

FSP 1223 RIR

*REGULATORY INFORMATION REPORT*

FIRE-RESISTANCE TEST  
ON FIRE COLLARS CAST INTO A  
REINFORCED CONCRETE SLAB

In confidence to  
HILTI (AUST.) PTY LTD

30 NOVEMBER 2006



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## REGULATORY INFORMATION REPORT

### FIRE-RESISTANCE TEST ON FIRE COLLARS CAST INTO A REINFORCED CONCRETE SLAB

SPONSORED INVESTIGATION No. FSP 1223 RIR

**IDENTIFICATION  
OF SPECIMEN:**

The sponsor identified the specimens as Hilti Firestop Collars cast into a reinforced concrete slab, protecting floor waste penetrations.

**SPONSOR:**

Hilti (Aust.) Pty Ltd  
23 Egerton Street,  
SILVERWATER NSW  
AUSTRALIA

**MANUFACTURER:**

Hilti Pty Ltd  
ITALY

**TEST STANDARDS:** Australian Standard 1530, Methods for fire tests on building materials, components and structures,  
Part 4: Fire-resistance tests of elements of construction - 2005;

Australian Standard 4072, Components for the protection of openings in fire-resistant separating elements,  
Part 1: Service penetrations and control joints -2005.

**TEST NUMBER:**

FS 3872/2954

**TESTED:**

The fire-resistance test was conducted on 22 September 2006.

**DESCRIPTION  
OF SPECIMEN:**

**GENERAL**

The specimen comprised a 1150-mm x 1150-mm x 150-mm thick reinforced concrete slab penetrated by four uPVC pipe fittings, protected by cast-in Hilti Firestop collars. The cast-in collars were cast into the existing reinforced concrete slab using a fast curing cement that was backfilled into 225-mm diameter pre-cored holes.

For the purpose of the test, the specimens were referenced as Penetrations A, B, C & D.



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**Penetration A – Hilti CP 680 75/2.5" N – RAD Cast-in Firestop Collar  
(50-mm uPVC pipe with a uPVC elbow flange fitting  
inside the collar and a PVC floor grate)**

The Hilti CP 680 75/2.5" N Cast-in Firestop Collar consisted of a 1.5-mm thick polypropylene case, 79-mm in diameter and 250-mm in height.

The collar incorporated a graphite based intumescent lining supported by a steel ring housed within the collar, and a neoprene rubber seal that fits around the pipe.

The collar also included a RAD Device that was retrofitted to the underside of the metal ring using four 25-mm long x 4.7-mm diameter wafer head self tapping screws. The RAD Device was made out of mild steel casing ring housing a graphite based intumescent sheet. The intumescent sheet was sandwiched between the casing and steel spring finger plates and fixed together using steel rivets.

A nominal 50-mm uPVC pipe was fitted through the collar's sleeve. The pipe projected vertically, approximately flush with the top of the concrete slab. On the exposed side of the slab, a uPVC elbow flange fitting was inserted into the collar that projected approximately 150-mm into the furnace chamber. The pipe was capped at the top with a standard 80-mm diameter chrome plated PVC floor grate. The floor grate housing was bonded to the pipe and grouted into position using sand and cement mix formed into a nominal 280-mm diameter x 20-mm thick hob. On the exposed side of the slab, the pipe was capped with a standard plastic cap fitting and supported near the cap by a metal pipe clamp.

**Penetration B – Hilti CP 680 75/2.5" N – RAD Cast-in Firestop Collar  
(50-mm uPVC pipe with a uPVC elbow flange fitting  
below the collar and a PVC floor grate)**

The Hilti CP 680 75/2.5" N Cast-in Firestop Collar consisted of a 1.5-mm thick polypropylene case, 79-mm in diameter and 250-mm in height.

The collar incorporated a graphite based intumescent lining supported by a steel ring housed within the collar, and a neoprene rubber seal that fits around the pipe.

