the ground.



#### HOOKED IN T-COUPLING

Check the coupling for assembly with maximum clearance after final settling of the barrier element.

Box 9

All element types

### 4. Check-up of installation position and alignment.

- ▶ The deviation from the intended installation line is recommended to be not more than 5 cm.
- ▶ The clearance between the concrete elements at the height of the built-in coupling according to the installation drawing K733137 (K-drawing), can deviate from the indicated measurement due to production and installation tolerances.
- ▶ The height offset between the DELTABLOC® safety barrier elements is recommended to be not more than 1 cm.



#### CHECKING THE INSTALLATION POSITION

Box 10

All element types

### 5. Repeat the procedure for all elements according to the installation drawing K733137.

➔ CONTINUE WITH NEXT STEP!

## **STEP 3** FINAL CHECK OF THE INSTALLATION

1. Check the correct alignment of the chain of elements.
  - ▶ Check the alignment regarding the vertical and horizontal position of the chain of elements.
  
2. Check the visual quality of the installation.
  - ▶ Check the visual quality of the barrier elements.
  - ▶ Check the visual quality of the alignment.
  - ▶ Check the visual quality of any accessories or fixation devices.
  - ▶ Check the visual quality of any embedment or joint filling if applicable.
  
3. Make sure the labelling of the element chain of safety barriers is correct according to the national requirements.
  
4. Remove any remaining installation material and debris from site.
  
5. Check the delivery notes.
  - ▶ All delivered elements and built-in parts must be checked for completeness and damage on the basis of the delivery notes when unloading. Deviations from the information on the delivery note – such as missing or additional built-in parts – or faulty elements must be noted on the delivery note.



# SB 70 6m MW180 T3 W2 A surface mounted



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### STEP 1 DISASSEMBLY OF ELEMENT CHAIN

Please note the following steps to disassemble the elements:

**1. Lift the element.**

- ▶ Place the lifting grab in the middle of the element and remove it.



DISASSEMBLY USING LIFTING GRAB

Only Type P

Box 11

**2. Repeat the process for all elements.**

# SB 70 6m MW180 T3 W2 A surface mounted



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## 6 SUPPLEMENTARY PRODUCTS

In addition to crash tested standard systems, supplementary products are required in order to provide a continuous, seamless protection of zones in need of protection.

For the SB Series and the DB Series complementary products such as terminals, transition elements and dilata-tions are made entirely of steel.

### 6.1 TERMINALS

Open ends of temporary safety barriers must be secured with terminal elements or other appropriate terminal constructions.

Terminal elements for the SB Series (SB 50, SB 70, SB 70B, SB 70P) are made entirely out of steel.

Terminal elements for the DB Series (DB 50SL, DB 65S, DB 65S-P) are made of concrete and steel.



#### TERMINAL ELEMENT

Terminal element made of steel.

Box 12

Terminals

### 6.2 TRANSITIONS

Various transition elements are available for connecting two different types of safety barriers. To achieve transition to temporary or permanent safety barrier systems, several transition elements can be linked to each other.

Transition elements for the SB Series (SB 50, SB 70, SB 70B, SB 70P) are made entirely out of steel.

Transition elements for the DB Series (DB 50SL, DB 65S, DB 65S-P) are made of concrete and steel.

# SB 70 6m MW180 T3 W2 A surface mounted



## TRANSITION ELEMENT

Transition element SB 70 to SB 50.

Box 13

Transitions

## 6.3 DILATATIONS

Bridges or other structures experience longitudinal expansion due to temperature changes. Expansion joints are therefore used in bridges along roads in order to compensate these expansions.

Dilatation elements are used to span the expansion joints on bridges.

Due to the slim design, the product families SB 50 and SB 70 also require dilatation elements to be used on the open road approx. every 240 m for SB 50 and every 500 m for SB 70. Without dilatation elements there is a risk that the element chain may buckle during the warm season.

No dilatation elements are required on the open road for the DB Series (DB 50SL, DB 65S, DB 65S-P) and the product families SB 70P and SB 70B of the SB Series.



## DILATATION ELEMENT

Dilatation element for the compensation of the thermal expansion

Box 14

Dilatations

### Dilatation D25:

- ▶ The dilatation D25 has a length of 0.8 m in the centre position and provides a length compensation of  $\pm 12.5$  cm.
- ▶ The M16 screws of the dilatation element must be tightened with a torque of 17 Nm per screw joint.

