

---

**TEST REPORT NR: 3605-2008 Aeng**  
(translated report No.: 3605-2008 A)

**Report on acceptance test of a barrier construction**

---

**1. General Informations:**

- 1.1. System / Object of inspection: „Nordic Crash Barriers“  
mobile Aluminium Block Barrier  
here: corner elements Type CB90B and CB90S
- 1.2. Operator: Nordic Staging ApS  
Helge Nielsen Allé 5  
8723 Løsning  
Denmark
- 1.3. Manufacturer: see point 1.2.
- 1.4. Static Calculation: Ingenieurbüro Dr. Roland Ondra GmbH  
Richthofenstr. 5  
86343 Königsbrunn, Germany
- 1.5. Check Report Documentation:  
No.: 3605-2008 B TÜV Thüringen e.V.  
Inspecting Office for Stress Analysis  
and Temporary Structures  
Rudolstädter Straße 41  
07745 Jena, Germany
- 1.6. Year of construction: 2008
- 1.7. Identification: none
- 1.8. Testing place: Jena, Werkhalle WEA
- 1.9. Testing date: June 17, 2008
- 1.10. Testing scope: constructional part
- 1.11. Testing basic rules:  
- DIN 4112 Standard - Temporary Structures, Guidelines  
for Structural Design and Execution  
- DIN 4113 Standard - Aluminum Constructions  
DIN 1055 Standard - Part 1 Loading for Structures  
- VdTÜV Instruction Sheet 1507

„Crash Barriers“ are not Temporary Structure acc. to the definition in German Building Law.  
But they will be treated here as well under application of the relevant norms.

## 2. Submitted Documents:

- 2.1. Static Calculation see Report No. 3605-2008B, point 2.1.
- 2.2. Drawings see Report No. 3605-2008B, point 2.2.
- 2.3. Further technical documents:

Welder Approval Test Certificat acc. to EN 287 for Karol Krystek, Gastrometal Smigiel, Poland by Zaklad Doskonalenia Zawodowego, Poznan Poland Nov. 29, 2007, valid thru Nov. 29, 2009.  
Acceptance test certificates 3.1. acc. to EN 10204.

## 3. Testing results:

### 3.1. Manufacturing check:

For manufacturing check, 8 barrier-elements (three of each CB-90B and CB-90S and 2 straight Barriers) were present ready assembled and compared with drawings (see point 2.2.). Wall thicknesses were checked by random with ultrasonic measurement (DM4: 16855-00H643). Deviations between construction and drawings are: Total width onto drawing No. 0-1 (1250 instead of 1041 mm) and profile of struts on drawing No. 4-1156 (50/25/3 instead of 40/25/3). These errors are not safety relevant.

### 3.2. Loading tests:

In the course of the acceptance inspection, the barrier elements were subjected to a test series, in which maximum loads, in part clearly exceeding the standards taken as a base (see point 1.11.), were applied to the completely mounted barrier elements. In this test, the reaction of the framework was observed and conclusions were drawn concerning to their future use.

Participants of load test procedure, June 17, 2008:  
Mr Buring Nordic Staging ApS  
Mr Drößler TÜV Thüringen e.V.  
Mr Müller TÜV Thüringen e.V.

For this procedure all 6 present barriers elements are tested. Corners were built in several angle and straight barriers were connected on both sides. Putting test loads as crane weights on the upper surface of the barriers (500 kg + 750 kg), the maximum live load required in the standard DIN 4112, point 4.2.1.2. could be exceeded for the respective surface. Horizontal live loads onto the handrails were simulated with a forklifter, load belts and a chain hoist. A measuring instrument gave possibility for controlling the loads (see figure 1, load test assembly).