The collar also included a RAD Device that was retrofitted to the underside of the metal ring using four 25-mm long x 4.7-mm diameter wafer head self tapping screws. The RAD Device was made out of mild steel casing ring housing a graphite based intumescent sheet. The intumescent sheet was sandwiched between the casing and steel spring finger plates and fixed together using steel rivets.

A nominal 50-mm uPVC pipe was fitted through the collar's sleeve. The pipe projected vertically, approximately flush with the top of the concrete slab. On the exposed side of the slab, a uPVC elbow flange fitting was joined onto a straight section of pipe just below the collar that projected approximately 200-mm into the furnace chamber. The pipe was capped at the top with a standard 80-mm diameter chrome plated PVC floor grate. The floor grate housing was bonded to the pipe and grouted into position using sand and cement mix formed into a nominal 280-mm diameter x 20-mm thick hob. On the exposed side of the slab, the pipe was capped with a standard plastic cap fitting and supported near the cap by a metal pipe clamp.



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**Penetration C – Hilti CP 680 75/2.5” N Cast-in Firestop Collar  
(50-mm uPVC pipe with a uPVC elbow flange fitting  
inside the collar and a PVC floor grate)**

The Hilti CP 680 75/2.5” N Cast-in Firestop Collar consisted of a 1.5-mm thick polypropylene case, 79-mm in diameter and 250-mm in height.

The collar incorporated a graphite based intumescent lining supported by a steel ring housed within the collar, and a neoprene rubber seal that fits around the pipe.

A nominal 50-mm uPVC pipe was fitted through the collar's sleeve. The pipe projected vertically, approximately flush with the top of the concrete slab. On the exposed side of the slab, a uPVC elbow flange fitting was inserted into the collar that projected approximately 150-mm into the furnace chamber. The pipe was capped at the top with a standard 80-mm diameter chrome plated PVC floor grate. The floor grate housing was bonded to the pipe and grouted into position using sand and cement mix formed into a nominal 280-mm diameter x 20-mm thick hob. On the exposed side of the slab, the pipe was capped with a standard plastic cap fitting and supported near the cap by a metal pipe clamp.

**Penetration D – Hilti CP 680 75/2.5” N Cast-in Firestop Collar  
(50-mm uPVC pipe with a uPVC elbow flange fitting  
below the collar and a PVC floor grate)**

The Hilti CP 680 75/2.5” N Cast-in Firestop Collar consisted of a 1.5-mm thick polypropylene case, 79-mm in diameter and 250-mm in height.

The collar incorporated a graphite based intumescent lining supported by a steel ring housed within the collar, and a neoprene rubber seal that fits around the pipe.

A nominal 50-mm uPVC pipe was fitted through the collar's sleeve. The pipe projected vertically, approximately flush with the top of the concrete slab. On the exposed side of the slab, a uPVC elbow flange fitting was joined onto a straight section of pipe just below the collar that projected approximately 200-mm into the furnace chamber. The pipe was capped at the top with a standard 80-mm diameter chrome plated PVC floor grate. The floor grate housing was bonded to the pipe and grouted into position using sand and cement mix formed into a nominal 280-mm diameter x 20-mm thick hob. On the exposed side of the slab, the pipe was capped with a standard plastic cap fitting and supported near the cap by a metal pipe clamp.

**DIMENSIONS**

The specimen's overall dimension was 1150-mm x 1150-mm to suit the opening in the specimen frame.

**ORIENTATION**

The reinforced concrete slab was placed horizontally on top of the furnace chamber, and subjected to fire exposure from the underside as specified by clause 10.4.3.3. of AS1530.4-2005.



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DOCUMENTATION: Confidential information about the test specimen has been submitted and is retained at the Division of Manufacturing and Infrastructure Technology.

DEPARTURE FROM

TEST STANDARDS: There were no departures from the requirements of AS 1530.4-2005 and AS 4072.1-1992.