## 7 OPERATION, MAINTENANCE & REPAIR

### 7.1 OPERATION



#### USEFUL INFORMATION

Exposition classes and concrete cover for this DELATABLOC® safety barrier are defined in the production drawing (B-drawing).

National regulations or special applications might require different or lower exposition classes or concrete cover. Always make sure, that the concrete quality and concrete cover are suitable to meet or outreaches the respective requirements for performance lifetime.

#### 7.1.1 CROSS-OVER POINTS

In case of an urgently needed opening, the safety barrier elements can be repositioned with a crane by the road operator.

Alternatively, if the concrete barriers are provided with lifting holes, they can be easily lifted without concrete safety barrier grabs.

### 7.2 MAINTENANCE & INSPECTION

The areas in front of and behind the concrete barriers should be cleaned on demand and checked annually.



#### NOTE!

For the annual inspections or inspections of the damages, please make use of the checklists „Inspection“ on page 41 and „Damage Classification“ on page 42.

#### 7.2.1 DRAINAGE OPENINGS

To ensure an unobstructed performance, the drainage openings of the concrete barrier must be checked annually according to the following points:

- ▶ Visual supervision
- ▶ Removal of loose parts and vegetation in the drainage openings
- ▶ Cleaning of the drainage openings by dint of a high-pressure cleaner



### 7.2.2 REFLECTORS

To ensure an unobstructed performance, the reflectors must be checked annually according to the following points:

- ▶ Checking for dirt on reflectors. If necessary, cleaning of the reflectors by using a high pressure cleaner.
- ▶ Checking the position and orientation. If necessary, correcting the position and orientation of the reflectors.

### 7.2.3 CRACKS

During the inspection, the elements must be checked for cracks.



#### COUNTRY-SPECIFIC INFORMATION – CRACKS

As a rule, elements with cracks  $> 0.3$  mm have to be repaired or replaced. However, national regulations may contain different information on the maximum permissible crack width. The durability of the elements must be fully guaranteed.

The crack width can be determined using a crack template. This renovation cannot be carried out on the construction site by filling, but must be grouted professionally. In most cases, it makes more sense to replace the damaged elements.

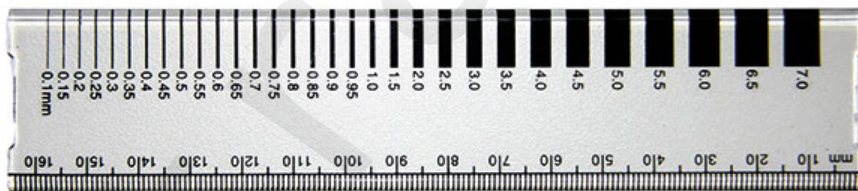


Figure 5 | Example of crack gauge.

### 7.2.4 INSPECTION

To ensure an unobstructed performance of the DELATABLOC® concrete barrier, the inspection plan must be implemented for the whole life time of the system.

### INSPECTION CHECKLIST

KIND OF INSPECTION		✓
1.	Inspection of drainage openings (remove loose parts and vegetation, cleaning)	
2.	Inspection of reflectors (cleaning, position check)	
3.	Visual supervision of coupling (is the coupling present and not deformed)	
4.	Visual supervision of the position of the concrete barrier element	
5.	Visual supervision of cracks and spalling on the concrete barrier	
6.	Check of the connection to the subgrade (DB Pins, square washer, anchors etc.)	
7.	Check of optional equipment (reflectors, climbing aids etc.)	
8.	In any case of damage, use the Damage Classification Checklist and report damages	
9.	Commission the repair of the damage.	
10.	Inspection of repairs	
11.	Check of the pressure plate.	
12.	Check of the longitudinal profile made of steel for deformation	

Table 10 | Inspection checklist for annual inspection.

## 7.3 DAMAGE CLASSIFICATION & REPAIR

### 7.3.1 DAMAGE CLASSIFICATION

There are three damage classes to evaluate the damages to the elements. Depending on the classified damage class (A, B or C) the damaged element has to be repaired or replaced.

Carry out a damage classification with the aid of the below-mentioned checklist after every damage case and report the occasion to your local DELATABLOC® partner. Add the filled in checklist and attach photos of the damaged parts. Consider the chapter „Damage Examples“ on page 44 in support of the damage classification.