Test No.	Corner Type	angle *)	total vertical load	total horizontal load	remarks / failure
1	CB-90B	270°	5,0 + 7,5 kN	3,0 kN	none
2	CB-90B	270°	5,0 + 7,5 kN	3,0 kN	none
3	CB-90S	270°	5,0 + 7,5 kN	3,0 kN	none
4	CB-90S	~250°	5,0 + 7,5 kN	2,8 kN	none
5	CB-90S	~110°	5,0 + 7,5 kN	4,3 kN	none
6	CB-90B	~140°	5,0 + 7,5 kN	4,9 kN	none
7	CB-90S	~160°	5,0 + 7,5 kN	5,3 kN	none

\*) here this is the angle, which the public side of barriers enclose



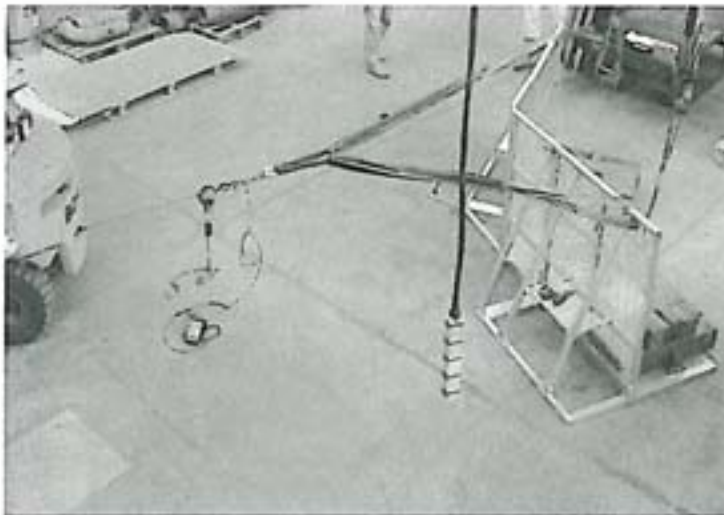


figure 1: assembly, test No. 6

### 3.3. Conclusion:

Present barriers resist far into exceeded loads according to the relevant norms. There are no objections against application of the barriers considering the inspection scope and following the requirements.

### 4. Requirements:

- 4.1. When mounting the structure, it must always be guaranteed that all temporary connections (screws between bottom frame and barrier frame) will be installed immediately.
- 4.2. The bottom frame should stand always full supported onto underground. If this is not possible, for example crossing railways, curbstones etc. the regarding element must be underpinned.
- 4.3. It is recommended, make a tensile-fixed connection also between the top-bars of barrier elements, to certain avoid the risk of any injuries.
- 4.4. When the system is used in wintertime, snow and ice has to be removed immediately to avoid the risk of sliding.
- 4.5. All advises and terms of mounting should summarize in a short and clear operators instruction in the language of final operator.

### 5. Summary:

On the base of the documents submitted and the inspections carried out, and under observance all the requirements, the use of the barrier elements for the purpose of blocking people in any length is supported. The reproduction of this report is only permitted in full length.

**Acceptance test is closed.**

**TÜV Thüringen e.V.  
Inspecting Office for Stress Analysis  
and Temporary Structures**

**Place, Date**

**Expert**

Jena, July 23, 2008

*C. Müller*



**Dipl.-Ing. Christian Müller**

This is a translation of check report no. 3605-2008 A.  
In any case of doubt, this German original report is valid.



---

## CHECK REPORT No.: 3605-2008 Beng (translated report No.: 3605-2008 B)

### Report on testing the constructional documentations of a block barrier

---

#### 1. General Informations:

- 1.1. System / Object of inspection: „Nordic Crash Barriers“  
mobile Aluminium Block Barrier  
here: corner elements Type CB90B and CB90S
- 1.2. Operator: Nordic Staging ApS  
Helge Nielsen Allé 5  
8723 Løsning  
Denmark
- 1.3. Manufacturer: see point 1.2.
- 1.4. Drawings: Nordic Staging ApS  
Helge Nielsen Allé 5  
8723 Løsning  
Denmark
- Static Calculation: Ingenieurbüro Dr. Roland Ondra GmbH  
Richthofenstr. 5  
86343 Königsbrunn  
Germany
- 1.5. Manufacturer Identification: none
- 1.6. Identification: none
- 1.7. Testing scope: constructional part
- 1.8. Testing basic rules:
- DIN 4112 Standard - Temporary Structures, Guidelines for Structural Design and Execution
  - DIN 4113 Standard - Aluminum Constructions
  - DIN 1055 Standard - Part 1 Loading for Structures
  - VdTUV Instruction Sheet 1507

„Crash Barriers“ are not Temporary Structure acc. to the definition in German Building Law.  
But they will be treated here as well under application of the relevant norms.