TEST RESULTS: CRITICAL OBSERVATIONS

The following observations were made during the fire-resistance test:

- 1 minute - Smoke is fluing from penetration B.
- 2 minutes - Smoke is fluing from penetrations A, C & D.
- 3 minutes - Smoke has ceased fluing from penetration B.
- 4 minutes - Cotton pad test applied over penetration C – no ignition.
- 5 minutes - Insulation Failure of Penetrations C & D – Maximum temperature rise limit of 180 K is exceeded on top of the grates.
- 6 minutes - Smoke has ceased fluing from penetrations A & B. Cotton pad test applied over penetration D – no ignition.
- 7 minutes - Centre of the grate of penetration D is starting to deform.
- 10 minutes - Cotton pad test applied over penetration C – no ignition.
- 11 minutes - Smoke continues to be emitted from penetrations C & D (photograph 3).
- 15 minutes - Cotton pad test applied over penetration C – no ignition.
- 23 minutes - Small amount of smoke is being emitted from penetrations C & D only.
- 60 minutes - No apparent change to the specimens.
- 120 minutes - No apparent change to the specimens.
- 180 minutes - No apparent change to the specimens.
- 235 minutes - Smoke quantity emitted from penetration D has increased slightly.
- 241 minutes - Test terminated.



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**PERFORMANCE**

Performance observed in respect of the following heating conditions and general AS 1530.4-2005 criteria:

Penetration A – Hilti CP 680 75/2.5" N – RAD Cast-in Firestop Collar  
(50-mm uPVC pipe with a uPVC elbow flange fitting inside the collar and a PVC floor grate)

Structural adequacy - not applicable

Integrity - no failure at 241 minutes

Insulation - no failure at 241 minutes

Penetration B – Hilti CP 680 75/2.5" N – RAD Cast-in Firestop Collar  
(50-mm uPVC pipe with a uPVC elbow flange fitting below the collar and a PVC floor grate)

Structural adequacy - not applicable

Integrity - no failure at 241 minutes

Insulation - no failure at 241 minutes

Penetration C – Hilti CP 680 75/2.5" N Cast-in Firestop Collar  
(50-mm uPVC pipe with a uPVC elbow flange fitting inside the collar and a PVC floor grate)

Structural adequacy - not applicable

Integrity - no failure at 241 minutes

Insulation - 5 minutes

Penetration D – Hilti CP 680 75/2.5" N Cast-in Firestop Collar  
(50-mm uPVC pipe with a uPVC elbow flange fitting below the collar and a PVC floor grate)

Structural adequacy - not applicable

Integrity - no failure at 241 minutes

Insulation - 5 minutes

This report details methods of construction, the test conditions and the results obtained when specific element of construction described herein was tested following the procedure outlined in this standard. Any significant variation with respect to size, constructional details, loads, stresses, edge or end conditions, other than those allowed under the field of direct application in the relevant test method, is not covered by this report.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.



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**FIRE-RESISTANCE  
LEVEL:**

For the purpose of building regulations in Australia, the fire-resistance levels (FRL) of the test specimens are as follows:

Penetration A	-/240/240
Penetration B	-/240/240
Penetration C	-/240/0
Penetration D	-/240/0

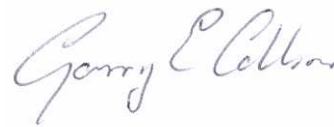
The fire-resistance level is applicable for exposure to fire from the same side as tested.

**APPENDICES:**      **APPENDIX 1**

Drawing titled "top view", dated 2 August 2006, by Hilti Pty Ltd ..... Page 8  
Drawing titled "Specimen A", dated 2 August 2006, by Hilti Pty Ltd ..... Page 9  
Drawing titled "Specimen B", dated 2 August 2006, by Hilti Pty Ltd ..... Page 10  
Drawing titled "Specimen C", dated 2 August 2006, by Hilti Pty Ltd ..... Page 11  
Drawing titled "Specimen D", dated 2 August 2006, by Hilti Pty Ltd ..... Page 12