#### COUNTRY-SPECIFIC INFORMATION - REPAIR, REPLACEMENT

National regulations may stipulate different or stricter requirements with regard to the repair or replacement of concrete elements!

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## DAMAGE CLASSIFICATION CHECKLIST

GENERAL INFORMATION					
Date of damage:		Contact data (name, e-mail, tel.):			
LOCALISATION					
Highway:		Direction of traffic:			
Km-section:		Location of safety barrier: <input type="checkbox"/> Median <input type="checkbox"/> Verge			
DAMAGE CLASS A	<input checked="" type="checkbox"/>	DAMAGE CLASS B	<input checked="" type="checkbox"/>	DAMAGE CLASS C	<input checked="" type="checkbox"/>
Minor spalling	<input type="checkbox"/>	Medium spalling	<input type="checkbox"/>	Disintegration of the element	<input type="checkbox"/>
Spalling spots with $\varnothing < 5$ cm	<input type="checkbox"/>	Spalling spots with $5 \text{ cm} \leq \varnothing \leq 25$ cm	<input type="checkbox"/>	Spalling areas with $\varnothing > 25$ cm	<input type="checkbox"/>
No cracks	<input type="checkbox"/>	Non-structural / netlike cracks	<input type="checkbox"/>	Structural cracks / one long continuous crack on more than one face	<input type="checkbox"/>
Scratches	<input type="checkbox"/>			Tension bar visible	<input type="checkbox"/>
Tyre marks	<input type="checkbox"/>			Y-profile damaged	<input type="checkbox"/>
Storage marks	<input type="checkbox"/>			Deformation of coupling	<input type="checkbox"/>
Marks caused by weathering	<input type="checkbox"/>			Deformation of screws or DB Pins	<input type="checkbox"/>
				Deformation of the pressure plate	<input type="checkbox"/>
				Deformation of longitudinal profile made of steel	<input type="checkbox"/>
OTHER ANNOTATIONS					
DRAWING FOR LOCALISATION OF DAMAGES					

Table 11 | Damage classification checklist, part 1: Documentation of damages. Fill in after any crash or impact and transmit to the DELTABLOC® partner!

MEASURES TO TAKE		
NO ACTION!	REPAIR!	REPLACE!
Normal mechanical wear, no activity necessary.	Negative effects on the functionality of the safety barrier cannot be excluded. The element has to be inspected by a DELTABLOC® specialist and repaired properly.	The functionality of the safety barrier is not assured. The element has to be replaced.
	<b>Report damage to the DELTABLOC® partner!</b> Add this checklist and attach photos of the damaged parts!	

Table 12 | Damage classification checklist, part 2: Required measures to take.



### DANGER!

Repairs of Y-profiles, DB Couplings, screws, DB Anchors, DB Ram pins or DB Pins are not permitted for safety reasons.

DB Couplings, screws, DB Anchors, DB Ram Pins or DB Pins showing any kind of deformation have to be replaced immediately for safety reasons.

In case of any doubt whether the damage class is B or C, the element has to be checked by a specialist of your local DELTABLOC® partner.

### 7.3.2 DAMAGE EXAMPLES

#### DAMAGES TYPE A



NORMAL WEAR AND TEAR

Box 15

Damage class A

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## MINOR SPALLING

Spalling < 5 cm

Box 16

Damage class A



## STORAGE MARKS AND MARKS CAUSED BY WEATHERING

Box 17

Damage class A



## TYRE MARKS

Box 18

Damage class A

## DAMAGES TYPE B



## SPALLING ON THE FRONT SIDE

Spalling < 25 cm

Box 19

Damage class B



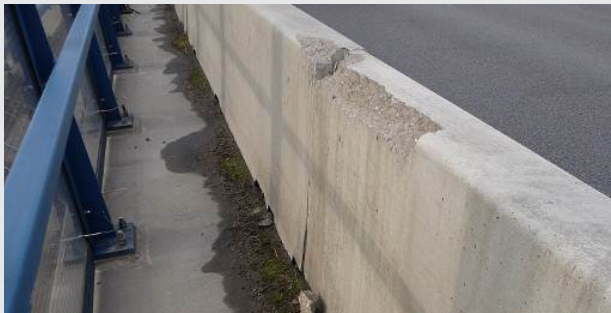
### NON-STRUCTURAL CRACKS

Crack pattern netlike

Box 20

Damage class B

## DAMAGES TYPE C



### HEAVY SPALLING

Diameter > 25 cm

Box 21

Damage class C



### Y-PROFILE & COUPLING PLASTICALLY DEFORMED

Box 22

Damage class C

### 7.3.3 REPAIR

In case of **damages of type B**, the damaged parts must be repaired properly. If there is any doubt whether the damage class is B or C, the element has to be checked by a specialist of your local DELTABLOC® partner.