## 2. Documents submitted:

### 2.1. Static calculation and stress analysis:

Static calculation to a barrier frame for events. Set up by Ingenieurbüro Dr.Ondra GmbH, Richthofenstr.5, 86343 Königshofen, Germany, march 2003.

Supplement to static calculation to a barrier frame for events. Set up by Ingenieurbüro Dr.Ondra GmbH, Richthofenstr.5, 86343 Königshofen, Germany, 20.05.2003.

### 2.2. Drawings:

No. of drawing	Name of drawing	Date
0-1wersja 90	Plot aluminiowy 90 stpni	2008-01-16
0-1wersja 90	Plot aluminiowy 90 stpni	2008-01-16
0-1	Plot aluminiowy 90 stpni	2008-01-16
4-1156	CB-90	2008-01-16
4-1156	CB-90	2008-01-16

Further 35 detail drawings are present.

## 3. Materials:

It will be used the following significant materials:

ground frame, barrier frame, struts,  
top-bar, connecting sleeves

Aluminium alloy AlMgSi0,5-F22 (EN AW 6060 T66)

## 4. Description of design:

The structure to be inspected here are corner segments of "Crash Barriers" of Nordic company in two different types CB-90B (large) and CB-90S (small). They have ground measures ca. 1,20 m x 1,20 m (CB-90S) and 1,20 m x 1,60 m (CB-90B) with a total height (handrail) about 1,20 m. Barrier Corners bases on the straight "Crash Barriers" with inspection no. 1272-2003 B.

Each barrier corner segment is stable in itself and it contains two ground frames in triangle shape and two barrier frames, which are hinge-connected and have the option standing any angles more than 90°.

General assembly and profiles are similar to straight "Crash Barriers" with inspection No. 1272-2003B.

## 5. Testing remarks:

Errors in the static calculation will be only marked, if there effects on the dimensions and the design of the ride itself.

### 5.1 Loading condition

Dead load of construction is considered by following the DIN 1055 Part 1 und DIN 4112 and respecting constructors information.

Vertical live load is 7.5 kN/m<sup>2</sup> according DIN 4112, point 4.2.1.2. Horizontal live load is 1.0 kN/m according DIN 4112, figure 4.2.2.1. They are correctly set in calculation. Wind and ice loads are not considered.

## 5.2 Calculation

The framework-calculation-program is not object of inspection.

Correctness of inputted dates are checked.

Calculation based on DIN 4112 and DIN 4113. Calculated stresses are completely permissible. Determinations against sliding and overturning are fulfilled.

The aluminium plates have an additive stiffening effect to the construction, which is not considered in the static calculation. Thereby the elements have a constructional reserve.

## 6. Testing results:

Static calculation and stress analysis of barrier elements and drawings are complete and correct according to based rules and norms. The application of block-barriers is recommended.

## 7. Requirements:

- 7.1. It is to make sure, that all the segments will be connected by screws immediately after assembling of the barriers.
- 7.2. The barrier elements should stand full onto underground. If this is not possible, for example crossing curbstones, the concerning barrier-elements have to be underpinned.
- 7.3. The behaviour under load should be tested in an acceptance test procedure.

**The testing of the documentation is closed.**

TÜV Thüringen e.V.  
Inspecting Office for Stress Analysis  
and Temporary Structures

Place, Date

Jena, July 23, 2008

Expert



Dipl.-Ing. Christian Müller



This is a translation of check report no. 3605-2008 B.  
In any case of doubt, this German original report is valid.