**TESTED BY:**

Chris Wojcik  
Testing Officer



Garry Collins  
Manager, Fire Testing and Assessment

30 NOVEMBER 2006



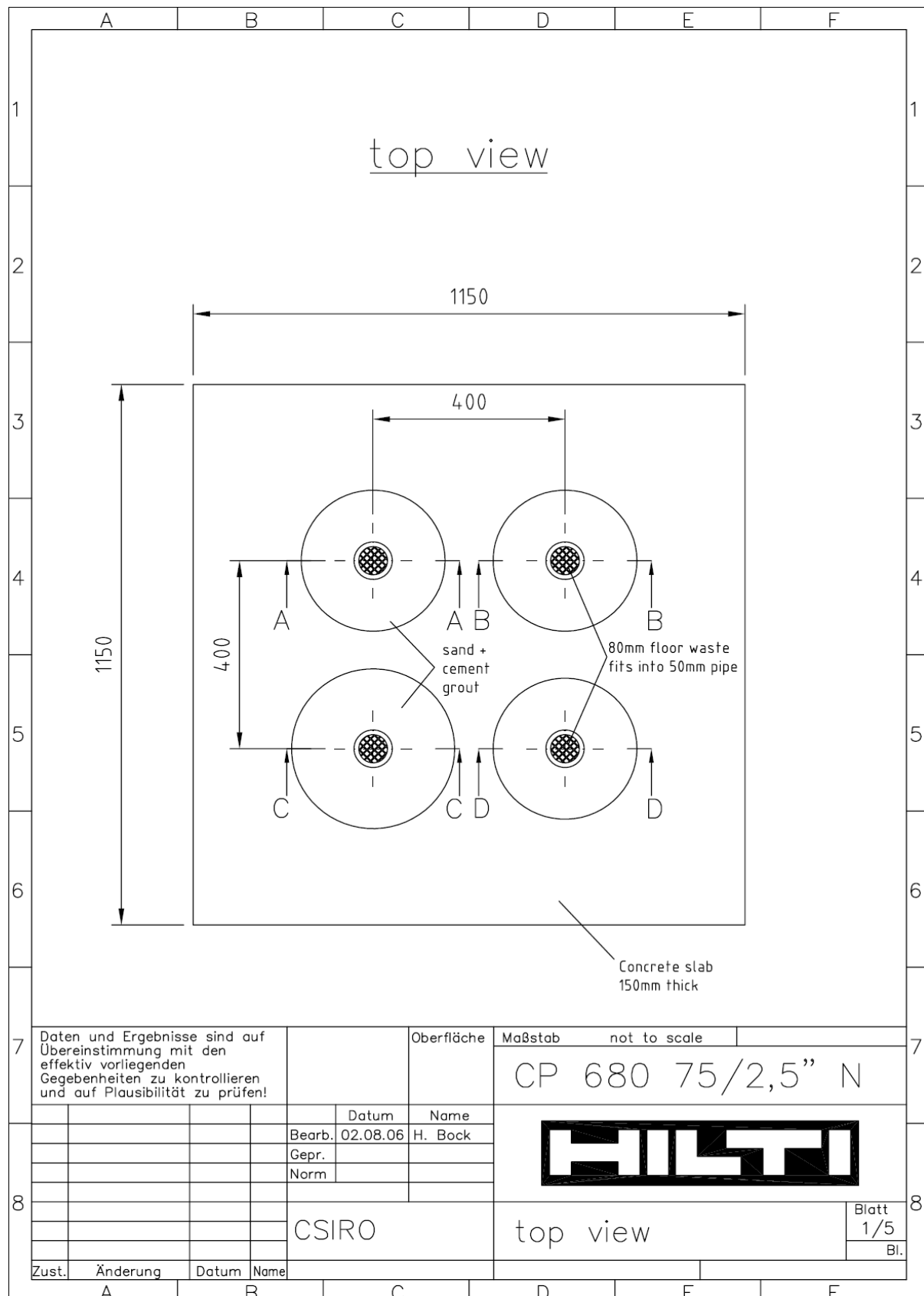
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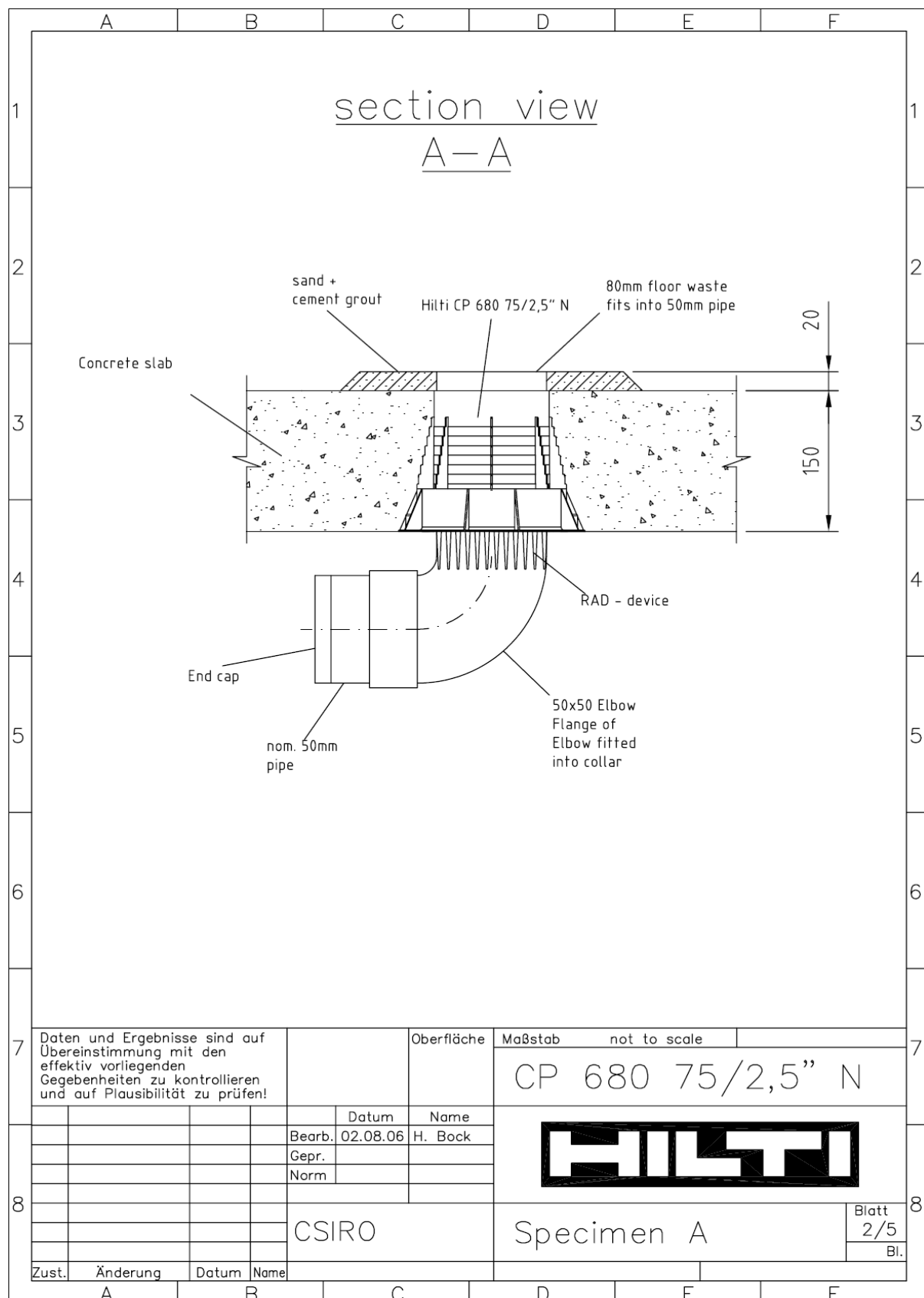