For repairing minor damages, the usage of standard mortar is possible. The result of the repair should be a seamless and smooth surface.





### COUNTRY-SPECIFIC INFORMATION – EXPOSED REINFORCEMENT

Elements with exposed reinforcement should be replaced!

A repair with exposed reinforcement can only be carried out with a lot of effort. As a result, durability must be ensured. A modified repair mortar must be used for repair. The works must be carried out by trained personal. A nationally approved repair mortar has to be used.

- ▶ Repair: system.  
Repair after a crash event. A shift in the elements, for example.
- ▶ Repair: Element.  
Damaged elements must be refurbished.

### 7.3.4 REPLACEMENT, DISASSEMBLING AND DISPOSAL

Note as follows for the replacement and disassembly of safety barriers:

- ▶ The disassembling of the safety barrier happens through lifting up the element with the aid of appropriate lifting gear, generally for disassembling of the elements there can be proceeded in reverse order of the installation process.
- ▶ The entire DELATABLOC® vehicle restraint system is recyclable and does not contain any polluting materials or toxic substances. The system has to be exploited or disposed according to the specific national regulations.



### DANGER!

The re-use of damaged or withdrawn safety barrier elements is prohibited!

## 8 TRANSPORT & STORAGE OF ELEMENTS



WEAR HEAD PROTECTION!  
WEAR SAFETY FOOTWEAR!  
WEAR SAFETY CLOTHING!  
WEAR GLOVES!



### USEFUL INFORMATION

National regulations might require other or additional safety equipment!

### 8.1 RECOMMENDED EQUIPMENT

- ▶ Crane
- ▶ Load-handling devices (belts, chains, lugs etc.)
- ▶ Truck with crane (optional: mobile crane or forklift)
- ▶ Timber beams



### USEFUL INFORMATION

For a range of recommended DB Equipment get in touch with your local DELTABLOC® partner.

### 8.2 TRANSPORTATION PROCESS



### USEFUL INFORMATION

The following information to the transportation process describes the minimum requirements. National regulations might define stricter requirements.

Important and useful specifications needed for transport as dimensions and weights are listed in the data sheet of the product.

- ▶ Place large elements on timber beams.
- ▶ Load smaller parts collectively in carrier boxes.

# SB 70 6m MW180

## T3 W2 A surface mounted



- ▶ Generation 2 products of DELTABLOC® systems with tongue and groove technology have to be loaded uniformly in the same direction according to the needed orientation for installation. This measure is very important for providing a smooth installation.



### DANGER!

Consider the maximum permissible axle weight of the transport vehicle.

Adjust the capacity of the lifting equipment to the characteristics of the load (weight, centre of gravity and point of contact).

## 8.3 REQUIREMENTS TO THE STORAGE YARD

### 8.3.1 GENERAL

A covered and clean storage of mounting parts and reinforcement is recommended to avoid rust developing and to provide a longer durability. The storage place must be even and stable.

- ▶ Consider the maximum loading capacity of the ground, storage surfaces and shelves.
- ▶ Consider always the maximum stacking height.
- ▶ Only store clearly and visibly marked goods. No removal of labels!

### 8.3.2 LOAD CAPACITY OF THE SUBSURFACE

The minimum requirement for the carrying capacity of the surface results from

- ▶ the dead weight of the transport vehicle.
- ▶ the total weight of the charge.

The maximum subsurface pressure depends on

- ▶ the ground pressure of the tires of the loaded forklift or
- ▶ from the contact area of the lowest layer of the beams and
- ▶ on the number of elements stacked on top of each other at the storage location.



### USEFUL INFORMATION

Weight specifications can be found in the product data sheet or in the specific drawing.

### 8.4 STACKING OF ELEMENTS

The stacking can be carried out crosswise or linear.

#### 8.4.1 CROSSWISE STACKING

Crosswise stacking is only applicable for SB 50, SB 70 and SB 70P.