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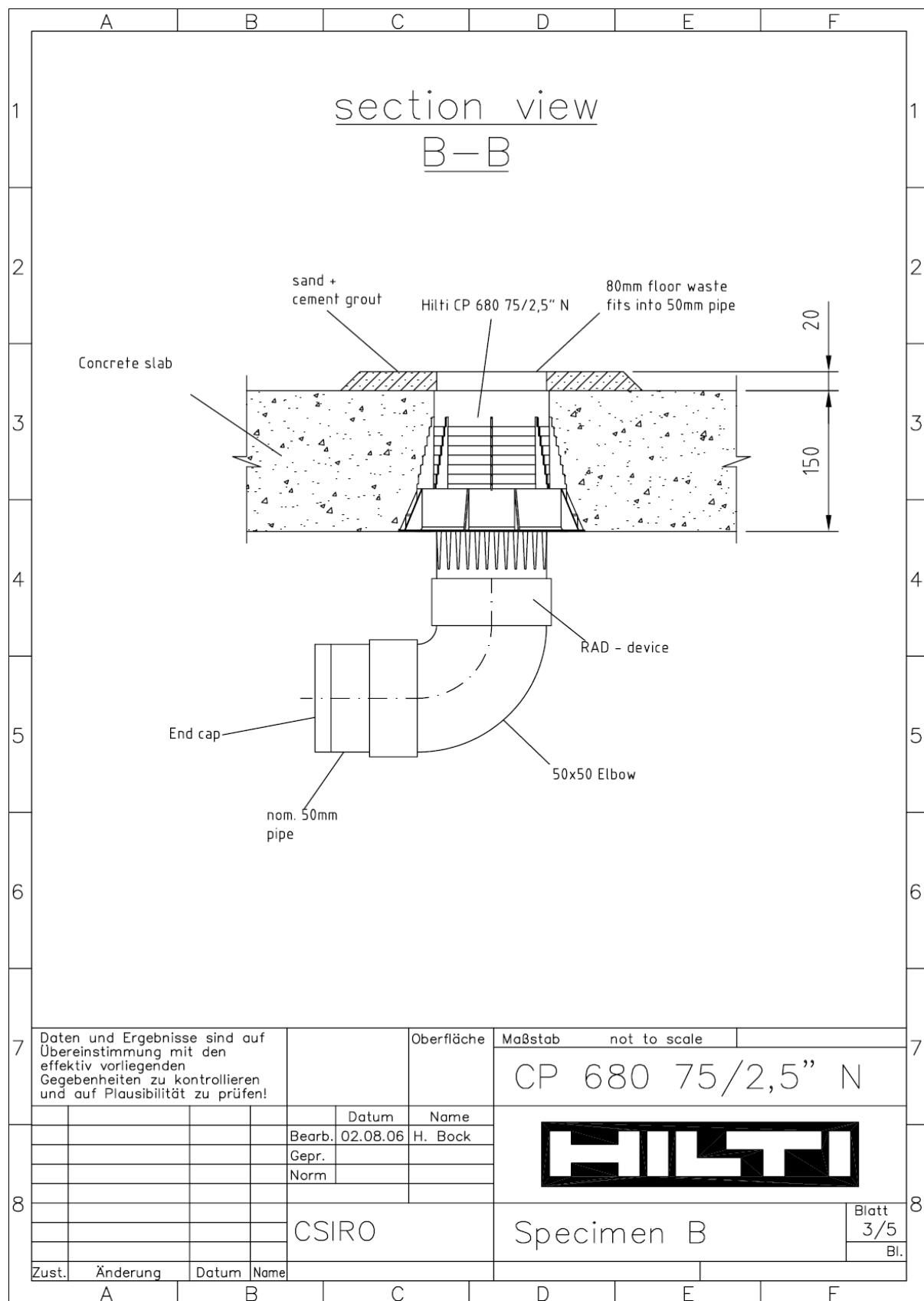