- ▶ Each stacking layer is rotated by 90° to the one below, every second stacking layer is oriented in the same way
- ▶ Place timber beams between the layers. Dimension: 240 × 25 × 10 cm (at least class D30).
- ▶ Inclination maximum 1 / 50 (corresponds to 2 cm on 1 m distance).
- ▶ Subgrade pressure resistance of the soil at least 230 kPa.
- ▶ A maximum of 5 layers can be stacked, provided that the bottom layer consists of 13 elements.

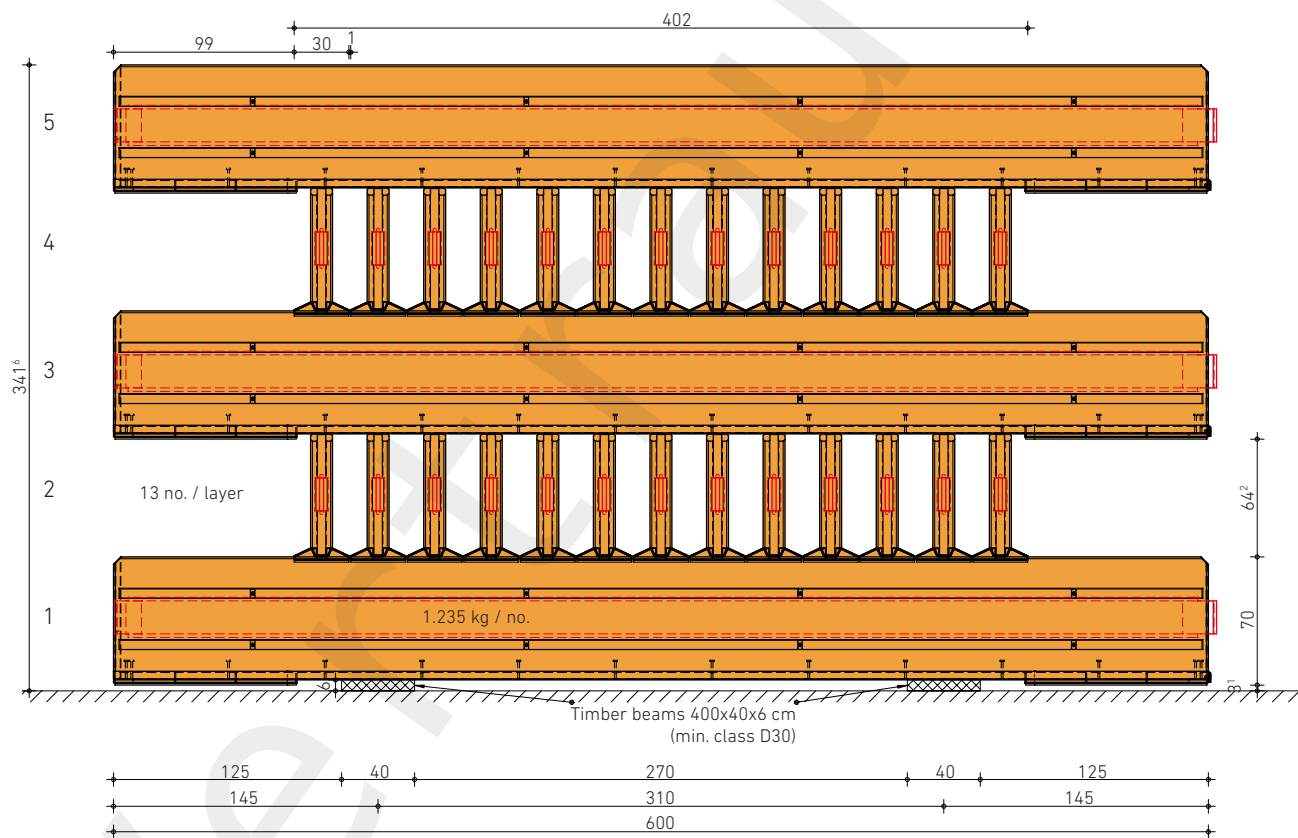


Figure 6 | Example of a crosswise stacked block.

With this storage method, it is possible to stack up to 5 layers high. This results in 65 elements per crosswise stacked block.

### 8.4.2 LINEAR STACKING

Linear stacking is only applicable for SB 50, SB 70, SB 70B and SB 70P.