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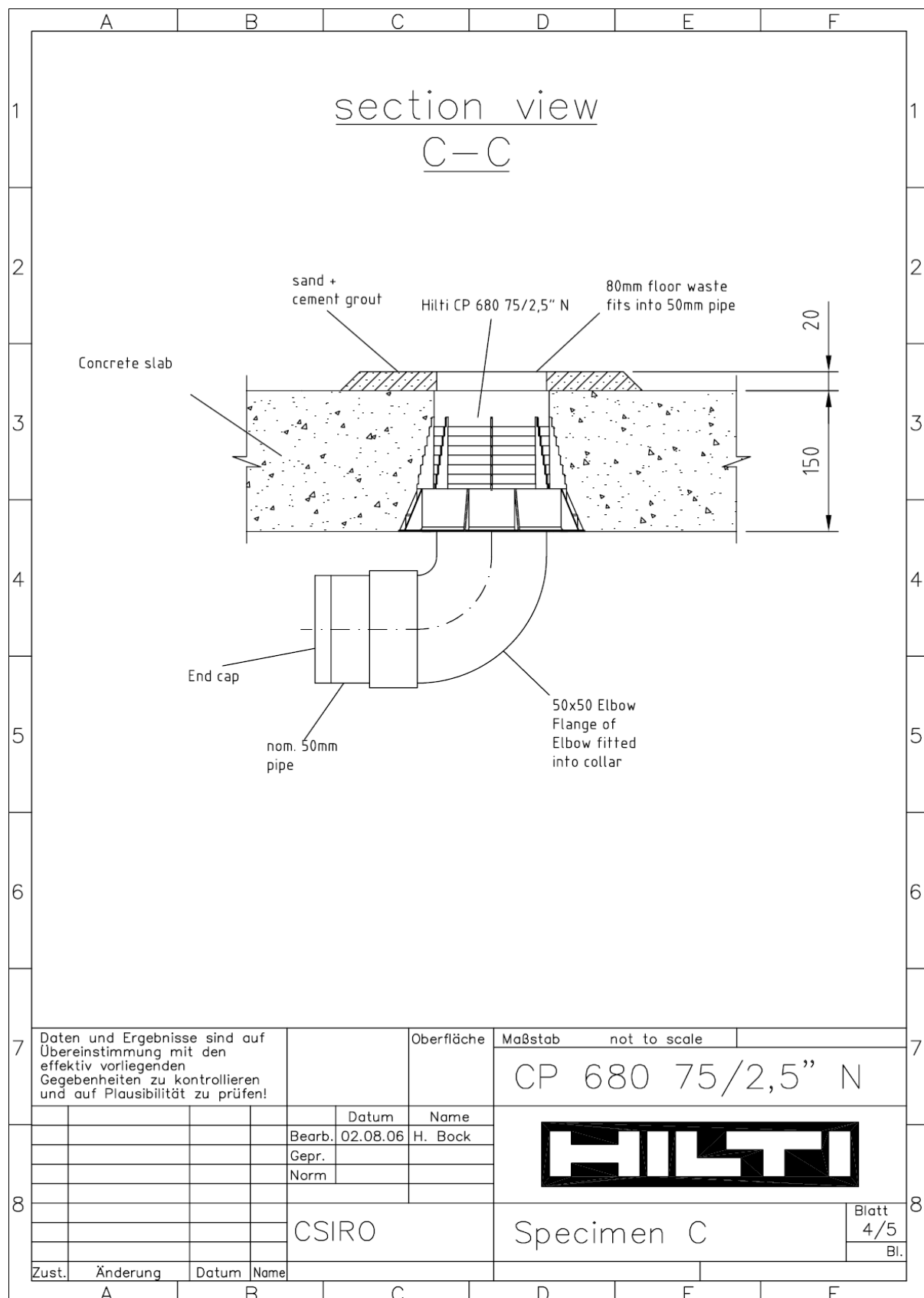


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