- ▶ Each stacking layer has the same orientation.
- ▶ The elements of a layer are centred over the elements of the layer below.
- ▶ Dimensions of the timber beams: 400 × 40 × 6 cm (at least class D30).
- ▶ The timber beams should not be offset by more than ± 5 cm from the lowest timber beam.
- ▶ Elements must not be more than ± 5 cm apart to prevent the timber beams from bending.
- ▶ Due to the risk of top elements overturning, two elements must be omitted from the top row on both sides.
- ▶ Inclination maximum 1/50 (corresponds to 2 cm over 1 m length).
- ▶ Subgrade pressure resistance of the soil at least 450 kPa.
- ▶ A maximum of 5 layers can be stacked, provided that the bottom layer consists of at least 11 elements.

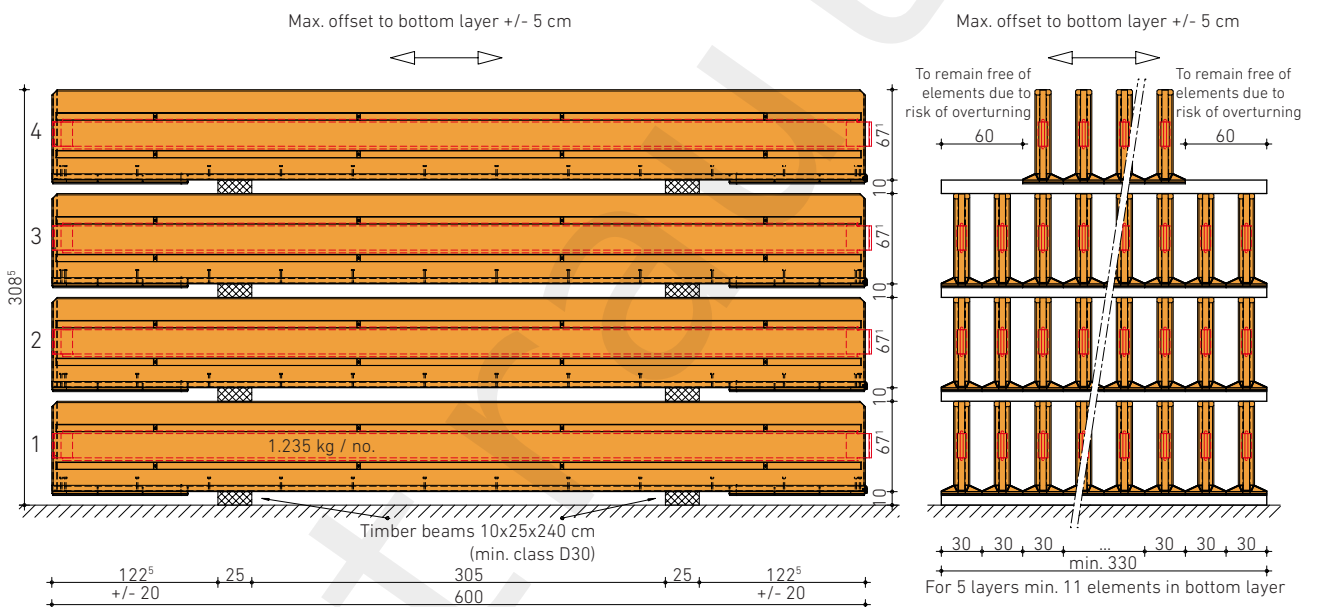


Figure 7 | Example for a linear stacked block.

With this storage method, it is possible to stack up to 5 layers high. This results in 51 elements per linear stacked block.

### 8.4.3 DISTANCES BETWEEN ELEMENTS AND JOINTS

Minimum distance between elements

- ▶ in the lateral direction: 10 cm

Minimum distance between element joints

- ▶ in the longitudinal direction: 20 cm

## NOTES

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Making roads safer worldwide.  
For over 20 years.



The Austrian family owned industry group has a long history and is with its divisions Cement, Construction Minerals, Concrete Solutions and Road & Traffic an internationally successful company. Since the introduction of DELTABLOC® concrete safety barriers in 1995, Kirchdorfer is the leading developer of concrete and steel vehicle restraint systems and of modern noise protection systems.



# THE ULTRALIGHT SB SERIES PROTECTS WITH MODULAR SAFETY

The holistic safety concept  
for a state of the art work zone protection.



**KIRCHDORFER**  
ROAD & TRAFFIC

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